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NSWC INDIAN HEAD
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TECHNICAL MEMORANDUM REGARDING PHASE 1A SUPPLEMENTAL INVESTIGATION
WORK PLAN AND TOLUENE DISPOSAL AT SITE 43 NSWC INDIAN HEAD MD
10/23/2008
TETRA TECH NUS



TECHNICAL MEMORANDUM

Date: September 23, 2008

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Subject: Site 43 Phase 1A Supplemental SSP investigation Work Plan
Site 43 – Toluene Disposal
NSF-IH, Indian Head, Maryland

1.0 INTRODUCTION

The need for additional field investigation has been identified to refine the characterization of groundwater contamination at Site 43, Toluene Disposal Area at the Naval Support Facility, Indian Head (NSF-IH) located in Indian Head, Maryland. The Site Screening Process (SSP) Investigation was completed in 2005, and the Phase I Supplemental SSP investigation was completed in 2007. However, additional investigation is believed to be needed to identify the extent of volatile organic contamination in groundwater. The proposed investigation described herein includes use of a Membrane Interface Probe (MIP) to estimate the extent of groundwater contamination and optimize the locations of permanent monitoring wells to be installed as part of the Phase 2 Supplemental SSP investigation.

Site 43 consists of two areas near Buildings 1040 and 1041. The area near Building 1040 was investigated because spent acetone from parts cleaning was reportedly disposed in a drainage ditch between the building and Schuyler Road. During the 2005 investigation, one soil boring (S43SB001) was advanced to a depth of 8 feet, and another soil boring was advanced to a depth of 20 feet (S43SB002) and converted into a shallow groundwater monitoring well (S43MW001). The depth to groundwater was approximately 9 feet. Surface and subsurface soil samples were collected from each boring, and a groundwater sample was collected from the monitoring well. All samples were analyzed for Target Compound List (TCL) volatile organic compounds (VOCs), explosives, Target Analyte List (TAL) metals, and cyanide. Based on a conservative risk screening evaluation, there are no unacceptable risks to human health or the environment from chemicals detected in soil. However, trichloroethene (TCE)

[54,000 micrograms per liter ($\mu\text{g/L}$)] and cis-1,2-dichloroethene (530 $\mu\text{g/L}$) were detected in shallow groundwater. Based on these results, the shallow groundwater is contaminated and poses potential risks to human health under a residential use scenario; however, the source area was not found. Therefore, additional investigation was warranted to determine the source and extent of shallow groundwater contamination detected near Building 1040.

During a Membrane Interface Probe (MIP) investigation completed at Site 43 in November 2007, the most contaminated portion of the aquifer was identified at S43MIP01, with contamination extending west to S43MIP05. These were the only MIP locations with positive electron capture detector (ECD) readings. At S43MIP05, the ECD readings were lower than those at S43MIP01. The ECD log indicated contamination from approximately 19 feet below ground surface (bgs) to 27 feet bgs. The ECD log indicated a confining layer beginning at approximately 25 feet bgs. Table 1 provides a summary of positive detections of VOCs in groundwater near Building 1040 and a comparison to Maximum Contaminant Levels (MCLs) or Risk-Based Concentrations (RBCs) (for chemicals without an MCL) from the 2005 and 2007 investigations at Building 1040.

Groundwater sampling collected from S43MW001 (near S43MIP01) confirmed the MIP results. The concentration of TCE in the sample was 36,000 $\mu\text{g/L}$. A temporary well was not installed at S43MIP05. The concentration of TCE in the sample collected at S43TW001, located north of S43MIP05 and northwest of S43MIP01 and S43MW001, was 3.2 $\mu\text{g/L}$. This is less than the MCL of 5 $\mu\text{g/L}$.

Building 1041 is located approximately 700 feet southwest of Building 1040. The area near this building was investigated because toluene was reportedly disposed in a drainage ditch near a utility pole located across Gallery Road from the building. During the 2005 investigation, three soil borings (S43SB003 through S43SB005) were advanced to a depth of 8 feet, and another soil boring (S43SB006) was advanced to a depth of 20 feet and converted into a shallow groundwater monitoring well (S43MW002). Surface and subsurface soil samples were collected from each boring, and a groundwater sample was collected from the monitoring well. All samples were analyzed for VOCs, explosives, metals, and cyanide. TCE (1.3 $\mu\text{g/L}$) was detected in shallow groundwater; however, it is not known if this detection is related to the groundwater plume associated with Building 1040. Based on a conservative risk screening evaluation, there are no unacceptable risks to human health or the environment from chemicals detected in soil and shallow groundwater under a residential use scenario. Therefore, no additional investigation is proposed near Building 1041 except to verify the 2005 investigation results as part of the Phase 2 Supplemental SSP investigation.

2.0 DPT/MIP INVESTIGATION RATIONALE

During the July 2008 IHIRT meeting, an overview of this work plan was presented. The plan was discussed further during a teleconference in August 2008. The scheduled work includes the placement of direct push technology (DPT)/MIP borings to delineate the extent of groundwater contamination.

The DPT/MIP locations are proposed at the following locations (Figure 1):

- Four (4) initial DPT/MIP locations will be placed in the vicinity of 43MW001 and 43MW002. The proposed locations will be verified in the field based on the presence of utilities, parking areas, and grade suitable for setup of the DPT rig. The field geologist will work with the Navy and Tt Project Managers to place the MIP locations as close as practicable to the intended locations.
- Additional DPT/MIP locations will then be placed in an outward direction from the initial locations dependent upon the results of the groundwater quality encountered. The potential follow-up DPT/MIP boring locations have been identified in the case that elevated VOC concentrations are identified at one or more of the perimeter locations. The determination of which follow-up locations are utilized will be made during the investigation based on the real-time results generated; additionally, further step-outs may be required in some areas. The field geologist will relay the field results to the Project Manager as received to determine the appropriate locations for follow-up borings.
- All of the locations will be used to determine the depth/strata of the maximum contaminated areas and to verify the top of the upper confining layer identified during the Phase I Supplemental SSP investigation. The borings will be advanced to a depth of approximately 25 feet to confirm that the contamination has not penetrated this stratum.

The site characterization effort will utilize a DPT drill rig. The MIP probe is mounted on a standard direct-push rod, and a carrier gas line runs from the probe to the detector through the inside of the tooling. The device allows the user to detect VOCs as the MIP is driven to depth. VOCs are drawn through the system's semi-permeable membrane and transported via a clean carrier gas to a detector at the surface where VOCs are measured. There are a variety of detectors that could be used. An ECD is recommended for chlorinated compounds such as TCE. A photoionization detector (PID) is generally used for aromatic hydrocarbons (e.g., benzene, toluene, ethylbenzene, and xylene). A flame ionization detector (FID) is best suited for straight-chain hydrocarbons such as methane, but can be used for chlorinated compounds. These detectors cannot identify individual compounds. They can, however, provide semi-quantitative results (low, medium, and high concentrations based on the relative response of the detector) for total VOCs appropriate to the specific detector. They are also useful for identification

of potential dense nonaqueous phase liquid (based on high VOC concentrations). The specific detector(s) to be used will be based on vendor and drilling subcontractor recommendations.

The MIP also incorporates a lithologic sensor to evaluate the subsurface characteristics of the area and the presence of any confining unit or aquitard.

Measurements of total VOCs will be obtained between the water table and the confining unit to obtain a vertical profile of groundwater contamination at each location. It is envisioned that this will allow a three-dimensional characterization of the contaminant plume. The data collected with the MIP can also be used to identify conventional sampling points (soil borings and monitoring wells) during subsequent (e.g. Phase 2) site work.

3.0 FIELD INVESTIGATION

It is intended that the field investigation will conform to the procedures described in the Master Field Sampling Plan (FSP) (TtNUS, 2004a) and the Facility Standard Operating Procedures (SOPs) (TtNUS, 2004b).

3.1 Mobilization/Demobilization

Mobilization and demobilization operations will be performed as described in Section 2.1.1 of the Master FSP.

3.2 Utility Clearance

A subcontractor will be procured to perform utility clearance at the proposed DPT/MIP investigation locations.

3.3 DPT/MIP Investigation

The DPT/MIP tasks will be conducted in conformance with equipment vendor and drilling subcontractor SOPs and Section 2.2.3 of the Master FSP.

3.4 Site Restoration

If required as a result of the soil boring, DPT/MIP, and sampling activities, site restoration will be performed in accordance with Section 2.1.2 of the Master FSP.

3.5 Decontamination

Decontamination procedures will be conducted in accordance with Section 2.11 of the Master FSP and facility SOP SA-7.1.

3.6 Investigation-Derived Waste Handling

The investigation-derived waste (IDW) that will be produced during this investigation includes borehole cuttings, decontamination fluids, personal protective equipment, and miscellaneous trash. The handling and disposal of IDW will be conducted in accordance with Section 2.12 of the Master FSP.

3.7 Surveying

TtNUS personnel will determine horizontal locations of DPT/MIP locations using a global positioning system survey in accordance with Master FSP Section 2.10.

ENCLOSURES

Figure 1	DPT/MIP Investigation
Table 1	Summary of Positive Detections

REFERENCES

TtNUS (Tetra Tech NUS, Inc.), 2004a. Master Field Sampling Plan for Installation Restoration Program Environmental Investigations at Naval District Washington, Indian Head, Indian Head, Maryland. Prepared for Engineering Field Activity Chesapeake, Naval Facilities Engineering Command, Washington Navy Yard, D.C. King of Prussia, Pennsylvania.

TtNUS, 2004b. Facility Standard Operating Procedures for Installation Restoration Program Environmental Investigations at Naval District Washington, Indian Head, Indian Head, Maryland. Prepared for Engineering Field Activity Chesapeake, Naval Facilities Engineering Command, Washington Navy Yard, D.C. King of Prussia, Pennsylvania.

TtNUS, 2004c. Master Quality Assurance Project Plan for Installation Restoration Program Environmental Investigations at Naval District Washington, Indian Head, Indian Head, Maryland. Prepared for Engineering Field Activity Chesapeake, Naval Facilities Engineering Command, Washington Navy Yard, D.C. King of Prussia, Pennsylvania.

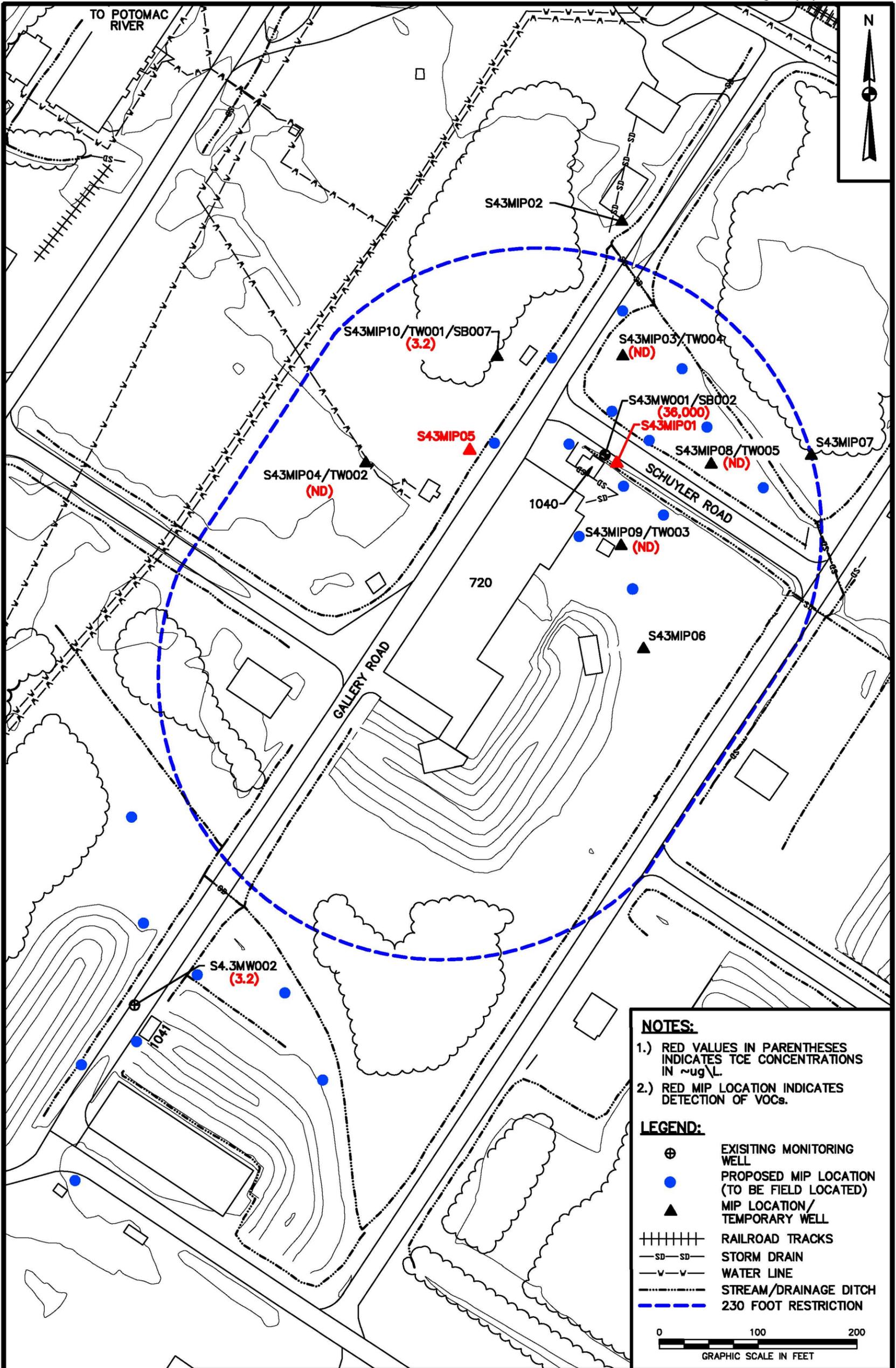
TABLE 1

SUMMARY OF POSITIVE DETECTIONS - VOLATILE ORGANICS IN GROUNDWATER
 BUILDING 1040 AREA
 SITE 43 - TOLUENE DISPOSAL
 NSF-IH, INDIAN HEAD, MARYLAND

Parameter	MCL	RBC	S43MW001 2005	S43MW001-D 2005	S43MW001 2007	S43MW001-D 2007	S43TW001 2007	S43TW002 2007	S43TW003 2007	S43TW004 2007	S43TW005 2007
Volatile Organics (µg/L)											
2-Butanone	NA	7,000	5000 U	5000 U	8000 U	8000 U	5 U	5 U	4.2 J	5 U	5 U
Acetone	NA	5,500	5000 U	5000 U	8000 U	8000 U	5 U	5 U	17	5 U	5 U
Bromoform	80	8.5	500 U	500 U	800 U	960	0.5 U				
cis-1,2-Dichloroethene	70	61	580	480 J	800 U	800 U	0.36 J	0.5 U	0.5 U	0.5 U	0.5 U
Trichloroethene	5	0.026	53000 J	55,000 J	36,000	36,000	3.2	0.5 U	0.5 U	0.5 U	0.5 U

Shaded cell indicates exceedance of MCL.

µg/L	Micrograms per liter.
D	Field duplicate sample.
J	Estimated.
MCL	Maximum Contaminant Level.
MW	Monitoring well.
NA	Not available.
RBC	Region 3 risk-based concentration for tap water.
TW	Temporary well.
U	Not detected above concentration noted.



NOTES:

- 1.) RED VALUES IN PARENTHESES INDICATES TCE CONCENTRATIONS IN $\mu\text{g/L}$.
- 2.) RED MIP LOCATION INDICATES DETECTION OF VOCs.

LEGEND:

- ⊕ EXISTING MONITORING WELL
- PROPOSED MIP LOCATION (TO BE FIELD LOCATED)
- ▲ MIP LOCATION/TEMPORARY WELL
- ++++ RAILROAD TRACKS
- SD-SD- STORM DRAIN
- W-W- WATER LINE
- - - - - STREAM/DRAINAGE DITCH
- 230 FOOT RESTRICTION

0 100 200
GRAPHIC SCALE IN FEET

DRAWN BY	DATE
MF	3/18/08
CHECKED BY	DATE
REVISIED BY	DATE
SCALE AS NOTED	



PHASE 1 SUPPLEMENTAL SSP
SAMPLE LOCATIONS
SITE 43 - TOLUENE DISPOSAL
NAVAL SUPPORT FACILITY, INDIAN HEAD
INDIAN HEAD, MARYLAND

CONTRACT NO. 0771	
OWNER NO.	
APPROVED BY	DATE
DRAWING NO. FIGURE 1	REV. 0