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Subject: Navy CLEAN III Program
Contract No. N62470-02-D-3052
Contract Task Order 0051
Final Work Plan for Pre-Feasibility Study Activities at Site 47
Naval District Washington Indian Head, Indian Head, MD

Dear Joe:

CH2M HILL is pleased to submit one hard copy of the above-referenced document and one CD containing an electronic version of the document in pdf format. The final work plan is provided as an attachment to this cover letter. Copies of the document and CD have also been distributed as shown below.

If you have any questions regarding this deliverable, please call me at 703-471-6405 ext. 4135.

Sincerely,

CH2M HILL

Gunarti H. Coghlan
Project Manager

WDC\Site 47 Final WP - pre FS.doc

Cc: Shawn Jorgensen/NDWIH (2 CDs)
Curtis DeTore/MDE (1 hard copy, 1 CD)
Dennis Orenshaw/USEPA (1 hard copy, 1 CD)
George Latulippe/TTNUS (1 CD)
CH2M HILL (1 hard copy)
Noelle Cuti/File/CH2M HILL (cover letter only)

Attachment
Final Work Plan for Pre-FS Investigation Activities
Site 47 Groundwater
Naval District Washington, Indian Head

Project Objectives and Scope

This work plan (WP) describes the activities to be performed to collect additional data for the pre-feasibility study (FS) investigation at Site 47 at Naval District Washington, Indian Head (NDWIH). This work plan is a supplement to the following documents:

- Master Plans prepared for NDWIH by TTNUS (February 2004)
- Final Remedial Investigation (RI) Report, Site 47 (December 2003)

This pre-FS investigation will address the recommendations that were made in the RI report as well as provide a better understanding of site conditions as is necessary for completion of the FS. This work plan documents the scope of work required to complete the tasks recommended for Site 47.

The objectives for this investigation are to:

- Provide data necessary for the evaluation of monitored natural attenuation (MNA) as a remedial alternative.
- Provide wet chemistry data and other data necessary for evaluation of other possible remedial alternatives.
- Refine our understanding of the distribution of volatile organic compounds (VOCs) and metals throughout the groundwater plume in the vicinity of Site 47, particularly in the eastern portion of the site where portions of the plume are solely defined by direct push data.
- Supplement the existing network of monitoring wells throughout the contaminated area and in the direction of groundwater flow.

The proposed scope of work will accomplish the above objectives through the following activities:

- (1) installation of three new monitoring wells in the shallow aquifer to provide an eight monitoring well network (including five existing wells) for sampling;
- (2) collection of groundwater samples from the eight monitoring well network to provide the necessary data to evaluate remedial alternatives;
- (3) performance of a slug test to estimate subsurface hydraulic conductivity; and
- (4) interpretation of results and preparation of a Technical Memorandum summarizing the results of this investigation.

Installation of Groundwater Monitoring Wells

In support of this investigation, three new monitoring wells will be installed at the locations shown on Figure 1. These locations were chosen to maximize coverage of the plume, while taking into account site access issues.

The installation of three new groundwater monitoring wells, as opposed to using direct push sampling in these areas, will allow resampling to establish temporal trends, assess remedy performance, and support pilot studies.

Groundwater Sampling and Analysis

Eight locations for *in situ* groundwater sampling have been selected for this investigation, including five existing monitoring wells and the three new monitoring wells shown on Figure 1. One of the existing wells is upgradient and will be used to collect background information. The proposed groundwater sampling and analysis are summarized in Table 1.

Samples will be analyzed for TCL (target compound list) VOCs and selected MNA parameters (summarized on Table 2) at a fixed-base laboratory. Other MNA parameters including dissolved oxygen (DO), pH, ferrous iron, and oxidation-reduction potential (ORP) will be measured onsite using a Horiba U-22® fitted with a flow-through cell.

Table 1				
Groundwater Sampling Summary, Site 47 Pre-FS Investigation				
NDWIH, Indian Head, Maryland				
Location	Metals and Cyanide	TCL VOCs	MNA Parameters ¹	Notes
IS47MW08	X		X	Background well
IS47MW03	X	X	X	
IS47MW04	X	X	X	
IS47MW05	X	X	X	
IS47MW10		X	X	
IS47MW16		X	X	Proposed well
IS47MW17		X	X	Proposed well
IS47MW18		X	X	Proposed well
¹ MNA Parameters defined in Table 2.				

Details of the proposed sampling and analysis are included in Tables 2 and 3. Table 2 provides the analytical methods to be used, bottleware, preservation, and holding time

requirements. Table 3 provides a summary of QA/QC sample collection frequencies for this project. In addition, a soil sample from one newly installed well will be used in a soil oxidant demand test. This test will be used to estimate the amount of naturally-occurring organic matter and reduced mineral species that will consume oxidants. This information will be used in the evaluation of possible in situ chemical oxidation remedies to estimate the amount of reagent required.

Samples will be labeled using the following format:

IS47MW0##MMYY, where

- Refers to well number

MMYY - Refers to month and year of sampling

Slug Test

Up to three monitoring wells will be used to estimate hydraulic conductivity using slug tests. Slug tests provide a qualitative estimate of hydraulic conductivity that will be used in the conceptual design of injection- or extraction-based remedies. Slug tests generate no investigation-derived waste requiring disposal.

General Considerations

Data will be reviewed by CH2M HILL chemists at an EPA Region III M-1 level using the appropriate sections of the Region III data validation guidance for organic and inorganic review. The M-1 level data review consists of reviewing of the results, QC forms, and the case narrative, but not checking the raw data. Field work will follow the standard operating procedures provided in the Master Plans prepared for NDW-IH by TTNUS (February 2004).

Data Evaluation and Reporting

Once the analytical data have been received from the laboratory, all data will be entered into the electronic database that currently contains all analytical results obtained at NDWIH by CH2M HILL as part of its project work at the facility. Key results will be presented to the team on a conference call or at the following NDWIH meeting. The data then will be used in the evaluation of remedial alternatives in the Site 47 Groundwater Feasibility Study.

References

CH2M HILL. December 2003. *Final Remedial Investigation Report, Site 47 – Mercuric Nitrate Disposal Area, NSWC Indian Head, Maryland.*

TetraTech NUS, Inc. (TTNUS). February 2004. *Master Plans for Installation, Restorations Program Environmental Investigations at Naval District Washington, Indian Head, Indian Head, MD.*

Table 2 Analytical Methods, Bottleware, Preservation, and Holding Time Requirements Site 47 Pre-Feasibility Study NDWIH Indian Head, Maryland						
Media	Analytical Methods	Number of Samples ^a	Number of Containers Per Sample	Container Type	Preservation	Holding Times
Groundwater	Cyanide (ILM04)	4	1	500-ml plastic	NaOH >12; cool to 4 degrees C	14 days to analysis
	Metals (ILM04)	4	1	1-L plastic	HNO ₃ to pH < 2; cool to 4 degrees C	6 months (28 days for mercury)
	TCL VOCs (CLP OLM04)	7	3	40-ml vials	HCl to pH < 2; cool to 4 degrees C	14 days to analysis
	Total organic carbon (SW-846/9060)	8	1	250-ml plastic	H ₂ SO ₄ to pH < 2, cool to 4 degrees C	28 days to analysis
	Sulfide (MCAWW 376.1)	8	1	500-ml plastic	NaOH > 9; Zinc Acetate, cool to 4 degrees C	7 days to analysis
	Other natural-attenuation parameters (IC 300)	8	1	500-ml plastic	Cool to 4 degrees C	28 days to analysis, nitrate 48 hours
	Methane, ethane, ethene (RSK-175)	8	1	40-ml vials	HCl to pH < 2; cool to 4 degrees C	14 days to analysis
	TDS (160.1)	4	1	250-ml plastic	Cool to 4 degrees C	7 days to analysis
	Alkalinity (MCAWW 310.1)	8	1	250-ml plastic	Cool to 4 degrees C	14 days to analysis

^a Does not include quality control samples (blanks, duplicates)

TCL = Target Compound List

IC 300 provides analysis for nitrate, nitrite, sulfate, and chloride.

Natural-attenuation parameters that will be performed by a fixed-base laboratory are as follows: total organic carbon (TOC), nitrate, nitrite, sulfate, sulfide, chloride, methane, ethane, and ethene.

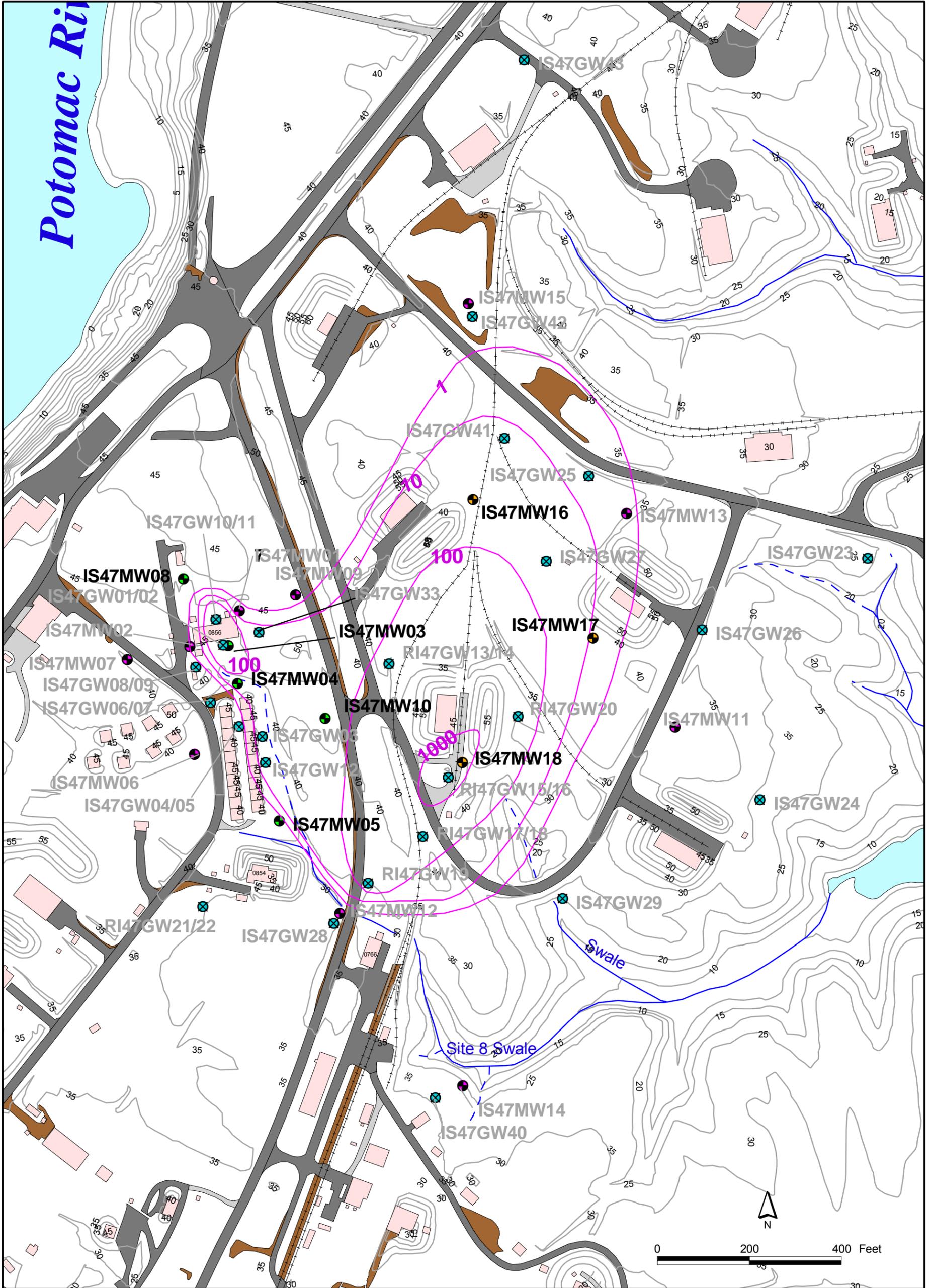
Natural-attenuation parameters that will be performed by onsite analysis include dissolved oxygen (DO), pH, oxidation-reduction potential (ORP), and ferrous iron. Other field measurements include temperature, turbidity, and specific conductivity.

Soil Oxidant Demand test by treatability studies laboratory

**Table 3
Sample Collection Frequencies
Site 47 Pre-Feasibility Study
NDWIH
Indian Head, Maryland**

Media	Analysis	Environmental Samples	Field Duplicates	Equipment Rinsate Blanks	Field Blanks	Trip Blanks	Total Number of Samples	MS/MSDs
Groundwater	Metals/Cyanide	4	1	1	1	0	7	1
	Volatile organic compounds (VOCs)	7	1	1	1	1	11	1
	Total organic carbon (TOC)	8	1	1	1	0	11	1
	Sulfide	8	1	0	0	0	9	1
	Other natural-attenuation parameters (nitrate, nitrite, sulfate, and chloride) for lab analysis	8	1	0	0	0	9	1
	Methane, ethane, ethene	8	1	0	0	1	10	1
	TDS	4	0	0	0	0	4	0
	Alkalinity	8	1	0	0	0	9	1
	Natural-attenuation parameters by field analysis	8	0	0	0	0	8	0

Field duplicates are collected at the rate of 1 for every 10 environmental samples
Equipment rinsate blanks will be collected at the rate of 1 per day during monitoring well sampling
1 field blank will be collected weekly during the monitoring well sampling
1 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, including quality-control samples



LEGEND

- Interpolated isoconcentration line for 1,2-Dichloroethane
- Monitoring Well Location
- ⊗ Direct Push Groundwater Sample Location
- ⚡ Perennial Swale
- ⚡ Intermittent Swale
- ⚡ Railroad
- Proposed Monitoring Well Location
- To be Sampled
- Building
- Asphalt
- Dirt
- Gravel

Note: Composite based on direct-push and monitoring well samples collected between 1999 and 2002.

Figure 1
Monitoring Well Installation and Sampling Locations
Work Plan - NA Investigation
Indian Head, Maryland