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Final Work Plan for the Upgradient Investigation at Site 17

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Introduction

This work plan is a supplement to the *Final Work Plan for the Additional Investigation at Site 17* (CH2M HILL, 2004). The following are not repeated in this work plan to reduce duplication of material: previous documents to which this work plan references or is a supplement, documentation of field information, data evaluation and reporting procedures, standard operating procedures, and health and safety information. Instead, this work plan focuses on the specific information that is necessary to accomplish the proposed investigation objectives.

Objectives

Based on the analytical results of the February/March 2005 sampling event (refer to Figure 1), the Indian Head Installation Restoration Team (IHIRT) agreed that an additional investigation should be conducted in the upgradient northwest area of the site to bound the areal extent of the plume.

Thus, the objectives of this investigation are to determine if there is an upgradient source of chlorinated volatile organic compounds (cVOCs) and to delineate the cVOC plume on the northwest side of the site. The scope of work to accomplish these objectives includes the following activities:

(1) Collection of qualitative VOC data from 13 proposed locations using membrane interface probe (MIP) technology;

(2) Collection of direct push (DP) groundwater samples from 13 proposed locations; and

(3) Interpretation and presentation of the data in the Draft Final FFS Report.

The field investigation activities are discussed in more detail below.

Scope of Work

Field activities to be conducted include the following:

- Mobilization/demobilization
- MIP and DP Sampling
- Survey of MIP/DP Locations
- Decontamination of sampling equipment
- Sampling frequency, quality assurance and control (QA/QC) samples, and sample handling
- Investigation-derived waste handling

Mobilization/Demobilization

The Navy will verify the accessibility of the site (due to nearby site operations by NDWIH personnel). CH2M HILL's utility clearance subcontractor will perform clearance for field operations associated with these tasks before any fieldwork or other potentially disruptive and/or intrusive actions begin. Mobilization includes those activities required for general site conditions, including coordination with other Navy contractors and site orientation for field staff. Mobilization may also require tree-cutting and vegetation clearance to permit access to sample locations (only with clearance from NDWIH Environmental). Prior to mobilization, CH2M HILL field personnel will review this work plan. Demobilization will consist of following proper decontamination procedures for all personnel and equipment. Demobilization will include limited site restoration, but not replacement of cleared vegetation.

Membrane Interface Probe (MIP) and Direct-Push (DP) Sampling

A MIP rig will be utilized to collect qualitative VOC data at each of the 13 proposed locations shown on Figure 2. The MIP uses a DP probing system to advance sensors through a soil column while collecting continuous data on temperature, electrical conductivity, and VOC concentrations in gas phase. The basic operating principle behind the MIP is that a down-hole heating element raises subsurface temperatures, volatilizing organic contaminants. These VOCs permeate across a membrane at the probe tip and are brought to the surface in an inert carrier gas stream for analysis. MIP rigs are typically equipped with a flame ionization detector (FID), photoionization detector (PID), and an electron capture detector (ECD). The FID measures the mass of total combustible compounds in the gas stream. The PID measures only those ionizable compounds whose ionization potential is less than the PID bulb energy; thus, the PID response is a subset of the FID response. The FID signal includes methane and other high molecular-weight organic chemicals not detected by the PID. The ECD analyzes the mass of a smaller set of organic chemicals that generally represent the cVOCs. The PID, FID, and ECD data are collected continuously during advancement.

The Triad approach will be used during this MIP investigation. MIP data will be collected from the 13 proposed locations (IS17DP51 through IS17DP63) depending on the data obtained in the field. The intent of this sampling approach is to fully delineate (with field screening level data quality) the nature and extent of cVOCs upgradient of the site and determine if there is another source of cVOCs. Observation of decreasing MIP response

while moving away from the site (that is, while moving upgradient) should indicate that there is not another source upgradient and that the extent of cVOCs is understood, based on the topography at the site and IHIRT's understanding of the site history.

Implementation of the Triad approach allows decisions to be made in the field (based on the MIP data obtained during this investigation) as to whether further samples are needed to adequately define the nature and extent of contamination. The MIP data will be evaluated based on total VOC readings on the FID, PID, and ECD. If the readings on these detectors indicate that *de minimis* levels have been reached at a particular location,[1] then further sampling will not be performed. These MIP locations may be adjusted, and additional locations added, as necessary, to delineate the nature and extent of contamination.

MIP borings will be terminated at the basal clay layer encountered during previous investigations at depths ranging from 8 feet to 13 feet below ground surface. The electrical conductivity signal on the MIP will confirm the clay layer when encountered.

The investigative approach consists of MIPing locations IS17DP51 through IS17DP55 (Tier 1 locations) first. If there is a MIP response at all of these locations, the MIP investigation will progress to the next outward tier of sample locations, IS17DP56 through IS17DP61 (Tier 2 locations). If MIP responses are detected at all the Tier 2 locations, then the next outward tier consisting of locations IS17DP62 and IS17DP63 (Tier 3 locations) will be investigated with the MIP.

Some of the locations within a tier may not be necessary if there are no MIP detections in corresponding adjacent locations in the previous tier. For example, if there are no MIP responses at locations DP51 and DP52, but there are responses at DP53 through DP55, the next set of MIP locations would likely be DP59 through DP61. MIP data would not be collected from locations DP56 through DP58. This same logic applies as the investigation progresses outward.

Groundwater samples will be collected from two depth intervals at all locations that are MIPed, regardless of MIP response. The depth intervals will be approximately 0 to 2 feet below the water table and 0 to 2 feet above the basal clay layer. The groundwater samples will be analyzed for VOCs (CLP OLM04) at an offsite laboratory.

The groundwater sample data will provide the concentration of cVOCs at these locations. This is particularly important for the outermost locations that do not provide a MIP response, considering the detection limits of the MIP sensors.[1]

Survey of MIP Locations

MIP locations will be surveyed with a portable global positioning system (GPS) unit.

Decontamination of Sampling Equipment

All non-dedicated sampling equipment will be decontaminated before beginning sampling activities and after each use. Decontamination procedures are presented in the SOP provided in the Master Plans (TETRA TECH NUS, 2004).

[1] Current MIP detection limits for chlorinated solvents range from 100 to 250 parts per billion for chlorinated solvents.

Sampling Frequency, Quality Assurance, and Sample Handling

Table 1 presents the sample media, sample IDs, and analyses for the investigation. Table 2 lists the sample containers, preservatives, and holding times required for the intended analyses. Table 3 presents the analytical procedures and the frequency at which field QA/QC samples will be collected. Samples will be named, handled, documented, packaged, and shipped as detailed in the Master Plans and utilizing protocol from the Remedial and Pre-Feasibility Study investigations at Site 17.

Investigation-Derived Waste (IDW) Handling

Handling and disposal of investigation-derived waste (IDW) will be performed in accordance with the Master Plans.

Schedule

Fieldwork is anticipated to commence on August 23, 2005, and end on August 26, 2005.

Table 1
Summary of Sampling Program
Upgradient Sampling - Site 17
NDWIH, Indian Head, Maryland

Sample Media	Sample ID Number	Sample Depth/Location	Analysis
			VOCs
Direct Push Groundwater	IS17GW51*TDBD* - IS17GW63*TDBD*	Up to two groundwater samples: One just below water table and one just above basal clay layer at each of the locations, if possible.	X

Notes
VOCs = Volatile organic compounds
IS17DS## - "##" refers to the direct push location from which the soil sample is collected (refer to Figure 2).
TDBD - Refers to the two-digit top depth and two-digit bottom depth of the sample interval for soil and screen interval for groundwater

Table 2
Analyses, Bottleware, Preservation, and Holding Time Requirements
Upgradient Sampling - Site 17
NDWIH, Indian Head, Maryland

Media	Analysis	Number of Containers Per Sample	Container Type	Preservation	Holding Times
Direct-Push Groundwater	TCL VOCs (OLM04)	3	40-ml vials	HCl to pH<2; cool to 4°C	10 days to analysis

Notes
ml = millileter
TCL VOCs = Target Compound List Volatile Organic Compounds
HCl = hydrochloric acid
°C = degrees Celsius

Table 3
Sample Collection Frequencies
Upgradient Sampling - Site 17
NDWIH, Indian Head, Maryland

Analysis/Test	Sample Matrix	Field Samples	Field Duplicates	Equipment Rinsate Blanks	Field Blanks	Matrix Spikes	Matrix Spike Duplicates	Trip Blanks
Direct Push Groundwater Samples								
TCL VOCs by CLP OLM04	Groundwater	26	3	4	1	2	2	3
IDW Sampling								
Full TCLP	soil/aqueous	2						
RCI Characteristics	soil/aqueous	2						

Notes
TCL = Target Compound List
VOCs = Volatile organic compounds
TCLP = Toxicity Characteristic Leachate Procedure
RCI = reactivity, corrosivity, and ignitability characteristics
Field duplicates are collected at the rate of 1 for every 10 environmental samples
Equipment rinsate blanks are typically collected at the rate of 1 per day per media
Field blanks are typically collected at the rate of 1 per week during sampling
One trip blank is supplied in each cooler submitted to an offsite lab containing VOCs and is analyzed only for VOCs
MS/MSDs are collected at the rate of 1 for every 20 samples

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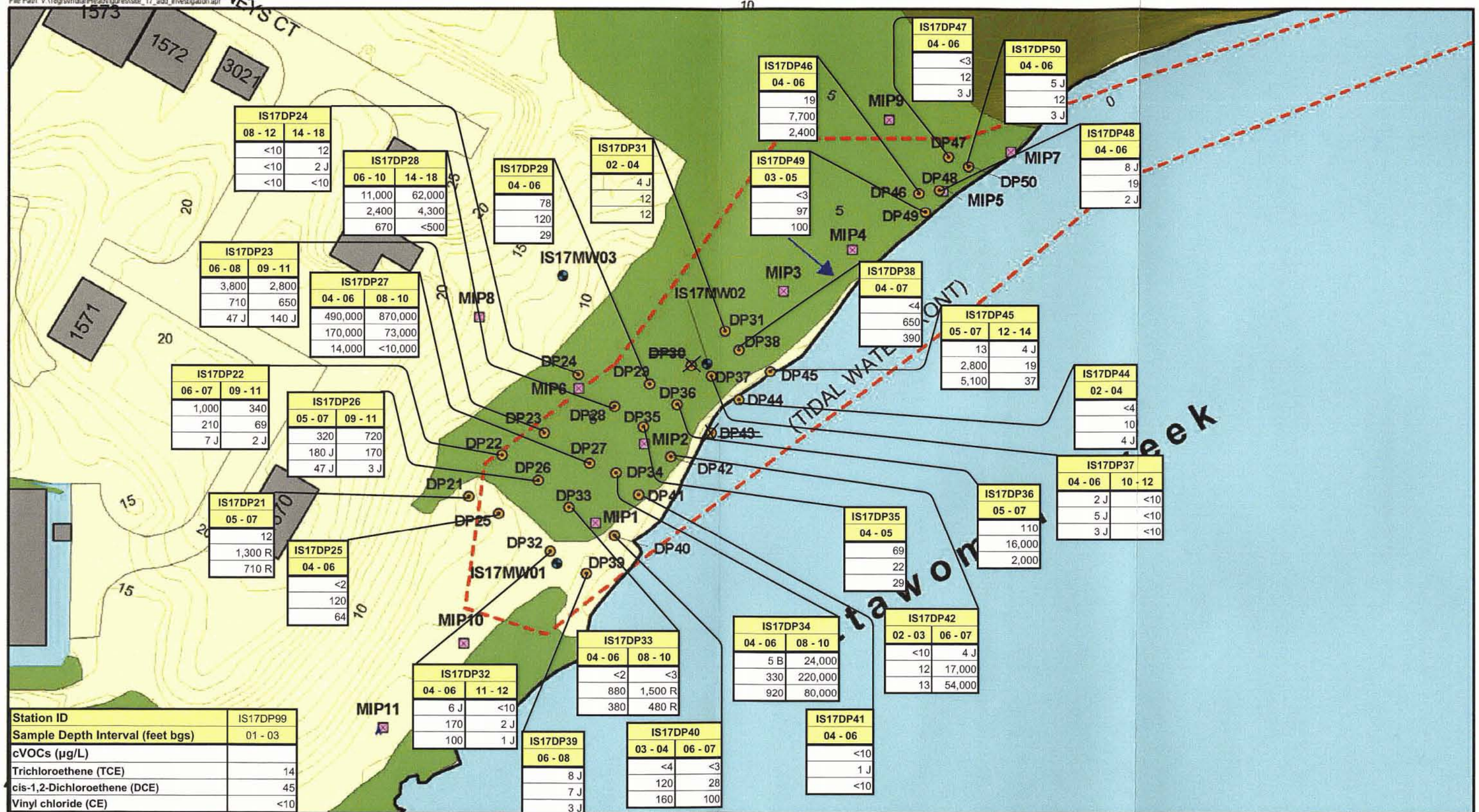

Figure 1
Select cVOCs in Direct Push Groundwater
Additional Investigation February/March 2005
Site 17, NDW Indian Head

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LEGEND

- Monitoring Wells
- Proposed MIP/Direct Push Sample Locations
- Previous MIP/Direct Push Sample Locations (2002)
- Previous Direct Push Sample Locations (2005)
- Approximate Site Boundary
- Buildings
- Waterbodies
- Wooded Area
- Dense Wooded Area
- Groundwater Direction
- Road
- Elevation Contours (feet msl)
- Base Boundary

N

0 60 120 Feet

1" = 60'

Figure 2
Site 17 Upgradient Investigation
Site 17 Groundwater Focused Feasibility Study
NDWIH, Indian Head, Maryland

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