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SITE SCREENING PROCESS INVESTIGATION WORK PLAN FOR SITE 19, SITE 26, SITE 27, WETLEND AREA ADJACENT TO SITE 45, AND STUMP NECK SWMUS 14 AND 20

NSWC INDIAN HEAD MD

4/1/2005

CH2MHILL

Final

Site Screening Process Investigation Work Plan for Sites 19, 26, 27, Wetland Area Adjacent to Site 45, and Stump Neck SWMUs 14 and 30

Naval District Washington, Indian Head
Indian Head, Maryland

Prepared for

Department of the Navy

Naval Facilities Engineering Command Washington

Contract No N62470-02-D-3052
CTO-0050

April 2005

Prepared by

CH2MHILL

Final

Site Screening Process Investigation Work Plan for Sites 19, 26, 27, Wetland Area Adjacent to Site 45, and Stump Neck SWMUs 14 and 30

Naval District Washington, Indian Head
Indian Head, Maryland

Contract Task Order 0050

April 2005

Prepared for

Department of the Navy
Naval Facilities Engineering Command
Washington

Under the

LANTDIV Clean III Program
Contract N62470-02-D-3052

Prepared by

CH2MHILL

Herndon, Virginia

Executive Summary

This Site Screening Investigation Work Plan for the Naval District Washington, Indian Head (NDWIH) in Indian Head, Maryland, was prepared in response to Contract Task Order (CTO)-050, under the Comprehensive Long-term Environmental Action, Navy (CLEAN III), Contract Number N62470-02-D-3052.[1] The purpose of this Work Plan is to present site-specific information and planned investigations for six sites at NDWIH.

In this Work Plan, Site Screening Process (SSP) Investigations are proposed for six Site Screening Areas (SSAs):

- Site 19—Catch Basins at Chip Collection Houses
- Site 26—Thermal Destructor 2
- Site 27—Thermal Destructor 1
- Wetland Area Adjacent to Site 45
- Stump Neck Solid Waste Management Unit (SWMU) 14—Photographic Lab Septic Tank System
- Stump Neck SWMU 30—Building 2015 Dry Well

The objective of these investigations is to make one of the following management decisions for each SSA: (1) perform further investigations at the SSA and possibly advance the site in the CERCLA process or (2) recommend no further action (NFA) and remove the SSA from further study.

Three other SSAs, also managed under CTO-050, will be processed through a desktop evaluation (DE) and are not included in this Work Plan. These sites are

- Site 8—Mercury Contamination at Building 766
- Site 40—Palladium Catalyst in Sediment
- Site 56—Lead Contamination at Industrial Wastewater Outfall 87

Various environmental media will be sampled at the six SSA sites addressed in this work plan. The overall field investigation includes the installation of six monitoring wells and the collection of groundwater samples from each. In addition, soil samples will be collected from 27 locations and surface water samples will be collected from 2 locations.

The sites and tasks covered by this Work Plan are summarized in Table ES-1. The table summarizes the work planned for each site, including the number of samples to be collected for each medium.

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[1] On 1 October 2003, the installation management functions at Indian Head transferred from Indian Head Division, Naval Surface Warfare Center (IHDIV-NSWC) to Naval District Washington (NDW). References to this installation will now be to Naval District Washington, Indian Head (NDWIH).

An SSP Investigation Report will be generated following the completion of the SSP Investigation. The report will present the results and recommendations of the investigations. The SSP Investigation Report will also include a signature page for those sites where no further action is recommended.

TABLE ES-1
Summary of Proposed Activities
SSP Investigation Work Plan, CTO-050, NDWIH, Indian Head, Maryland

Site	Monitoring Wells Installed	Groundwater Samples	Surface Water	Soil Samples	Laboratory Analyses
Site 19—Catch Basins at Chip Collection Houses	NA	NA	NA	9 *	TAL metals, explosives (including nitroglycerin and nitroguanidine), TOC, and pH
Site 26—Thermal Destructor 2	NA	NA	NA	4	UDMH, Hydrazine, TAL metals, TCL SVOCs, TCL VOCs, explosives (including nitroglycerin and nitroguanidine), TOC, and pH
Site 27—Thermal Destructor 1	NA	NA	NA	4	UDMH, Hydrazine, TAL metals, TCL SVOCs, TCL VOCs, explosives (including nitroglycerin and nitroguanidine), TOC, and pH
Wetland Area Adjacent to Site 45	NA	NA	2	NA	TAL metals (filtered and unfiltered), DOC, TOC, pH, and hardness
Stump Neck SWMU 14—Photographic Lab Septic Tank System	2	2	NA	10	Soil: TCL VOCs, TCL SVOCs, TAL metals, TOC, and pH. Groundwater: TCL VOCs, TCL SVOCs, TAL metals (filtered and unfiltered), hardness, TOC, and pH.
Stump Neck SWMU 30—Building 2015 Dry Well	4	4	NA	4	Soil: TCL VOCs, TCL SVOCs, TAL metals, TOC, and pH. Groundwater: TCL VOCs, TCL SVOCs, TAL metals (filtered and unfiltered), hardness, TOC, and pH.

Notes:

Number of samples does not include QA/QC samples.
* = Depending on site conditions, some samples may be sediment samples.
DOC = dissolved organic carbon
NA = Does not apply to the Site Screening Area
TAL = Target Analyte List
TCL = Target Compound List
TOC = Total Organic Carbon
SVOC = Semivolatile Organic Compound
SWMU = Solid Waste Management Unit
VOC = Volatile Organic Compound

Contents

Appendixes

Tables (Tables are located at the end of each section.)

Figures (Figures are located at the end of each section.)

Abbreviations and Acronyms

AOC	Areas of Concern
ASTM	American Society for Testing and Materials
BERA	Baseline Ecological Risk Assessment
bgs	below ground surface
CERCLA	Comprehensive Environmental Response, Compensation, and Liabilities Act
CLEAN	Comprehensive Long-Term Environmental Action, Navy
CLP	Contract Laboratory Program
COMAR	Code of Maryland Regulations
CRDL	Contract required detection limits
CRQL	Contract required quantitation limits
CTO	Contract Task Order
DE	desktop evaluation
DO	dissolved oxygen
DOC	Dissolved Organic Carbon
DQO	Data Quality Objectives
EFACHES	Engineering Field Activity Chesapeake
ERA	Ecological Risk Assessment
FFA	Federal Facility Agreement
FS	Feasibility Study
FSP	Field Sampling Plan
GIS	Geographic Information System
GPS	Global Positioning System
HDPE	High-Density Polyethylene
HHRA	Human Health Risk Assessment
HSA	Hollow-Stem Auger
HSP	Health and Safety Plan
IAS	Initial Assessment Study
IDW	Investigation Derived Waste
IHDIV	Indian Head Division
IHIRT	Indian Head Installation Restoration Team
MDE	Maryland Department of the Environment
mL	milliliter
MS/MSD	matrix spike/matrix spike duplicate
msl	mean sea level
NAD 83	North American Datum, 1983
NDW	Naval District Washington

NDWIH	Naval District Washington, Indian Head
NFA	No Further Action
NGVD 29	National Geodetic Vertical Datum, 1929
NOS	Naval Ordnance Station
NPDES	National Pollutant Discharge Elimination System
NPL	National Priorities List
NSWC	Naval Surface Warfare Center
ORNL	Oak Ridge National Laboratory
ORP	oxidation-reduction potential
PA	Preliminary Assessment
PCE	tetrachloroethene
PID	Photoionization Detector
ppb	parts per billion
PQL	practical quantitation limits
PVC	polyvinyl chloride
QA	Quality Assurance
QAPP	Quality Assurance Project Plan
QC	Quality Control
RBC	Risk Based Concentrations
RCRA	Resource Conservation and Recovery Act
RFA	RCRA Facility Assessment
RI	Remedial Investigation
RPM	Remedial Project Manager
SI	Site Inspection
SJP	Standard Job Procedure
SOP	Standard Operating Procedures
SSA	Site Screening Areas
SSP	Site Screening Process
SVOC	Semivolatile Organic Compounds
SWMU	Solid Waste Management Unit
TAL	Target Analyte List
TCL	Target Compound List
TOC	Total Organic Carbon
UDMH	unsymmetrical dimethylhydrazine
USEPA	United States Environmental Protection Agency
UXO	unexploded ordnance
VOC	volatile organic compounds
VSI	Visual Site Inspection

SECTION 1

Introduction

This Work Plan presents the objectives, scope, and procedures for Site Screening Process (SSP) Investigations at six sites located at the Naval District Washington, Indian Head (NDWIH) facility in Indian Head, Maryland. This document was prepared under Comprehensive Long-term Environmental Action, Navy (CLEAN) Contract Number N62470-02-D-3052, Contract Task Order (CTO) 050.

The following Site Screening Areas (SSAs) are covered under this Work Plan:

- Site 19 – Catch Basins at Chip Collection Houses
- Site 26 – Thermal Destructor 2
- Site 27 – Thermal Destructor 1
- Wetland Area Adjacent to Site 45
- Stump Neck Solid Waste Management Unit (SWMU) 14 – Photographic Lab Septic Tank System
- Stump Neck SWMU 30 – Building 2015 Dry Well

Three additional SSAs are covered under CTO-050 and are being addressed through Desktop Evaluations (DEs) instead of SSP Investigations. These sites are:

- Site 8 – Mercury Contamination at Building 766
- Site 40 – Palladium Catalyst in Sediment
- Site 56 – Lead Contamination at Industrial Wastewater Outfall 87

Information regarding these sites is provided in the following desktop evaluation (DE) documents:

- *Desktop Evaluation for Site 40 – Palladium Catalyst in Sediment, Naval District Washington Indian Head* (CH2M HILL, 2004a)
- *Desktop Evaluation for Site 8 – Mercury Contamination at Building 766 and Site 56 – Lead Contamination at Industrial Wastewater Outfall 87, Naval District Washington Indian Head* (CH2M HILL, 2004b)

Since SSP Investigations are not being conducted at these three SSAs, they are not discussed further in this Work Plan.

This Work Plan incorporates by reference the *Master Plans for Installation Restoration Program Environmental Investigations* (Tetra Tech NUS, Inc., 2004) (hereafter referred to as the Master Plans). The Master Plans consist of the following documents:

- *Master Work Plan for Installation Restoration Program Environmental Investigations (hereafter referred to as Master Work Plan)*
- *Master Field Sampling Plan for Installation Restoration Program Environmental Investigations (hereafter referred to as Master FSP)*

- *Master Quality Assurance Project Plan for Installation Restoration Program Environmental Investigations (hereafter referred to as Master QAPP)*
- *Health and Safety Plan Guidance Document for Installation Restoration Program Environmental Investigations (hereafter referred to as Master HSP)*
- *Facility Standard Operating Procedures for Installation Restoration Program Environmental Investigations (hereafter referred to as Facility SOPs)*

Unless stated otherwise in this document, the SSP Investigation procedures will be performed in accordance with these Master Plans.

CH2M HILL has prepared a HSP specific to this SSP Investigation at Indian Head that will be followed during the field activities. The HSP is included as Appendix A.

1.1 Overview of Site-Screening Process

SSAs are locations that may, but are not yet known to, pose a threat or potential threat to public health, public welfare, or the environment. SSAs may be Resource Conservation and Recovery Act (RCRA) SWMUs, RCRA Areas of Concern (AOCs), or Comprehensive Environmental Response, Compensation, and Liabilities Act of 1980 (CERCLA) AOCs.

Per the Federal Facility Agreement (FFA) (USEPA, 2000a) for NDWIH, the SSP is initiated at SSAs "to determine if there have been releases of hazardous substances, pollutants, contaminants, hazardous wastes, or hazardous constituents to the environment from the SSA." At some SSAs, this determination can be made by completing a DE using available site information and previous investigation results. At other sites, field investigations are required to determine if releases have occurred.

An SSP Investigation consists of three general steps:

1. Submittal of a SSP Work Plan to the Indian Head Installation Restoration Team (IHIRT). The IHIRT consists of representatives from the United States Environmental Protection Agency (USEPA), the Maryland Department of the Environment (MDE), and the Department of the Navy (Navy). The SSP Work Plan outlines the activities necessary to determine if a release of contaminants to the environment has occurred at a particular SSA.
2. Following IHIRT approval of the SSP Work Plan, a SSP Investigation is executed in accordance with the SSP Work Plan.
3. SSP Investigation methods, findings, and recommendations are summarized in a SSP Investigation Report, which is submitted to the IHIRT for review.

The SSP Investigation Report provides the basis for making one of the following management decisions for each SSA, following the CERCLA process:

1. Perform a Remedial Investigation (RI), Feasibility Study (FS), and/or other investigation or remedial action as warranted at the SSA; or

2. Remove the SSA from further study because the site does not appear to pose a threat or potential threat to public health, public welfare, or the environment and no further action (NFA) is warranted.

The SSP Investigation Report will include a signature page at the front of the document, which will list the sites that require NFA. The signature page will contain the following caveat: "In the event that contamination posing an unacceptable risk to human health or the environment is discovered after execution of the SSP for any of the sites, the IHIRT agrees to reevaluate the Site(s) as deemed necessary."

1.2 Project Objectives

The objective of these investigations is to move six SSAs through the SSP and gain endorsement from the IHIRT on the appropriate management decision for each site.

To achieve this objective, chemical data for various environmental media will be collected and evaluated for each site. Analytical results for all media evaluated will be compared against a variety of regulatory and risk-based standards and criteria and applicable background values to assess if parameters analyzed exceed any regulatory screening criteria and/or background values. The information will be presented in the SSP Investigation Report for use by the IHIRT to make a management decision for the path forward for each site. As described in Section 1 of this Work Plan, the two possible management decision outcomes are as follows: (1) perform further investigations (e.g., RI and/or FS) or remedial actions at the site; or (2) remove the site from further study.

1.3 Base Setting

NDWIH is a military facility located in northwestern Charles County, Maryland, approximately 25 miles southwest of Washington, District of Columbia. The facility consists of two tracts of land: the main area on the Cornwallis Neck Peninsula and the Stump Neck Annex located across the Mattawoman Creek (Figure 1-1).

The main area contains approximately 2,500 acres and is bounded by the Potomac River to the northwest, west, and south, the Mattawoman Creek to the south and east, and the town of Indian Head to the northeast (Figure 1-2). Included as part of the main area are Marsh Island and Thoroughfare Island, which are located in the Mattawoman Creek. Elevations range from sea level to approximately 125 feet (ft) above mean sea level (msl).

The Stump Neck Annex contains approximately 1,084 acres and is bounded by the Mattawoman Creek to the northeast, the Potomac River to the northwest, and the Chicamuxen Creek to the south-southwest (Figure 1-3). Elevations range from sea level to approximately 10 ft above msl.

Both the main area (Cornwallis Neck Peninsula) and the Stump Neck Annex are on the National Priorities List (NPL). The main area and Stump Neck Annex are separated by the Mattawoman Creek (noncontiguous), have separate USEPA identification numbers, and perform dissimilar operations.

Additional information on the NDWIH base setting is provided in Sections 1 and 2 of the Master Work Plan (Tetra Tech NUS, Inc., 2004).

1.4 Site Screening Areas

The following subsections provide brief descriptions for each of the SSAs covered under this Work Plan. Locations of Site 19, Site 26, Site 27, and Wetland Area Adjacent to Site 45 are shown in Figure 1-2 (main area). Locations of Stump Neck SWMU 14 and Stump Neck SWMU 30 are shown on Figure 1-3 (Stump Neck Annex).

1.4.1 Site 19—Catch Basins at Chip Collection Houses

Site 19 is located west of Silo Road and consists of the drainage areas leading from the two Chip Collection Houses, Buildings 785 and 1051, the primary source areas (Figure 1-4). Historically, wastewater containing explosive chips and metallic salts drained from the two buildings into catch basins.

1.4.2 Site 26—Thermal Destructor 2

Site 26 is located adjacent to Jenkins Road on the east side of the Indian Head main area, approximately 500 ft north of Mattawoman Creek (Figure 1-5). The site consists of the area surrounding the location of the former thermal destructor unit (designated Building 1595) and its drainage area. Building 1595 was the prior location of a propane-fired thermal destructor or incinerator, used to burn hydrazine-containing fuel and unsymmetrical dimethylhydrazine (UDMH)-contaminated wastewater between 1976 and 1978.

1.4.3 Site 27—Thermal Destructor 1

Site 27 is located north of Hershey Road, on the east side of the Indian Head main area, approximately 400 ft north of Mattawoman Creek. The former thermal destructor 1 was located on a concrete pad (designated Building 1584), adjacent to Building 406 (Figure 1-6). The incinerator, which operated from 1976 to 1979, burned hydrazine-containing fuel and UDMH-contaminated wastewater.

1.4.4 Wetland Area Adjacent to Site 45

The Wetland Area Adjacent to Site 45 is located approximately 100 ft south of the main investigation area of Site 45 and approximately 100 ft east of Building 1990 (Figure 1-7). Site 45, a location where abandoned drums were previously investigated (HydroGeoLogic, 2004), is located in the northwest-central portion of NDWIH. The findings of the RI indicated that several inorganic compounds (copper, lead, zinc, aluminum, and silver) may pose an unacceptable risk to ecological receptors at the wetland area (HydroGeoLogic, 2004).

1.4.5 Stump Neck SWMU 14—Photographic Lab Septic Tank System

Stump Neck SWMU 14 is located on the north side of the Stump Neck Annex and is approximately 300 ft south of the Potomac River (Figure 1-8). The site consists of a photographic laboratory (Building 22SN), X-ray facility (Building 2009), their original septic tank, associated discharge lines, and drain fields.

1.4.6 Stump Neck SWMU 30—Building 2015 Dry Well

Stump Neck SWMU 30 is located north of Archer Avenue, on the east side of the Stump Neck Annex and is approximately 1,800 ft south of the Potomac River (Figure 1-9). Stump Neck SWMU 30 consists of a dry well that was connected to a laboratory, previously located in Building 2015. Historical discharges to the dry well included chemical waste, wash water, cooling water, and film development chemicals.

1.5 Project Organization

CH2M HILL will perform the screening phase of the project with support from the Navy. The Navy Remedial Project Manager (RPM) will be Mr. Jeff Morris.

Mr. Jeff Morris
Department of the Navy
Naval Facilities Engineering Command, Washington
Washington Navy Yard, Building 212
1314 Harwood Street, SE
Washington Navy Yard, DC 20374-5018
(202) 685-3279
(202) 433-6193 (Fax)
E-mail: jeffrey.w.morris@navy.mil

Mr. Shawn Jorgensen will be the primary contact at the NDWIH.

Mr. Shawn Jorgensen, Code HN2SJ
Naval District Washington, Indian Head
Building 289, 101 Strauss Avenue
Indian Head, MD 20640-5035
(301) 744-2263
(301) 744-4180 (Fax)
E-mail: JorgensenSA@ih.navy.mil

The CH2M HILL project manager will be Chris English. The CH2M HILL project team organization is shown on Figure 1-10.

Mr. Chris English
CH2M HILL
727 North First St., Suite 400
St. Louis, MO 63102-2542
(314) 421-0313 x221
(414) 454-8738 (Fax)
E-mail: Chris.English@ch2m.com

1.6 Work Plan Organization

The remainder of this Work Plan is divided into the following sections:

Section 2—Project Scope. Provides an overview of the SSP Investigation scope and the data quality objectives (DQOs).

Section 3—General Field Methodologies. Describes general field procedures that will be followed during the SSP Investigation.

Section 4—Sample Management. Provides details regarding quality assurance/quality control (QA/QC) sampling; sample volumes, container types, and preservation requirements; sample nomenclature; and sample packaging and shipping methods.

Sections 5 through 10—Site-specific SSP Investigation Procedures. Describes investigation rationale, DQOs, and sample collection scope specific to each of the SSAs covered under this SSP Investigation project.

Section 11—References. Lists all references cited in the Work Plan.

A project-specific HSP is provided as Appendix A to this Work Plan. The HSP identifies potential hazards and outlines the health and safety procedures that will be implemented on the project. A QAPP Addendum is provided as Appendix B. The QAPP Addendum provides information regarding laboratory analyses for the SSP Investigation that are not included in the Master QAPP.

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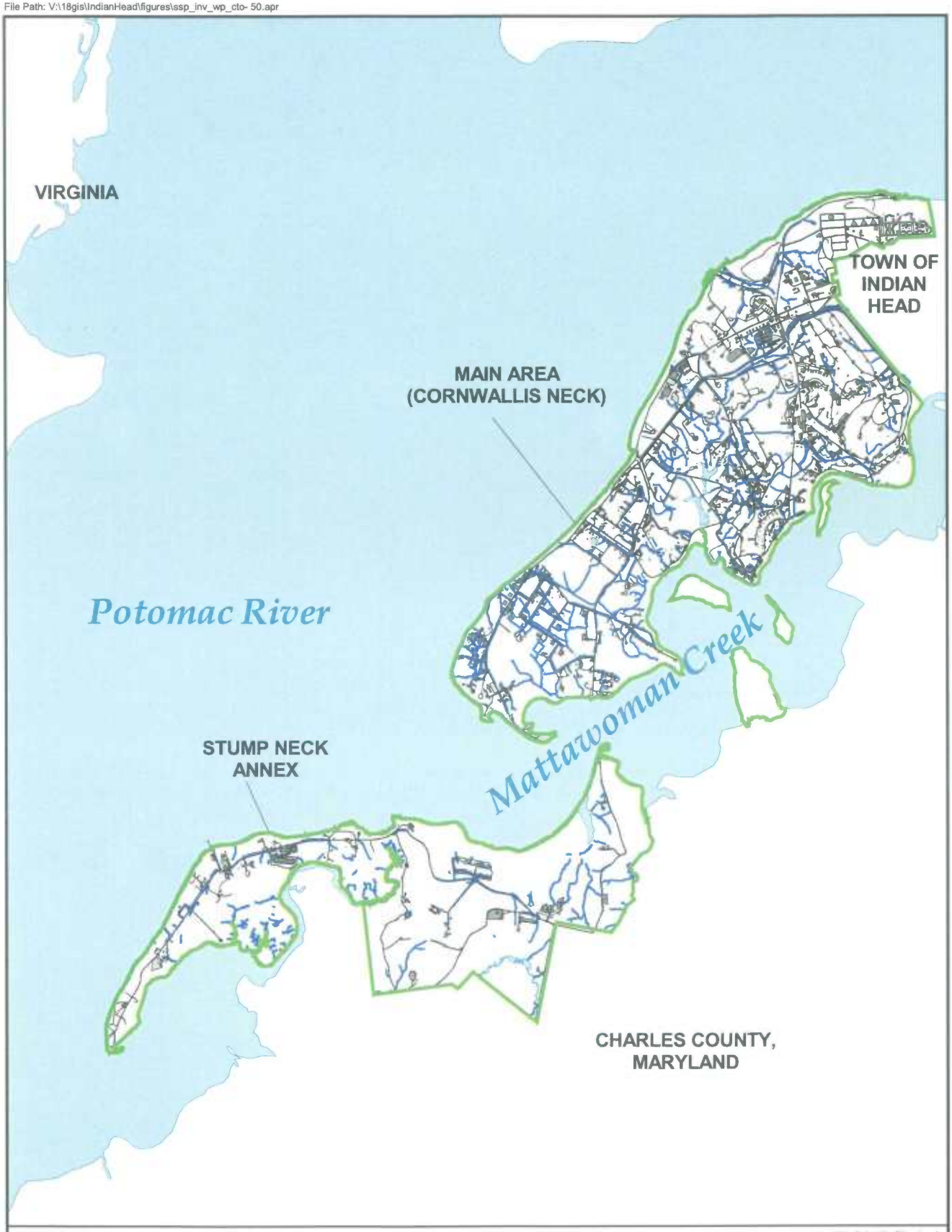

FIGURE 1-1
NDWIH BASE LOCATION MAP
SSP INVESTIGATION WORK PLAN, CTO-050
NDWIH, INDIAN HEAD, MARYLAND

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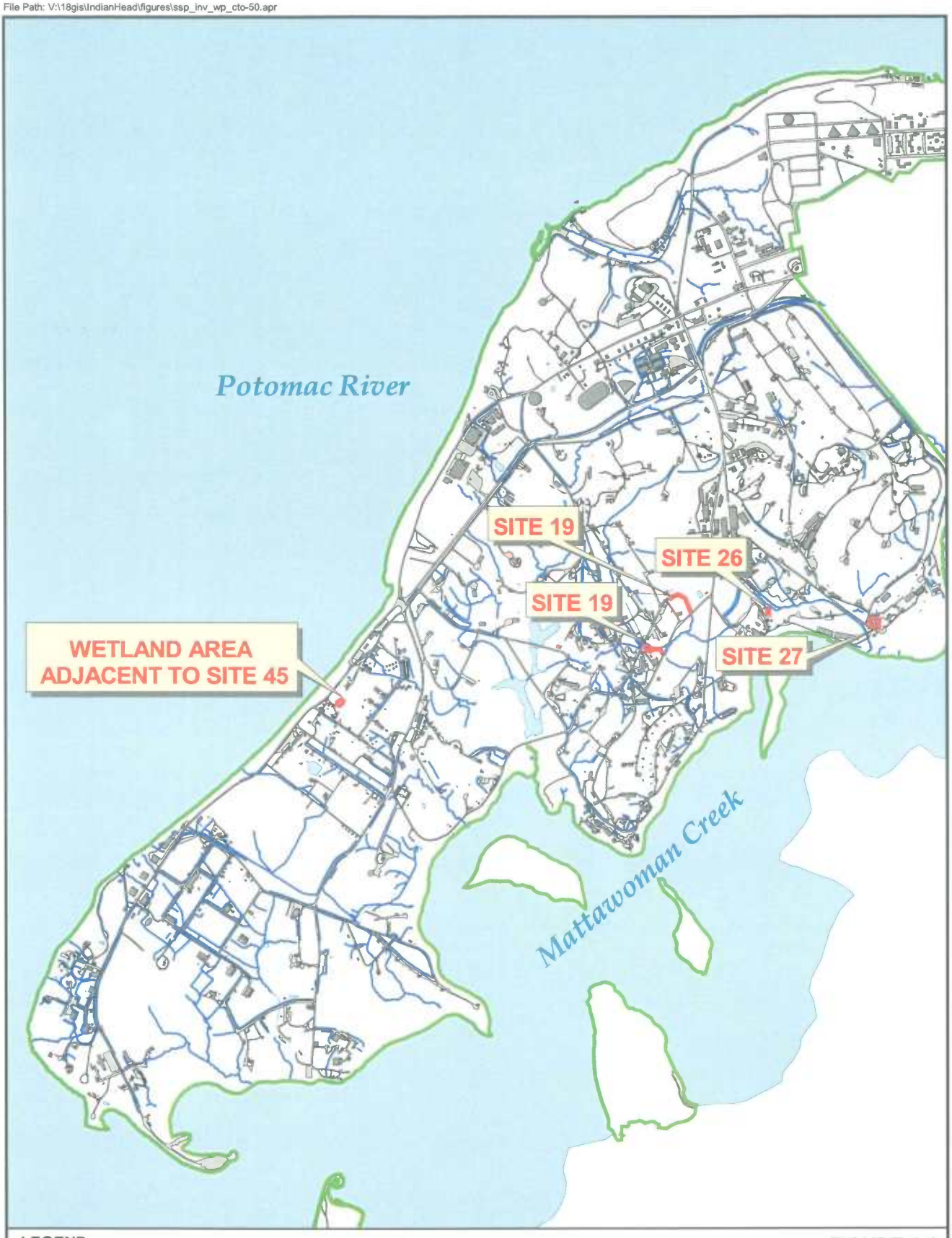

FIGURE 1-2
SITE LOCATION MAP - MAIN AREA
SSP INVESTIGATION WORK PLAN, CTO-050
NDWIH, INDIAN HEAD, MARYLAND

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FIGURE 1-3
SITE LOCATION MAP - STUMP NECK ANNEX
SSP INVESTIGATION WORK PLAN, CTO-050
NDWIH, INDIAN HEAD, MARYLAND

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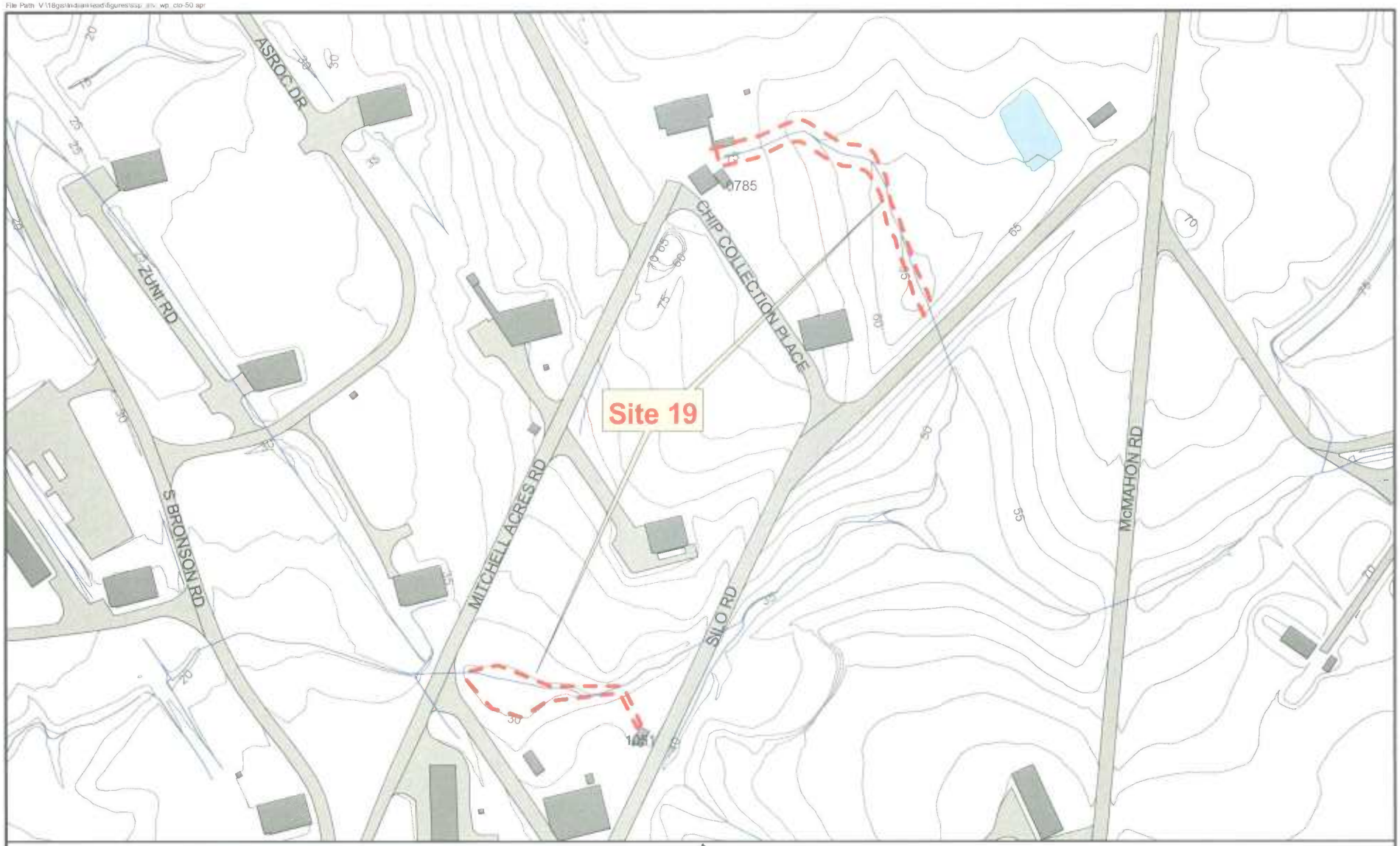

FIGURE 1-4
SITE 19, CATCH BASINS AT
CHIP COLLECTION HOUSES
SSP INVESTIGATION WORK PLAN, CTO-050
NDWIH, INDIAN HEAD, MARYLAND

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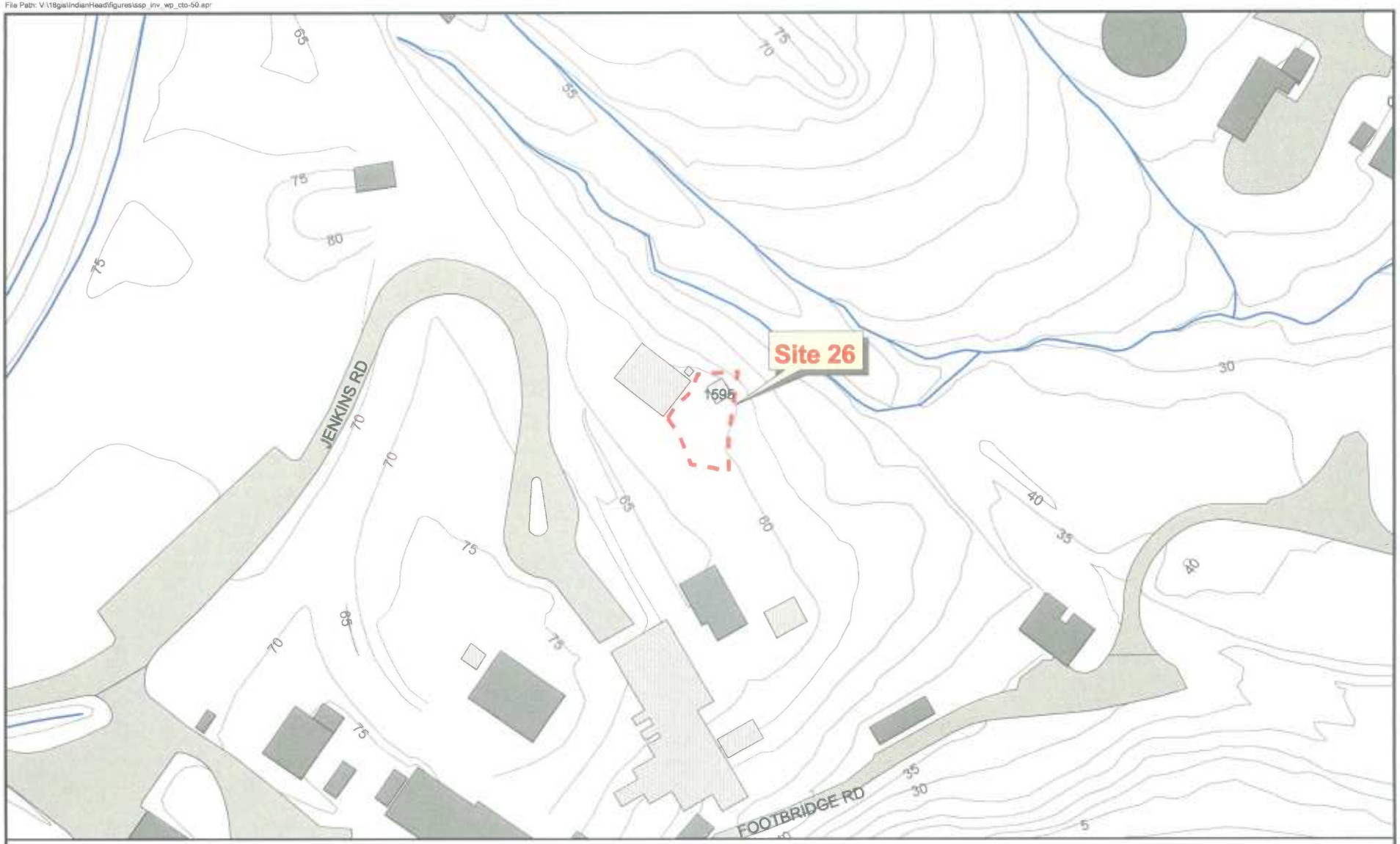

LEGEND

- Approximate Site Boundary
- Elevation Contours (5 foot Interval)
- Buildings
- Concrete Pad (Former Structure)
- Roads & Paved Areas
- Railroads
- Water Bodies

N

0 50 100 Feet

1 INCH = 100 FEET

FIGURE 1-5
SITE 26, THERMAL DESTRUCTOR 2
SSP INVESTIGATION WORK PLAN, CTO-050
NDWIH, INDIAN HEAD, MARYLAND

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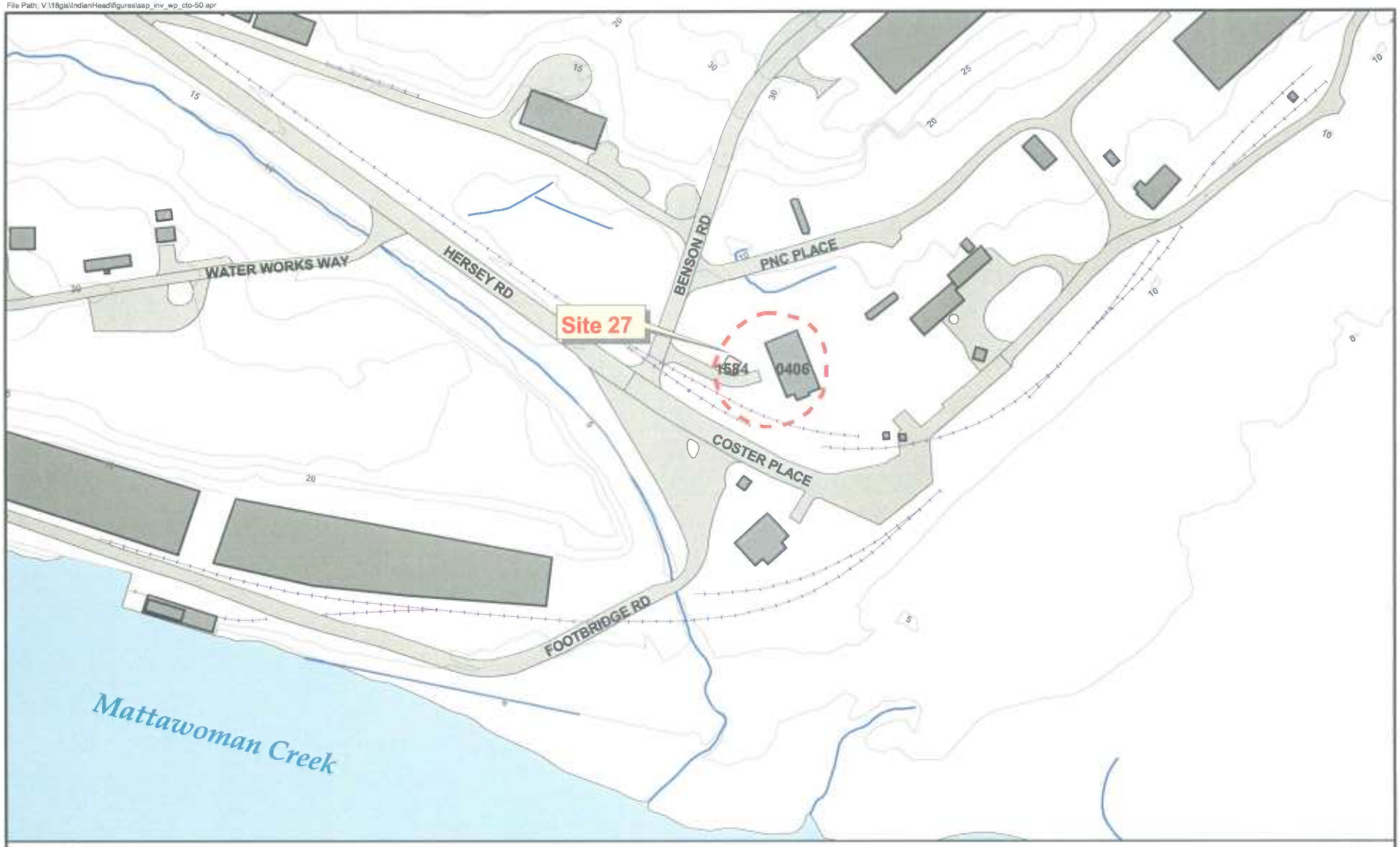

FIGURE 1-6
SITE 27, THERMAL DESTRUCTOR 1
SSP INVESTIGATION WORK PLAN, CTO-050
NDWIH, INDIAN HEAD, MARYLAND

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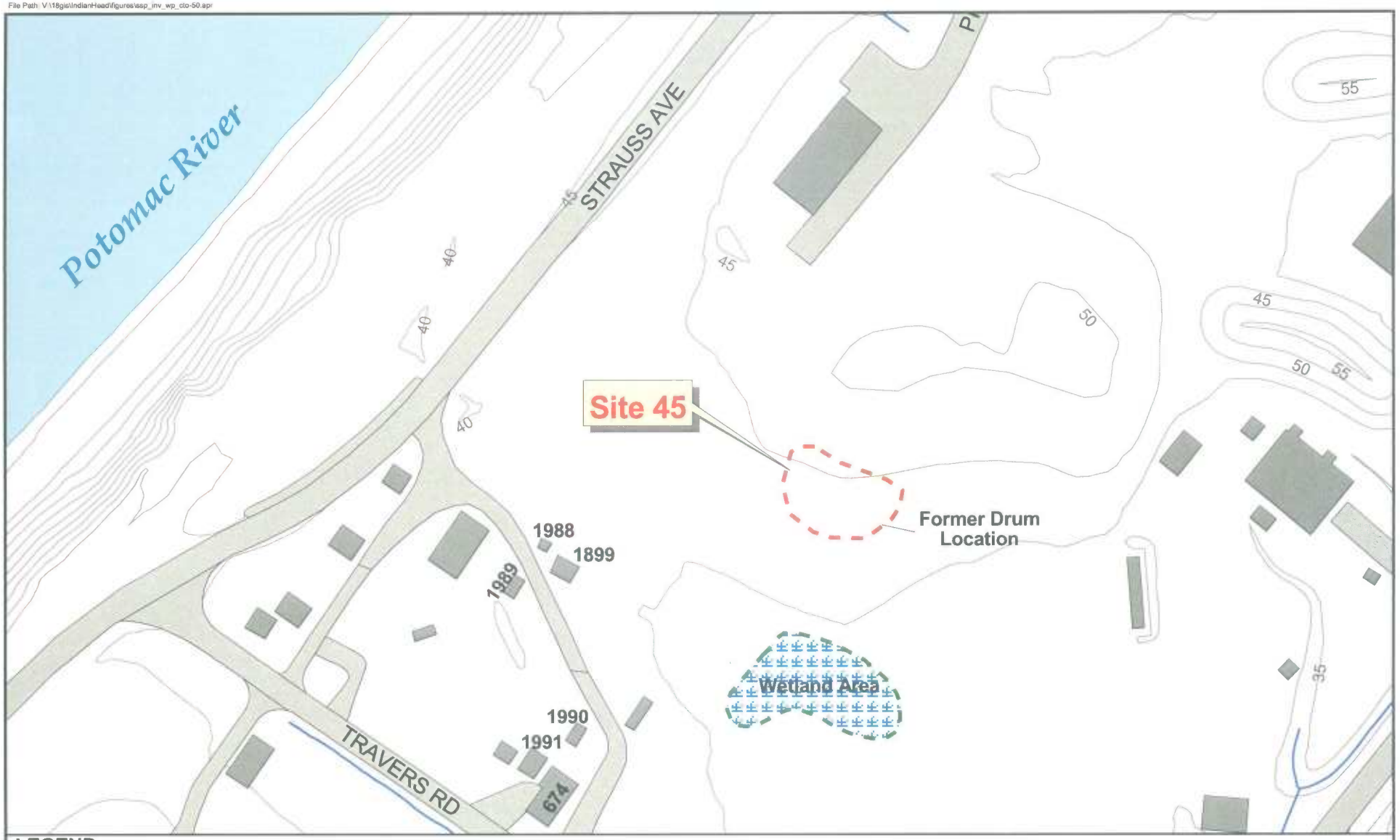

LEGEND

- Approximate Site Boundary
- Buildings
- Roads & Paved Areas
- Wetland Area
- Water Bodies
- Elevation Contour (5 Foot Interval)

N

0 50 100 Feet

1 INCH = 100 FEET

FIGURE 1-7
WETLAND AREA ADJACENT TO SITE 45
SSP INVESTIGATION WORK PLAN, CTO-050
NDWIH, INDIAN HEAD, MARYLAND

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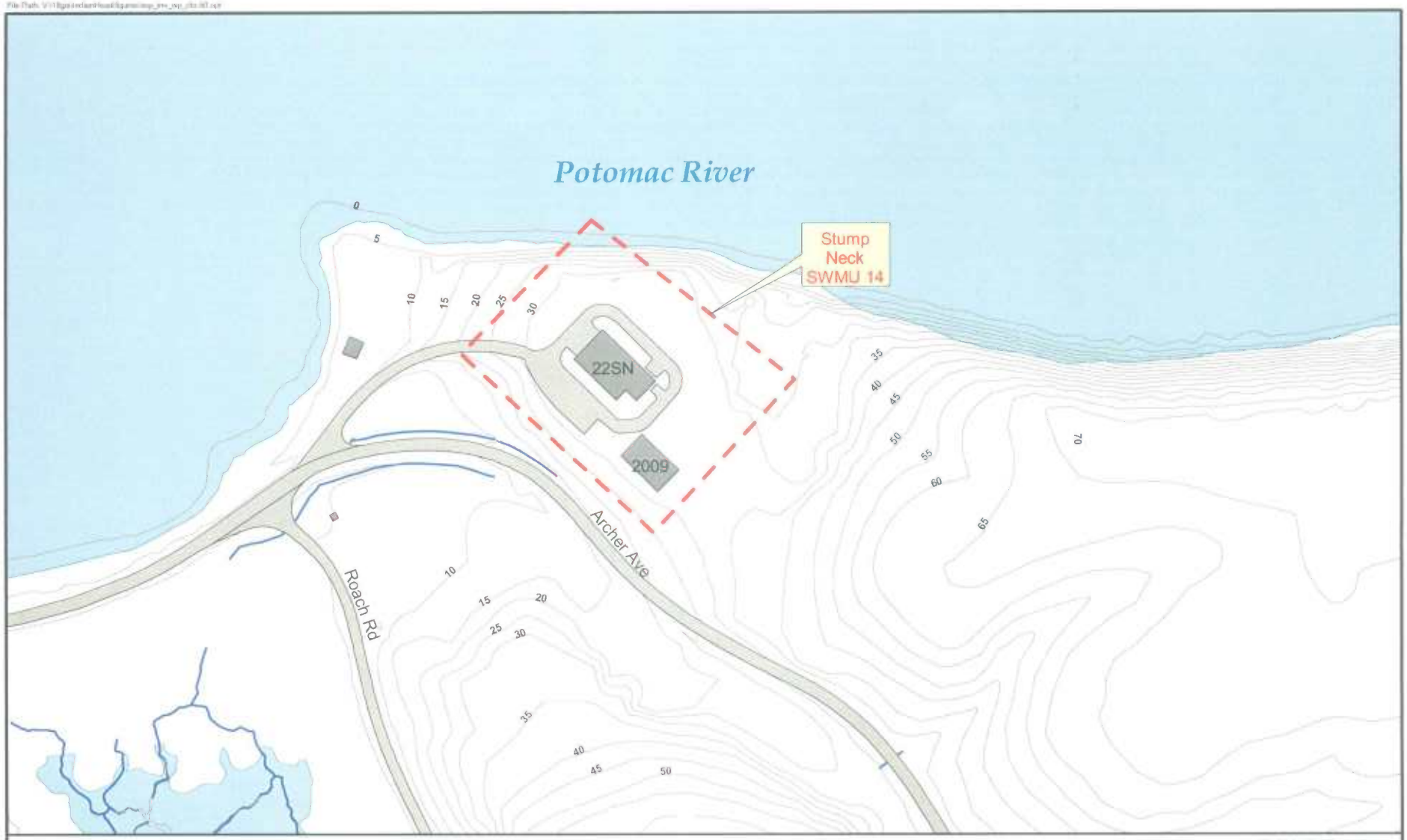

FIGURE 1-8
STUMP NECK SWMU 14, PHOTOGRAPHIC LAB SEPTIC SYSTEM
SSP INVESTIGATION WORK PLAN, CTO-050
NDWIH, INDIAN HEAD, MARYLAND

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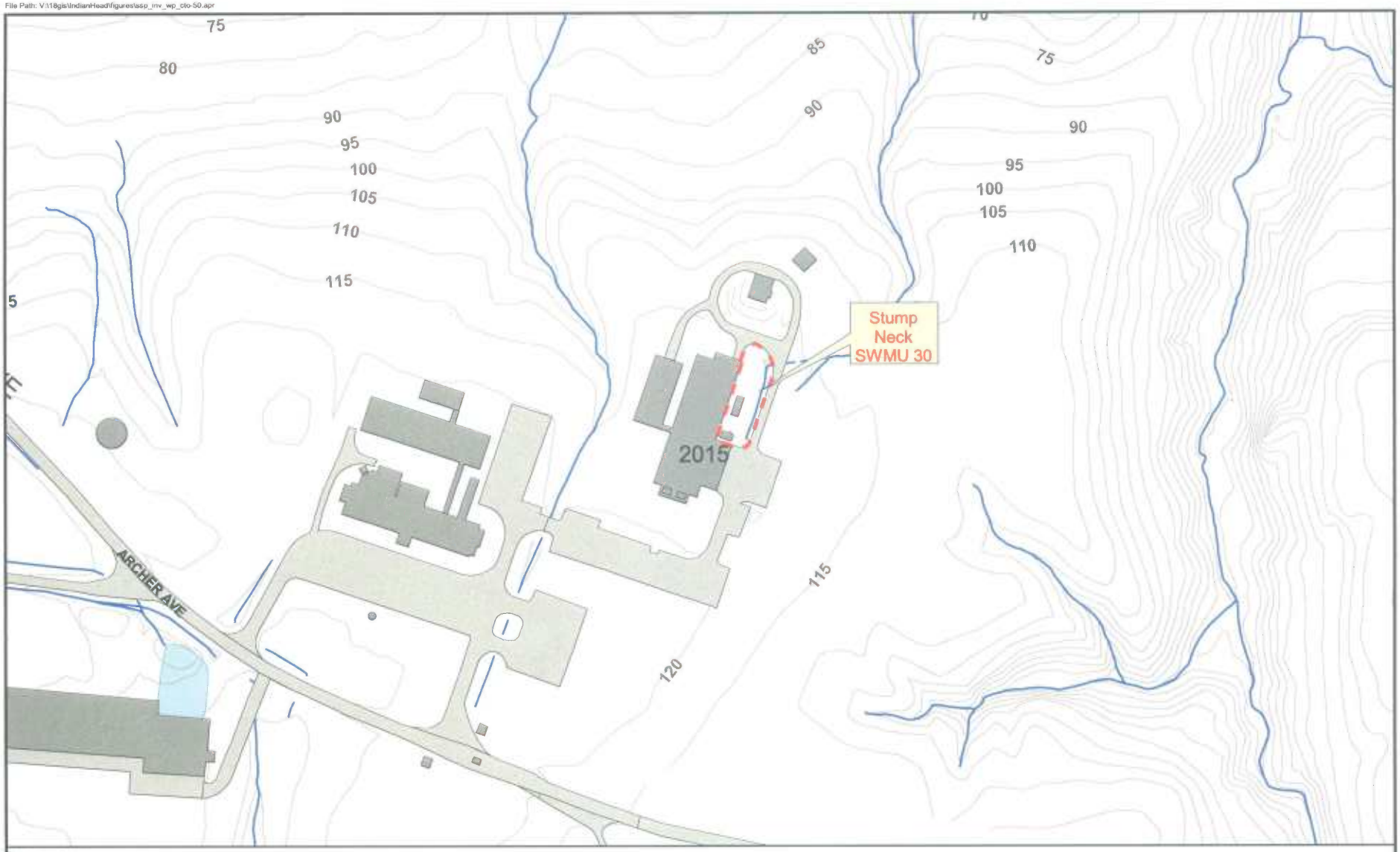

LEGEND

- Approximate SWMU Boundary
- Buildings
- Roads & Paved Areas
- Water Bodies
- Elevation Contour (5 Foot Interval)

N

0 100 200 Feet

1 INCH = 200 FEET

FIGURE 1-9
STUMP NECK SWMU 30, DRY WELL
SSP INVESTIGATION WORK PLAN, CTO-050
NDWIH, INDIAN HEAD, MARYLAND

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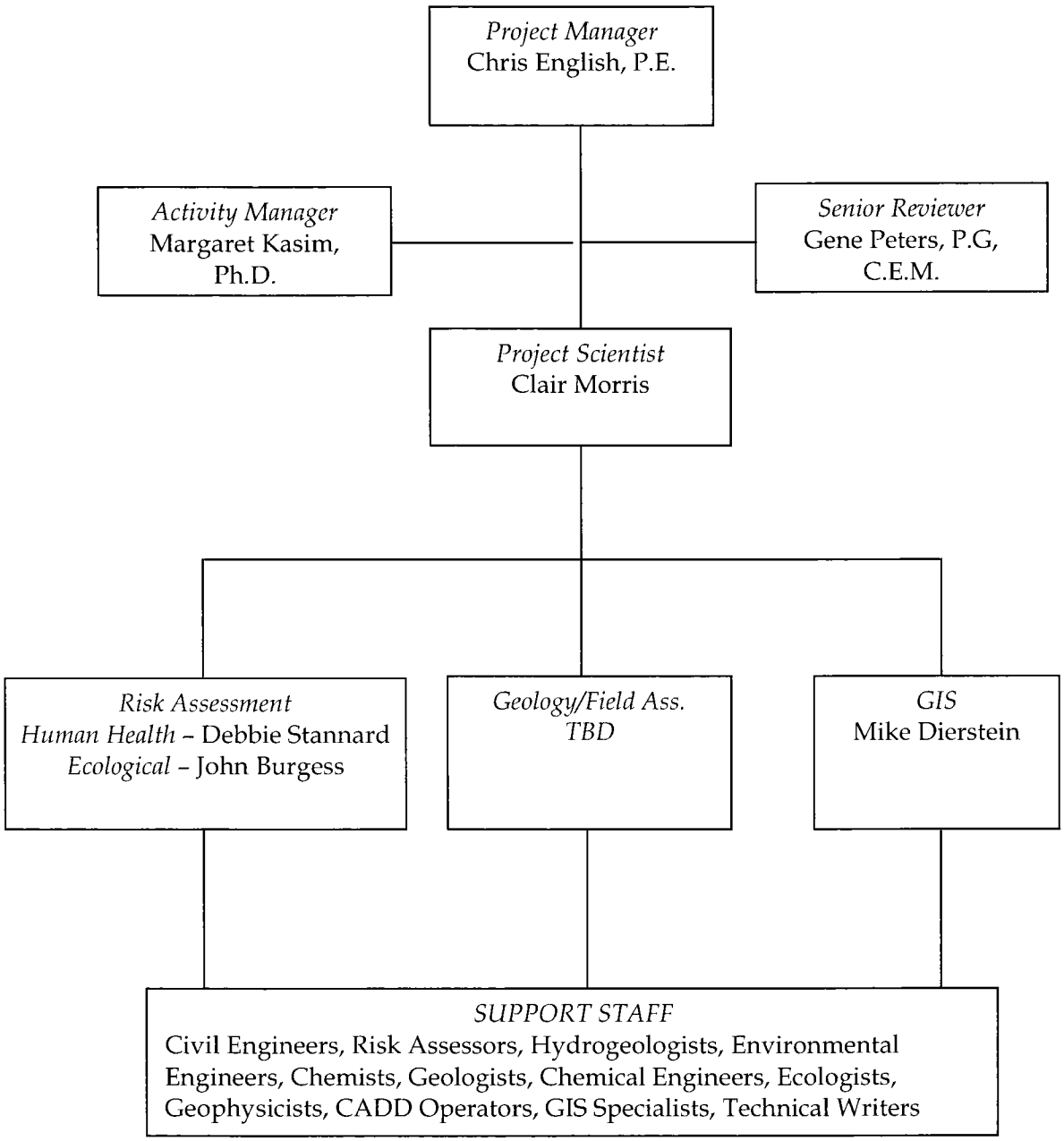


FIGURE 1-10
CH2M HILL PROJECT TEAM ORGANIZATION CHART
SSP INVESTIGATION WORK PLAN, CTO-050
NDWIH, INDIAN HEAD, MARYLAND

SECTION 2

Project Scope

This section provides an overview of the tasks included in the SSP Investigations.

2.1 Field Investigation

Field activities at the six SSP Investigation sites may include:

- Visual reconnaissance
- Surface soil and sediment sampling
- Monitoring well installation
- Surveying
- Completion of soil borings
- Subsurface soil sampling
- Groundwater sampling
- Investigation-derived waste (IDW) disposal

These field activities are described in more detail in Section 3. Unless noted otherwise, activities will be performed in accordance with the Master Plans for NDWIH (Tetra Tech NUS, Inc., 2004).

2.2 Laboratory Analysis

Table 2-1 presents the laboratory methods that will be used to analyze samples for the listed parameters. The analytical suite will vary on a site-by-site basis. Site-specific analytical parameters are discussed in Sections 5 through 10 of this Work Plan.

A description of these analytical parameters, with the exception of UDMH and hydrazine, is provided in the Master QAPP (Tetra Tech NUS, Inc., 2004). UDMH and hydrazine are discussed in a QAPP Addendum provided as Appendix B. The analytical laboratory or laboratories contracted on this project will be required to meet the following quantitation and detection limits:

- Contract-required quantitation limits (CRQLs) for Target Compound List (TCL) organics
- Contract-required detection limits (CRDLs) for Target Analyte List (TAL) inorganics
- Estimated practical quantitation limits (PQLs) for all parameters not included in the USEPA Contract Laboratory Program (CLP) TCL or TAL statements of work

These limits are provided in the Master QAPP (Tetra Tech NUS, Inc., 2004).

Detailed information on the sample volume, analytical methods, and analytical QA/QC procedures is provided in Section 4.

2.3 Data Quality Objectives

DQOs are pre-established goals that help monitor and assess the progress of the project. They provide the benchmarks against which the quality of fieldwork and the quality of resulting analytical data are evaluated.

DQOs specify the data type, quality, quantity, and how data are used to support project decisions. Data gathered during the SSP Investigation will be used to assess the presence of contamination at each site. Consequently, the quality and quantity of the data must be sufficient to compare analytical data with appropriate screening levels.

General project DQO guidelines are provided in Section 5 of the Master Work Plan. The investigation-specific DQOs included in this Work Plan were developed following the seven step process outlined by the USEPA (2000b). Overall DQOs for this investigation are summarized below. Site-specific DQOs are provided in Sections 5 through 10.

2.3.1 Step 1: State the Problem

Because facility operations at the six SSAs may have released hazardous substances into environmental media, a SSP Investigation will be performed to aid in site management decisions. The management team, (i.e., IHIRT), as stated in Section 1.1, consists of representatives of the USEPA, MDE, and Navy.

2.3.2 Step 2: Identify the Decision

The principal objective of the SSP Investigation at each SSA is "to determine if there have been releases of hazardous substances, pollutants, contaminants, hazardous wastes, or hazardous constituents to the environment from the SSA" (USEPA, 2000a). Following the collection of information during the investigations, one of the following management decisions will be made following the CERCLA process:

1. The SSA will require additional investigation and may be advanced in the CERCLA process to the appropriate next step (e.g. RI, FS, interim response action, etc.).
2. The SSA warrants NFA.

2.3.3 Step 3: Identify Inputs to the Decision

Current information about the sites consists of information collected during the Initial Assessment Study (IAS) in 1983, pertinent subsequent studies, and historical resources. Additionally, site visits were conducted by CH2M HILL in March and April 2004 to examine current conditions.

Analytical data collected during the SSP Investigations will be compared against the following criteria:

- USEPA Region III Risk Based Concentrations (RBCs);
- Background concentrations identified in the Indian Head Background Soil Investigation Report (Tetra Tech NUS, Inc., 2002a);

- Applicable literature-based screening toxicity values for ecological risk (e.g., Oak Ridge National Laboratory [ORNL] Preliminary Remediation Goals for Ecological Endpoints).

Additional information regarding these criteria is provided in Section 2.6.

Sample locations, media, and analytical parameters will be selected such that the presence or absence of contamination related to previous site activities at each SSA can be determined. The scopes of site-specific SSP Investigations are discussed in Sections 5 through 10. Delineation of contamination is not a goal of the SSP and would occur during a subsequent investigation if a site were recommended for further action.

2.3.4 Step 4: Define the Boundaries of the Study

Both the main area and the Stump Neck Annex of NDWIH are bounded to the west by the Potomac River. Mattawoman Creek runs along the eastern boundary of the Main Area and along part of the northern boundary of the Stump Neck Annex.

The spatial location of each SSA was provided in Section 1.3 of this Work Plan and is detailed in Sections 5 through 10. The boundaries shown for each site were estimated based on previous information and are likely to be revised based on the findings of this investigation. The extent of the area to be investigated will be determined on a site-by-site basis, based on such factors as physical boundaries, drainage areas, and probable mobility of potential contaminants.

Both ecological and human receptors will be of concern in these investigations.

2.3.5 Step 5: Develop a Decision Rule

The analytical results will be the primary basis for project decisions as defined in the flow chart shown in Figure 2-1; therefore, the analysis of soil, sediment, groundwater and surface water samples will require a high level of Quality Control (QC) at the laboratory. The QC requirements specified in the Master QAPP (Tetra Tech NUS, Inc., 2004) and the SOPs attached to the Master FSP (Tetra Tech NUS, Inc., 2004) will be followed to establish analytical quality. Further, complete analytical data packages and third-party data validation will be required.

The SSP will initially involve the comparison of the site specific data to risk-based screening levels to determine if a potential for human health or ecological risk exists. Data that exceed risk screening levels will be further evaluated by comparing them to site background concentrations. After the comparison of the data to risk based levels and background values, the IHIRT will discuss the appropriate next step for each site. Should risk based and background screening levels be exceeded for a site, additional investigation, risk evaluations, or interim removal actions may be recommended for the site. If no risk based or background levels are exceeded at the site, NFA will be recommended for the site. The SSP Investigation Report will document the consensus of the IHIRT on all six sites.

2.3.6 Step 6: Specify Limits on Decision Errors

Decision errors will be minimized by biased sampling as explained in the "Step 6: Specify Limits on Decision Errors" subsection for each SSP site, as presented in Sections 5 through 10. Sampling and measurement errors in the analytical data may cause over- or

underestimation of risk and subsequently lead to a NFA decision when further action is warranted, or conversely, lead to a recommendation for further investigation at a site where no unacceptable risk exists. The chance of errors is minimized through adherence to sampling procedures and the collection of quality control samples. Sampling techniques are discussed in detail in the Master FSP.

QA/QC samples will be used to verify the accuracy and precision of the data generated during the SSP Investigations. When data are suspect because a QC sample is outside of a laboratory's established control limits, the data user will be notified through the laboratory's case narrative and the data validator's report. Data validation is an important step in determining how the data can be used by the risk assessors and for risk screening. All data used for risk screening will be validated following *Region III Modifications to the Laboratory Data Validation Functional Guidelines for Evaluating Inorganics Analyses* (USEPA, 1993) and the *Region III Modifications to National Functional Guidelines for Organic Data Review Multi-media, Multi-concentration,* (OLM01.0-OLM01.9) (USEPA, 1994).

2.3.7 Step 7: Optimize the Design

To achieve the objective of these investigations, the additional sample needs have been determined based on evaluation of previous sample data (which only exist for the Wetland Area Adjacent to Site 45), site conditions, and historical operations at each SSA site.

2.4 Data Management and Validation

Analytical and field data will be managed to ensure compliance with the project's DQOs. Data management tasks will consist of the following:

- Database setup and management
- Data validation and reporting
- Incorporation of validated data into CH2M HILL's EnDat database and Basewide Geographic Information System (GIS)

Data collected during the SSP Investigation fieldwork will be validated before interpretation. Data validation will be performed by an independent subcontractor, and will conform to *Region III Modifications to the Laboratory Data Validation Functional Guidelines for Evaluating Inorganics Analyses* (USEPA, 1993) and *Region III Modifications to National Functional Guidelines for Organic Data Review Multi-media, Multi-concentration,* (OLM01.0-OLM01.9) (USEPA, 1994). As defined in *Innovative Approaches to Data Validation* (USEPA, 1995) the data validators will perform a level M-3 data validation for organic compounds and a level IM-2 data validation for inorganic constituents. This is the most thorough level of data validation. Qualified data will be flagged with the appropriate symbol. Results for QA/QC samples will be reviewed and the data will be qualified further, if necessary. The data set as a whole will be examined for consistency, anomalous results, and reasonableness.

CH2M HILL will incorporate the data collected during the field investigation into CH2M HILL's EnDat database and site GIS. These data will then be presented in the SSP Investigation Report. Analytical data collected during the investigation also will be provided electronically to NDWIH for incorporation into their GIS.

2.5 Data Evaluation

Field and laboratory data collected during the SSP Investigation will be used to perform human health and ecological risk screening. The results of these risk screenings will be used to determine if further investigation or remediation is warranted or if the site should be removed from further study.

A flowchart summarizing the data evaluation process is provided in Figure 2-1. The process presented in the figure is described in the following subsections.

2.5.1 Human Health Risk Screening

A human health risk-based screening will be conducted for each SSA to determine if there is the potential for adverse effects to human receptors. The maximum detected concentrations in each media at each site will be compared to the appropriate USEPA Region III RBC from the current USEPA Region III RBC table. Soil data will be compared to residential soil RBCs, groundwater data to tap water RBCs, surface water data to 10 times tap water RBCs, and sediment data to 10 times residential soil RBCs. RBCs based on noncarcinogenic effects will be divided by 10 (to adjust to a Hazard Index of 0.1) to account for exposure to multiple constituents. RBCs associated with carcinogenic effects are based on an excess lifetime cancer risk of 10^{-6}, and will not be adjusted from the values in the RBC table. If the maximum detected concentration exceeds the applicable screening value, the site-related concentrations will be compared with background concentrations identified in the *Background Soil Investigation Report for Indian Head and Stump Neck Annex* (Tetra Tech NUS, Inc., 2002a).

If maximum detected concentrations exceed the screening levels, and site-related concentrations are above background concentrations, the SSA will be considered to warrant further consideration of potential human health risk, and the next step for addressing the site will be discussed among the IHIRT.

2.5.2 Ecological Risk Screening

An ecological risk screening will be conducted for each SSA to determine whether site conditions create potential for adverse effects to ecological receptors. Each site will be evaluated to determine if viable habitat is present for terrestrial or aquatic life. Potential chemical transport pathways will also be reviewed to determine if chemicals potentially could be transported to viable habitats at off-site locations. Further evaluation will be recommended only for sites where viable habitats exist and could be affected by releases.

If viable habitats are present and/or if site-related releases can affect viable habitat, then chemical concentrations measured in samples of site media will be compared to applicable ecological risk-based screening criteria (e.g., ORNL Preliminary Remediation Goals for Ecological Endpoints).

No further ecological evaluation will be recommended for sites with on-site chemical concentrations at or below screening toxicity values. Chemical concentrations exceeding screening toxicity values will also be compared to background concentrations identified in the *Background Soil Investigation Report for Indian Head and Stump Neck Annex* (Tetra Tech

NUS, Inc., 2002a). If SSA chemical concentrations exceed these background concentrations, additional action is warranted.

At five of the six sites, only data collected during this investigation will be used because no historical data exist for these sites. The sixth site, the Wetland Area Adjacent to Site 45, has been sampled previously. At this site, both new and historical surface water data will be used to update the screening level Ecological Risk Assessment (ERA) for the wetland. If a potential risk to aquatic receptors is confirmed by surface water sampling completed during the SSP Investigation, then the problem formulation (Step 3B) to support a Baseline Ecological Risk Assessment (BERA) for the wetland will be prepared along with the update to the screening level ERA.

2.6 Reporting

The results of the SSP Investigation and analyses will be documented in an SSP Investigation Report. The SSP Investigation Report will summarize the background, objectives, and analytical methods, and will present the results of the SSP Investigation. The report will also provide recommended management decisions for each site, such as NFA or conducting an RI.

The SSP Investigation Report will also include a signature page at the front of the document, which will list the sites that require NFA. The signature page will contain the following caveat: "In the event contamination posing an unacceptable risk to human health or the environment is discovered after execution of the SSP for any of the sites, the IHIRT agrees to reevaluate the Site(s) as deemed necessary."

TABLE 2-1
Laboratory Analytical Parameters
SSP Investigation Work Plan, CTO-050,
NDWIH, Indian Head, Maryland

Analyte	Method Number
Hardness[1]	EPA 130.2
Nitroglycerin	SW-846 8332
Nitroguanidine	SW-846 8330 (modified)
Nitroaromatics / Nitramines	SW-846 8330 (modified)
pH	SW-846 9045C
Target Analyte List (TAL) Metals[2]	CLP ILM04.1
Target Compound List (TCL) Semivolatile Organic Compounds (SVOCs)	CLP OLM04.2
TCL Volatile Organic Compounds (VOCs)	CLP OLM04.2
Dissolved Organic Carbon (DOC)	SW-846 9060
Total Organic Carbon (TOC)	SW-846 9060 (aqueous) Lloyd Kahn Method (solid)
UDMH / Hydrazine	Ion Chromatography, no standard method exists

[1] Aqueous samples only.
[2] Aqueous samples will be collected and analyzed for total (unfiltered) and dissolved (filtered) TAL metals.

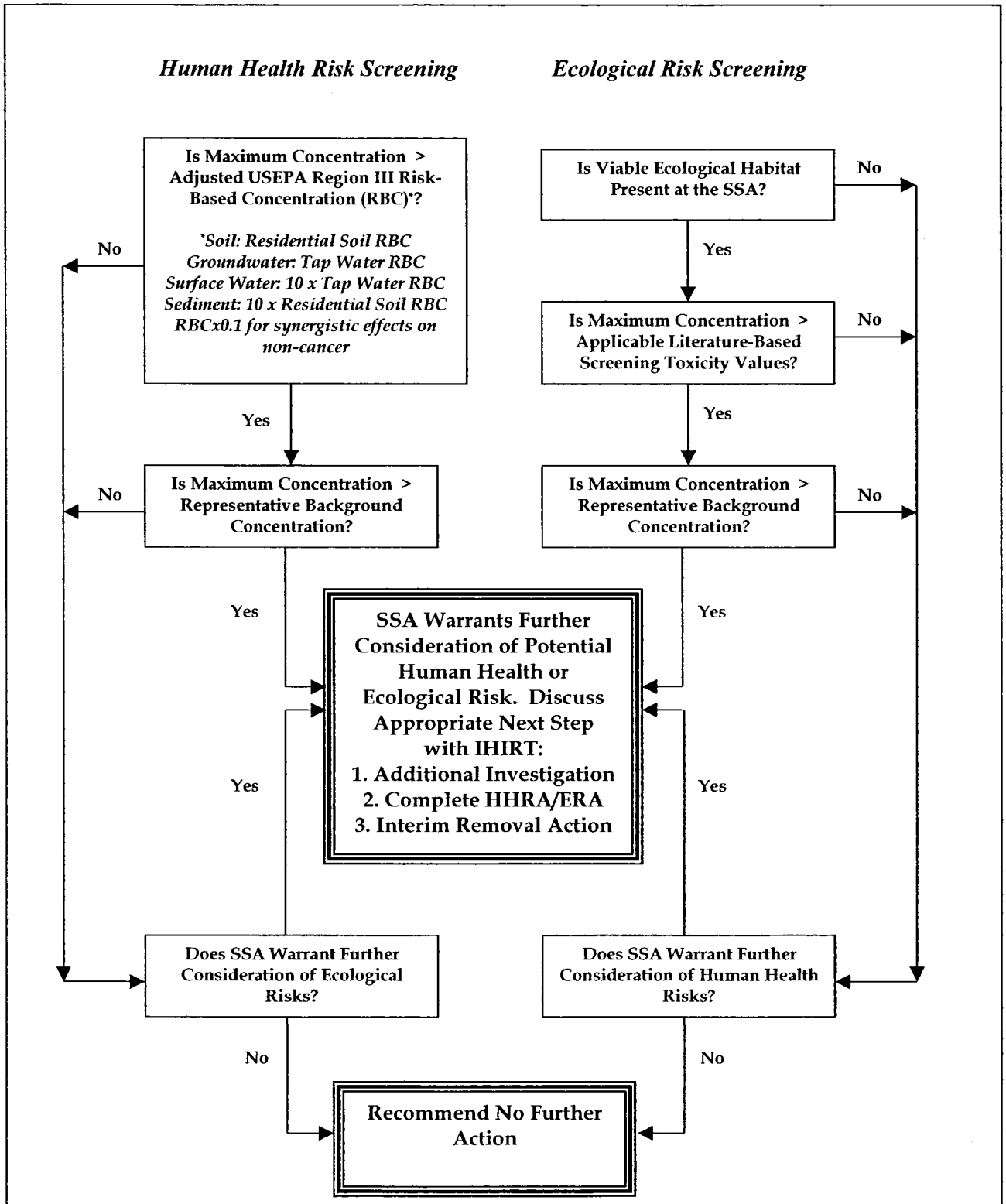


FIGURE 2-1
DATA EVALUATION PROCESS FLOWCHART
SSP INVESTIGATION WORK PLAN, CTO-050
NDWIH, INDIAN HEAD, MARYLAND

SECTION 3

General Field Methodologies

General field methodologies for the SSP Investigation are described in this section. Unless stated otherwise, field methodologies will be performed in accordance with the Master FSP (Tetra Tech NUS, Inc., 2004). Site-specific field methodologies and sampling locations are described in Sections 5 through 10 of this Work Plan.

3.1 Site Reconnaissance and Preparation

Before beginning fieldwork at NDWIH, CH2M HILL will coordinate mobilization activities with Shawn Jorgensen at NDWIH, or his designee. Underground utilities will be located in all areas designated for drilling or other intrusive sampling, in accordance with Facility SOP HS-10, *Utility Locating and Excavation Clearance* (Tetra Tech NUS, Inc., 2004). In addition to utilities, site access will be evaluated prior to the commencement of any field activity. All security and access requirements specific to the base will be followed.

Even though the presence of unexploded ordnance (UXO) is not anticipated at any SSA, potential UXO issues will be evaluated at each SSA in accordance with Facility SOP HS-2.0, *Unexploded Ordnance and Chemical Warfare Agents Activities* (Tetra Tech NUS, Inc., 2004). Precautionary procedures, as detailed in the Health and Safety Plan (Appendix A), will be followed when collecting samples in areas where the potential for UXO exist.

3.2 Borehole Drilling and Abandonment

Soil borings will be advanced at select SSAs to assess subsurface soil conditions. Borehole drilling and abandonment are discussed in the following subsections.

3.2.1 Hollow-Stem Auger (HSA) Drilling

A truck-mounted HSA rig will be used to advance soil borings in accordance with Facility SOP GH-1.3, *Soil and Rock Drilling Methods* (Tetra Tech NUS, Inc., 2004). Boreholes will be advanced using either 4 ¼-in.-inner-diameter, 8-in.-outer-diameter, or smaller hollow stem augers (HSAs) for boreholes that will not be converted into permanent monitoring wells. Unless specified otherwise, boreholes will be advanced to 5 ft below the first saturated zone encountered during drilling. If refusal is encountered before the first saturated zone, then the soil borings will be terminated at refusal.

Each soil boring will be continuously sampled, for the purpose of soil logging, using 2-in.-diameter, 2-ft-long stainless steel split-spoons in accordance with Facility SOP GH-1.5, *Borehole and Sample Logging* (Tetra Tech NUS, Inc., 2004). The field engineer or geologist will inspect and log subsurface soil conditions and measure volatile organic vapors using a photoionization detector (PID) equipped with an 11.2-eV bulb. Subsurface conditions and PID readings will be recorded on CH2M HILL's standard boring log forms.

3.2.2 Borehole Abandonment

Boreholes that are not converted into monitoring wells will be abandoned in accordance with Code of Maryland Regulations (COMAR) 26.04.04.11, Abandonment Standards. Boreholes will be backfilled with a bentonite clay mixture consisting of at least 2 pounds of bentonite clay per one gallon of water.

3.3 Monitoring Well Installation and Development

At select SSAs, monitoring wells will be installed in accordance with Facility SOP GH-2.8, *Groundwater Monitoring Well Installation* (Tetra Tech NUS, Inc., 2004). Monitoring well boreholes will be advanced and logged following the procedures described in Section 3.2.

Monitoring wells will be constructed of 2-in.-diameter polyvinyl chloride (PVC) risers and 0.010-in. slotted screen. Unless evidence of contamination is observed over a depth interval greater than 5 ft, screens will be 5 ft in length. Contamination in the subsurface may be evidenced by discoloration of the soil and/or groundwater, presence of non-native material, elevated PID measurements, and odors. A 10-ft screen length may be used if evidence of contamination is observed over a depth interval exceeding 5 ft. The well screen depth interval will intersect the first encountered saturated zone, which indicates the presence of the water table.

After well installation, the wells will be developed by overpumping and surging until the water runs clear or until the field geologist determines the well cannot be developed further. The methods and procedures for well development are provided in Facility SOP GH-2.8, *Groundwater Monitoring Well Installation,* Section 5.4.1 (Tetra Tech NUS, Inc., 2004). The field geologist or engineer will generate a detailed boring log for each borehole using CH2M HILL standard forms (similar to the format shown in Facility SOP GH-1.5, *Borehole and Sample Logging* (Tetra Tech NUS, Inc., 2004). Similarly, a monitoring well construction log will be created for each well. A standard well construction diagram is provided as Figure 3-1.

Following installation, wells will be surveyed for horizontal and vertical coordinates according to the procedures outlined in Section 3.9.

3.4 Groundwater Sampling

Prior to sampling, the depth to groundwater will be measured to the nearest 0.01 ft using a water level indicator in accordance with the Facility SOP GH-1.2, *Evaluation of Existing Monitoring Wells and Water Level Measurement* (Tetra Tech NUS, Inc., 2004). The water-level depth and well depth will be used to calculate the volume of groundwater in the well. Specific conductance, pH, turbidity, oxidation-reduction potential (ORP), dissolved oxygen (DO), and temperature will be recorded at regular volume intervals (e.g., after every 0.5 gallons purged). Sampling will commence once these parameters have stabilized (pH within 0.05 units; temperature within 1°C; and ORP, dissolved oxygen, and specific conductance within 10 percent over three consecutive measurements at least 3 minutes apart). Turbidity will be reduced to the extent practical. The purging process will continue until the parameters are stable or at least five well volumes have been removed, whichever comes

first. After purging is complete, samples will be collected directly from the pump tubing. QA/QC samples will also be collected at the frequency detailed in Section 4.1 of this Work Plan. QA/QC samples are discussed in more detail in Section 4. The equipment and procedures required to perform groundwater sampling are discussed in more detail in Facility SOP SA-1.1, *Groundwater Sample Acquisition and Onsite Water Quality Testing* (Tetra Tech NUS, Inc., 2004).

3.5 Subsurface Soil Sampling

It is anticipated that at least one soil sample will be retained from every soil boring for laboratory analysis for selected analytical parameters. Additional soil samples may be retained from borings that show evidence of contamination over multiple depth intervals. The presence of soil contamination will be assessed in the field based on PID measurements and inspection of the soil sample for discoloration, staining, and odors. Field observations will be recorded in the log book.

If no evidence of contamination is observed in a soil boring, one soil sample will be retained for laboratory analyses. In general, samples will be collected either from the uppermost 2 ft of soil or immediately above the water table, depending on the site. The sample collection scope and rationale specific to each site are detailed in Sections 5 through 10. The equipment and procedures used to collect subsurface soil samples are described in Facility SOP SA-1.3, *Soil Sampling* (Tetra Tech NUS, Inc., 2004).

3.6 Surface Soil Sampling

At locations designated for surface soil sampling (but not soil borings), a trowel will be used to collect surface soil samples from 0 to 6 inches below ground surface (bgs). Soil samples collected for volatile organic compound (VOC) analyses will be collected using an EnCore sampler in accordance with section 5.2.1.1 of Facility SOP SA-1.3, *Soil Sampling* (Tetra Tech NUS, Inc., 2004).

3.7 Sediment Sampling

Sediment as a medium is defined as unconsolidated geologic materials that are saturated with sufficient frequency and duration to sustain aquatic ecological communities. Media not meeting this definition (i.e., insufficient saturation) are defined and treated as surface soil. Sediment will be identified, and labeled accordingly, upon observation of site conditions when the samples are collected. Sediment samples will be collected only at those locations where surface water is sufficiently shallow to permit sample collection by hand. A spoon or trowel will be used to collect the sediment sample from 0 to 6 inches bgs. Sediment sampling procedures are discussed in Facility SOP SA-1.2, *Surface Water and Sediment Sampling* (Tetra Tech NUS, Inc., 2004).

3.8 Surface Water Sampling

Grab surface water samples will be collected from the wetland area when the water depth is 6 inches or more, to minimize the inclusion of sediment in the surface water samples. While the SSP Investigation is in progress, an effort will be made to collect the surface water samples after a rainfall event. If surface water is not present during the initial sampling effort, the field team will attempt to collect samples following a precipitation event, when surface water is likely to be present. At each location, after collecting a sample for laboratory analysis, pH, specific conductance, turbidity, ORP, DO, and temperature will be recorded. Surface water sampling procedures are discussed in Facility SOP SA-1.2, *Surface Water and Sediment Sampling* (Tetra Tech NUS, Inc., 2004).

3.9 Surveying

Groundwater monitoring wells will be surveyed by a Maryland-registered land surveyor. Existing survey monuments at NDWIH will be used as reference points. Horizontal locations will be surveyed to ± 0.1 ft according to Maryland State Plane Coordinate System, North Zone, North American Datum, 1983 (NAD 83). Vertical elevations will be surveyed to ± 0.01 ft, based on the National Geodetic Vertical Datum, 1929 (NGVD 29). Groundwater monitoring well elevations will be measured from the notch on the top of the casing riser pipe and at ground surface. Soil, surface water, and sediment locations will be surveyed with a portable Global Positioning System (GPS) unit.

3.10 Equipment Decontamination

Equipment decontamination procedures are described in Facility SOP SA-7.1, *Decontamination of Field Equipment and Waste Handling* (Tetra Tech NUS, Inc., 2004). Prior to mobilization, the location of temporary decontamination areas will be coordinated with base personnel.

3.11 Investigation-Derived Waste (IDW) Handling

IDW produced during the SSP Investigations may consist of the following:

- Soil cuttings from soil borings and well installation;
- Groundwater from well installation, well development, and well purging during sampling activities; and
- PPE.

All IDW will be handled in accordance with Section 2.12, *Handling and Disposal of Investigation-Derived Waste*, of the Master FSP (Tetra Tech NUS, Inc., 2004). A staging area for the IDW will be coordinated with base personnel prior to initiating field activities.

CH2MHILL

PROJECT NUMBER	WELL NUMBER SHEET OF

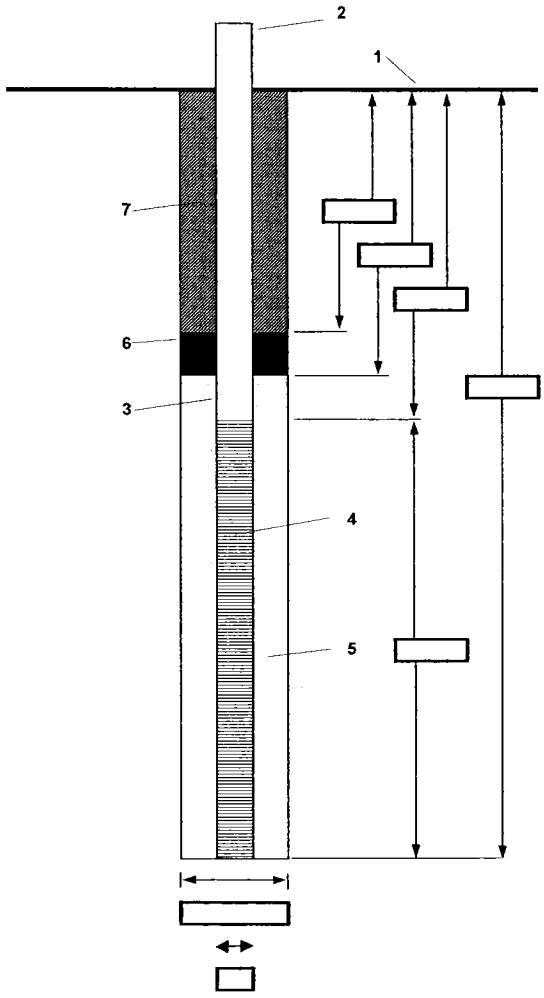
WELL COMPLETION DIAGRAM

PROJECT : LOCATION :

DRILLING CONTRACTOR :

DRILLING METHOD AND EQUIPMENT USED :

WATER LEVELS : START : END : LOGGER :



1- Ground elevation at well _____

2- Top of casing elevation _____
a) vent hole? _____

3- Dia /type of well casing _____

4- Type/slot size of screen _____

5- Type screen filter _____
a) Quantity used _____

6- Type of seal _____
a) Quantity used _____

7- Grout
a) Grout mix used _____
b) Method of placement _____
c) Vol. of well casing grout _____

Development method _____

Development time _____

Estimated purge volume _____

Comments _____

Figure 3-1
STANDARD WELL CONSTRUCTION DIAGRAM
SSP INVESTIGATION WORK PLAN, CTO-050
NDWIH, INDIAN HEAD, MARYLAND

SECTION 4

Sample Management

This section provides an overview of sample management activities that will be performed during the course of the SSP Investigation.

4.1 Field QA/QC Samples

Field QA/QC samples will consist of equipment blanks, field blanks, trip blanks, Matrix Spike/Matrix Spike Duplicates (MS/MSDs), and field duplicates. A description and collection frequency for each type of QA/QC sample is provided below.

4.1.1 Equipment Blanks

An equipment blank is a sample of American Society for Testing and Materials (ASTM) Type II reagent grade water (ASTM, 1993) poured into, over or pumped through the sampling device, collected in a sample container, and transported to the laboratory for analysis. Equipment blanks are used to assess the effectiveness of equipment decontamination procedures and will be collected immediately following decontamination. The equipment blank will be analyzed for the same parameters specified for the environmental samples collected at the site.

Equipment blanks will be collected no more frequently than once per day. If four or fewer samples are collected per day, and the field effort is several days long, one equipment blank will be collected for every ten samples. At least one equipment blank per week will be collected.

If pre-certified disposable sampling equipment is used, provided in unopened, factory sealed containers, only one equipment blank is required for this equipment for the entire sampling event. In this case, the ASTM Type II reagent grade water will be poured over the equipment before it is used.

4.1.2 Field Blanks

A field blank is a sample of ASTM Type II reagent grade water that is collected in the field and used to assess whether contamination occurs from ambient conditions. The blank will be analyzed for all laboratory analyses requested for the environmental samples collected at the site. Field blanks will be collected once per week.

4.1.3 Trip Blanks

The trip blank consists of a 40-milliliter (mL) sample vial filled in the laboratory with ASTM Type II reagent water, transported to the sampling site, handled with the environmental samples, and returned to the laboratory for analysis. Trip blanks are not opened in the field. Trip blanks are prepared only when VOC samples are collected and are analyzed only for VOCs. Trip blanks are used to assess the potential introduction of contaminants from sample containers or during the transportation and storage procedures. One trip blank will accompany each cooler of samples sent to the laboratory for analysis of VOCs.

4.1.4 Matrix Spike/Matrix Spike Duplicates

MS/MSDs are aliquots of sample spiked with known concentrations of analytes. The spiking occurs prior to sample preparation and analysis.

To allow the analytical laboratory to run MS/MSD analyses, additional samples may be collected in the field to provide sufficient sample volume. A minimum of one MS and one MSD sample will be analyzed for every 20 primary samples.

4.1.5 Field Duplicates

A field duplicate sample is a second sample collected at the same location as the original sample. Duplicate samples are collected simultaneously or in immediate succession, using identical recovery techniques, and treated in an identical manner during storage, transportation, and analysis. The sample containers are assigned an identification number in the field such that they cannot be identified as duplicate samples (i.e., blind duplicate) by laboratory personnel performing the analysis. Specific locations are designated for collection of field duplicate samples prior to the beginning of sample collection.

Duplicate sample results are used to assess precision of the sample collection process. For VOCs, precision of soil samples is assessed by collecting co-located samples rather than through compositing, because the compositing process required to obtain uniform samples could result in loss of the compounds of interest.

For each environmental medium, field duplicates will be collected at a frequency of one for every 20 primary samples. A minimum of one field duplicate will be collected for each environmental matrix.

4.2 Sample Volumes, Containers, and Preservation

Sample volumes, container types, and preservation requirements for the analytical methods performed on SSP Investigation samples are listed in Table 4-1. Sample holding time tracking begins with the collection of samples and continues until extraction or analysis is complete. Holding times for analytical methods required during the SSP Investigation are specified in Table 4-1.

4.3 Sample Identification

Each sample will be designated by an alphanumeric code that identifies the site and matrix sampled and contains a sequential sample number. Site-specific procedures are elaborated below. The following is a general guide for sample identification:

First Segment of Sample Number	Second Segment of Sample Number	Third Segment of Sample Number		
Naval Installation Abbreviation	Site Number	Sample Type	Sample Location	Additional Qualifiers (sample depth, date)
A	ANN	AA	NN	NNNN

Symbol Definition:

"A"	=	Alphabetic
"N"	=	Numeric

Naval Installation Abbreviation:

A	=	One letter abbreviation identifying the Naval Installation where the sample was collected (e.g., I = Indian Head)

Site Number:

ANN	=	One letter and two numbers identifying the site on the facility where the sample was collected

For Sites 19, 26, and 27, the following Site Number nomenclature will be used:

S19	=	Site 19
S26	=	Site 26
S27	=	Site 27

For Stump Neck SWMUs 14 and 30, the following Site Number nomenclature will be used:

U14	=	SWMU 14
U30	=	SWMU 30

For the Wetland Area Adjacent to Site 45, the following Site Number nomenclature will be used:

A45	=	Wetland Area Adjacent to Site 45

Sample Type:

SS	=	Surface Soil Sample
SB	=	Subsurface Soil Sample
SD	=	Sediment Sample
SW	=	Surface Water Sample
GW	=	Grab Groundwater Sample
MW	=	Monitoring Well Sample
WS	=	Waste (solid)
T#	=	Trip Blank (# corresponds to the number of sample collected on a given date [1=First, 2=Second, etc.])
EB	=	Equipment Blank
FB	=	Field Blank

Sample Location:

MM	=	QA/QC Samples—2-digit month of sampling event
NN	=	Primary Samples—2-digit number indicating sample location.

Additional Qualifiers:

MMYY	=	Monitoring Well and Grab Groundwater Samples—2-digit month and 2-digit year of sampling event (i.e., June 2004 = 0604)

BDED = Surface Soil, Subsurface Soil, and Sediment Samples—2-digit beginning depth and 2-digit end depth rounded up to nearest foot (i.e., 2 ft to 2 ft 6 in. = 0203)

DDYY = QA/QC Samples—2-digit day and 2-digit year of sampling event

Examples of this numbering approach are:

IS19SS040001	The 4th surface soil sample collected from 0 ft to 1 ft at Site 19
IU30GW020804	The 2nd grab GW sample collected at Stump Neck SWMU 30 in August 2004

Examples of this numbering approach for QA/QC samples are:

IU30FB081004	Field blank collected at Stump Neck SWMU 30 on August 10, 2004
IU30T1081004	First trip blank collected at Stump Neck SWMU 30 on August 10, 2004
IU30EB081004	Equipment blank collected at Stump Neck SWMU 30 on August 10, 2004
IS19SS020001	Matrix spike/matrix spike duplicate surface soil sample collected from 0 ft to 1 ft at Site 19. This numbering will be the same as the primary sample numbering.

Field duplicates will be "blind duplicates," and thus labeled in the same manner as regular samples. Their locations and corresponding sample numbers will be recorded in the logbook.

4.4 Sample Packaging and Shipping

Samples will be packaged in accordance with Facility SOP SA-6.1, *Non-Radiological Sample Handling* (Tetra Tech NUS, Inc., 2004). The sample will be tightly packed in a cooler with Vermiculite or bubble wrap packaging material and ice as a preservative. The samples will be either picked up at the site by a courier from the analytical laboratory or shipped to the laboratory via Federal Express. The CH2M HILL Field Team Leader is responsible for completion of the following forms:

- Sample labels
- Chain-of-custody seals
- Chain-of-custody forms
- Appropriate labels and forms required for shipment

Custody of the samples will be maintained and documented at all times. Chain-of-custody will begin with the collection of the samples in the field and will continue through the analysis of the sample at the analytical laboratory.

TABLE 4-1
Bottleware, Preservation, and Holding Time Requirements
SSP Investigation Work Plan, CTO-050,
NDWIH, Indian Head, Maryland

Media	Analysis	Total Number of Samples[1]	Number of Containers per Sample	Container Type	Preservation	Holding Time
Soil	TAL Metals CLP Method ILM04.1	39	1	4 oz. Sampling container with Teflon liner	Cool to <4°C	28 days for Mercury with all others 6 months to analysis
	TCL SVOCs CLP OLM04.2	27	1	4 oz. Sampling container with Teflon liner	Cool to <4°C	14 days to extract; 40 days to analysis
	TCL VOCs CLP OLM04.2	27	1	Separate 4 oz. Sampling container with Teflon liner and minimized head space	Cool to <4°C	7 days
	UDMH / Hydrazine Ion Chromatography (no standard method available)	14	1	4 oz. Sampling container with Teflon liner	Cool to <4°C	14 days to extract; 40 days to analysis
	Nitroglycerin SW-846 8332	19	1	4 oz. Sampling container with Teflon liner	Cool to <4°C	14 days to extract; 40 days to analysis
	Nitroguanidine SW-846 8330 (Modified)	19	1	4 oz. Sampling container with Teflon liner	Cool to <4°C	14 days to extract; 40 days to analysis
	Nitroaromatics / Nitramines SW-846 8330	19	1	4 oz. Sampling container with Teflon liner	Cool to <4°C	14 days to extract; 40 days to analysis
	pH SW-846 9045C	46	1	4 oz. Sampling container with Teflon liner	Cool to <4°C	Analyze ASAP
	TOC Lloyd Kahn Method	46	1	4 oz. Sampling container with Teflon liner	Cool to <4°C	28 days to analysis

TABLE 4-1
Bottleware, Preservation, and Holding Time Requirements
SSP Investigation Work Plan, CTO-050,
NDWIH, Indian Head, Maryland

Media	Analysis	Total Number of Samples[1]	Number of Containers per Sample	Container Type	Preservation	Holding Time
Groundwater and Surface Water	Hardness EPA 130.2	17	1	250 mL HDPE	HNO_3 to pH<2 and cool to <4°C	6 months to analysis
	TAL Metals (unfiltered samples) CLP ILM04.1	17	1	500 mL HDPE	HNO_3 to pH<2 and cool to <4°C	28 days for Mercury; all others 6 months to analysis
	TAL Metals (filtered samples) CLP ILM04.1	17	1	500 mL HDPE	HNO_3 to pH<2 and cool to <4°C	14 days
	TCL SVOCs CLP OLM04.2	12	1	1 L amber glass	Cool to 4°C	7 days to extract; 40 days to analysis
	TCL VOCs CLP OLM04.2	12	1	40 mL glass	HCl to pH<2 and cool to 4°C	14 days to analysis
	Dissolved Organic Carbon (DOC) (filtered samples) SW-846 9060	5	1	500 mL HDPE	HCl or H_2SO_4 to pH<2 and cool to <4°C	28 days to analysis
	TOC SW-846 9060	17	1	500 mL HDPE	HCl or H_2SO_4 to pH<2 and cool to <4°C	28 days to analysis
	pH SW-846 9045C	17	1	250 mL HDPE	Cool to <4°C	

[1] Includes QA/QC samples (one field duplicate, MS/MSD, and equipment blank assumed for each site and sample medium). Trip blanks are not included. Actual number of samples collected during SSP Investigation may vary from numbers displayed in this table. For example, multiple soil samples may be collected from a single soil boring if evidence of contamination is observed across multiple depth intervals.

SECTION 5

SSP Investigation at Site 19

5.1 Site Description

Site 19, Catch Basins at Chip Collection Houses, is located west of Silo Road and consists of the drainage areas leading from the two chip collection houses, Buildings 785 and 1051. The northern drainage area, leading from Building 785, is approximately 0.25 acre. The southern drainage area, leading from Building 1051, is approximately 0.18 acre. The locations of Site 19 are shown in Figure 1-4.

5.2 Previous Investigations

Site 19 was first identified in the IAS (Fred C. Hart Associates, Inc., 1983). At that time, no sludge deposits were observed in the catch basins and no evidence of vegetation stress along the swale or stream was noted.

Prior to this SSP Investigation, no environmental samples appear to have been collected from Site 19.

5.3 Data Quality Objectives

5.3.1 Step 1: State the Problem

Site-related releases from the catch pad outfalls or runoff from the pad may have contaminated stream sediments to levels warranting additional investigation.

Conceptual Site Model

Operations at buildings adjacent to Site 19 used a variety of metallic salts in processing explosives. These operations resulted in an aqueous wastewater stream that contained bright orange chips of explosives and metallic salts, particularly of copper and lead. Historically, this wastewater drained from the two buildings through fabric bags, to collect the explosive shavings, and then into baffled catch basins to further capture smaller explosive shavings. This wastewater was discharged for an unknown period of time. Spills of explosive shavings may have occurred around and downstream from the catch basins when the fabric bags attached to the outfall end of the pipes ruptured or detached.

Wastewater from Building 785 was historically drained through an 8-in. cast iron pipe into an approximately 2-ft-by-2-ft wooden catch basin. Discharge from the catch basin would then lead into a downgradient swale. Discharges from Building 785 occurred from 1956, when the building was constructed, until 1999 when the waste stream was diverted to a wastewater treatment building. After the initial site visit for preparation of this work plan, explosives technicians removed the wooden structure. The concrete base that supported the wooden catch basin remains in place.

Building 1051 discharged wastewater through an approximately 50-ft-long cast iron pipe, through the fabric bag, to a concrete outfall and into an approximately 2-ft-by-2-ft metal catch basin. Subsequently, water would migrate approximately 15 ft into a downgradient stream. Releases from the outfall could have contaminated stream sediments. Discharges from Building 1051 occurred from 1962, when the building was constructed, until 1999 when the waste stream was diverted to a wastewater treatment building. Discharges may have been intermittent from 1976 until 1999.

Building 1051 is no longer used as a chip collection house and no longer produces a wastewater stream. Building 785 is still in operation as a chip house, but wastewater is now recycled rather than discharged to the swale.

The primary constituents of interest at Site 19 are inorganics and explosives. Based on CH2M HILL's understanding of the site history, the most likely location for contamination related to site activities would be (1) immediately downgradient of the catch basins, where potentially contaminated water was discharged and (2) on the ground surface immediately adjacent to the catch basins where spills may have occurred under high flow conditions. The most likely migration pathway for these contaminants is physical transport via surface water flow downgradient of the outfall along the swale and dissolution of chemicals from the deposited chips into surface and near-surface soils.

5.3.2 Step 2: Identify the Decision

The primary questions to be answered with this investigation, and therefore its objectives, are to determine: (1) if site-related contamination is present in surface soil (0–6 in. bgs) and (2) whether the magnitude of contamination warrants further investigation. Following the collection of information during the SSP Investigation, one of the following management decisions will be made following the CERCLA process:

1. Site 19 will require additional investigation and may be advanced in the CERCLA process to the appropriate next step (RI, FS, interim response action, etc.).
2. Site 19 warrants NFA.

5.3.3 Step 3: Identify Inputs to the Decision

Samples of surface soil and/or sediment will be analyzed for potential contaminants (metals and explosives) based on the conceptual site model. The reported potential contaminants at the site are copper and lead salts and explosives. The only explosives machined at these locations were double-based, consisting of nitroglycerin and nitrocellulose.

Samples will be analyzed for TAL metals and explosives (including nitroglycerin). The samples will also be analyzed for hardness, total organic carbon (TOC), and pH to better enable the evaluation of data for ecological screening. Samples will not be analyzed for nitrocellulose because this compound does not pose a risk to human or ecological receptors.

For the human health screening, the maximum detected concentrations in each media at each site will be compared to the appropriate USEPA Region III RBC from the current USEPA Region III RBC table. The ecological screening will evaluate if viable habitats are present and if site-related releases can affect viable habitat. If true, then chemical concentrations measured in samples of site media will be compared to applicable literature-

based screening toxicity values. Analyte-specific background values from facility-wide background studies (Tetra Tech NUS, Inc., 2002a) will be used to establish whether site-related releases have occurred.

5.3.4 Step 4: Define the Boundaries of the Study

This investigation will focus on the soil and/or sediments adjacent to the catch basins since the greatest concentrations of potential contaminants are expected to reside in this area. Site 19 sample locations associated with Buildings 785 and 1051 are shown in Figures 5-1 and 5-2, respectively. The SSP Investigation sample parameters are summarized in Table 5-1.

5.3.5 Step 5: Develop a Decision Rule

The data collected during this investigation will be compared to risk-based screening criteria and background concentrations to determine if soil and/or sediment concentrations present a potential threat to human health and/or the environment. The decision logic is summarized graphically in Figure 2-1.

5.3.6 Step 6: Specify Limits on Decision Error

In addition to the data quality procedures specified in Section 2.3, decision errors will be minimized through the use of judgmental or biased sampling. Rather than a statistically random sampling program, sample locations will be chosen that have the greatest probability of encountered contamination. Since the decision logic is essentially binary, whether additional investigation is warranted or not, decision error should be minimized, although not explicitly quantified. This approach implicitly assumes that contamination will be greater near the source than downgradient.

Type I errors (the null hypothesis is assumed to be site contamination to levels that warrant investigation) would occur if site data indicate that analyte concentrations are below screening criteria and are consistent with background conditions when true site conditions warrant investigation. This could be considered a "false negative." This error will be minimized by sampling close to the potential source, where contamination is assumed to be greatest. The alternative hypothesis, Type II error, would occur when site conditions indicate that additional investigations are warranted when true site conditions do not warrant investigation. This could be considered a "false positive." This type of error will be minimized through data quality assurance procedures and data validation.

More rigorous statistical treatment of decision error and sampling design are not warranted for this type of screening level investigation and binary decision logic. This more rigorous treatment may be applied during the design of the additional investigations, if warranted.

5.3.7 Step 7: Optimize the Design

As noted above in Section 5.3.1, the most likely location for contamination related to site activities would be immediately downgradient of the catch basins and on the ground surface immediately adjacent to the catch basins. Because the release occurred at the surface, it is unlikely that the entire mass released would infiltrate into the subsurface, resulting in non-detect values in the surface samples. If contamination is present, the majority would be expected to occur in the surface soils.

The downgradient surface soil samples will be collected immediately downgradient, 25 ft downgradient, and 50 ft downgradient of the catch basin at Building 785. Downgradient soil samples associated with Building 1051 will be collected immediately downstream and approximately 10 ft downstream from the catch basin. Two surface soil samples will be collected on each side of each former catch basin to address overflow spills that may have occurred. As shown in Figures 5-1 and 5-2, these samples will be aligned perpendicular to flow direction from the catch basin. The SSP Investigation sample parameters are summarized in Table 5-1.

The Indian Head Base personnel have removed large chips that may have been on the ground in the vicinity of the catch basins as a result of past releases. In the event that any chips are encountered during the sampling effort, CH2M HILL will stop all work immediately and remove personnel from the Site. Shawn Jorgensen of NDWIH will be immediately notified of the presence of potentially explosive chips.

TABLE 5-1
Site 19 SSP Investigation Scope
SSP Investigation Work Plan, CTO-050,
NDWIH, Indian Head, Maryland

Sample Media/Type	Sample ID Number	Sample Location	Sample Analyses
Surface Soil (or Sediment)			
Primary	IS19SS010001	IS19SS01	Laboratory Analyses:
	IS19SS020001	IS19SS02	TAL metals, explosives (including nitroglycerin and nitroguanidine), TOC, and pH
	IS19SS030001	IS19SS03	
	IS19SS040001	IS19SS04	
	IS19SS050001	IS19SS05	
	IS19SS060001	IS19SS06	
	IS19SS070001	IS19SS07	
	IS19SS080001	IS19SS08	
	IS19SS090001	IS19SS09	
MS/MSD*	IS19SS020001	IS19SS02	
Duplicate*	IS19SS110001	IS19SS06	
Equipment Blank*	IS19EB####04	ASTM Type II water collected after washing and rinsing sampling equipment	

Represents the 4-digit value for day and month in which QC sample was collected

* An MS/MSD, duplicate, and equipment blank specifically associated with Site 19 may not be required if these QA/QC samples are collected at other sites. Please refer to Section 4 for the appropriate collection frequency for these QA/QC samples.

For the determination of the sample IDs, it is assumed that the samples will be comprised of surface soil. If sediment is found at any of the sampling locations, the sample ID will be changed accordingly (i.e., the SS will be changed to SD).

Health and Safety: Chip collection equipment has been removed from the site. No samples will be collected if chip collection equipment is still in place or if bright orange chips (potential explosive contaminants) are found in the area. Please notify Shawn Jorgensen at (301) 744-2263 if either are found at the site.

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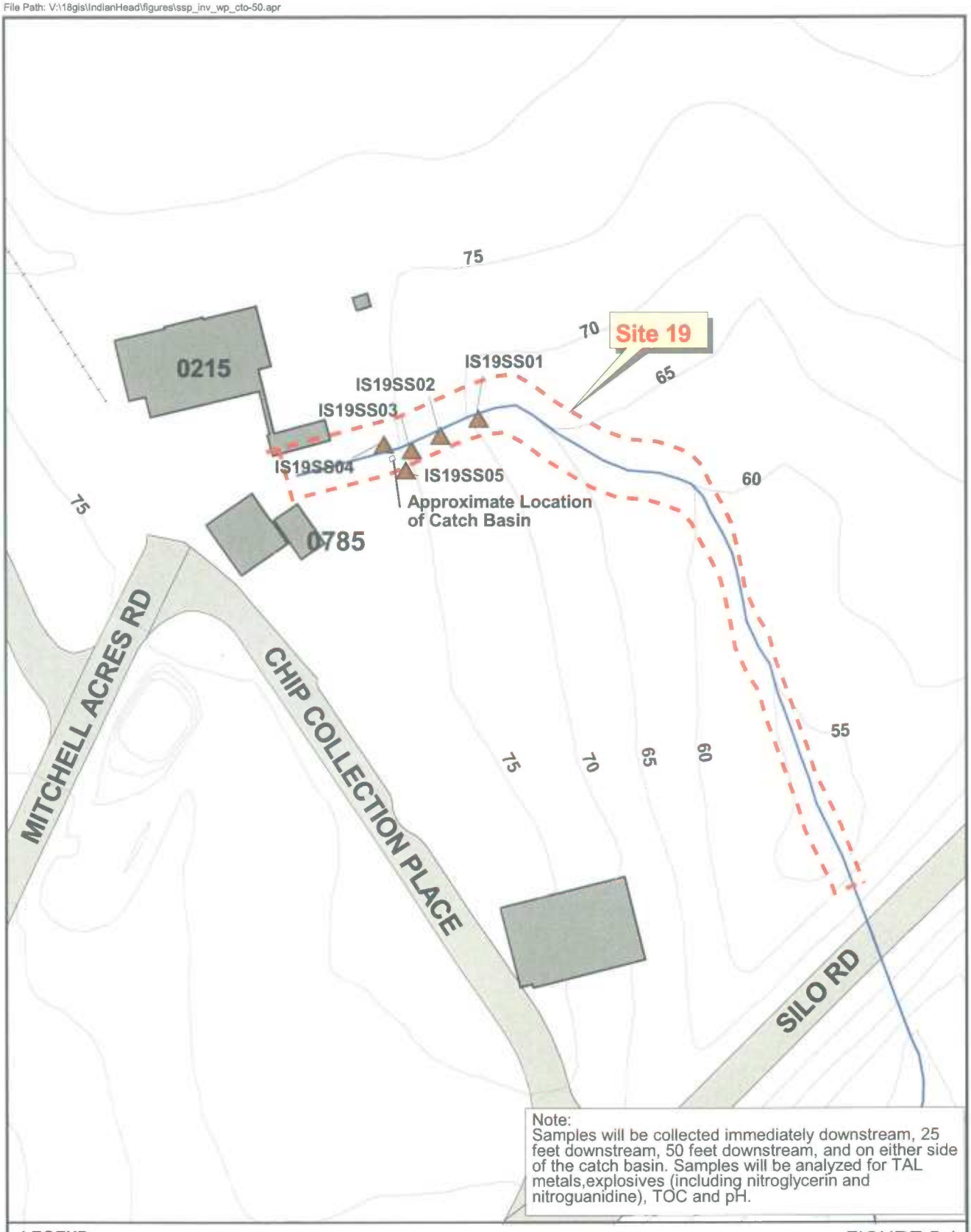

LEGEND

- Approximate Site Boundary
- Elevation Contour (5 Foot interval)
- Buildings
- Water Bodies
- Railroads
- Roads & Paved Areas
- Approximate Sediment or Surface Soil Sample

N

0 75 Feet

1 INCH = 75 FEET

FIGURE 5-1
SITE 19 PROPOSED SAMPLE LOCATIONS AT BUILDING 785
SSP INVESTIGATION WORK PLAN, CTO-050
NDWIH, INDIAN HEAD, MARYLAND

CH2MHILL

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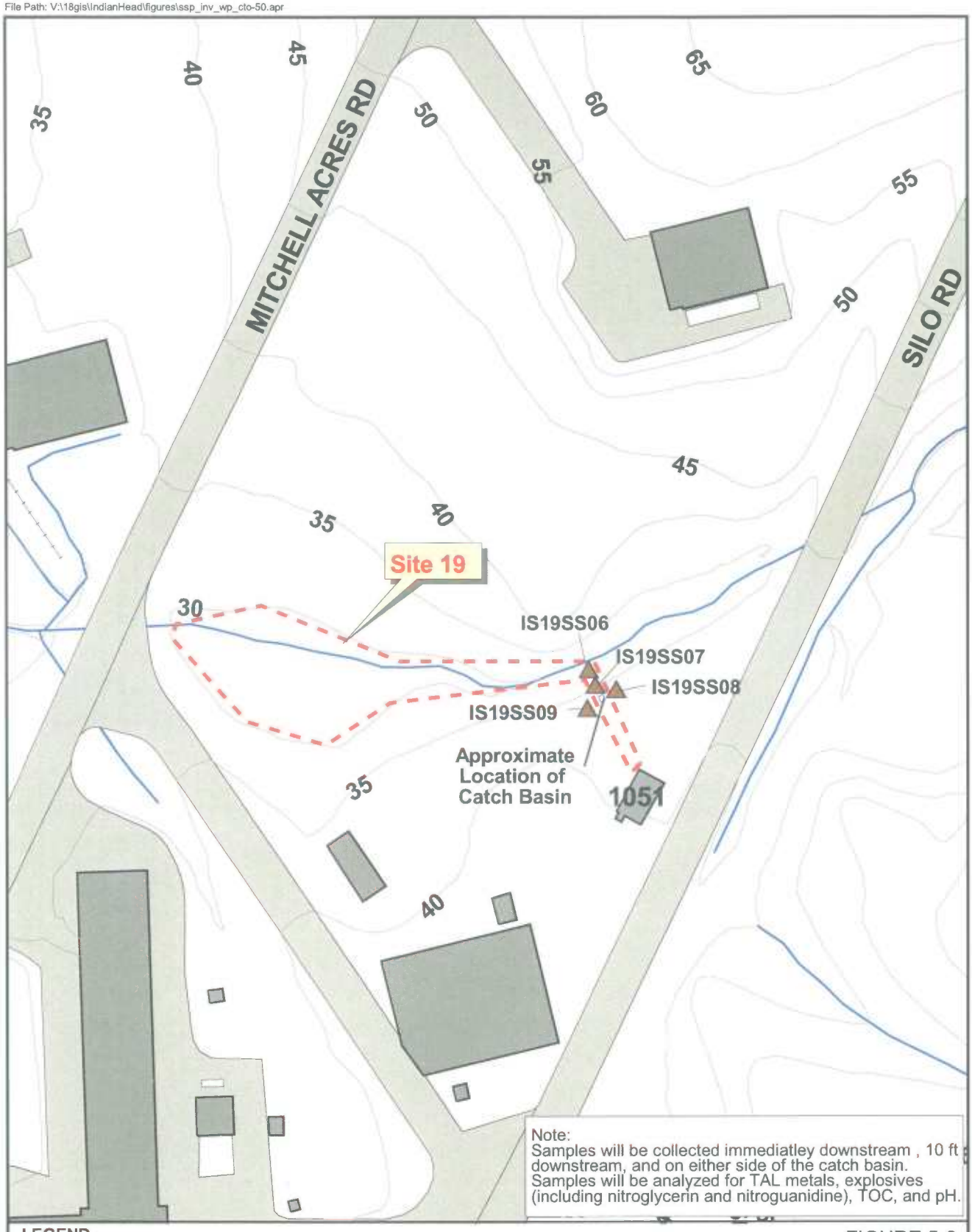

FIGURE 5-2
SITE 19 PROPOSED SAMPLE LOCATIONS AT BUILDING 1051
SSP INVESTIGATION WORK PLAN, CTO-050
NDWIH, INDIAN HEAD, MARYLAND

CH2MHILL

SECTION 6

SSP Investigation at Site 26

6.1 Site Description

Site 26 consists of the concrete pad (Building 1595) where the former Thermal Destructor 2 was located and the immediate surrounding area. The approximate Site 26 boundary is shown in Figure 6-1 and encompasses approximately 0.06 acre.

6.2 Previous Investigations

Site 26 was first identified in the IAS (Fred C. Hart Associates, 1983). At the time of the IAS, site visits did not indicate the presence of any spillage or evidence of stressed vegetation in the area surrounding the incinerator.

No studies have been performed at Site 26 since the IAS.

6.3 Data Quality Objectives

6.3.1 Step 1: State the Problem

Potential spills from the operation of the Thermal Destructor 2 may have contaminated soils surrounding the concrete pad where the Thermal Destructor 2 was located.

Conceptual Site Model

Site 26 was the location of an incinerator constructed on a concrete pad, labeled as Building 1595 in Figure 6-1. The destructor was a propane-fired incinerator that was used to burn wastewater contaminated with hydrazine-fuel and UDMH. According to the IAS (Fred C. Hart Associates, 1983), Site 26 and associated structures were in operation from 1976 to 1978. However, other NDWIH records (e.g., a February 1983 buildings list) indicate that Buildings 1595 through 1599 were constructed in 1977. Buildings 1595 through 1598 were demolished in 2001. Building 1599 still exists. Current site features in and around Site 26 are shown in Figure 6-1.

Possible spills of hydrazine- and UDMH-contaminated wastewater may have occurred in the immediate vicinity of the incinerator. Although no pipe ruptures or leaks were noted in available site records, small releases of hydrazine- or UDMH-contaminated wastewater may have occurred at the location where the inflow piping entered the incinerator above the concrete pad. UDMH and hydrazine are generally unstable in the natural environment and decompose in the atmosphere, soil and groundwater environments; they are not considered to be persistent contaminants. Given the instability, sufficient mass is unlikely to have been available for extensive subsurface contamination. Residual contamination, if present, is more likely to be detected in surficial soils.

6.3.2 Step 2: Identify the Decision

The primary questions are (1) if the surface soils surrounding the concrete pad are contaminated, and (2) if the magnitude of contamination warrants further investigation. Following the collection of information during the SSP Investigation, one of the following management decisions will be made following the CERCLA process:

1. Site 26 will require additional investigation and may be advanced in the CERCLA process to the appropriate next step (e.g. RI, FS, interim response action, etc.).
2. Site 26 warrants NFA.

6.3.3 Step 3: Identify Inputs to the Decision

Surface soil samples collected at the site will be analyzed for potential contaminants (UDMH and hydrazine) identified in the site conceptual model. Surface soil samples will also be analyzed for TAL metals, TCL SVOCs, TCL VOCs, and explosives (including nitroglycerin and nitroguanidine) even though they were not identified in the accounts of historical activities. They are included because historical operations at similar sites, such as Site 27, included analysis for these parameters. The samples will also be analyzed for TOC and pH to better enable the evaluation of data for ecological screening.

For the human health screening, the maximum detected concentrations in each media at each site will be compared to the appropriate USEPA Region III RBC from the current USEPA Region III RBC table. The ecological screening will evaluate if viable habitats are present and if site-related releases can affect viable habitat. If true, then chemical concentrations measured in samples of site media will be compared to applicable literature-based screening toxicity values. Analyte-specific background values from facility-wide background studies (Tetra Tech NUS, Inc., 2002a) will be used to establish whether site-related releases have occurred.

6.3.4 Step 4: Define the Boundaries of the Study

This investigation will focus on surface soils adjacent to the concrete pad since the greatest concentrations of potential contaminants are expected to reside in this area. As noted above in Section 6.3.1, wastewater may have historically spilled from the thermal destructor, possibly causing contamination of soils surrounding the pad. Based on this information, four sampling locations are proposed adjacent to the concrete pad that supported the former incinerator unit. Proposed sampling locations at Site 26 are shown in Figure 6-1. The SSP Investigation sample parameters are summarized in Table 6-1.

6.3.5 Step 5: Develop a Decision Rule

The data collected during this investigation will be compared to risk-based screening criteria and background concentrations to determine if soil concentrations present a potential threat to human health and/or the environment. The decision logic is summarized graphically in Figure 2-1.

6.3.6 Step 6: Specify Limits on Decision Error

A binary decision logic, similar to that used at Site 19 (Section 5.3.6), will be used at Site 26 to minimize decision errors in the SSP Investigation.

6.3.7 Step 7: Optimize the Design

Because UDMH and hydrazine are unstable in the natural environment and decompose rapidly when exposed to the atmosphere, surface spills containing these compounds, if they occurred, are not likely to have resulted in subsurface UDMH or hydrazine contamination. However, to assess the presence of subsurface contamination, four soil borings will be advanced at Site 26, each to a depth of 20 ft or to the first occurrence of saturated soils, whichever occurs first. One boring will be drilled on each side of the concrete pad and one soil sample will be collected from each boring.

Subsurface soil conditions will be logged and examined in the field. If field evidence of contamination (e.g., soil discoloration, odor, or elevated PID measurements) is observed, one sample will be retained from the depth interval exhibiting the greatest evidence of contamination. If no such evidence is observed, then soil from the uppermost 2 ft of soil column will be retained for laboratory analysis. Multiple samples may be collected from a single boring if warranted by field evidence of contamination. Samples will be analyzed for UDMH, hydrazine, TAL metals, TCL SVOCs, TCL VOCs, and explosives (including nitroglycerin and nitroguanidine), TOC, and pH.

TABLE 6-1
Site 26 SSP Investigation Scope
SSP Investigation Work Plan, CTO-050,
NDWIH, Indian Head, Maryland

Sample Media/Type	Sample ID Number	Sample Location	Sample Analyses
Soil			
Primary	IS26SB01XXXX*	IS26SB01	Laboratory Analyses: UDMH, Hydrazine, TAL metals, TCL SVOCs, TCL VOCs, and explosives (including nitroglycerin and nitroguanidine), TOC, and pH
	IS26SB02XXXX*	IS26SB02	
	IS26SB03XXXX*	IS26SB03	
	IS26SB04XXXX*	IS26SB04	
MS/MSD**	IS26SB01XXXX*	IS26SB01	
Duplicate**	IS26SB02XXXX*	IS26SB01	
Equipment Blank**	IS26EB####04	ASTM Type II water collected after washing and rinsing sampling equipment	

represents the 4-digit value for day and month in which QC sample was collected

* XXXX represents the depth interval (2-digit beginning depth and 2-digit end depth rounded up to nearest foot) selected for sampling. If field observations and measurements indicate no presence of contamination in the soil boring, the soil sample will be retained for laboratory analysis from the 0 to 2 ft bgs depth interval. Additional samples may be collected if multiple depth intervals appear to be contaminated, based on field observations and measurements.

** An MS/MSD, duplicate, and equipment blank specifically associated with Site 26 may not be required if these QA/QC samples are collected at other sites. Please refer to Section 4 for the appropriate collection frequency for these QA/QC samples

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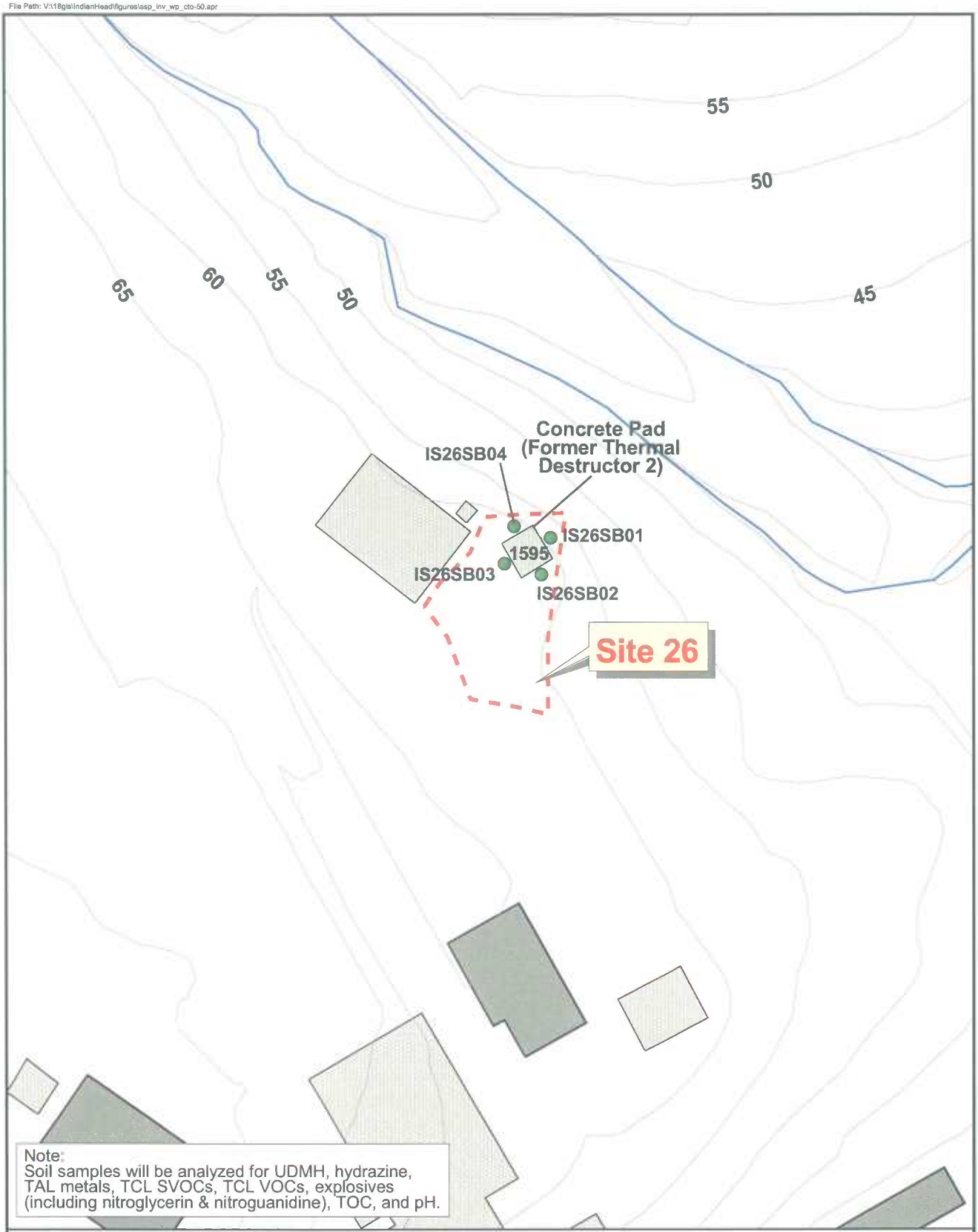

FIGURE 6-1
SITE 26 PROPOSED SAMPLE LOCATIONS
SSP INVESTIGATION WORK PLAN, CTO-050
NDWIH, INDIAN HEAD, MARYLAND

CH2MHILL

SECTION 7

SSP Investigation at Site 27

7.1 Site Description

Similar to Site 26, Site 27 consists of the concrete pad, which formerly held Thermal Destructor 1, and the immediate vicinity. The concrete pad and approximate location of Site 27 is shown on Figure 7-1. The approximate area of Site 27 is 0.27 acre.

7.2 Previous Investigations

Site 27 was first identified in the IAS (Fred C. Hart Associates, 1983). At the time of the IAS, site visits did not indicate the presence of any spillage or evidence of stressed vegetation in the area surrounding the incinerator.

No studies have been performed at Site 27 since the IAS.

7.3 Data Quality Objectives

7.3.1 Step 1: State the Problem

Potential spills from the operation of the Thermal Destructor 1 may have contaminated soils surrounding the concrete pad, the former location of the Thermal Destructor 1.

Conceptual Site Model

Similar to Site 26, Thermal Destructor 1 was a propane-fired incinerator that burned wastewater between 1976 and 1979. Site 27 was historically named Building 1584 Thermal Destructor Pad Area, and consisted of an outside concrete pad upon which the incinerator was located. Site 27 is shown in Figure 7-1.

Historical information concerning the wastewater incinerated at Thermal Destructor 1 varies. The IAS (Fred C. Hart Associates, 1983) notes that the incinerator burned hydrazine-containing fuel and UDMH-contaminated wastewater. However, in a Standard Job Procedure (SJP), *Contaminated Organic Waste Disposal by Incineration,* dated December 4, 1978, chemicals listed in the Hazardous Materials Index for the site and adjacent buildings do not include hydrazine or UDMH. A recent interview with a prior site employee (conducted by Navy personnel) indicated the wastewater was generated from the caustic recovery area and contained neutralized caustic salts. Additionally, the interviewee indicated UDMH was not treated at Site 27.

During operation of the incinerator, the area, with the exception of the actual incinerator, was diked. Potentially, small spills may have occurred in the area of the incinerator when the pump transferring wastewater did not switch off in time.

The thermal destructor at Site 27 has been dismantled, and only the concrete pad currently remains at the site. The concrete pad for Building 1584 is approximately 15 ft^2 surrounded by a grass covered area. Building 406 is located adjacent to the site. Building 406, constructed in 1923, was used as a nitre cake (sodium bisulfate) shed until 1947 when it became a storehouse for acid plant filter materials. From 1957, the building was used as a chemical storehouse, until 1976 when it was used or tool and equipment storage. Since 1999, Building 406 has been used as a HVAC storage building.

Possible spills of contaminated wastewater may have occurred in the immediate vicinity of the incinerator. Although no pipe ruptures or leaks were noted in available site records, small releases of contaminated wastewater may have occurred at the location where the inflow piping entered the incinerator. Available records for the site do not indicate specific contaminants (e.g., UDMH) that may have been incinerated at the site. For this reason, the specific fate and transport properties of chemical potentially released at Site 27 cannot be predicted.

7.3.2 Step 2: Identify the Decision

The primary questions are (1) if the surface soils surrounding the concrete pad are contaminated, and (2) if the magnitude of contamination warrants further investigation. Following the collection of information during the SSP Investigation, one of the following management decisions will be made following the CERCLA process:

1. Site 27 will require additional investigation and may be advanced in the CERCLA process to the appropriate next step (e.g. RI, FS, interim response action, etc.).
2. Site 27 warrants NFA.

7.3.3 Step 3: Identify Inputs to the Decision

Since the historical uses of the incinerator appear to have varied, the surface soil samples collected at Site 27 will be analyzed for all suspected contaminants including UDMH, hydrazine, TAL metals, TCL SVOCs, TCL VOCs, and explosives. The samples will also be analyzed for TOC and pH to better enable the evaluation of data for ecological screening.

For the human health screening, the maximum detected concentrations in each media at each site will be compared to the appropriate USEPA Region III RBC from the current USEPA Region III RBC table. The ecological screening will evaluate if viable habitats are present and if site-related releases can affect viable habitat. If true, then chemical concentrations measured in samples of site media will be compared to applicable literature-based screening toxicity values. Analyte-specific background values from facility-wide background studies (Tetra Tech NUS, Inc., 2002a) will be used to establish whether site-related releases have occurred.

7.3.4 Step 4: Define the Boundaries of the Study

This investigation will focus on surface soils adjacent to the concrete pad since the greatest concentrations of potential contaminants, if present, are expected to reside in this area. Sampling locations are proposed adjacent to the concrete pad that supported the former incinerator unit. Proposed sampling locations at Site 27 are shown in Figure 7-1.

To address the uncertainty in the types of waste incinerated at Site 27, surface soil samples will be analyzed for a wide range of chemicals that may have been present in the waste. Samples will be analyzed for UDMH, hydrazine, TAL metals, TCL SVOCs, TCL VOCs, explosives (including nitroglycerin and nitroguanidine), TOC, and pH. The SSP Investigation sample parameters are summarized in Table 7-1.

7.3.5 Step 5: Develop a Decision Rule

The data collected during this investigation will be compared to risk-based screening criteria and background concentrations to determine if soil concentrations present a potential threat to human health and/or the environment. The decision logic is summarized graphically in Figure 2-1.

7.3.6 Step 6: Specify Limits on Decision Error

A binary decision logic, similar to that used at Site 19 (Section 5.3.6), will be used at Site 27 to minimize decision errors in the SSP Investigation.

7.3.7 Step 7: Optimize the Design

To assess the presence of subsurface contamination, four soil borings will be advanced at Site 27, each to a depth of 20 ft or to the first occurrence of saturated soils, whichever occurs first. One boring will be drilled on each side of the concrete pad and one soil sample will be collected from each boring.

Subsurface soil conditions will be logged and examined in the field. If field evidence of contamination (e.g., soil discoloration, odor, or elevated PID measurements) is observed, one sample will be retained from the depth interval exhibiting the greatest evidence of contamination. If no such evidence is observed, then soil from the uppermost 2 ft of soil column will be retained for laboratory analysis. Multiple samples may be collected from a single boring if warranted by field evidence of contamination.

TABLE 7-1
Site 27 SSP Investigation Scope
SSP Investigation Work Plan, CTO-050,
NDWIH, Indian Head, Maryland

Sample Media/Type	Sample ID Number	Sample Location	Sample Analyses
Soil			
Primary	IS27SB01XXXX*	IS27SB01	Laboratory Analyses: UDMH, Hydrazine, TAL metals, TCL SVOCs, TCL VOCs, explosives (including nitroglycerin and nitroguanidine), TOC, and pH
	IS27SB02XXXX*	IS27SB02	
	IS27SB03XXXX*	IS27SB03	
	IS27SB04XXXX*	IS27SB04	
MS/MSD**	IS27SB01XXXX*	IS27SB01	
Duplicate**	IS27SB05XXXX*	IS27SB03	
Equipment Blank**	IS27EB####04	ASTM Type II water collected after washing and rinsing sampling equipment	

represents the 4-digit value for day and month in which QC sample was collected

* XXXX represents the depth interval (2-digit beginning depth and 2-digit end depth rounded up to nearest foot) selected for sampling. If field observations and measurements indicate no presence of contamination in the soil boring, the soil sample will be retained for laboratory analysis from the 0-to-2-ft-bgs depth interval. Additional samples may be collected if multiple depth intervals appear to be contaminated, based on field observations and measurements.

** An MS/MSD, duplicate, and equipment blank specifically associated with Site 27 may not be required if these QA/QC samples are collected at other sites. Please refer to Section 4 for the appropriate collection frequency for these QA/QC samples

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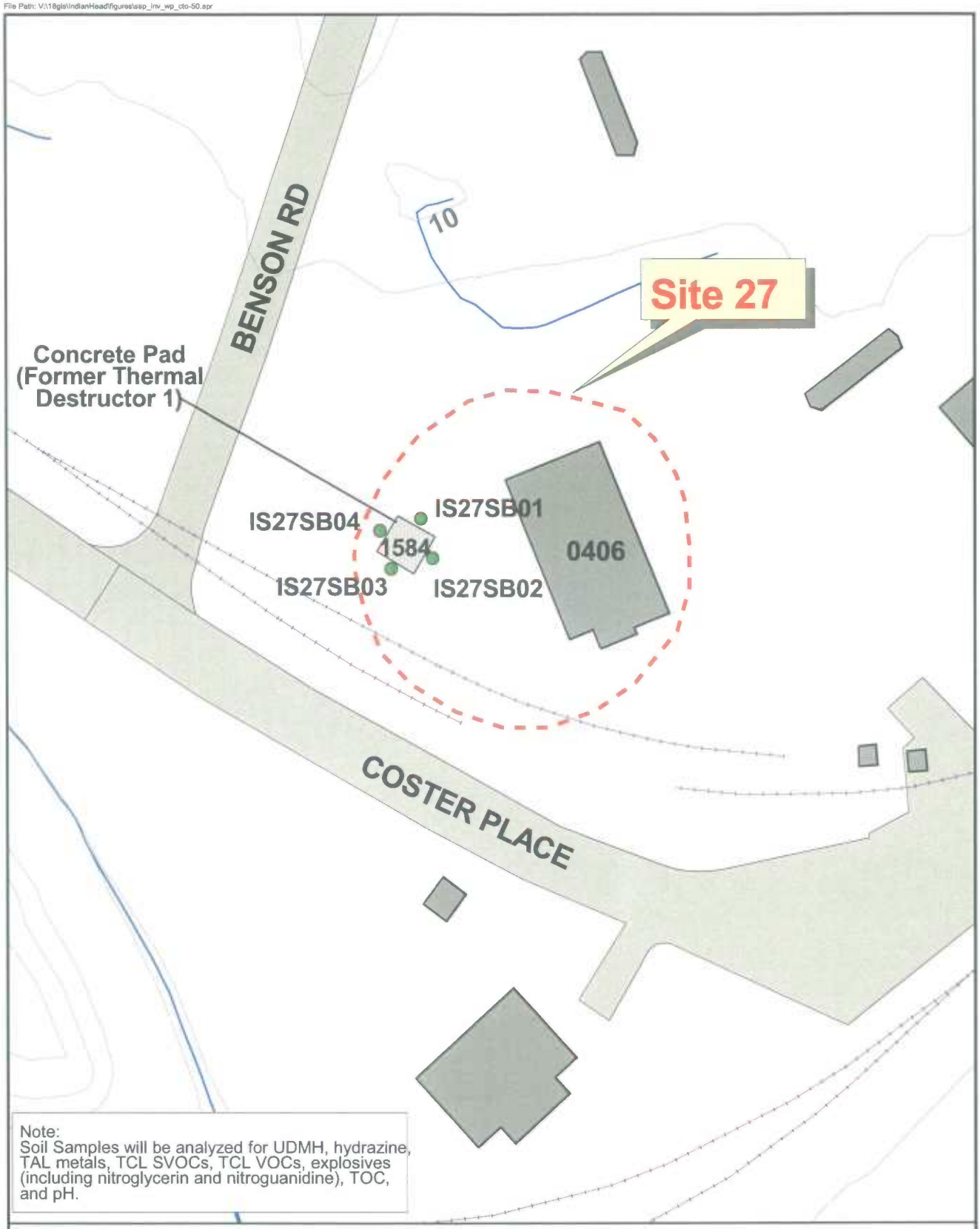

FIGURE 7-1
SITE 27 PROPOSED SAMPLE LOCATIONS
SSP INVESTIGATION WORK PLAN, CTO-050
NDWIH, INDIAN HEAD, MARYLAND

CH2MHILL

SECTION 8

SSP Investigation at Wetland Area Adjacent to Site 45

8.1 Site Description

The wetland area adjacent to Site 45 is located in the northwest-central portion of NDWIH and lies roughly 100 ft south of Site 45 (Figures 1-7 and 8-1). The wetland boundary shown in the figures is approximate, and has shifted slightly in the area shown in response to environmental changes. The area of the wetland as shown in the figure is approximately 0.10 acre.

8.2 Previous Investigations

In 1992, a Preliminary Assessment (PA) (NEESA, 1992) was performed at Site 45 to identify if potential contamination existed at the site and document the presence of the abandoned drums. Following a recommendation in the PA, Ensafe/Allen & Hoshall (1994) conducted a Site Inspection (SI) to determine if surface soils had been contaminated as a result of abandoned drums. The SI consisted of three shallow soil samples (0 to 1 ft bgs) and four soil gas samples.

None of the detected concentrations exceeded corresponding USEPA Region III RBC screening levels. Soil gas readings registered low levels of total volatiles, xylene, and tetrachloroethene (PCE), although none of these concentrations exceeded the USEPA Region III RBC screening levels for air inhalation.

The 1994 SI Report recommended further investigation at Site 45 and the removal of all drums located at the site.

Subsequently, a RI was performed to further characterize Site 45 (the drum disposal area) and to collect samples from the adjacent wetland area. The RI field investigation (HydroGeoLogic, 2004) evaluated the presence of VOCs, SVOCs, explosives and metals in the surface soil, subsurface soil, shallow groundwater in the drum disposal area, and surface water and sediments at the adjacent wetland. Four samples each of surface soil, subsurface soil, and grab shallow groundwater were collected in the drum disposal area, and four sediment and two surface water samples were collected from the wetland area. Site-specific background surface soil and subsurface soil samples were also collected.

Results from the RI were documented in a report, which concluded that, although the corroded drums appear to have resulted in contamination of the Site 45 surface soil, this contamination is limited to the area immediately surrounding the drums (HydroGeoLogic, 2004). The data also indicated that contamination from the drums has not leached substantially to the underlying subsurface soil or groundwater, nor migrated downgradient to the wetland. No potential risks were identified for Site 45. A final Proposed Plan

recommending NFA at Site 45 was completed on October 19, 2004 (CH2M HILL, 2004c). The public comment period was held from October 19, 2004, through November 17, 2004, and a public meeting was held on October 21, 2004. No significant comments were received. The draft final Record of Decision for this site is currently under review.

In the adjacent wetlands, three VOCs and 13 SVOCs were detected in the sediment samples. No VOCs or SVOCs were detected in the surface water samples. Explosives were not detected in either surface water or sediment samples. Twenty-two inorganics were detected in sediment samples, while 19 inorganics were detected in the surface water samples. Most of the inorganic compounds are naturally occurring, contributing to detected concentrations.

A baseline Human Health Risk Assessment (HHRA) and screening level ERA were performed for the wetland area to assess the potential threat of the detected compounds to human and ecological receptors. The HHRA indicated no unacceptable risks associated with the constituents in surface water and sediment. The screening level ERA indicated that sediments pose a minimal risk to ecological receptors, but that copper, lead, zinc, aluminum, and silver in the surface water may pose a risk to aquatic receptors.

The RI recommended that the ERA proceed to Step 3B (Problem Formulation), the first step of a BERA, for surface water in the Wetland Area Adjacent to Site 45. The samples collected during this investigation will be used in the BERA to be conducted for the Wetland Area Adjacent to Site 45.

8.3 Data Quality Objectives

8.3.1 Step 1: State the Problem

The influx of water to the wetland area may have elevated the inorganic content of the surface water to a level that poses unacceptable risk to ecological receptors. Additional surface water samples will be collected to provide insight into temporal changes in water quality and to update the screening level ERA for the wetland in support of a BERA for the wetland, if necessary.

The wetland area adjacent to Site 45 is flat, and there is no apparent surface water outflow from the area. During the 2001 RI at Site 45 (upgradient), groundwater levels were found to be 3.4 to 5.6 ft bgs (HydroGeoLogic, 2004). Surface topography observed during an April 2004 site visit indicates that surface water entering the wetland area infiltrates into groundwater rather than flowing offsite.

Buildings and structures located near the site consist of an equipment building (Building 1899) and several tanks and secondary containment structures that contain acids and caustics (Buildings 674, 1988, 1989, 1991, and 1990). These buildings and structures were built between 1995 and 1998.

Influx to the wetland includes discharge from secondary containment from the nearby caustic tanks. After significant precipitation events, NDWIH personnel open a valve to release standing water from the secondary containment after it is sampled for pH. This effluent flows into a stormwater management structure and overflow from the structure flows into the wetlands.

Originally, the wetland area was considered to lie within the Site 45 boundaries. Site 45 includes a former abandoned drum storage area. Although the origin and original contents of the drums at Site 45 are not known, they may have contained solvents used in the soak-out process at nearby Site 44 (HydroGeoLogic, 2004). Under this process, a soak tank was filled with solvent to remove propellant from rocket motor catapult tubes (NEESA, 1992). However, investigation data collected during the RI at Sites 6, 39, and 45 (HydroGeoLogic, 2004) indicated that the wetland was not affected by contamination associated with the drum abandonment area. For this reason, the wetland was removed from Site 45 and is being investigated as a separate SSA.

8.3.2 Step 2: Identify the Decision

The primary question is if additional investigation, in the form on a BERA, is warranted at this site. The results of the surface water sampling will be used to update the screening level ERA for the wetland. If a potential risk to aquatic receptors is confirmed by the second round of surface water sampling, then the problem formulation (Step 3B) to support a BERA for the wetland will be prepared along with the update to the screening level ERA. If the potential risk is not confirmed, then NFA will be recommended for the Wetland Area Adjacent to Site 45.

8.3.3 Step 3: Identify Inputs to the Decision

The surface water samples collected from the wetland will be analyzed for the constituents identified which potentially pose an unacceptable risk to ecological receptors (filtered and unfiltered metals). The samples will also be analyzed for hardness, TOC, and pH to better enable the evaluation of data for ecological screening. These analytical data will be compared to various sets of ecological risk-based screening criteria (e.g., ORNL Preliminary Remediation Goals for Ecological Endpoints).

At this site, both new and historical surface water data will be used to update the screening level ERA for the wetland. If a potential risk to aquatic receptors is confirmed by surface water sampling completed during the SSP Investigation, then the problem formulation (Step 3B) to support a BERA for the wetland will be prepared along with the update to the screening level ERA.

8.3.4 Step 4: Define the Boundaries of the Study

Two surface water samples will be collected from the wetland area, assuming that surface water is present during the SSP Investigation. Sample locations may change based on the location of the surface water in the wetland area. Care will be taken to ensure that the sediments are not disturbed prior to sample collection to avoid introducing suspended particles in the samples. The samples will be analyzed for filtered and unfiltered metals, dissolved organic carbon (DOC), TOC, hardness, and pH. The samples will not be analyzed for VOCs because no VOCs were detected in the previous samples. In addition, the following field water quality parameters will be measured in the field at the time of sample collection: dissolved oxygen, specific conductivity, pH, ORP, temperature, and turbidity. The SSP Investigation sample parameters are summarized in Table 8-1.

8.3.5 Step 5: Develop a Decision Rule

The data collected during this investigation will be compared to risk-based screening criteria and background concentrations to determine if surface water concentrations present a potential threat to human health and/or the environment.

8.3.6 Step 6: Specify Limits on Decision Error

A binary decision logic, similar to that used at Site 19 (Section 5.3.6), will be used at the Wetland Area Adjacent to Site 45 to minimize decision errors in the SSP Investigation.

8.3.7 Step 7: Optimize the Design

Sediment samples are not proposed for the wetland area because the screening level ERA indicated that sediments pose a minimal risk to ecological receptors (HydroGeoLogic, 2004) and good spatial coverage of the wetland sediments was achieved during the previous sampling effort.

TABLE 8-1
Wetland Area Adjacent to Site 45 SSP Investigation Scope
SSP Investigation Work Plan, CTO-050,
NDWIH, Indian Head, Maryland

Sample Media/Type	Sample ID Number	Sample Location	Sample Analyses
Surface Water			
Primary	IA45SW010001	IA45SW01	Laboratory Analyses:
	IA45SW020001	IA45SW02	TAL metals (filtered and unfiltered), DOC, TOC, pH, and hardness
MS/MSD*	IA45SW020001	IA45SW02	
Duplicate*	IA45SW060001	IA45SW02	
Equipment Blank*	IA45EB####04	ASTM Type II water collected after washing and rinsing sampling equipment	

represents the 4-digit value for day and month in which QC sample was collected

* An MS/MSD, duplicate, and equipment blank specifically associated with the Wetland Area Adjacent to Site 45 may not be required if these QA/QC samples are collected at other sites. Please refer to Section 4 for the appropriate collection frequency for these QA/QC samples.

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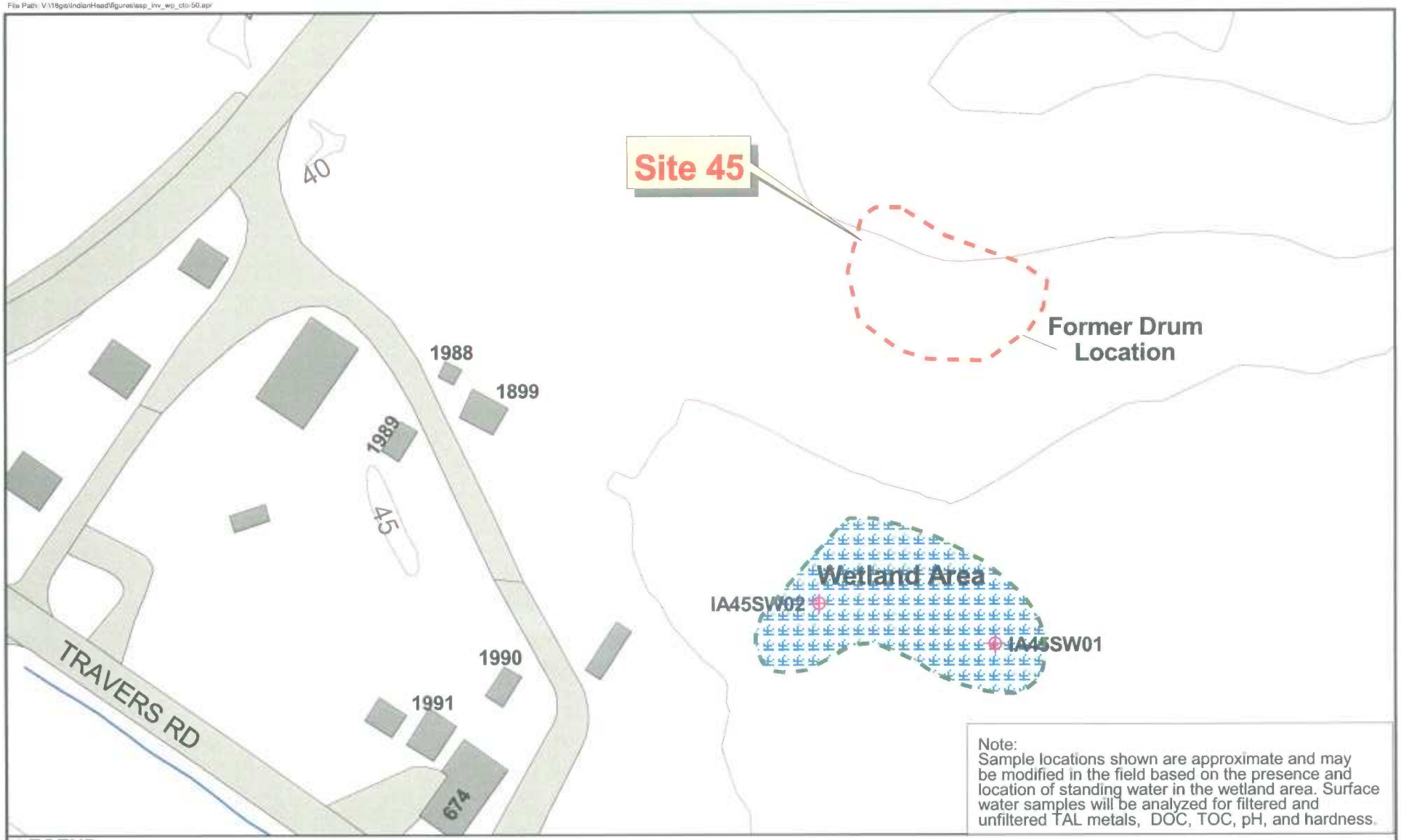

FIGURE 8-1
WETLAND AREA PROPOSED SAMPLE LOCATIONS
SSP INVESTIGATION WORK PLAN, CTO-050
NDWIH, INDIAN HEAD, MARYLAND

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SECTION 9

SSP Investigation at Stump Neck SWMU 14

9.1 Site Description

Stump Neck SWMU 14 is located in the Stump Neck Annex and is approximately 300 ft south of the Potomac River. The site consists of a photographic laboratory (Building 22SN), X-ray facility (Building 2009), and the associated two septic tanks, discharge lines, and drain fields as shown in Figure 9-1. The approximate area of Stump Neck SWMU 14 is 2.4 acres.

9.2 Previous Investigations

Stump Neck SWMU 14 was inspected during the RCRA Facility Assessment (RFA) in 1990. Stump Neck SWMU 14 was included in a January 2002 Desk-Top Audit Decision Document (Tetra Tech NUS, Inc., 2002b), which was signed by Remedial Project Managers from NDWIH, Engineering Field Activity Chesapeake (EFACHES), and EPA Region 3. The decision reached during the desktop audit was that, due to lack of investigation data available, Stump Neck SWMU 14 should be retained as an area of concern pending additional investigation of the old drain field associated with Stump Neck SWMU 14.

9.3 Data Quality Objectives

9.3.1 Step 1: State the Problem

Discharges from the septic systems may have contaminated the soil and/or groundwater in the vicinity of the drain fields.

Conceptual Site Model

The original septic tank system at Stump Neck SWMU 14 was constructed in approximately 1968. Photographic development chemicals containing silver, hydroquinone, and sodium thiosulfate were discharged for an unknown period (not continuously) to the original septic system (A.T. Kearney, Inc., 1990). The septic effluent was chlorinated before discharging to the Potomac River.

Historically, discharge to the Potomac River originated from sanitary and industrial sources at the site. The sanitary effluent was regulated under National Pollutant Discharge Elimination System (NPDES) Permit MD0020885. The industrial effluent was regulated under NPDES permit MD0003158. These permits are still in effect and regulate sanitary and industrial discharges at other locations on the base. Violations of the sanitary NPDES permit (MD0020885) were documented for exceedances of DO and/or chlorine limits set in the permit. These two permits govern the discharges for both the Indian Head and Stump Neck Annex Activity Areas. Both NPDES permits have been renewed twice since the original permits expired in April 1993, and are, at present, in effect at the facility.

At the time of a 1990 RFA, (A.T. Kearney, Inc., 1990), waste fixer containing silver was containerized in Building 22SN and transported off-site for silver recovery. No evidence of release was documented during a Visual Site Inspection (VSI) conducted as part of the RFA.

The 1990 RFA Report stated that the original septic system was replaced with a new system following the VSI. Available construction documents indicate that the original septic tank was abandoned in place. The 1990 RFA Report indicated that the new septic system eliminated surface discharges to the Potomac River. The RFA Report also stated that the new septic system handled only sanitary wastewater from Building 22SN and was inspected weekly, in accordance with NPDES permit conditions. The NDPES outfall was sampled monthly.

The 1990 RFA Report did not account for discharges from Building 2009 that continued to discharge into the new septic tank system. Waste fixer from the X-ray facility, which contains silver, was treated on-site for silver recovery and then released to the septic system with the wash water and developer.

The NDWIH, formerly known as Indian Head Division Naval Surface Warfare Center (IHDIV/NSWC, 1998), documented failing septic systems at the Stump Neck Annex, including the newer septic system that serviced Buildings 22SN and 2009. NDWIH noted that the drain field had become clogged due to an overload of sewage into the system, causing floating solids to rise through the tank and clog the downstream drainpipes. This resulted in periodic back-ups of sewage from the septic tank into Building 22SN.

Since 2002, Buildings 22SN and 2009 have been connected to a pipeline that conveys sanitary and process wastewater from the building to the NDWIH wastewater treatment plant. Consequently, neither of the two septic systems at the site is in use. Currently, silver-contaminated waste fixer from the X-ray facility is treated on-site for silver recovery and then released to the sewer pipeline with the wash water and developer. In 1999, the photographic laboratory was converted to a completely digital system and no longer discharges waste into the sanitary sewer system.

Based on available site information, the septic tank drain fields are the most likely locations for contaminants associated with historic activities at Stump Neck SWMU 14. Constituents released into the drain fields may include VOCs, SVOCs, and metals. These constituents, if present, are likely to be found in near-surface soils within the drain field. Some chemicals may be water-soluble and therefore may have migrated vertically through the vadose zone into underlying groundwater. At least some residual contamination will remain in near-surface soils.

9.3.2 Step 2: Identify the Decision

The primary questions are (1) if the soils surrounding the drain fields and the nearby groundwater are contaminated, and (2) if the magnitude of contamination warrants further investigation. Following the collection of information during the SSP Investigation, one of the following management decisions will be made following the CERCLA process:

1. Stump Neck SWMU 14 will require additional investigation and may be advanced in the CERCLA process to the appropriate next step (e.g. RI, FS, interim response action, etc.).
2. Stump Neck SWMU 14 warrants NFA.

9.3.3 Step 3: Identify Inputs to the Decision

The soil and groundwater samples will be analyzed for the suspected contaminants (VOCs, SVOCs, and metals). The samples will also be analyzed for hardness, TOC and pH to better enable the evaluation of data for ecological screening.

For the human health screening, the maximum detected concentrations in each media at each site will be compared to the appropriate USEPA Region III RBC from the current USEPA Region III RBC table. The ecological screening will evaluate if viable habitats are present and if site-related releases can affect viable habitat. If true, then chemical concentrations measured in samples of site media will be compared to applicable literature-based screening toxicity values. Analyte-specific background values from facility-wide background studies (Tetra Tech NUS, Inc., 2002a) will be used to establish whether site-related releases have occurred.

9.3.4 Step 4: Define the Boundaries of the Study

The investigation will focus on the soils around and the groundwater in the immediate vicinity of the drain fields. The SSP Investigation sample parameters are summarized in Table 9-1. Proposed sampling locations at Stump Neck SWMU 14 are shown in Figure 9-1.

Soil samples will be analyzed for TCL VOCs, TCL SVOCs, TAL metals, pH, and TOC. Organic and inorganic analyses are proposed to account for a variety of chemicals that may have been released into the drain fields during the operational life of the septic systems. Groundwater samples will be analyzed for TCL VOCs, TCL SVOCs, TAL metals (filtered and unfiltered), and hardness.

9.3.5 Step 5: Develop a Decision Rule

The data collected during this investigation will be compared to risk-based screening criteria and background concentrations to determine if soil and/or groundwater concentrations present a potential threat to human health and/or the environment. The decision logic is summarized graphically in Figure 2-1.

9.3.6 Step 6: Specify Limits on Decision Error

A binary decision logic, similar to that used at Site 19 (Section 5.3.6), will be used at the Stump Neck SWMU 14 to minimize decision errors in the SSP Investigation.

9.3.7 Step 7: Optimize the Design

Because of the potential for contamination in each of the two drain fields at Stump Neck SWMU 14, soil borings in both drain fields will be advanced. Three borings will be advanced in each drain field, for a total of six. The borings will be positioned to provide sufficient spatial coverage within each drain field. Each boring will terminate at 5 ft below the groundwater table. One soil sample will be collected from each boring at a depth immediately above the groundwater table. Additional samples may be collected if multiple depth intervals appear to be contaminated.

Two monitoring wells will be installed, one in each of the drain fields, as shown in Figure 9-1. The monitoring wells will be screened across the groundwater table. Following well development and purging, groundwater grab samples will be collected from each monitoring well.

TABLE 9-1
Stump Neck SWMU 14 SSP Investigation Scope
SSP Investigation Work Plan, CTO-050, NDWIH, Indian Head, Maryland

Sample Media/Type	Sample ID Number	Sample Location	Sample Analyses
Soil			
Primary	IU14SB01XXXX*	IU14SB01	Laboratory Analyses:
	IU14SB02XXXX*	IU14SB02	TCL VOCs, TCL SVOCs, TAL metals, TOC, pH
	IU14SB03XXXX*	IU14SB03	
	IU14SB04XXXX*	IU14SB04	
	IU14SB05XXXX*	IU14SB05	
	IU14SB06XXXX*	IU14SB06	
MS/MSD**	IU14SB01XXXX*	IU14SB01	
Duplicate**	IU14SB02XXXX*	IU14SB02	
Equipment Blank**	IU14EB####04	ASTM Type II water collected after washing and rinsing sampling equipment	
Groundwater			
Primary	IU14MW01XXXX*	IU14MW01	Laboratory Analyses:
	IU14MW02XXXX*	IU14MW02	TCL VOCs, TCL SVOCs, TAL metals (filtered and unfiltered), hardness, TOC, and pH.
MS/MSD**	IU14MW01XXXX*	IU14MW01	
Duplicate**	IU14MW01XXXX*	IU14MW01	
Equipment Blank**	IU14EB####04	ASTM Type II water collected after washing and rinsing sampling equipment	

represents the 4-digit value for day and month in which QC sample was collected.

* XXXX in the soil sample ID represents the depth interval (2-digit beginning depth and 2-digit end depth rounded up to nearest foot) selected for sampling. Soil samples shall be collected from interval just below filter field. Additional samples may be collected if multiple depth intervals appear to be contaminated, based on field observations and measurements. XXXX in the groundwater sample ID represents the 2-digit month and 2-digit year of the sampling event.

** An MS/MSD, duplicate, and equipment blank specifically associated with Stump Neck SWMU 14 may not be required if these QA/QC samples are collected at other sites. Please refer to Section 4 for the appropriate collection frequency for these QA/QC samples.

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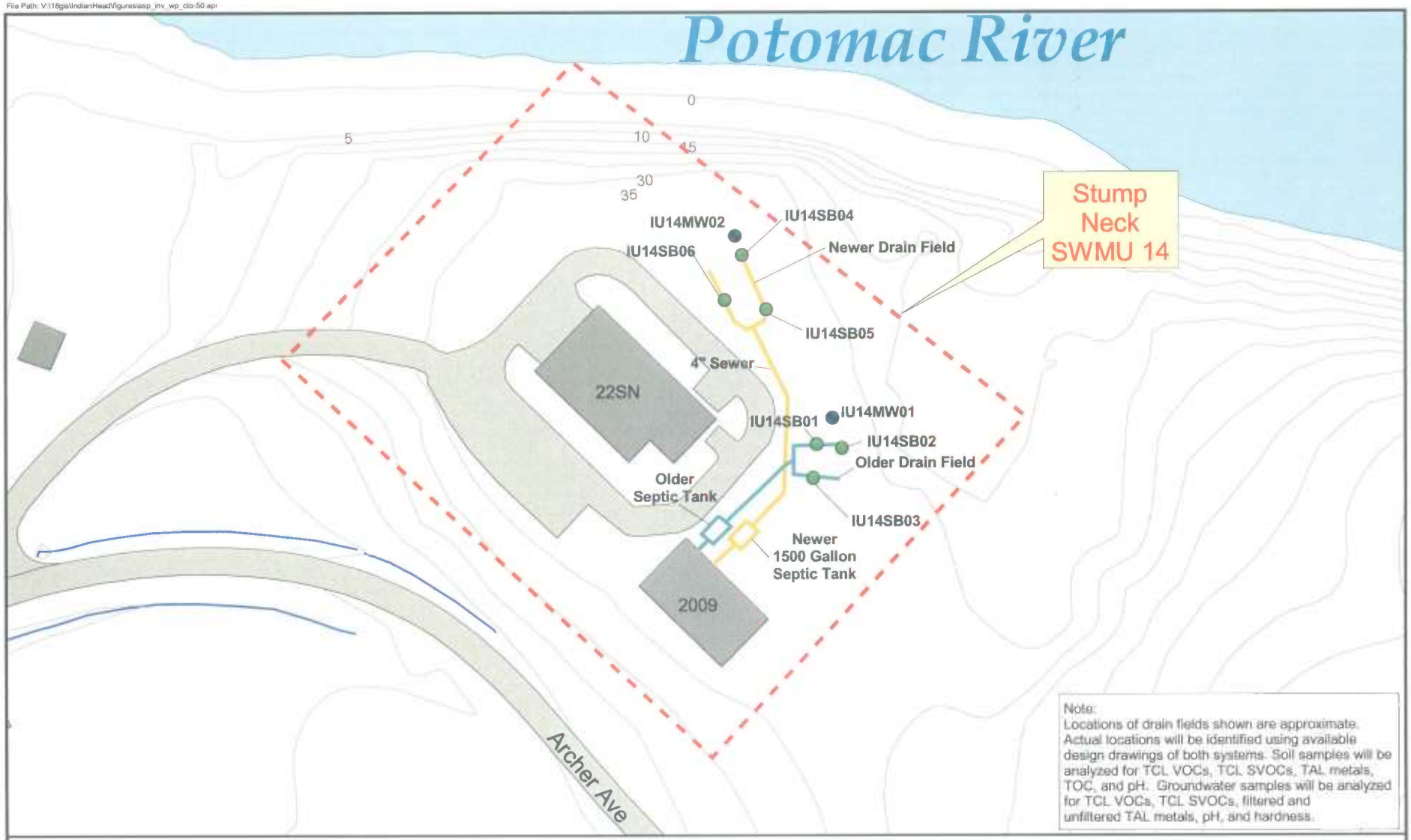

LEGEND

- Approximate SWMU Boundary
- Buildings
- Roads & Paved Areas
- Water Bodies
- Elevation Contours (5 Foot Interval)
- Approximate Soil Sampling Location
- Approximate Groundwater Monitoring Well Sampling Location

N

0 45 90 Feet

1 INCH = 90 FEET

FIGURE 9-1
STUMP NECK SWMU 14 PROPOSED SAMPLE LOCATIONS
SSP INVESTIGATION WORK PLAN, CTO-050
NDWIH, INDIAN HEAD, MARYLAND

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SECTION 10

SSP Investigation at Stump Neck SWMU 30

10.1 Site Description

Stump Neck SWMU 30 consists of a dry well that is located approximately 20 ft north of the utility room wing of Building 2015 on Stump Neck Annex, as shown on Figure 10-1. The approximate area of Stump Neck SWMU 30 is 0.16 acre.

10.2 Previous Investigations

Building 2015 was identified as Stump Neck SWMU 30 in 1991. The catch tank was sampled in October 1991 for mercury. The analytical results reported that 20 parts per billion (ppb) of mercury was detected in the sample from the catch tank.

Stump Neck SWMU 30 was included in a January 2002 Desk-Top Audit Decision Document (Tetra Tech NUS, Inc., 2002b), which was signed by Remedial Project Managers from NDWIH, EFACHES, and USEPA Region 3. The decision reached during the desktop audit was that, due to lack of investigation data available, Stump Neck SWMU 30 should be retained as an area of concern pending additional investigation.

10.3 Data Quality Objectives

10.3.1 Step 1: State the Problem

Due to past activities at the dry well, contamination of the subsurface soil and groundwater surrounding the bottom of the dry well may have occurred. Historically, the dry well received wastewater from a laboratory sink in Building 2015. The laboratory sink was connected to a settling tank where solid materials would settle out of the wastewater. Subsequently, the wastewater drained from the settling tank through a 1.5-in.-diameter drain to the dry well. The dry well, installed in approximately 1974, consists of a 3.5-ft-diameter concrete manhole section with an open bottom that is filled with washed gravel from approximately 3 to 11 ft bgs. The wastewater percolated through the gravel to the open bottom end of the dry well and subsequently to the soil around the bottom of the dry well. Wastewater discharged to the dry well may have percolated to the shallow groundwater table.

Spent chemical reagents from the laboratory were reportedly discarded in the laboratory sink. Since it is suspected that laboratory reagents were disposed in the laboratory sink that drained to the dry well, the soil and groundwater samples collected at Stump Neck SWMU 30 will be analyzed for VOCs, SVOCs, and metals. The laboratory sink was connected to a septic system in 1995. Currently, the laboratory sink is used as a hand-washing sink and is no longer connected to the dry well.

Until 1995, overflow from the dry well entered the NPDES permitted Outfall IW 64 via a grassy drainage ditch located approximately 15 ft to the east of the dry well location. The ditch conveys intermittent surface water flow (e.g., stormwater precipitation) northward. A culvert on the north end of the drainage ditch extends the ditch underneath the road into a creek that drains towards the northeast.

Outfall IW 64 was monitored monthly from May 1990 until March 1995. Flow was observed only on one occasion, in June 1990. According to the Naval Ordnance Station (NOS) Industrial Wastewater Outfall Information Package, revised June 1989, Outfall IW 64 received overflow from the dry well, wash water, cooling water, and film development chemicals. Outfall IW 64 was removed from the NPDES permit in 1995.

10.3.2 Step 2: Identify the Decision

The primary questions are (1) if the subsurface soils and groundwater surrounding the bottom of the dry well are contaminated, and (2) if the magnitude of contamination warrants further investigation. Following the collection of information during the SSP Investigation, one of the following management decisions will be made following the CERCLA process:

1. Stump Neck SWMU 30 will require additional investigation and may be advanced in the CERCLA process to the appropriate next step (e.g. RI, FS, interim response action, etc.).
2. Stump Neck SWMU 30 warrants NFA.

10.3.3 Step 3: Identify Inputs to the Decision

Since it is suspected that laboratory reagents were disposed in the laboratory sink that drained to the dry well, the soil and groundwater samples collected at Stump Neck SWMU 30 will be analyzed for VOCs, SVOCs, and metals. The samples will also be analyzed for hardness, TOC and pH to better enable the evaluation of data for ecological screening.

For the human health screening, the maximum detected concentrations in each media at each site will be compared to the appropriate USEPA Region III RBC from the current USEPA Region III RBC table. The ecological screening will evaluate if viable habitats are present and if site-related releases can affect viable habitat. If true, then chemical concentrations measured in samples of site media will be compared to applicable literature-based screening toxicity values. Analyte-specific background values from facility-wide background studies (Tetra Tech NUS, Inc., 2002a) will be used to establish whether site-related releases have occurred.

10.3.4 Step 4: Define the Boundaries of the Study

This investigation will focus on the areas of suspected contamination (i.e. subsurface soils and groundwater surrounding the bottom of the dry well). The SSP Investigation analytical parameters are summarized in Table 10-1. Proposed sampling locations at Stump Neck SWMU 30 are shown in Figure 10-1.

Additional wells will be placed, and soil and groundwater samples collected, downgradient from the dry well to evaluate the groundwater flow direction and gradient.

10.3.5 Step 5: Develop a Decision Rule

The data collected during this investigation will be compared to risk-based screening criteria and background concentrations to determine if soil and/or groundwater concentrations present a potential threat to human health and/or the environment. The decision logic is summarized graphically in Figure 2-1.

10.3.6 Step 6: Specify Limits on Decision Error

A binary decision logic, similar to that used at Site 19 (Section 5.3.6), will be used at the Stump Neck SWMU 30 to minimize decision errors in the SSP Investigation.

10.3.7 Step 7: Optimize the Design

Two of the four soil borings will be advanced adjacent to the dry well located near Building 2015. Samples collected from these borings will serve to determine if a potential risk exists at the site. Two of the four soil borings will be located downgradient from the site: one in the drainageway associated with Outfall IW 64 and one northeast of Building 2015. Proposed boring locations at Stump Neck SWMU 30 are shown in Figure 10-1. The borings will be advanced to a total depth of 14 ft bgs. If evidence of soil contamination (e.g., visual discoloration, elevated PID readings) is observed at 14 ft bgs, the soil borings will be advanced further until evidence of contamination is not observed. One subsurface soil sample will be collected from each boring at 12 to 14 ft bgs to capture contaminants which may have been transported from the bottom of the dry well, at 11 ft bgs, to deeper soils. Additional samples may be collected if evidence of contamination is observed at other depth intervals. Because the chemicals disposed of in the dry well are unknown, soil samples will be analyzed for a full suite of analytes, consisting of TCL VOCs, TCL SVOCs, TAL metals, pH, and TOC.

Monitoring wells will be installed in the four soil borings and screened from 9 to 14 ft bgs to intercept the bottom of the dry well. The two downgradient wells will serve to evaluate the groundwater flow direction and gradient. Following well development and purging, one groundwater grab sample will be collected from each of the monitoring wells and analyzed for TCL VOCs, TCL SVOCs, and TAL metals (filtered and unfiltered). The samples will also be analyzed for hardness, TOC and pH to better enable the evaluation of data for ecological screening.

TABLE 10-1
Stump Neck SWMU 30 SSP Investigation Scope
SSP Investigation Work Plan, CTO-050,
NDWIH, Indian Head, Maryland

Sample Media/Type	Sample ID Number	Sample Location	Sample Analyses
Soil			
Primary	IU30SB01XXXX*	IU30SB01	Laboratory Analyses:
	IU30SB02XXXX*	IU30SB02	TCL VOCs, TCL SVOCs, TAL metals, TOC, pH
	IU30SB03XXXX*	IU30SB03	
	IU30SB04XXXX*	IU30SB04	
MS/MSD**	IU30SB01XXXX*	IU30SB01	
Duplicate**	IU30SB02XXXX*	IU30SB02	
Equipment Blank**	IU30EB####04	ASTM Type II water collected after washing and rinsing sampling equipment	
Groundwater			
Primary	IU30MW01XXXX*	IU30MW01	Laboratory Analyses:
	IU30MW02XXXX*	IU30MW02	TCL VOCs, TCL SVOCs, TAL metals (filtered and unfiltered), hardness, TOC, and pH.
	IU30MW03XXXX*	IU30MW03	
	IU30MW04XXXX*	IU30MW04	
MS/MSD**	IU30MW01XXXX*	IU30MW01	
Duplicate**	IU30MW01XXXX*	IU30MW01	
Equipment Blank**	IU30EB####04	ASTM Type II water collected after washing and rinsing sampling equipment	

represents the 4-digit value for day and month in which QC sample was collected

* XXXX represents the depth interval (2-digit beginning depth and 2-digit end depth rounded up to nearest foot) selected for sampling. Soil samples shall be collected from the 12-to-14-ft interval. Additional samples may be collected if multiple depth intervals appear to be contaminated, based on field observations and measurements.

** An MS/MSD, duplicate, and equipment blank specifically associated with Stump Neck SWMU 30 may not be required if these QA/QC samples are collected at other sites. Please refer to Section 4 for the appropriate collection frequency for these QA/QC samples

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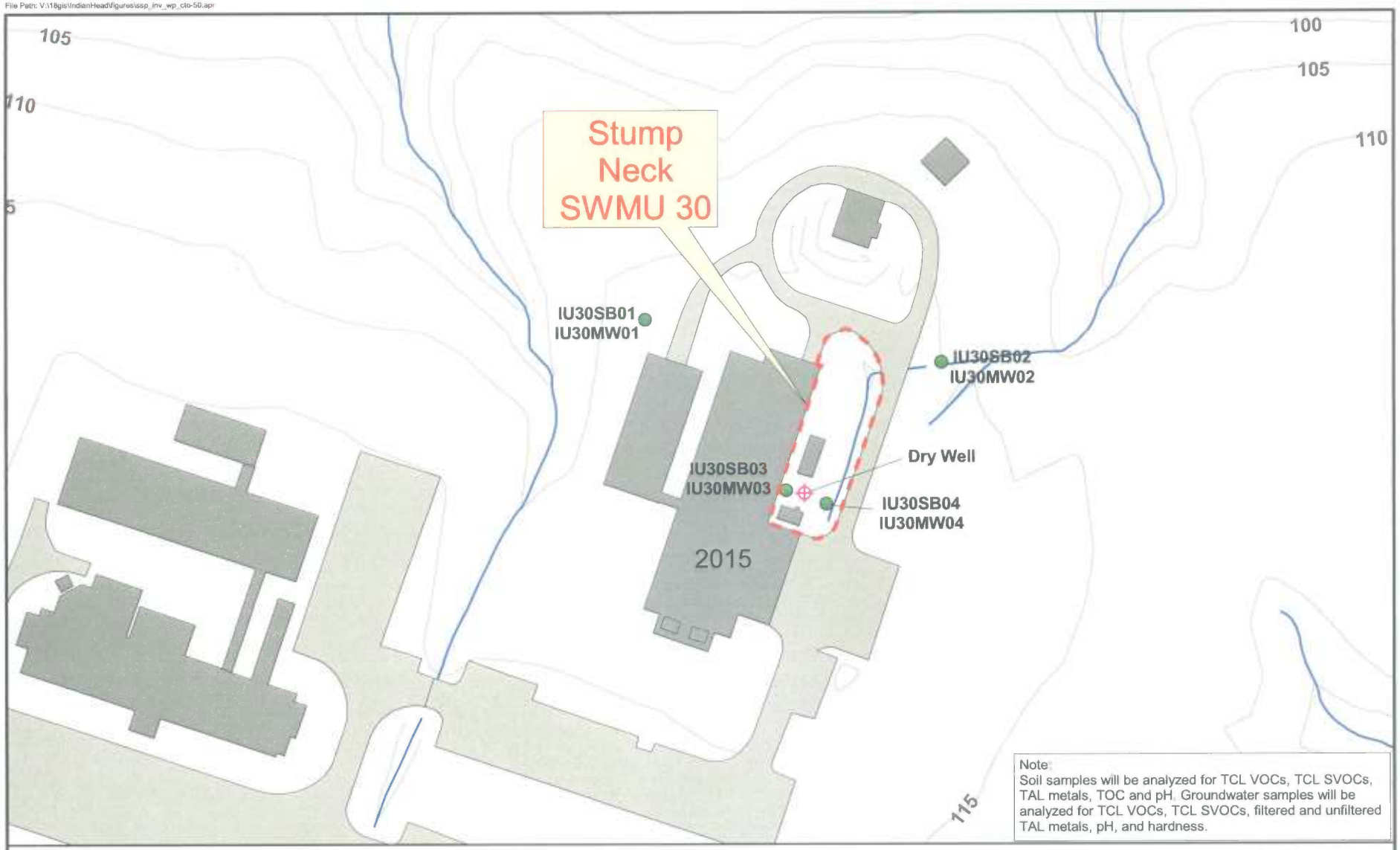

FIGURE 10-1
STUMP NECK SWMU 30 PROPOSED SAMPLE LOCATIONS
SSP INVESTIGATION WORK PLAN, CTO-050
NDWIH, INDIAN HEAD, MARYLAND

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SECTION 11

References

American Society for Testing and Materials (ASTM), 1993. D1193-99e1 Standard Specification for Reagent Water.

A.T. Kearney, Inc., 1990. *RCRA Facility Assessment Report of the U.S. Naval Explosive Ordnance Disposal Technology Center, Stump Neck Annex, Indian Head, Maryland.* April

CH2M HILL, 2004a. *Desktop Evaluation for Site 40 – Palladium Catalyst in Sediment, Naval District Washington Indian Head.* April 23.

CH2M HILL, 2004b. *Desktop Evaluation for Site 8 – Mercury Contamination at Building 766, and Site 56 – Lead Contamination at Industrial Wastewater Outfall 87, Naval District Washington Indian Head.*

CH2M HILL, 2004c. *Proposed Plan, Site 45, Abandoned Drums.* Naval District Washington, Indian Head, Indian Head, Maryland.

Code of Maryland Regulations, Title 26 *Department of the Environment*, Subtitle 04 *Regulation of Water Supply, Sewage Disposal, and Solid Waste*, Chapter 04 *Well Construction*, Section 11 *Abandonment Standards.*

Ensafe/Allen & Hoshall, 1994. *Final Site Inspection Report, Phase II, Indian Head Division, Naval Surface Warfare Center.* March 4.

Fred C. Hart Associates Inc., 1983. *Initial Assessment Study of Naval Ordnance Station, Indian Head, Maryland.* May.

HydroGeologic, Inc., 2004. *Final Remedial Investigation Report, Sites 6, 39 and 45, Indian Head Division – NSWC, Indian Head, Maryland.* April.

Indian Head Division Naval Surface Warfare Center (IHDIV/NSWC), 1998. Memoranda from "045." *Failing Septic Systems at the Stump Neck Annex (EODTECH).* Dated January 13 and 14.

Naval Energy and Environmental Support Activity (NEESA), 1992. *Preliminary Assessment Report, Naval Ordnance Station, Indian Head, Maryland.* Document number NEESA 13-021A. January.

Tetra Tech NUS, Inc., 2002a. *Background Soil Investigation Report for Indian Head and Stump Neck Annex Naval Surface Warfare Center, Indian Head, Maryland.*

Tetra Tech NUS, Inc., 2002b. *Desk-Top Audit Decision Document Indian Head Division, Naval Surface Warfare Center, Indian Head, Maryland.*

Tetra Tech NUS, Inc., 2004. *Master Plans for Installation Restoration Program Environmental Investigations at Naval District Washington, Indian Head,* Indian Head Maryland. June.

United States Environmental Protection Agency (USEPA), 1993. *Region III Modifications to the Laboratory Data Validation Functional Guidelines for Evaluating Inorganics Analyses*. EPA 903/1993.3. April.

USEPA, 1994. *Region III Modifications to National Functional Guidelines for Organic Data Review Multi-media, Multi-concentration,* (OLM01.0-OLM01.9). EPA 903/1994.1. September.

USEPA, 1995. *Innovative Approaches to Data Validation,* USEPA Region III. June.

USEPA, 2000a. Region III, United States Department of the Navy. *Federal Facility Agreement under CERCLA Section 120, Naval Surface Warfare Center, Indian Head Division, Indian Head, Maryland.* Administrative Docket Number: III-FCA-CERC-018. December 9.

USEPA, 2000b. Office of Environmental Information. *Data Quality Objectives Process for Hazardous Waste Site Investigations (EPA QA/G-4HW)*. EPA/600/R-00/007. January.

Appendix A
Health and Safety Plan (HSP)

CH2M HILL HEALTH AND SAFETY PLAN

This Health and Safety Plan (HSP) will be kept on the site during field activities and will be reviewed as necessary. The plan will be amended or revised as project activities or conditions change or when supplemental information becomes available. The plan adopts, by reference, the Standards of Practice (SOPs) in the CH2M HILL *Corporate Health and Safety Program, Program and Training Manual*, as appropriate. In addition, this plan adopts procedures in the project Work Plan. The Site Safety Coordinator (SSC) is to be familiar with these SOPs and the contents of this plan. CH2M HILL's personnel and subcontractors must sign Attachment 1.

Project Information and Description

PROJECT NO: 314070

CLIENT: Department of the Navy, Naval Facilities Engineering Command, Washington

PROJECT/SITE NAME: Site Screening Process (SSP) Investigation for Contract Task Order (CTO)-050

SITE ADDRESS: Indian Head, Maryland

CH2M HILL PROJECT MANAGER: Christopher English/ STL

CH2M HILL OFFICE: St. Louis

DATE HEALTH AND SAFETY PLAN PREPARED: May 2004; Revised July 2004

DATE(S) OF SITE WORK: September 2004

SITE ACCESS: Access to the site is via the main gate located on Route 210 in Indian Head. Badges are required to access the restricted area of the base.

SITE SIZE: Approximately 2,500 acres in main area of facility

SITE TOPOGRAPHY: Local topography includes an upland area in the northern portion of the facility, extending northeast beyond the main gate. This upland area slopes to the north and northwest terminating as bluffs along the shore of the Potomac River. It gently slopes to the southeast toward the southern boundary of the facility, where low-lying swampy areas are present along Mattawoman Creek. Along the eastern part of the facility, the eroded edge of the upland forms several steep slopes along Mattawoman Creek.

PREVAILING WEATHER: The climate of the Washington, D.C., area is characterized by warm and humid summers and mild winters. July is generally the warmest month, with average daily temperatures in the upper 80s. The lowest temperatures generally are recorded in late January and early February, when average high temperatures are in the middle 40s. Average annual precipitation is 41 inches; average annual snowfall is approximately 20 inches (Johnston, 1964). Because of the geographic location of the Naval District Washington Indian Head (NDWIH), prevailing wind direction at and around the facility varies on a daily basis. Frontal systems approach the area primarily from the northwest or southwest, bringing with them northwesterly or southwesterly winds, respectively. In addition, easterly winds blowing in off the Atlantic Ocean and Chesapeake Bay reach the facility due to its proximity to these bodies of water.

SITE DESCRIPTION AND HISTORY: Naval District Washington Indian Head (NDWIH) is a military facility, approximately 25 miles southwest of Washington D.C. (Figure 1-1) consisting of the main area (on the Cornwallis Neck Peninsula; Figure 1-2) and the Stump Neck Annex (Figure 1-3), near Indian Head, in northwestern Charles County, Maryland. The mission of Naval District Washington Indian

Head (NDWIH) is to provide primary technical capability in energetics for all warfare centers through engineering, fleet and operational support, manufacturing technology, limited production, and industrial base support. Secondary technical capability is provided through research, development, test and evaluation for energetic materials, ordnance devices and components, and related ordnance engineering standards including chemicals, propellants and their propulsion systems, explosives, pyrotechnics, warhead, and simulators.

Though intended to be a Master Health and Safety Plan, the following provides background information on sites currently undergoing work by CH2M HILL.

DESCRIPTION OF SPECIFIC TASKS TO BE PERFORMED:
Descriptions of the specific four sites and two Solid Waste Management Units (SWMUs) addressed in the SSP Investigation for CTO-050. Refer to the specific site figures included in the final report *Site Screening Process Investigation Work Plan for Sites 19, 26, 27, Wetland Area Adjacent to Site 45, and Stump Neck SWMUs 14 and 30* (CH2M HILL, 2005), for specific site details and sampling locations.

Site 19 - Catch Basins at Chip Collection Houses

Site 19, Catch Basins at Chip Collection Houses, is located west of Silo Road and consists of the drainage areas leading from the two chip collection houses, Buildings 785 and 1051. Historically, wastewater contaminated with lead and copper salts drained from the two buildings into catch basins that contained bags to capture explosive shavings. Contaminated wastewater was discharged for an undetermined period of time. In addition, spills of explosive shavings may have occurred when fabric bags attached to the outfall end of the pipes ruptured or detached. The explosive shavings

Wastewater from Building 785 was historically drained through an 8-inch cast iron pipe into an approximately 2 foot by 2 foot wooden catch basin. Discharge from the catch basin would then lead into a down-gradient swale. After the initial site visit for preparation of this work plan, the wooden structure was removed by explosives technicians. The concrete base that supported the wooden catch basin remains in place.

Building 1051 discharged wastewater through an approximately 50 feet long cast iron pipe to a concrete outfall and into an approximately 2 foot by 2 foot metal catch basin. Subsequently, water could migrate approximately 15 feet into a downgradient stream.

Building 1051 is no longer used as a chip collection house and no longer produces a wastewater stream. Building 785 is still in operation as a chip house, but wastewater is now recycled rather than discharged to the swale.

Chip collection equipment and any explosive chips on the ground will be removed from the site before sample collection begins. No samples will be collected if chip collection equipment is still in place or if bright orange chips (potential explosive contaminants) are found in the area. Please notify Shawn Jorgensen at (301) 744-2263 if either are found at the site.

Site 26 - Thermal Destructor 2

Thermal Destructor 2 comprised Site 26, and was the location of an incinerator constructed on a concrete pad. The destructor was a propane-fired incinerator that was used to burn wastewater that was contaminated with hydrazine-fuel and UDMH.

Historic buildings adjacent to Site 26 (also called Building 1595) include Building 1596, a 500,000 gallon-capacity water storage tank; Building 1597, Knock Down Tank (capacity unknown); Building 1598, Cooling Tower (capacity unknown); and Building 1599, UDMH Tank with a capacity of 8,000 gallons.

According to the IAS (Fred C. Hart Associates, 1983), Site 26 and associated structures were in operation from 1976 to 1978. However, other NDWIH records (e.g., a February 1983 buildings list) indicate that

Buildings 1595 through 1599 were constructed in 1977. It is not known when the buildings were demolished.

Site 27 - Thermal Destructor 1

Similar to Site 26, Site 27 (Thermal Destructor 1) was a propane-fired incinerator that burned wastewater between 1976 and 1979. Site 27 was historically named Building 1584 'Thermal Destructor Pad Area', and consisted of an outside concrete pad upon which the incinerator was located.

Historic buildings adjacent to Site 27 include Building 1585 'Gas Storage Tank Area', Building 1586 'Waste Storage Tank Area', Building 1587 'Loading Platform', and Building 859 which was used as a caustic recovery area. Structures named Buildings 1584 and 1585 were built in 1975, Building 1586 was constructed in either 1975 or 1976, and Building 1587 was built in 1976. It is not known when Building 859 was constructed.

Historical information concerning the wastewater incinerated at Thermal Destructor 1 varies. The IAS, (Fred C. Hart Associates, 1983), notes that the incinerator burned hydrazine-containing fuel and UDMH-contaminated wastewater. However, in a Standard Job Procedure (SJP), Contaminated Organic Waste Disposal by Incineration, dated December 4, 1978, chemicals listed in the Hazardous Materials Index for the site and adjacent buildings do not include hydrazine or UDMH. A recent interview with a prior site employee (conducted by Navy personnel) indicated the wastewater derived from the caustic recovery area and the water contained neutralized caustic salts. Additionally, the interviewee indicated UDMH was not treated at Site 27.

During operation of the incinerator, the area, with the exception of the actual incinerator, was diked. Potentially, small spills may have occurred in the area of the incinerator when the pump transferring wastewater did not switch off in time.

The thermal destructor at Site 27 has been dismantled, and only the concrete pad currently remains at the site. The concrete pad for Building 1584 is approximately fifteen square feet surrounded by a grass covered area. Currently, Building 406 is located adjacent to the site.

Site 45 - Abandoned Drums and Wetland Area Adjacent to Site 45

The wetland area adjacent to Site 45 is located in the northwest-central portion of NDWIH and lies roughly 100 feet southwest of Site 45.

Buildings and structures located near the site consist of an equipment building (Building 1899) and several tanks and secondary containment structures that contain acids and caustics (Buildings 1988, 1989, 1991, and 1990). These buildings and structures were built between 1995 and 1998.

The wetland area adjacent to Site 45 is flat, and there is no apparent surface water outflow from the area. During the 2001 RI at Site 45 (upgradient), groundwater levels were found to be 3.4 to 5.6 feet below ground surface [bgs] (HydroGeoLogic, 2004). Surface topography observed during an April 2004 site visit indicates that surface water entering the wetland area infiltrates into groundwater rather than flowing offsite.

Inflow to the wetland includes discharge from secondary containment from the nearby caustic tanks. After significant precipitation events, NDWIH personnel open a valve to release standing water from the secondary containment area into the wetland area.

Originally, the wetland area was considered to lie within the Site 45 boundaries. Site 45 includes a former abandoned drum storage area. Although the origin and original contents of the drums at Site 45 are not known, they may have contained solvents used in the soak-out process at nearby Site 44 (HydroGeoLogic, 2004). Under this process, a soak tank was filled with solvent to remove propellant from rocket motor catapult tubes (NEESA, 1992). However, investigation data collected during the RI at

Sites 6, 39, and 45 (HydroGeoLogic, 2004) indicated that the wetland was not affected by contamination associated with the drum abandonment area. For this reason, the wetland was removed from Site 45 and will be investigated as a separate screening area.

Stump Neck SWMU 14 - Photographic Lab Septic tank System

Stump Neck SWMU 14 is located in the Stump Neck Annex and is approximately 300 feet south of the Potomac River. The site consists of a photographic laboratory (Building 22SN), X-ray facility (Building 2009), and the associated two septic tanks, discharge lines, and drain field.

The original septic tank system at Stump Neck SWMU 14 was constructed in approximately 1968. The effluent was chlorinated and discharged to the Potomac River under a National Pollutant Discharge Elimination System (NPDES) Permit MD0020885, issued in May 1988. During its period of operation, the septic system handled wastewater from Buildings 22SN and 2009. Photographic chemicals containing silver, hydroquinone, and sodium thiosulfate were discharged for an unknown period (not continuously) to the original septic system (A.T. Kearney, Inc., 1990).

At the time of a 1990 RCRA Facility Assessment (RFA), (A.T. Kearney, Inc., 1990), waste fixer containing silver was containerized in Building 22SN and transported off-site for silver recovery. Although the septic system had been cited for NPDES permit violations in the past, no evidence of release was documented during a VSI conducted as part of the RFA. Findings from the RFA were documented by A.T. Kearney, Inc. (1990).

The 1990 RFA Report stated that the original septic system was replaced with a new system following the VSI. Available construction documents indicate that the original septic tank was abandoned in place. The 1990 RFA Report indicated that the new septic system eliminated surface discharges to the Potomac River. The RFA Report also stated that the new septic system handled only sanitary wastewater from Building 22SN and was inspected weekly, in accordance with NPDES permit conditions. The NDPES outfall was sampled monthly. Available documentation indicates that the NPDES permit was due to expire in April 1993. The compliance with and status of the NPDES permit after April 1993 is unknown.

The 1990 RFA Report did not account for discharges from Building 2009 that continued to discharge into the new septic tank system. Waste fixer from the X-ray facility, which contains silver, was treated on-site for silver recovery and then released to the septic system with the washwater and developer.

The NDWIH, formerly known as Indian Head Division Naval Surface Warfare Center (IHDIV/NSWC), documented failing septic systems at the Stump Neck Annex (IHDIV/NSWC, 1998), including the newer septic system that serviced Buildings 22SN and 2009. NDWIH noted that the drain field had become clogged due to an overload of sewage into the system, causing floating solids to rise through the tank and clog the downstream drainpipes. This resulted in periodic back-ups of sewage from the septic tank into Building 22SN.

Since 2002, Buildings 22SN and 2009 have been connected to a pipeline that conveys sanitary and process wastewater from the building to the NDWIH wastewater treatment plant. Consequently, neither of the two septic systems at the site is in use. Currently, silver-contaminated waste fixer from the X-ray facility is treated on-site for silver recovery and then released to the sewer pipeline with the washwater and developer. In 1999, the photographic laboratory was converted to a completely digital system and no longer discharges waste into the sanitary sewer system.

Stump Neck SWMU 30 - Stump Neck Annex Building 2015

Stump Neck SWMU 30 consists of a dry well that is located approximately 20 feet north of the utility room wing of Building 2015 on Stump Neck Annex. The dry well was connected to a laboratory sink in Building 2015. The sink was connected to a catch tank where solid materials would settle out of the wastewater prior to being discharged to the dry well. Water drained from the settling tank through a 1.5-

inch diameter drain to the dry well. The dry well, installed in approximately 1974, consists of a 3.5-foot diameter concrete manhole section with an open bottom that is filled with washed gravel from approximately three to eleven feet below ground surface. Spent chemical reagents from the laboratory were reportedly discarded in the sink. The sink, which was connected to a septic system in 1995, is currently used as a hand sink and is no longer connected to the dry well.

Until 1995, overflow from the dry well entered the NPDES permitted Outfall IW 64 via a grassy drainage ditch approximately 15 feet away. A culvert on the north end of the drainage ditch extends the ditch underneath the road into a creek that drains towards the northeast. Outfall IW 64 was monitored monthly from May 1990 until March 1995. Flow was observed only on one occasion, in June 1990. According to the Naval Ordnance Station (NOS) Industrial Wastewater Outfall Information Package, revised June 1989, IW 64 received overflow from the dry well, wash water, cooling water, and film development chemicals. Outfall IW 64 was removed from the NPDES permit in 1995.

References

A.T. Kearney, Inc. 1990. *RCRA Facility Assessment Report of the U.S. Naval Explosive Ordnance Disposal Technology Center, Stump Neck Annex, Indian Head, Maryland.* April.

CH2M HILL. 2005. *Final Site Screening Process Investigation Work Plan for Sites 19, 26, 27, Wetland Area Adjacent to Site 45, and Stump Neck SWMUs 14 and 30.* March.

Fred C. Hart Associates Inc. 1983. *Initial Assessment Study of Naval Ordnance Station, Indian Head, Maryland.* May.

HydroGeologic, Inc. 2004. *Final Remedial Investigation Report, Sites 6, 39 and 45, Indian Head Division – NSWC, Indian Head, Maryland.* April.

Indian Head Division Naval Surface Warfare Center (IHDIV/NSWC). 1998. (Memoranda from "045".) *Failing Septic Systems at the Stump Neck Annex (EODTECH).* January 13, and 14.

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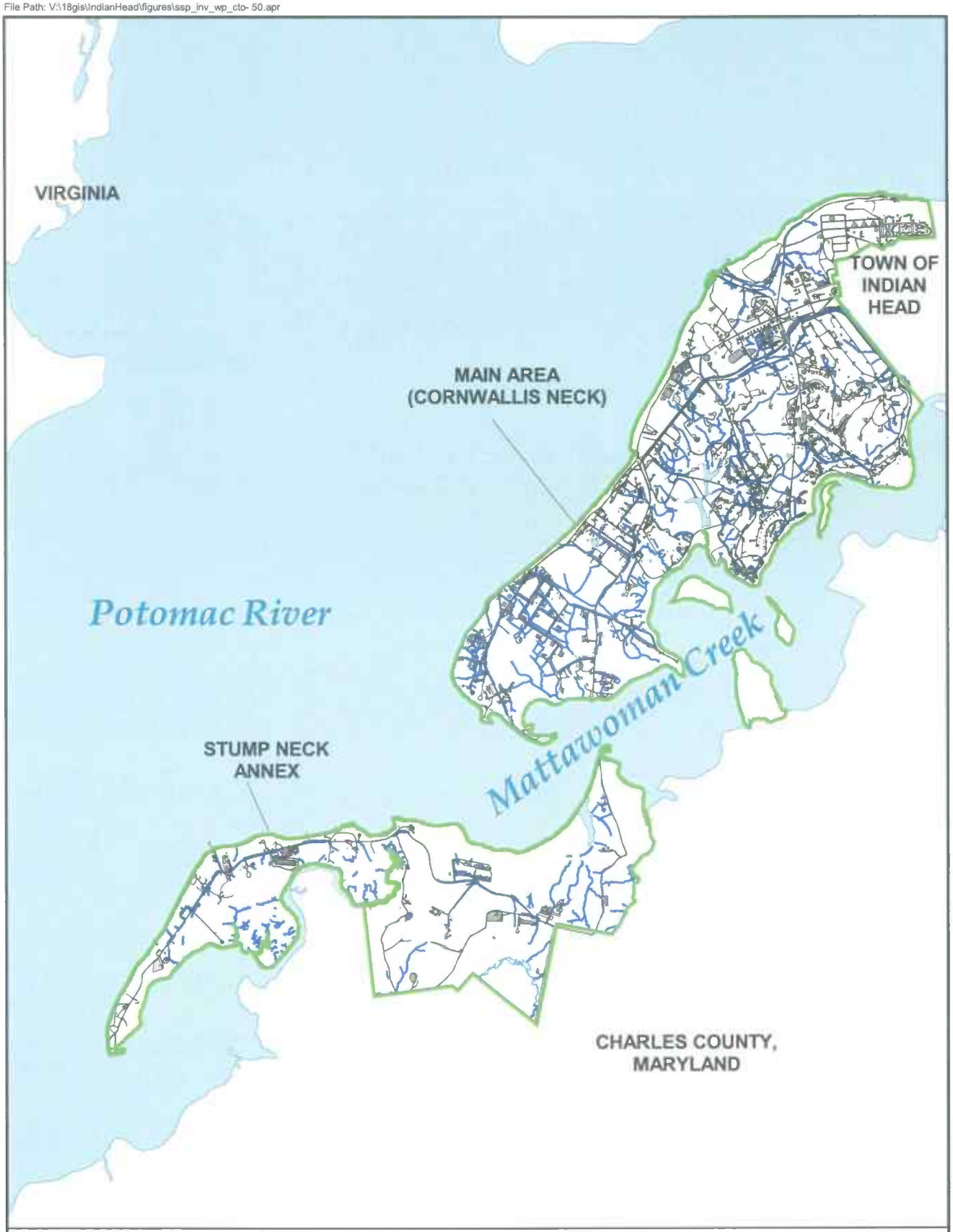

FIGURE 1-1
NDWIH BASE LOCATION MAP
SSP INVESTIGATION WORK PLAN, CTO-050
NDWIH, INDIAN HEAD, MARYLAND

CH2MHILL

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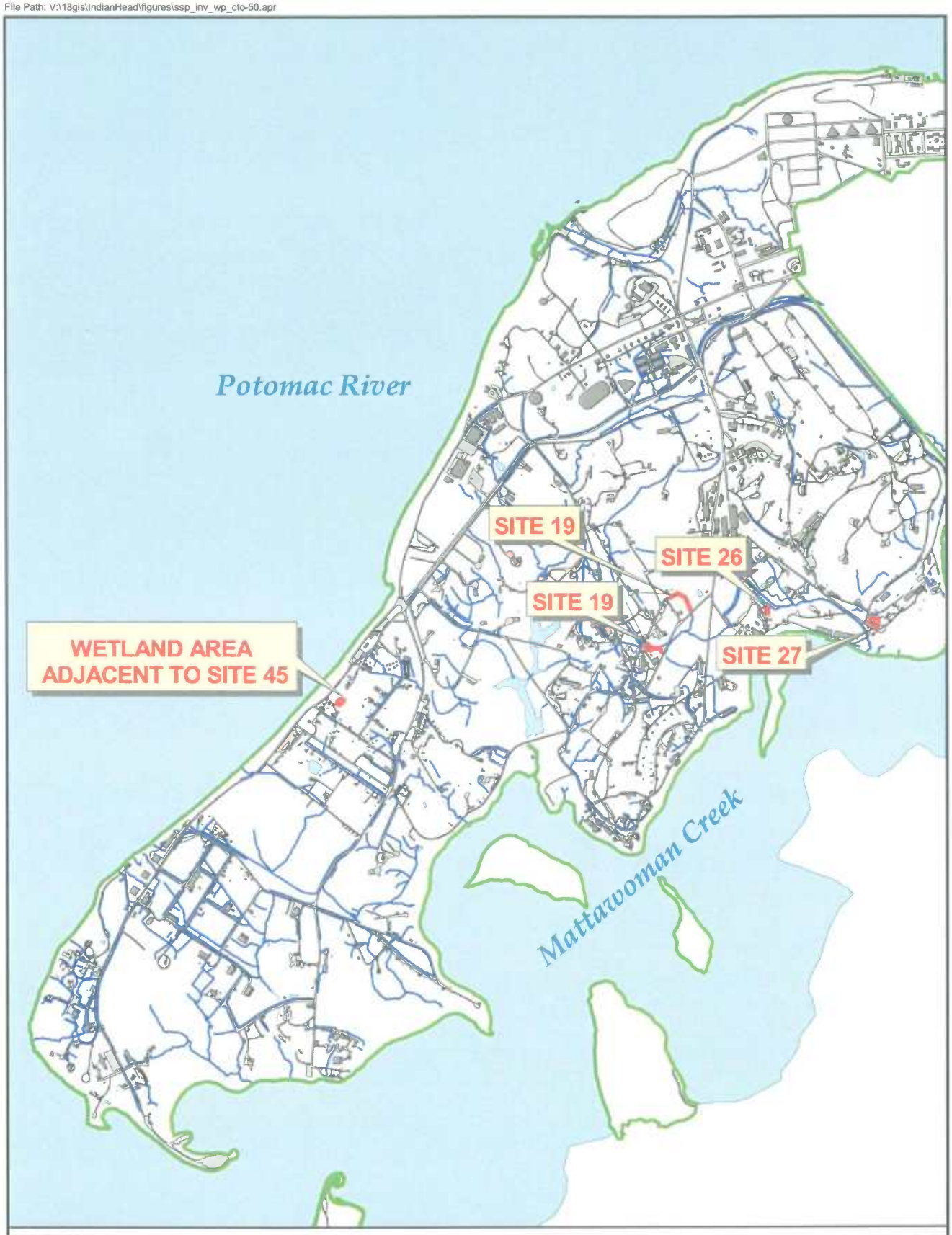

FIGURE 1-2
SITE LOCATION MAP - MAIN AREA
SSP INVESTIGATION WORK PLAN, CTO-050
NDWIH, INDIAN HEAD, MARYLAND

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FIGURE 1-3
SITE LOCATION MAP - STUMP NECK ANNEX
SSP INVESTIGATION WORK PLAN, CTO-050
NDWIH, INDIAN HEAD, MARYLAND

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Project HS&E Change Management Form

*This evaluation form should be reviewed on a **continuous** basis to determine if the current site health and safety plan adequately addresses ongoing project work, and should be completed whenever new tasks are contemplated or changed conditions are encountered..*

Project Task:	
Project Number:	Project/Task Manager:
Name:	Employee #:

	Evaluation Checklist	Yes	No
1.	Have the CH2MHILL staff listed in the original HSP/FSI changed?		
2.	Has a new subcontractor been added to the project?		
3.	Is any chemical or product to be used that is not listed in Attachment 2 of the plan?		
4.	Have additional tasks been added to the project which were not originally addressed in the plan?		
5.	Have new contaminants or higher than anticipated levels of original contaminants been encountered?		
6.	Have other safety, equipment, activity or environmental hazards been encountered that are not addressed in the plan?		

If the answer is "YES" to Question 3, an HSP/FSI revision is NOT needed. Please take the following actions:

- Add the chemical to Attachment 2, and ensure employees handling the chemical are trained, and training documentation is added to Attachment 3.

If the answer is "YES" to Questions 1, 2 or 4-6, an HSP/FSI revision MAY BE NEEDED. Please contact HS&E directly.

1 Tasks to be Performed Under this Plan

1.1 Description of Tasks

(Reference Field Project Start-up Form)

Refer to project documents (i.e., Work Plan) for detailed task information. A health and safety risk analysis (Section 1.2) has been performed for each task and is incorporated in this plan through task-specific hazard controls and requirements for monitoring and protection. Tasks other than those listed below require an approved amendment or revision to this plan before tasks begin. Refer to Section 8.2 for procedures related to "clean" tasks that do not involve hazardous waste operations and emergency response (Hazwoper).

1.1.1 Hazwoper-Regulated Tasks

- Drilling
- Soil boring installation
- Geoprobe boring
- Groundwater monitoring/sampling
- Surface water sampling
- Sediment sampling
- Monitoring well installation
- Subsurface soil sampling
- Surface soil sampling
- Surveying
- Investigation-derived waste (drum) sampling and disposal
- Observation of material loading for offsite disposal

1.1.2 Non-Hazwoper-Regulated Tasks

Under specific circumstances, the training and medical monitoring requirements of federal or state Hazwoper regulations are not applicable. It must be demonstrated that the tasks can be performed without the possibility of exposure in order to use non-Hazwoper-trained personnel. **Prior approval from the Health and Safety Manager (HSM) is required before these tasks are conducted on regulated hazardous waste sites.**

TASKS	CONTROLS
• General heavy equipment work (excavation, grading, etc.)	• Brief on hazards, limits of access, and emergency procedures
• Waste removal/hauling	• Post contaminant areas as appropriate (refer to Section 6 for details)
	• Sample and monitor as appropriate (refer to Section 5.0)

1.2 Task Hazard Analysis

(Refer to Section 2 for hazard controls)

Potential Hazards	Tasks						
	Drilling, geoprobe, and well installation & abandonment	Groundwater monitoring, aquifer testing	Surface water and sediment sampling from the shore or water	Hand augering	Surveying	IDW drum sampling and disposal	Observation of loading material for offsite disposal
Flying debris/objects	X		X	X		X	X
Noise > 85dBA	X						X
Electrical	X	X					
Suspended loads	X						X
Buried utilities, drums, tanks	X			X			
Slip, trip, fall	X	X	X	X	X	X	X
Back injury	X	X	X	X		X	
Confined space entry					X		
Visible lightning	X	X	X	X	X	X	X
Vehicle traffic							X
Elevated work areas/ falls			X				
Fires	X		X			X	
Entanglement	X			X			
Drilling	X						
Heavy equipment	X						X
Working near water			X				
IDW Drum Sampling						X	

2 Hazard Controls

This section provides safe work practices and control measures used to reduce or eliminate potential hazards. These practices and controls are to be implemented by the party in control of either the site or the particular hazard. CH2M HILL employees and subcontractors must remain aware of the hazards affecting them regardless of who is responsible for controlling the hazards. CH2M HILL employees and subcontractors who do not understand any of these provisions should contact the SSC for clarification.

In addition to the controls specified in this section, Project-Activity Self-Assessment Checklists are contained in Attachment 6. These checklists are to be used to assess the adequacy of CH2M HILL and subcontractor site-specific safety requirements. The objective of the self-assessment process is to identify gaps in project safety performance, and prompt for corrective actions in addressing these gaps. Self-assessment checklists should be completed early in the project, when tasks or conditions change, or when otherwise specified by the HSM. The self-assessment checklists, including documented corrective actions, should be made part of the permanent project records, and be promptly submitted to the HSM.

Self Assessment Checklists

The self assessment checklist for the following tasks and exposures are required when the task or exposure is initiated and weekly while the task or exposure is taking place and submitted to the project H&S manager weekly.

- Drilling operations
- Exposure to earthmoving/heavy equipment operations

Project Specific Training

In addition to the basic training requirements for Hazardous Waste sites the following specialty training is required for the following tasks.

- Public Vehicle Exposure - All staff who are exposed to public vehicle traffic must take the on-line traffic safety course

2.1 Project-Specific Hazards

2.1.1 Exposure to Public Vehicular Traffic

(Reference CH2M HILL SOP HSE-24, *Traffic Control*)

The following precautions must be taken when working around traffic, and in or near an area where traffic controls have been established by others.

- Exercise caution when exiting traveled way or parking along street – avoid sudden stops, use flashers, etc.
- Park in a manner that will allow for safe exit from vehicle, and where practicable, park vehicle so that it can serve as a barrier.
- All staff working adjacent to traveled way or within work area must wear reflective/high-visibility safety vests.
- Eye protection should be worn to protect from flying debris.
- Remain aware of factors that influence traffic related hazards and required controls – sun glare, rain, wind, flash flooding, limited sight-distance, hills, curves, guardrails, width of shoulder (i.e., breakdown lane), etc.
- Always remain aware of an escape route -- behind an established barrier, parked vehicle, guardrail, etc.
- Always pay attention to moving traffic – never assume drivers are looking out for you
- Work as far from traveled way as possible to avoid creating confusion for drivers.
- When workers must face away from traffic, a "buddy system" should be used, where one worker is looking towards traffic.

- Lookouts should be used when physical barriers are not available or practical. The lookout continually watches approaching traffic for signs of erratic driver behavior and warns workers. Vehicles should be parked at least 40 feet away from the work zone and traffic. Minimize the amount of time that you will have your back to oncoming traffic.

2.1.2 Drilling

(Reference CH2M HILL SOP HS-35, *Drilling*)

- Only authorized personnel are permitted to operate drill rigs.
- Stay clear of areas surrounding drill rigs during every startup.
- Stay clear of the rotating augers and other rotating components of drill rigs.
- Stay as clear as possible of all hoisting operations. Loads shall not be hoisted overhead of personnel.
- Do not wear loose-fitting clothing or other items such as rings or watches that could get caught in moving parts. Long hair should have it restrained.
- If equipment becomes electrically energized, personnel shall be instructed not to touch any part of the equipment or attempt to touch any person who may be in contact with the electrical current. The utility company or appropriate party shall be contacted to have line de-energized prior to approaching the equipment.
- Smoking around drilling operations is prohibited.

2.1.3 Earthmoving/Excavation/Hauling Equipment

(Reference CH2M HILL SOP HS-27, *Earthmoving Equipment*)

- Only authorized personnel are permitted to operate earthmoving equipment.
- Maintain safe distance from operating equipment and stay alert of equipment movement. Avoid positioning between fixed objects and operating equipment and equipment pinch points, remain outside of the equipment swing and turning radius. Pay attention to backup alarms, but not rely on them for protection. Never turn your back on operating equipment.
- Approach operating equipment only after receiving the operator's attention. The operator shall acknowledge your presence and stop movement of the equipment. Caution shall be used when standing next to idle equipment; when equipment is placed in gear it can lurch forward or backward. Never approach operating equipment from the side or rear where the operator's vision is compromised.
- When required to work in proximity to operating equipment, wear high-visibility vests to increase visibility to equipment operators. For work performed after daylight hours, vests shall be made of reflective material or include a reflective stripe or panel.
- Do not ride on earthmoving equipment unless it is specifically designed to accommodate passengers. Only ride in seats that are provided for transportation and that are equipped with seat belts.
- Stay as clear as possible of all hoisting operations. Loads shall not be hoisted overhead of personnel.
- Earthmoving equipment shall not be used to lift or lower personnel.
- If equipment becomes electrically energized, personnel shall be instructed not to touch any part of the equipment or attempt to touch any person who may be in contact with the electrical current. The utility company or appropriate party shall be contacted to have line de-energized prior to approaching the equipment

2.2 General Hazards

2.1.2 General Practices and Housekeeping

(Reference CH2M HILL SOP HS-20, *General Practices*)

- Site work should be performed during daylight hours whenever possible. Work conducted during hours of darkness require enough illumination intensity to read a newspaper without difficulty.

- Good housekeeping must be maintained at all times in all project work areas.
- Common paths of travel should be established and kept free from the accumulation of materials.
- Keep access to aisles, exits, ladders, stairways, scaffolding, and emergency equipment free from obstructions.
- Provide slip-resistant surfaces, ropes, and/or other devices to be used.
- Specific areas should be designated for the proper storage of materials.
- Tools, equipment, materials, and supplies shall be stored in an orderly manner.
- As work progresses, scrap and unessential materials must be neatly stored or removed from the work area.
- Containers should be provided for collecting trash and other debris and shall be removed at regular intervals.
- All spills shall be quickly cleaned up. Oil and grease shall be cleaned from walking and working surfaces.

2.1.3 Hazard Communication

(Reference CH2M HILL SOP HS-05, *Hazard Communication)*

The SSC is to perform the following:

- Complete an inventory of chemicals brought on site by CH2M HILL using Attachment 2.
- Confirm that an inventory of chemicals brought on site by CH2M HILL subcontractors is available.
- Request or confirm locations of Material Safety Data Sheets (MSDSs) from the client, contractors, and subcontractors for chemicals to which CH2M HILL employees potentially are exposed.
- Before or as the chemicals arrive on site, obtain an MSDS for each hazardous chemical.
- Label chemical containers with the identity of the chemical and with hazard warnings, and store properly.
- Give employees required chemical-specific HAZCOM training using Attachment 3.
- Store all materials properly, giving consideration to compatibility, quantity limits, secondary containment, fire prevention, and environmental conditions.

2.2.3 Shipping and Transportation of Chemical Products

(Reference CH2M HILL's *Procedures for Shipping and Transporting Dangerous Goods)*

Chemicals brought to the site might be defined as hazardous materials by the U.S. Department of Transportation (DOT). All staff who ship the materials or transport them by road must receive CH2M HILL training in shipping dangerous goods. All hazardous materials that are shipped (e.g., via Federal Express) or are transported by road must be properly identified, labeled, packed, and documented by trained staff. Contact the HSM or the Equipment Coordinator for additional information.

2.2.4 Lifting

(Reference CH2M HILL SOP HS-29, *Lifting*)

- Proper lifting techniques must be used when lifting any object.
  - Plan storage and staging to minimize lifting or carrying distances.
  - Split heavy loads into smaller loads.
  - Use mechanical lifting aids whenever possible.
  - Have someone assist with the lift -- especially for heavy or awkward loads.
  - Make sure the path of travel is clear prior to the lift.

2.2.5 Fire Prevention

(Reference CH2M HILL SOP HS-22, *Fire Prevention*)

- Fire extinguishers shall be provided so that the travel distance from any work area to the nearest extinguisher is less than 100 feet. When 5 gallons or more of a flammable or combustible liquid is being used, an extinguisher must be within 50 feet. Extinguishers must:

  - be maintained in a fully charged and operable condition,
  - be visually inspected each month, and
  - undergo a maintenance check each year.
- The area in front of extinguishers must be kept clear.
- Post "Exit" signs over exiting doors, and post "Fire Extinguisher" signs over extinguisher locations.
- Combustible materials stored outside should be at least 10 feet from any building.
- Solvent waste and oily rags must be kept in a fire resistant, covered container until removed from the site.
- Flammable/combustible liquids must be kept in approved containers, and must be stored in an approved storage cabinet.

2.2.6 Electrical

(Reference CH2M HILL SOP HS-23, *Electrical*)

- Only qualified personnel are permitted to work on unprotected energized electrical systems.
- Only authorized personnel are permitted to enter high-voltage areas.
- Do not tamper with electrical wiring and equipment unless qualified to do so. All electrical wiring and equipment must be considered energized until lockout/tagout procedures are implemented.
- Inspect electrical equipment, power tools, and extension cords for damage prior to use. Do not use defective electrical equipment, remove from service.
- All temporary wiring, including extension cords and electrical power tools, must have ground fault circuit interrupters (GFCIs) installed.
- Extension cords must be:
  - equipped with third-wire grounding.
  - covered, elevated, or protected from damage when passing through work areas.
  - protected from pinching if routed through doorways.
  - not fastened with staples, hung from nails, or suspended with wire.
- Electrical power tools and equipment must be effectively grounded or double-insulated UL approved.
- Operate and maintain electric power tools and equipment according to manufacturers' instructions.
- Maintain safe clearance distances between overhead power lines and any electrical conducting material unless the power lines have been de-energized and grounded, or where insulating barriers have been installed to prevent physical contact. Maintain at least 10 feet from overhead power lines for voltages of 50 kV or less, and 10 feet plus ½ inch for every 1 kV over 50 kV.
- Temporary lights shall not be suspended by their electric cord unless designed for suspension. Lights shall be protected from accidental contact or breakage.
- Protect all electrical equipment, tools, switches, and outlets from environmental elements.

2.2.7 Stairways and Ladders

(Reference CH2M HILL SOP HS-25, *Stairways and Ladders*)

- Stairway or ladder is generally required when a break in elevation of 19 inches or greater exists.
- Personnel should avoid using both hands to carry objects while on stairways; if unavoidable, use extra precautions.
- Personnel must not use pan and skeleton metal stairs until permanent or temporary treads and landings are provided the full width and depth of each step and landing.
- Ladders must be inspected by a competent person for visible defects prior to each day's use. Defective ladders must be tagged and removed from service.
- Ladders must be used only for the purpose for which they were designed and shall not be loaded beyond their rated capacity.
- Only one person at a time shall climb on or work from an individual ladder.

- User must face the ladder when climbing; keep belt buckle between side rails
- Ladders shall not be moved, shifted, or extended while in use.
- User must use both hands to climb; use rope to raise and lower equipment and materials
- Straight and extension ladders must be tied off to prevent displacement
- Ladders that may be displaced by work activities or traffic must be secured or barricaded
- Portable ladders must extend at least 3 feet above landing surface
- Straight and extension ladders must be positioned at such an angle that the ladder base to the wall is one-fourth of the working length of the ladder
- Stepladders are to be used in the fully opened and locked position
- Users are not to stand on the top two steps of a stepladder; nor are users to sit on top or straddle a stepladder
- Fixed ladders $\geq$ 24 feet in height must be provided with fall protection devices.
- Fall protection should be considered when working from extension, straight, or fixed ladders greater than 6 feet from lower levels and both hands are needed to perform the work, or when reaching or working outside of the plane of ladder side rails.

2.2.8 Heat Stress

(Reference CH2M HILL SOP HS-09, *Heat and Cold Stress*)

- Drink 16 ounces of water before beginning work. Disposable cups and water maintained at 50°F to 60°F should be available. Under severe conditions, drink 1 to 2 cups every 20 minutes, for a total of 1 to 2 gallons per day. Do not use alcohol in place of water or other nonalcoholic fluids. Decrease your intake of coffee and caffeinated soft drinks during working hours.
- Acclimate yourself by slowly increasing workloads (e.g., do not begin with extremely demanding activities).
- Use cooling devices, such as cooling vests, to aid natural body ventilation. These devices add weight, so their use should be balanced against efficiency.
- Use mobile showers or hose-down facilities to reduce body temperature and cool protective clothing.
- Conduct field activities in the early morning or evening and rotate shifts of workers, if possible.
- Avoid direct sun whenever possible, which can decrease physical efficiency and increase the probability of heat stress. Take regular breaks in a cool, shaded area. Use a wide-brim hat or an umbrella when working under direct sun for extended periods.
- Provide adequate shelter/shade to protect personnel against radiant heat (sun, flames, hot metal).
- Maintain good hygiene standards by frequently changing clothing and showering.
- Observe one another for signs of heat stress. Persons who experience signs of heat syncope, heat rash, or heat cramps should consult the SSC/DSC to avoid progression of heat-related illness.

SYMPTOMS AND TREATMENT OF HEAT STRESS					
	Heat Syncope	**Heat Rash**	**Heat Cramps**	**Heat Exhaustion**	**Heat Stroke**
Signs and Symptoms	Sluggishness or fainting while standing erect or immobile in heat.	Profuse tiny raised red blister-like vesicles on affected areas, along with prickling sensations during heat exposure.	Painful spasms in muscles used during work (arms, legs, or abdomen); onset during or after work hours.	Fatigue, nausea, headache, giddiness; skin clammy and moist; complexion pale, muddy, or flushed; may faint on standing; rapid thready pulse and low blood pressure; oral temperature normal or low	Red, hot, dry skin; dizziness; confusion; rapid breathing and pulse; high oral temperature.
Treatment	Remove to cooler area. Rest lying	Use mild drying lotions and	Remove to cooler area.	Remove to cooler area. Rest lying down, with head	Cool rapidly by soaking in cool-

SYMPTOMS AND TREATMENT OF HEAT STRESS					
	down. Increase fluid intake. Recovery usually is prompt and complete.	powders, and keep skin clean for drying skin and preventing infection.	Rest lying down. Increase fluid intake.	in low position. Administer fluids by mouth. Seek medical attention.	but not cold–water. Call ambulance, and get medical attention immediately!

Monitoring Heat Stress

These procedures should be considered when the ambient air temperature exceeds 70°F, the relative humidity is high (>50 percent), or when workers exhibit symptoms of heat stress.

The heart rate (HR) should be measured by the radial pulse for 30 seconds, as early as possible in the resting period. The HR at the beginning of the rest period should not exceed 100 beats/minute, or 20 beats/minute above resting pulse. If the HR is higher, the next work period should be shortened by 33 percent, while the length of the rest period stays the same. If the pulse rate still exceeds 100 beats/minute at the beginning of the next rest period, the work cycle should be further shortened by 33 percent. The procedure is continued until the rate is maintained below 100 beats/minute, or 20 beats/minute above resting pulse.

2.2.9 Cold Stress

(Reference CH2M HILL SOP HS-09, *Heat and Cold Stress*)

- Be aware of the symptoms of cold-related disorders, and wear proper, layered clothing for the anticipated fieldwork. Appropriate rain gear is a must in cool weather.
- Consider monitoring the work conditions and adjusting the work schedule using guidelines developed by the U.S. Army (wind-chill index) and the National Safety Council (NSC).
- Wind-Chill Index is used to estimate the combined effect of wind and low air temperatures on exposed skin. The wind-chill index does not take into account the body part that is exposed, the level of activity, or the amount or type of clothing worn. For those reasons, it should only be used as a guideline to warn workers when they are in a situation that can cause cold-related illnesses.
- NSC Guidelines for Work and Warm-Up Schedules can be used with the wind-chill index to estimate work and warm-up schedules for fieldwork. The guidelines are not absolute; workers should be monitored for symptoms of cold-related illnesses. If symptoms are not observed, the work duration can be increased.
- Persons who experience initial signs of immersion foot, frostbite, hypothermia should consult the SSC/DSC to avoid progression of cold-related illness.
- Observe one another for initial signs of cold-related disorders.
- Obtain and review weather forecast – be aware of predicted weather systems along with sudden drops in temperature, increase in winds, and precipitation.

SYMPTOMS AND TREATMENT OF COLD STRESS			
	Immersion (Trench) Foot	**Frostbite**	**Hypothermia**
Signs and Symptoms	Feet discolored and painful; infection and swelling present.	Blanched, white, waxy skin, but tissue resilient; tissue cold and pale.	Shivering, apathy, sleepiness; rapid drop in body temperature; glassy stare; slow pulse; slow respiration.
Treatment	Seek medical treatment immediately.	Remove victim to a warm place. Re-warm area quickly in warm–but **not** hot–water. Have victim drink warm fluids, but **not** coffee or alcohol. Do not break blisters. Elevate the injured area, and get medical attention.	Remove victim to a warm place. Have victim drink warm fluids, but **not** coffee or alcohol. Get medical attention.

2.2.10 Compressed Gas Cylinders

- Valve caps must be in place when cylinders are transported, moved, or stored.
- Cylinder valves must be closed when cylinders are not being used and when cylinders are being moved.
- Cylinders must be secured in an upright position at all times.
- Cylinders must be shielded from welding and cutting operations and positioned to avoid being struck or knocked over; contacting electrical circuits; or exposed to extreme heat sources.
- Cylinders must be secured on a cradle, basket, or pallet when hoisted; they may not be hoisted by choker slings.

2.2.11 Procedures for Locating Buried Utilities

Local Utility Mark-Out Service

Name: Coordinated through Shawn Jorgensen
Phone: (301) 744-2263

- Where available, obtain utility diagrams for the facility.
- Review locations of sanitary and storm sewers, electrical conduits, water supply lines, natural gas lines, and fuel tanks and lines.
- Review proposed locations of intrusive work with facility personnel knowledgeable of locations of utilities. Check locations against information from utility mark-out service.
- Where necessary (e.g., uncertainty about utility locations), excavation or drilling of the upper depth interval should be performed manually
- Monitor for signs of utilities during advancement of intrusive work (e.g., sudden change n advancement of auger or split spoon).
- When the client or other onsite party is responsible for determining the presence and locations of buried utilities, the SSC should confirm that arrangement.

2.2.12 Investigation Derived Waste (IDW) Drum Sampling

Personnel are permitted to handle and/or sample drums containing IDW only; handling or sampling other drums requires a plan revision or amendment approved by the CH2M HILL HSM. The following control measures will be taken when sampling drums containing IDW:

- Minimize transportation of drums.
- Sample only labeled drums or drums known to contain IDW.
- Use caution when sampling bulging or swollen drums. Relieve pressure slowly.
- If drums contain, or potentially contain, flammable materials, use non-sparking tools to open.
- Picks, chisels, and firearms may not be used to open drums.
- Reseal bung holes or plugs whenever possible.
- Avoid mixing incompatible drum contents.
- Sample drums without leaning over the drum opening.
- Transfer the content of drums using a method that minimizes contact with material.
- Personal protective equipment (PPE) and air monitoring requirements specified in Sections 4 and 5 must address IDW drum sampling.
- Spill-containment procedures specified in Section 7 must be appropriate for the material to be handled.

2.1.4 Confined Space Entry

(Reference CH2M HILL SOP HS-17, *Confined Space Entry*)

When planned activities will not include confined-space entry, permit-required confined spaces accessible to CH2M HILL personnel are to be identified before the task begins. The SSC is to confirm that permit spaces are properly posted or that employees are informed of their locations and hazards.

The following requirements must be met prior to confined space entry:

- Confined space entrants, attendants, and entry supervisors must complete the CH2M HILL 8-Hour Confined Space Entry training.
- A Confined Space Entry Permit (CSEP), Alternative Procedure Certificate (APC), or Nonpermit Certificate (NPC) must be completed and posted near the space entrance point for review.
- Each confined space entrant and attendant must attend a pre-entry briefing conducted by the entry supervisor.
- Each confined space entrant and attendant must verify that the entry supervisor has authorized entry and that all permit or certificate requirements have been satisfied.
- Only individuals listed on the Authorization/Accountability Log are permitted to enter the space.
- Each confined space entrant and attendant must verify that atmospheric monitoring has been conducted at the frequency specified on the permit or certificate and that monitoring results are documented and within acceptable safe levels.

The following requirements must be met during confined space entry:

- Communication must be maintained between the attendant and entrants to enable the attendant to monitor entrant status.
- Entrants must use equipment specified on the permit or certificate accordingly.
- All permit or certificate requirements must be followed.
- Entrants must evacuate the space upon orders of the attendant or entry supervisor, when an alarm is sounded, or when a prohibited condition or dangerous situation is recognized.
- Entrants and attendants must inform the entry supervisor of any hazards confronted or created in the space or any problems encountered during entry.

2.3 Biological Hazards and Controls

2.3.1 Snakes

Snakes typically are found in underbrush and tall grassy areas. If you encounter a snake, stay calm and look around; there may be other snakes. Turn around and walk away on the same path you used to approach the area. If a person is bitten by a snake, wash and immobilize the injured area, keeping it lower than the heart if possible. Seek medical attention immediately. **DO NOT** apply ice, cut the wound, or apply a tourniquet. Try to identify the type of snake: note color, size, patterns, and markings.

2.3.2 Poison Ivy and Poison Sumac

Poison ivy, poison oak, and poison sumac typically are found in brush or wooded areas. They are more commonly found in moist areas or along the edges of wooded areas. Become familiar with the identity of these plants. Wear protective clothing that covers exposed skin and clothes. Avoid contact with plants and the outside of protective clothing. If skin contacts a plant, wash the area with soap and water immediately. If the reaction is severe or worsens, seek medical attention.

2.3.3 Ticks

Ticks typically are in wooded areas, bushes, tall grass, and brush. Ticks are black, black and red, or brown and can be up to one-quarter inch in size. Wear tightly woven light-colored clothing with long sleeves and pant legs tucked into boots; spray **only outside** of clothing with permethrin or permanone and spray skin with only DEET; and check yourself frequently for ticks. See Attachment 7 for more details.

If bitten by a tick, grasp it at the point of attachment and carefully remove it. After removing the tick, wash your hands and disinfect and press the bite areas. Save the removed tick. Report the bite to human resources. Look for symptoms of Lyme disease or Rocky Mountain spotted fever (RMSF). Lyme: a rash might appear that looks like a bullseye with a small welt in the center. RMSF: a rash of red spots under the skin 3 to 10 days after the tick bite. In both cases, chills, fever, headache, fatigue, stiff neck, and bone pain may develop. If symptoms appear, seek medical attention.

2.3.4 Bees and Other Stinging Insects

Bee and other stinging insects may be encountered almost anywhere and may present a serious hazard, particularly to people who are allergic. Watch for and avoid nests. Keep exposed skin to a minimum. Carry a kit if you have had allergic reactions in the past, and inform the SSC and/or buddy. If a stinger is present, remove it carefully with tweezers. Wash and disinfect the wound, cover it, and apply ice. Watch for allergic reaction; seek medical attention if a reaction develops.

2.3.5 Bloodborne Pathogens

(Reference CH2M HILL SOP HS-36, *Bloodborne Pathogens*)

Exposure to bloodborne pathogens may occur when rendering first aid or cardiopulmonary resuscitation (CPR), or when coming into contact with landfill waste or waste streams containing potentially infectious material. Exposure controls and PPE are required as specified in CH2M HILL SOP HS-36, *Bloodborne Pathogens*. Hepatitis B vaccination must be offered before the person participates in a task where exposure is a possibility.

2.3.6 Other Anticipated Biological Hazards

None anticipated.

2.4 Radiological Hazards and Controls

Refer to CH2M HILL's *Corporate Health and Safety Program, Program and Training Manual,* and *Corporate Health and Safety Program, Radiation Protection Program Manual,* for standards of practice in contaminated areas.

Hazards	Controls
Radiological materials are present on the station in various forms. Most radiological material consists of X-ray materials located at the Naval Explosive Ordinance Disposal Technology Center in Building 2009.	None Required

2.5 Potential Contaminants of Concern

Contaminant	Location and Maximum[a] Concentration (ppm) (Site)	Exposure Limit[b]	IDLH[c]	Symptoms and Effects of Exposure	PIP[d] (eV)
Site 19					
Arsenic	GW: SB: SS:	0.01 mg/m^3	5 Ca	Ulceration of nasal septum, respiratory irritation, dermatitis, gastrointestinal disturbances, peripheral neuropathy, hyperpigmentation	NA
Copper	GW: SB: SS:	1 mg/m^3	100	Irritation eyes, respiratory system; cough, dyspnea (breathing difficulty), wheezing; [potential occupational carcinogen]	
Cadmium	GW: SB: SS:	0.005 mg/m^3	9 Ca	Pulmonary edema, coughing, chest tightness/pain, headache, chills, muscle aches, nausea, vomiting, diarrhea, difficulty breathing, loss of sense of smell, emphysema, mild anemia	NA
Chromium (hexavalent)	GW: SB: SS:	0.01 mg/m^3	15 Ca	Irritated respiratory system, nasal septum perforation, liver and kidney damage, leucytosis, leupen, monocytosis, eosinophilla, eye injury, conjunctivitis, skin ulcer, sensitization dermatitis	NA
Cobalt (Metal, Dusts, and Fumes)	GW: SB: SS:	0.05 mg/m^3	20	Coughing, difficulty breathing, wheezing, decreased pulmonary function, diffuse nodule fibrosous, dermatitis, respiratory hypersensitivity, asthma	NA
Lead	GW: SB: SS:	0.05 mg/m^3	100	Weakness lassitude, facial pallor, pal eye, weight loss, malnutrition, abdominal pain, constipation, anemia, gingival lead line, tremors, paralysis of wrist and ankles, encephalopathy, kidney disease, irritated eyes, hypertension	NA
Mercury	GW: SB: SS:	0.025 mg/m^3	10	Skin and eye irritation, cough, chest pain, difficult breathing, bronchitis, pneumontitis, tremors, insomnia, irritability, indecision, headache, fatigue, weakness, GI disturbance	UK
Silver	GW: SB: SS:	0.1mg/m^3	10 mg/ m^3	Overexposure to this substance may result in gastrointestinal, upper respiratory and skin irritation. Discoloration of the eyes, skin and hair	NA
4-Amino-2,6-dinitrotoluene	GW: SB: SS:				

2.5 Potential Contaminants of Concern

Contaminant	Location and Maximum[a] Concentration (ppm) (Site)	Exposure Limit[b]	IDLH[c]	Symptoms and Effects of Exposure	PIP[d] (eV)
2-Amino-4,6-dinitrotoluene	GW: SB: SS:				
Benzene	GW: SB: SS:	1 ppm	500 Ca	Eye, nose, skin, and respiratory irritation; headache; nausea; dermatitis; fatigue; giddiness; staggered gait; bone marrow depression	9.24
2-Butanone (Methyl Ethyl Ketone, MEK)	GW: SB: SS:	200 ppm	3,000	Eye, skin, and nose irritation; headache; dizziness; vomiting; dermatitis	9.54
Carbon Disulfide	GW: SB: SS:	10	500	Dizziness, poor sleep, fatigue, nervousness, anorexic, low weight; psychosis; Parkinson-like syndrome; ocular changes; coronary heart disease; gastritis; kidney, liver injury; eye and skin burns; dermatitis; reproductive effects.	10.8
Carbon Tetrachloride	GW: SB: SS:	2 ppm	200 Ca	Central nervous system (CNS) depression, nausea, vomiting, eye and skin irritation, liver and kidney injury, drowsiness, dizziness	11.47
Chlorobenzene	GW: SB: SS:	10 ppm	1,000	Skin, eye, and nose irritation; drowsiness; uncoordination; CNS depression	9.07
Chloroform	GW: SB: SS:	2 ppm	500 Ca	Dizziness, mental dullness, nausea, confusion, disorientation, headache, fatigue, eye and skin irritation, anesthesia, enlarged liver	11.42
Chloromethane	GW: SB: SS:	100 ppm	2000 Ca	Dizziness; nausea, vomiting; visual disturbance, staggering, slurred speech, convulsions, coma; liver and kidney damage [carcinogen].	11.28
Cresol (all isomers of 2-, 3-, & 4-methylphenol)	GW: SB: SS:	5 ppm	250	Eye, skin, and mucous membrane irritant; CNS effects including confusion, depression, and respiratory failure; difficulty breathing; irregular rapid respiration; weak pulse; eye and skin burns; dermatitis; lung, liver, kidney, and pancreas damage	8.98

2.5 Potential Contaminants of Concern

Contaminant	Location and Maximum[a] Concentration (ppm) (Site)	Exposure Limit[b]	IDLH[c]	Symptoms and Effects of Exposure	PIP[d] (eV)
Dibutylphthalate (DBP)	GW: SB: SS:	5 mg/m^3	4,000	Eye, upper respiratory system, and stomach irritant	UK
o-Dichlorobenzene (1,2-Dichlorobenzene)	GW: SB: SS:	25 ppm	200	Nose and eye irritation, liver and kidney damage, skin blisters	9.06
p-Dichlorobenzene (1,4-Dichlorobenzene)	GW: SB: SS:	10 ppm	150 Ca	Headache, eye irritation, nausea, vomiting, swelling periorbital, profus rhinitis, jaundice, cirrhosis	8.98
1,1-Dichloroethene	GW: SB: SS:	5	ND Ca	Eye, skin, and throat irritant; dizziness, headache, nausea; dyspnea; liver and kidney dysfunction; pneumonitis; [carcinogen]	10.00
1,2-Dichloroethane (Ethylene Dichloride)	GW: SB: SS:	1 ppm	50 Ca	CNS depression, nausea, vomiting, dermatitis, eye irritation, liver, kidney, and CNS damage; corneal opacity	11.05
1,2-Dichloroethene (cis and trans)	GW: SB: SS:	200	1000	Eye and respiratory system irritant; CNS depressant	9.65
1,3-Dinitrobenzene	GW: SB: SS:	1 mg/m^3	50 mg/m^3	Anoxia, cyanosis; visual disturbance, central scotomas; bad taste, burning mouth, dry throat, thirst; yellowing hair, eyes, skin; anemia; liver damage	10.43
Bis-(2-ethylhexyl)phthalate (DEHP, DOP)	GW: SB: SS:	5 mg/m^3	5,000 Ca	Eye and mucous membrane irritant	UK
Hexahydro-1,3,5-trinitro-1,3,5-triazine	GW: SB: SS:	1.5 mg/m^3	N.D.	Irritation eyes, skin; headache, irritability, lassitude (weakness, exhaustion), tremor, nausea, dizziness, vomiting, insomnia, convulsions	NA

2.5 Potential Contaminants of Concern

Contaminant	Location and Maximum[a] Concentration (ppm) (Site)	Exposure Limit[b]	IDLH[c]	Symptoms and Effects of Exposure	PIP[d] (eV)
Hydrazine	GW: SB: SS:	0.03 ppm Ca	50 Ca	Irritation eyes, skin, nose, throat; temporary blindness; dizziness, nausea; dermatitis; eye, skin burns; in animals: bronchitis, pulmonary edema; liver, kidney damage; convulsions; [potential occupational carcinogen]	8.43
Methyl-2,4,6-trinitrophenylnitramine	GW: SB: SS:				
Nitrobenzene	GW: SB: SS:	1 ppm	200 ppm	Irritation eyes, skin; anoxia; dermatitis; anemia; methemoglobinemia; in animals: liver, kidney damage; testicular effects	9.92
Nitroglycerin	GW: SB: SS:	0.1mg/m^3	75 mg/m^3	Severe headaches, nausea, vomiting, abdominal cramps, confusion, delirium, altered heart rhythm, dyspnea, methemoglobinemia, cyanosis. This material will also cause skin irritation and possibly a rash	NA
Nitroguanidine	GW: SB: SS:				
2-Nitrotoluene	GW: SB: SS:	2 ppm	200 ppm	Anoxia, cyanosis; headache, lassitude (weakness, exhaustion), dizziness; ataxia; dyspnea (breathing difficulty); tachycardia; nausea, vomiting	9.43
3-Nitrotoluene	GW: SB: SS:	2 ppm	200 ppm	Anoxia, cyanosis; headache, lassitude (weakness, exhaustion), dizziness; ataxia; dyspnea (breathing difficulty); tachycardia; nausea, vomiting	9.48
4-Nitrotoluene	GW: SB: SS:	2 ppm	200 ppm	Anoxia, cyanosis; headache, lassitude (weakness, exhaustion), dizziness; ataxia; dyspnea (breathing difficulty); tachycardia; nausea, vomiting	9.50

2.5 Potential Contaminants of Concern

Contaminant	Location and Maximum[a] Concentration (ppm) (Site)	Exposure Limit[b]	IDLH[c]	Symptoms and Effects of Exposure	PIP[d] (eV)
Pentaerythritol Tetranitrate	GW: SB: SS:	NL	NL	Overexposure to fumes after detonation may cause nausea. Eye and skin irritation; headache; weakness; fall in blood pressure; methemoglobinemia.	UK
PNAs (Limits as Coal Tar Pitch)	GW: SB: SS:	0.2 mg/m^3	80 Ca	Dermatitis and bronchitis	UK
Tetrachloroethylene (PCE)	GW: SB: SS:	25 ppm	150 Ca	Eye, nose, and throat irritation; nausea; flushed face and neck; vertigo; dizziness; sleepiness; skin redness; headache; liver damage	9.32
1,1,2,2-Tetrachloroethane (Tetrachlorethane)	GW: SB: SS:	1 ppm	100 Ca	Nausea, vomiting, abdominal pain, finger tremors, jaundice, hepatitis, liver tenderness, monocytosis, kidney damage, dermatitis	11.10
Tetrachloroethylene (PCE)	GW: SB: SS:	25 ppm	150 Ca	Eye, nose, and throat irritation; nausea; flushed face and neck; vertigo; dizziness; sleepiness; skin redness; headache; liver damage	9.32
1,1,2-Trichloroethane	GW: SB: SS:	10 ppm	100 Ca	Eye and nose irritation, CNS depression, liver damage, dermatitis	11.00
Trichloroethylene (TCE)	GW: SB: SS:	50 ppm	1,000 Ca	Headache, vertigo, visual disturbance, eye and skin irritation, fatigue, giddiness, tremors, sleepiness, nausea, vomiting, dermatitis, cardiac arrhythmia, paresthesia, liver injury	9.45
1,3,5-Trinitrotoluene	GW: SB: SS:	NL	NL	Acute: causes nausea, vomiting, and anorexia. Do not breathe vapors or swallow material. Use with adequate ventilation. Can cause skin irritation. Avoid contact with eyes, skin, and clothing. Target organs: can cause dermatitis, liver and blood damage. An allergen.	UK

2.5 Potential Contaminants of Concern

Contaminant	Location and Maximum[a] Concentration (ppm) (Site)	Exposure Limit[b]	IDLH[c]	Symptoms and Effects of Exposure	PIP[d] (eV)
Toluene	GW: SB: SS:	50 ppm	500	Eye and nose irritation, fatigue, weakness, confusion, dizziness, headache, dilated pupils, excessive tearing, nervousness, muscle fatigue, paresthesia, dermatitis, liver and kidney damage	8.82
Xylenes	GW: SB: SS:	100 ppm	900	Irritated eyes, skin, nose, and throat; dizziness; excitement; drowsiness; incoherence; staggering gait; corneal vacuolization; anorexia; nausea; vomiting; abdominal pain; dermatitis	8.56
Vinyl Chloride	GW: SB: SS:	1 ppm	NL Ca	Weakness, abdominal pain, gastrointestinal bleeding, enlarged liver, pallor or cyanosis of extremities	9.99

Footnotes:

[a] Specify sample-designation and media: SB (Soil Boring), A (Air), D (Drums), GW (Groundwater), L (Lagoon), TK (Tank), S (Surface Soil), SL (Sludge), SW (Surface Water).

[b] Appropriate value of PEL, REL, or TLV listed.

[c] IDLH = immediately dangerous to life and health (units are the same as specified "Exposure Limit" units for that contaminant); NL = No limit found in reference materials; CA = Potential occupational carcinogen.

[d] PIP = photoionization potential; NA = Not applicable; UK = Unknown.

[e] The following additional contaminants have been detected at IH during past investigations: acenaphthelene, chrysene, RDX, cyclotetramethylene, dinitrotoluene, nitrocellulose, nitroguanidine, nitrotoluene, phenanthrene, 2,4,6-Trinitrotoluene, aluminum, beryllium, copper, manganese, nickel, zinc, DDT, benzo(a)pyrene, bis(2-ethylhexyl)phthalate, creosote/cresol, asbestos, butylbenzylphthalate. No information is available on distribution or detected levels, however, concentrations of these contaminants are expected to be low. If conditions or information changes, the HSM will be contacted and the situation will be re-evaluated.

2.6 Potential Routes of Exposure

Dermal: Contact with contaminated media. This route of exposure is minimized through proper use of PPE, as specified in Section 4.	**Inhalation:** Vapors and contaminated particulates. This route of exposure is minimized through proper respiratory protection and monitoring, as specified in Sections 4 and 5, respectively.	**Other:** Inadvertent ingestion of contaminated media. This route should not present a concern if good hygiene practices are followed (e.g., wash hands and face before drinking or smoking).

3 Project Organization and Personnel

3.1 CH2M HILL Employee Medical Surveillance and Training

(Reference CH2M HILL SOPs HS-01, *Medical Surveillance,* and HS-02, *Health and Safety Training)*

The employees listed below are enrolled in the CH2M HILL Comprehensive Health and Safety Program and meet state and federal hazardous waste operations requirements for 40-hour initial training, 3-day on-the-job experience, and 8-hour annual refresher training. Employees designated "SSC" have completed a 12-hour site safety coordinator course, and have documented requisite field experience. An SSC with a level designation (D, C, B) equal to or greater than the level of protection being used must be present during all tasks performed in exclusion or decontamination zones. Employees designated "FA-CPR" are currently certified by the American Red Cross, or equivalent, in first aid and CPR. At least one FA-CPR designated employee must be present during all tasks performed in exclusion or decontamination zones. The employees listed below are currently active in a medical surveillance program that meets state and federal regulatory requirements for hazardous waste operations. Certain tasks (e.g., confined-space entry) and contaminants (e.g., lead) may require additional training and medical monitoring.

Pregnant employees are to be informed of and are to follow the procedures in CH2M HILL's SOP HS-04, *Reproduction Protection,* including obtaining a physician's statement of the employee's ability to perform hazardous activities before being assigned fieldwork.

Employee Name	Office	Responsibility	SSC/FA-CPR
Clair Morris	STL	Designated Safety Coordinator	

3.2 Field Team Chain of Command and Communication Procedures

3.2.1 Client

Contact Name: Jeff Morris, Department of the Navy, Naval Facilities Engineering Command, Washington
Phone: (202) 685-3279
Facility Contact Name: Shawn Jorgensen, Naval District Washington, Indian Head
Phone: (301) 744-2263

3.2.2 CH2M HILL

Project Manager: Chris English/STL
Health and Safety Manager: Steve Beck/MKE
Field Team Leader: Clair Morris/STL
Site Safety Coordinator: Clair Morris/STL

The SSC is responsible for contacting the Field Team Leader and Project Manager. In general, the Project Manager will contact the client. The Health and Safety Manager should be contacted as appropriate.

3.2.3 CH2M HILL Subcontractors

(Reference CH2M HILL SOP HS-55, *Subcontractor, Contractor, and Owner*)

Subcontractor To Be Determined
Subcontractor Contact Name: To Be Determined
Telephone: To Be Determined

The subcontractors listed above are covered by this HSP and must be provided a copy of this plan. However, this plan does not address hazards associated with the tasks and equipment that the subcontractor has expertise in (e.g., drilling, excavation work, electrical). Subcontractors are responsible for the health and safety procedures specific to their work, and are required to submit these procedures to CH2M HILL for review before the start of field work. Subcontractors must comply with the established health and safety plan(s). The CH2M HILL SSC should verify that subcontractor employee training, medical clearance, and fit test records are current and must monitor and enforce compliance with the established plan(s). CH2M HILL's oversight does not relieve subcontractors of their responsibility for effective implementation and compliance with the established plan(s).

CH2M HILL should continuously endeavor to observe subcontractors' safety performance. This endeavor should be reasonable, and include observing for hazards or unsafe practices that are both readily observable and occur in common work areas. CH2M HILL is not responsible for exhaustive observation for hazards and unsafe practices. In addition to this level of observation, the SSC is responsible for confirming CH2M HILL subcontractor performance against both the subcontractor's safety plan and applicable self-assessment checklists. Self-assessment checklists contained in Attachment 6 are to be used by the SSC to review subcontractor performance.

Health and safety related communications with CH2M HILL subcontractors should be conducted as follows:

- Brief subcontractors on the provisions of this plan, and require them to sign the Employee Signoff Form included in Attachment 1.
- Request subcontractor(s) to brief the project team on the hazards and precautions related to their work.
- When apparent non-compliance/unsafe conditions or practices are observed, notify the subcontractor safety representative and require corrective action – the subcontractor is responsible for determining and implementing necessary controls and corrective actions.
- When repeat non-compliance/unsafe conditions are observed, notify the subcontractor safety representative and stop affected work until adequate corrective measures are implemented.
- When an apparent imminent danger exists, immediately remove all affected CH2M HILL employees and subcontractors, notify subcontractor safety representative, and stop affected work until adequate corrective measures are implemented. Notify the Project Manager and HSM as appropriate.
- Document all oral health and safety related communications in project field logbook, daily reports, or other records.

3.2.4 Contractors

(Reference CH2M HILL SOP HS-55, *Subcontractor, Contractor, and Owner*)

Contractor: To Be Determined
Contractor Contact Name: To Be Determined
Telephone: To Be Determined

This plan does not cover contractors that are contracted directly to the client or the owner. CH2M HILL is not responsible for the health and safety or means and methods of the contractor's work, and we must never assume such responsibility through our actions (e.g., advising on H&S issues). In addition to this plan, CH2M HILL staff should review contractor safety plans so that we remain aware of appropriate precautions

that apply to us. Except in unusual situations when conducted by the HSM, CH2M HILL must never comment on or approve contractor safety procedures. Self-assessment checklists contained in Attachment 6 are to be used by the SSC to review the contractor's performance ONLY as it pertains to evaluating our exposure and safety.

Health and safety related communications with contractors should be conducted as follows:

- Request the contractor to brief CH2M HILL employees and subcontractors on the precautions related to the contractor's work.
- When an apparent contractor non-compliance/unsafe condition or practice poses a risk to CH2M HILL employees or subcontractors:
  - Notify the contractor safety representative
  - Request that the contractor determine and implement corrective actions
  - If needed, stop affected CH2M HILL work until contractor corrects the condition or practice. Notify the client, Project Manager, and HSM as appropriate.
- If apparent contractor non-compliance/unsafe conditions or practices are observed, inform the contractor safety representative. Our obligation is limited strictly to informing the contractor of our observation – the contractor is solely responsible for determining and implementing necessary controls and corrective actions.
- If an apparent imminent danger is observed, immediately warn the contractor employee(s) in danger and notify the contractor safety representative. Our obligation is limited strictly to immediately warning the affected individual(s) and informing the contractor of our observation – the contractor is solely responsible for determining and implementing necessary controls and corrective actions.
- Document all oral health and safety related communications in project field logbook, daily reports, or other records.

4 Personal Protective Equipment (PPE)

(Reference CH2M HILL SOP HS-07, *Personal Protective Equipment*, HS-08, *Respiratory Protection*)

PPE Specifications [a]

Task	Level	Body	Head	Respirator [b]
General site entry Surveying Observation of material loading for offsite disposal	D	Work clothes; steel-toe, leather work boots; work glove.	Hardhat [c] Safety glasses Ear protection [d]	None required
Surface water sampling Sediment sampling Subsurface Soil sampling Surface soil sampling Geoprobe boring	Modified D	Work clothes or cotton coveralls **Boots:** Steel-toe, chemical-resistant boots OR steel-toe, leather work boots with outer rubber boot covers **Gloves:** Inner surgical-style nitrile & outer chemical-resistant nitrile gloves.	Hardhat [c] Safety glasses Ear protection [d]	None required
Groundwater sampling Soil boring Investigation-derived waste (drum) sampling and disposal	Modified D	**Coveralls:** Uncoated Tyvek® **Boots:** Steel-toe, chemical-resistant boots OR steel-toe, leather work boots with outer rubber boot covers **Gloves:** Inner surgical-style nitrile & outer chemical-resistant nitrile gloves.	Hardhat [c] Splash shield [c] Safety glasses Ear protection [d]	None required.
Tasks requiring upgrade	C or B	**Coveralls:** Polycoated Tyvek® **Boots:** Steel-toe, chemical-resistant boots OR steel-toe, leather work boots with outer rubber boot covers **Gloves:** Inner surgical-style nitrile & outer chemical-resistant nitrile gloves.	Hardhat [c] Splash shield [c] Ear protection [d] Spectacle inserts	Positive-pressure demand self-contained breathing apparatus (SCBA); MSA Ultralite, or equivalent.

Reasons for Upgrading or Downgrading Level of Protection

Upgrade[f]	Downgrade
• Request from individual performing tasks. • Change in work tasks that will increase contact or potential contact with hazardous materials. • Occurrence or likely occurrence of gas or vapor emission. • Known or suspected presence of dermal hazards. • Instrument action levels (Section 5) exceeded.	• New information indicating that situation is less hazardous than originally thought. • Change in site conditions that decreases the hazard. • Change in work task that will reduce contact with hazardous materials.

[a] Modifications are as indicated. CH2M HILL will provide PPE only to CH2M HILL employees.

[b] No facial hair that would interfere with respirator fit is permitted.

[c] Hardhat and splash-shield areas are to be determined by the SSC.

[d] Ear protection should be worn when conversations cannot be held at distances of 3 feet or less without shouting.

[e] Cartridge change-out schedule is at least every 8 hours (or one work day), except if relative humidity is > 85%, or if organic vapor measurements are > midpoint of Level C range (refer to Section 5)–then at least every 4 hours. If encountered conditions are different than those anticipated in this HSP, contact the HSM.

[f] Performing a task that requires an upgrade to a higher level of protection (e.g., Level D to Level C) is permitted only when the PPE requirements have been approved by the HSM, and an SSC qualified at that level is present.

5 Air Monitoring/Sampling

(Reference CH2M HILL SOP HS-06, *Air Monitoring)*

5.1 Air Monitoring Specifications

Instrument	Tasks	Action Levels[a]		Frequency[b]	Calibration
PID: OVM with 10.6eV lamp or equivalent	Monitoring well installation, soil, and groundwater sampling activities	0 – 5 ppm 5 - 50 ppm > 50 ppm	Level D Level C Level B	Initially and periodically during task	Daily
CGI: MSA model 260 or 261 or equivalent	Drilling and Confined space Entry	0-10% : 10-25% LEL: >25% LEL:	No explosion hazard Potential explosion hazard Explosion hazard; evacuate or vent	Continuous during advancement of boring or trench	Daily
O_2Meter: MSA model 260 or 261 or equivalent	Drilling and Confined space Entry	>25%[c] O_2: 20.9%[c] O_2: <19.5%[c] O_2:	Explosion hazard; evacuate or vent Normal O_2 O_2 deficient; vent or use SCBA	Continuous during advancement of boring or trench	Daily
Dust Monitor: Miniram model PDM-3 or equivalent	Test-pitting and excavation	<0.8 mg/m^3[d] 0.8 - 3 mg/m^3 >3 mg/m^3	Level D Level C Stop work; implement dust suppression measures	Initially and periodically during tasks	Zero Daily
Detector Tube: Drager specific (0.05 to 2 mg/m^3 range), or equivalent		<0.5 ppm 0.5-1 ppm >1 ppm	Level D Level C Level B	Initially and periodically when PID/FIB >1 ppm	Not applicable
Nose-Level Monitor [e]:		<85 dB(A) 85-120 dB(A) 120 dB(A)	No action required Hearing protection required Stop; re-evaluate	Initially and periodically during task	Daily

[a] Action levels apply to sustained breathing-zone measurements above background.
[b] The exact frequency of monitoring depends on field conditions and is to be determined by the SSC; generally, every 5 to 15 minutes if acceptable; more frequently may be appropriate. Monitoring results should be recorded. Documentation should include instrument and calibration information, time, measurement results, personnel monitored, and place/location where measurement is taken (e.g., "Breathing Zone/MW-3", "at surface/SB-2", etc.).
[c] If the measured percent of O_2 is less than 10, an accurate LEL reading will not be obtained. Percent LEL and percent O_2 action levels apply only to ambient working atmospheres, and not to confined-space entry. More-stringent percent LEL and O_2 action levels are required for confined-space entry (refer to Section 2).
[d] Refer to SOP HS-10 for instructions and documentation on radiation monitoring and screening.
[e] Noise monitoring and audiometric testing also required.

5.2 Calibration Specifications

(Refer to the respective manufacturer's instructions for proper instrument-maintenance procedures)

Instrument	Gas	Span	Reading	Method
PID: OVM, 10.6 or 11.8 eV bulb	100 ppm isobutylene	RF = 1.0	100 ppm	1.5 lpm reg T-tubing
PID: MiniRAE, 10.6 eV bulb	100 ppm isobutylene	CF = 100	100 ppm	1.5 lpm reg T-tubing
PID: TVA 1000	100 ppm isobutylene	CF = 1.0	100 ppm	1.5 lpm reg T-tubing
Dust Monitor: Miniram-PDM3	Dust-free air	Not applicable	0.00 mg/m^3 in "Measure" mode	Dust-free area OR Z-bag with HEPA filter
CGI: MSA 260, 261, 360, or 361	0.75% pentane	N/A	50% LEL $\pm$ 5% LEL	1.5 lpm reg direct tubing

5.3 Air Sampling

Sampling, in addition to real-time monitoring, may be required by other OSHA regulations where there may be exposure to certain contaminants. Air sampling typically is required when site contaminants include lead, cadmium, arsenic, asbestos, and certain volatile organic compounds. Contact the HSM immediately if these contaminants are encountered.

Method Description

To be determined.

Personnel and Areas

Results must be sent immediately to the HSM. Regulations may require reporting to monitored personnel. Results reported to:

HSM: Steve Beck/MKE

6 Decontamination

(Reference CH2M HILL SOP HS-13, *Decontamination*)

The SSC must establish and monitor the decontamination procedures and their effectiveness. Decontamination procedures found to be ineffective will be modified by the SSC. The SSC must ensure that procedures are established for disposing of materials generated on the site.

6.1 Decontamination Specifications

Personnel	Sample Equipment	Heavy Equipment
• Boot wash/rinse • Glove wash/rinse • Outer-glove removal • Body-suit removal • Inner-glove removal • Respirator removal • Hand wash/rinse • Face wash/rinse • Shower ASAP • Dispose of PPE in municipal trash, or contain for disposal • Dispose of personnel rinse water to facility or sanitary sewer, or contain for offsite disposal	• Wash/rinse equipment • Solvent-rinse equipment • Contain solvent waste for offsite disposal	• Power wash • Steam clean • Dispose of equipment rinse water to facility or sanitary sewer, or contain for offsite disposal

6.2 Diagram of Personnel-Decontamination Line

No eating, drinking, or smoking is permitted in contaminated areas and in exclusion or decontamination zones. The SSC should establish areas for eating, drinking, and smoking. Contact lenses are not permitted in exclusion or decontamination zones.

Figure 6-1 illustrates a conceptual establishment of work zones, including the decontamination line. Work zones are to be modified by the SSC to accommodate task-specific requirements.

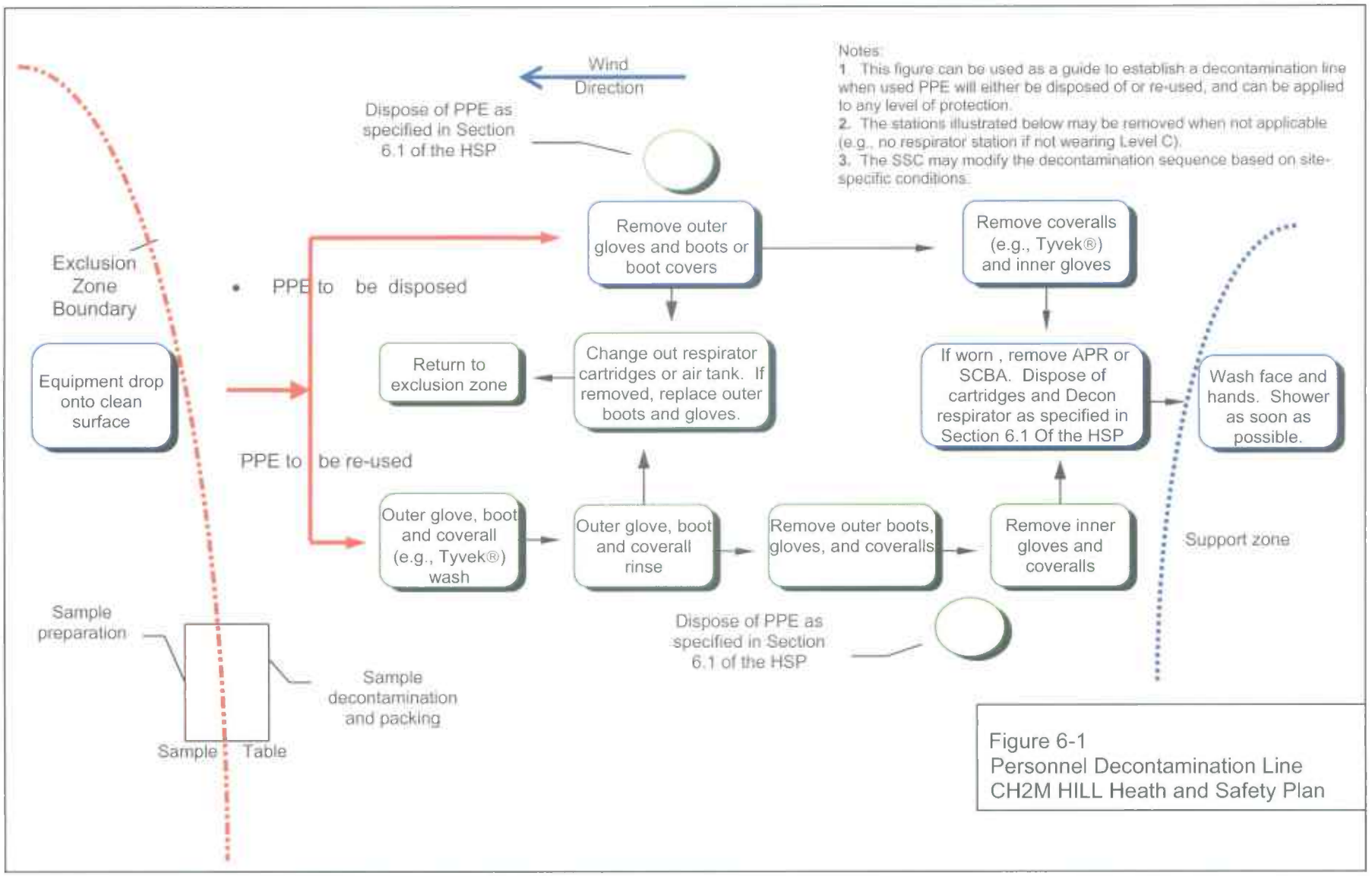


Figure 6-1
Personnel Decontamination Line
CH2M HILL Heath and Safety Plan

7 Spill-Containment Procedures

Sorbent material will be maintained in the support zone. Incidental spills will be contained with sorbent and disposed of properly.

8 Site-Control Plan

8.1 Site-Control Procedures

(Reference CH2M HILL SOP HS-11, *Site Control)*

- The SSC will conduct a site safety briefing (see below) before starting field activities or as tasks and site conditions change.
- Topics for briefing on site safety: general discussion of Health and Safety Plan, site-specific hazards, locations of work zones, PPE requirements, equipment, special procedures, emergencies.
- The SSC records attendance at safety briefings in a logbook and documents the topics discussed.
- Post the OSHA job-site poster in a central and conspicuous location in accordance with CH2M HILL SOP HS-71, *OSHA Postings.*
- Establish support, decontamination, and exclusion zones. Delineate with flags or cones as appropriate. Support zone should be upwind of the site. Use access control at entry and exit from each work zone.
- Establish onsite communication consisting of the following:
  - Line-of-sight and hand signals
  - Air horn
  - Two-way radio or cellular telephone if available
- Establish offsite communication.
- Establish and maintain the "buddy system."
- Initial air monitoring is conducted by the SSC in appropriate level of protection.
- The SCC is to conduct periodic inspections of work practices to determine the effectiveness of this plan – refer to Sections 2 and 3. Deficiencies are to be noted, reported to the HSM, and corrected.

8.2 Hazwoper Compliance Plan

(Reference CH2M HILL SOP HS-19, *Site-Specific Written Safety Plans)*

Certain parts of the site work are covered by state or federal Hazwoper standards and therefore require training and medical monitoring. Anticipated Hazwoper tasks (Section 1.1.1) might occur consecutively or concurrently with respect to non-Hazwoper tasks. This section outlines procedures to be followed when approved activities specified in Section 1.1.2 do not require 24- or 40-hour training. Non-Hazwoper-trained personnel also must be trained in accordance with all other state and federal OSHA requirements.

- In many cases, air sampling, in addition to real-time monitoring, must confirm that there is no exposure to gases or vapors before non-Hazwoper-trained personnel are allowed on the site, or while non-Hazwoper-trained staff are working in proximity to Hazwoper activities. Other data (e.g., soil) also must document that there is no potential for exposure. The HSM must approve the interpretation of these data. Refer to subsections 2.5 and 5.3 for contaminant data and air sampling requirements, respectively.
- When non-Hazwoper-trained personnel are at risk of exposure, the SSC must post the exclusion zone and inform non-Hazwoper-trained personnel of the:
  - nature of the existing contamination and its locations
  - limitations of their access
  - emergency action plan for the site

- Periodic air monitoring with direct-reading instruments conducted during regulated tasks also should be used to ensure that non-Hazwoper-trained personnel (e.g., in an adjacent area) are not exposed to airborne contaminants.
- When exposure is possible, non-Hazwoper-trained personnel must be removed from the site until it can be demonstrated that there is no longer a potential for exposure to health and safety hazards.
- Remediation treatment system start-ups: Once a treatment system begins to pump and treat contaminated media, the site is, for the purposes of applying the Hazwoper standard, considered a treatment, storage, and disposal facility (TSDF). Therefore, once the system begins operation, only Hazwoper-trained personnel (minimum of 24 hour of training) will be permitted to enter the site. All non-Hazwoper-trained personnel must not enter the TSDF area of the site.

9 Emergency Response Plan

(Reference CH2M HILL, SOP HS-12, *Emergency Response*)

9.1 Pre-Emergency Planning

The SSC performs the applicable pre-emergency planning tasks before starting field activities and coordinates emergency response with CH2M HILL onsite parties, the facility, and local emergency-service providers as appropriate.

- Review the facility emergency and contingency plans where applicable.
- Determine what onsite communication equipment is available (e.g., two-way radio, air horn).
- Determine what offsite communication equipment is needed (e.g., nearest telephone, cell phone).
- Confirm and post emergency telephone numbers, evacuation routes, assembly areas, and route to hospital; communicate the information to onsite personnel.
- Field Trailers: Post "Exit" signs above exit doors, and post "Fire Extinguisher" signs above locations of extinguishers. Keep areas near exits and extinguishers clear.
- Review changed site conditions, onsite operations, and personnel availability in relation to emergency response procedures.
- Where appropriate and acceptable to the client, inform emergency room and ambulance and emergency response teams of anticipated types of site emergencies.
- Designate one vehicle as the emergency vehicle; place hospital directions and map inside; keep keys in ignition during field activities.
- Inventory and check site emergency equipment, supplies, and potable water.
- Communicate emergency procedures for personnel injury, exposures, fires, explosions, and releases.
- Rehearse the emergency response plan before site activities begin, including driving route to hospital.
- Brief new workers on the emergency response plan.
- The SSC will evaluate emergency response actions and initiate appropriate follow-up actions.

9.2 Emergency Equipment and Supplies

The SSC should mark the locations of emergency equipment on the site map and post the map.

Emergency Equipment and Supplies	Location
20 LB (or two 10-lb) fire extinguisher (A, B, and C classes)	Support Zone/Field Vehicle/Heavy Equipment
First aid kit	Support Zone/Field Vehicle
Eye Wash	Support & Decon Zone/Field Vehicle
Potable water	Support & Decon Zone/Field Vehicle

Bloodborne-pathogen kit	Support Zone/Field Vehicle
Additional equipment (specify): cell phone	On person or in Field Vehicle

9.3 Incident Response

In fires, explosions, or chemical releases, actions to be taken include the following:

- Shut down CH2M HILL operations and evacuate the immediate work area.
- Notify appropriate response personnel.
- Account for personnel at the designated assembly area(s).
- Assess the need for site evacuation, and evacuate the site as warranted.

Instead of implementing a work-area evacuation, note that small fires or spills posing minimal safety or health hazards may be controlled.

9.4 Emergency Medical Treatment

The procedures listed below may also be applied to non-emergency incidents. Injuries and illnesses (including overexposure to contaminants) must be reported to Human Resources. If there is doubt about whether medical treatment is necessary, or if the injured person is reluctant to accept medical treatment, contact the CH2M HILL medical consultant. During non-emergencies, follow these procedures as appropriate.

- Notify appropriate emergency response authorities listed in the emergency contacts list and in Section 9.7 (e.g., 911).
- The SCC will assume charge during a medical emergency until the ambulance arrives or until the injured person is admitted to the emergency room.
- Prevent further injury.
- Initiate first aid and CPR where feasible.
- Get medical attention immediately.
- Perform decontamination where feasible; lifesaving and first aid or medical treatment take priority.
- Make certain that the injured person is accompanied to the emergency room.
- When contacting the medical consultant, state that the situation is a CH2M HILL matter, and give your name and telephone number, the name of the injured person, the extent of the injury or exposure, and the name and location of the medical facility where the injured person was taken.
- Report incident as outlined in Section 9.7.

9.5 Evacuation

- Evacuation routes and assembly areas (and alternative routes and assembly areas) are specified on the site map.
- Evacuation route(s) and assembly area(s) will be designated by the SSC before work begins.
- Personnel will assemble at the assembly area(s) upon hearing the emergency signal for evacuation.
- The SSC and a "buddy" will remain on the site after the site has been evacuated (if safe) to assist local responders and advise them of the nature and location of the incident.
- The SSC will account for all personnel in the onsite assembly area.
- A designated person will account for personnel at alternate assembly area(s).
- The SSC will write up the incident as soon as possible after it occurs and submit a report to the Corporate Director of Health and Safety.

9.6 Evacuation Signals

Signal	Meaning
Grasping throat with hand	Emergency-help me.
Thumbs up	OK; understood.
Grasping buddy's wrist	Leave area now.
Continuous sounding of horn	Emergency; leave site now.

9.7 Incident Notification and Reporting

- Upon any project incident (fire, spill, injury, near miss, death, etc.), immediately notify the PM and HSM. Call emergency beeper number if HSM is unavailable.
- For CH2M HILL work-related injuries or illnesses, contact and help Human Resources administrator complete an Incident Report Form (IRF). IRF must be completed within 24 hours of incident.
- For CH2M HILL subcontractor incidents, complete the Subcontractor Accident/Illness Report Form and submit to the HSM.
- Notify and submit reports to client as required in contract.

10 Approval

This site-specific Health and Safety Plan has been written for use by CH2M HILL only. CH2M HILL claims no responsibility for its use by others unless that use has been specified and defined in project or contract documents. The plan is written for the specific site conditions, purposes, dates, and personnel specified and must be amended if those conditions change.

10.1 Original Plan

Written By: Craig Klein/HOU **Date:** July 29, 2004

Approved By: Jim Bushnell **Date:** July 29, 2004

Note: Approval for Draft Plan only. Final Approval is required once the subcontractors have been identified.

10.2 Revisions

Revisions Made By: **Date:**

Revisions to Plan:

Revisions Approved By: **Date:**

11 Attachments

Attachment 1: Employee Signoff Form – Field Safety Instructions

Attachment 2: Project-Specific Chemical Product Hazard Communication Form

Attachment 3: Chemical-Specific Training Form

Attachment 4: Emergency Contacts

Attachment 5: Project Activity Self-Assessment Checklists

Attachment 6: Protection from Poison Ivy

Attachment 7: Tick-Borne Pathogens Fact Sheet

Attachment 8: Sun Exposure Fact Sheet

Attachment 9: Applicable Material Safety Data Sheets

CH2MHILL

EMPLOYEE SIGNOFF FORM

Health and Safety Plan

The CH2M HILL project employees and subcontractors listed below have been provided with a copy of this HSP, have read and understood it, and agree to abide by its provisions.

Project Name: Indian Head Sites 19, 26, 27, 45, and Stump Neck SWMUs 14 and 30 **Project Number:** 314070

EMPLOYEE NAME (Please print)	EMPLOYEE SIGNATURE	COMPANY	DATE

CH2MHILL

Project-Specific Chemical Product Hazard Communication Form

This form must be completed prior to performing activities that expose personnel to hazardous chemicals products. Upon completion of this form, the SSC shall verify that training is provided on the hazards associated with these chemicals and the control measures to be used to prevent exposure to CH2M HILL and subcontractor personnel. Labeling and MSDS systems will also be explained.

Project Name: Indian Head Sites 19, 26, 27, 45, and Stump Neck SWMUs 14 and 30 **Project Number:** 310470

MSDSs will be maintained at the following location(s): Field Trailer

Hazardous Chemical Products Inventory

Chemical	Quantity	Location	MSDS Available	Container labels	
				Identity	Hazard
Methane	1 liter, compressed	Support Zone			
Isobutylene	1 liter, compressed	Support Zone			
Pentane	1 liter, compressed	Support Zone			
Hydrochloric acid	< 500 ml	Support Zone / sample bottles			
Nitric acid	< 500 ml	Support Zone / sample bottles			
Sulfuric Acid	< 500 ml	Support Zone / sample bottles			
Sodium hydroxide	< 500 ml	Support Zone / sample bottles			
Methanol	< 1 Gallon	Support/Decon Zones			
Hexane	< 1 Gallon	Support/Decon Zones			
pH buffers	< 500 ml	Support Zone			
MSA Sanitizer	< 1 liter	Support/Decon Zones			
Alconox/Liquinox	< 1liter	Support/Decon Zones			

Refer to SOP HS-05 *Hazard Communication* for more detailed information.

CH2MHILL

CHEMICAL-SPECIFIC TRAINING FORM

Location: Indian Head Sites 19, 26, 27, 45, and Stump Neck SWMUs 14 and 30	Project # : 310470
HCC: Clair Morris/STL	Trainer: TBD

TRAINING PARTICIPANTS:

NAME	SIGNATURE	NAME	SIGNATURE

REGULATED PRODUCTS/TASKS COVERED BY THIS TRAINING:

The HCC shall use the product MSDS to provide the following information concerning each of the products listed above.

☐ Physical and health hazards

☐ Control measures that can be used to provide protection (including appropriate work practices, emergency procedures, and personal protective equipment to be used)

☐ Methods and observations used to detect the presence or release of the regulated product in the workplace (including periodic monitoring, continuous monitoring devices, visual appearance or odor of regulated product when being released, etc.)

Training participants shall have the opportunity to ask questions concerning these products and, upon completion of this training, will understand the product hazards and appropriate control measures available for their protection.

Copies of MSDSs, chemical inventories, and CH2M HILL's written hazard communication program shall be made available for employee review in the facility/project hazard communication file.

Emergency Contacts

24-hour CH2M HILL Emergency Beeper – (888) 444-1226

Medical Emergency – 911
Facility Medical Response #: (301) 744-4333
Local Ambulance #: (301) 744-4333

Fire/Spill Emergency – 911
Facility Fire Response #: (301) 744-4333
Local Fire Dept #: NA

Security & Police – 911
Facility Security #: (301) 744-4111
Local Police #: (301) 744-4381

Utilities Emergency
Water: (301) 743-5511
Gas: (703) 750-9500 or (800) 752-7520
Electric: (301) 843-6142 or (888) 440-3311

Designated Safety Coordinator (DSC)
Name: Clair Morris/STL
Phone: (314) 421-0313 ext. 232

Project Manager
Name: Chris English/STL
Phone: (314) 749-1550 cell

Federal Express Dangerous Goods Shipping
Phone: (800) 238-5355

CH2M HILL Emergency Number for Shipping Dangerous Goods
Phone: (800) 255-3924

CH2M HILL Medical Consultant
CH2M HILL Medical Consultant
Health Resources
Dr. Jerry H. Berke, M.D., M.P.H.
600 West Cummings Park, Suite 3400
Woburn, MA 01801-6350
(781) 938-4653 (800) 350-4511
(After hours calls will be returned within 20 minutes)

Local Occupational Physician
Occupational Health Clinic
9501 Farrell Rd # Gc11, Fort Belvoir, VA 22060 (703) 805-0946

Corporate Director Health and Safety
Name: Dave Waite/SEA
Phone: (425) 453-5000
24-hour emergency beeper: 888-444-1226

Health and Safety Manager (HSM)
Name: Steve Beck
Phone: (414)272-2426 ext. 277

Regional Human Resources Department
Name: Cindy Bauder/WDC
Phone: (703) 471-1441 ext. 4243

Corporate Human Resources Department
Name: Pete Hannon/COR
Phone: (303) 771-0900

Worker's Compensation:
Contact Regional HR dept. to have form completed or contact Julie Zimmerman after hours: (303) 664-3304

Automobile Accidents:
Rental: Carol Dietz/COR (303) 713-2757
CH2M HILL owned vehicle:
Zurich Insurance Co. (800) 987-3373

Contact the Project Manager. Generally, the Project Manager will contact relevant government agencies.

Facility Alarms: Since CH2M HILL personnel will not always be working in close proximity to each other, hand signals, voice commands, air horns, and two-way radios will comprise the mechanisms to alert site personnel of an emergency.

All onsite contractors must read and sign the "Hazard Control Briefing for Environmental Division Visitors IHDIVNAVSURFAWARCEN", and attend the "Pre-construction Safety Briefing" from the Safety Department prior to commencing work.

Evacuation Assembly Area(s): In the event that the site must be evacuated, all personnel will immediately stop activities and report to a safe place of refuge at the support zone area. The safe place of refuge may also serve as the telephone communication point, as communication with emergency response agencies may be necessary. Telephone communication points and safe places of refuge will be determined prior to the commencement of site activities.

Facility/Site Evacuation Route(s): Evacuation procedures will be discussed prior to the initiation of any work at the site. Primary and secondary evacuation routes will be conveyed to site personnel before initiation of work. Evacuation routes from the site 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) will influence the designation of evacuation routes. As a result, assembly points will be selected, and will be proceeded to by field personnel in the event of an emergency by the most direct route possible without further endangering themselves.

Hospital Name/Address:
Waldorf Family Medical Center
10 St Patricks Dr
Waldorf, MD 20603

Hospital Phone #:
(301) 843-0222

Directions to Hospital

Include written directions here, and attach or post a highlighted map if needed.

1: Depart on Strauss Ave (East)	0.2 miles
2: Turn RIGHT (South) onto S Jackson Rd	0.0 miles
3: Turn LEFT (East) onto E Farnum Rd	0.1 miles
4: Bear RIGHT (East) onto Strauss Ave	0.0 miles
5: Road name changes to SR-210 [Indian Head Hwy]	9.6 miles
6: Keep RIGHT onto Local road(s)	0.0 miles
7: Keep STRAIGHT onto SR-228 [Berry Rd]	6.7 miles
8: Turn RIGHT (South-West) onto US-301 [Crain Hwy]	0.7 miles
9: Arrive Waldorf Family Medical Ctrs	0.0 miles

Total Distance: 17.6 miles
Estimated Time: 25 minutes

CH2M HILL HEALTH AND SAFETY PLAN

Attachment 5

Project Activity Self-Assessment Checklists

CH2MHILL

HS&E Self-Assessment Checklist - DRILLING

This checklist shall be used by CH2M HILL personnel **only** and shall be completed at the frequency specified in the project's written safety plan.

This checklist is to be used at locations where: 1) CH2M HILL employees are potentially exposed to drilling hazards, 2) CH2M HILL staff are providing support function related to drilling activities, and/or 3) CH2M HILL oversight of a drilling subcontractor is required.

Safety Coordinator may consult with drilling subcontractors when completing this checklist, but shall not direct the means and methods of drilling operations nor direct the details of corrective actions. Drilling subcontractors shall determine how to correct deficiencies and we must carefully rely on their expertise. Items considered to be imminently dangerous (possibility of serious injury or death) shall be corrected immediately, or all exposed personnel shall be removed from the hazard until corrected.

Project Name: _____ Project No.: _____

Location: _____ PM: _____

Auditor: _____ Title: _____ Date: _____

This specific checklist has been completed to:

☐ Evaluate CH2M HILL employee exposures to drilling hazards (complete Section 1).
☐ Evaluate CH2M HILL support functions related to drilling activities (complete Section 2)
☐ Evaluate a CH2M HILL subcontractor's compliance with drilling safety requirements (complete entire checklist).
Subcontractors Name: _____

- Check "Yes" if an assessment item is complete/correct.
- Check "No" if an item is incomplete/deficient. Deficiencies shall be brought to the immediate attention of the drilling subcontractor. Section 3 must be completed for all items checked "No."
- Check "N/A" if an item is not applicable.
- Check "N/O" if an item is applicable but was not observed during the assessment.

Numbers in parentheses indicate where a description of this assessment item can be found in SOP HSE-35.

SECTION 1 - SAFE WORK PRACTICES (4.1)

	Yes	No	N/A	N/O
1. Personnel cleared during rig startup	☐	☐	☐	☐
2. Personnel clear of rotating parts	☐	☐	☐	☐
3. Personnel not positioned under hoisted loads	☐	☐	☐	☐
4. Loose clothing and jewelry removed	☐	☐	☐	☐
5. Smoking is prohibited around drilling operation	☐	☐	☐	☐
6. Personnel wearing appropriate personal protective equipment (PPE), per written plan	☐	☐	☐	☐
7. Personnel instructed not to approach equipment that has become electrically energized	☐	☐	☐	☐

SECTION 2 - SUPPORT FUNCTIONS (4.2)

FORMS/PERMITS (4.2.1)

8. Driller license/certification obtained	☐	☐	☐	☐
9. Well development/abandonment notifications and logs submitted and in project files	☐	☐	☐	☐
10. Water withdrawal permit obtained, where required	☐	☐	☐	☐
11. Dig permit obtained, where required	☐	☐	☐	☐

UTILITY LOCATING (4.2.2)

12. Location of underground utilities and structures identified	☐	☐	☐	☐

CH2MHILL

HS&E Self-Assessment Checklist - DRILLING

SECTION 2 (Continued)

	Yes	No	N/A	N/O
WASTE MANAGEMENT (4.2.3)				
13. Drill cuttings and purge water managed and disposed properly	☐	☐	☐	☐
DRILLING AT HAZARDOUS WASTE SITES (4.2.4)				
14. Waste disposed of according to project's written safety plan	☐	☐	☐	☐
15. Appropriate decontamination procedures being followed, per project's written safety plan	☐	☐	☐	☐
DRILLING AT ORDNANCE EXPLOSIVES (OE)/UNEXPLODED ORDNANCE (UXO) SITES (4.2.5)				
16. OE plan prepared and approved	☐	☐	☐	☐
17. OE/UXO avoidance provided, routes and boundaries cleared and marked	☐	☐	☐	☐
18. Initial pilot hole established by UXO technician with hand auger	☐	☐	☐	☐
19. Personnel remain inside cleared areas	☐	☐	☐	☐
SECTION 3 - DRILLING SAFETY REQUIREMENTS (4.3)				
GENERAL (4.3.1)				
20. Only authorized personnel operating drill rigs	☐	☐	☐	☐
21. Daily safety briefing/meeting conducted with crew	☐	☐	☐	☐
22. Daily inspection of drill rig and equipment conducted before use	☐	☐	☐	☐
DRILL RIG PLACEMENT (4.3.2)				
23. Location of underground utilities and structures identified	☐	☐	☐	☐
24. Safe clearance distance maintained from overhead power lines	☐	☐	☐	☐
25. Drilling pad established, when necessary	☐	☐	☐	☐
26. Drill rig leveled and stabilized	☐	☐	☐	☐
27. Additional precautions taken when drilling in confined areas	☐	☐	☐	☐
DRILL RIG TRAVEL (4.3.3)				
28. Rig shut down and mast lowered and secured prior to rig movement	☐	☐	☐	☐
29. Tools and equipment secured prior to rig movement	☐	☐	☐	☐
30. Only personnel seated in cab are riding on rig during movement	☐	☐	☐	☐
31. Safe clearance distance maintained while traveling under overhead power lines	☐	☐	☐	☐
32. Backup alarm or spotter used when backing rig	☐	☐	☐	☐
DRILL RIG OPERATION (4.3.4)				
33. Kill switch clearly identified and operational	☐	☐	☐	☐
34. All machine guards are in place	☐	☐	☐	☐
35. Rig ropes not wrapped around body parts	☐	☐	☐	☐
36. Pressurized lines and hoses secured from whipping hazards	☐	☐	☐	☐
37. Drill operation stopped during inclement weather	☐	☐	☐	☐
38. Air monitoring conducted per written safety plan for hazardous atmospheres	☐	☐	☐	☐
39. Rig placed in neutral when operator not at controls	☐	☐	☐	☐
DRILL RIG SITE CLOSURE (4.3.5)				
40. Ground openings/holes filled or barricaded	☐	☐	☐	☐
41. Equipment and tools properly stored	☐	☐	☐	☐
42. All vehicles locked and keys removed	☐	☐	☐	☐
DRILL RIG MAINTENANCE (4.3.6)				
28. Defective components repaired immediately	☐	☐	☐	☐
29. Lockout/tagout procedures used prior to maintenance	☐	☐	☐	☐
30. Cathead in clean, sound condition	☐	☐	☐	☐
31. Drill rig ropes in clean, sound condition	☐	☐	☐	☐
32. Fall protection used for fall exposures of 6 feet (U.S.) 1.5 meters (Australia) or greater	☐	☐	☐	☐
33. Rig in neutral and augers stopped rotating before cleaning	☐	☐	☐	☐
34. Good housekeeping maintained on and around rig	☐	☐	☐	☐

CH2MHILL

HS&E Self-Assessment Checklist - DRILLING

SECTION 4

Complete this section for all items checked "No" in previous sections. Deficient items must be corrected in a timely manner.

Item #	Corrective Action Planned/Taken	Date Corrected

Auditor: ______________________________ Project Manager: ______________________________

CH2MHILL

HS&E Self-Assessment Checklist - EARTHMOVING EQUIPMENT

This checklist shall be used by CH2M HILL personnel **only** and shall be completed at the frequency specified in the project's HSP/FSI.

This checklist is to be used at locations where: 1) CH2M HILL employees are potentially exposed to the hazards of earthmoving equipment operations, 2) CH2M HILL employees are operating earthmoving equipment, and/or 3) CH2M HILL provides oversight of a subcontractor operating earthmoving equipment.

The CH2M HILL Safety Coordinator may consult with subcontractors operating earthmoving equipment when completing this checklist, but shall not direct the means and methods of equipment operations nor direct the details of corrective actions. Earthmoving equipment subcontractors shall determine how to correct deficiencies and we must carefully rely on their expertise. Items considered to be imminently dangerous (possibility of serious injury or death) shall be corrected immediately or all exposed personnel shall be removed from the hazard until corrected.

Project Name: _____ Project No.: _____

Location: _____ PM: _____

Auditor: _____ Title: _____ Date: _____

This specific checklist has been completed to:

- ☐ Evaluate CH2M HILL employee exposures to earthmoving equipment hazards (complete Section 1).
- ☐ Evaluate CH2M HILL employees operating earthmoving equipment (complete entire checklist).
- ☐ Evaluate CH2M HILL subcontractor's compliance with earthmoving equipment safety requirements (complete entire checklist).
  Subcontractors Name: _____

- Check "Yes" if an assessment item is complete/correct.
- Check "No" if an item is incomplete/deficient. Deficiencies shall be brought to the immediate attention of the earthmoving equipment subcontractor. Section 3 must be completed for all items checked "No."
- Check "N/A" if an item is not applicable.
- Check "N/O" if an item is applicable but was not observed during the assessment.

Numbers in parentheses indicate where a description of this assessment item can be found in Standard of Practice HSE-27.

SAFE WORK PRACTICES (3.1) SECTION 1	Yes	No	N/A	N/O
1. Personnel maintaining safe distance from operating equipment	☐	☐	☐	☐
2. Positioning personnel in close proximity to operating equipment is avoided	☐	☐	☐	☐
3. Personnel wearing high-visibility and/or reflective vests when close to operating equipment	☐	☐	☐	☐
4. Personnel approach operating equipment safely	☐	☐	☐	☐
5. Personnel riding only in seats of equipment cab and using seat belts	☐	☐	☐	☐
6. Personnel not positioned under elevated portions of equipment	☐	☐	☐	☐
7. Personnel not positioned under hoisted loads	☐	☐	☐	☐
8. Personnel not hoisted by equipment	☐	☐	☐	☐
9. Personnel do not to approach equipment that has become electrically energized	☐	☐	☐	☐
10. Personnel wearing appropriate PPE, per HSP/FSI	☐	☐	☐	☐

CH2MHILL

HS&E Self-Assessment Checklist - EARTHMOVING EQUIPMENT

EQUIPMENT SAFETY REQUIREMENTS SECTION 2	Yes	No	N/A	N/O
PRIOR TO OPERATING EQUIPMENT (3.2.1)				
11. Only qualified and authorized personnel operating equipment	☐	☐	☐	☐
12. Daily safety briefing/meeting conducted with equipment operators	☐	☐	☐	☐
13. Daily inspection of equipment conducted and documented	☐	☐	☐	☐
14. Modifications and attachments used approved by equipment manufacturer	☐	☐	☐	☐
15. Backup alarm or spotter used when backing equipment	☐	☐	☐	☐
16. Operational horn provided on bi-directional equipment	☐	☐	☐	☐
17. Seat belts are provided and used	☐	☐	☐	☐
18. Rollover protective structures (ROPS) provided	☐	☐	☐	☐
19. Braking system capable of stopping full payload	☐	☐	☐	☐
20. Headlights and taillights operable when additional light required	☐	☐	☐	☐
21. Brake lights in operable condition	☐	☐	☐	☐
22. Cab glass provides no visible distortion to the operator	☐	☐	☐	☐
23. All machine guards are in place	☐	☐	☐	☐
24. Hauling equipment (dump trucks) provided with cab shield or canopy	☐	☐	☐	☐
25. Dump truck beds provided with positive means of support during maintenance or inspection	☐	☐	☐	☐
26. Dump truck operating levers provided with latch to prevent accidental dumping	☐	☐	☐	☐
27. Air monitoring conducted per HSP/FSI for hazardous atmospheres	☐	☐	☐	☐
EQUIPMENT PLACEMENT (3.2.2)				
28. Equipment position on firm/level surface, outriggers used	☐	☐	☐	☐
29. Location of underground utilities identified	☐	☐	☐	☐
30. Safe clearance distance maintained while working under overhead power lines	☐	☐	☐	☐
31. Safe distance is maintained while traveling under power lines	☐	☐	☐	☐
32. Warning system used to remind operator of excavation edge	☐	☐	☐	☐
33. Unattended equipment visibly marked at night	☐	☐	☐	☐
34. Tools lowered/parking brake set when not in use, wheels chocked when parked on incline	☐	☐	☐	☐
EQUIPMENT OPERATION (3.2.3)				
35. Equipment operated on safe roadways and grades	☐	☐	☐	☐
36. Equipment operated at safe speed	☐	☐	☐	☐
37. Operators maintain unobstructed view of travel path	☐	☐	☐	☐
38. Equipment not operated during inclement weather, lightning storms	☐	☐	☐	☐
39. Equipment started and moved safely	☐	☐	☐	☐
40. Operators keep body parts inside cab during operation	☐	☐	☐	☐
41. Vehicle occupants in safe position while loading/unloading	☐	☐	☐	☐
42. Signal person visible to operator when required	☐	☐	☐	☐
43. Equipment used for hoisting done according to equipment manufacturer specifications	☐	☐	☐	☐
44. Lifting and hauling capacities are not exceeded	☐	☐	☐	☐
EQUIPMENT MAINTENANCE (3.2.4)				
45. Defective components repaired immediately	☐	☐	☐	☐
46. Suspended equipment or attachments supported prior to work under or between	☐	☐	☐	☐
47. Lockout/tagout procedures used prior to maintenance	☐	☐	☐	☐
48. Tires on split rims removed using safety tire rack or cage	☐	☐	☐	☐
49. Good housekeeping maintained on and around equipment	☐	☐	☐	☐
EXCAVATING AT HAZARDOUS WASTE SITES (3.2.5)				
50. Waste disposed of according to HSP/FSI	☐	☐	☐	☐
51. Appropriate decontamination procedures being followed, per HSP/FSI	☐	☐	☐	☐

CH2MHILL

HS&E Self-Assessment Checklist - EARTHMOVING EQUIPMENT

SECTION 3

Complete this section for all items checked "No" in Sections 1 or 2. Deficient items must be corrected in a timely manner.

Item #	Corrective Action Planned/Taken	Date Corrected

Auditor: ______________________ Project Manager: ______________________

CH2M HILL HEALTH AND SAFETY PLAN

Attachment 6

Protection from Poison Ivy

Poison Oak (Ivy and Sumac too)

Reaction to Poison Oak is an allergic response and ranges from no reaction to a severe "rhus" dermatitis. Rhus is the class of poisonous plants which also includes poison ivy and poison sumac, mango, and other urushiol containing plants. 3 of 4 people will develop dermatitis on contact with urushiol.

Shrubs are usually 12" to 30" high, or a tree-climbing vine, with triple leaflets and short, smooth hair underneath. A project site in Portland had 8' tall poison oak bushes. Early berries are fuzzy and white; later, dun-colored. Plants are red and dark green in Spring and Summer, with yellowing leaves anytime especially in dry areas. Leaves may achieve bright reds in Fall, but the plant loses its (yellowed, then brown) leaves in Winter, leaving toxic stems. All parts of the plant remain toxic throughout the seasons.

Spring Growth

Summer Colors

Fall Colors

Primary contamination results from contact with bruised or broken plant parts that release "toxicodendrol", an oily resin containing the toxic chemical "urushiol".

Poison Ivy

Poison Sumac

Poison Oak

Exposure to Poison Oak is Preventable

Exposure to poison oak often becomes an OSHA recordable illness. The dermatitis is so severe that many people seek medical care and get prescription cortisone creams to reduce the suffering caused by the itch.

Exposure to Poison Oak is not an unavoidable part of working outdoors!

1. Identify Poison Oak – The best way to prevent exposure is to recognize the plant and avoid working in areas where poison oak is present.

2. If you must work in areas with poison oak, contact you project manager and health and safety manager to determine the best procedures to prevent contamination.

3. Contamination with poison oak can happen through several pathways. These include

   - Direct skin contact with any part of the plant.
   - Contact with clothing that has been contaminated
   - Contact from removing shoes that have been contaminated. (your shoes are coated with oil)
   - Sitting in a vehicle that has become contaminated
   - Contact with any objects or tools that have become contaminated.

4. If you must work on a site with poison oak the following precautions are necessary.

Do not drive vehicles onto the site where it will come into contact with poison oak. Vehicles which need to work in the area, such as drill rigs or heavy equipment must be washed as soon as possible after leaving the site.

All tools used in the poison oak area, including those used to cut back poison oak, surveying instruments used in the area, air monitoring equipment or other test apparatus must be decontaminated before they are placed back into the site vehicle. If on-site decontamination is not possible, use plastic to wrap any tools or equipment until they can be decontaminated.

Personal protective equipment, including tyvek coveralls, gloves, and boot covers must be worn. PPE must be placed into plastic bags and sealed if they are not disposed immediately into a trash receptacle.

As soon as possible following the work, shower to remove any potential contamination. Any body part with suspected or actual exposure should be washed with "Tecnu" or other product designed for removing urushiol. If you do not have Tecnu wash with cold water. Do not take a bath, as the oils can form and invisible film on top of the water and contaminate your entire body upon exiting the bath.

Tecnu may also be used to decontaminate equipment.

5. If there is exposure use the following first aid procedures, or others you may find to alleviate the pain and itch.

Poison Oak First Aid

Are there any of these problems? • Swelling in the throat, tongue and/or lips • A hard time breathing or swallowing • Weakness, dizziness • Bluish lips and mouth • Unconsciousness	
	Use emergency kit with adrenalin, if available, and Get Emergency Care.
Do you have any of these problems? • Skin that is very bright red. • Pus. • Rash that has spread to the mouth, eyes or genitals. • Rash on large areas of the body or the face.	

	See Doctor and Give first aid before seeing doctor:
	• Take a hot shower (only after rash develops), put the rash area in hot water or pour hot water over it. Make sure the water is not too hot to burn the skin. The hot water causes itching at first, but brings relief later. Do not use soap.
	• Take an over-the-counter antihistamine, such as Benadryl, as stated on the label.
	• For weeping blisters:
	  • Mix 2 teaspoons of baking soda in 1 quarter (4 cups) of water.
	  • Dip squares of gauze in this mixture.
	  • Cover the blisters with the wet gauze for 10 minutes, four times a day. (Do not apply this to the eyes.)

Self-Care/First Aid

- Make sure you wash all clothes and shoes with hot water and a strong soap. Also, bathe pets who have come in contact with poison ivy, oak or sumac. The sap can stay on pets for many days.
- Keep your hands away from your eyes, mouth and face.
- Do not scratch or rub the rash.
- Apply any of these to the skin rash:
- Calamine (not Caladryl) lotion
- Zinc oxide ointment
- Paste made with baking soda - mix 3 teaspoons of baking soda with 1 teaspoon of water
- Take an over-the-counter antihistamine such as Benadryl, as stated on the label

If self-care/first aid measures don't bring relief, call your doctor.

Poison Oak Facts

Urushiol Oil is Potent

- Only 1 nanogram (billionth of a gram) needed to cause rash
- Average is 100 nanograms for most people
- 1/4 ounce of urushiol is all that is needed to cause a rash in every person on earth
- 500 people could itch from the amount covering the head of a pin
- Specimens of urushiol several centuries old have found to cause dermatitis in sensitive people.
- 1 to 5 years is normal for urushiol oil to stay active on any surface including dead plants
- Derived from **urushi**, Japanese name for lacquer

Myth ..	Fact
Poison Oak is contagious	Rubbing the rashes won't spread poison ivy to other parts of your body (or to another person). You spread the rash only if **urushiol oil** – the sticky, resinlike substance that causes the rash -- has been left on your hands.
You can catch poison ivy simply by being near the plants	Direct contact is needed to release **urusiol oil**. Stay away from forest fires, direct burning, or anything else that can cause the oil to become airborne such as a lawnmower, trimmer, etc.
Leaves of three, let them be	Poison sumac has 7 to 13 leaves on a branch, although poison ivy and oak have 3 leaves per cluster
Do not worry about dead plants	**Urushiol** oil stays active on any surface, including dead plants, for up to 5 years.
Breaking the blisters releases **urushiol** oil that can spread	Not true. But your wounds can become infected and you may make the scarring worse. In very extreme cases, excessive fluid may need to be withdrawn by a doctor.

CH2M HILL FIELD SAFETY INSTRUCTIONS

Attachment 7

Tick-Borne Pathogens Fact Sheet

Tick-Borne Pathogens Fact Sheet

There are six notable tick-borne pathogens that present a significant field hazard, and in some areas account for more than half of our serious field incidents. These procedures should be applied during any field activity - even those field efforts that are located predominantly in paved areas but with bordering vegetation.

Hazard Control

The methods for controlling exposure to ticks include the following, in order of most to least preferred:

- Avoiding tick habitats and ceasing operations in heavily infested areas
- Reducing tick abundance through habitat disruption or the application of a pesticide
- Personal protection through the use of repellants and protective clothing
- Frequent tick inspections and proper hygiene

In most circumstances, treating persons who only have a tick bite (i.e., no signs of illness) is not recommended.

Avoidance and Reduction of Ticks

To the extent practical, tick habitats should be avoided. Stay within established paths or clearings and avoid traversing through brushy areas. In areas with significant tick infestation, consider stopping work and withdrawing until adequate tick population control can be achieved. Stopping and withdrawing should be considered as seriously as entering an area without proper energy control or with elevated airborne contaminants - tick-borne pathogens present risk of serious illness!

In areas where significant population density or infestation exists, tick reduction should be considered. Tick reduction can be achieved by (1) disrupting tick habitats and/or (2) direct population reduction through the use of non-restricted tick-toxic pesticides (e.g., Damminix, Sevin). This approach is more commonly practical in smaller, localized areas or perimeter areas that might require frequent access.

Habitat disruption may include only simple vegetative maintenance such as removing leaf litter and trimming grass and brush. Tick populations can be reduced between 72 percent and 100 percent when leaf litter alone is removed. In more heavily infested areas, habitat disruption may include grubbing and tree trimming or removal; and direct population reduction can be achieved with non-restricted pesticide application (e.g., Damminix, Sevin). Consumer (non-restricted) pesticides can be used when use is consistent with product label requirements, application will not occur in environmentally sensitive areas, and property owner concurrence is obtained. When pesticides are used at an industrial facility, provide written notification so that the facility can consider including such use in their Community Right-to-Know reports.

Habitat controls must be implemented with appropriate health and safety controls, in compliance with environmental requirements, and may be best left to the property owner, tenant, or licensed pesticide applicator. Contact your regional Environmental Compliance Coordinator (ECC) to determine whether the desired area of application includes environmentally sensitive areas. Caution should be exercised when using chemical repellents or pesticides in or around areas where environmental or industrial media samples will be collected.

Personal Protection

After other prevention and controls are implemented, personal protection is still necessary in controlling exposure to ticks. Personal protection must include all of the following steps:

- So that ticks may be seen on your clothing, wear light-colored clothing. Full-body New Tyvek® (paper-like disposable coveralls) may also be used, worn entirely or up to one's waist.
- To prevent ticks from getting underneath clothing, tuck pant legs into socks or tape to boots.
- Consider using hip waders (even treated with Fluon) in heavily infested areas.
- Wear lightweight long-sleeved shirts, a hat, and high boots. Tie back long hair.

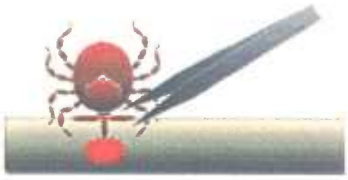
- A 0.5 percent formulation of permethrin (applied to clothes) *is the most effective product available in controlling ticks* (this is the same product used in strengths of 1 percent to 5 percent to control head lice). Apply permethrin repellent/insecticide to the outside of boots and clothing before wearing, per product label. Consider applying to work-only cotton coveralls or disposal coveralls (e.g., New or QC Tyvek®).
- Apply DEET repellent to exposed skin or clothing per product label.
- Frequently check for ticks and remove from clothing. Roller-type, double-tape lint remover can be used to effectively remove ticks from clothing.
- At the end of the day, search your entire body for ticks (particularly groin, armpits, neck, and head) and shower.
- To prevent pathogen transmission through mucous membranes or broken/cut skin, wash or disinfect hands and/or wear surgical-style nitrile gloves when ticks are handled.

Pregnant women and individuals using prescription medications should consult with their physician and/or pharmacists before using chemical repellents. Because human health effects may not be fully known, use of chemical repellents should be kept to a minimum frequency and quantity. Always follow manufacturers' use instructions and precautions. Wash hands after handling, applying, or removing protective gear and clothing. Avoid hand-to-face contact, eating, drinking, and smoking when applying or using repellents. Remove and wash clothes per repellent product label. Chemical repellents should not be used on infants and children.

In most circumstances, treating persons who only have a tick bite (i.e., no signs of illness) is not recommended. Even if signs and symptoms of illness are not experienced, report all work-related tick bites to your supervisor, Health & Safety (H&S), and Human Resources (HR).

Tick Removal

1. Use fine-tipped tweezers or shield your fingers with a tissue, paper towel, or nitrile gloves.
2. Grasp the tick as close to the skin surface as possible and pull upward with steady, even pressure. Do not twist or jerk the tick; this may cause the mouthparts to break off and remain in the skin. (If this happens, remove mouthparts with tweezers. Consult your healthcare provider if infection occurs.)



3. Do not squeeze, crush, or puncture the body of the tick because its fluids (saliva, hemolymph, gut contents) may contain infectious organisms. Releasing these organisms to the outside of the tick's body or into the bite area may increase the chance of infectious organism transmission.
4. Do not handle the tick with bare hands because infectious agents may enter through mucous membranes or breaks in the skin. This precaution is particularly directed to individuals who remove ticks from domestic animals with unprotected fingers. Children, elderly persons, and immunocompromised persons may be at greater risk of infection and should avoid this procedure.
5. After removing the tick, thoroughly disinfect the bite area and wash your hands with soap and water.
6. You may wish to save the tick for identification in case you become ill. Your doctor can use the information to assist in making an accurate diagnosis. Place the tick in a plastic bag and put it in your freezer. Write the date of the bite on a piece of paper with a pencil and place it in the bag.

Note: Folk remedies, such as petroleum jelly or hot matches, do little to encourage a tick to detach from skin. In fact, they may make matters worse by irritating the tick and stimulating it to release additional saliva, increasing the chances of transmitting the pathogen. These methods of tick removal should be avoided. In addition, a number of tick-removal devices have been marketed, but none are better than a plain set of fine-tipped tweezers.

First-Aid and Medical Treatment

Tick bites should always be treated with first aid. Clean and wash hands and disinfect the bite area after removing the embedded tick. Consult a healthcare professional if infection or symptoms and effects of tick-borne illnesses develop. Even if signs and symptoms of illness are not experienced, report all work-related tick bites to your supervisor, H&S, and HR.

Medical treatments for tick-borne infections include antibiotics and other medical interventions. Diagnosis of specific illness includes both clinical and laboratory confirmations. Preventative antibiotic treatment in non-ill individuals who have had a recent tick bite is recommended in specific cases only.

Previously infected individuals are not conferred immunity – reinfection from future tick bites can occur even after a person has contracted a tick-borne disease.

Hazard Recognition

An important step in controlling tick-related hazards is understanding how to identify ticks, their habitats, their geographical locations, and signs and symptoms of tick-borne illnesses.

Tick Identification

There are four varieties of hard-bodied ticks that have been associated with transmitting one or more tick-borne pathogens. These tick varieties include the following:

- Deer (Black Legged) Tick (eastern and pacific)
- Lone Star Tick
- Dog Tick
- Rocky Mountain Wood Tick

These varieties and their geographical locations are illustrated on the following page.

Tick Habitat

In the eastern states, ticks are associated with deciduous forest and habitat containing leaf litter. Leaf litter provides a moist cover from wind, snow, and other elements. In the north central states, tick habitats are generally found in heavily wooded areas often surrounded by broad tracts of land cleared for agriculture. On the Pacific coast, the tick habitats are more diverse. Here, ticks have been found in habitats with forest, north coastal scrub, high brush, and open grasslands. Coastal tick populations thrive in areas of high rainfall, but ticks are also found at inland locations.

Illnesses -- Signs and Symptoms

There are six notable tick-borne pathogens that cause human illness in the United States. These pathogens may be transmitted during a tick bite – normally many hours after initial attachment. The illnesses, presented in approximate order of most to least common, include the following:

- Lyme (bacteria)
- RMSF (bacteria)
- Ehrlichiosis (bacteria)
- STARI (Southern Tick-Associated Rash Illness) (bacteria)
- Tularemia (Rabbit Fever) (bacteria)
- Babesia (protozoan parasite)

Symptoms will vary based on the illness, and may develop in infected individuals typically between 3 and 30 days after transmission. Some infected individuals will not become ill or may develop only mild symptoms. These illnesses present with some or all of the following signs and symptoms: fever; headache; muscle aches; stiff neck; joint aches; nausea; vomiting; abdominal pain; diarrhea; malaise; weakness; and small, solid, ring-like, or spotted rashes. The bite area may be red, swollen, or develop ulceration or lesions. A variety of long-term symptoms may result when untreated, including debilitating effects and death.

Deer Tick

From Left: adult female, adult male, nymph, and larvae Deer Tick (cm scale)

Lone Star Tick

Dog Tick

Rocky Mountain Wood Tick

Distribution of Deer Tick (Green)

Distribution of Pacific Deer Tick (Green)

Distribution of Lone Star Tick (Green)

Distribution of Dog Tick (Yellow)

Distribution of Rocky Mountain Wood Tick (Yellow)

CH2M HILL FIELD SAFETY INSTRUCTIONS

Attachment 8

Sun Exposure Fact Sheet

Sun Exposure Fact Sheet

Significant exposure to the sun (ultraviolet radiation) may cause skin and eye burns and some cancers (long term). The following precautions should be taken to reduce risk of injury from ultraviolet (UV) exposure.

Potential Biological Effects

Health effects regarding UV radiation are confined to the skin and eyes. Overexposure can result in many skin conditions, including erythema (redness or sunburn), photoallergy (skin rash), phototoxicity (extreme sunburn acquired during short exposures to UV radiation while on certain medications), premature skin aging, and numerous types of skin cancer.

Acute overexposure of the eyes may lead to photokeratitis (inflammation of the cornea), also known as snow blindness. Snow blindness is basically a sunburn of the cornea (transparent front part of the eye). Symptoms include redness of the eyes and a gritty feeling, which progresses to pain and an inability to tolerate any kind of light. Fortunately, snow blindness is usually only temporary. This condition can also occur when working in or around water and other UV radiation reflectors. In such situations, the combination of direct and reflected sunlight results in double exposure. In addition, long-term exposure to sunlight is thought to cause cataracts or clouding of the lens of the eye.

Control Measures

- Avoid exposure to the sun, or take extra precautions when the UV index rating is high. The National Weather Service's daily UV index predicts how long it would take a light-skinned person to get a sunburn if exposed and unprotected, to the noonday sun, given the geographical location and the local weather. Ratings range from 1 (about 60 minutes before the skin will burn) to a high of 10 (about 10 minutes before the skin will burn).
- Limit exposure time when UV radiation is at peak levels. Approximately 60 percent of the daily UV radiation reaching the earth's surface arrives 2 hours before and after the sun is at its highest point in the sky. Minimizing exposure during this time period will significantly reduce UV radiation exposure.
- Take lunch and breaks in shaded areas. Use the shade from existing buildings, trees, and other objects when available. Create shade or shelter through the use of umbrellas, tents, and canopies. Rotate staff so the same personnel are not exposed all of the time.
- Reduce UV radiation damage by wearing proper clothing; for example, long-sleeved shirts with collars and long pants. The fabric should be closely woven and should not let light through. Natural fibers such as cotton are more comfortable because they allow sweat to evaporate better than synthetic fabrics.
- Head protection should be worn to protect the face, ears, and neck. Wide-brimmed hats with a neck flap or "Foreign Legion" style caps offer added protection. A flap of fabric may be added to the back of a hardhat to protect the neck during bending.
- Wear UV-protective sunglasses or safety glasses. These should fit closely to the face. Wrap-around style glasses provide the best protection.
- Apply sunscreen generously to all exposed skin surfaces at least 20 minutes before exposure. Re-apply sunscreen at least every 2 hours, and more frequently when sweating or performing activities where sunscreen may be wiped off. A sunscreen's sun protection factor (SPF) measures how well the product blocks UV radiation. A sunscreen with a SPF rating of 15 blocks about 90 percent of UV radiation, while SPF 30 sunscreens block approximately 97 percent. A broad-spectrum sunscreen with a SPF 15 rating is considered the minimum effective sunscreen. Most dermatologists advocate SPF 30 or higher for significant sun exposure. Waterproof sunscreens should be selected for use in or near water and by those who perspire sufficiently to wash off non-waterproof products. Check for expiration dates because most sunscreens are only good for about 3 years. Store in a cool place out of the sun. Remember that no sunscreen provides 100 percent protection against UV radiation. Other precautions must be taken to avoid overexposure.

CH2M HILL HEALTH AND SAFETY PLAN

Attachment 9

Applicable Material Safety Data Sheets

Appendix B
Quality Assurance Project Plan (QAPP) Addendum

APPENDIX B

Indian Head CTO-050 Quality Assurance Project Plan Addendum

This Addendum describes modifications to the Indian Head Master Quality Assurance Project Plan (QAPP) (Tetra Tech NUS, Inc., 2004).

QA/QC requirements for the performance of all CERCLA activities are described in the Indian Head Master QAPP referenced above. The QA/QC requirements for the CTO-050 Site Screening Process Investigation Work Plan for Sites 19, 26, 27, Wetland Area Adjacent to Site 45, and Stump Neck SWMUs 14 and 30 will include, and be consistent with, the requirements set forth in the Master QAPP and its addendum.

However, the following exceptions to the Indian Head Master QAPP (Tetra Tech NUS, Inc., 2004) will be effective for this site screening investigation project plan:

- All references to the Contract Laboratory Program (CLP) Method OLM03.1 or OLM04.1 are changed to OLM04.2.
- All references to the CLP Method ILM04.0 are changed to ILM04.1.
- Unsymmetrical dimethylhydrazine (UDMH) and hydrazine do not have an EPA approved method of analysis. This analysis will follow the Severn Trent Laboratories SOP No. DEN-WC-0048H. The UDMH and hydrazine will be filtered and acidified, and then injected into a strongly acidic cation exchange column. The separated cations are then measured by integrated amperometry as they elute from the column. The method contains initial and continuing calibrations, laboratory control samples, matrix spikes and matrix spike duplicates, and method blanks for every sample delivery group. The QC standards for the method are typical of most EPA approved general chemistry methods.

  This SOP is proprietary, so it is not available for publication or reproduction. It is available for review by request to all project regulators or Navy personnel under the condition that it is not distributed. Attached are the reporting limits and quality control limits for the method.

Reference

Tetra Tech NUS, Inc., 2004. *Master Plans for Installation Restoration Program Environmental Investigations at Naval District Washington, Indian Head,* Indian Head Maryland. February.

STL Reference Data Summary

Structured Analysis Code: I-88-3J-01-04
Target Analyte List: All Analytes

Matrix: WATER
Extraction: NO SAMPLE PREPARATION PERFORMED / DIRECT INJ
Method: Hydrazine
QC Program: STANDARD TEST SET
Location: STL Denver

Analyte List		Detection Limits				Check List 4516							Spike List 4854						
Syn	Compound	RL	Units	MDL	Units	Run Date	T	A	Amt	Units	LCL	UCL	RPD	T	A	Amt	Units	LCL	UCL	RPD
1523	Hydrazine	10	ug/L	0.14	ug/L	20031206	C	Y	50	ug/L	81	121	20	C	Y	50	ug/L	35	148	30

STL Reference Data Summary

Structured Analysis Code: I-88-BK-01-04
Target Analyte List: All Analytes

Matrix: WATER
Extraction: NO SAMPLE PREPARATION PERFORMED / DIRECT INJ
Method: MMH
QC Program: STANDARD TEST SET
Location: STL Denver

Analyte List		Detection Limits					Check List 4516							Spike List 4854						
Syn	Compound	RL	Units	MDL	Units	Run Date	T	A	Amt	Units	LCL	UCL	RPD	T	A	Amt	Units	LCL	UCL	RPD
5252	MMH	10	ug/L	0.31	ug/L	20031206	C	Y	50	ug/L	82	122	20	C	Y	50	ug/L	57	138	30

STL Reference Data Summary

Structured Analysis Code: I-88-BJ-01-04
Target Analyte List: All Analytes

Matrix: WATER
Extraction: NO SAMPLE PREPARATION PERFORMED / DIRECT INJI
Method: UDMH
QC Program: STANDARD TEST SET
Location: STL Denver

Analyte List		Detection Limits				Check List 4516							Spike List 4854						
Syn	Compound	RL	Units	MDL	Units	Run Date	T	A	Amt	Units	LCL	UCL	RPD	T	A	Amt	Units	LCL	UCL	RPD
1135	UDMH	10	ug/L	0.91	ug/L	20031206	C	Y	50	ug/L	81	121	20	C	Y	50	ug/L	32	183	30

STL Reference Data Summary

Structured Analysis Code: A-82-3J-01-04
Target Analyte List: All Analytes

Matrix: SOLID
Extraction: LEACHATE, DI (Routine)
Method: Hydrazine
QC Program: STANDARD TEST SET
Location: STL Denver

Analyte List		Detection Limits					Check List 4516							Spike List 4854						
Syn	Compound	RL	Units	MDL	Units	Run Date	T	A	Amt	Units	LCL	UCL	RPD	T	A	Amt	Units	LCL	UCL	RPD
1523	Hydrazine	50	ug/kg	1.4	ug/kg	20031206	C	Y	500	ug/kg	79	122	20	C	Y	500	ug/kg	70	122	30

STL Reference Data Summary

Structured Analysis Code: A-82-BK-01-04
Target Analyte List: All Analytes

Matrix: SOLID
Extraction: LEACHATE, DI (Routine)
Method: MMH
QC Program: STANDARD TEST SET
Location: STL Denver

Analyte List		Detection Limits					Check List 4516							Spike List 4854						
Syn	Compound	RL	Units	MDL	Units	Run Date	T	A	Amt	Units	LCL	UCL	RPD	T	A	Amt	Units	LCL	UCL	RPD
5252	MMH	50	ug/kg	3.23	ug/kg	20031206	C	Y	500	ug/kg	81	121	20	C	Y	500	ug/kg	64	129	30

STL Reference Data Summary

Structured Analysis Code: A-82-BJ-01-04
Target Analyte List: All Analytes

Matrix: SOLID
Extraction: LEACHATE, DI (Routine)
Method: UDMH
QC Program: STANDARD TEST SET
Location: STL Denver

Analyte List			Detection Limits				Check List 4516							Spike List 4854						
Syn	Compound	RL	Units	MDL	Units	Run Date	T	A	Amt	Units	LCL	UCL	RPD	T	A	Amt	Units	LCL	UCL	RPD
1135	UDMH	100	ug/kg	9.1	ug/kg	20031206	C	Y	500	ug/kg	79	122	20	C	Y	500	ug/kg	65	136	30

MARYLAND DEPARTMENT OF THE ENVIRONMENT
1800 Washington Boulevard • Baltimore MD 21230
410-537-3000 • 1-800-633-6101

April 28, 2005

Shawn Jorgensen
Naval District Washington, Indian Head
Code HN2SJ, Bldg. 289
101 Strauss Avenue
Indian Head, MD 20640-5035

RE: Revised Final Letter Work Plan for Additional Field Investigation at Site 17 to Support the Focused Feasibility Study for Groundwater, Naval District Washington – Indian Head, February 2005

Final Work Plan for the Baseline Ecological Risk Assessment of the Lab Area, Naval District Washington – Indian Head, March 2005

Final Site Screening Process Investigation Work Plan for Sites 19, 26, 27, Wetland Area Adjacent to Site 45, and Stump Neck SWMUs 14 and 30, Naval District Washington – Indian Head, April 2005

Dear Mr. Jorgensen:

The Federal Facilities Division of the Maryland Department of the Environment's Hazardous Waste Program has no comment on the above referenced documents.

If you have any questions, please contact me at (410) 537-3791.

Sincerely,

Curtis DeTore
Remedial Project Manager
Federal Facilities Division

CD:mh

cc: Mr. Dennis Orenshaw
Mr. Jeff Morris
Mr. Horacio Tablada
Mr. Harold L. Dye, Jr.

Price 4/1

Responses to Comments on Draft Site Screening Process Investigation Work Plan for Sites 19, 26, 27, Wetland Area Adjacent to Site 45, and Stump Neck SWMUs 14 and 30

PREPARED FOR: Shawn Jorgensen/NDWIH
Jeff Morris/NAVFAC Washington
Joe Rail/NAVFAC Washington
Curtis DeTore/MDE
Dennis Orenshaw/EPA Region III
Simeon Hahn/NOAA (BTAG)
Devin Ray/USFWS (BTAG)[CH1]

PREPARED BY: Chris English/CH2M HILL

COPIES: Margaret Kasim/CH2M HILL
Gene Peters/CH2M HILL

DATE: March 25, 2005

This memorandum provides responses to comments on the document referenced above. Comments are presented as received, followed by CH2M HILL responses shown in italics. Please review the responses to ensure they address your concerns.

Comments from EPA Region III

The Draft Site Screening Process (SSP) Investigation Work Plan (Work Plan) was accepted by EPA Region III without comment.

Comments from Shawn Jorgensen/NDWIH

1. Title of document. Please add "Stump Neck" before SWMUs 14 and 30 on the cover of the document. The reason is that there are also SWMUs 14 and 30 on Indian Head, but they are not the same SWMUs as those on Stump Neck.

   Response: *This comment will be incorporated as requested.*

2. Page VI. First two lines on page are repeated from the last two lines on page V.

   Response: *Repetitive sentences in the executive summary will be removed.*

3. Page 5-3. Section 5.3.6, second paragraph, last sentence. "Procures" should be "procedures."

   Response: *This comment will be incorporated as requested.*

4. **Page 8-1. Section 8.2, last paragraph on page, last sentence.** The final Proposed Plan, recommending NFA at Site 45, was completed on 19 October 2004. The public comment period was held from 19 October 2004 through 17 November 2004 and a public meeting was held on 21 October 2004. No significant comments were received. The draft final Record of Decision for this site is currently under review.

   Response: *The last sentence of the paragraph referenced above states, "Currently, a draft final proposed plan, recommending NFA at Site 45, is under review." This sentence will be removed and text from the comment above will be inserted at the end of the paragraph.*

5. **Page 11-1. References**. You may want to add the Final Proposed Plan for Site 45 to the list of references.

   Response *This reference will be added to the References section as requested. A citation to this reference will be added to the text described above in our response to Comment #4.*

6. **Appendix A. Page II. Description of Specific Tasks to be Performed, first paragraph, second sentence**. a) Please add "Stump Neck" prior to "SWMUs 14 and 30." This applies to the rest of the appendix, as well; such as on page III and page IV. b) You may also want to change "pre-draft" to "draft" in this sentence, since the document is now a draft document. Note that this will change to "final" in the final version of the document.

   Response: *The text "Stump Neck" will be added prior to each mention of SWMUs 14 and 30. The text "Pre-draft" will be changed to "final" to reflect the final version of the Work Plan.*

7. **Page IV. References, second reference**. See comment #6b above.

   Response: *This Comment will be incorporated as requested.*

Comments from Curtis DeTore/MDE

General Comments

1. Text in this document references both the Stump Neck Solid Waste Management Unit (SWMU) 14 and the Stump Neck SWMU 30 in several places. The cover page of this document references SWMU 14 and SWMU 30. For consistency sake, please include the descriptor "Stump Neck" before SWMUs 14 and 30 on the document cover page.

   Response: *This comment will be incorporated as requested.*

2. Please include the acreage for each site under the appropriate "Site Description" heading.

   Response: *Acreages for each of the sites will be added to the appropriate "Site Description" sections of the Work Plan.*

Specific Comments

1. Executive Summary, page VI, first paragraph, first two sentences. These sentences repeat the final two sentences from page V. Please remove them.

Response: *The repetitive sentences will be removed from the executive summary.*

2. **Section 6**. Section 6 outlines the proposed sampling for Site 26. Site 26 is a former incinerator that reportedly burned wastewater contaminated with hydrazine and/or unsymmetrical dimethylhydrazine (UDMH). Text states that samples taken from this site are to be analyzed for hydrazine and UDMH.

   Section 7 outlines the proposed sampling for Site 27. Site 27 is also a former incinerator that reportedly burned wastewater contaminated with hydrazine and/or UDMH. Text in Section 7 states that prior site employees indicated that additional types of wastewater were also burned at Site 27. To account for the additional types of wastewater burned at Site 27, samples taken at this site are to be analyzed for hydrazine, UDMH, metals, volatile organic compounds, semi-volatile organic compounds and explosives.

   It is the opinion of the Federal Facilities Division that these additional types of wastewater could also have been burned at Site 26. Therefore, the FFD recommends that the samples taken at Site 26 be analyzed for the same parameters as the samples from Site 27.

   Table ES-1 will have to be updated to reflect this comment as well.

   Response: *Per the recommendation above, samples from Site 26 will be analyzed for the same parameters as the samples collected from Site 27. Section 6 and Table ES-1 will be updated to reflect the additional laboratory parameters.*

MDE
MARYLAND DEPARTMENT OF THE ENVIRONMENT
1800 Washington Boulevard • Baltimore MD 21230
410-537-3000 • 1-800-633-6101

Robert L. Ehrlich, Jr.
Governor

Michael S. Steele
Lt. Governor

Kendl P. Philbrick
Secretary

Jonas A. Jacobson
Deputy Secretary

March 8, 2005

Shawn Jorgensen
Naval District Washington, Indian Head
Code HN2SJ, Bldg. 289
101 Strauss Avenue
Indian Head, MD 20640-5035

RE: Draft Site Screening Process Investigation Work Plan for Sites 19, 26, 27, Wetland Adjacent to Site 45, and SWMUs 14 and 30, Naval District Washington Indian Head, November 2004

Dear Mr. Jorgensen:

Enclosed are comments from the Federal Facilities Division of the Maryland Department of the Environment's Hazardous Waste Program on the above referenced document.

If you have any questions, please contact me at (410) 537-3791.

Sincerely,

Curtis DeTore
Remedial Project Manager
Federal Facilities Division

CD:mh

Enclosure

cc: Mr. Dennis Orenshaw
Mr. Jeff Morris
Mr. Horacio Tablada
Mr. Harold L. Dye, Jr.

Maryland Department of the Environment
Hazardous Waste Program
Federal Facilities Division

Comments on:

Draft Site Screening Process Investigation Work Plan for Sites 19, 26, 27, Wetland Adjacent to Site 45, and SWMUs 14 and 30, Naval District Washington Indian Head, November 2004

General Comments:

1. Text in this document references both the Stump Neck Solid Waste Management Unit (SWMU) 14 and the Stump Neck SWMU 30 in several places. The cover page of this document references SWMU 14 and SWMU 30. For consistency sake, please include the descriptor "Stump Neck" before SWMUs 14 and 30 on the document cover page.

2. Please include the acreage for each site under the appropriate "Site Description" heading.

Specific Comments:

1. Executive Summary, page VI, first paragraph, first two sentences.
   These sentences repeat the final two sentences from page V. Please remove them.

2. Section 6
   Section 6 outlines the proposed sampling for Site 26. Site 26 is a former incinerator that reportedly burned wastewater contaminated with hydrazine and or unsymmetrical dimethylhydrazine (UDMH). Text states that samples taken from this site are to be analyzed for hydrazine and UDMH.

   Section 7 outlines the proposed sampling for Site 27. Site 27 is also a former incinerator that reportedly burned wastewater contaminated with hydrazine and or UDMH. Text in Section 7 states that prior site employees indicated that additional types of wastewater were also burned at Site 27. To account for the additional types of wastewater burned at Site 27, samples taken at this site are to be analyzed for hydrazine, UDMH, metals, volatile organic compounds, semi-volatile organic compounds and explosives.

   It is the opinion of the Federal Facilities Division that these additional types of wastewater could also have been burned at Site 26. Therefore, the FFD recommends that the samples taken at Site 26 be analyzed for the same parameters as the samples from Site 27.

   Table ES-1 will have to be updated to reflect this comment as well.

Morris, Jeffrey CIV (NAVFACWASH)

From: Morris, Jeffrey CIV (NAVFACWASH) **Sent:** Fri 12/3/2004 3:43 PM
To: Chris.English@ch2m.com; mkasim@CH2M.com; JorgensenSA@ih.navy.mil; Rail, Joseph CIV (NAVFACWASH); Curtis DeTore; Dennis Orenshaw
Cc:
Subject: Draft Site Screening Process Investigation Work Plan (6 Sites) - NAVFACWASH Comments
Attachments:

I have reviewed the draft SSP Investigation Work Plan and have no additional comments.

Jeff

Responses to
NAVFAC Washington Comments on
Change-Tracked Draft Work Plan
for Site-Screening Process Investigations
Naval District Washington - Indian Head
Prepared by Jeff Morris
October 19, 2004

These comments were generated following review of the change-tracked work plan for Sites 19, 26, 27, Wetland Area Adjacent to Site 45, and SWMUs 14 and 30. They may not contain all changes discussed during the conference call of 10/7.

General

Consideration should be given to using some field-level sampling methods to assist in focusing those samples that will be submitted to an off-site lab. There is still too much emphasis on the traditional approach to collecting and analyzing data.

RESPONSE: **Available historical information does not narrow the constituents of interest at most of the sites covered under the work plan. For this reason, a relatively broad range of chemicals will be investigated at these sites. Because historical information suggests that a variety of contaminants may have been used and potentially released at the sites, field-level sampling kits would not provide a sufficient basis for eliminating a substantial number of the analytes of interest. For sites where specific contaminants are targeted (e.g. Site 26), no field-level tests are available for those constituents of interest (e.g., for UDMH and hydrazine).**

General

Most of the comments that follow for the individual sites are related directly or indirectly, which accounts for the number. On the whole, the work plan is very good.

2.3.5 Step 5: Develop a Decision Rule

The rules do not allow for any refinement of the data. For a simple example, if only a single exceedance is identified, it might not necessarily force further investigation. Some additional criteria should be included to avoid moving a site up to the next level when there is really sufficient information already available or it would take minimal effort to obtain such information to close it out. On the other hand, if the data indicates either an imminent risk or an easily-remediated hot-spot, there should be decision rules to address these. (Note: Figure 2-1 does this, although the text is silent on these possibilities.)

RESPONSE: **The text in Section 2.3.5 is currently silent on these possibilities and will be modified as described later in this response. Please note that the decision rules depicted in Figure 2-1 are described in Sections 1.1 and 2.5 of the SSP Investigation Work Plan.**

If a single exceedance is found, then the appropriate next step for the site will be discussed among the IHIRT. Further investigation may be necessary to determine if the exceedance is an isolated occurrence or if it is indicative of wider-spread contamination at the site. This scope of the additional investigation may be minimal and may not warrant moving the site up to the next level (e.g., an RI) in the CERCLA process. A follow-on SSP-level sampling effort, rather than a RI, could conceivably be performed to further investigate an area where exceeding chemical concentrations are measured.

Because the purpose of this investigation is to screen the sites for potential contamination, the number of samples planned is not large enough to delineate the contamination to the extent necessary to determine locations of hot-spots, perform a representative risk assessment, or define the magnitude of removal actions. If the concentrations in one sample exceed the risk-based and background criteria, additional investigation will likely be necessary to determine

the extent of contamination. Without additional information about the extent of contamination, a remedial action (e.g. soil removal) applied to the area may not be sufficient, possibly leading to an iterative process of remedial action application and confirmation sampling, which may lead to increased cost and time. Again, the process presented in the SSP Investigation Work Plan allows for discussion among the IHIRT to determine the most sensible and cost-effective means for addressing a site that may have low levels of residual contamination.

The second paragraph of Section 2.3.5 has been revised as follows. The bold text indicates added text.

"The SSP will initially involve the comparison of the site specific data to risk-based screening levels to determine if a potential for human health or ecological risk exists. Data that do not exceed risk screening levels will be further evaluated by comparing them to site background concentrations. **After the comparison of the data to risk based levels and background values, the IHIRT will discuss the appropriate next step for each site.** Should either the risk based or background screening levels be exceeded **for a site, additional** investigation, **risk evaluations, or interim removal actions may be** recommended for the site. If no risk based or background levels are exceeded for the site, NFA will be recommended **for the site**. **The SSP Investigation Report will document the consensus of the IHIRT on all six sites."**

3.7 Sediment Sampling

How will it be determined if the medium is sediment or soil if surface water is non-existent? Unnecessary classification of soil as sediment should be avoided.

RESPONSE: **The paragraph in Section 3.7 was revised as follows.**

"Sediment as a medium is defined for this project as unconsolidated geologic materials that are saturated with sufficient frequency and duration to sustain aquatic ecological communities. Media not meeting this definition (i.e., insufficient saturation) are defined and treated as surface soil. Sediment will be identified, and labeled accordingly, upon observation of site conditions when the samples are collected. Sediment samples will be collected only at those locations where surface water is sufficiently shallow to permit sample collection by hand. A spoon or trowel will be used to collect the sediment sample from 0 to 6 inches bgs. Sediment sampling procedures are discussed in Facility SOP SA-1.2, *Surface Water and Sediment Sampling* (Tetra Tech NUS, Inc., 2004)."

3.8 Surface Water Sampling

Does it matter if it has just rained or not rained for a long time in collecting these surface water samples? Are these samples to determine if there are continuing discharges of chemical constituents? If continuing chemical discharges are not an issue from these historical sources, then soil and sediment samples may be all that are needed and not collecting surface water may be OK. The logic here is, if sources are stopped, then observed chemicals in surface water are from soil and/or sediment.

RESPONSE: **During a recent Remedial Investigation (RI), documented in a 2004 RI Report by HydroGeoLogic, four sediment and two surface water samples were collected from the wetland area adjacent to Site 45. Based on chemical concentrations measured in the sediment samples, no presumptively unacceptable human health or ecological risks were found to be associated with sediment. For this reason, the scope of the SSP Investigation does not include the collection of additional sediment samples from this area.**

The screening level ecological risk assessment (ERA), conducted as part of the RI, indicated that copper, lead, zinc, aluminum, and silver in surface water may pose a risk to aquatic receptors. Because the presence of surface water in the wetland area is intermittent, we believe that chemical concentrations in the surface water may vary over time. To assess the potential

temporal change in surface water quality, the collection of additional surface water samples is proposed during the SSP Investigation. The additional surface water samples will augment the existing data set and move the ERA to Step 3B (Problem Formulation), the first step of a Baseline ERA. This approach is consistent with the recommendations brought forth in the 2004 RI Report.

The source of the inorganics found in the wetland area is unknown at this time. Therefore, one purpose of the surface water samples is to assess whether there are continuing discharges of chemical constituents into the wetland area.

The paragraph in Section 3.8 has been revised as follows.

"Grab surface water samples will be collected from the wetland area when the water depth is 6 inches or more, to minimize the inclusion of sediment in the surface water sample. While the SSP Investigation is in progress, an effort will be made to collect the surface water sample after a rainfall event. If surface water is not present during the initial sampling effort, the field team will attempt to collect samples following a precipitation event, when surface water is likely to be present. At each location, after collecting a sample for laboratory analysis, pH, specific conductance, turbidity, ORP, DO, and temperature will be recorded. Surface water sampling procedures are discussed in Facility SOP SA-1.2, *Surface Water and Sediment Sampling* (Tetra Tech NUS, Inc., 2004)."

5.3.1 Step 1: State the Problem

The Conceptual Site Model paints a good picture of the site history, but not of the likely specific contaminants, their probable fate and transport, possible receptors, etc. Also, it would be good to mention the physical form (i.e. red chips) of the contaminant, as described by Shawn Jorgensen during the conference call.

RESPONSE: **We will add this information into Section 5.3.1, pulling some of this information from the Step 7 discussion presented in Section 5.3.7. Because the presence of red chips is highly unlikely at Site 19, based on conversations with Shawn Jorgensen, we recommend not inserting that information in Section 5.3.1, but discussing it later in Section 5.3.7, as described in our response to the Navy's comment on Section 5.3.7.**

5.3.2 Step 2: Identify the Decision

Refer to the comment on Section 2.3.5.

RESPONSE: **The text in this section and Sections 7.3.2, 9.3.2, and 10.3.2 will be modified so that the text in these sections is consistent with Section 2.3.2. To accomplish this, the last two sentences of each of these sections will be replaced with the following text:**

"Following the collection of information during the SSP Investigation, one of the following management decisions will be made following the CERCLA process:

1. **[Name of Site] will be advanced in the CERCLA process to the appropriate next step (e.g. RI, FS, interim response action, etc.).**

2. **[Name of Site] warrants NFA."**

5.3.5 Step 5: Develop a Decision Rule

In this case, where the contaminants may be in the form of relatively large chips, will the risk be biological (i.e. toxic) or physical (i.e. explosive)? This needs to be determined and the proper decision rule established. (Note: This could impact the analytes , etc.)

RESPONSE: **From our conversation with Shawn Jorgensen, the presence of large chips at Site 19 is highly unlikely because they were removed by Base personnel during previous operation of the chip collection boxes. CH2M HILL will not attempt to collect samples of these chips in the unlikely event that they are encountered during the SSP Investigation. Instead, CH2M**

HILL will notify Shawn Jorgensen immediately and withdraw from the area. This logic will be added to the Step 7 discussion in Section 5.3.7.

5.3.6 Step 6: Specify Limits on Decision Errors

No specifics are presented that would lead to corrective action or what the corrective action might be if an unnamed failure were to occur.

RESPONSE: **Per a phone conversation between Jeff Morris and Chris English/CH2M HILL on November 2, 2004, the text in this section will be left unchanged. Mr. Morris and Mr. English agreed that the SSP-level investigations proposed in the work plan would not provide sufficient data to quantitatively define limits on decision errors.**

5.3.7 Step 7: Optimize the Design

Further explain the reasoning for not sampling subsurface soil (e.g. size of chips).

RESPONSE: **The following text was added to the end of the first paragraph of this section:**

"Because the release occurred at the surface, it is unlikely that the entire mass released would infiltrate into the subsurface, resulting in non-detect values in the surface samples. If contamination is present, the majority would be expected to occur in the surface soils."

Because of a potential explosive hazard associated with bright-colored chips that may be present in the investigation area, we will add text to this section stating that these chips, if encountered, will not be sampled. Instead, CH2M HILL will remove personnel and equipment from the area and notify NDWIH that the chips are present.

6.3.1 Step 1: State the Problem

The Conceptual Site Model again paints a good picture of the site history, but not of the likely fate and transport, possible receptors, etc. (Comment also applies to Sections 7.3.1 and 9.3.1)

RESPONSE: **We will add this information into Section 6.3.1, pulling some of this information from the Step 7 discussion presented in Section 6.3.7. The same approach will be taken in Sections 7.3.1 and 9.3.1, pulling relevant information respectively from Sections 7.3.7 and 9.3.7.**

6.3.2 Step 2: Identify the Decision

Refer to the comment on Section 2.3.5. This does not include an option for risk assessments or a removal action. (Comment also applies to Section 7.3.2, 9.3.2, and 10.3.2)

RESPONSE: **Please see response to comment on Section 2.3.5.**

6.3.3 Step 3: Identify Inputs to the Decision

Provide the reason for analyzing for TOC and pH, as it is not clear since only UDMH and hydrazine are suspected contaminants.

RESPONSE: **The last sentence of the first paragraph was replaced with the following text.**

"The samples will also be analyzed for TOC and pH to better enable the evaluation of data for ecological screening."

6.3.6 Step 6: Specify Limits on Decision Errors

Refer to comment on 5.3.6. (Comment also applies to 7.3.6, 8.3.6, 9.3.6, and 10.3.6.)

RESPONSE: **Please see response to comment on Section 5.3.6.**

7.3.3 Step 3: Identify Inputs to the Decision

This section does not call for analyzing for TOC and pH, while the matching section for the similar Site 26 does. Ensure these are consistent, if appropriate. (Note: Table 7-1 does call for this analysis.)

RESPONSE: **The following text was added to the end of the first paragraph.**

"The samples will also be analyzed for TOC and pH to better enable the evaluation of data for ecological screening."

8.3.3 Step 3: Identify Inputs to the Decision

This section brings up the possibility of human health risk, yet the preceding section, which identifies the decision, is limited to ecological risk. There seems to be no reason at this point to consider human health further (refer to 8.3.7), but at least ensure the sections are consistent.

RESPONSE: **The last paragraph of this section will be deleted.**

The following text will be added after the first sentence in the first paragraph.

"The samples will also be analyzed for hardness, TOC and pH to better enable the evaluation of data for ecological screening."

8.3.5 Step 5: Develop a Decision Rule

Since the decision stated in Step 2 is to determine if a BERA is required or if the site may be closed out, the reference to Figure 2-1 may not be necessary if the outcome of the above two comments regarding human health risk is that only ecological risk will be considered.

RESPONSE: **The reference to Figure 2-1 (the last sentence) will be removed from this section.**

9.3.7 Step 7: Optimize the Design

Is bedrock refusal likely at Stump Neck or would it be better to set another criteria?

RESPONSE: **Bedrock refusal is not expected to occur within the soil profile being investigated at the Stump Neck SWMUs. The phrase referring to bedrock refusal will be removed from the first paragraph of this section.**

10.3.1 Step 1: State the Problem

The text provides a history and description of the site, but fails to clearly state the problem. The first sentence of 10.3.3 does this and could be modified for use in Step 1.

RESPONSE: **This comment will be incorporated into Section 10.3.1.**

10.3.7 Step 7: Optimize the Design

The fourth sentence involves wells, but the discussion around it pertains to soil. As the wells are discussed in the second paragraph, recommend moving this sentence there.

RESPONSE: **The fourth sentence of the first paragraph will be moved to the second paragraph after the first sentence.**

CH2M HILL
13921 Park Center Road
Suite 600
Herndon, VA 20171

CH2MHILL

November 11, 2004
314070.PP.DF
04-LEA-0594

Mr. Jeff Morris
Department of the Navy
Naval Facilities Engineering Command, Washington
Washington Navy Yard, Building 212
1314 Harwood Street, SE
Washington Navy Yard, DC 20374-5018

Subject: Navy CLEAN III Program
Contract N62470-02-D-3052
Contract Task Order 0050
Draft Site Screening Process Investigation Work Plan for Sites 19, 26, 27, Wetland Area Adjacent to Site 45, and Stump Neck SWMUs 14 and 30
Naval District Washington, Indian Head, Indian Head, MD

Dear Jeff:

CH2M HILL is pleased to submit two hard copies and one CD of the above referenced document for your review. Please provide comments to CH2M HILL by January 10, 2005. Copies of the document have also been distributed as shown below.

If you have any questions regarding this deliverable, please call me at (314) 421-0313 or Margaret Kasim at (703) 471-1441.

Sincerely,

CH2M HILL

Christopher E. English

Chris English, P.E.
Project Manager

cc: Shawn Jorgensen/NDWIH (2 hard copies, 2 CDs)
Curtis DeTore/MDE (1 hard copy)
Dennis Orenshaw/USEPA (4 hard copies, 1 CD)
CH2M HILL (2 hard copies)
Noelle Cuti/File/CH2M HILL (cover letter only)

NAVFAC Washington Comments on
Change-Tracked Draft Work Plan
for Site-Screening Process Investigations
Naval District Washington - Indian Head
Prepared by Jeff Morris
October 19, 2004

These comments were generated following review of the change-tracked work plan for Sites 19, 26, 27, Wetland Area Adjacent to Site 45, and SWMUs 14 and 30. They may not contain all changes discussed during the conference call of 10/7.

General

Consideration should be given to using some field-level sampling methods to assist in focusing those samples that will be submitted to an off-site lab. There is still too much emphasis on the traditional approach to collecting and analyzing data.

General

Most of the comments that follow for the individual sites are related directly or indirectly, which accounts for the number. On the whole, the work plan is very good.

2.3.5 Step 5: Develop a Decision Rule

The rules do not allow for any refinement of the data. For a simple example, if only a single exceedance is identified, it might not necessarily force further investigation. Some additional criteria should be included to avoid moving a site up to the next level when there is really sufficient information already available or it would take minimal effort to obtain such information to close it out. On the other hand, if the data indicates either an imminent risk or an easily-remediated hot-spot, there should be decision rules to address these. (Note: Figure 2-1 does this, although the text is silent on these possibilities.)

3.7 Sediment Sampling

How will it be determined if the medium is sediment or soil if surface water is non-existent? Unnecessary classification of soil as sediment should be avoided.

3.8 Surface Water Sampling

Does it matter if it has just rained or not rained for a long time in collecting these surface water samples? Are these samples to determine if there are continuing discharges of chemical constituents? If continuing chemical discharges are not an issue from these historical sources, then soil and sediment samples may be all that are needed and not collecting surface water may be OK. The logic here is, if sources are stopped, then observed chemicals in surface water are from soil and/or sediment.

5.3.1 Step 1: State the Problem

The Conceptual Site Model paints a good picture of the site history, but not of the likely specific contaminants, their probable fate and transport, possible receptors, etc. Also, it would be good to mention the physical form (i.e. red chips) of the contaminant, as described by Shawn Jorgensen during the conference call.

5.3.2 Step 2: Identify the Decision

Refer to the comment on Section 2.3.5.

5.3.5 Step 5: Develop a Decision Rule

In this case, where the contaminants may be in the form of relatively large chips, will the risk be biological (i.e. toxic) or physical (i.e. explosive)? This needs to be determined and the proper decision rule established. (Note: This could impact the analytes, etc.)

5.3.6 Step 6: Specify Limits on Decision Errors

No specifics are presented that would lead to corrective action or what the corrective action might be if an unnamed failure were to occur.

5.3.7 Step 7: Optimize the Design

Further explain the reasoning for not sampling subsurface soil (e.g. size of chips).

6.3.1 Step 1: State the Problem

The Conceptual Site Model again paints a good picture of the site history, but not of the likely fate and transport, possible receptors, etc. (Comment also applies to Sections 7.3.1 and 9.3.1)

6.3.2 Step 2: Identify the Decision

Refer to the comment on Section 2.3.5. This does not include an option for risk assessments or a removal action. (Comment also applies to Section 7.3.2, 9.3.2, and 10.3.2)

6.3.3 Step 3: Identify Inputs to the Decision

Provide the reason for analyzing for TOC and pH, as it is not clear since only UDMH and hydrazine are suspected contaminants.

6.3.6 Step 6: Specify Limits on Decision Errors

Refer to comment on 5.3.6. (Comment also applies to 7.3.6, 8.3.6, 9.3.6, and 10.3.6.)

7.3.3 Step 3: Identify Inputs to the Decision

This section does not call for analyzing for TOC and pH, while the matching section for the similar Site 26 does. Ensure these are consistent, if appropriate. (Note: Table 7-1 does call for this analysis.)

8.3.3 Step 3: Identify Inputs to the Decision

This section brings up the possibility of human health risk, yet the preceding section, which identifies the decision, is limited to ecological risk. There seems to be no reason at this point to consider human health further (refer to 8.3.7), but at least ensure the sections are consistent.

8.3.5 Step 5: Develop a Decision Rule

Since the decision stated in Step 2 is to determine if a BERA is required or if the site may be closed out, the reference to Figure 2-1 may not be necessary if the outcome of the above two comments regarding human health risk is that only ecological risk will be considered.

9.3.7 Step 7: Optimize the Design

Is bedrock refusal likely at Stump Neck or would it be better to set another criteria?

10.3.1 Step 1: State the Problem

The text provides a history and description of the site, but fails to clearly state the problem. The first sentence of 10.3.3 does this and could be modified for use in Step 1.

10.3.7 Step 7: Optimize the Design

The fourth sentence involves wells, but the discussion around it pertains to soil. As the wells are discussed in the second paragraph, recommend moving this sentence there.

1.4.3

Topics for Discussion

Site Screening Process Investigation Work Plan for Sites 19, 26, 27, Wetland Area Adjacent to Site 45, and Stump Neck SWMUs 14 and 30

Items from Jeff's comments:

Section 2.4 Data Management and Validation

Will only new data be used or will the historical data also be used in the screening? Include an explanation.

The following text was added to the end of Section 2.5.2 to address this comment.

At five of the six sites, only data collected during this investigation will be used since no historical data exists for these sites. The sixth site, the Wetland Area Adjacent to Site 45, has been sampled previously. At this site, both new and historical surface water data will be used to update the screening level ERA for the wetland. If a potential risk to aquatic receptors is confirmed by the second round of surface water sampling, then the problem formulation (Step 3B) to support a baseline ERA for the wetland will be prepared along with the update to the screening level ERA.

Section 3.2.1 Hollow-Stem Auger (HAS) Drilling

Need to make a connection to how these drilling data will be connected to the DQOs described above. What does a sample represent?

This comment is addressed in the site specific sections (sections 5-10) where HSA is recommended to collect samples.

Section 3.3 Monitoring Well Installation and Development

How will evidence of contamination be determined when the well is being drilled so that well screening lengths may be determined? Is this really a reference to waste material rather than contamination?

Additional text was added to section 3.3 to address the first question.

In response to the second question, we do not expect to find waste or foreign materials at these sites, since, to our knowledge, these sites were not historically used as landfills or refuse dumping grounds.

Section 3.5 Subsurface Soil Sampling

Explain the basis for the selection of the top 2 feet of soil or 2 feet of soil above the water table to represent the soil exposure route of concern?

A sentence was inserted referring the reader to Section 5 – 10. The original sentence in this section begins with "In general," indicating that a generalization as to where the samples are collected is being made. The specifics as to the basis of sample collection belongs in Sections 5 – 10.

Section 3.7 Sediment Sampling

Include the rationale for limiting sediment sampling to locations where surface water is < 6" deep.

Little or no water is expected to exist at the sediment sampling sites. Since there the water is expected to shallow or nonexistent, hand trowels or spoons may be used to collect the samples and larger equipment will not be necessary.

The text has been reworded as follows:

Because sediment samples will be collected at locations where surface water is shallow or nonexistent, a spoon or trowel will be used to collect the sediment sample. Sediment will be collected from zero to six inches bgs. Sediment sampling procedures are discussed in Facility SOP SA-1.2, *Surface Water and Soil Sampling* (Tetra Tech NUS, Inc., 2004).

Section 3.8 Surface Water Sampling

Does it matter if it has just rained or not rained for a long time in collecting these surface water samples? Are these samples to determine if there are continuing discharges of chemical constituents? If continuing chemical discharges are not an issue from these historical sources, then soil and sediment samples may be all that are needed and not collecting surface water may be OK. The logic here is, if sources are stopped, then observed chemicals in surface water are from soil and/or sediment.

will be opportunistic

The collection of surface water samples at the Wetland Area Adjacent to Site 45 should be discussed, so that concurrence on the collection methodology can be reached.

Section 4 Sample Management

POTENTIAL SAFETY ISSUE: While there appears to be a likelihood of encountering explosive or energetic materials in at least one of these sites (Site 19), these is no mention of screening these samples for explosive levels in media prior to shipment or of how such site conditions will be recognized or addressed in the health and safety plan.

A sentence was added to Section 3.1, indicating that the proper Health and Safety precautionary procedures will be implemented when samples are collected. CH2M HILL has several explosives experts on our firm's Health and Safety team. At least one of these experts will be consulted before field activities begin and they may be on-site during collection activities, as necessary.

Additional information about the type of explosive shavings would be helpful to specify the proper health and safety procedures to take during and after sample collection. We would like to discuss this with the Navy prior to finalizing the HSP for IHIRT review.

Section 5.1 Site Description

It would be valuable to know how long Buildings 785 and 1051 discharged wastewater to the catch basins and accompanying drainage pathways. Information on the period and length of operation, and volume of discharges might help in determining appropriate sampling locations in the drainages.

We do not have additional information on the operations of Buildings 785 and 1051. We have included this in our list of questions for Shawn.

The samples will be collected from the soil/sediment immediately surrounding the catch basins to attempt to capture the highest concentration of contamination. See next comment for discussion of sampling locations.

Section 5.3 SSP Investigation Scope and Rationale

Given that lead and copper salts are relatively soluble, limiting sampling in the drainages to within 50 feet of the catch basins may not be adequate for detecting the more soluble COPCs. Also, some explosives are slightly water-soluble (e.g. nitroguanidine and nitroglycerin) and may impact ground water. Can ground water truly be written off at this point as not impacted? (Also affects Figures 5-1 and 5-2) SEE ABOVE COMMENT REGARDING POTENTIAL EXPLOSIVE HAZARDS.

Groundwater sampling was discussed at the March 24-25, 2004 partnering meeting. The team agreed that if the soil and sediment samples, collected from the sides and downstream from the chip collection boxes, are clean then the groundwater is probably clean.

Additionally, the leaching potential and solubility of the contaminants was discussed. It was determined that the fate and transport of the UDMH and chip house products would be researched. It was recommended that the groundwater rationale should be consistent for Sites 19, 26, and 27.

Is this reasoning still valid? Is it acceptable to proceed following this logic?

Section 6.3 SSP Investigation Scope and Rationale

Why are the soil borings planned for 20 feet when the COCs are unstable, decompose rapidly, and not expected to migrate significantly downward? Perhaps we can write off the ground water pathway due to rapid oxidation of these compounds. If this is possible, then the factual case needs to be made for this assumption.

The plan calls for multiple samples from a single boring if field evidence is encountered. The types of evidence mentioned (discoloration, odor, elevated PID) do not seem like characteristics of the anticipated contaminants UDMH and hydrazine, yet that is what the samples would be analyzed for.

The soil borings will be advanced to 20 ft bgs or to the first occurrence of saturated soils. By advancing the borings to the water table, or to a maximum depth of 20 ft, a log of the subsurface, including any evidence of contamination, will be constructed. It is expected that saturated soils will be encountered before reaching 20 ft bgs, however, should an abnormal water table level be encountered, the maximum boring depth is set at 20 ft bgs.

Groundwater samples are not proposed at this site (nor at Site 27, a similar site). The collection of groundwater samples at Sites 26 and 27 should be discussed prior to finalizing the Work Plan for IHIRT review.

One sample will be collected from each boring – either from the top 2 feet of soil or from an interval where contamination is observed. Following this logic, we are able to collect the sample from the area suspected to be most contaminated. It is not expected that contamination will be encountered deep in the subsurface, however, as written in the Work Plan, the possibility exists to change the sampling depth depending on site conditions.

The evidence of contamination will be monitored following standard procedures for explosives. The text will be modified based on the response from the Health and Safety Team.

This rationale also applies to the comment on Section 7.3.

Section 7.1 Site Description

With respect to Building 406, some explanation on its relationship to the site seems warranted.

We agree that additional information regarding Building 406 would be useful in the Work Plan. We would like to work with Shawn to find this information. We have included this in our list of questions for Shawn.

Section 7.3 SSP Investigation Scope and Rationale

Why advance soil borings to 20 feet in this area? The groundwater at nearby Site 41 is only 5 to 6 feet bgs and the elevation at Site 27 is, at most, only 5 feet higher than Site 41.

See discussion of comment on Section 6.3.

Section 9.3 SSP Investigation Scope and Rationale

Given that the record reflects NPDES discharge violations, it is not clear what additional data are needed beyond the historical data for a screen, as it seems likely that either a human health or ecological screen, or both will fail using only these data. If this is correct, it seems that an updated CSM is necessary reflecting exposure pathway(s), likely receptors, and risk questions as a basis for a baseline risk assessment. Data from the other photo fluid discharges at Indian Head already studied could reasonably be used to provide the additional data inputs and CSM validation for this risk-based survey design.

The October 2001 "Sediment Toxicity Identification Evaluation Demonstration", Indian Head Warfare Center (SAIC) found evidence of no mortality to Hyalella or Pimephales observed at silver pore water concentrations as high as 33.1 ug/l, which is a factor of 8.1 greater than its respective Freshwater Acute Aquatic Life Criteria threshold (4.1 ug/l). This finding may be helpful in determining the need for additional baseline investigation of elevated silver at the site, if this is the chemical with elevated HQ.

Shawn indicated in his comments that the NPDES discharge violations were for DO and Cl exceedances. Do any other documents exist which indicate that NPDES discharge violations were issued for other contaminants?

The information contained in the second paragraph may be useful in the evaluation of the data but has not been included in the work plan.

Section 10.3 SSP Investigation

It is not clear that further screening is warranted for this site given just the mercury finding and no other chemical of concern indicated. If Hg is the only chemical of concern and given that the dry well would likely contain the major Hg release, an EE/CA may be the more appropriate action for this site using field Hg test kits for soil testing. Even if additional sampling is conducted, the number of cores seems excessive and it is not clear how these twin cores will provide greater information and insight than one core and the same is true for the 3 monitoring wells proposed. One in the down gradient vicinity of the dry well would seem adequate for this initial screen of the dry well.

The desktop evaluation determined that a lack of data warranted further investigation at Stump Neck SWMU 30. The additional data needs are being addressed by performing a screening investigation. Should the screening evaluation determine the presence of COPCs, a full investigation will be performed at the site. If no contamination is encountered, then no further action will be requested for this site.

Based on the historical information available, the only samples collected previously at this site were from the catch tank and were only analyzed for mercury. This work plan proposes to collect soil and groundwater samples from adjacent to and downgradient from the dry well. The samples will be analyzed for a suite of potential contaminants including metals.

Please see the following comment regarding the downgradient wells.

Figure 10.1 SWMU 30 Proposed Sampling Locations

Why are IS30SB01 and IS30MW01 located as proposed?

The soil borings/wells IS30SB/MW01 and IS30SB/MW02 are included in the work plan based on discussions concerning SWMU 30 in the March 25, 2004 partnering meeting. It was decided to spread out the wells to evaluate groundwater flow direction and gradient.

Items from Shawn's Comments:

3. 1-2 ***Section 1.1, last two lines on page.*** *I suggest that we not prepare separate decision document. I believe that we could just include a signature page at the front of the document (like we did with the Site 5 SSA) stating which sites require no further action and which sites require additional sampling (as recommended in the SSA document). The caveat at the end could state "If additional information is discovered that changes the potential risk to human health or the environment from any of these sites, then the Partnership agrees to reevaluate the site(s) as deemed necessary." This covers us if we determine a site needs further evaluation AND if we determine a site doesn't need further evaluation (such as Site 33 at Stump Neck).*

The text has been revised (per this comment and a comment from Jeff) and reads as follows:

The SSP Investigation Report provides the basis for making one of the following management decisions for each SSA, following the CERCLA process:

1. Perform a Remedial Investigation (RI), Feasibility Study (FS), and/or other investigation or remedial action as warranted at the SSA; or
2. Remove the SSA from further study because the site does not appear to pose a threat or potential threat to public health, public welfare, or the environment and no further action is warranted. The Navy will prepare a brief decision document reflecting the decision. The decision document will then be signed by representatives from the Navy and USEPA. MDE is not a signatory agency to decision documents, but may provide a letter stating concurrence with the IHIRT decision, if appropriate.

Should a signature page be included at the beginning of the work plan?

13. 2-4 ***Section 2.3.6, first partial paragraph on page, last sentence.*** *FSP should be spelled out the first time it is used. If it already was spelled out, I apologize for missing it.*

FSP is first used in Section 1.0, at the bottom of page 1-1, in the reference to the Master FSP.

15. 2-6 ***Section 2.6, second paragraph.*** *See comment #3.*

This section was not revised since Jeff's comments recommended decision documents for those sites where NFA is recommended

30. 7-1 ***Section 7.1, second paragraph, last sentence.*** *According to the facilities database, Building 859 was constructed in 1953.*

This paragraph was deleted per Jeff's comments.

NAVFAC Washington Comments on
Pre-Draft Work Plan
for Site-Screening Process Investigations
Naval District Washington - Indian Head
Prepared by Jeff Morris
August 30, 2004

These comments were generated following review of the work plan for Sites 19, 26, 27, Wetland Area Adjacent to Site 45, and SWMUs 14 and 30. Comments presented here are focused on technical content. The editorial preparation of the document was excellent.

General

The unnecessary building numbers should be omitted from all figures.

General

The document attempts to utilize the DQO process; however, a review of the subsections that address the DQO process and those that address the sites, suggests that improvement is still required. The DQO process is intended to document the logic underpinning environmental sampling designs (and ultimately the entire investigation).

Based on the limited information presented, it appears *judgmental sampling* is proposed for most sites; however, in the absence of well-developed DQOs, this cannot be verified even if it is appropriate. Further, there is no justification as to why judgmental sampling is most appropriate. In other words, because a well-developed CSM and subsequent DQOs are not presented, no substantive review of the sampling design is possible.

It should be noted that to fully develop DQOs can be (but does not have to be) a labor-intensive process. It is unfortunate that the process was not more fully implemented during the remedial investigations of higher priority sites. From these earlier efforts, templates would have been developed that would have limited future efforts. To fully implement the process for screening sites is less advantageous from a cost/benefit perspective. That noted, however, implementing the DQO process will benefit any environmental investigation, regardless of scale, by focusing and documenting the logic underpinning the investigation. Further, securing regulator buy-in on well-developed DQOs, limits the chances that costly remobilizations will be required.

The following presents a synopsis of the DQO process and the minimum information required to implement it:

Step 1:

- A statement of the potential problem
  - **Example**: An unknown quantity of explosives waste was released at Site 19
- A conceptual site model
  - *The importance of the CSM cannot be overstated; detailed CSMs are the basis for all decisions regarding the site. The CSM should include, the potential contaminants released, the manner of the release, the properties of the contaminants, their likely fate and transport since release, potential receptors, as well as any other information pertinent to understanding the potential risks posed by a site.*

Step 2:

- A primary study question
  - **Example**: Does residual contamination present at Site 19 exist at levels that present risks to human health and/or the environment
- Alternative actions
  - **Example**: 1) No further action; 2) Remedial investigation; or 3) Removal action

- A statement that combines the primary question and the alternative actions
    - **Example**: Determine whether or not residual contamination at Site 19 poses risks to human health and/or the environment and if so, determine whether the risks exist at levels that require the initiation of a remedial action (unacceptable) or remedial investigation (potentially unacceptable) or require no further action (acceptable)

Step 3:

- The information required
    - **Example**: The analytical results of samples submitted for SVOCs, explosives, and TAL metals
- Action Levels
    - **Example**: USEPA Region III RBCs

Step 4:

- A description of population characteristics
    - **Example**: Explosives contaminated surface and shallow subsurface soil
- A geographic description the site
    - **Example**: The upper 2 feet of soil along a 75-foot long section of the drainage swale, extending from Building XXX
- The statement regarding the scale of decision
    - **Example:** The exposure unit is defined as the entire site
    - *It should be noted that there are several factors that may be considered: risk (as above), regulatory constraints, technology, finances, etc.*

Step 5:

- A (or a series of) decision rule(s)
    - **Example**: If the 95% UCL of the mean of any contaminant exceeds its corresponding RBC and background concentration (if applicable) at a concentration that suggests an imminent threat to human health and/or the environment, the site will be recommended for a removal action
    - **Example**: If the 95% UCL of the mean of any contaminant exceeds its corresponding RBC and background concentration (if applicable) that suggests a potential threat to human health and/or the environment, the site will be recommended for further evaluation
    - **Example**: If the 95% UCL of the mean of all contaminants are below their corresponding RBCs and background concentrations (if applicable), the site will be recommended for no further action
    - *As discussed below, statistically-based sampling designs are not required for all situations*

Step 6:

- A series of Decision Performance Goal Diagrams
    - **Example**: See USEPA DQO Guidance, page 45
    - *It should be noted that generating a large number of these diagrams could be quite costly; however, using metals as an example, costs could be constrained by limiting the diagrams to the 5 most toxic/carcinogenic metals and/or other contaminants*
    - *It should also be noted that for screens or other potentially low-risk scenarios, generating actual PGDs may not be required*

Step 7:

- A review of all previous steps (iterative)
- The actual sampling design
    - **Example**: **n** systematic, triangular grid samples will be collected, based on **X** probability of detecting a hot spot of **Y** size
    - *It should be noted that probabilistic (statistically-based) sampling designs are not required. The need for a probabilistic sampling design will be determined by the CSM and the potential consequences of decision errors. Specifically, where the consequences of decision error are low, judgmental sampling designs may be appropriate.*

Section 1.1 Overview of Site-Screening Process

A Decision Document is not necessary for other than NFA recommendations.

Section 1.2 Project Objectives

The first paragraph states that the objective of the SSI is to arrive at a management decision for each site, then the second paragraph states that the "overall" objective is to collect and evaluate chemical data. This should actually be an underlying objective in support of the management decision.

Section 1.5 Project Organization

Omit Jeff Morris' code CH20C and correct his fax number to 202-433-6193.

Section 1.6 Work Plan Organization

Section 2 also provides an *overview* of the DQO process. The site-specific DQOs would be located within Sections 5 through 10, where the rationale and scope are discussed.

Section 2.3 Data Quality Objectives

This section provides a good, general explanation of the DQO process, but is insufficient to specify the data type, quality, quantity, and how data will be used to support management decisions.

To make the management decision stated as the objective of these investigations it will be necessary to conduct a screening level Human Health and Ecological Risk Assessment for each of the sites. Thus, data collected for these sites needs to fit the conceptual site model (CSM) for the specific site and this purpose. By taking this approach the screening threshold levels for chemical constituents at each of these site for the site specific CSM need to be defined. The ability to reach a decision of no further action would be set by this agreement on the CSM, site initial problem formulation, initial site assessment endpoints, and screening threshold benchmarks and upper trophic level TRVs, [the scientific management decision points (SMDPs) for each site]. Further, since it appears that soil background comparisons will be made, this effort also entails a screening refinement for each specific site.

Section 2.3.3 Step 3: Identify Inputs to the Decision

It would be valuable to have more information on sources of applicable ecological screening criteria for these investigations, or how screening criteria will be derived. At a minimum a list or hierarchy of sources should be provided for regulator buy-in.

Section 2.3.4 Step 4: Define Boundaries of the Study

How are "surface soil" and "sediment" being defined (i.e. soil 0-2", 0-6"; sediment grain size, location, other?)?

Section 2.3.5 Step 5: Develop a Decision Rule

See General comment for Step 5, as this section sounds more like Step 3. Step 5 should provide specific information on how the inputs to the decision (Step 3) will be used to support the decision identified in Step 2.

Section 2.3.6 Step 6: Specify Limits on Decision Errors

Decision error is how well the site survey design (i.e. samples) represents the possible release of chemical constituents associated with past operations and subsequent migration of those chemicals through rain, etc, and how well the analytical sensitivity of the method is capable of attaining the decision rule. These issues are not addressed or suggested as important; only QA/QC and adherence to the sampling procedures, which are important, are discussed. Further, no specifics are presented that would lead to corrective action or what the corrective action might be if an unnamed failure were to occur.

Section 2.3.7 Step 7: Optimize the Design

How were these historical data used to identify additional data needs? Were historical data sufficient to conduct this screen? Were historical data suggestive of additional site sources or

chemical constituents? Were historical data suggestive that the proposed site boundaries need to be enlarged in X, Y, or Z directions?

Section 2.4 Data Management and Validation

Will only new data be used or will the historical data also be used in the screening? Include an explanation.

Section 2.5 Ecological Risk Screening

The last paragraph on this page states that chemical concentrations will be compared to background concentrations and, if they exceed background, they will be compared to ecological screening criteria. However, Figure 2-1 shows concentrations will be compared to ecological screening criteria first, then to background if they exceed screening values. The document should be revised to make the figure and text consistent with each other, as well as with the current EPA policy and guidance on background comparison.

Figure 2-1 Data Evaluation Flowchart

This figure is very descriptive and has much of the information that needs to be included in the DQOs discussed above. This is very nice figure. (Note: Refer to the comment above.)

Section 3.2.1 Hollow-Stem Auger (HAS) Drilling

Need to make a connection to how these drilling data will be connected to the DQOs described above. What does a sample represent?

Section 3.3 Monitoring Well Installation and Development

How will evidence of contamination be determined when the well is being drilled so that well screening lengths may be determined? Is this really a reference to waste material rather than contamination?

Section 3.5 Subsurface Soil Sampling

Explain the basis for the selection of the top 2 feet of soil or 2 feet of soil above the water table to represent the soil exposure route of concern?

Section 3.7 Sediment Sampling

Include the rationale for limiting sediment sampling to locations where surface water is < 6" deep.

Section 3.8 Surface Water Sampling

Does it matter if it has just rained or not rained for a long time in collecting these surface water samples? Are these samples to determine if there are continuing discharges of chemical constituents? If continuing chemical discharges are not an issue from these historical sources, then soil and sediment samples may be all that are needed and not collecting surface water may be OK. The logic here is, if sources are stopped, then observed chemicals in surface water are from soil and/or sediment.

Section 4 Sample Management

POTENTIAL SAFETY ISSUE: While there appears to be a likelihood of encountering explosive or energetic materials in at least one of these sites (Site 19), these is no mention of screening these samples for explosive levels in media prior to shipment or of how such site conditions will be recognized or addressed in the health and safety plan.

Section 4.1.1 Equipment Blanks

The *only* editorial comment: insert "following" in the second sentence of the first paragraph to make "…immediately *following* decontamination…".

Section 5.1 Site Description

It would be valuable to know how long Buildings 785 and 1051 discharged wastewater to the catch basins and accompanying drainage pathways. Information on the period and length of

operation, and volume of discharges might help in determining appropriate sampling locations in the drainages.

Section 5.3 SSP Investigation Scope and Rationale

Given that lead and copper salts are relatively soluble, limiting sampling in the drainages to within 50 feet of the catch basins may not be adequate for detecting the more soluble COPCs. Also, some explosives are slightly water-soluble (e.g. nitroguanidine and nitroglycerin) and may impact ground water. Can ground water truly be written off at this point as not impacted? (Also affects Figures 5-1 and 5-2) SEE ABOVE COMMENT REGARDING POTENTIAL EXPLOSIVE HAZARDS.

Figures 5-1 and 5-2

It appears that all of the samples will be collected within 50 feet of the discharge point. Figure 5.1 indicates a rather steep slope of 5 feet every 50 feet. This could suggest contaminants were transported further down gradient. It's unclear how steep the gradient is from the Bldg 1051 catch basin.

Section 6.3 SSP Investigation Scope and Rationale

Why are the soil borings planned for 20 feet when the COCs are unstable, decompose rapidly, and not expected to migrate significantly downward? Perhaps we can write off the ground water pathway due to rapid oxidation of these compounds. If this is possible, then the factual case needs to be made for this assumption.

The plan calls for multiple samples from a single boring if field evidence is encountered. The types of evidence mentioned (discoloration, odor, elevated PID) do not seem like characteristics of the anticipated contaminants UDMH and hydrazine, yet that is what the samples would be analyzed for.

Section 7.1 Site Description

The information on when Buildings 859, 1584, 1585, 1586, and 1587 does not seem useful to this plan. With respect to Building 406, some explanation on its relationship to the site seems warranted.

Section 7.3 SSP Investigation Scope and Rationale

Why advance soil borings to 20 feet in this area? The groundwater at nearby Site 41 is only 5 to 6 feet bgs and the elevation at Site 27 is, at most, only 5 feet higher than Site 41.

Section 8 SSP Investigation at Wetland Area Adjacent to Site 45

Since the screening-level ERA already conducted for the wetland area determined that "the wetland was not affected by contamination associated with the drum abandonment area" (HydroGeoLogic, 2004), it is not clear from the work plan why additional sampling for screening is being conducted, or why this area is part of this SSP, since the recommendations from the existing ecological screening were to move to a baseline ERA. Without a better explanation, we may give the impression that the screening is being repeated to try to arrive at a different outcome. Additional rationale for the planned screen is needed here to avoid this perception.

Section 9.1 Site Description

The fourth paragraph ends with this sentence: "The compliance with and status of the NPDES permit after April 1993 is unknown." This information should be available from NDW Indian Head. It is also not clear how the septic tank discharged to the Potomac River or why it had a permit for such a discharge.

Section 9.3 SSP Investigation Scope and Rationale

Given that the record reflects NPDES discharge violations, it is not clear what additional data are needed beyond the historical data for a screen, as it seems likely that either a human health or

ecological screen, or both will fail using only these data. If this is correct, it seems that an updated CSM is necessary reflecting exposure pathway(s), likely receptors, and risk questions as a basis for a baseline risk assessment. Data from the other photo fluid discharges at Indian Head already studied could reasonably be used to provide the additional data inputs and CSM validation for this risk-based survey design.

The October 2001 "Sediment Toxicity Identification Evaluation Demonstration", Indian Head Warfare Center (SAIC) found evidence of no mortality to *Hyalella* or *Pimephales* observed at silver pore water concentrations as high as 33.1 ug/l, which is a factor of 8.1 greater than its respective Freshwater Acute Aquatic Life Criteria threshold (4.1 ug/l). This finding may be helpful in determining the need for additional baseline investigation of elevated silver at the site, if this is the chemical with elevated HQ.

Section 10.3 SSP Investigation

It is not clear that further screening is warranted for this site given just the mercury finding and no other chemical of concern indicated. If Hg is the only chemical of concern and given that the dry well would likely contain the major Hg release, an EE/CA may be the more appropriate action for this site using field Hg test kits for soil testing. Even if additional sampling is conducted, the number of cores seems excessive and it is not clear how these twin cores will provide greater information and insight than one core and the same is true for the 3 monitoring wells proposed. One in the down gradient vicinity of the dry well would seem adequate for this initial screen of the dry well.

Section 10.3 SSP Investigation Scope and Rationale

The plan proposes to collect a soil sample from each boring at "12 to 14 ft bgs to correspond with the total depth of the dry well at 11 ft bgs". Please explain the correlation between the depths.

Figure 10.1 SWMU 30 Proposed Sampling Locations

Why are IS30SB01 and IS30MW01 located as proposed?

Questions Concerning Site Histories and Site Conditions at NDWIH

Site Screening Process Investigation Work Plan for Sites 19, 26, 27, Wetland Area Adjacent to Site 45, and Stump Neck SWMUs 14 and 30

Questions for Shawn

1. Shawn's Comment #10. We have not yet addressed this comment, which applies to Figures 1-6 and 6-1. Please see the question below regarding Shawn's Comment #28.

Site 19

2. Jeff's Comment on Section 5.1. Can you please provide information on the length of time that Building 785 and 1051 discharged wastewater to the catch basins and accompanying drainage pathways?

RESPONSE: According to our building database, Building 785 was constructed in 1956 and 1051 in 1962. It is safe to assume that those dates are when discharges began. Building 1782, the wastewater treatment building by 785 was constructed in 1999 to treat the waste stream from Building 785. Therefore, discharges to the stream ended from Building 785 in 1999. As for Building 1051, the Water Pollution Study of 1976 states that Building 1051 is a Chip Collection House, but that it was inactive at the time. In 1999, Building 1051 is listed as an Asbestos Storehouse. My wastewater person told me that it is very possible that the building was used on and off for this time period. Officially, the discharges ended completed in 1999.

agreed to limit to soil

3. Please verify our understanding of the flow train at Site 19: the wastewater would drain from the buildings through cast iron pipes to fabric bags attached at the end of the pipes. The larger explosive shavings would be captured in the fabric bags and the wastewater would flow through the bags, along with smaller shavings. The water from the fabric bags flowed to baffled catch basins where the smaller shavings would settle out. The clarified wastewater would overflow the catch basins and flow downstream.

RESPONSE: What is written above is correct. However, the photographs from the 1976 Water Pollution Study of 1976 show screening baskets, rather than the baffled box, which we saw in disrepair at the drain line from Building 785. I am uncertain when the use of baffled box began, but it was apparently after 1976.

4. Please verify that the catch basins have been removed from the Site.

RESPONSE: I will do this as soon as possible.

Site 26:

5. Shawn's Comment #28. This comment indicates that Buildings 1595 through 1598 were demolished in 2001 and that Building 1599 still exists. The comment infers that the concrete slab for Building 1595 remains but that the slabs for Buildings 1596 through 1598 have been removed. Please confirm. We have used the information in Comment #28 to address the text in Section 6.1, but as noted above we still need to incorporate this comment into Figures 1-6 and 6-1.

RESPONSE: I will do this as soon as possible.

Site 27:

6. Jeff's Comment on Section 7.1. Please let us know where we can find information on the historical and current use of Building 406.

RESPONSE: According to the Building database that Jim Dolph prepared for us, Building 406 was constructed in 1923 and was a nitre cake shed until 1947 when it became a storehouse for acid plant filter materials. It remained a storehouse/storage shed until 1957, when it was used as a chemical storehouse. In 1976 it was used for tool & equipment storage until 1999. Since 1999 it has been a "Storage Building - HVAC."

Wetland Area Adjacent to Site 45:

7. Which buildings correspond to the caustic tanks described in Section 8.1?

RESPONSE: I will check on this as soon as possible.

8. Shawn's Comment #36. Please provide the pdf file of the wetland border from your GIS system.

RESPONSE: Included in email.

Stump Neck SWMU 14

9. Shawn's Comment #37. It was stated that Building 2009 currently discharges to the sewer system. When was Building 2009 connected to the sewer system? When did the discharges to the Potomac River cease? Your comment #37c states that the discharges to the Potomac River ceased in June 1997. However, the 1990 RFA report discussed the new septic system (installed before the report was written). Can you please provide a brief history of the septic/discharge systems which were used at the site?

RESPONSE: The 1990 "new septic system" was a mounded system. It included a big pile of sand that the wastewater flowed through (like a swimming pool filter set on top of the ground) which discharged to the Potomac. In 1997, an actual drainage field was put in place. Therefore, the discharge to the Potomac River ceased. If you need further clarification of this, please contact Ms. Diana Rose on (301) 744-2267. She did mention not to confuse septic system with sewer system. Unfortunately, she is not in the office today so I can't get her to look over my answer before sending it to you.

10. When was the industrial effluent NPDES permit (MD0003158) issued? At the same time as the sanitary permit (May 1988)?

RESPONSE: Both permits were issued in May 1988, but I believe that they were initially issued prior to that (I think that the 1988 permits were renewals of previous permits.) Again, please contact Ms Diana Rose on (301) 744-2267 to clarify.

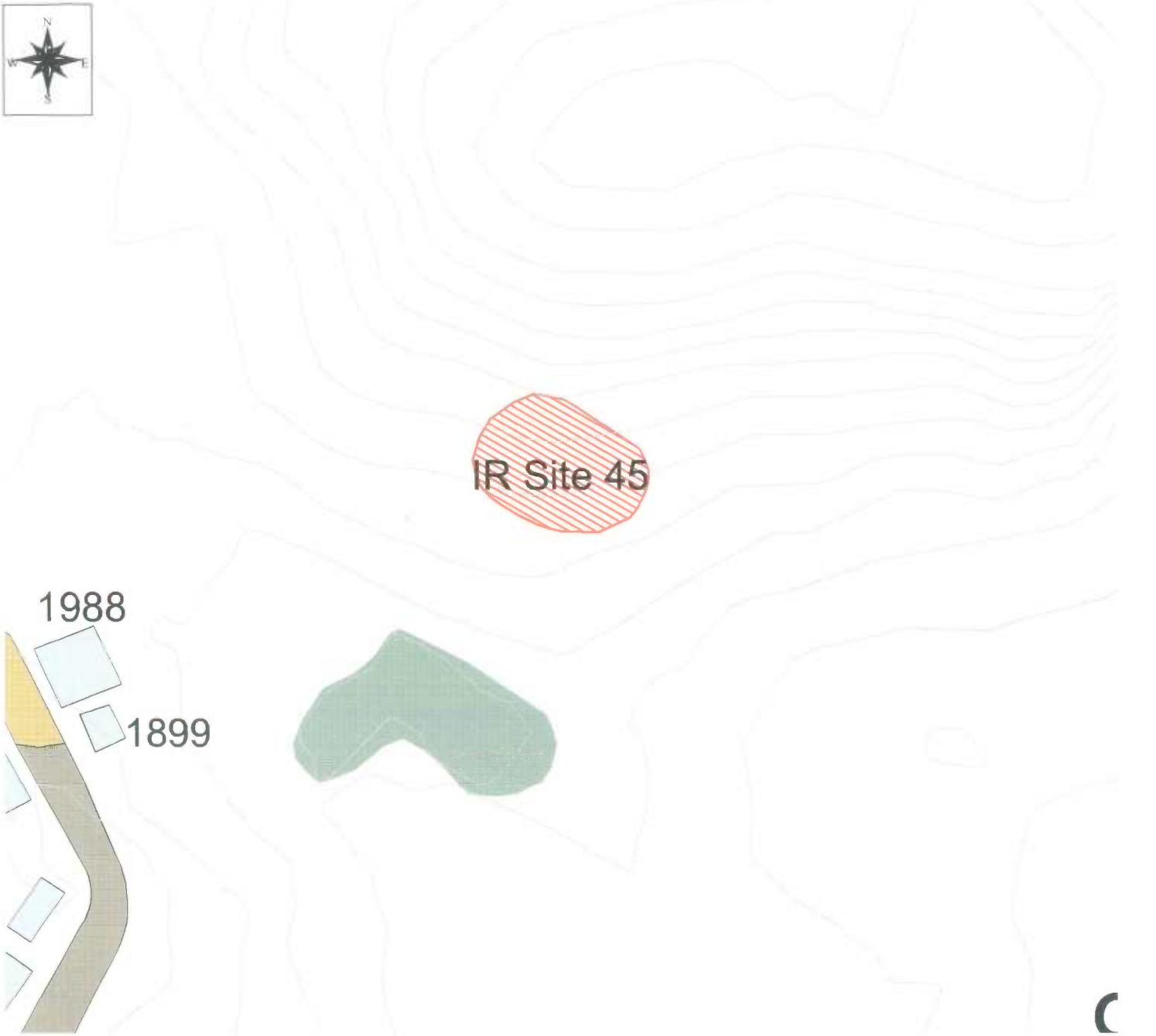
Stump Neck SWMU 30

11. How were the settled solids from the settling tank disposed? Is information available concerning the size of the settling tank?

RESPONSE: I will check on this as soon as possible, but I'm not sure that there is anyone still around that will know the answer.

12. Please verify our understanding of the process train for the dry well: the laboratory sink drain was connected to a settling tank where the solids were settled out. The clarified wastewater in the settling tank flowed into a 1.5 in diameter drain, which subsequently flowed into the dry well. The dry well was 3.5 ft diameter concrete manhole which extended to approximately 11 ft bgs. A gravel pack existed from 3 to 11 feet bgs. The water would percolate through the gravel pack to the open end of the manhole cylinder then through the soil.

RESPONSE: This is my understanding of the process.



Site 45 Wetland Area As Shown in GIS

Lfhypcnt_ih.shp
Potable Water Lines
IR Sites
Streams/Ditches
Standing Surface Water
Buildings
Roads
Asphalt
Dirt
Gravel
Parking Lots
Asphalt
Concrete
Gravel
Wetland
Boundary

100 0 100 200 Fe

FIGURE 379. DRAIN LINE FROM BUILDING 1051

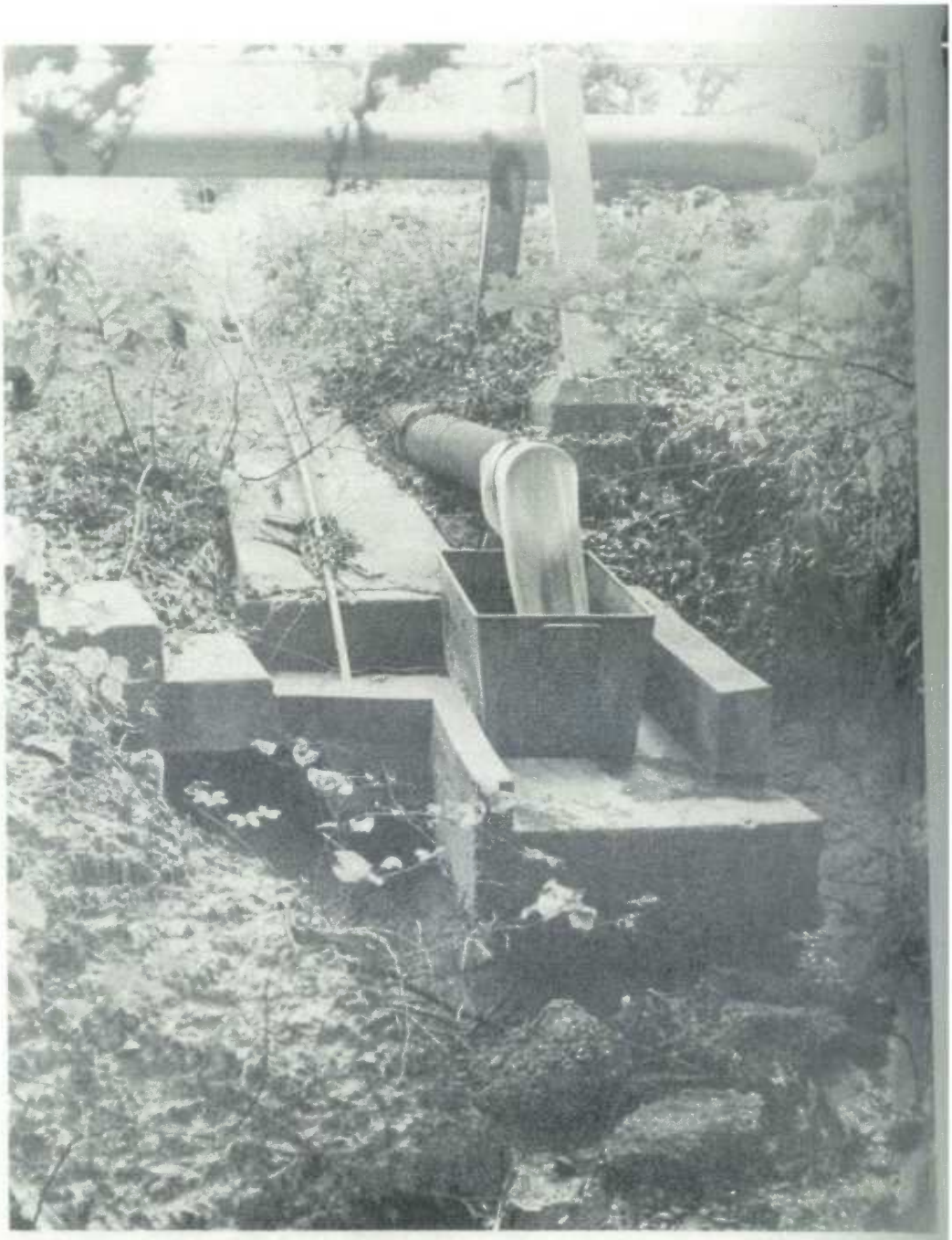


FIGURE 377. SCREENED DRAIN LINE FROM BUILDING 785

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FIGURE 1-1
NDWIH BASE LOCATION MAP
SSP INVESTIGATION WORK PLAN, CTO-050
NDWIH, INDIAN HEAD, MARYLAND

CH2MHILL

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FIGURE 1-2
SITE LOCATION MAP - MAIN AREA
SSP INVESTIGATION WORK PLAN, CTO-050
NDWIH, INDIAN HEAD, MARYLAND

CH2MHILL

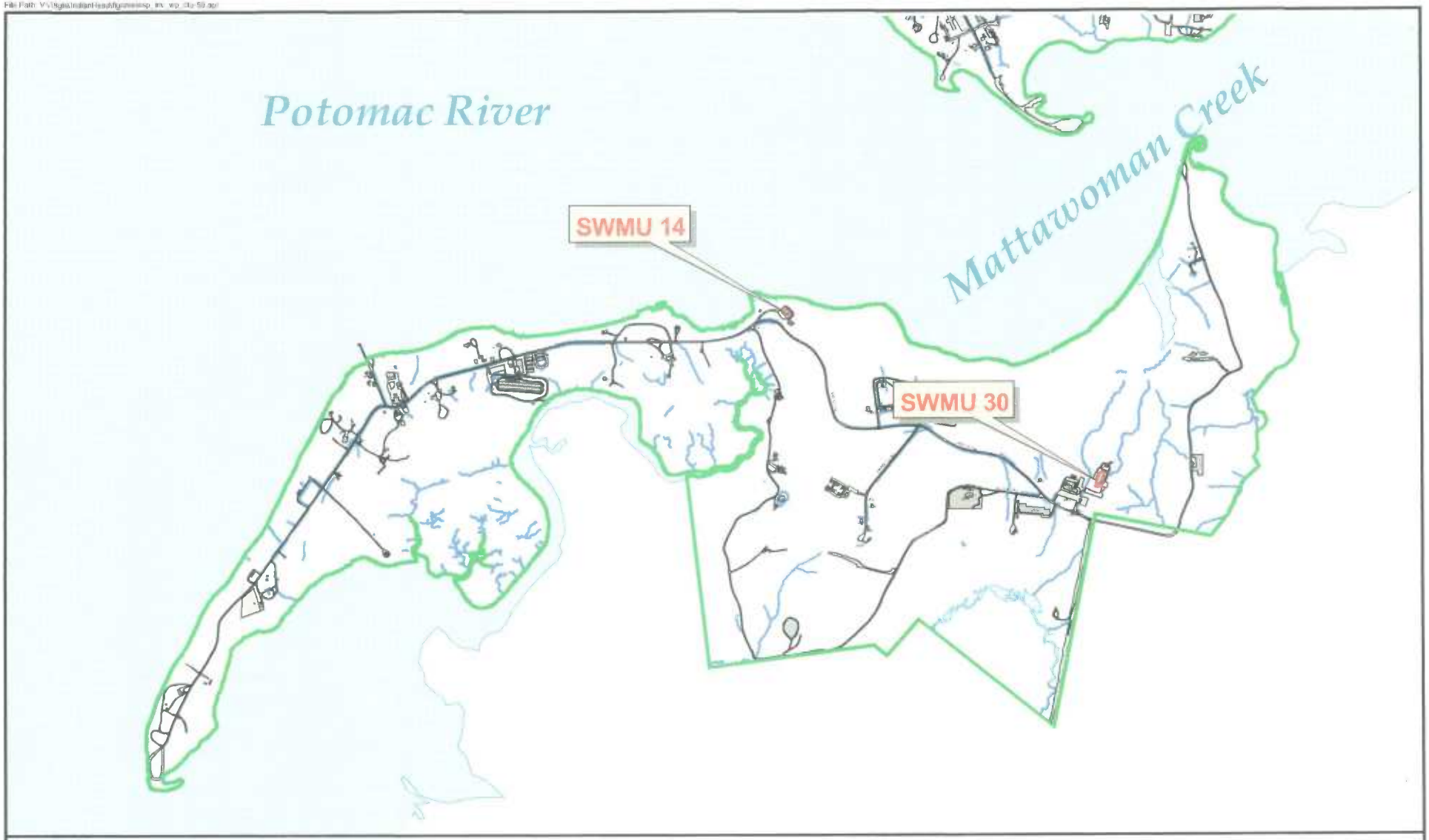

FIGURE 1-3
SITE LOCATION MAP - STUMP NECK ANNEX
SSP INVESTIGATION WORK PLAN, CTO-050
NDWIH, INDIAN HEAD, MARYLAND

CH2MHILL

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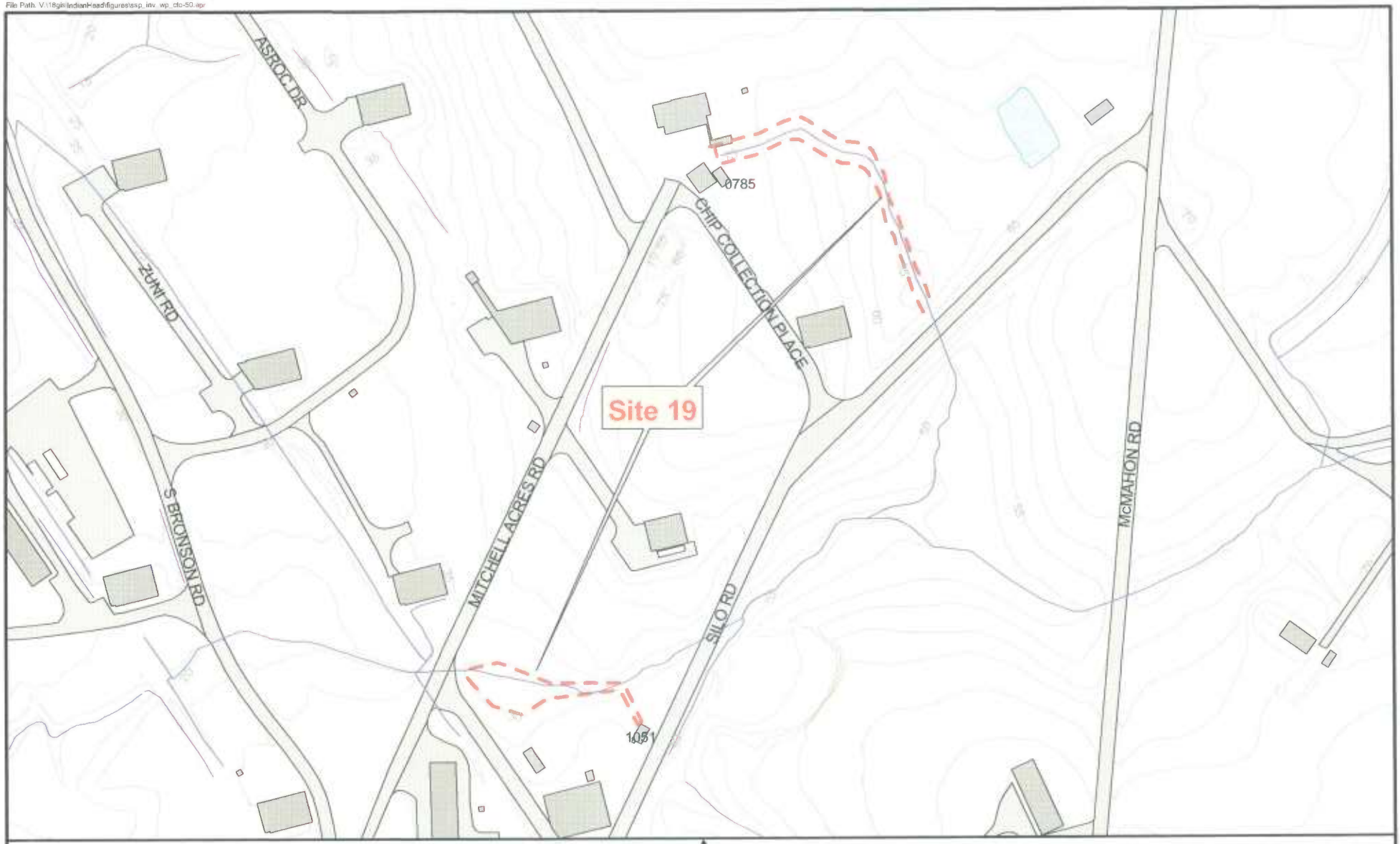

LEGEND

- Approximate Site Boundary
- Elevation Contour (5 Foot interval)
- Buildings
- Water Bodies
- Roads & Paved Areas

N

0 100 200 Feet

1 INCH = 200 FEET

FIGURE 1-4
SITE 19, CATCH BASINS AT
CHIP COLLECTION HOUSES
SSP INVESTIGATION WORK PLAN, CTO-050
NDWIH, INDIAN HEAD, MARYLAND

CH2MHILL

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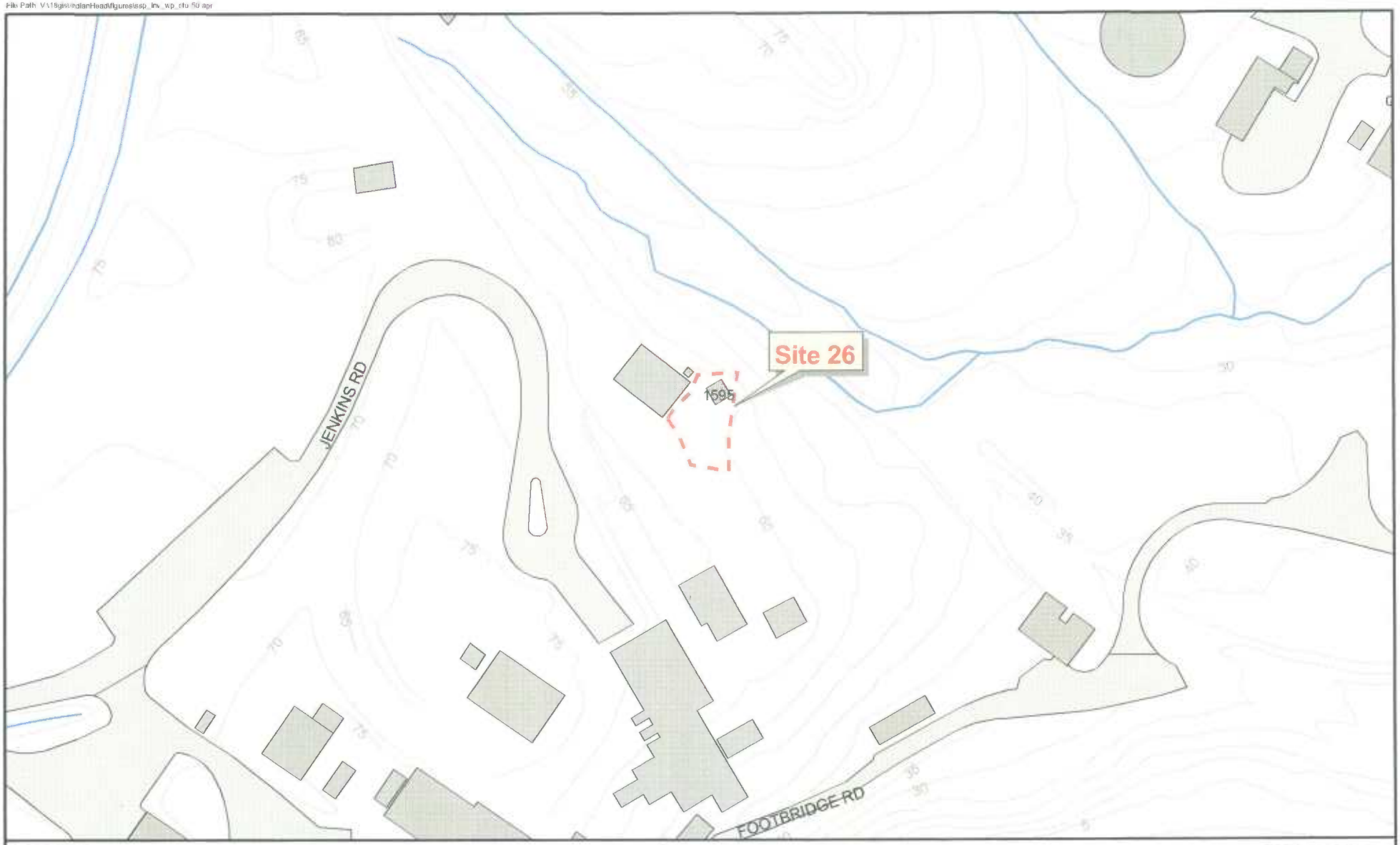

LEGEND

- Approximate Site Boundary
- Buildings
- Roads & Paved Areas
- Water Bodies
- Elevation Contour (5 Foot Interval)

N

0 50 100 Feet

1 INCH = 100 FEET

FIGURE 1-5
SITE 26, THERMAL DESTRUCTOR 2
SSP INVESTIGATION WORK PLAN, CTO-050
NDWIH, INDIAN HEAD, MARYLAND

CH2MHILL

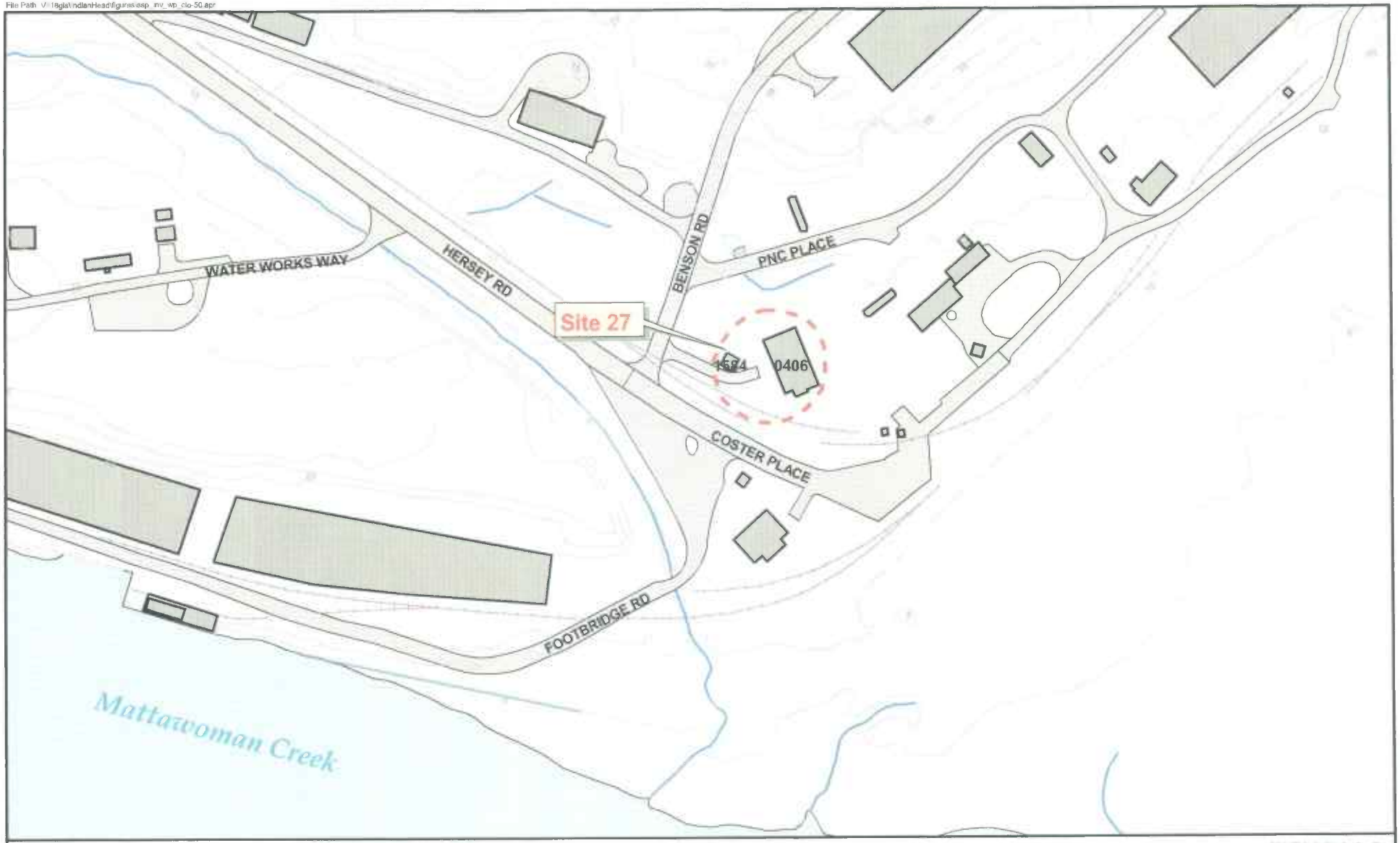

FIGURE 1-6
SITE 27, THERMAL DESTRUCTOR 1
SSP INVESTIGATION WORK PLAN, CTO-050
NDWIH, INDIAN HEAD, MARYLAND

CH2MHILL

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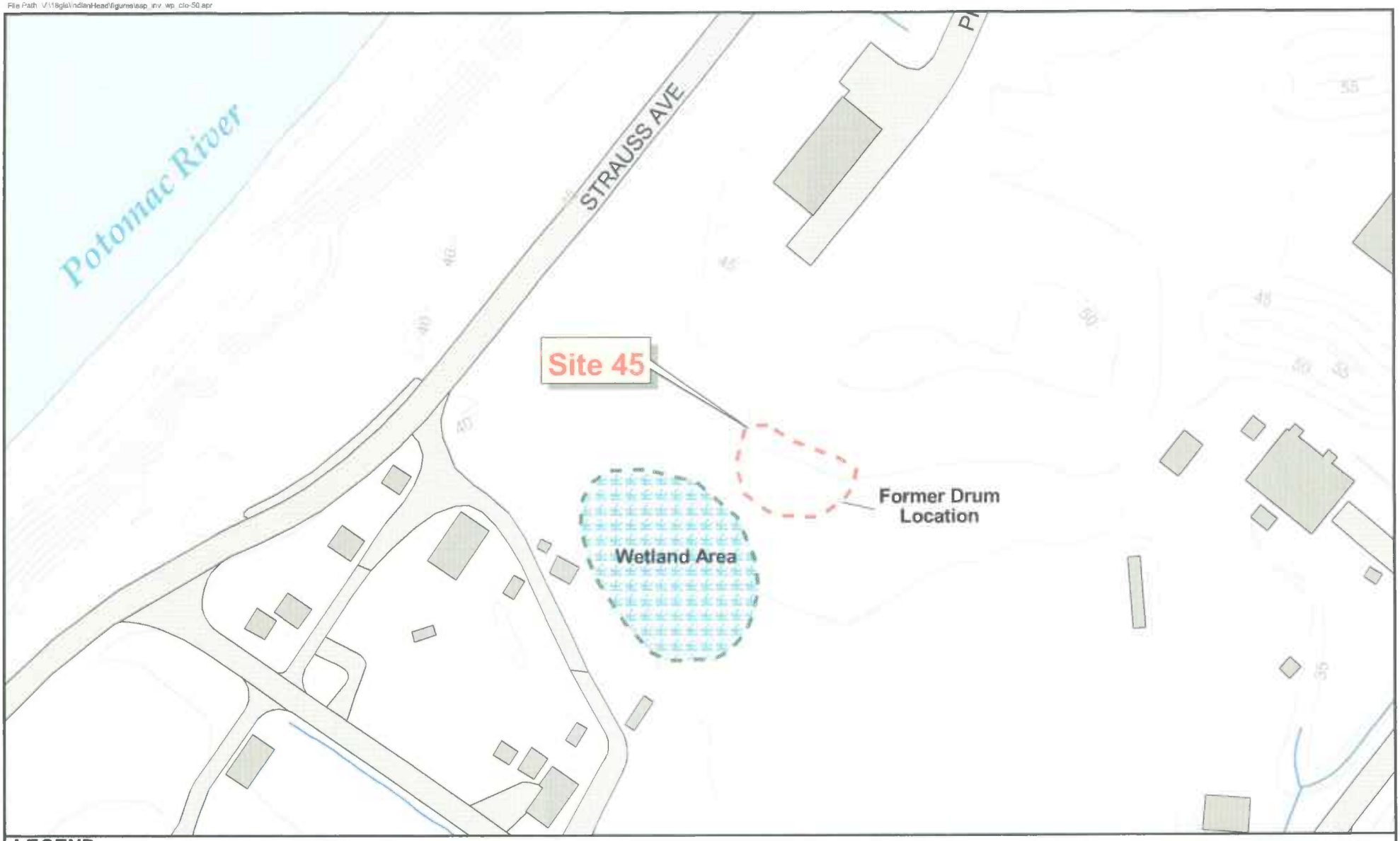

LEGEND

- Approximate Site Boundary
- Buildings
- Roads & Paved Areas
- Wetland Area
- Water Bodies
- Elevation Contour (5 Foot Interval)

N

0 50 100 Feet

1 INCH = 100 FEET

FIGURE 1-7
WETLAND AREA ADJACENT TO SITE 45
SSP INVESTIGATION WORK PLAN, CTO-050
NDWIH, INDIAN HEAD, MARYLAND

CH2MHILL

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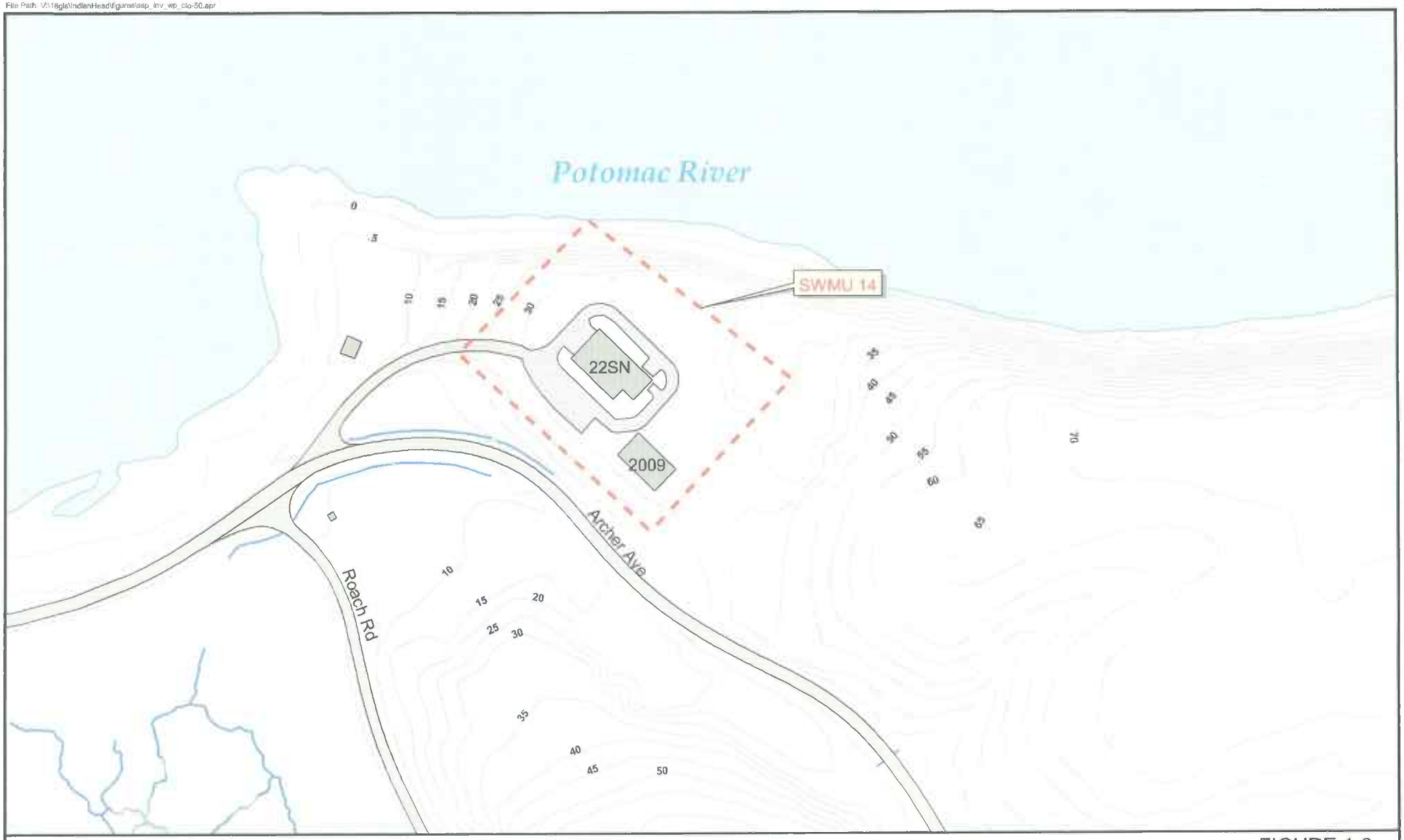

LEGEND

- Approximate SWMU Boundary
- Buildings
- Roads & Paved Areas
- Water Bodies
- Elevation Contours (5 Foot Interval)

N

0 100 200 Feet

1 INCH = 200 FEET

FIGURE 1-8
SWMU 14, PHOTOGRAPHIC LAB SEPTIC SYSTEM
SSP INVESTIGATION WORK PLAN, CTO-050
NDWIH, INDIAN HEAD, MARYLAND

CH2MHILL

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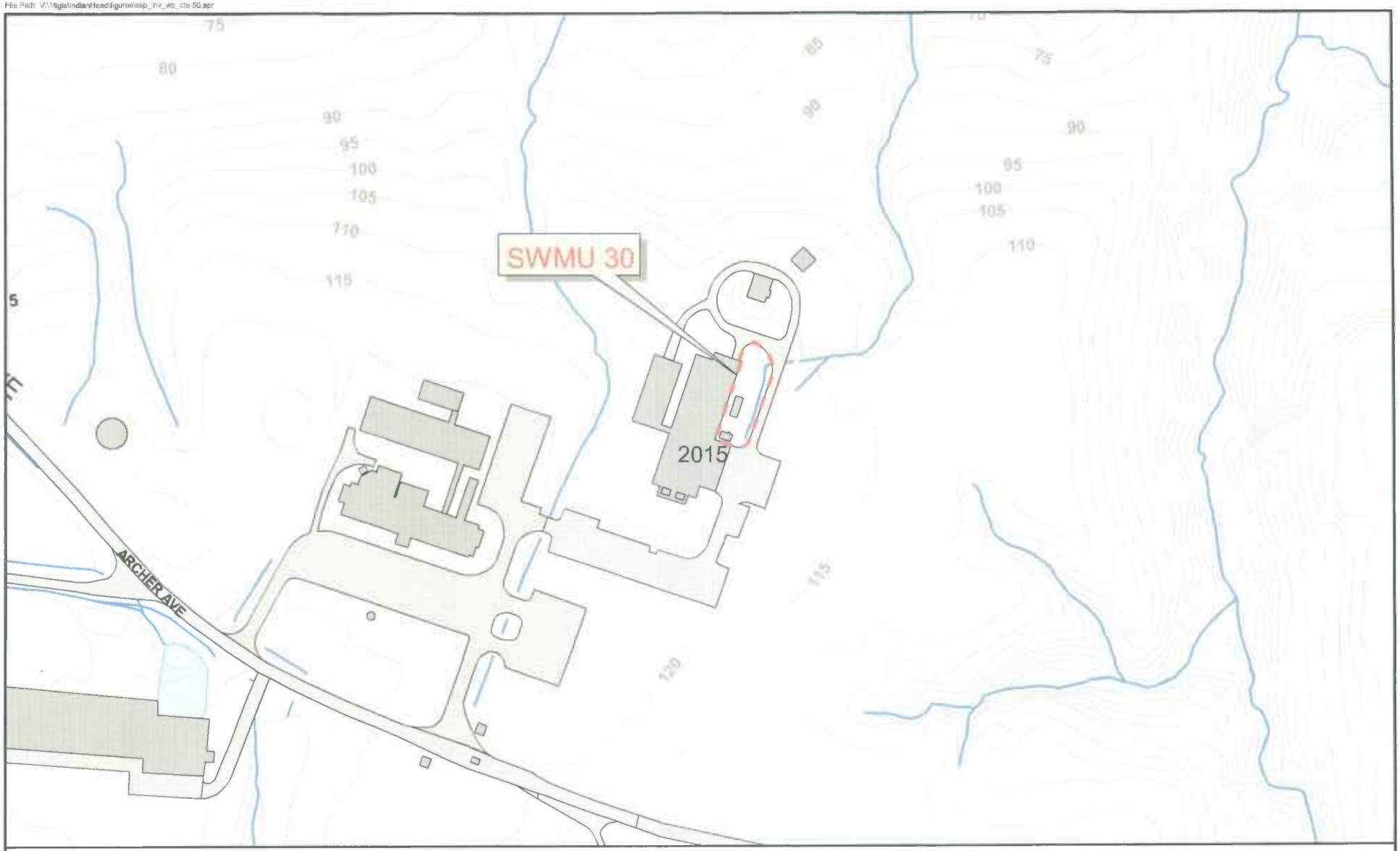


LEGEND

- Approximate SWMU Boundary
- Buildings
- Roads & Paved Areas
- Water Bodies
- Elevation Contour (5 Foot Interval)

N

0 100 200 Feet

1 INCH = 200 FEET

FIGURE 1-9
SWMU 30, DRY WELL
SSP INVESTIGATION WORK PLAN, CTO-050
NDWIH, INDIAN HEAD, MARYLAND

CH2MHILL

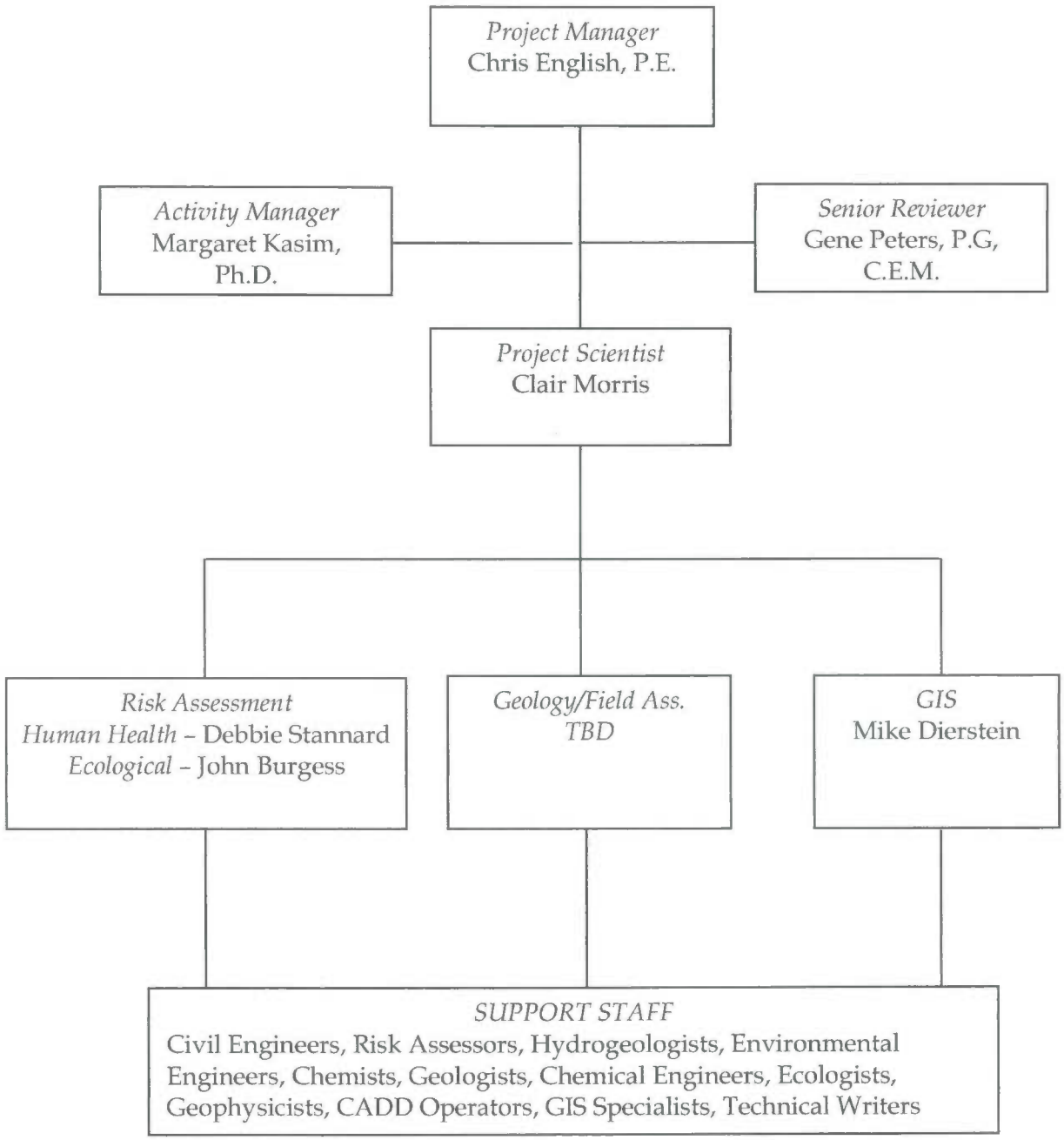


FIGURE 1-10
CH2M HILL PROJECT TEAM ORGANIZATION CHART
SSP INVESTIGATION WORK PLAN, CTO-050
NDWIH, INDIAN HEAD, MARYLAND

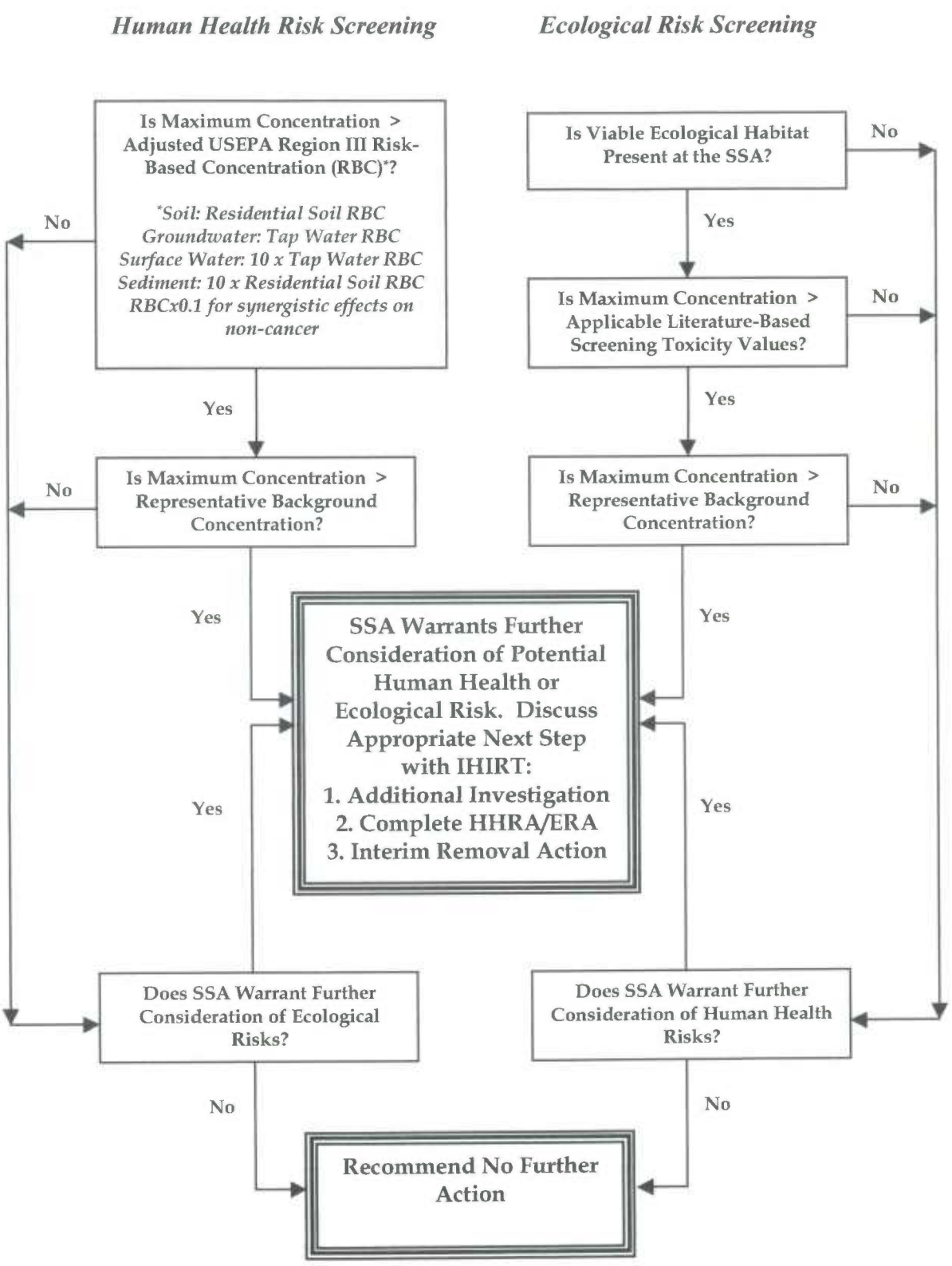


FIGURE 2-1
DATA EVALUATION PROCESS FLOWCHART
SSP INVESTIGATION WORK PLAN, CTO-050
NDWIH, INDIAN HEAD, MARYLAND

CH2MHILL

PROJECT NUMBER	WELL NUMBER SHEET OF

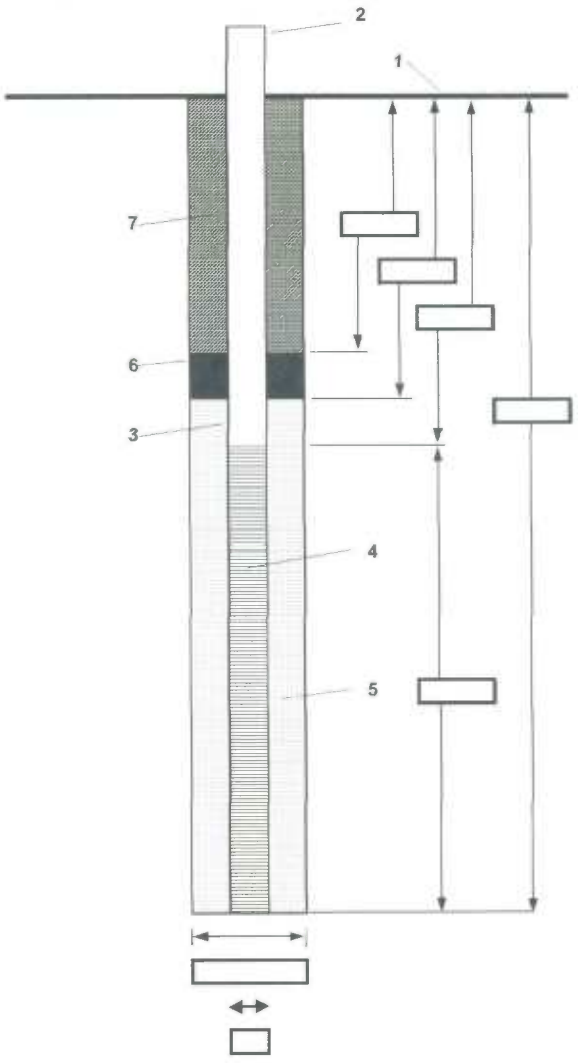
WELL COMPLETION DIAGRAM

PROJECT : LOCATION :

DRILLING CONTRACTOR :

DRILLING METHOD AND EQUIPMENT USED :

WATER LEVELS : START : END : LOGGER :



1- Ground elevation at well _____

2- Top of casing elevation _____
a) vent hole? _____

3- Dia./type of well casing _____

4- Type/slot size of screen _____

5- Type screen filter _____
a) Quantity used _____

6- Type of seal _____
a) Quantity used _____

7- Grout
a) Grout mix used _____
b) Method of placement _____
c) Vol. of well casing grout _____

Development method _____

Development time _____

Estimated purge volume _____

Comments _____

Figure 3-1
STANDARD WELL CONSTRUCTION DIAGRAM
SSP INVESTIGATION WORK PLAN, CTO-050
NDWIH, INDIAN HEAD, MARYLAND

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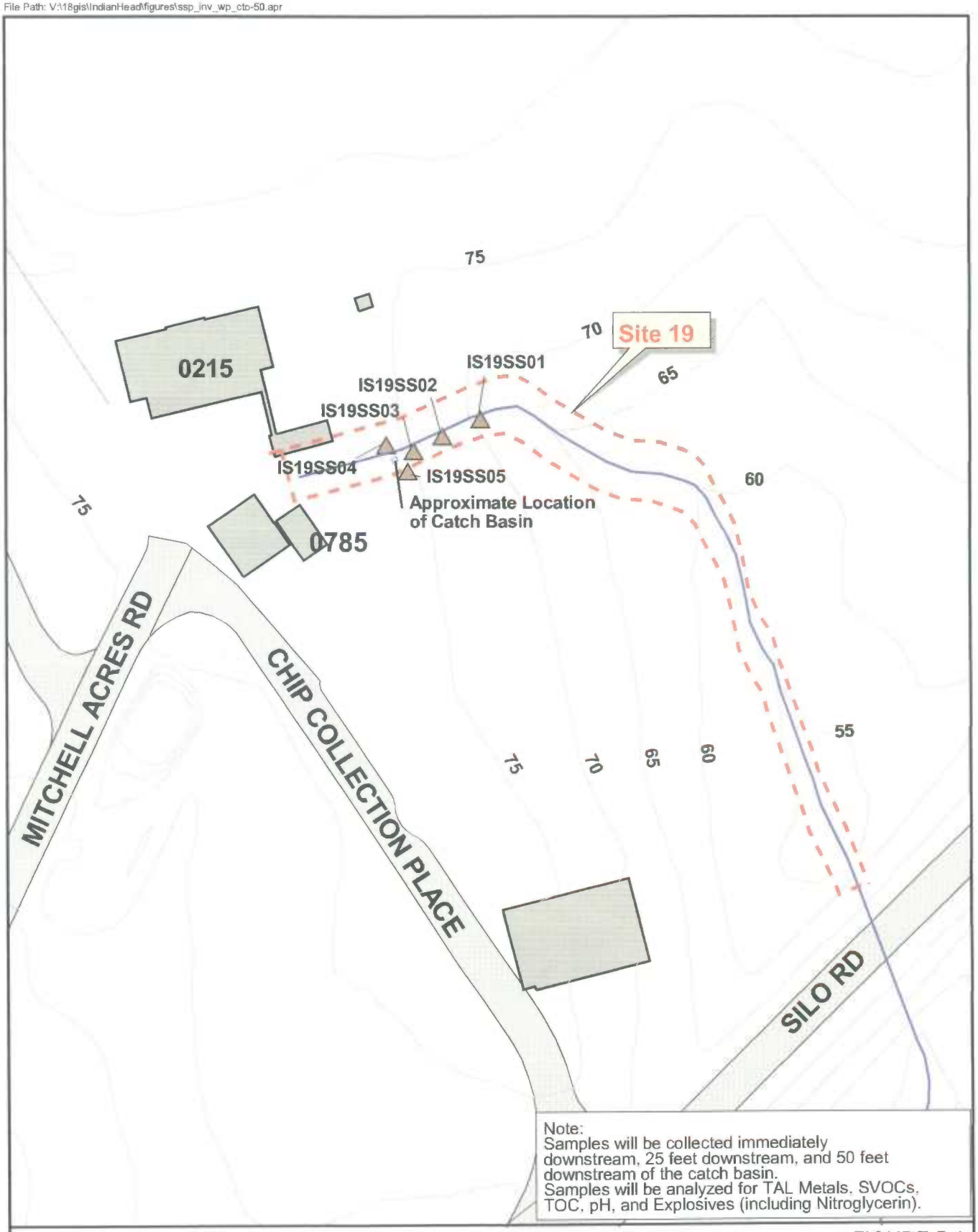

FIGURE 5-1
SITE 19 PROPOSED SAMPLE LOCATIONS AT BUILDING 785
SSP INVESTIGATION WORK PLAN, CTO-050
NDWIH, INDIAN HEAD, MARYLAND

CH2MHILL

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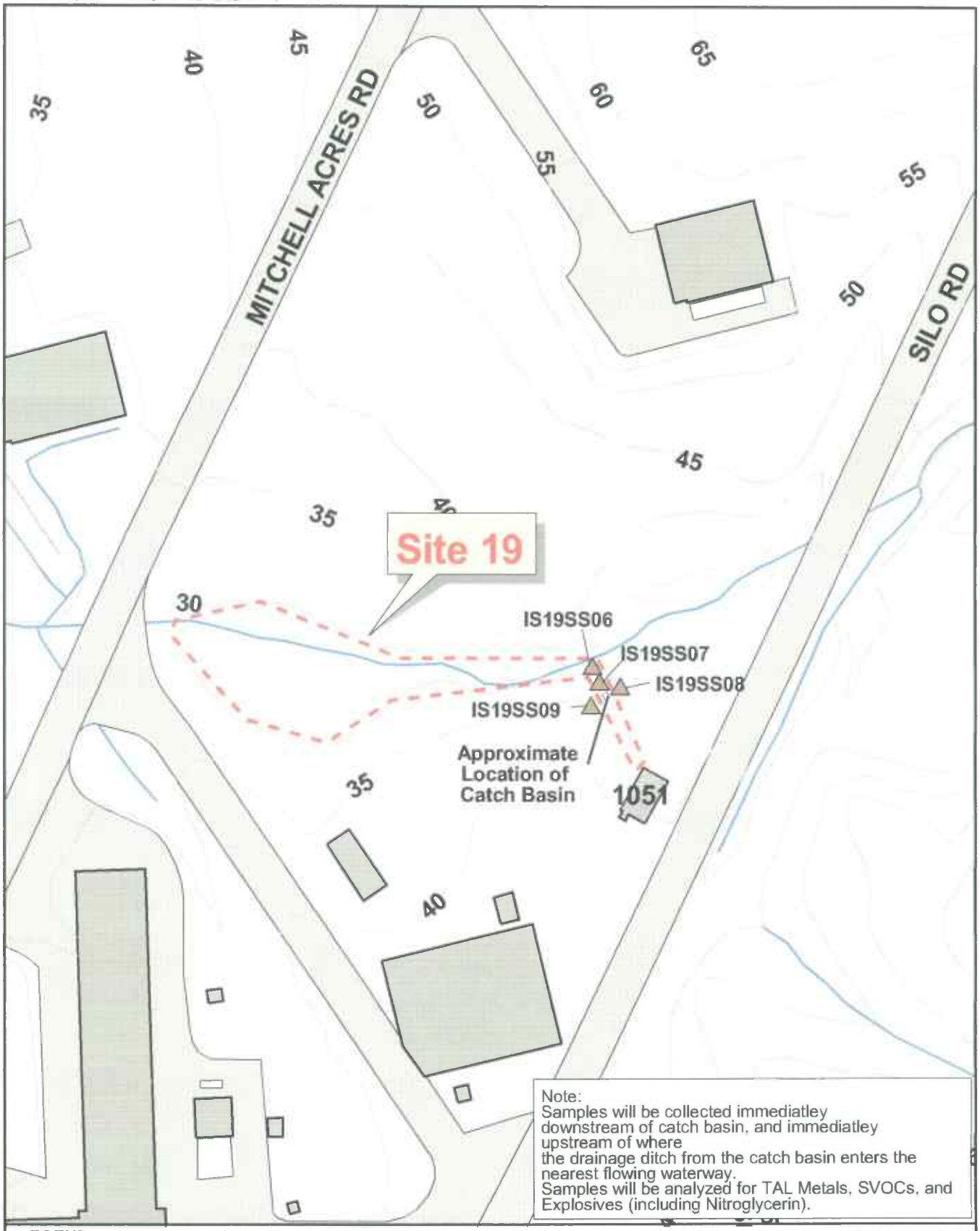

FIGURE 5-2
SITE 19 PROPOSED SAMPLE LOCATIONS AT BUILDING 1051
SSP INVESTIGATION WORK PLAN, CTO-050
NDWIH, INDIAN HEAD, MARYLAND

CH2MHILL

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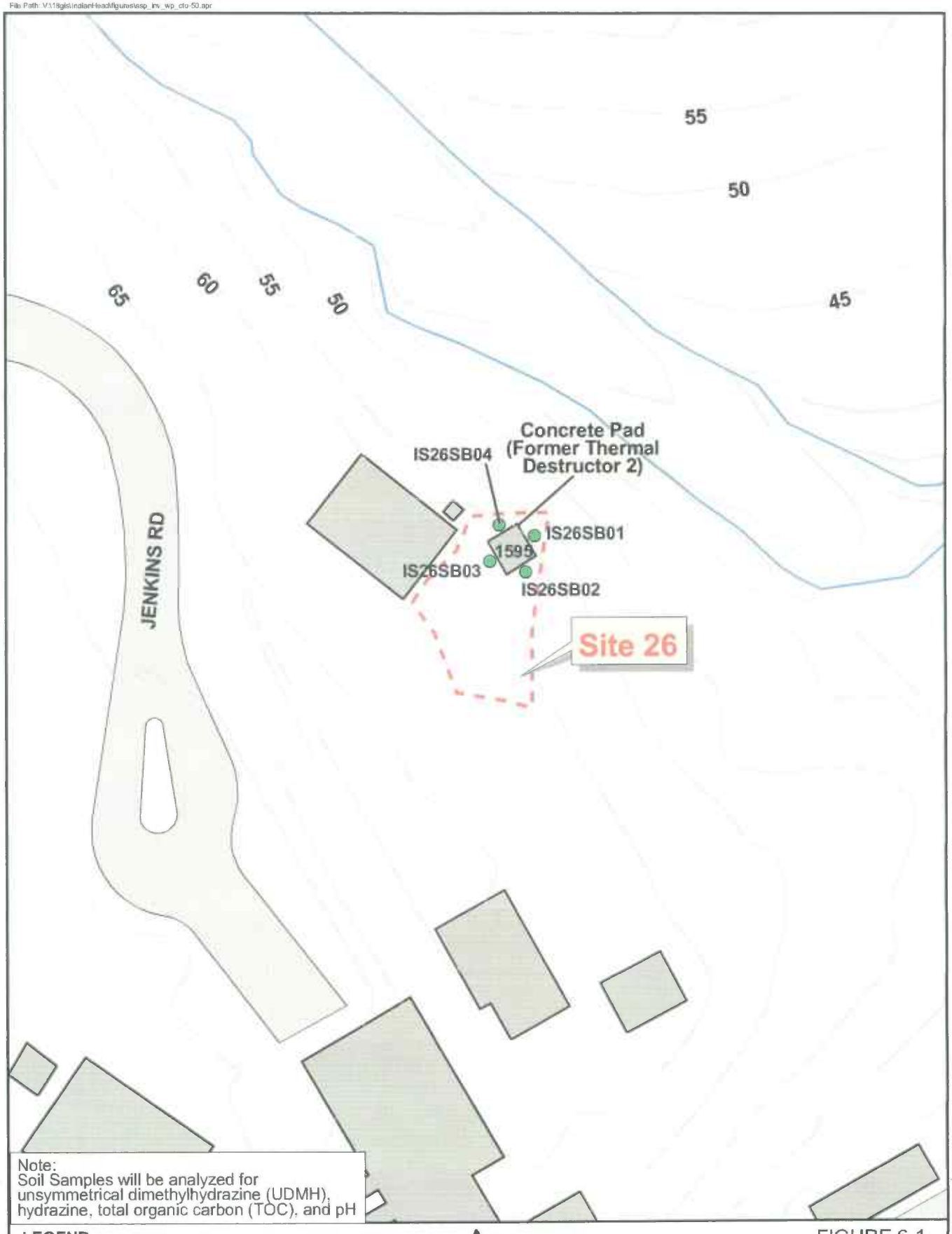

Note:
Soil Samples will be analyzed for unsymmetrical dimethylhydrazine (UDMH), hydrazine, total organic carbon (TOC), and pH

LEGEND

- Approximate Site Boundary
- Approximate HSA Soil Sample Location
- Elevation Contour (5 Foot Interval)
- Buildings
- Water Bodies
- Roads & Paved Areas

N

0 25 50 Feet

1 INCH = 50 FEET

FIGURE 6-1
SITE 26 PROPOSED SAMPLE LOCATIONS
SSP INVESTIGATION WORK PLAN, CTO-050
NDWIH, INDIAN HEAD, MARYLAND

CH2MHILL

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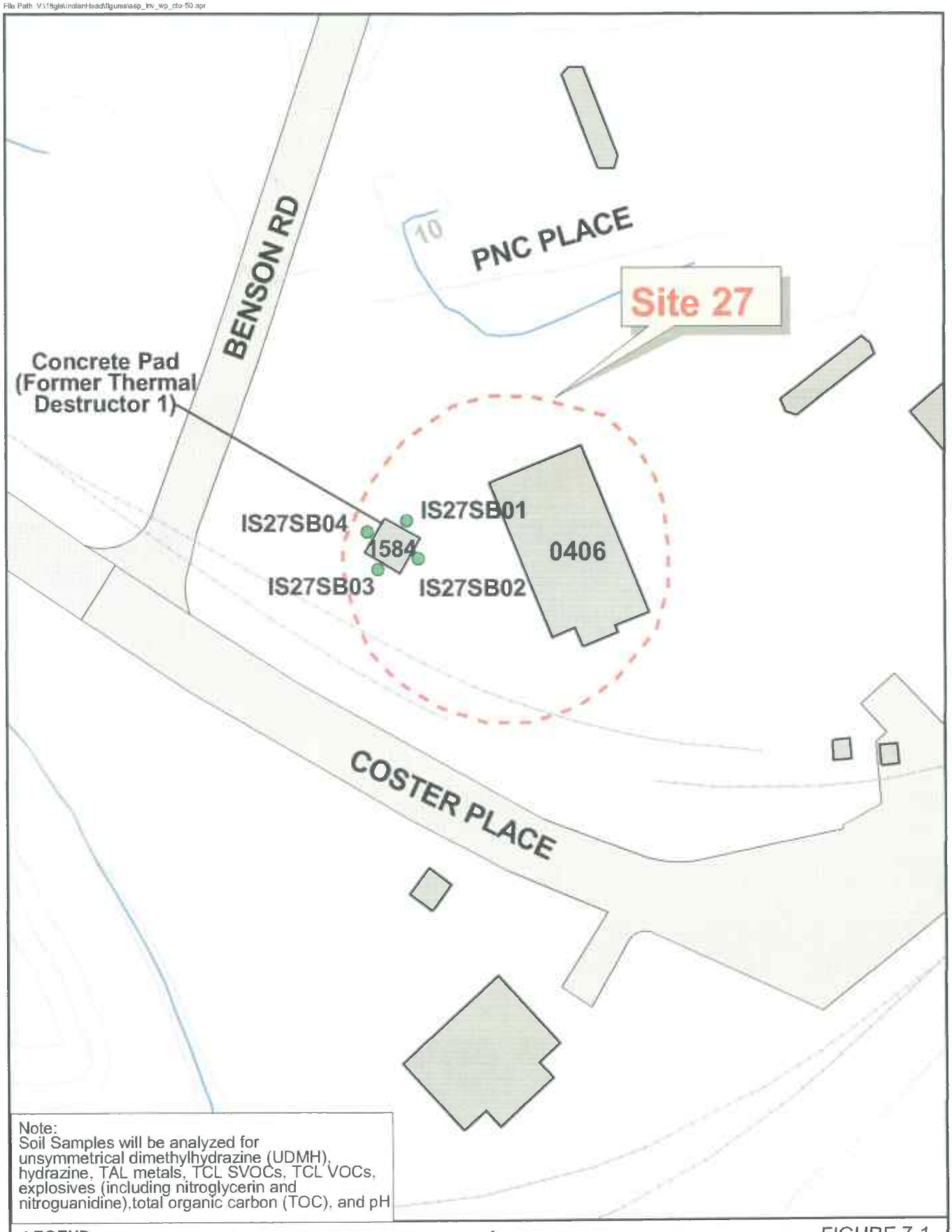


Note:
Soil Samples will be analyzed for unsymmetrical dimethylhydrazine (UDMH), hydrazine, TAL metals, TCL SVOCs, TCL VOCs, explosives (including nitroglycerin and nitroguanidine),total organic carbon (TOC), and pH

LEGEND

- Approximate Site Boundary
- Approximate HSA Soil Sample Location
- Elevation Contour (5 Foot Interval)
- Railroads
- Buildings
- Roads & Paved Areas
- Water Bodies

N

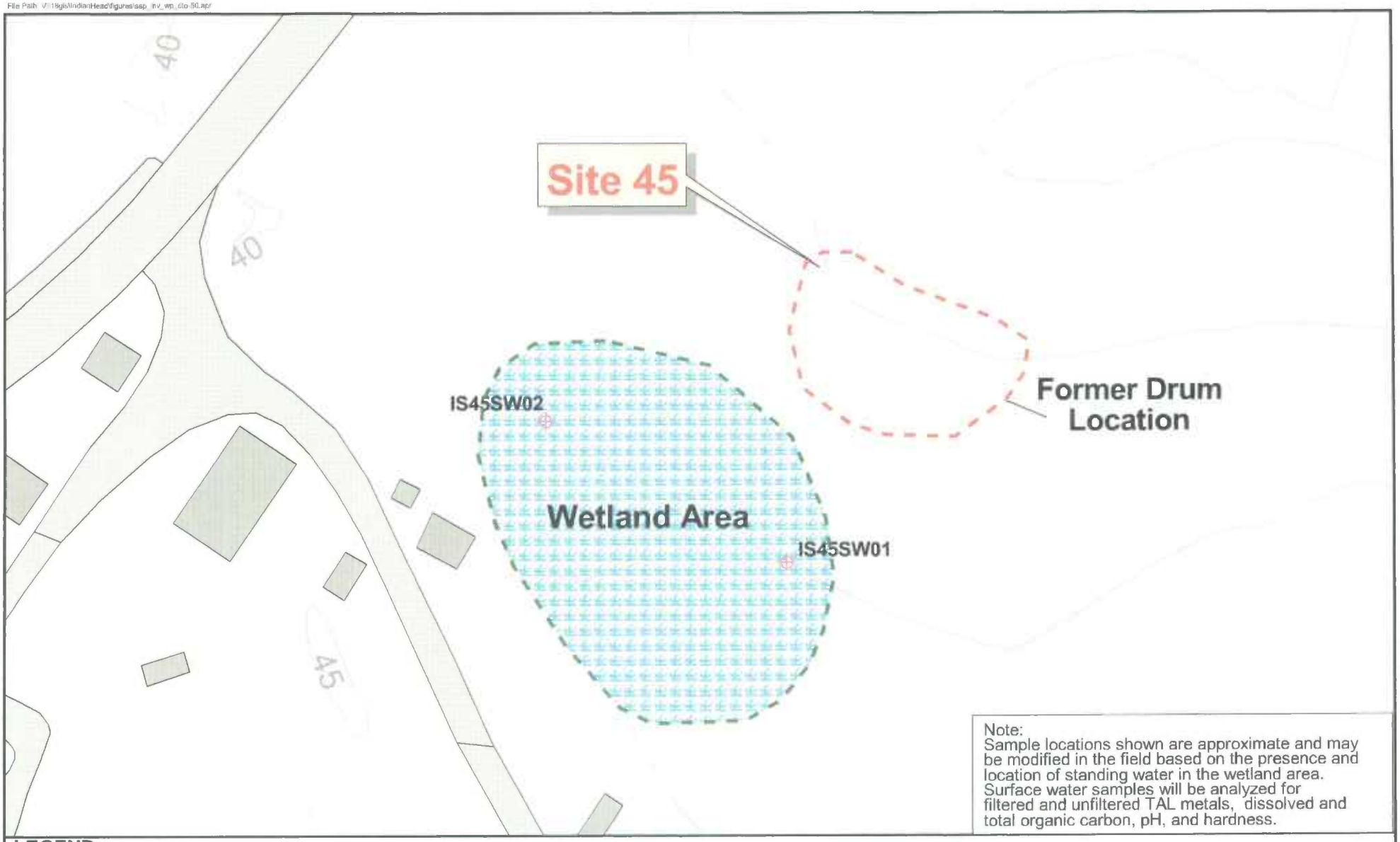
0 30 60 Feet

1 INCH = 50 FEET

FIGURE 7-1
SITE 27 PROPOSED SAMPLE LOCATIONS
SSP INVESTIGATION WORK PLAN, CTO-050
NDWIH, INDIAN HEAD, MARYLAND

CH2MHILL

File Path: V:\18gis\IndianHead\figures\ssp_inv_wp_cto-50.apr



Note:
Sample locations shown are approximate and may be modified in the field based on the presence and location of standing water in the wetland area. Surface water samples will be analyzed for filtered and unfiltered TAL metals, dissolved and total organic carbon, pH, and hardness.

LEGEND

- Approximate Surface Water Sample Locations
- Approximate Site Boundary
- Buildings
- Roads & Paved Areas
- Wetland Area
- Elevation Contour (5 Foot Interval)
- Water Bodies

N

0 25 50 Feet

1 INCH = 50 FEET

FIGURE 8-1
WETLAND AREA PROPOSED SAMPLE LOCATIONS
SSP INVESTIGATION WORK PLAN, CTO-050
NDWIH, INDIAN HEAD, MARYLAND

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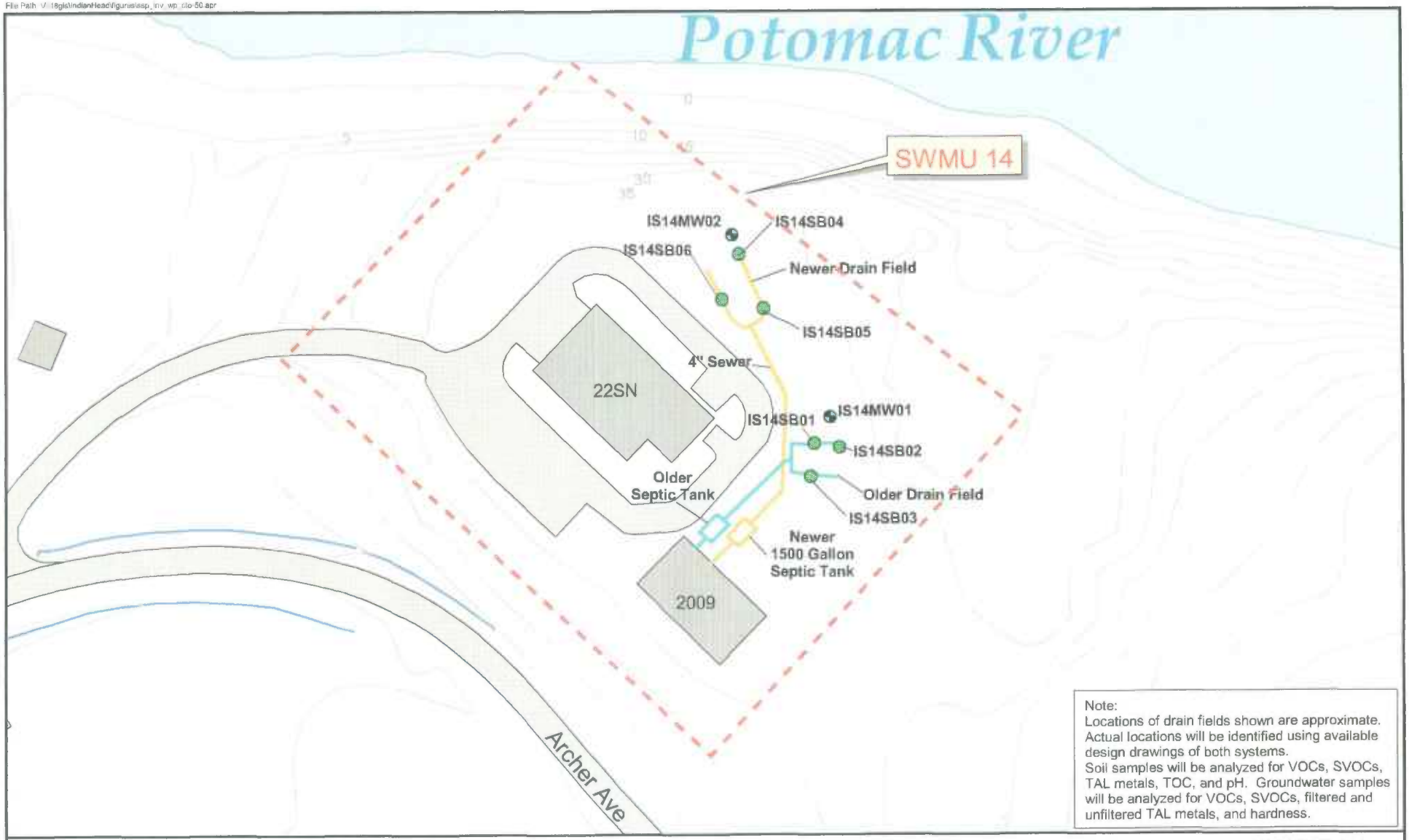

FIGURE 9-1
SWMU 14 PROPOSED SAMPLE LOCATIONS
SSP INVESTIGATION WORK PLAN, CTO-050
NDWIH, INDIAN HEAD, MARYLAND

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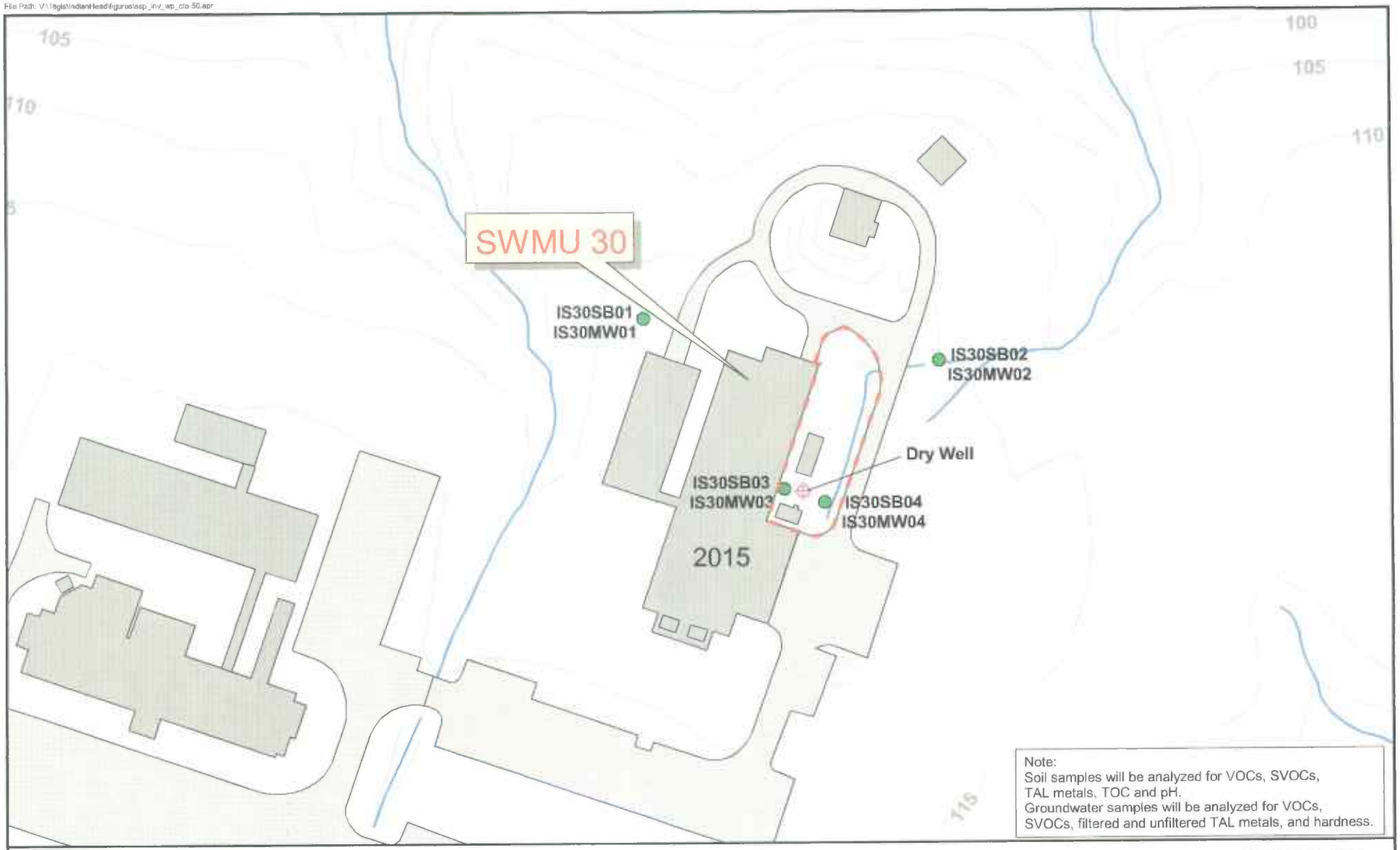

FIGURE 10-1
SWMU 30 PROPOSED SAMPLE LOCATIONS
SSP INVESTIGATION WORK PLAN, CTO-050
NDWIH, INDIAN HEAD, MARYLAND

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Suggestions on SSP Investigation Work Plan for Sites 19, 26, 27, Wetland Area Adjacent to Site 45, and SWMUs 14 and 30

Page #	Section #	Suggestion
v	Executive Summary	To make the management decision stated as the objective of these investigations it shall be necessary to conduct a screening level Human Health and Ecological Risk Assessment for each of these sites. Thus, data collected for these sites needs to fit the conceptual site model (CSM) for the specific site and this purpose. By taking this approach the screening threshold levels for chemical constituents at each of these site for the site specific CSM needs to be defined. Thus, the ability to reach a decision of no further action shall be set by this agreement on the CSM, site initial problem formulation, initial site assessment endpoints and screening threshold benchmarks and upper trophic level TRVs, hence the scientific management decision points (SMDPs) for each site. Further, since it appears that soil background comparisons shall be made this effort also entails a screening refinement for each specific site.
2-3	2.3.3	It would be valuable to have more information on sources of applicable ecological screening criteria for these investigations, or how screening criteria shall be derived. At a minimum a list or hierarchy of sources should be provided for regulator buy-in. See above overarching suggestion for further details as to the specifics that could enhance this presentation.
2-3	2.3.4	How is "surface soil" and "sediment" being defined (i.e. soil 0-2", 0-6", some other? Sediment grainsize, location, other?)?
2-3	2.3.5	Step 5 of the DQO process should provide specific information on how the inputs to the decision (Step 3) will be used to inform the decision identified in Step 2. Step 2 identifies two possible management decisions that could be made based upon the data findings. Step 5 should tell the reader how the data will be used to arrive at the appropriate decision, i.e.; what conditions will lead to the decision to advance the site in the CERCLA process, vs what conditions will lead to the decision of no further action. Likely in this investigation the highest chemical constituent concentration found at the site shall be compared to its human health and ecological screening benchmark, or back calculated site exposure estimate to its TRV to determine if the respective acceptable criteria was exceeded. If so, a refinement was undertaken to see if the

		criteria were still exceeded. If a site constituent was still exceeded that a baseline risk assessment would be undertaken. If not then a finding of acceptable risk would be made and no further action at the site proposed.
2-3	2.3.6	Decision error is really how well the site survey design, i.e., samples represent the possible release of chemical constituents associated with past operation and subsequent translocation of those chemicals through rain, etc and further how well the analytical sensitivity of the method is capable of attaining the decision screening cutpoint mentioned above. These issues are not discussed or suggested as important only QA/QC and adherence to the sampling procedures, which are important, is discussed. Further no specifics are presented that would lead to corrective action or what the correction action might be if an unnamed failure were to occur.
2-4	2.3.7	How were these historical data used to identify additional data? Were historical data sufficient to conduct this screen? Were historical data suggestive of additional site sources or chemical constituents? Were historical data suggestive that the propose site boundaries need to be enlarged in an X, Y or Z directions?
2-4	2.4	Will only these new data be used or shall the historical data also be used in the screen, if not why not?
2-5	2.5.2	The last paragraph on this page states that chemical concentrations will be compared to background concentrations, and if they exceed background will be compared to ecological screening criteria. However, Figure 2-1 shows concentrations will be compared to ecological screening criteria first, then to background if they exceed screening values. The document should be revised to make the Figure and text consistent with each other as well as the current EPA policy on background comparison and the EPA guidance for same.
2-7	Figure 2-1	This figure is very descriptive and has much of the information that needs to be included in the DQOs discussed above and summarized in this decision flow diagram. This is very nice figure.
3-1	3.2.1	Need to make a connection to how these drilling data shall be connected to the DQOs described above. What does a sample represent, see comment on 2.3.4
3-2	3.3	How will evidence of contamination be determined when the well is being drilled so that well screening lengths be determined? Is this really a reference to waste material rather than contamination?
3-3	3.5	What is the basis for the selection of the top 2 feet of soil

		or 2 feet of soil above the water table to represent the soil exposure route of concern?
3-3	3.7	What is the rationale for limiting sediment sampling to locations where surface water is < 6" deep.
3-3	3.8	Does it matter if it has just rained or not rained for a long time in collecting these surface water samples? Are these samples to determine if there are continuing discharges of chemical constituents? If continuing chemical discharges are not an issue from these historical sources, then soil and sediment samples may be all that are needed and not collecting surface water may be OK. The logic here is if sources are stopped then observed chemicals in surface water is from soil and/or sediment.
4-1	Sample Management And Human Health and Safety plan	POTENTIAL SAFETY ISSUE: While these appears to be a likelihood of encountering explosive or energetic materials in at least one of these sites (Site 19), these is no mention of screening these samples for explosive levels in media prior to shipment or mention of how such site conditions shall be recognized or addressed in the health and safety plan.
5.1	5-1	It would be valuable to know how long buildings 785 and 1051 discharged wastewater to the catch basins and accompanying drainage pathways. Information on the period and length of operation, and volume of discharges might help in determining appropriate sampling locations in the drainages.
5.3	5-2, also Figures 5-1 and 5-2	Given that lead and copper salts are relatively soluble, limiting sampling in the drainages to within 50 feet of the catch basins may not be adequate for detecting the more soluble COPCs. Also, some explosives are slightly water soluble (e.g.nitroguanidine and nitroglycerin) and may impact ground water. Can ground water be written off at this point as not impacted? SEE ABOVE COMMENT REGARDING POTENTIAL EXPLOSIVE HAZARDS.
5-4 and 5-5	Figures 5.1 and 5.2	It appears that all of the samples shall be collected within 50 feet of the discharge point. Figure 5.1 appears to drain rapidly 5 feet every 50 feet. Would this change to likelihood of being moved further down gradient? Unclear how rapid the gradient is from Bldg 1051 catch basin.
6-2	6.3	Since hydrazine and UDMH are both largely miscible in water. Can one write off the ground water pathway due to rapid oxidation of these compounds? If this is possible, then the factual case needs to be made for this assumption.
7-1	7.1	Why does one need to know when Bldgs 859, 1584, 1585,

		1586 and 1587 were constructed? Were these structures engaged in production or storage of the site chemicals? What is Building 0406, and why is it included within the Site Boundary shown on Figure 1?
7-2	7.3	Same as above: Since hydrazine and UDMH are both largely miscible in water. Can one write off the ground water pathway due to rapid oxidation of these compounds? If this is possible, then the factual case needs to be made for this assumption. See related safety issue observation as explosives are suggested to have been also incinerated here.
8-3	8.1 - 8.3	Since a screening-level ERA has already been conducted for the wetland area and it was determined that "the wetland was not affected by contamination associated with the drum abandonment area" (HydroGeoLogic, 2004), it is not clear why additional sampling for screening is being conducted, or why this area is part of this SSP, since the recommendations from the existing ecological screening were to move to a baseline ERA. Are there reasons to believe water quality has changed since the last round of sampling or that there may be another source of surface water contamination other than the drum site? If not this sampling seems unnecessary, and may give the impression that the screening is being repeated to try to arrive at a different outcome. Additional rationale for repeating the screen is needed here to avoid this perception.
9-1	9.1	It is not clear how the septic tank discharged to the Potomac River and also had a permit for such a discharge.
9-2 and 9-3	9.3	Given that the record reflects NPDES discharge violations, it is not clear what additional data are needed beyond the historical data for a screen, as it seems likely that either a human health, an ecological screen or both will fail using only these data. If this is correct, it seems that an updated CSM is necessary reflecting exposure pathway(s), likely receptors and risk questions as a basis for a baseline risk assessment. Data from the other photo fluid discharges at Indian Head already studied could reasonably be used to provide the additional data inputs and CSM validation for this risk based survey design.
9-3		October 2001 "Sediment Toxicity Identification Evaluation Demonstration", Indian Head Warfare Center (SAIC) found evidence of no mortality to *Hyalella* or *Pimephales* observed at silver pore water concentrations as high as 33.1 ug/l which is a factor of 8.1 greater than its respective Freshwater Acute Aquatic Life Criteria

		threshold (4.1 ug/l). This finding may be helpful in determining the need for additional baseline investigation of elevated silver at the site, if this is the chemical with elevated HQ.
10-1	10.2	It is not clear that further screening is warranted for this site given just the mercury fining and no other chemical of concern indicated. If Hg is the only chemical of concern and given that the dry well would likely contain the major Hg release an EE/CA may be the more appropriate action for this site using field Hg test kits for soil testing. Even if additional sampling is conducted, the number of cores seems excessive and it is not clear how these twin cores will provide greater information and insight than one core and the same is true for the 3 monitoring wells proposed. One in the down gradient vicinity of the dry well would seem adequate for this initial screen of the dry well.

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July 30, 2004

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Mr. Jeff Morris, Code CH20C
NAVFAC Washington
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1314 Harwood Street, SE
Washington Navy Yard, DC 20374-5018

Subject: Navy CLEAN III Program
Contract N62470-02-D-3052
Contract Task Order 0050
Pre-Draft Work Plan for Site Screening Process Investigations at Sites 19, 26, 27, Wetland Area Adjacent to Site 45, and SWMUs 14 and 30
NDWIH, Indian Head, MD

Dear Jeff:

CH2M HILL is pleased to submit two hard copies of the above-referenced document. Hard copies and CDs containing the document in pdf format have also been distributed as shown below.

If you have any questions regarding this deliverable, please call me at (314) 421-0313 ext. 221 or Margaret Kasim at (703) 471-6405 ext. 4422.

Sincerely,

CH2M HILL

Chris English, P.E.
Project Manager

STL\SSPInvestWPCoverLetter.doc
Cc: Shawn Jorgenson/NDWIH (three hard copies, nine CDs)
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