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LETTER SUMMARIZING FINAL RESULTS OF GROUNDWATER CONTAMINATION
INVESTIGATION AT WELL 16MW11 NWS EARLE NJ
3/15/2003
TETRA TECH



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Project Number 2856

Mr. Brian Helland, Code 1812
Senior Environmental Engineer
Northern Division
Naval Facilities Engineering Command
10 Industrial Highway Mail Stop 82
Lester Pennsylvania 19113

Reference: Contract No. N62467-94-D-0888 (CLEAN)
Contract Task Order No. 0808

Subject: Extent of Groundwater Contamination at Well 16MW11 Final Letter Report
Naval Weapons Station Earle
Colts Neck, New Jersey

Dear Mr. Helland:

This letter summarizes the final results of the groundwater contamination investigation at well 16MW11. The investigation was performed to delineate the extent of benzene and methyl tertiary-butyl ether (MTBE) in groundwater in the general vicinity of monitoring well 16MW11. This well is located approximately 600 feet north of the NJDEP-approved classification exception area (CEA) boundary for a long-term groundwater remedial action (RA) currently being performed by the Navy due to past fuel-related spills at Buildings C-16/17/20/50. Well 16MW11 is a designated downgradient sentry well for the CEA long-term groundwater monitoring program. Benzene and MTBE have been encountered in area groundwater at concentrations above New Jersey Department of Environmental Protection (NJDEP) Groundwater Quality Standards (GQS).

Field procedures followed Tetra Tech NUS standard operating procedures (SOPs) as presented in the work plan. Tetra Tech NUS personnel performed all sample collection, handling, and management, and oversight of well drilling/installation throughout this investigation. Groundwater and Environmental Services, Incorporated (GES), of Wall, New Jersey provided well drilling, well installation and well abandonment services.

As a result of previous investigations (see the preliminary Extent of Groundwater Contamination Letter Report Dated July 26, 2002) two permanent monitoring wells (16MW24 and 16MW25) were installed on August 19, 2002 to define the downgradient compliance limit. On the same day GES performed abandonment of all former temporary micro wells, except the three wells 16MW-2-15, 16MW-2-16, and 16MW-2-17 that were converted into permanent monitoring wells 16MW15, 16MW16, and 16MW17. The two new monitoring wells and three converted micro wells have been included in quarterly monitoring and have been sampled three times; August 2002, November 2002, and February 2003. In addition, two surface water samples have been collected from the marshy area approximately 500 feet north of 16MW11 during each quarterly sampling round since August 2002. Sample summary tables and a sample location map (Figure 1) are attached to this letter.

Monitoring Well Installation

The two new monitoring wells were installed using the Hollow Stem Auger (HSA) methods. Well 16MW24 is located near the intersection of the unnamed stream with Saipan Road, downgradient of the wetland marsh area north of 16MW15. Monitoring well 16MW25 is located further north of well 16MW24 along Saipan Road between the area of contamination and the Family Housing and Child Care facilities (see Figure 1). After advancing a 4.25-inch inside diameter (ID) hollow stem auger to the desired depth, a 2-inch ID polyvinyl chloride (PVC) screen and riser were placed in open boreholes to ensure that the wells would monitor water table conditions. Monitoring well construction details, boring logs, well permits and survey coordinates of the new monitoring wells will be included in the Year 5 Groundwater Monitoring Report. The wells were developed with a peristaltic pump immediately following installation. At the same time, nine micro wells were abandoned and three micro wells were converted to permanent monitoring wells (16MW15, 16MW16, and 16MW17). Materials (PVC, tubing, steel casings) pulled from abandoned micro wells were properly disposed by GES and bore holes were abandoned in conformance with NJDEP requirements. On each of the converted micro wells, GES constructed a concrete pad around the well to make a permanent installation. A New Jersey-licensed surveyor surveyed the elevation and the horizontal position of the new permanent monitoring wells. Monitoring well data for the new and converted wells are presented below in Table 1.

Groundwater Sampling

Synoptic rounds of water level measurements were obtained three times (August 2002, November 2002, and February 2003) as a part of quarterly groundwater sampling activities. Depths to groundwater were measured with an electronic water level indicator to the nearest 0.01 foot. The level measurements indicate the prevailing groundwater flow direction generally to the north in agreement with the groundwater flow direction derived previously for the CEA.

**TABLE 1
MONITORING WELL DATA
16MW11 GROUNDWATER INVESTIGATION
NWS EARLE
COLTS NECK, NEW JERSEY**

Well ID	Total Depth (ft bgs)	Screened Interval (ft bgs)	Water level (ft toc)			Groundwater Elevation Aug. 2002 (ft msl)	Groundwater Elevation Nov. 2002 (ft msl)	Groundwater Elevation Feb. 2003 (ft msl)
			Aug. 2002	Nov. 2002	Feb. 2003			
16MW-11	12	7-12	4.87	3.12	3.09	86.94	88.69	88.72
16MW-15	15	10-15	5.88	3.58	3.65	86.09	88.39	88.32
16MW-16	15	10-15	6.00	4.39	4.12	88.34	89.95	90.22
16MW-17	15	10-15	5.86	4.30	4.03	88.08	89.64	89.91
16MW-24	13.5	3-13	5.45	4.03	4.02	84.43	85.85	85.86
16MW-25	13.5	3-13	9.04	6.30	6.20	84.18	86.92	87.02

ft bgs – feet below ground surface
ft toc – feet below top of casing
msl – mean sea level

The wells were sampled using low flow sampling techniques in accordance with the United States Environmental Protection Agency (EPA) Region 2 Groundwater Sampling Procedure Low Stress (low flow) Purging and Sampling (March 16, 1998) and NJDEP guidelines. Low pumping rates (less than 1 liter per minute) were maintained to minimize water drawdown and to ensure that fresh formation water was being drawn through the well screen. An in-line water quality measuring device was used to monitor water quality parameters during well purging: pH, specific conductivity, temperature, oxidation/reduction potential, dissolved oxygen, and turbidity. When these parameters had stabilized, the water quality meter was disconnected and the well sample was obtained by filling the sample containers directly from the pump outflow. The samples were submitted to an NJDEP-certified laboratory for the analysis of BTEX, naphthalene, and MTBE.

The two new proposed downgradient monitoring wells, 16MW24 and 16MW25, have been sampled three times (August 2002, November 2002, and February 2003). Results of analysis show no compounds detected above the GQS. All benzene results were non-detect for both wells. Low concentrations of MTBE (3.2 ug/L and 3.6 ug/L) were found in two sample events in 16MW24 well below the GQS of 70 ug/L. A summary of analytical results, presenting detected compounds in groundwater and comparing the results to NJDEP GQS is presented as Table 2.

Surface Water Sampling

Two surface water samples were collected from the small stream that originates in the marshy area at the intersection of the power line right-of-way and the railroad tracks. The purpose of the surface water samples was to determine if contamination is entering the stream through groundwater discharge to surface water. Surface water samples were collected by filling the sample bottles directly from the water to be sampled. Sample 16SW01 was collected east of the railroad tracks, near the source of the stream, and sample 16SW02 was collected west of the railroad tracks, where the stream forms a pool. The samples were submitted to an NJDEP-certified laboratory and analyzed for BTEX, naphthalene, and MTBE.

A summary of detected compounds for surface water samples is presented in Table 3. MTBE was the only compound of concern detected. The detected concentrations are below the NJDEP GQS for MTBE. MTBE in sample 16SW01 ranged from non-detected to 3 ug/L and in 16SW02 ranged from 3.8 ug/L to 7.7ug/L.

Conclusions

Monitoring wells 16MW24 and 16MW25 appear to define the northern extent of MTBE and benzene in groundwater associated with the plume at 16MW11. These wells therefore could serve as sentinel wells under the existing CEA in place at the Buildings C- C-16/17/20/50 if agreed to by NJDEP.

Recommendation

Based on the analytical results from the monitoring wells and surface water samples, the following actions are recommended:

- Continue monitoring the migration/extent of the plume towards the north because contaminants (benzene and MTBE) have been detected in wells 16MW11 and 16MW15 at concentrations above the NJDEP GQS.
- Monitoring well 16MW11, the two new monitoring wells (16MW24 and 16MW25), and the three converted wells (16MW15, 16MW16, and 16MW17) should remain in the quarterly monitoring program for the site until they are deemed no longer necessary.

- The two surface water sample locations (SW-01, and SW-02) should be incorporated into the quarterly monitoring plan to monitor possible contaminant migration from groundwater to the stream.

If you have any questions or comments, please contact me.

Respectfully,



Russell Turner
Project Manager

RT/nfs

Attachments: Table 2
Table 3
Figure 1

c: Larry Burg (NWS Earle)
Don Whalen (Tetra Tech NUS)
Garth Glenn (Tetra Tech NUS)
File 2856

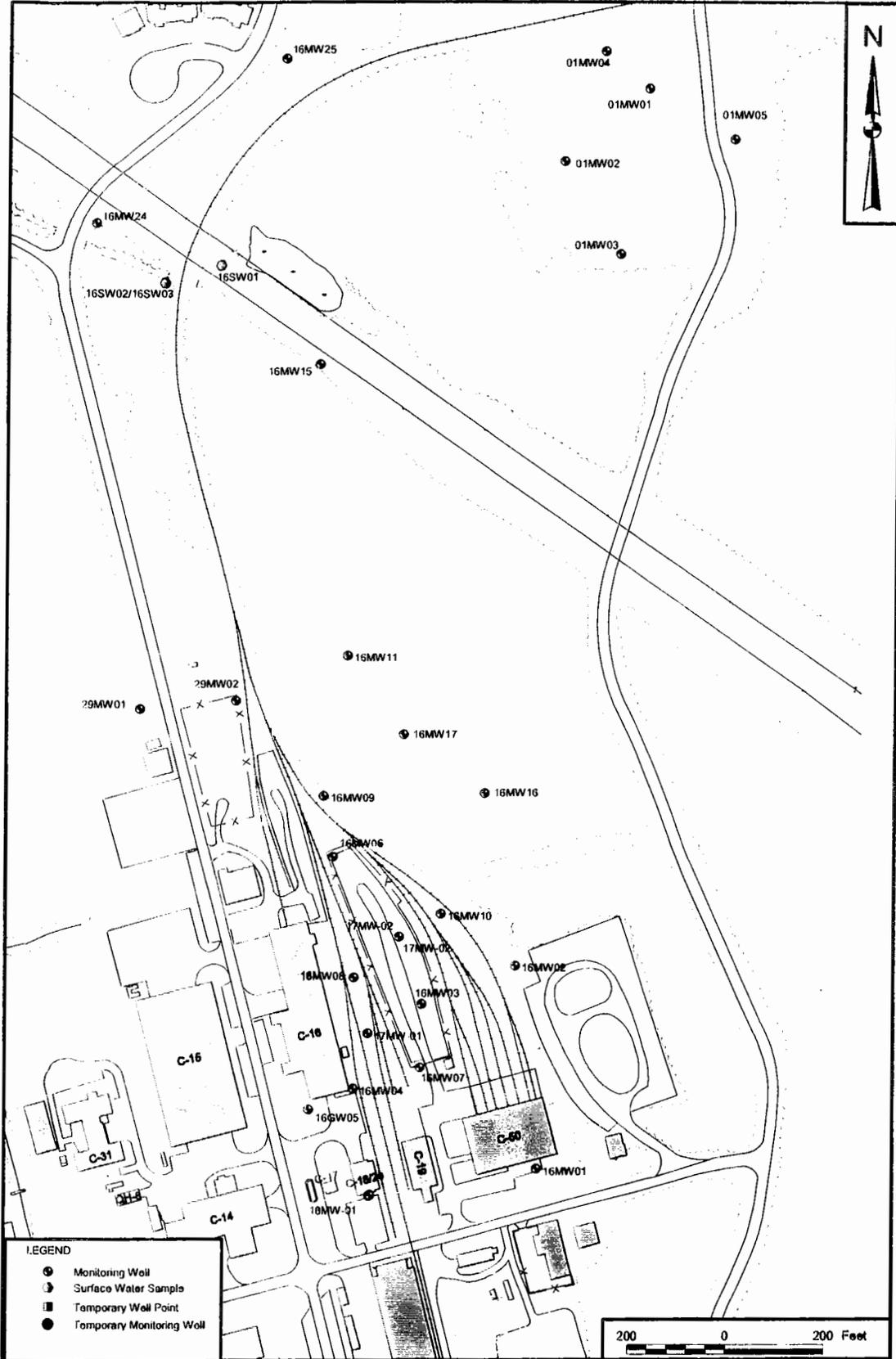
TABLE 2
SUMMARY OF ANALYTICAL RESULTS
GROUNDWATER SAMPLING
GROUNDWATER INVESTIGATION AT WELL 16MW11
NWS EARLE, NJ

Sample ID	Sample Date	Compounds					
		Naphthalene ug/l	Benzene ug/l	Ethylbenzene ug/l	Methyl Tert Butyl Ether ug/l	Toluene ug/l	Xylene (Total) ug/l
NJDEP GQS		300	1	700	70	1,000	1,000
16MW-11	8/28/2002	5.6 U	21.2	2 U	20.5	2 U	6 U
	11/7/2002	1 U	106	1.4 U	75.9	1 U	2 U
	2/4/2003	1.7 J	132	0.7 U	74.5	0.5 U	1 U
16MW-15	2/13/2002	34.8	1110	77.6	85.7	26.8	375
	3/12/2002	31.6	846	73.5	77.2	24.9	373
	8/28/2002	13	289	7.4	16.5	3.3	49.5
	11/7/2002	10.9	271	3.5 U	17.8	4 J	32.8
	2/5/2003	4 J	20.6	0.85 J	1.6 J	0.5 U	5.8 J
16MW-16	2/13/2002	5.5 U	1 U	2 U	2 U	2 U	6 U
	3/13/2002	5 U	1 U	2 U	2 U	2 U	6 U
	8/28/2002	5.6 U	1 U	2 U	2 U	2 U	6 U
	11/6/2002	1 U	0.5 U	0.7 U	0.5 U	0.5 U	1 U
	2/4/2003	1 U	0.5 U	0.7 U	0.5 U	0.5 U	1 U
16MW-17	2/13/2002	5 U	1 U	2 U	2 U	2 U	6 U
	3/13/2002	5 U	1 U	2 U	2 U	2 U	6 U
	8/28/2002	5.2 U	1 U	2 U	2 U	2 U	6 U
	11/6/2002	1 U	0.5 U	0.7 U	0.5 U	0.5 U	1 U
	2/5/2003	1 U	0.5 U	0.7 U	0.5 U	0.5 U	1 U
16MW-24	8/29/2002	5.2 U	1 U	2 U	3.1	2 U	6 U
	11/7/2002	1 U	0.5 U	0.7 U	3.6	0.5 U	1 U
	2/7/2003	1.1 U	0.5 U	0.7 U	1.3 J	0.5 U	1 U
16MW-25	8/29/2002	5.3 U	1 U	2 U	2 U	2 U	6 U
	11/7/2002	1 U	0.5 U	0.7 U	0.5 U	0.5 U	1 U
	2/7/2003	1.1 U	0.5 U	0.7 U	0.5 U	0.5 U	1 U

Notes: J - Estimated value. Bold values indicate NJDEP GQS exceedances.

TABLE 3
SUMMARY OF ANALYTICAL RESULTS
SURFACE WATER SAMPLING
GROUNDWATER INVESTIGATION AT WELL 16MW11
NWS EARLE, NJ

Sample ID	Sample Date	Compounds					
		Naphthalene	Benzene	Ethylbenzene	Methyl Tert Butyl Ether	Toluene	Xylene (Total)
		ug/l	ug/l	ug/l	ug/l	ug/l	ug/l
16SW-01	5/15/2002	5.5 U	1 U	2 U	3	2 U	6 U
	11/7/2002	1.1 U	0.5 U	0.7 U	0.5 U	0.5 U	1 U
	2/10/2003	1.1 U	0.5 U	0.7 U	0.56 J	0.5 U	1 U
16SW-02	5/15/2002	5 U	1 U	2 U	3.8	2 U	6 U
DUP	5/15/2002	5.5 U	1 U	2 U	4.4	2 U	6 U
	11/8/2002	1 U	0.5 U	0.7 U	3.8 J	0.5 U	1 U
DUP	11/8/2002	1 U	0.5 U	0.7 U	5.5 J	0.5 U	1 U
	2/10/2003	1.1 U	0.5 U	0.7 U	7.7	0.5 U	1 U



LEGEND	
●	Monitoring Well
▲	Surface Water Sample
■	Temporary Well Point
●	Temporary Monitoring Well

DRAWN BY K. PERA DATE 7/23/02	Tetra Tech NUS, Inc.	CONTRACT NUMBER 2856-0830	OWNER NUMBER
CHECKED BY DATE	MONITORING WELL LOCATIONS CTO 808 GROUNDWATER INVESTIGATION AT WELL 16MW-11 NWS EARLE COLTS NECK, NEW JERSEY	FILENAME: 2856-FIGURE1.pdf LDL PHL	APPROVED BY DATE 3/14/03
COST/PROJECT/C AREA		DRAWING NO. FIGURE 1	REV
SCALE: AS NOTED			

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