TECHNICAL MEMORANDUM CH2MHILL

Investigation of Groundwater Flow at Site 13, Indian Head Division-NSWC, Indian Head, Maryland

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Introduction

This technical memorandum presents the results of additional investigation activities conducted at Installation Restoration (IR) Site 13 at the Indian Head Division – Naval Surface Warfare Center (IHDIV-NSWC). The investigation was undertaken in an effort to reduce the level of uncertainty regarding potential volatile organic compound (VOC) contamination in groundwater at Site 13. The *Draft Final Remedial Investigation Report for Sites 11, 13, 17, 21, and 25* (CH2M HILL, 2002) concluded that the former painting activities at Site 13 likely had minimal impact on the underlying groundwater. The regulatory agencies, however, expressed concern about the level of uncertainty surrounding this determination. During the September 2002 Indian Head Installation Restoration Team (IHIRT) meeting, it was proposed that one monitoring well be installed at the site and sampled for VOCs. The scope was further clarified during an IHIRT conference call and subsequently presented in the final work plan dated November 11, 2002 (CH2M HILL, 2002).

Background

Site 13 encompasses the area adjacent to the Paint Shop (Building 870). In July of 2000, nine surface soil samples and five subsurface soil samples were collected from soil borings installed at Site 13. The subsurface soil samples were collected from either the depth with the highest photoionization detector (PID) reading or, if there were no PID readings above background levels, the maximum boring depth. Sample collection depths ranged from 17 feet below ground surface (bgs) to 30 feet bgs. Groundwater was not encountered in any of the soil borings.

The surface soil samples and subsurface soil samples were analyzed for Target Compound List (TCL) VOCs, TCL semi-volatile organic compounds (SVOCs), and Target Analyte List

(TAL) metals. The results were compared to the United States Environmental Protection Agency (EPA) Region III Soil Screening Levels (SSLs) with a dilution and attenuation factor of 20. In the surface soil samples, four compounds, 1,1,2-trichloroethane, acetophenone, 2,6-dinitrotoluene and arsenic, were detected at concentrations above their corresponding SSLs. One VOC, methylene chloride and two SVOCs, diethylphthalate and pyrene, were detected in the five subsurface soil samples (CH2M HILL, 2002). No organic compounds, however, were detected in subsurface samples above the SSLs. These results suggested that the former painting operations had minimal impact on the surface soil and that little transport of organic compounds from the surface soil to the subsurface soil had occurred.

The RI report further concluded that the potential for former operations at Site 13 to impact the underlying groundwater was minimal. This conclusion was based on the fact that depth to groundwater was greater than 30 feet bgs and 15 to 17 feet of fine-grained material (i.e., low conductivity) were observed in each borehole. It was noted, however, that there was some uncertainty associated with this conclusion.

The IHIRT team initially agreed that the level of uncertainty associated with the site was acceptable given the weight of evidence behind the site conclusions. However, subsequent concerns were raised by EPA and Maryland Department of the Environment (MDE) regarding impacts to groundwater, which led to the investigation presented below.

Field Activities

One monitoring well (IS13MW01) was installed and sampled at Site 13 (Figure 1). The borehole was advanced with a hollow-stem auger (HSA) rig to a depth of 46 feet bgs. Split-spoon samples were collected throughout the boring during drilling. The samples were logged lithologically and screened for VOCs using a PID (Figure 2). Groundwater was encountered during drilling at approximately 37 feet bgs. The monitoring well was installed to a depth of 44 feet bgs and constructed with Schedule 40 polyvinyl chloride (PVC) casing and a 10-foot PVC screen. Soil-boring and well-construction data are provided in Figure 2.

Following installation and development, the well was sampled using low-flow methodology. The sample was submitted to a fixed-based laboratory for analysis of Low-Concentration (LC) VOCs.

Results

The analytical data report was submitted for third-party validation. Table 1 presents the raw data and detected constituents (as shaded cells). One VOC, toluene, was detected in the primary and duplicate samples at a concentration of 0.32 J micrograms per liter (µg/l). EPA's Region III Risk-Based Concentration (RBC) for toluene in tap water (October 9, 2002) is 75 µg/l and the Federal Maximum Contaminant Level (MCL) for toluene (November 2000) is 1,000 µg/l. Neither of these screening criteria for toluene was exceeded in the groundwater sample (Table 2).

Conclusion and Recommendation

The applicable screening criteria were not exceeded during the 2003 sampling event. Based on constituent concentrations in the groundwater, operations at Building 870 have not impacted groundwater and have only minimally impacted soil. The analytical results confirm the recommendation proposed in the *Draft Final Remedial Investigation Report for Sites 11, 13, 17, 21, and 25*, for no further action (NFA) for Site 13. This technical memorandum will be included in the final RI report as an appendix and CH2M HILL will proceed with the generation of a NFA Proposed Remedial Action Plan (PRAP), as outlined in the following consensus agreement drafted during the February 2003 IHIRT meeting:

> **CONSENSUS: Site 13, 2/12/03** The team agrees to proceed with a NFA PRAP at Site 13 pending the receipt of validated data consistent with unvalidated data presented at the 2/12/03 IHIRT meeting. The technical memorandum with sampling results will be incorporated as an appendix in Final RI.

References

CH2M HILL. August 2002. *Draft Final Remedial Investigation Report, Sites 11, 13, 17, 21, and 25, Indian Head Division–NSWC*, Indian Head, Maryland.

CH2M HILL. November 2002. *Final Work Plan,, Site 13, Indian Head Division–NSWC*, Indian Head, Maryland.

Table 1
Raw Data and Detected Constituents for Monitoring Well Groundwater Sample
Investigation of Groundwater at Site 13
CTO 122, NSWC
Indian Head, Maryland

Station ID	IS13MW01			
Sample ID	IS13MW010103		IS13MW010103P	
Sample Date	01/22/03		01/22/03	
Chemical Name				
Volatile Organic Compounds (UG/L)				
1,1,1-Trichloroethane	0.5	U	0.5	U
1,1,2,2-Tetrachloroethane	0.5	U	0.5	U
1,1,2-Trichloro-1,2,2-trifluoroethane(Freon-113)	0.5	U	0.5	U
1,1,2-Trichloroethane	0.5	U	0.5	U
1,1-Dichloroethane	0.5	U	0.5	U
1,1-Dichloroethene	0.5	U	0.5	U
1,2,3-Trichlorobenzene	0.5	U	0.5	U
1,2,4-Trichlorobenzene	0.5	U	0.5	U
1,2-Dibromo-3-chloropropane	1	R	1	R
1,2-Dibromoethane	0.5	U	0.5	U
1,2-Dichlorobenzene	0.5	U	0.5	U
1,2-Dichloroethane	0.5	U	0.5	U
1,2-Dichloropropane	0.5	U	0.5	U
1,3-Dichlorobenzene	0.5	U	0.5	U
1,4-Dichlorobenzene	0.5	U	0.5	U
2-Butanone	5	R	5	R
2-Hexanone	5	U	5	U
4-Methyl-2-pentanone	5	U	5	U
Acetone	2.8	B	2.9	B
Benzene	0.5	U	0.5	U
Bromochloromethane	0.5	U	0.5	U
Bromodichloromethane	0.5	U	0.5	U
Bromoform	0.5	U	0.5	U
Bromomethane	0.5	U	0.5	U
Carbon disulfide	0.5	U	0.5	B
Carbon tetrachloride	0.5	U	0.5	U
Chlorobenzene	0.5	U	0.5	U
Chloroethane	0.5	U	0.5	U
Chloroform	0.5	U	0.5	U
Chloromethane	0.5	U	0.5	U
Cumene	0.5	U	0.5	U

NA - Not analyzed
B - Analyte not detected above associated blank
J - Reported value is estimated
R - Unreliable result

Table 1
Raw Data and Detected Constituents for Monitoring Well Groundwater Sample
Investigation of Groundwater at Site 13
CTO 122, NSWC
Indian Head, Maryland

Station ID	IS13MW01			
Sample ID	IS13MW010103		IS13MW010103P	
Sample Date	01/22/03		01/22/03	
Chemical Name				
Cyclohexane	0.5	U	0.5	U
Dibromochloromethane	0.5	U	0.5	U
Dichlorodifluoromethane(Freon-12)	0.5	U	0.5	U
Ethylbenzene	0.5	U	0.5	U
Methyl acetate	0.5	U	0.5	U
Methyl-tert-butyl ether (MTBE)	0.5	U	0.5	U
Methylcyclohexane	0.5	U	0.5	U
Methylene chloride	1.2	B	1.4	B
Styrene	0.5	U	0.5	U
Tetrachloroethene	0.5	U	0.5	U
Toluene	0.32	J	0.32	J
Trichloroethene	0.5	U	0.5	U
Trichlorofluoromethane(Freon-11)	0.5	U	0.5	U
Vinyl chloride	0.5	U	0.5	U
Xylene, total	0.5	U	0.5	U
cis-1,2-Dichloroethene	0.5	U	0.5	U
cis-1,3-Dichloropropene	0.5	U	0.5	U
trans-1,2-Dichloroethene	0.5	U	0.5	U
trans-1,3-Dichloropropene	0.5	U	0.5	U

Notes:
Shaded cell indicatesconstituent is detected in the sample.
Sample IS13MW010103 is the primary (or parent) sample.
Sample IS13MW010103P is the duplicate sample.

NA - Not analyzed
B - Analyte not detected above associated blank
J - Reported value is estimated
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Table 2
Comparison of Detected Constituent to Screening Criteria for Monitoring Well Groundwater Sample Data
Investigation of Groundwater at Site 13
CTO 122, NSWC
Indian Head, Maryland

Station ID	**MCL**	**Tap Water Adjusted RBC ***	IS13MW01	
Sample ID			IS13MW010103	IS13MW010103P
Sample Date			01/22/03	01/22/03
Chemical Name				
Volatile Organic Compounds (UG/L)				
Toluene	1,000	75	0.32 J	0.32 J

Note:
*Tapwater RBC for toluene, a non-caricogenic constituent, was adjusted by dividing the RBC by 10 resulting in a hazard quotient of 0.1 to account for multiple constituents.

NA - Not analyzed
B - Analyte not detected above associated blank
J - Reported value is estimated
R - Unreliable result
U - Analyte not detected

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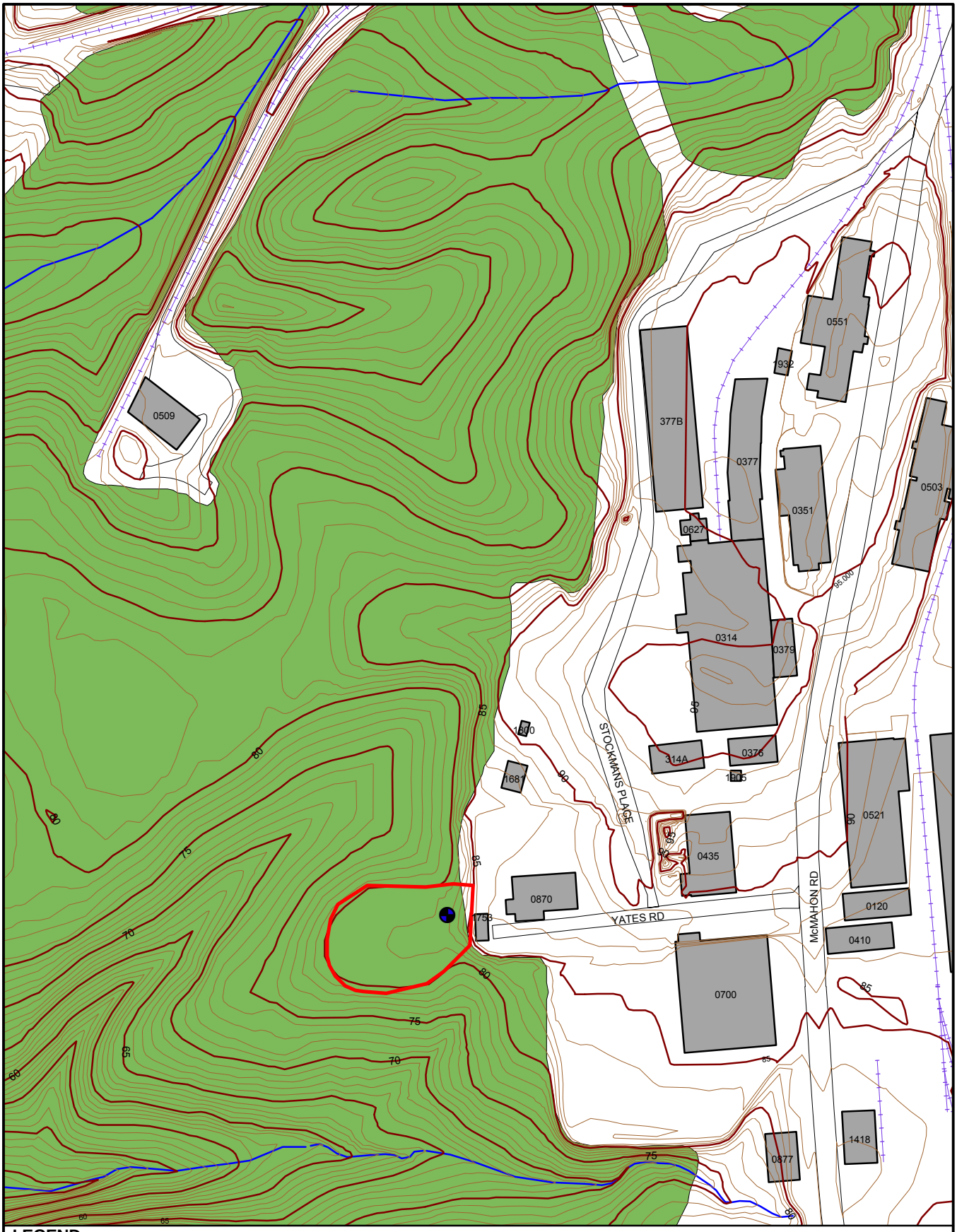

Figure 1
Monitoring Well Location
Site 13
IHDIV-NSWC
Indian Head, Maryland

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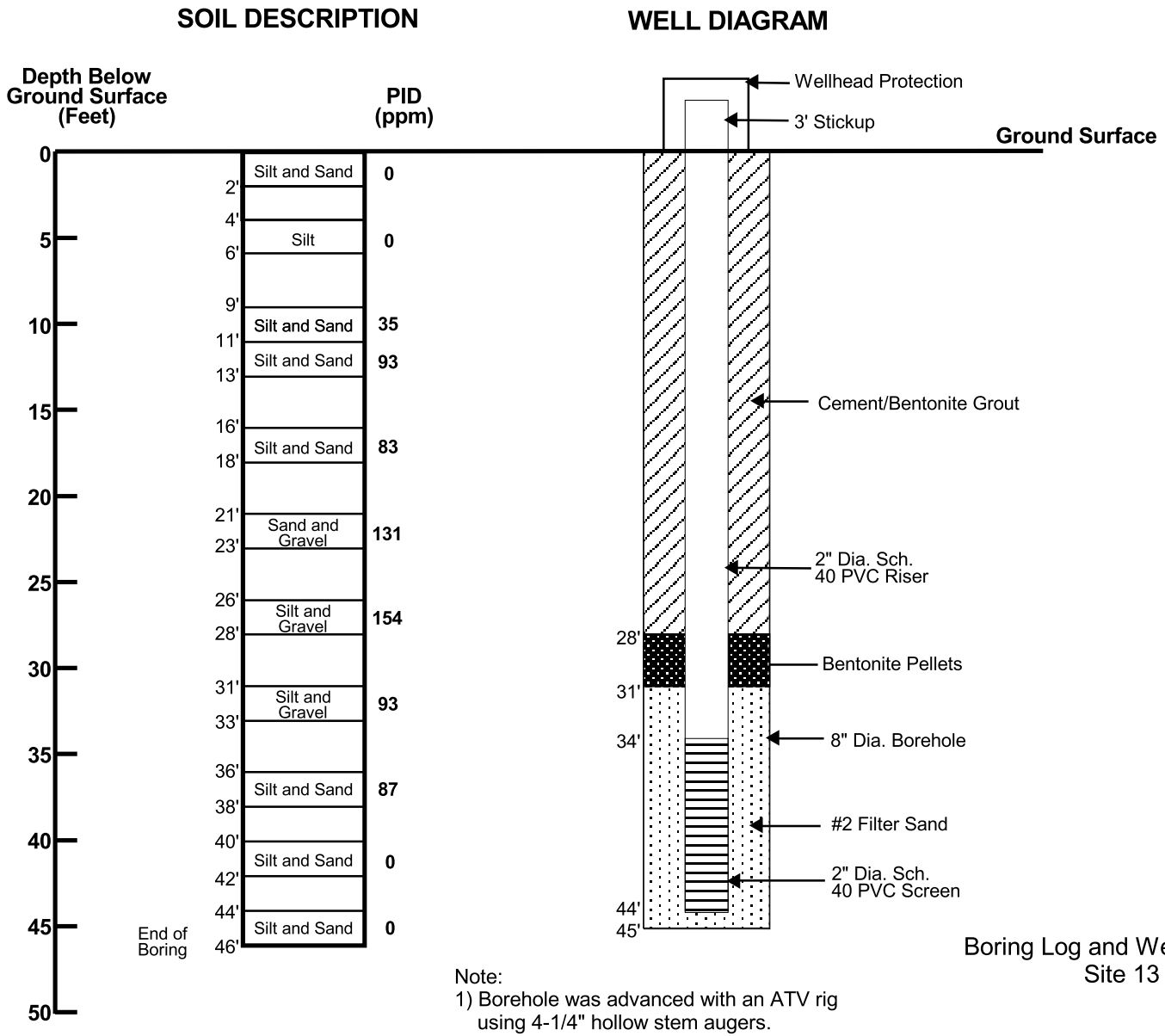

Note:
1) Borehole was advanced with an ATV rig using 4-1/4" hollow stem augers.
2) Water was encountered at 37.4 feet bgs.

Figure 2
Boring Log and Well Construction Diagram
Site 13 Technical Memorandum
IHDIV-NSWC
Indian Head, Maryland

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