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02-DS-276

June 5, 2002

Commander
EFA Chesapeake
Mr. Jeff Morris
Washington Navy Yard
1314 Harwood St SE
Washington Navy Yard, DC 20374-5018

Dear Jeff:

Subject: Navy CLEAN II Program
Contract N62470-95-D-6007
Contract Task Order 122
Work Plan for Pre-Feasibility Study Groundwater Sampling Activities at Site 21
Indian Head Division-NSWC, Indian Head, Maryland

Attached is the draft work plan describing the pre-FS groundwater sampling to be performed at Site 21, Indian Head Division-Naval Surface Warfare Center, and the additional data management, evaluation, and reporting needed to complete the Feasibility Study.

A general scope of work was presented by CH2M HILL during the January 2002, Indian Head Installation Restoration Team meeting. The following presents the formalized work plan. If you have any questions, please call me at 703-471-6405 ext. 4166.

Sincerely,

CH2M HILL

David Steckler
Hydrogeologist

Attachment

- c: Shawn Jorgensen/IHDIV NSW (one copy)
- Heidi Morgan/IHDIV NSW (eleven copies)
- Curtis DeTore/MDE (one copy)
- Dennis Orenshaw/USEPA (two copies)
- Noelle Cuti/File/CH2M HILL (cover letter only)
- Anne Estabrook/CH2M HILL (one copy)
- Bob Root/CH2M HILL (one copy)
- Margaret Kasim/CH2M HILL (one copy)

Attachment
Work Plan for Pre-Feasibility Study Groundwater Sampling Activities
Site 21, Indian Head Division-NSWC

The work plan (WP) describes the groundwater sampling activities to be performed to collect additional data for the feasibility study (FS) at Site 21 at the Indian Head Division-Naval Surface Warfare Center (IHDIV-NSWC.) The remedial investigation (RI) conducted at the site identified contaminants of concern in groundwater (CH2M HILL, 2001). Data gaps remain after the completion of the RI. The additional work to be performed at the site will fill these data gaps and has the following purpose:

- Obtain additional information regarding the oxidation-reduction conditions in the aquifer beneath Site 21.
- Verify the concentration of manganese observed in IS21MW02

The following describes the proposed additional work. The WP also briefly describes the data management, evaluation, and reporting to be performed to aid the completion of the FS.

Groundwater Sampling at Site 21

Groundwater sampling conducted at Site 21 during the initial field effort (September, 2000) detected constituents of concern in groundwater. Specifically, the groundwater sample collected from monitoring well IS21MW02 contained manganese at a concentration of 23,000 micrograms per liter ($\mu\text{g}/\text{l}$; Figure 1). Overall groundwater flow to the southwest, although there appears to be a radial component, as well (Figure 2). Monitoring well IS21MW02 is situated downgradient of the landfill. The mean concentration observed in the samples collected from the wells located upgradient and cross gradient of the landfill is approximately 459 $\mu\text{g}/\text{l}$. This suggests that the concentration of manganese observed in IS21MW02 may be the consequence of an oxidation-reduction process caused by an anthropogenic change in the geochemical conditions in the aquifer beneath Site 21. The outcome of the process, a depletion in dissolved oxygen in the aquifer, is discussed in detail in Bennett et al. (1993). In order to better document this process and to ensure that the concentration of manganese observed in IS21MW02 was not anomalous, a second round of groundwater sampling is proposed.

Scope of Work

All site monitoring wells (IS21MW01, IS21MW02, IS21MW03, and IS21MW04) will be resampled for TAL inorganics (total and dissolved) and sulfate. Additionally, the *insitu* parameters temperature, oxidation-reduction potential, pH, specific conductance, and dissolved oxygen will be measured onsite during sampling.

Data Evaluation and Reporting

Once the validated data have been received, it will be entered into the electronic database that currently contains all analytical results obtained at IHDIV-NSWC by CH2M HILL as part of its project work at the facility.

The data generated from the inorganics sampling will be used to verify the concentration initially observed in IS21MW02. It will also be used to identify potential temporal changes in manganese concentrations of all monitoring wells. The sulfate data will be used to differentiate anthropogenic from natural conditions. The *insitu* data will be used to identify the geochemical conditions present in the subsurface in the vicinity of the monitoring wells.

Following the completion of the data evaluation, the results will be documented in a technical memorandum and distributed to the team. The results will also be presented and discussed at the soonest following partnering meeting. It should be noted that at this time, based on past IHIRT discussions, no additional field activities are proposed; however, following the data evaluation and reporting, additional activities may be required.

The data generated during the groundwater sampling and any data generated from additional field efforts will be incorporated into the forthcoming FS.

General Considerations

The data generated from samples collected at Site 21 will not be used to revise the human-health and ecological risk assessments. The data will be incorporated into the FS only. A third-party subcontractor will validate the inorganic data.

Field work will follow the standard operating procedures provided in the master work plan prepared for IHDIV-NSWC by Brown & Root (1997) and will be consistent with that performed during the RI (CH2M HILL, 2001.)

References

Bennett, P.C., Siegel, D.E., Baedecker, M. J., and Hult, M.F. 1993. *Crude Oil in a Shallow Sand and Gravel Aquifer -I. Hydrogeology and Inorganic Geochemistry*. Applied Geochemistry, Vol. 8, pp. 529-549.

Brown & Root Environmental. 1997. *Standard Operating Procedures for Remedial Investigations at Indian Head Division*, Naval Surface Warfare Center, Indian Head, Maryland. April.

CH2M HILL. 2000. *Draft Final Site-Specific Remedial Investigation Work Plan for Sites 11, 13, 17, 21, and 25*, Naval Surface Warfare Center, Indian Head Division, Indian Head, Maryland. May.

CH2M HILL. 2001. *Draft Remedial Investigation Report, Sites 11, 13, 17, 21, and 25*, Indian Head Division, Naval Surface Warfare Center, Indian Head, Maryland. July.

Table 1
Work-Plan Summary
Site 21 Pre-FS Groundwater Sampling
IHDIV-NSWC
Indian Head, Maryland

Media	Objective	Investigative Technique	Locations	Number of Samples	Analysis
Site 21					
Groundwater	Obtain additional information regarding oxidation-reduction conditions in the aquifer beneath Site 21	Monitoring well sampling	The four site monitoring wells	4	TAL inorganics and Sulfate

TAL =Target Analyte List

**Table 2
 Summary of Sampling Program
 Site 21 Pre-FS Groundwater Sampling
 IHDIV-NSWC
 Indian Head, Maryland**

Sample Media	Sample ID Number	Sample Location and Depth	Analysis		
			TAL Inorganics (total)	TAL Inorganics (dissolved)	Sulfate
Site 21					
Groundwater	IS21MW01MMYY - IS21MW04MMYY	The 4 site monitoring wells	X	X	X

TAL =Target Analyte List

MMYY - Refers to month and year of sampling

Table 3
Bottleware, Preservation, and Holding Times
Sites 11 and 25 Phase II Work Plan
IHDIV-NSWC
Indian Head, Maryland

Sample Media	Analysis	Total Number of Samples^a	Number of Containers Per Sample	Container Type	Preservation	Holding Times
Groundwater	TAL Inorganics - CLP ILM04.0	7 ^b	1	1 L Polyethylene bottle	HNO ₃ to pH<2; Cool to 4°C	6 months; Hg 28 days
	Sulfate	4	1	250 ml Plastic bottle	Cool to 4°C	14 days to analysis

TAL = Target Analyte List

a = includes QA/QC samples

b = both total and dissolved samples will be collected

Table 4
Sample Collection Frequencies
Site 21 Pre-FS Groundwater Sampling
IHDIV-NSWC
Indian Head, Maryland

Media	Analysis	Environmental Samples	Field Duplicates	Equipment Rinsate Blanks	Field Blanks	Total Number of Samples	MS/MSDs
Site 21							
Groundwater	TAL Inorganics (Total)	4	1	1	1	7	1
	TAL Inorganics (Dissolved)	4	1	1	1	7	1
	Sulfate	4				4	

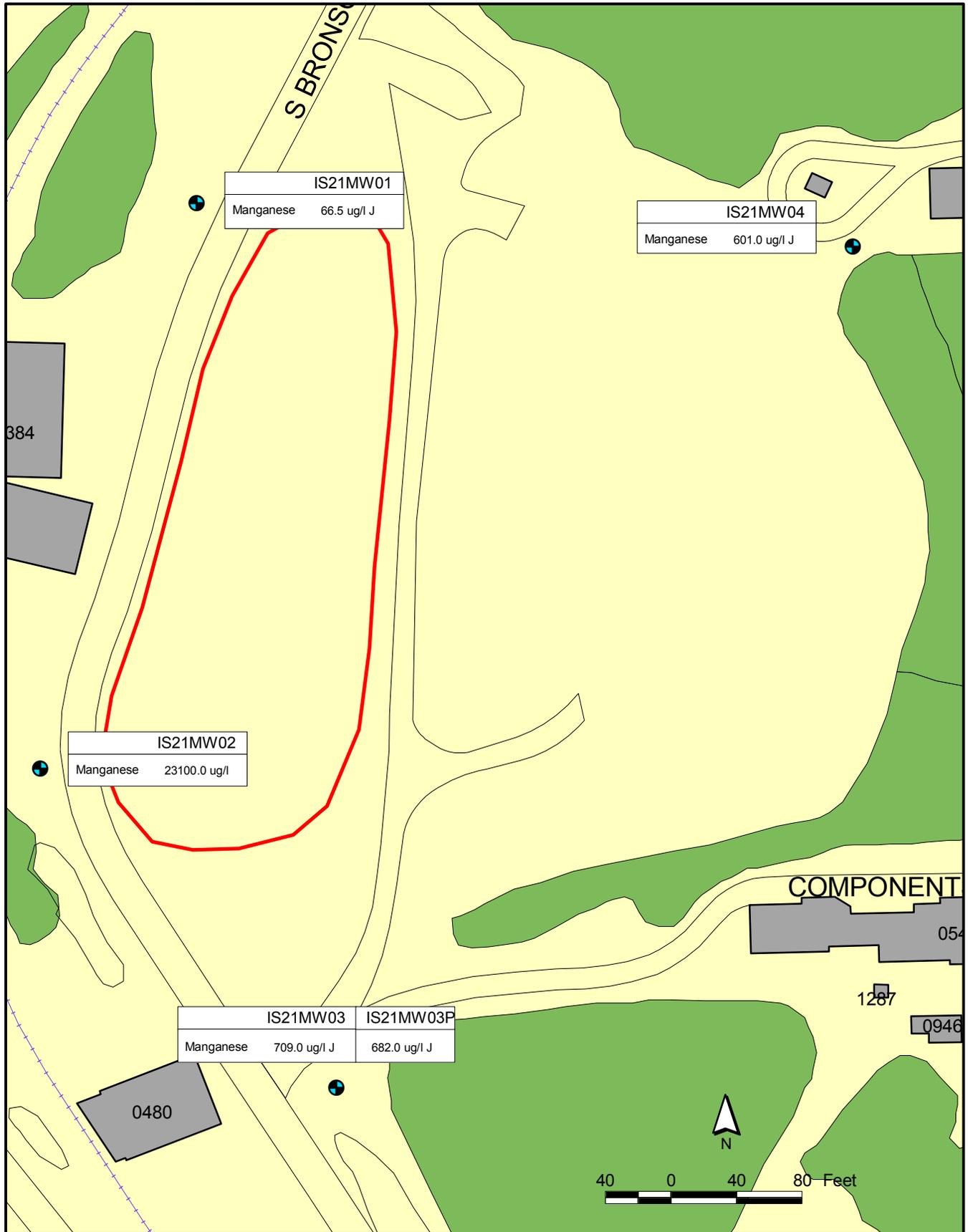
TAL = Target Analyte List

Field duplicates are collected at the rate of 1 for every 10 environmental samples

Equipment rinsate blanks are collected at the rate of 1 per day per media

One field blank will be collected weekly during the sampling

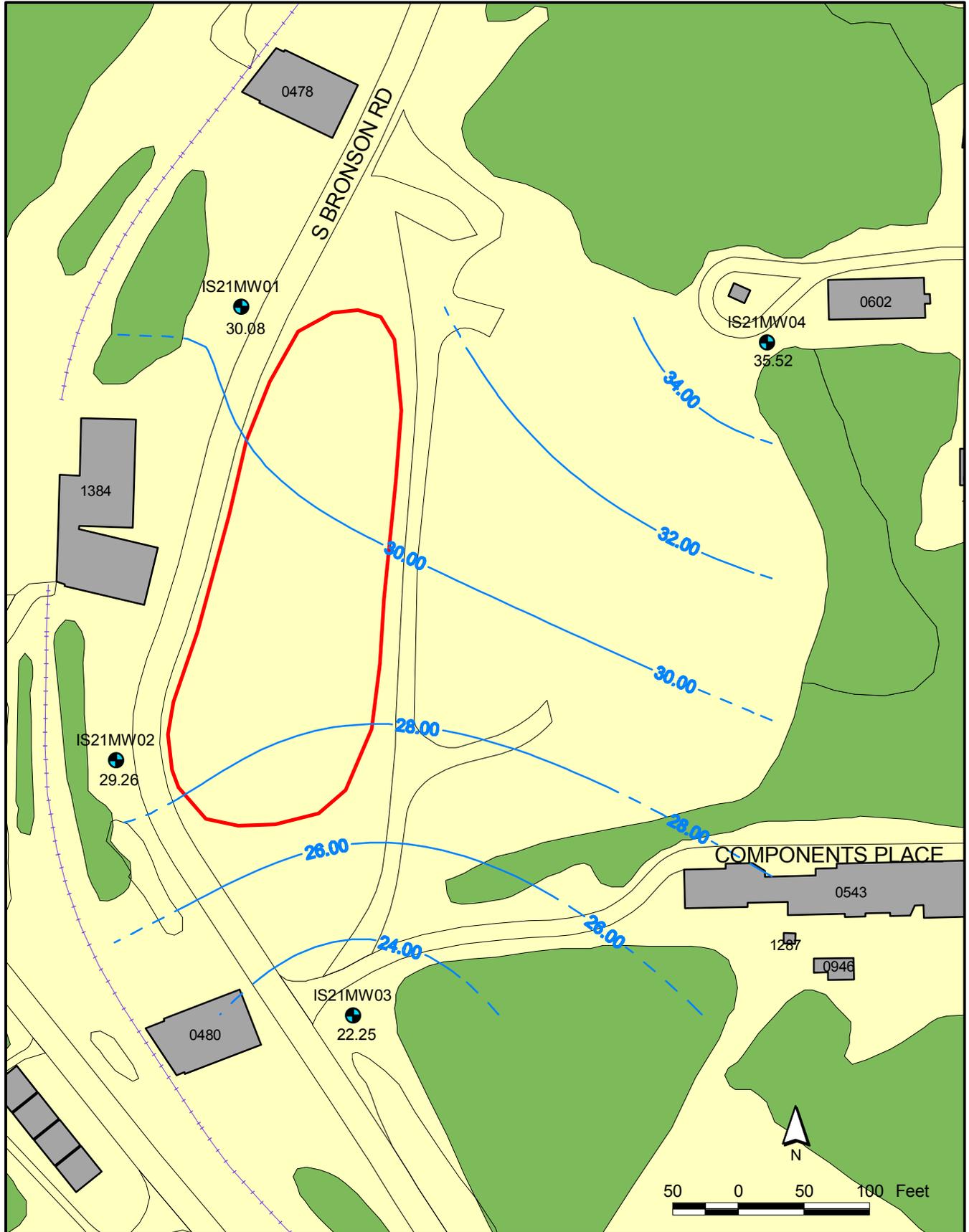
MS/MSDs are collected at the rate of 1 for every 20 samples, including quality-control samples



LEGEND

- Monitoring Wells
- IR Sites
- Buildings
- Railroads
- Road
- Wooded Area
- ND = Non Detect
- J = Estimated Value Below the Detection Limit
- ug/l = Micrograms per liter

Figure 1
 Site 21 - Manganese in Groundwater
 Site 21 Pre-FS Sampling
 IHDIV-NSWC, Indian Head, Maryland



LEGEND

- Monitoring Wells
 - Interpolated Groundwater Contour
 - Inferred Groundwater Contour
 - IR Sites
 - Buildings
 - Railroads
 - Road
 - Wooded Area
- 22.25 = Feet above msl

Figure 2
Site 21
Groundwater Contour Map
Site 21 Pre-FS Sampling
IHDIV-NSWC, Indian Head, Maryland
CH2MHILL