



## DEPARTMENT OF THE ARMY

OFFICE OF ASSISTANT CHIEF OF STAFF FOR INSTALLATION MANAGEMENT  
U.S. ARMY FORT MONMOUTH  
P.O. 148  
OCEANPORT, NEW JERSEY 07757

8 May 2018

Mr. Ashish Joshi  
New Jersey Department of Environmental Protection  
Division of Remediation Management & Response  
Northern Bureau of Field Operations  
7 Ridgedale Avenue (2<sup>nd</sup> Floor)  
Cedar Knolls, NJ 07927-1112

**SUBJECT: Request for Unrestricted Use, No Further Action Approval  
UST 444 Site Investigation Report  
Fort Monmouth, Monmouth County, Oceanport, New Jersey  
PI G000000032**

Dear Mr. Joshi:

The U.S. Army Fort Monmouth (FTMM) Team has prepared this Site Investigation (SI) Report to summarize previous investigations and present the results of additional field sampling at former Underground Storage Tank (UST) 444 in Parcel 79.

### **1.0 OBJECTIVES**

Field screening borings and groundwater sampling was conducted in 2017 and 2018 to address New Jersey Department of Environmental Protection (NJDEP) comments on UST 444 (**Attachment A, Correspondences 3 and 6**). Proposed field investigation activities were documented in the Unregulated Heating Oil Tank (UHOT) Work Plan (WP) (August 2017) which was approved in October 2017 by NJDEP (**Attachment A, Correspondences 1 and 2**).

### **2.0 SITE DESCRIPTION**

UST 444 was a steel 1,000-gallon No. 2 fuel oil UST (without a Registration ID) that was removed in January 2010. In February 2010, an unreported quantity of contaminated soil was removed. The former location of UST 444 is shown on **Figure 1**. Holes were observed in the tank and soil staining and an oily sheen was observed on groundwater during the tank removal; approximately 40 cubic yards of contaminated soil were excavated. Discharge Investigation and Corrective Action Report (DICAR) No. 10-01-27-1916-11 was submitted to NJDEP in 2010.

#### **2.1 Site Land Use**

Parcel 79 is currently an unoccupied open field. Future land use for the UST 444 area as described in the Fort Monmouth Reuse and Redevelopment Plan (EDAW, 2008) is commercial.

#### **2.2 Site Geology and Hydrogeology**

UST 444 is located on the former Main Post (MP) of FTMM. The Hornerstown Formation underlies much of the MP including the UST 444 area and is approximately 25 to 30 feet thick based on other MP soil borings. This formation is distinguished by varying proportions of glauconitic clay, silty clay,

and minor sand. The Tinton Formation underlies the Hornerstown Formation and consists of dense fine sand and trace silt, glauconite, and clay.

During the November 2017 field investigation at UST 444, soil borings encountered primarily brown, coarse to fine sand with some clay and gravel. Deeper soils below approximately 10 feet (ft) typically consisted of black to dark green fine sand. Indications of fill such as wood, coal, concrete and brick were observed in multiple borings (for example, PAR-79-444-SCREEN-4 and PAR-79-444-TMW-02) at varying depths from 1 to 7.5 ft below ground surface (bgs). Soil borings logs are provided in **Attachment B**. The depth to groundwater at UST 444 ranged from approximately 6.5 to 7.5 ft bgs in the soil borings, and 2.5 to 3 ft bgs in monitoring wells (**Table 1**). Groundwater was typically encountered in the brown and deeper black sands and flows northeast towards Parkers Creek (**Figure 2**).

### 3.0 PREVIOUS INVESTIGATIONS

As previously documented for UST 444 (**Attachment A, Correspondence 7**), the tank was removed in January 2010, and post-excavation soil samples were collected along the sidewalls and bottom of the excavation and analyzed for total petroleum hydrocarbons (TPH). Semi-volatile organic compounds (SVOCs) were also analyzed for the east sidewall soil sample. Fingerprint analysis of an oily sheen collected from the groundwater in the tank excavation was consistent with “diesel fuel No. 2.” Additional soil was removed from the east sidewall of the excavation, and final soil samples were collected in February 2010; these results were non-detect (ND) for TPH. NFA approval was requested in 2015 for UST 444. However, NJDEP concluded (letter dated 25 August 2015) that a groundwater investigation was required (**Attachment A, Correspondence 6 and 7**).

In August 2016, the Army performed initial groundwater investigation work in response to NJDEP comments on the 10 February 2016 work plan (**Attachment A, Correspondence 4 and 5**). Temporary well PAR-79-MP-TMW-02 was installed downgradient from the former UST 444, sampled, and subsequently abandoned. As shown on **Table 2 of Attachment B**, one VOC (benzene), three SVOCs (2-methylnaphthalene, benzo[a]anthracene, and benzo[a]pyrene), and the total sum SVOC tentatively identified compounds (TICs) exceeded the respective NJDEP Ground Water Quality Criteria (GWQC). The slight exceedance from benzo[a]anthracene (0.27 µg/L) and benzo[a]pyrene (0.14 µg/L) compared to the NJDEP GWQC (0.1 µg/L) in the temporary well sample was not attributable to fuel oil contamination.

Based on the August 2016 results, further investigation was requested by NJDEP (**Attachment A, Correspondence 3**). The Army conducted additional soil and groundwater investigations in 2017 and 2018 to confirm and delineate groundwater contamination as described below.

### 4.0 2017 AND 2018 SITE INVESTIGATION RESULTS

NJDEP approved the installation of six borings, three temporary wells, and three permanent wells surrounding the area of former UST 444 (**Attachment A, Correspondence 1**).

In November 2017, six field screening borings (PAR-79-444-Screen 1 through PAR-79-444-Screen 6) were logged visually and with a PID. Contamination was not observed during the boring operations and there were no elevated PID readings noted on the boring logs (**Attachment B**). The field results were used to verify the field locations for subsequent temporary wells in order to assist with delineation of the groundwater plume. No soil samples were collected for laboratory analyses.

Along with the soil borings, three temporary monitor wells (PAR-79-444-TMW-01 through 03) were installed, sampled and abandoned downgradient of former UST 444. Temporary monitor wells (PAR-79-444-TMW-01 and PAR-79-444-TMW-02) were installed approximately 100 ft downgradient of the former tank to verify the direction and lateral boundaries of the plume. The third temporary monitor well (TMW-03) was installed approximately 100 ft farther downgradient to establish the extent of the plume prior to installing a permanent downgradient sentry well. As with the field screening borings, the borings for temporary wells were logged visually and with a PID to estimate the extent of the plume in the field. Contamination was not observed during the temporary monitor well installations and there were no elevated PID readings noted on the boring logs (**Attachment B**).

In December 2017, two permanent monitoring wells were installed (**Figure 2**). One permanent well (PAR-79-444-MW-01) was placed in the vicinity of the former UST and was screened from 3 to 13 ft bgs. The second well (PAR-79-444-MW-02) was placed approximately 100 ft downgradient of the former UST area, and was screened from 5 to 15 ft bgs. The third permanent monitoring well that was planned and approved was not installed due to minimal groundwater contamination encountered, as demonstrated by the non-detect results for VOCs and SVOCs from the three temporary wells (**Table 2**). Contamination was not observed during the permanent monitoring well installations and there were no elevated PID readings noted on the boring logs (**Attachment B**). Field notes are provided in **Attachment C**. The two new permanent wells were sampled in January 2018 and groundwater samples were analyzed for VOCs and SVOCs (**Table 2**) in accordance with the NJDEP requirements for No. 2 fuel oil. Each well was sampled at two different depths in accordance with NJDEP well profiling requirements (7.5 and 12.5 ft bgs for PAR-79-444-MW-01, and 8.5 and 13.5 ft bgs for PAR-79-444-MW-02).

#### **4.1 Groundwater Results**

Groundwater sampling was performed in November 2017 (temporary wells) and January 2018 (permanent wells) at the locations shown on **Figure 2**. Groundwater elevations are also presented on **Figure 2**; however, only posted elevations are shown rather than potentiometric surface contours, because the field team was unable to locate a third existing permanent well (430MW-1) during the January 2018 event.

##### **4.1.1 Exceedances of NJDEP Comparison Criteria**

Benzo(a)anthracene was the only analyte that exceeded the GWQC in any of the temporary and permanent wells sampled during the 2017 and 2018 sampling events, and it exceeded in only one sample from one permanent well (PAR-79-444-MW-01; see **Table 2**). However, there were no analytes indicative of fuel oil contamination that exceeded the GWQC, as described below.

##### **4.1.2 Constituents of Potential Concern (COPCs)**

Benzo(a)anthracene is not typically related to fuel oil contamination and therefore is not considered a COPC in groundwater at UST 444. This and other polynuclear aromatic hydrocarbons (PAHs) have been encountered at other FTMM locations within surficial soils and fill that are unrelated to fuel oil USTs. The slight exceedance of benzo(a)anthracene at PAR-79-444-MW-01 is most likely the result

of entrainment of soil in the groundwater sample resulting from sample turbidity. Fill including coal was noted in multiple soil borings at this site (**Attachment B**).

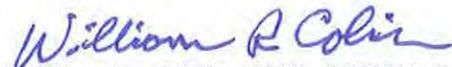
Benzene, 2-methylnaphthalene and Total TICs previously exceeded the NJDEP GWQC at temporary well PAR-79-MP-TMW02 (see **Table 2**), which was installed at the former UST 444 location in 2016. Permanent well PAR-79-444-MW-01 was subsequently installed at this location in 2017. However, there were no exceedances of these analytes at either permanent well PAR-79-444-MW-01 or at the downgradient permanent well PAR-79-444-MW-02. In comparison to temporary well results, the results from permanent wells are much more representative of groundwater conditions because permanent wells are developed and purged prior to low flow groundwater sampling.

## 5.0 SUMMARY AND RECOMMENDATIONS

No COPCs associated with fuel oil were identified in groundwater at former UST 444. Given the results of the groundwater investigation, an Unrestricted Use, NFA determination is requested for UST 444.

Thank you for reviewing this request; we look forward to your approval and/or comments. Our technical Point of Contact is Kent Friesen at (732) 383-7201; [kent.friesen@parsons.com](mailto:kent.friesen@parsons.com). I can be reached at (732) 380-7064; [william.r.colvin18.civ@mail.mil](mailto:william.r.colvin18.civ@mail.mil).

Sincerely,

  
William R. Colvin, PMP, CHMM, PG  
BRAC Environmental Coordinator

cc: Ashish Joshi (e-mail and 2 hard copies)  
William Colvin, BEC (e-mail and 1 hard copy)  
Joseph Pearson, Calibre (e-mail)  
James Moore, USACE (e-mail)  
Jim Kelly, USACE (e-mail)  
Joseph Fallon, FMERA (e-mail)  
Cris Grill, Parsons (e-mail)

### Attachments:

Figure 1 – UST 444 Site Location

Figure 2 – UST 444 Site Layout – Groundwater Elevations – January 15, 2018

Table 1 - Groundwater Gauging Data and Elevations (January 15, 2018)

Table 2 – Ground Water Sampling Results – Comparison to NJDEP Ground Water Quality Criteria

Attachment A - Regulatory Correspondence

Attachment B – Soil Boring Logs and Well Construction Details

Attachment C – Field Notes

**REFERENCES CITED:**

EDAW, Inc., 2008. *Fort Monmouth Reuse and Redevelopment Plan, Final Plan*. Prepared for Fort Monmouth Economic Revitalization Planning Authority. August 22.



New Jersey Department of Environmental Protection

Site Remediation Program

Report Certifications for RCRA GPRA 2020, CERCLA, and Federal Facility Sites

These certifications are to be used for reports submitted for RCRA GPRA 2020, CERCLA, and Federal Facility Sites. The Department has developed guidance for report certifications for RCRA GPRA 2020, CERCLA, and Federal Facility Sites under traditional oversight. The "Person Responsible for Conducting the Remediation Information and Certification" is required to be submitted with each report. For those sites that are required or opt to use a Licensed Site Remediation Professional (LSRP) the report must also be certified by the LSRP using the "Licensed Site Remediation Professional Information and Statement". For additional guidance regarding the requirement for LSRPs at RCRA GPRA 2020, CERCLA and Federal Facility Sites see [http://www.nj.gov/dep/srp/srra/training/matrix/quick\\_ref/rcra\\_cercla\\_fed\\_facility\\_sites.pdf](http://www.nj.gov/dep/srp/srra/training/matrix/quick_ref/rcra_cercla_fed_facility_sites.pdf).

Document:

- "Request for Unrestricted Use, No Further Action Approval, UST 444 Site Investigation Report, Fort Monmouth, Monmouth County, Oceanport, New Jersey" (08 May 2018)

PERSON RESPONSIBLE FOR CONDUCTING THE REMEDIATION INFORMATION AND CERTIFICATION

Full Legal Name of the Person Responsible for Conducting the Remediation: William R. Colvin
Representative First Name: William Representative Last Name: Colvin
Title: Fort Monmouth BRAC Environmental Coordinator (BEC)
Phone Number: (732) 380-7064 Ext: Fax:
Mailing Address: P.O. Box 148
City/Town: Oceanport State: NJ Zip Code: 07757
Email Address: william.r.colvin18.civ@mail.mil

This certification shall be signed by the person responsible for conducting the remediation who is submitting this notification in accordance with Administrative Requirements for the Remediation of Contaminated Sites rule at N.J.A.C. 7:26C-1.5(a).

I certify under penalty of law that I have personally examined and am familiar with the information submitted herein, including all attached documents, and that based on my inquiry of those individuals immediately responsible for obtaining the information, to the best of my knowledge, I believe that the submitted information is true, accurate and complete. I am aware that there are significant civil penalties for knowingly submitting false, inaccurate or incomplete information and that I am committing a crime of the fourth degree if I make a written false statement which I do not believe to be true. I am also aware that if I knowingly direct or authorize the violation of any statute, I am personally liable for the penalties.

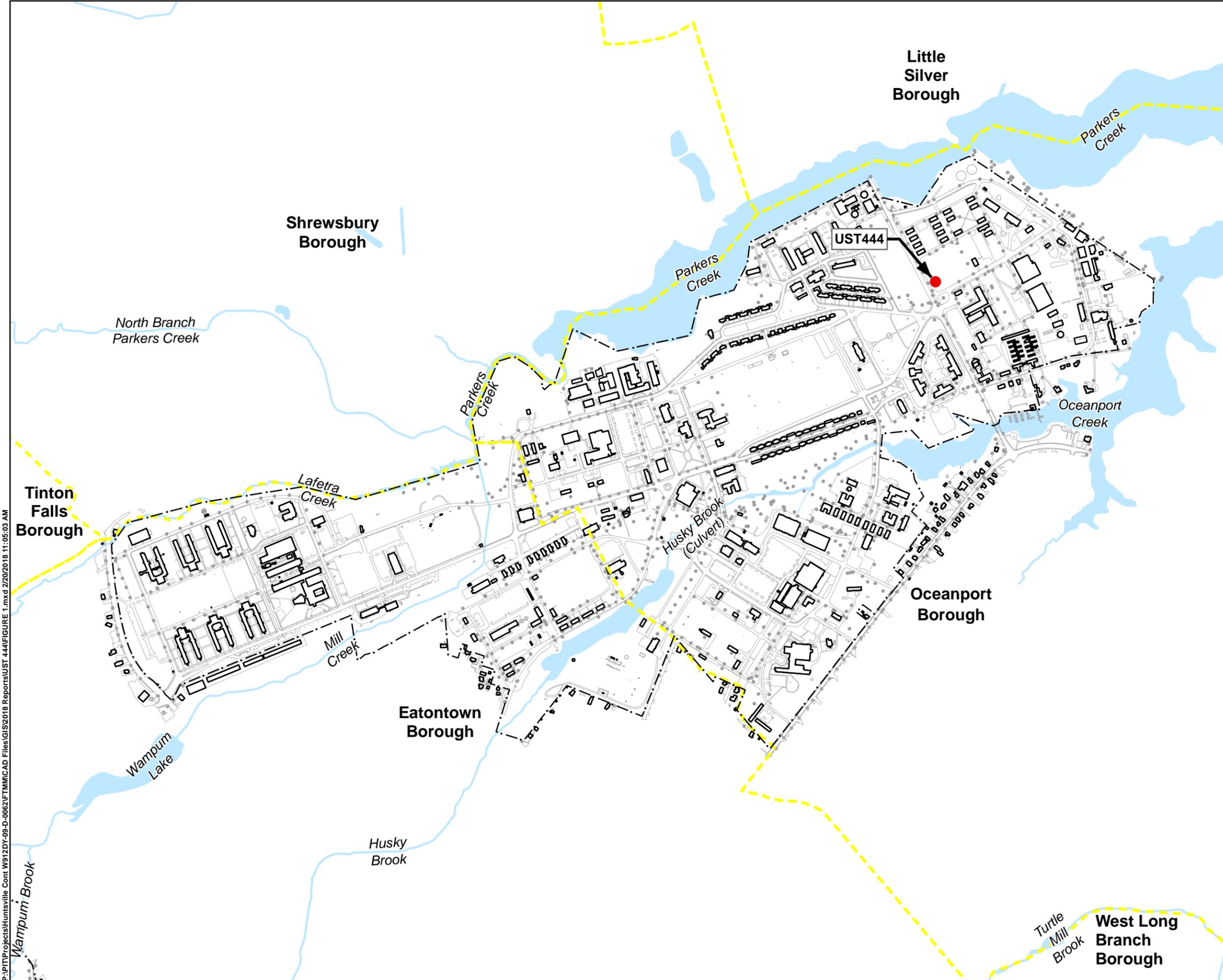
Signature: [Handwritten Signature] Date: 08 May 2018
Name/Title: William R. Colvin, PMP, CHMM, PG
BRAC Environmental Coordinator

Completed form should be sent to: Mr. Ashish Joshi
New Jersey Department of Environmental Protection
Division of Remediation Management & Response
Bureau of Northern Field Operations
7 Ridgedale Avenue (2nd Floor)
Cedar Knolls, New Jersey 07927-1112

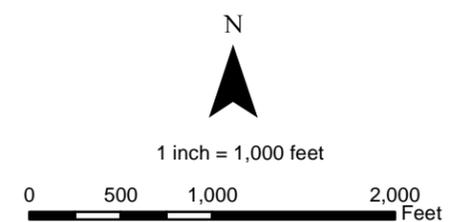
**FIGURES**

**Figure 1 –UST 444 Site Location**

**Figure 2 – UST 444 Site Layout -  
Groundwater Elevations – January 15, 2018**



- LEGEND:**
- UHOT Location
  - Installation Boundary
  - Municipal Boundary
  - Surface Water Feature

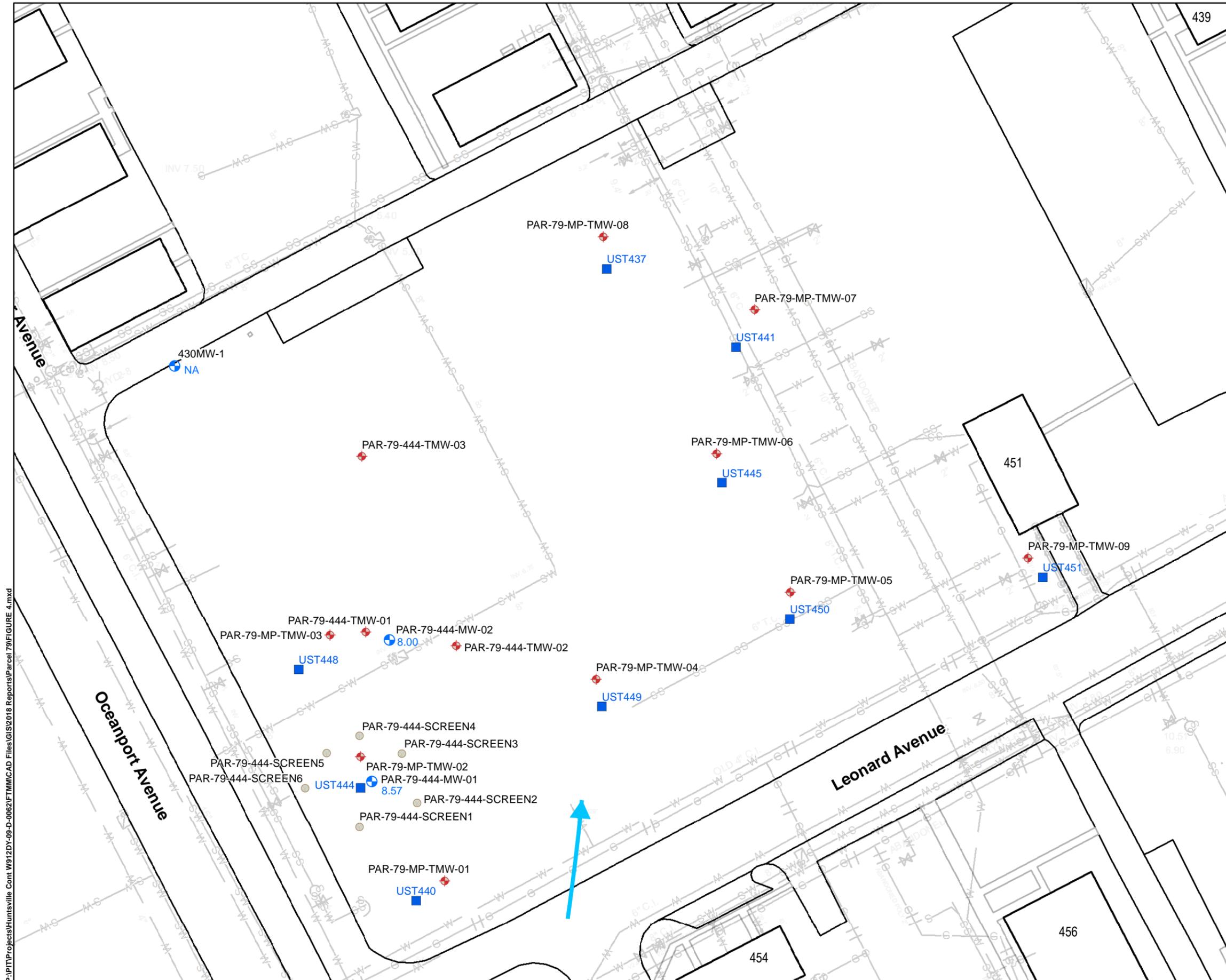


Source: FTMM Supplied CAD, 2013; ESRI Data and Maps, 2011; USGS NHD, 2012.

<b>PARSONS</b> 401 Diamond Drive NW, Huntsville AL	<b>Fort Monmouth</b> New Jersey
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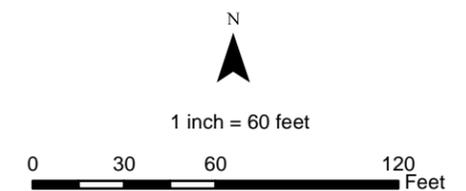
<b>UST444 SITE LOCATION</b>	
CREATED BY: <b>RR</b>	REVIEWED BY: <b>JC</b>
DATE: <b>FEB. 2018</b>	FIGURE NUMBER: <b>FIGURE 1</b>
PROJECT NUMBER: <b>748810-02130</b>	FILE: <b>FIGURE 1.mxd</b>

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**LEGEND:**

- ◆ Temporary Monitoring Well
- Soil Boring
- ⊕ Shallow Monitoring Well
- Former UST Location
- W Water Line
- S Sanitary Sewer Line
- SW Storm Sewer Line
- G Gas Line
- ← Estimated Groundwater Flow Direction
- 8.57 Groundwater Elevation Recorded on January 15, 2018 (NAD88) (ft.)
- NA Unavailable



Source: FTMM Supplied CAD, 2013; U.S. Army BRAC, 2008; 2008 SI Report; USGS NHD, 2012.

<b>PARSONS</b> 401 Diamond Drive NW, Huntsville AL	<b>Fort Monmouth</b> New Jersey
<b>UST 444 SITE LAYOUT - GROUNDWATER ELEVATIONS - JANUARY 15, 2018</b>	
CREATED BY: <b>RR</b>	REVIEWED BY: <b>KF</b>
DATE: <b>MAR. 2018</b>	FIGURE NUMBER: <b>FIGURE 2</b>
PROJECT NUMBER: <b>748810-06031</b>	FILE: <b>FIGURE 4.mxd</b>

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**TABLES**

**Table 1 - Groundwater Gauging Data and Elevations (January 15, 2018)**

**Table 2 – Ground Water Sampling Results –  
Comparison to NJDEP Ground Water Quality Criteria**

**Table 1**  
**Groundwater Gauging Data and Elevations (January 15, 2018)**  
**Parcel 79 UST 444**  
**Fort Monmouth, New Jersey**

Site	Well Permit #	Y Coord. (North)	X Coord. (East)	Installation Date	Depth	Well Riser Pipe Casing Length	Well Screen Length	Top of PVC Well Casing (elevation)	Slot Size	Flush Mount or Upright Protective Casing (FM or UR)	Protective Casing Elevation	Ground Surface Elevation	Gauge Time	Gauged Depth to Water	Gauged Depth to Bottom	Calculated Groundwater Elevation	Sampling Date
						(ft.)			inches					(ft. TOC)	(ft. TOC)	(ft.)	
PAR-79-444-MW-01	E201713116	541379.4	622069.7	12/15/2017	15.00	5.00	10.00	13.37	0.01	UR	13.76	10.82	9:23	4.80	15.35	8.57	1/18/2018
PAR-79-444-MW-02	E201713787	541466.2	622080.6	12/15/2017	16.00	6.00	10.00	14.00	0.01	UR	14.54	10.83	9:25	6.00	16.49	8.00	1/18/2018
430 MW-1	29-33756	541634.122	621948.496	8/16/1995	12.50	2.50	10.00	9.70	0.02	UR	14.54	10.83	Could not locate monitoring well			NS	

**Notes:**

- The synoptic round of water levels in the wells was collected on January 15, 2018.
- Well information were provided by FTMM for all wells installed before June 2013.
- ft = feet
- TOC = Top of Casing
- Elevation = feet above mean sea level
- N/A = information not available
- NS = Not Sampled
- **Bolded** top of casing elevations represent a mathematical adjustment between earlier NAD systems and the NAD 88 spatial system: the wells were reduced 1.09 feet to reflect the changes in the NAD systems.



**TABLE 2  
GROUND WATER SAMPLING RESULTS - COMPARISON TO NJDEP GROUND WATER QUALITY CRITERIA  
SITE PARCEL 79, PARCEL 79 444 USTPARCEL 79, PARCEL 79 444 USTPARCEL 79, PARCEL 79 444 UST  
FORT MONMOUTH, NEW JERSEY**

Loc ID	Loc ID	NJ Ground Water Quality Criteria	PAR-79-MP-TMW02	PAR-79-444-TMW-01	PAR-79-444-TMW-02	PAR-79-444-TMW-03	PAR-79-444-MW-01		PAR-79-444-MW-02	
Sample ID	Sample ID		PAR-79-MP-TMW02	PAR-79-444-TMW-01-11	PAR-79-444-TMW-02-11	PAR-79-444-TMW-03-11	PAR-79-444-GW-MW-01-7.5	PAR-79-444-GW-MW-01-12.5	PAR-79-444-GW-MW-02-8.5	PAR-79-444-GW-MW-02-13.5
Sample Date	Sample Date		8/3/2016	11/2/2017	11/2/2017	11/2/2017	1/18/2018	1/18/2018	1/18/2018	1/18/2018
Sample Round	Sample Round									
Filtered	Filtered		Total	Total	Total	Total	Total	Total	Total	Total
<b>TIC VOCs (µg/L)</b>										
Total TICs		500	121.5 JN	NA	NA	NA	NA	NA	NA	NA
<b>Semivolatile Organic Compounds (SVOCs) (µg/L)</b>										
1,2,4-Trichlorobenzene	UG/L	9	< 0.96 UJ	< 0.94	< 0.93	< 1	< 1	< 1	< 1	< 0.99
1,2-Dichlorobenzene	UG/L	600	< 0.96 UJ	< 0.94	< 0.93	< 1	< 1	< 1	< 1	< 0.99
1,2-Diphenylhydrazine	UG/L	20	< 0.96 UJ	< 0.94	< 0.93	< 1	< 1	< 1	< 1	< 0.99
1,3-Dichlorobenzene	UG/L	600	< 0.96 UJ	< 0.94	< 0.93	< 1	< 1	< 1	< 1	< 0.99
1,4-Dichlorobenzene	UG/L	75	< 0.96 UJ	< 0.94	< 0.93	< 1	< 1	< 1	< 1	< 0.99
2,4,5-Trichlorophenol	UG/L	700	< 2.9	< 2.8	< 2.8	< 3	< 3	< 3.1	< 3.1	< 3
2,4,6-Trichlorophenol	UG/L	20	< 0.96	< 0.94	< 0.93	< 1	< 1	< 1	< 1	< 0.99
2,4-Dichlorophenol	UG/L	20	< 0.96	< 0.94	< 0.93	< 1	< 1	< 1	< 1	< 0.99
2,4-Dimethylphenol	UG/L	100	< 4.8	< 4.7	< 4.6	< 5	< 5	< 5.2	< 5.2	< 5
2,4-Dinitrophenol	UG/L	40	< 7.7	< 7.5	< 7.4	< 8	< 8	< 8.3	< 8.3	< 7.9
2,4-Dinitrotoluene	UG/L	10	< 0.96 UJ	< 0.94	< 0.93	< 1	< 1	< 1	< 1	< 0.99
2,6-Dinitrotoluene	UG/L	10	< 0.96 UJ	< 0.94	< 0.93	< 1	< 1	< 1	< 1	< 0.99
2-Chloronaphthalene	UG/L	600	< 0.96 UJ	< 0.94	< 0.93	< 1	< 1	< 1	< 1	< 0.99
2-Chlorophenol	UG/L	40	< 1.9	< 1.9	< 1.9	< 2	< 2	< 2.1	< 2.1	< 2
2-Methylnaphthalene	UG/L	30	30.6 J	< 0.94	< 0.93	< 1	< 1	< 1	< 1	< 0.99
2-Methylphenol	UG/L	100	< 0.96	< 0.94	< 0.93	< 1	< 1	< 1	< 1	< 0.99
2-Nitroaniline	UG/L	100	< 0.96 UJ	< 0.94	< 0.93	< 1	< 1	< 1	< 1	< 0.99
2-Nitrophenol	UG/L	100	< 1.9	< 1.9	< 1.9	< 2	< 2	< 2.1	< 2.1	< 2
3,3'-Dichlorobenzidine	UG/L	30	< 2.9 UJ	< 2.8	< 2.8	< 3	< 3	< 3.1	< 3.1	< 3
3-Nitroaniline	UG/L	100	< 1.9 UJ	< 1.9	< 1.9	< 2	< 2	< 2.1	< 2.1	< 2
4,6-Dinitro-2-methylphenol	UG/L	1	< 4.8	< 4.7	< 4.6	< 5	< 5	< 5.2	< 5.2	< 5
4-Bromophenyl phenyl ether	UG/L	100	< 0.96 UJ	< 0.94	< 0.93	< 1	< 1	< 1	< 1	< 0.99
4-Chloro-3-methylphenol	UG/L	100	< 0.96	< 0.94	< 0.93	< 1	< 1	< 1	< 1	< 0.99
4-Chloroaniline	UG/L	30	< 0.96 UJ	< 0.94	< 0.93	< 1	< 1	< 1	< 1	< 0.99
4-Chlorophenyl phenyl ether	UG/L	100	< 0.96 UJ	< 0.94	< 0.93	< 1	< 1	< 1	< 1	< 0.99
4-Nitroaniline	UG/L	5	< 0.96 UJ	< 0.94	< 0.93	< 1	< 1	< 1	< 1	< 0.99
4-Nitrophenol	UG/L	100	< 4.8	< 4.7	< 4.6	< 5	< 5	< 5.2	< 5.2	< 5
Acenaphthene	UG/L	400	< 0.96 UJ	< 0.94	< 0.93	< 1	< 1	< 1	< 1	< 0.99
Acenaphthylene	UG/L	100	< 0.96 UJ	< 0.94	< 0.93	< 1	< 1	< 1	< 1	< 0.99
Anthracene	UG/L	2,000	0.39 J	< 0.94	< 0.93	< 1	< 1	< 1	< 1	< 0.99
Benzidine	UG/L	20	< 28.7 UJ	< 28.3	< 27.8	< 30	< 30	< 31.1	< 31.1	< 29.7
Benzo(a)anthracene	UG/L	0.1	0.27 J	< 0.94	< 0.93	< 1	< 1	0.3 J	< 1	< 0.99
Benzo(a)pyrene	UG/L	0.1	0.14 JB	< 0.94	< 0.93	< 1	< 1	< 1	< 1	< 0.99
Benzo(b)fluoranthene	UG/L	0.2	0.2 J	< 0.94	< 0.93	< 1	< 1	0.18 J	< 1	< 0.99
Benzo(ghi)perylene	UG/L	100	< 0.96 UJ	< 0.94	< 0.93	< 1	< 1	< 1	< 1	< 0.99
Benzo(k)fluoranthene	UG/L	0.5	< 0.96 UJ	< 0.94	< 0.93	< 1	< 1	< 1	< 1	< 0.99
Benzyl alcohol	UG/L	2,000	< 1.9	< 1.9	< 1.9	< 2	< 2	< 2.1	< 2.1	< 2
Bis(2-Chloroethoxy)methane	UG/L	100	< 0.96 UJ	< 0.94	< 0.93	< 1	< 1	< 1	< 1	< 0.99
Bis(2-Chloroethyl)ether	UG/L	7	< 0.96 UJ	< 0.94	< 0.93	< 1	< 1	< 1	< 1	< 0.99
Bis(2-Chloroisopropyl)ether	UG/L	300	< 0.96 UJ	< 0.94	< 0.93	< 1	< 1	< 1	< 1	< 0.99
Bis(2-Ethylhexyl)phthalate	UG/L	3	< 0.96 UJ	< 0.94	< 0.93	< 1	< 1	< 1	< 1	0.35 J
Butyl benzyl phthalate	UG/L	100	0.15 J	< 0.94	< 0.93	< 1	< 1	0.26 J	< 1	< 0.99
Carbazole	UG/L	100	1.2 J	< 0.94	< 0.93	< 1	< 1	0.17 J	< 1	< 0.99
Chrysene	UG/L	5	0.2 J	< 0.94	< 0.93	< 1	< 1	0.2 J	< 1	< 0.99
Cresol	UG/L	NLE	< 0.96	< 0.94	< 0.93	< 1	< 1	< 1	< 1	< 0.99
Dibenz(a,h)anthracene	UG/L	0.3	< 0.96 UJ	< 0.94	< 0.93	< 1	< 1	< 1	< 1	< 0.99
Dibenzofuran	UG/L	100	2.5 J	< 0.94	< 0.93	< 1	< 1	< 1	< 1	< 0.99
Diethyl phthalate	UG/L	6,000	< 0.96 UJ	< 0.94	< 0.93	< 1	< 1	< 1	< 1	< 0.99
Dimethyl phthalate	UG/L	100	< 0.96 UJ	< 0.94	< 0.93	< 1	< 1	< 1	< 1	< 0.99
Di-n-butylphthalate	UG/L	700	< 0.96 UJ	< 0.94	< 0.93	< 1	0.34 J	0.16 J	< 1	< 0.99
Di-n-octylphthalate	UG/L	100	0.099 J	< 0.94	< 0.93	< 1	< 1	0.13 J	< 1	< 0.99
Fluoranthene	UG/L	300	0.81 J	0.23 J	< 0.93	< 1	< 1	0.2 J	< 1	< 0.99
Fluorene	UG/L	300	3.2 J	< 0.94	< 0.93	< 1	< 1	< 1	< 1	< 0.99
Hexachlorobenzene	UG/L	0.02	< 0.96 UJ	< 0.94	< 0.93	< 1	< 1	< 1	< 1	< 0.99
Hexachlorobutadiene	UG/L	1	< 0.96 UJ	< 0.94	< 0.93	< 1	< 1	< 1	< 1	< 0.99
Hexachlorocyclopentadiene	UG/L	40	< 1.9 UJ	< 1.9	< 1.9	< 2	< 2	< 2.1	< 2.1	< 2
Hexachloroethane	UG/L	7	< 0.96 UJ	< 0.94	< 0.93	< 1	< 1	< 1	< 1	< 0.99
Indeno(1,2,3-cd)pyrene	UG/L	0.2	0.11 J	< 0.94	< 0.93	< 1	< 1	0.16 J	< 1	< 0.99
Isophorone	UG/L	40	< 0.96 UJ	< 0.94	< 0.93	< 1	< 1	< 1	< 1	< 0.99
Naphthalene	UG/L	300	23.8 J	< 0.94	< 0.93	< 1	< 1	< 1	< 1	< 0.99
Nitrobenzene	UG/L	6	< 1.9 UJ	< 1.9	< 1.9	< 2	< 2	< 2.1	< 2.1	< 2
N-Nitrosodimethylamine	UG/L	0.8	< 1.9 UJ	< 1.9	< 1.9	< 2	< 2	< 2.1	< 2.1	< 2
N-Nitroso-di-n-propylamine	UG/L	10	< 0.96 UJ	< 0.94	< 0.93	< 1	< 1	< 1	< 1	< 0.99

**TABLE 2  
GROUND WATER SAMPLING RESULTS - COMPARISON TO NJDEP GROUND WATER QUALITY CRITERIA  
SITE PARCEL 79, PARCEL 79 444 USTPARCEL 79, PARCEL 79 444 USTPARCEL 79, PARCEL 79 444 UST  
FORT MONMOUTH, NEW JERSEY**

Loc ID	Loc ID	NJ Ground Water Quality Criteria	PAR-79-MP-TMW02	PAR-79-444-TMW-01	PAR-79-444-TMW-02	PAR-79-444-TMW-03	PAR-79-444-MW-01		PAR-79-444-MW-02	
Sample ID	Sample ID		PAR-79-MP-TMW02	PAR-79-444-TMW-01-11	PAR-79-444-TMW-02-11	PAR-79-444-TMW-03-11	PAR-79-444-GW-MW-01-7.5	PAR-79-444-GW-MW-01-12.5	PAR-79-444-GW-MW-02-8.5	PAR-79-444-GW-MW-02-13.5
Sample Date	Sample Date		8/3/2016	11/2/2017	11/2/2017	11/2/2017	1/18/2018	1/18/2018	1/18/2018	1/18/2018
Sample Round	Sample Round									
Filtered	Filtered		Total	Total	Total	Total	Total	Total	Total	Total
<b>Semivolatile Organic Compounds (µg/L)</b>										
N-Nitrosodiphenylamine	UG/L	10	< 1.9 UJ	< 1.9	< 1.9	< 2	< 2	< 2.1	< 2.1	< 2
Pentachlorophenol	UG/L	0.3	< 7.7	< 7.5	< 7.4	< 8	< 8	< 8.3	< 8.3	< 7.9
Phenanthrene	UG/L	100	<b>5.8 J</b>	< 0.94	< 0.93	< 1	< 1	<b>0.16 J</b>	< 1	< 0.99
Phenol	UG/L	2,000	< 0.96	< 0.94	< 0.93	< 1	< 1	< 1	< 1	< 0.99
Pyrene	UG/L	200	<b>0.69 J</b>	<b>0.48 J</b>	< 0.93	< 1	< 1	<b>0.19 J</b>	< 1	< 0.99
<b>TIC SVOCs (µg/L)</b>										
<b>Total TICs</b>		500	<b>1757.9 JN</b>	<b>4.5 JN</b>	NA	<b>15.5 J</b>	9.5 JN	NA	NA	<b>5.7 JN</b>

Footnote:

- All historical data collected prior to 2013 are reported as provided by others.
  - Number of Analyses is the number of detected and non-detected results excluding rejected results. Sample duplicate pairs have not been averaged.
  - NLE = no limit established.
  - Bolded chemical detection
  - SS = Site Specific action level, see "Specific Chemical Class (or Parameter)" footnote for details.
  - Chemical result qualifiers are assigned by the laboratory and are evaluated and modified (if necessary) during the data validation.
- [blank] = detect, i.e. detected chemical result value.  
 JN = Tentatively identified compound, estimated concentration.  
 UJ=The compound was not detected; however, the results is estimated because of discrepancies in meeting certain analyte-specific QC criteria.  
 J = estimated detected value due to a concentration below the reporting limit or due to discrepancies in meeting certain analyte-specific quality control.  
 NA = Not Applicable  
 µg/L = micrograms per Liter

7) Specific Chemical Classes (or Parameters) comments or notes regarding how data is displayed, compared to Action Levels, or represented in this table.

8) Chemical results greater than or equal to the action level (depending on criteria) are highlighted based on the Criteria that are present.

- Cell Shade values represent a result that is above the NJ Ground Water Quality Criteria

###

NJDEP Interim Specific GWQC values are presented for the NJ GWQS where there is not a Specific Ground Water Quality Criteria. A full list of compounds is available at ([http://www.nj.gov/dep/wms/bwqsa/gwqs\\_interim\\_criteria\\_table.htm](http://www.nj.gov/dep/wms/bwqsa/gwqs_interim_criteria_table.htm)).

NJDEP Interim Generic GWQC values are presented for the NJ GWQS where there is not a XXXXX or a NJDEP Interim Specific GWQC. Available at ([http://www.nj.gov/dep/wms/bwqsa/gwqs\\_interim\\_criteria\\_table.htm](http://www.nj.gov/dep/wms/bwqsa/gwqs_interim_criteria_table.htm)).

9) Criteria action level source document and web address.

- The NJ Ground Water Quality Criteria refers to the NJDEP Groundwater Quality Standards - Adopted July 22, 2010

<http://www.state.nj.us/dep/wms/bwqsa/docs/njac79C.pdf>

## **Attachment A Correspondence**

1. New Jersey Department of Environmental Protection (NJDEP). 2017. Letter to the Army, *Supplemental Unregulated Heating Oil Tank (UHOT) Work Plan, Fort Monmouth, New Jersey*. Prepared by the Office of Assistant Chief of Staff for Installation Management, U.S. Army Fort Monmouth. October 13.
2. Department of the Army. 2017. *Supplemental Unregulated Heating Oil Tank (UHOT) Work Plan, Fort Monmouth, New Jersey*. Prepared by the Office of Assistant Chief of Staff for Installation Management, U.S. Army Fort Monmouth. August 15.
3. New Jersey Department of Environmental Protection (NJDEP). 2017. Letter to the Army, RE: *Request for No Further Action at Multiple Parcel 79 Storage Tanks Site Investigation Report Addendum dated May 2017, Fort Monmouth, Oceanport, Monmouth County*. May 8.
4. Department of the Army. 2017. *Parcel 79 Storage Tanks Site Investigation Report Addendum dated February 2017, Fort Monmouth, Oceanport, Monmouth County*. Prepared by the Office of Assistant Chief of Staff for Installation Management, U.S. Army Fort Monmouth. February 8.
5. Department of the Army. 2016. *Response to NJDEP's 25 August 2015 Comments on the April 2015 underground Storage Tanks within ECP Parcel 79, Fort Monmouth, New Jersey*. Prepared by the Office of Assistant Chief of Staff for Installation Management, U.S. Army Fort Monmouth. February 10.
6. New Jersey Department of Environmental Protection (NJDEP). 2015. Letter to the Army, RE: *Underground Storage Tanks Within ECP Parcel 79 dated April 2015, Fort Monmouth, Oceanport, Monmouth County*. August 25.
7. Department of the Army. 2015. *Underground Storage Tanks within Parcel 79, Fort Monmouth, NJ*. Prepared by the Office of Assistant Chief of Staff for Installation Management, U.S. Army Fort Monmouth. April 22.



## State of New Jersey

CHRIS CHRISTIE  
Governor

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BOB MARTIN  
Commissioner

KIM GUADAGNO  
Lt. Governor

October 13, 2017

Mr. William Colvin  
BRAC Environmental Coordinator  
OACSIM – U.S. Army Fort Monmouth  
P. O. Box 148  
Oceanport, NJ 07757

**Re: Supplemental Unregulated Heating Oil Tank Work Plan**  
Fort Monmouth  
Oceanport, Monmouth County  
PI G000000032

Dear Mr. Colvin,

The New Jersey Department of Environmental Protection (Department) has completed review of the Supplemental Unregulated Heating Oil Tank Work Plan (UST Workplan). The UST Workplan included proposal for further investigation(s) at various Underground Storage Tank (UST) locations. The Department offers the following comments:

- **UST 142B, UST 202A, UST 202D** – The proposal to install monitor wells (MWs) is approved. Please ensure that all approved sampling methodologies are utilized. Please also document field observations, including the presence of free product and/or sheen in any of the MWs. Please note that the proposal to install additional MW, as needed, is also approved as this may assist in further delineating the extent of ground water contamination.
- **UST 211** – Further investigation is approved as proposed. However, the Department recommends installing one temporary well south of boring locations SCREEN 5 and SCREEN 6.
- **UST 228B** – Further investigation is approved as proposed. Based on the findings from previous investigation(s) and subsequent sampling results (soils and ground water), the Department may recommend removing the UST.
- **UST 444** – The installation of borings (6), temporary wells (3) and permanent monitor wells (3) is approved. However, as other USTs were present in the area, please ensure that results from UST 444 and other USTs' results are not co-mingled.
- **UST 490** – Further investigation is approved as proposed. However, please indicate if any previous soil remediation in the form of soil removal was performed when this UST was removed in 1990 or thereafter.
- **UST 750J, UST 800-12, UST 800-20, UST 884, UST 906A and UST 3035** – Further investigations are approved as proposed at these locations.

Please submit all results of the findings to my attention for review. If possible, please have each UST findings, tables, figures and maps individually prepared. Thank you and please feel free to contact me if you have any questions.

Sincerely,

A handwritten signature in black ink, appearing to be 'A.J. Joshi', enclosed within a hand-drawn circle.

A.J. Joshi

C: James Moore, USACE  
Rich Harrison, FMERA  
Joe Fallon, FMERA  
Joe Pearson, Calibre  
File



## DEPARTMENT OF THE ARMY

OFFICE OF ASSISTANT CHIEF OF STAFF FOR INSTALLATION MANAGEMENT  
U.S. ARMY FORT MONMOUTH  
P.O. 148  
OCEANPORT, NEW JERSEY 07757

15 August 2017

Mr. Ashish Joshi  
New Jersey Department of Environmental Protection  
Northern Bureau of Field Operations  
7 Ridgedale Avenue  
Cedar Knolls, NJ 07927

**SUBJECT: Supplemental Unregulated Heating Oil Tank (UHOT) Work Plan  
Fort Monmouth, New Jersey  
PI G000000032**

### **Figures:**

- Figure 1 – UHOT Locations
- Figure 2 – UST 142B Sample Location
- Figure 3 – UST 202A and UST 202D Sample Locations
- Figure 4 – UST 211 Sample Locations
- Figure 5 – UST 228B Sample Location
- Figure 6 – UST 444 Sample Locations
- Figure 7 – UST 490 Sample Locations
- Figure 8 – UST 750J Sample Location
- Figure 9 – UST 800-12 Sample Locations
- Figure 10 – UST 800-20 Sample Locations
- Figure 11 – UST 884 Sample Locations
- Figure 12 – UST 906A Soil Sample Locations
- Figure 13 – UST 906A Groundwater Sample Locations
- Figure 14 – UST 3035 Sample Locations

### **Tables:**

- Table 1 – Sampling Summary
- Table 2 – UST 906A Soil Sample Results
- Table 3 – UST 906A Groundwater Sample Results

### **Attachments:**

- A. Groundwater Flow Direction Maps

Dear Mr. Joshi:

The U.S. Army Fort Monmouth (FTMM) Team has prepared this Work Plan to describe the proposed sampling and analyses activities to support environmental investigations at select unregulated heating oil tanks (UHOTs; also referred to as underground storage tanks [USTs] in this submittal) at FTMM (Figure 1).

The UHOTs described in this Work Plan are being evaluated in accordance with the New Jersey Administrative Code (NJAC) 7:26E *Technical Requirements for Site Remediation*. Most of these UHOTs require a remedial investigation (RI) in accordance with NJAC 7:26E-4.3 for delineation of an identified release of fuel oil constituents in groundwater. However, additional USTs have been included in this Work Plan that only require site investigation (SI) soil or groundwater sampling (NJAC 7:26E-3.4 or -3.5) to determine if a release has occurred, as designated below:

- UST 142B (SI)
- UST 202A (SI)
- UST 202D (RI)
- UST 211 (RI)
- UST 228B (SI)
- UST 444 (RI)
- UST 490 (RI)
- UST 750J (SI)
- UST 800-12 (RI)
- UST 800-20 (RI)
- UST 884 (RI)
- UST 906A (RI)
- UST 3035 (SI)

Specific data needs and proposed sampling at each UHOT site are described in the subsections below. Groundwater flow directions in the area where delineation in groundwater is required are generally not well established due to the distances to other nearby monitor wells. Therefore, regional groundwater flow directions from previous documents (Attachment A) were used as a basis for initial planning of groundwater sampling at each site.

The proposed groundwater assessment strategy includes a combination of field screening and groundwater sampling and analysis to delineate the groundwater plume. For a typical UHOT site without any previous plume assessment, Geoprobe soil borings will be placed in a ring around the former tank site, and each boring will be advanced to a depth below the shallow groundwater. Field screening using a photoionization detector (PID) and visual observation of the Geoprobe soil cores will be used to identify and assess areas impacted by fuel oil downgradient of the source area. Previous Geoprobe assessments at FTMM have successfully identified fuel oil contamination in areas downgradient of former UHOTs using these field screening techniques. The field screening results will be used to verify the contaminant migration direction (and by implication, the groundwater flow direction) for each UHOT site. Temporary groundwater monitoring wells will then be placed within and outside of the plume at each tank site using a Geoprobe, and the groundwater will be sampled to verify the nature and extent of groundwater contamination. Following receipt of analytical data from the temporary wells, permanent monitoring wells will be installed to establish a monitoring network with a minimum of three wells at each site: a source area well near the former tank site, a well downgradient of the source but within the plume, and a downgradient sentry well beyond the plume. Select existing monitoring wells will also be used for water level measurements to complement the monitoring network. All new permanent monitoring wells and the existing monitoring wells to be used for water level measurements will be surveyed by a New Jersey-licensed surveyor in accordance with the Sampling and Analysis Plan (SAP; Reference 23).

Sampling and analytical procedures will follow the protocols established for previous FTMM Work Plan submittals (Reference 24). All Site personnel will be required to read, understand, and comply with the safety guidelines in the Accident Prevention Plan (APP) including the Site Health and Safety Plan (SHASP), which is included as Appendix A of the APP (Reference 25). The detailed field procedures to be used for the activities described in this sampling plan are described in the SAP (Reference 23). Please let me know if you need these or any other documents referred to in this Work Plan to be sent to you.

Specific sampling and analytical requirements are summarized in Table 1, and are described for each UHOT in the subsections below.

### **1. UST 142B**

UST 142B was a steel 550-gallon No. 2 fuel oil UST that was removed in July 1994, along with approximately 30 cubic yards of contaminated soil, as presented in Attachment H of *USTs Within ECP Parcel 79* (Reference 2). Subsequently, NJDEP required a groundwater investigation to be performed (Reference 13); a temporary well was installed, sampled and abandoned in August 2016. Multiple polynuclear aromatic hydrocarbons (PAHs) were detected in the groundwater sample, which was attributed to sample turbidity rather than a release of fuel oil to groundwater (as reported in Reference 10). NJDEP (Reference 22) then recommended resampling using a method to reduce turbidity due to the high concentrations for PAHs detected.

To address this data need, a 2-inch diameter permanent monitoring well will be installed at the former UST 142B tank location, as shown on Figure 2. This approach is expected to result in a low-turbidity groundwater sample without PAH exceedances. The well will be installed within a Geoprobe boring and will be completed with a 10-foot well screen to approximately 7 feet (ft) below the water table (estimated at approximately 4 ft below ground surface [bgs]). The well will be developed to meet the criteria specified in NJDEP's most recent *Field Sampling Procedures Manual*. Low-flow sampling methods will be used to sample this well and the sample will be analyzed for volatile organic compounds (VOCs) and semivolatile organic compounds (SVOCs) in accordance with the requirements for No. 2 fuel oil in Table 2-1 of the NJAC 7:26E *Technical Requirements for Site Remediation*. The Field Geologist will note any indications of fill within the soil column such as cinders, coal, or other debris. A letter report will be prepared for UST 142B that either requests a No Further Action (NFA) determination or recommends additional investigation or action, as warranted from the analytical data.

### **2. UST 202A**

UST 202A was a fiberglass 1,000-gallon heating oil UST that was removed in October 2001, along with an unspecified quantity of contaminated soil, as presented in Attachment J of *USTs Within ECP Parcel 79* (Reference 2). NJDEP (Reference 13) subsequently required a groundwater investigation for the UST 202A and UST 202D area. One temporary well and two existing permanent wells were sampled in May and August 2016 (Reference 10). NJDEP then recommended installation of a permanent well nearby to assess UST 202D (Reference 22); at the same time, NFA was not approved for UST 202A. Additional data are needed to delineate groundwater contamination associated with UST 202A and to delineate groundwater contamination at nearby UST 202D (described in Section 3 below).

To address the UST 202A data need, one temporary monitoring well will be installed at the former UST 202A tank location, as shown on Figure 3. The well will be installed within a Geoprobe boring and will be completed with a 5-foot well screen to approximately 4 ft below the water table (estimated at approximately 2 ft bgs). This well will be sampled and the sample will be analyzed for VOCs and SVOCs in accordance with the requirements for No. 2 fuel oil in Table 2-1 of NJAC 7:26E. The Army may also install and sample additional permanent wells based on the temporary well results. A letter report will be prepared for UST 202A that either requests a No Further Action (NFA) determination or recommends additional investigation or action.

### **3. UST 202D**

UST 202D was a steel 500-gallon heating oil UST that was removed in May 2005 along with approximately 20 cubic yards of contaminated soil (Attachment L of Reference 2). A temporary well was sampled at the former UST 202D location in June 2011; benzene (1.61 µg/L) and 2-methylnaphthalene (109 to 233 µg/L) were detected at concentrations greater than NJDEP Ground Water Quality Criteria (GWQC). NJDEP subsequently required a groundwater investigation for UST 202D (Reference 13). One temporary well and two existing permanent wells were sampled in May and August 2016 (Reference 10). NJDEP then recommended installation of a permanent well to assess UST 202D with low-flow sampling and analysis for VOCs and SVOCs (Reference 22).

To address this data need, one permanent monitoring well and at least three temporary wells will be installed at the former UST 202D tank location, as shown on Figure 3. Recent temporary well results (Reference 10) suggest that fuel oil constituents have not migrated more than approximately 50 ft downgradient of the former tank location (Figure 3). Therefore, two additional downgradient temporary wells and one field screening boring will be installed for verification at offset locations approximately 50 feet downgradient of the former tank location to verify that the plume was not missed. A third temporary well will be installed at the former UST 202A location as described in Section 2.0 above. These temporary wells will be installed within a Geoprobe boring and will typically be completed with a 5-foot well screen to approximately 4 ft below the water table (estimated to be 2 ft bgs). Samples will be collected from the temporary wells for VOCs and SVOCs analyses, in accordance with the requirements for No. 2 fuel oil in Table 2-1 of NJAC 7:26E. Additional temporary wells may be installed as needed based on the groundwater sampling described above.

It is anticipated that existing well M16MW02 will be utilized as a downgradient sentry monitor well for the UST 202D site. New well 202MW02 will be developed. Both new well 202MW02 and existing well M16MW02 will be sampled using low-flow methods; the samples will be analyzed for VOCs and SVOCs in accordance with the requirements for No. 2 fuel oil in Table 2-1 of NJAC 7:26E.

Water level measurements will be collected from monitoring wells 202MW01, 202MW02, M16MW01, and M16MW02 (Figure 3) to determine the local groundwater flow direction. It is anticipated that a remedial investigation report will be prepared for UST 202D.

#### 4. UST 211

UST 211 was a fiberglass 2000-gallon No. 2 fuel oil UST that was removed in November 2001. As presented in Attachment F.1 of Reference 8, one closure soil sample contained 3,968 mg/kg Total Petroleum Hydrocarbons (TPH). A temporary well was sampled at the former UST 211 location in August 2016; multiple analytes were detected at concentrations greater than the GWQCs including 1,2,4-trimethylbenzene (543  $\mu\text{g/L}$ ), benzene (2.8  $\mu\text{g/L}$ ), naphthalene (1,450  $\mu\text{g/L}$ ), 2-methylnaphthalene (6,680  $\mu\text{g/L}$ ), total VOC Tentatively Identified Compounds (TICs; 1,302  $\mu\text{g/L}$ ) and total SVOC TICs (14,322  $\mu\text{g/L}$ ) (Attachment D of Reference 8). NJDEP stated that additional remedial efforts were required for this site (Reference 19). Additional data are needed to delineate groundwater contamination at UST 211.

To address this data need, multiple field screening borings, temporary monitoring wells and permanent monitoring wells will be installed near the former UST 211 tank location, as shown on Figure 4. Field screening Geoprobe borings SCREEN1 through SCREEN6 (Figure 4) will be advanced at locations around the former UST 211 location to provide field verification of the groundwater flow direction, which is assumed to be towards the north-northwest based on regional groundwater maps (Attachment A). These borings will be advanced past the water table, which is assumed to be approximately 12 ft bgs based on previous drilling at PAR-72-211-TMW-01. The field screening borings will be logged visually and with a PID, which has proven useful for identifying fuel oil contamination at FTMM. The field results will be used to validate the locations for subsequent temporary wells to assist with delineating the groundwater plume.

A total of four additional temporary monitor wells are proposed at UST 211. A line of three temporary monitor wells (TMW-02 through TMW-04) will be installed along Russel Avenue (approximately 60 ft downgradient of the tank) to verify the direction and lateral boundaries of the plume. A fourth temporary monitor well (TMW-05) will be installed further downgradient to establish the downgradient extent of the plume prior to installing a downgradient permanent sentry well. As with the field screening borings, the borings for temporary wells will be logged visually and with a PID to estimate the extent of the plume in the field. Additional field screening borings (like SCREEN7 on Figure 4) may be used to determine the downgradient extent of the plume. The temporary wells will be installed within Geoprobe borings and will typically be completed with a 5-foot well screen to approximately 4 ft below the water table (estimated at approximately 12 ft bgs). Samples will be collected from each temporary well and analyzed for VOCs and SVOCs in accordance with the requirements for No. 2 fuel oil in Table 2-1 of NJAC 7:26E.

Based on the analytical results of the temporary well samples, three permanent monitoring wells will be installed for groundwater monitoring: one at the source area (MW-01); one within the plume (MW-02); and one downgradient sentry location (MW-03). The new wells will be developed and sampled using low-flow methods, and the groundwater samples will be analyzed for VOCs and SVOCs, in accordance with the requirements for No. 2 fuel oil in Table 2-1 of NJAC 7:26E.

Water level measurements will be collected from the three new monitoring wells, and from nearby wells 200MW01 (located south of Building 216; see Attachment A), 200MW06 (located north of Building 228; Figure 5), and B5MW05B (located southeast of Building 261), to determine the local groundwater flow direction. It is anticipated that a remedial investigation report will be prepared for UST 211.

## 5. UST 228B

UST 228B is a steel 1,000-gallon No. 2 fuel oil UST that was partially uncovered in December 2010, and then re-buried and left in place. Therefore, UST 228B has not been administratively closed. The Army has conducted soil sampling along the tank to determine if a release has occurred at UST 228B, and the results were described in Attachment G.4 of Reference 8. One soil sample from the 7 to 7.5 foot interval of boring PAR-72-228-SB-03 had a 2-methylnaphthalene concentration of 23.9 mg/kg which exceeded the NJDEP Impact to Ground Water (IGW) screening level, but not the Residential Direct Contact Soil Remediation Standard (RDCSRS). Synthetic Precipitation Leachate Procedure (SPLP) analysis for 2-methylnaphthalene was not performed (as prescribed by NJDEP guidance) on this soil sample due to exceedance of holding times. However, a temporary well located about 10 ft downgradient of boring PAR-72-228-SB-03 was sampled and 2-methylnaphthalene was notably absent in this sample. NJDEP agreed that additional remedial efforts were required (Reference 19). Further evaluation of the soil boring log for PAR-72-228-SB-03 indicates that groundwater was encountered at approximately 7 ft bgs, and therefore this sample may have been from the saturated zone and, if so, IGW screening levels would not apply, and there would be no soil exceedances at this site. Additional data, as described below, are needed to assess the potential for unsaturated soil to exceed the SPLP criteria for 2-methylnaphthalene.

To address this data need, one Geoprobe soil boring (SB-04) will be advanced at the location of the previous boring PAR-72-228-SB-03 where the IGW screening level for 2-methylnaphthalene was exceeded (Figure 5). An unsaturated soil sample (from above the water table) will be collected from approximately 7 to 7.5 ft bgs for 2-methylnaphthalene analysis using the SPLP procedure. A letter report will be prepared for UST 228B that reports the results of this additional investigation.

## 6. UST 444

UST 444 was a steel 1,000-gallon No. 2 fuel oil UST that was removed in January 2010; an unreported quantity of contaminated soil was removed the following month (Attachment U of Reference 2). NJDEP required a groundwater investigation for the UST 444 area (Reference 13). A temporary well was sampled at the former UST 444 location in August 2016; multiple analytes were detected at concentrations greater than the GWQCs, including benzene (1.7 J  $\mu\text{g/L}$ ), 2-methylnaphthalene (30.6 J  $\mu\text{g/L}$ ), and total SVOC TICs (1,758  $\mu\text{g/L}$ ) (Reference 10). NJDEP commented that further investigation was necessary for this site (Reference 22). Additional data are needed to delineate groundwater contamination at UST 444.

To address this data need, multiple field screening borings, temporary monitoring wells and permanent monitoring wells will be installed around the former UST 444 tank location, as shown on Figure 6. Field screening Geoprobe borings SCREEN1 through SCREEN6 (Figure 6) will be advanced at locations around the former UST 444 location to determine the groundwater flow direction which is assumed to be towards the north based on regional groundwater maps (Attachment A). These borings will be advanced past the water table, which is assumed to be at approximately 6 ft bgs based on previous drilling at PAR-79-MP-TMW-02. The field screening borings will be logged visually and with a PID, which has proven useful for identifying fuel oil contamination at FTMM. The field results will be used to verify the field locations for subsequent temporary wells to assist with delineating the groundwater plume.

A total of three additional temporary monitor wells are proposed at UST 444. A line of two additional temporary monitor wells (TMW-01 and TMW-02) will be installed approximately 100 ft downgradient of the tank to verify the direction and lateral boundaries of the plume. Results from a temporary well (PAR-79-MP-TMW03) installed in August 2016 for another former UST investigation will be used to complete this line of temporary wells (there were no exceedances of GWQC in this well). A third temporary monitor well (TMW-03) will be installed approximately 100 feet farther downgradient to establish the downgradient extent of the plume prior to installing a permanent downgradient sentry well. As with the field screening borings, the borings for temporary wells will be logged visually and with a PID to estimate the extent of the plume in the field. Additional field screening borings may be used to determine the downgradient extent of the plume. The temporary wells will be installed within Geoprobe borings and will be completed with a 5-foot well screen to approximately 4 feet below the water table (estimated at approximately 6 ft bgs). Each temporary well will be sampled and the groundwater samples will be analyzed for VOCs and SVOCs, in accordance with the requirements for No. 2 fuel oil in Table 2-1 of NJAC 7:26E.

Three new permanent monitoring wells will be installed for groundwater monitoring at the source area (MW-01), within the plume (MW-02), and at a downgradient sentry location (MW-03). These wells will be installed after the analytical data for the temporary wells have been evaluated; therefore the actual locations may be adjusted from those shown on Figure 6 based on these data. The new wells will be developed and sampled using low-flow methods, and the groundwater samples will be analyzed for VOCs and SVOCs, in accordance with the requirements for No. 2 fuel oil in Table 2-1 of NJAC 7:26E.

Water level measurements will be collected from the three new monitoring wells and from nearby well 430MW-1 (Figure 6) to determine the local groundwater flow direction. It is anticipated that a remedial investigation report will be prepared for UST 444.

## **7. UST 490**

UST 490 was a steel 1,000-gallon No. 2 fuel oil UST that was removed in May 1990 (Attachment CC of Reference 2). NJDEP subsequently required additional characterization of groundwater contamination for the UST 490 area (Reference 13). Multiple rounds of Geoprobe soil sampling performed from 2005 through 2016 verified the presence of petroleum contaminated soils near the former UST location. Groundwater was sampled in August 2016 from a temporary well (PAR-79-490-TMW-03) located downgradient of the former UST location and just south of Building 490; 2-methylnaphthalene (63.5 µg/L) and total SVOC TICs (1,323 µg/L) were detected at concentrations greater than the GWQCs (Reference 10). NJDEP commented that additional groundwater investigations must also include analyses for PAHs (Reference 22). As described below, additional data are needed to estimate the nature and extent of groundwater contamination at UST 490.

Previous sampling results have been used to select additional field screening borings, temporary monitoring wells and permanent monitoring wells which will be installed downgradient of the former UST 490 location (Figure 7). Field screening Geoprobe borings will be advanced at two locations (SCREEN1 and SCREEN2; Figure 7) south of Building 490 to determine the groundwater flow direction which is assumed to be towards the southeast based on regional groundwater maps (Attachment A). The field screening borings will be advanced past the water table, which is assumed to be at approximately 3 ft bgs based on previous drilling at PAR-79-490-TMW-03. The field

screening borings will be logged visually and with a PID, which has proven useful for identifying fuel oil contamination at FTMM. The field results will be used to select the field locations of temporary wells to be installed to delineate the groundwater plume.

A total of four additional temporary monitor wells are proposed at UST 490. Two temporary monitor wells (TMW-04 and TMW-05) will be installed approximately 50 ft from the previous PAR-79-490-TMW-03 location to locate the lateral (cross-gradient) boundaries of the plume. Two temporary monitor wells (TMW-06 and TMW-07) will be installed approximately 70 and 120 ft farther downgradient from Building 490 to establish the downgradient extent of the plume, prior to installing a permanent downgradient sentry well. As with the field screening borings, the borings for temporary wells will be logged visually and with a PID to estimate the extent of the plume in the field. Additional field screening borings may be used to determine the downgradient extent of the plume. The temporary wells will be installed within Geoprobe borings and will typically be completed with a 5-ft well screen to approximately 4 ft below the water table (estimated at approximately 3 ft bgs). Samples will be collected from each temporary well for VOC and SVOC analyses, in accordance with the requirements for No. 2 fuel oil in Table 2-1 of NJAC 7:26E.

Existing well 490MW01 will be maintained as a source area well at the former UST 490 location. Two new permanent monitoring wells will be installed for groundwater monitoring within the plume (MW-02) and at a downgradient sentry location (MW-03). These wells will be installed after the analytical data for the temporary wells have been evaluated; therefore the actual locations may be adjusted from those shown on Figure 7. The two new wells will be developed. These two new wells and existing well 490MW01 will be sampled using low-flow methods and the groundwater samples will be analyzed for VOCs and SVOCs, in accordance with the requirements for No. 2 fuel oil in Table 2-1 of NJAC 7:26E.

Water level measurements will be collected from the three new monitoring wells, from the new well at former UST 142B (Figure 2), and from existing well M16MW01 (Figure 3) to determine the local groundwater flow direction. It is anticipated that a remedial investigation report will be prepared for UST 490.

## **8. UST 750J**

UST 750J was a steel 1,000-gallon heating oil UST that was removed in August 2009, along with approximately 24 cubic yards of contaminated soil (Attachment M of Reference 6). NJDEP commented that a groundwater investigation was warranted (Reference 21).

One temporary monitoring well (TMW-01) will be installed at the former UST 750J tank location (Figure 8). The well will be installed within a Geoprobe boring and will be completed with a 5 foot well screen to approximately 4 ft below the water table (approximately 6.5 ft bgs). A sample from this well will be analyzed for VOCs and SVOCs, in accordance with the requirements for No. 2 fuel oil in Table 2-1 of NJAC 7:26E. A letter report will be prepared for UST 750J that either requests a NFA determination or recommends additional investigation or action.

## **9. UST 800-12**

UST 800-12 was a steel 1,000-gallon No. 2 fuel oil UST located in the parking lot of the former First Atlantic Credit Union (Building 1006). This UST was removed in May 2003 along with

approximately 18 cubic yards of contaminated soil (Attachment J of Reference 3). NJDEP commented that a groundwater investigation for the UST 800-12 area was necessary (Reference 15). Temporary well ARE-800-TMW-07 was installed and sampled at the former UST 800-12 location in August 2016; 2-methylnaphthalene (148 µg/L) and total SVOC TICs (510 µg/L) were detected at concentrations greater than the GWQCs (Reference 9). Based on these groundwater results, NJDEP (Reference 20) commented that further groundwater investigation was necessary. Further delineation of groundwater contamination at UST 800-12 will be performed as described below.

Multiple field screening borings, temporary monitoring wells and permanent monitoring wells will be installed around the former UST 800-12 tank location (Figure 9). Field screening Geoprobe borings SCREEN1 through SCREEN6 (Figure 9) will be advanced at locations around the former UST 800-12 location to determine the local groundwater flow direction, which is assumed to be towards the north-northwest based on regional groundwater maps (Attachment A). These borings will be advanced past the water table, which is assumed to be approximately 8.5 ft bgs based on previous drilling at ARE-800-TMW-07 (Reference 9). The field screening borings will be logged visually and the soils will be monitored with a PID which has proven useful for identifying fuel oil contamination at FTMM. The field results will be used to select the field locations for temporary wells to assist with delineating the groundwater plume.

A total of four temporary monitor wells are proposed at UST 800-12. A line of three temporary monitor wells (TMW-01 through TMW-03) will be installed approximately 80 ft downgradient of the location of the former tank to determine the direction and lateral boundaries of the plume. A fourth temporary monitor well (TMW-04) will be installed approximately 80 ft farther downgradient to establish the downgradient extent of the plume; this temporary well will be installed and sampled prior to installing a permanent downgradient sentry well. As with the field screening borings, the borings for temporary wells will be logged visually and with a PID to estimate the extent of the plume in the field. Additional field screening borings may be used to determine the downgradient extent of the plume. The temporary wells will be installed within Geoprobe borings and will typically be completed with a 5 foot well screen to approximately 4 ft below the water table (approximately 8.5 ft bgs). Each temporary well will be sampled and the groundwater samples will be analyzed for VOCs and SVOCs, in accordance with the requirements for No. 2 fuel oil in Table 2-1 of NJAC 7:26E.

Three new permanent monitoring wells will be installed to monitor groundwater at the source area (MW-01), within the plume (MW-02), and at a downgradient sentry location (MW-03). These wells will be installed after the analytical data for the temporary wells have been evaluated; the actual locations may be adjusted from those shown on Figure 9 based on these data. The new permanent wells will be developed and sampled using low-flow methods. The groundwater samples will be analyzed for VOCs and SVOCs, in accordance with the requirements for No. 2 fuel oil in Table 2-1 of NJAC 7:26E.

Water level measurements will be collected from the three new monitoring wells and from nearby existing wells 812MW05 and 812MW13 (Figure 2 of Attachment A) to determine the local groundwater flow direction. It is anticipated that a remedial investigation report will be prepared for UST 800-12.

## 10. UST 800-20

UST 800-20 was a steel 1,000-gallon No. 2 fuel oil UST that was removed in July 2003 along with approximately 80 cubic yards of contaminated soil (Attachment O of Reference 3). NJDEP commented that a groundwater investigation for the UST 800-20 area was necessary (Reference 15). A temporary well was sampled at the former UST 800-20 location in August 2016; 1,1,2-trichloroethane (5.5 µg/L), 2-methylnaphthalene (41 µg/L) and total SVOC TICs (724 µg/L) were detected at concentrations greater than the GWQCs (Reference 9). Based on these groundwater results, NJDEP commented that additional groundwater investigation was necessary for this site (Reference 20). Further delineation of groundwater contamination at UST 800-20 will be performed as described below.

Multiple field screening borings, temporary monitoring wells and permanent monitoring wells will be installed around the former UST 800-20 tank location (Figure 10). Field screening Geoprobe borings SCREEN1 through SCREEN6 (Figure 10) will be advanced at locations around the former UST 800-20 location to determine the local groundwater flow direction, which is assumed to be towards the north-northwest based on regional groundwater maps (Attachment A). These borings will be advanced past the water table which is assumed to be at approximately 7 ft bgs based on previous drilling at ARE-800-TMW-08 (Reference 9). The field screening borings will be logged visually and with a PID which has proven useful for identifying fuel oil contamination at FTMM. The field results will be used to select the locations for temporary wells to assist with delineating the groundwater plume.

A total of four additional temporary monitor wells are proposed at former UST 800-20. A line of three temporary monitor wells (TMW-01 through TMW-03) will be installed approximately 60 ft downgradient of the former tank to verify the direction and lateral boundaries of the plume. A fourth temporary monitor well (TMW-04) will be installed approximately 80 ft farther downgradient to establish the downgradient extent of the plume, prior to installing a downgradient permanent sentry well. As with the field screening borings, the borings for temporary wells will be logged visually and with a PID to estimate the extent of the plume in the field. Additional field screening borings may be used to determine the downgradient extent of the plume. The temporary wells will be installed within Geoprobe borings and will typically be completed with a 5 foot well screen approximately 4 ft below the water table (approximately 7 ft bgs). Samples from each temporary well will be analyzed for VOCs and SVOCs, in accordance with the requirements for No. 2 fuel oil in Table 2-1 of NJAC 7:26E.

Three new permanent monitoring wells will be installed to monitor groundwater at the source area (MW-01), within the plume (MW-02), and at a downgradient sentry location (MW-03). These wells will be installed after the analytical data for the temporary wells have been evaluated; the actual locations may be adjusted from those shown on Figure 10 based on these data. The new wells will be developed and sampled using low-flow methods. The groundwater samples will be analyzed for VOCs and SVOCs, in accordance with the requirements for No. 2 fuel oil in Table 2-1 of NJAC 7:26E.

Water level measurements will be collected from the three new monitoring wells, and from nearby existing wells 812MW05 and 812MW13 (Figure 2 of Attachment A), to determine the local

groundwater flow direction. It is anticipated that a remedial investigation report will be prepared for UST 800-20.

## **11. UST 884**

UST 884 was a steel 1,000-gallon No. 2 fuel oil UST that was removed in October 2003 along with an unspecified amount of contaminated soil (Attachment U of the Reference 3). NJDEP commented that a groundwater investigation was necessary for the UST 884 area (Reference 15). A temporary well was sampled at the former UST 884 location in April 2016; 2-methylnaphthalene (150 µg/L) and total VOC TICs (981 µg/L) were detected at concentrations greater than the GWQCs (Reference 9). Based on these groundwater results, NJDEP commented additional groundwater investigation was necessary (Reference 20). Further delineation of groundwater contamination at UST 884 will be performed as described below.

Multiple field screening borings, temporary monitoring wells and permanent monitoring wells will be installed around the former UST 884 tank location (Figure 11). Field screening Geoprobe borings SCREEN1 through SCREEN6 (Figure 11) will be advanced at locations around the former UST 884 location to determine the local groundwater flow direction, which is assumed to be towards the northwest based on regional groundwater maps (Attachment A). These borings will be advanced past the water table, which is assumed to be at approximately 6 ft bgs based on previous drilling at ARE-800-TMW-05 (Reference 9). The field screening borings will be logged visually and with a PID which has proven useful for identifying fuel oil contamination at FTMM. The field results will be used to select the locations for temporary wells to assist with delineating the groundwater plume.

A total of four additional temporary monitor wells are proposed at UST 884. A line of three temporary monitor wells (TMW-01 through TMW-03) will be installed approximately 60 ft downgradient of the tank to verify the direction and lateral boundaries of the plume. A fourth temporary monitor well (TMW-04) will be installed approximately 60 ft farther downgradient to establish the downgradient extent of the plume, prior to installing a downgradient permanent sentry well. As with the field screening borings, the borings for temporary wells will be logged visually and with a PID to estimate the extent of the plume in the field. Additional field screening borings may be used to determine the downgradient extent of the plume. The temporary wells will be installed within Geoprobe borings and will typically be completed with a 5-foot well screen to approximately 4 ft below the water table (approximately 6 ft bgs). Samples will be collected from each temporary well and analyzed for VOCs and SVOCs in accordance with the requirements for No. 2 fuel oil in Table 2-1 of NJAC 7:26E.

Three new permanent monitoring wells will be installed to monitor groundwater at the source area (MW-01), within the plume (MW-02), and at a downgradient sentry location (MW-03). These wells will be installed after the analytical data for the temporary wells have been evaluated; based on these data, the actual locations may be adjusted from those shown on Figure 11. The new wells will be developed, and sampled using low-flow methods. The samples will be analyzed for VOCs and SVOCs, in accordance with the requirements for No. 2 fuel oil in Table 2-1 of NJAC 7:26E.

Water level measurements will be collected from the three new monitoring wells and from nearby existing wells 800MW01 and 800MW02 (located west and north of Building 800), to determine the

local groundwater flow direction. It is anticipated that a remedial investigation report will be prepared for UST 884.

## **12. UST 906A**

UST 906A was a steel 1,000-gallon No. 2 fuel oil UST that was removed in June 1990 (Attachment D of Reference 1). NJDEP did not approve the Army's NFA request for UST 906A due to elevated TPH levels in soil and 2-methylnaphthalene in groundwater at a concentration greater than the GWQC (Reference 14). The Army subsequently prepared a Work Plan for the UST 906A area (Reference 4), which was approved by NJDEP (Reference 16).

Field work at the UST 906A site was performed in April, May, and August 2016 and consisted of Geoprobe soil sampling near the former tank area and temporary well sampling from within and downgradient of the former UST 906A tank area. Soil sample results are presented in Table 2 and Figure 12, and as indicated, Extractable Petroleum Hydrocarbons (EPH) concentrations were greater than the NJDEP cleanup criteria of 5,100 mg/kg are present near the former tank area. The soil EPH exceedance has not been delineated in the northwest direction from the former tank site. One soil sample from boring PAR-68-SB-04 (Figure 12) was also analyzed for SVOCs and 2-methylnaphthalene in this sample (35 mg/kg) exceeded the NJDEP IGW screening level.

Groundwater analyses are presented in Table 3 and Figure 13. The groundwater sample at PAR-68-TMW-01 from the former UST 906A source area exceeded the GWQC for 1,2,2-trichloroethane (present at 4.6 µg/L) and total SVOC TICs (present at 2,719 µg/L). The groundwater sample further downgradient at PAR-68-TMW-02 exceeded the GWQC for 1,2,4-trimethylbenzene (102 µg/L), 2-methylnaphthalene (386 µg/L) and total SVOC TICs (2,319 µg/L). Based on these groundwater results, it is apparent that a groundwater plume associated with UST 906A has migrated in the north-northwest direction below Building 906 and farther downgradient an unknown distance. Therefore, additional data, as described below, are needed to delineate groundwater contamination at former UST 906A.

Multiple soil borings, temporary monitoring wells and permanent monitoring wells will be installed around the former UST 906A tank location, as shown on Figures 12 and 13. Field screening Geoprobe borings (locations PAR-68-TMW-2-1 through TMW-2-4 shown on Figure 13) were previously used in April 2016 to verify the north-northwest direction of plume migration; therefore, additional field screening borings are not proposed for the future work.

One additional soil boring (SB-07 on Figure 12) will be advanced to the northwest of the former UST 906A excavation for collection of soil samples to delineate the EPH exceedances in this direction. Three soil samples will be collected from this boring to characterize the soil with depth: one from above, one from within, and one from below the most contaminated soil interval within the boring. The soil samples will be analyzed for EPH and the sample with the highest field indications of contamination will be analyzed for the SVOCs 2-methylnaphthalene and naphthalene, in accordance with the requirements for No. 2 fuel oil in Table 2-1 of NJAC 7:26E.

A total of three temporary monitoring wells will be installed. A line of two temporary monitoring wells (TMW-03 and TMW-04 on Figure 13) will be installed approximately 100 ft downgradient of the tank to verify the lateral boundaries of the plume. The previous temporary well PAR-68-TMW-02 established the plume migration direction. An additional temporary monitoring well (TMW-05)

will be installed approximately 70 ft further downgradient to verify the downgradient extent of the plume, prior to installing a permanent downgradient sentry well. The borings for temporary wells will be logged visually and with a PID to estimate the extent of the plume in the field. Additional field screening borings may be used to determine the downgradient extent of the plume. The temporary wells will be installed within Geoprobe borings and will typically be completed with a 5 foot well screen to approximately 4 ft below the water table (approximately 5 ft bgs). Groundwater samples will be collected from each temporary well and will be analyzed for VOCs and SVOCs, in accordance with the requirements for No. 2 fuel oil in Table 2-1 of NJAC 7:26E.

Three new permanent monitoring wells will be installed to monitor groundwater at: the source area (MW-01, same location as new soil boring SB-07); within the plume (MW-02, same location as previous temporary well PAR-68-TMW-02); and at a downgradient sentry location (MW-03). These wells will be installed after the analytical data from the new temporary wells have been evaluated; the actual locations may be adjusted from those shown on Figure 13 based on these data. The new wells will be developed and sampled using low-flow methods and the groundwater samples will be analyzed for VOCs and SVOCs, in accordance with the requirements for No. 2 fuel oil in Table 2-1 of NJAC 7:26E.

Water level measurements will be collected from the three new monitoring wells and from nearby existing well M12MW14 (Figure 13) to determine the local groundwater flow direction. It is anticipated that a remedial investigation report will be prepared for UST 906A.

### **13. UST 3035**

UST 3035 was a steel 5,000-gallon No. 2 fuel oil UST that was removed in 1989. The location of former UST 3035 is not well documented and has been estimated based on the location of the former boiler room at Building 3035 (Figure 14).

As described in Reference 5, closure soil samples were not collected when former UST 3035 was removed. The SI Report Addendum was submitted to NJDEP along with a request for a NFA determination. NJDEP was unable to approve the NFA request without analytical data (Reference 17) and the Army proposed additional sampling (Reference 7) which was approved by NJDEP (Reference 18) and is the basis of the work described below.

Soil samples will be collected from three borings (SB-01, SB-02, and SB-03) (Figure 14) to support a future NFA request. Two soil samples will be collected from each boring. At each boring, a sample will be collected from approximately 8.0-8.5 ft bgs (or another interval representative of the soil below the removed tank) and from a 6-inch interval just above the water table (approximately 2 ft bgs). One of these two soil samples will be collected from the most contaminated interval encountered based on field evidence (visual, olfactory, or PID screening). If there is no field evidence of petroleum contamination, then the two soil samples will be collected from 8.0-8.5 ft bgs and from just above the water table (approximately 3 ft bgs). Each soil sample will be analyzed for total EPH with additional contingency SVOCs analyses (25 percent) for naphthalene and 2-methylnaphthalene if EPH concentrations exceed 1,000 mg/kg. These soil analyses are consistent with the requirements for No. 2 fuel oil in Table 2-1 of NJAC 7:26E. A letter report will be prepared for UST 3035 that reports the results of this investigation.

#### 14. SUMMARY

We look forward to your review of this Work Plan and approval or comments. The technical Point of Contact (POC) for this matter is Kent Friesen at (732) 383-7201 or by email at [kent.friesen@parsons.com](mailto:kent.friesen@parsons.com). Should you have any questions or require additional information, please contact me by phone at (732) 380-7064 or by email at [william.r.colvin18.civ@mail.mil](mailto:william.r.colvin18.civ@mail.mil).

Sincerely,



William R. Colvin, PMP, PG, CHMM  
BRAC Environmental Coordinator

cc: Ashish Joshi, NJDEP (e-mail and 2 hard copies)  
William Colvin, BEC (e-mail and 1 hard copy)  
Joseph Pearson, Calibre (e-mail)  
James Moore, USACE (e-mail)  
Jim Kelly, USACE (e-mail)  
Cris Grill, Parsons (e-mail)

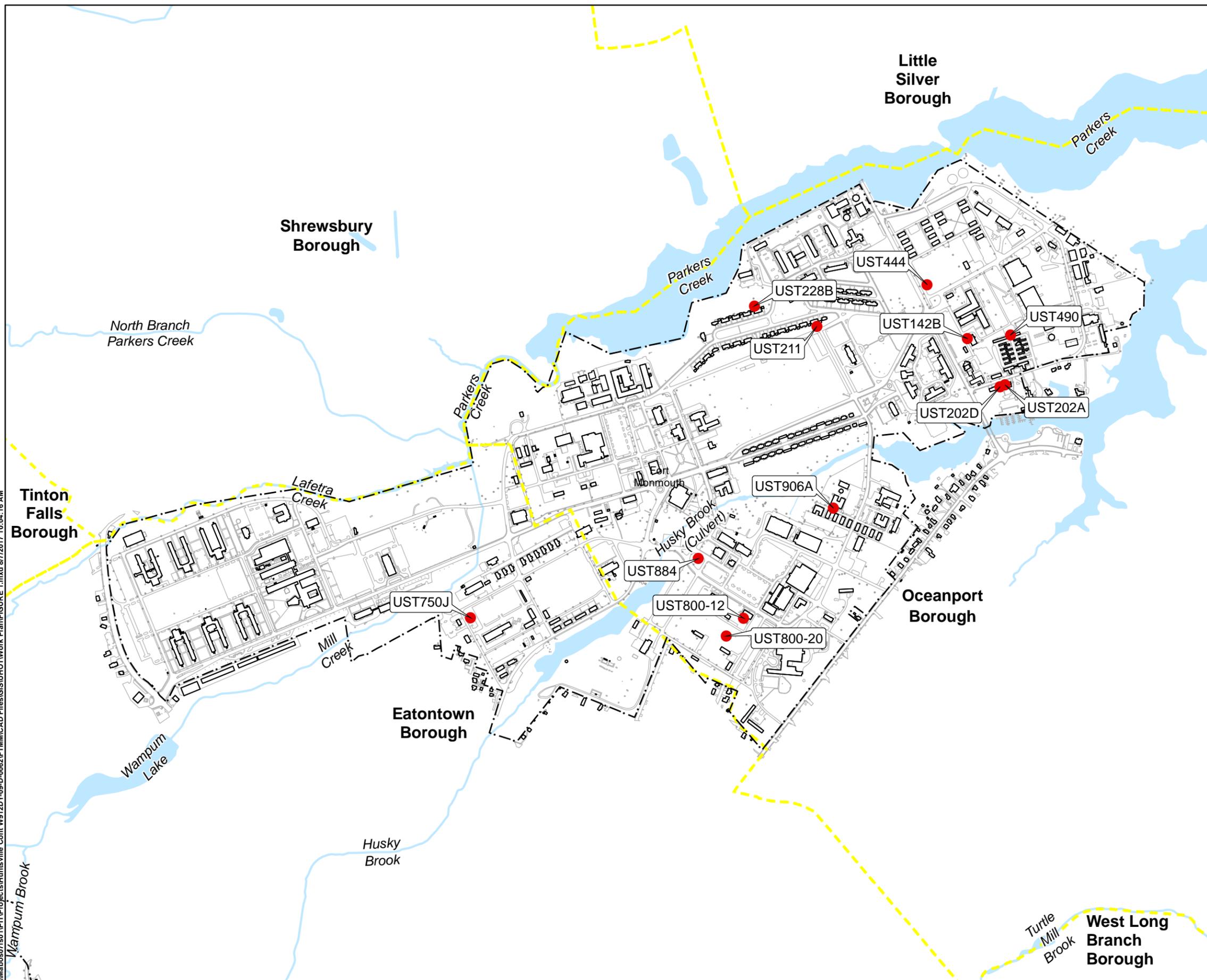
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\\mabos071s01\PT\Projects\Huntsville Cont W912DY-09-D-0062\FTMM\CAD Files\GIS\UHOT\Work Plan\FIGURE 1.mxd 8/7/2017 10:04:16 AM



**LEGEND:**

- UHOT Location
- Installation Boundary
- Municipal Boundary
- Surface Water Feature

**NOTE:**

UST3035 is located within the Charles Woods area, see text.

N

1 inch = 1,000 feet



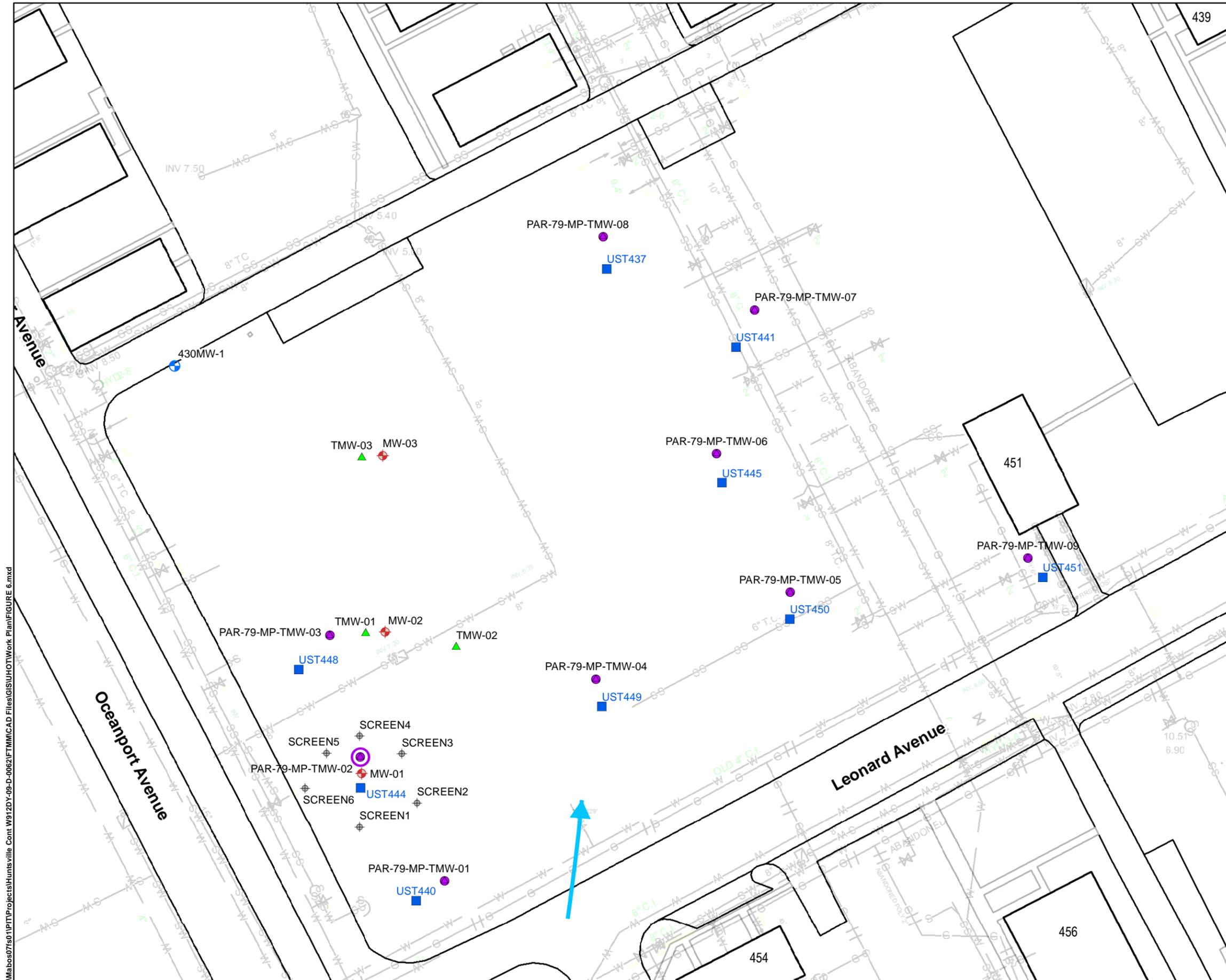
Source: FTMM Supplied CAD, 2013; ESRI Data and Maps, 2011; USGS NHD, 2012.

**PARSONS**  
 401 Diamond Drive NW,  
 Huntsville AL

**Fort Monmouth**  
 New Jersey

**UHOT LOCATIONS**

CREATED BY: RR	REVIEWED BY: KF
DATE: AUG. 2017	FIGURE NUMBER: FIGURE 1
PROJECT NUMBER: 748810-06031	FILE: FIGURE 1.mxd



**LEGEND:**

- ◆ Proposed Permanent Monitoring Well
- ▲ Proposed Groundwater Sample (Temporary Well)
- ⊕ Proposed Field Screening Boring
- Groundwater Sample (2016)
- Exceedance of Groundwater Quality Criteria
- Former UST Location
- W Water Line
- S Sanitary Sewer Line
- SW Storm Sewer Line
- G Gas Line
- ← Estimated Groundwater Flow Direction



1 inch = 60 feet



Source: FTMM Supplied CAD, 2013; U.S. Army BRAC, 2008; 2008 SI Report; USGS NHD, 2012.

**PARSONS**  
401 Diamond Drive NW,  
Huntsville AL

**Fort Monmouth**  
New Jersey

**UST 444**  
**SAMPLE LOCATIONS**

CREATED BY: <b>RR</b>	REVIEWED BY: <b>KF</b>
DATE: <b>AUG. 2017</b>	FIGURE NUMBER: <b>FIGURE 6</b>
PROJECT NUMBER: <b>748810-06031</b>	FILE: <b>FIGURE 6.mxd</b>

\\mabos071s01\PT\Projects\Huntsville Cont W912DY-09-D-0062\FTMM\CAD Files\GIS\UHOT\Work Plan\FIGURE 6.mxd

**TABLE 1  
SAMPLING SUMMARY FOR SUPPLEMENTAL UHOT WORK PLAN  
FORT MONMOUTH, NEW JERSEY**

Parcel	Location and General Rationale (see text)	Field Installation				Field Meter Readings <sup>a/</sup>	VOCs + TICs by Method 8260C <sup>b/</sup>	SVOCs + TICs by Method 8270D <sup>c/</sup>	Non-Fractionated EPH <sup>d/ e/</sup>
		SCRN	TMW	MW	SB				
<b>Groundwater</b>									
79	UST 142B (Figure 2) - 1 permanent well for low turbidity groundwater sample for release detection	--	--	1	--	1	1	1	0
81	USTs 202A and 202D (Figure 3) - Multiple groundwater samples for release detection (UST 202A) and delineation (UST 202D)	1	3	1	--	5	5	5	0
72	UST 211 (Figure 4) - multiple field screening borings and groundwater samples for delineation	7	4	3	--	14	7	7	0
79	UST 444 (Figure 6) - multiple field screening borings and groundwater samples for delineation	6	3	3	--	12	6	6	0
79	UST 490 (Figure 7) - multiple field screening borings and groundwater samples for delineation	2	4	2	--	7	7	7	0
51	UST 750J (Figure 8) - One groundwater sample for release detection	--	1	--	--	1	1	1	0
55	UST 800-12 (Figure 9) - multiple field screening borings and groundwater samples for delineation	6	4	3	--	13	7	7	0
56	UST 800-20 (Figure 10) - multiple field screening borings and groundwater samples for delineation	6	4	3	--	13	7	7	0
54	UST 884 (Figure 11) - multiple field screening borings and groundwater samples for delineation	6	4	3	--	13	7	7	0
68	UST 906A (Figure 13) - multiple groundwater samples for delineation	0	3	3	--	6	6	6	0
<b>Soil</b>									
72	UST 228B (Figure 5) - 1 soil sample for 2-methylnaphthalene analysis by SPLP <sup>f/</sup>	--	--	--	1	1	0	1 (SPLP)	0
68	UST 906A (Figure 12) - 1 additional soil boring for delineation	--	--	--	1	1	0	1	3
1	UST 3035 (Figure 14) - 3 soil borings for release detection	--	--	--	3	3	0	2	6
<b>QA/QC samples (see SAP for additional details) <sup>g/</sup></b>									
Field Duplicates (5% Sampling Frequency per media)		NA <sup>h/</sup>	NA	NA	NA	NA	3	4	1
Matrix Spike (5% Sampling Frequency per media)		NA	NA	NA	NA	NA	3	4	1
Matrix Spike Duplicate (5% Sampling Frequency per media)		NA	NA	NA	NA	NA	3	4	1
Trip Blank (1 per cooler of VOCs per media)		NA	NA	NA	NA	NA	3	0	0
QA Split (5% per media)		NA	NA	NA	NA	NA	3	4	1
Equipment Blank (5% Sampling Frequency per media)		NA	NA	NA	NA	NA	3	4	1
<b>TOTAL</b>		<b>34</b>	<b>30</b>	<b>22</b>	<b>10</b>	<b>NA</b>	<b>72</b>	<b>77</b>	<b>14</b>

**Notes:**

<sup>a/</sup> SCRN = Geoprobe boring for field screening; TMW = temporary monitor well; MW = Permanent monitor well; SB = soil boring for soil analyses

<sup>b/</sup> Field meter readings include, in soil samples: photoionization detector (PID) readings along entire soil column; and in groundwater: PID headspace pH, temperature, electrical conductivity, dissolved oxygen (DO), oxidation-reduction potential (ORP), and turbidity.

<sup>c/</sup> VOCs = volatile organic compounds; TICs = tentatively identified compounds.

<sup>d/</sup> SVOCs = semivolatile organic compounds; TICs = tentatively identified compounds.

<sup>e/</sup> EPH = extractable petroleum hydrocarbons.

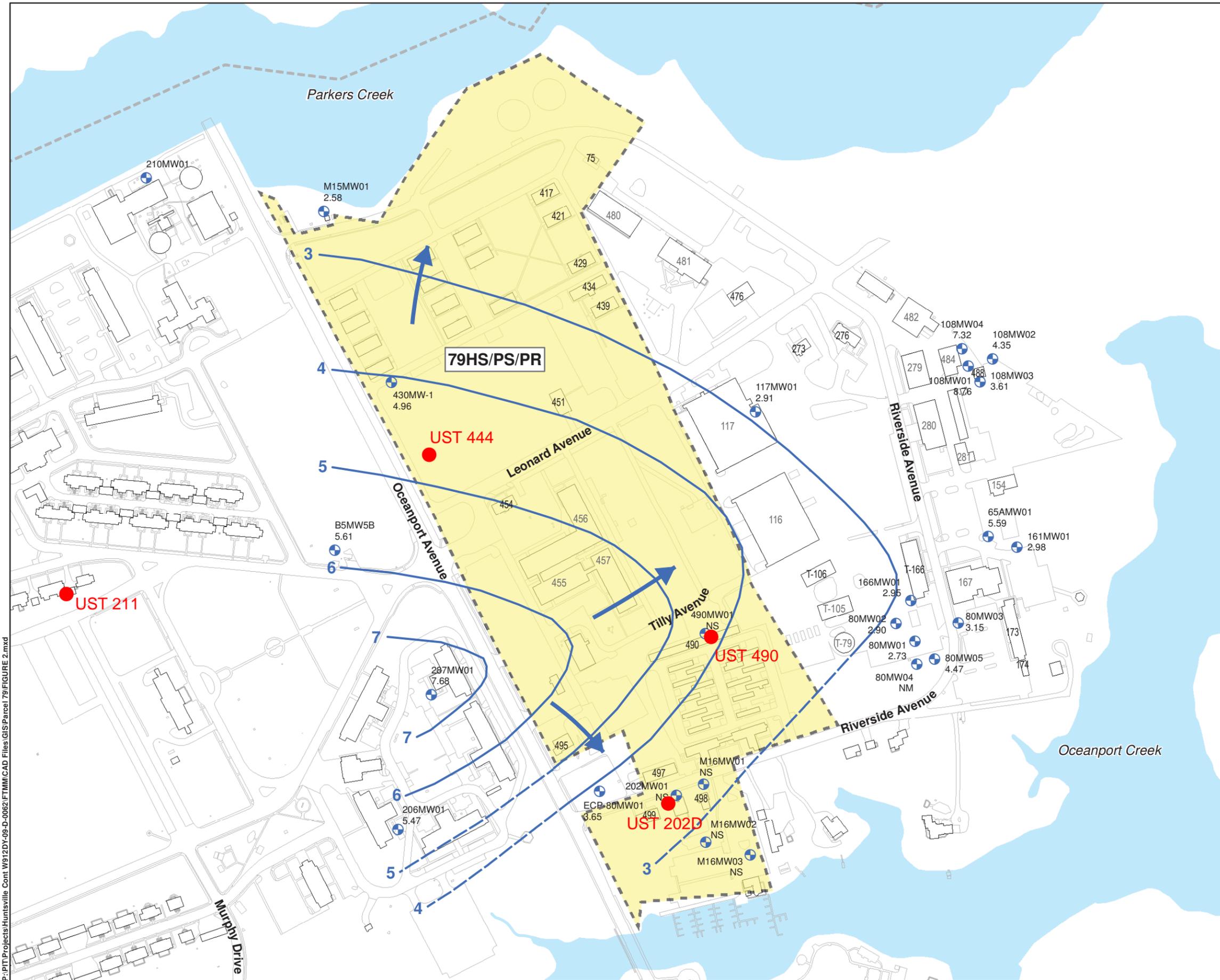
<sup>f/</sup> If any EPH concentrations in soil exceed 1000 mg/kg in any of the site samples, then minimum 25% of the samples where EPH exceeds 1000 mg/kg

<sup>g/</sup> SPLP = Synthetic Precipitation Leachate Procedure method SW1312

<sup>h/</sup> QA/QC = quality assurance/quality control; SAP = Sampling and Analysis Plan.

<sup>i/</sup> NA = not applicable.

**ATTACHMENT A**  
**Groundwater Flow Direction Maps**



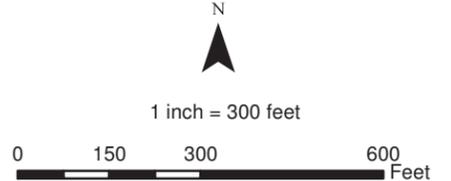
**LEGEND:**

- Shallow Monitoring Well
- Parcel 79 Boundary
- Municipal Boundary
- Surface Water Feature
- Grounwater Elevation Contour
- Inferred Grounwater Elevation Contour
- Estimated Groundwater Flow Direction

**NOTES:**

Groundwater elevations in monitoring wells 482MW01, 482MW02, 108MW01, 108MW02, 108MW03, 108MW04, 65AM01, 161MW01, 80MW03 and 80MW05 were considered anomalous compared to the fluid levels at neighboring wells and were not used to create groundwater contours.

NS = Not Surveyed  
 NM = Not Measured



Source: FTMM Supplied CAD, 2013; U.S. Army BRAC, 2008; 2008 SI Report; USGS NHD, 2012.

<b>PARSONS</b> 401 Diamond Drive NW, Huntsville AL		<b>Fort Monmouth</b> New Jersey	
<b>PARCEL 79 SHALLOW GROUNDWATER CONTOURS - OCTOBER 7, 2015</b>			
CREATED BY: <b>RR</b>	REVIEWED BY: <b>KF</b>	DATE: <b>FEB. 2016</b>	FIGURE NUMBER: <b>FIGURE 2</b>
PROJECT NUMBER: <b>748810-06010</b>	FILE: <b>FIGURE 2.mxd</b>		

P:\PT\Projects\Huntsville Cont W912\DY-09-D-0062\FTMM\CAD Files\GIS\Parcel 79\FIGURE 2.mxd



## State of New Jersey

CHRIS CHRISTIE  
Governor

DEPARTMENT OF ENVIRONMENTAL PROTECTION  
Bureau of Case Management  
401 East State Street  
P.O. Box 420/Mail Code 401-05F  
Trenton, NJ 08625-0028  
Phone #: 609-633-1455  
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BOB MARTIN  
Commissioner

KIM GUADAGNO  
Lt. Governor

May 8, 2017

William Colvin  
BRAC Environmental Coordinator  
OACSIM – U.S. Army Fort Monmouth  
PO Box 148  
Oceanport, NJ 07757

Re: *Request for No Further Action at Multiple Parcel 79 Storage Tanks Site Investigation Report Addendum*  
Fort Monmouth  
Oceanport, Monmouth County  
PI G000000032

Dear Mr. Colvin,

The New Jersey Department of Environmental Protection (Department) has completed review of the referenced report, received February 10, 2017, prepared by the Department of the Army's Office of Assistant Chief of Staff for Installation Management to present the results of additional sampling efforts at numerous above and underground storage tanks located within Parcel 79. Comments are as follows:

### **ASTs 1 & 2**

Based upon soil and ground water analytical results, it is agreed no further action is necessary.

### **UST 142B**

The request for an NFA for the PAHs found in ground water is not acceptable. The concentrations of benzo(a)anthracene is 85 times the Ground Water Quality Standard (GWQS). The concentration of benzo(a)pyrene is 149 times the GWQS, and benzo(b)fluoranthene is 97 times the GWQS. This location must be resampled using a method to reduce turbidity. Given the high concentrations when compared to samples taken from other UST locations, the Department is concerned these ground water concentrations may be indicative of actual ground water conditions, rather than the result of very turbid samples. A permanent well using low flow sampling methodology may be required to address this issue.

**UST 444**

Soil boring logs indicated odors and elevated PID readings. In addition, benzene, 2-methylnaphthalen and SVOC TICs exceeded the GWQS. As indicated in the submittal, further investigation at this location is necessary.

**USTs 202A & 202D**

As previously indicated in an email of April 17, 2017, the installation of a permanent well at a location immediately downgradient of UST 202D is recommended. Required analyses include VOs and SOVCs; the collection of SVOCs should be via low-flow.

**UST 490**

Ground water samples obtained from this location exceed the GWQS for 2-methylnaphthalene, PAHs, and SVOC TICs. The additional ground water investigations proposed must also include analyses for PAHs.

**USTs Requiring No Additional Action**

Following review of the referenced information, it is agreed no further action is necessary for the following #2 fuel USTs removed from within Parcel 79, as referenced in the above submittal:

- UST 437
- UST 440
- UST 441
- UST 445
- UST 448
- UST 449
- UST 450
- UST 451

Please contact this office if you have any questions.

Sincerely,



Linda S. Range

C: James Moore, USACE  
Rich Harrison, FMERA  
Joe Fallon, FMERA  
Joe Pearson, Calibre



## DEPARTMENT OF THE ARMY

OFFICE OF ASSISTANT CHIEF OF STAFF FOR INSTALLATION MANAGEMENT  
U.S. ARMY FORT MONMOUTH  
P.O. BOX 148  
OCEANPORT, NEW JERSEY 07757

08 February 2017

Ms. Linda Range  
New Jersey Department of Environmental Protection  
Bureau of Case Management  
401 East State Street  
PO Box 420/Mail Code 401-05F  
Trenton, NJ 08625-0028

**Subject: Request for No Further Action at Multiple Parcel 79 Storage Tanks Site  
Investigation Report Addendum  
Fort Monmouth, Oceanport, New Jersey  
PIG000000032**

### Attachments:

- A. Figure 1: Layout of Parcel 79  
Figure 2: Parcel 79 Area 75 Sample Locations  
Figure 3: Groundwater Sample Locations for Multiple USTs at Parcel 79  
Figure 4: Parcel 79 UST 142B Sample Locations  
Figure 5: Parcel 79 UST 202A and 202D Sample Locations  
Figure 6: Parcel 79 UST 490 Sample Locations
- B. Table 1: Validated Laboratory Data Results for Groundwater, Parcel 79  
Table 2: Validated Laboratory Data Results for Soil, Parcel 79
- C. Field Notes
- D. Boring Logs
- E. Analytical Data

### Previous Correspondence (not attached):

- 1. Army letter to NJDEP dated 22 April 2015, Subject: *Underground Storage Tanks within Parcel 79 Fort Monmouth, New Jersey.*
- 2. NJDEP letter to the Army dated 25 August 2015, Subject: *Underground Storage Tanks within ECP Parcel 76 dated April 2015 Fort Monmouth.*
- 3. Army letter to NJDEP dated 10 February 2016, Subject: *Response to NJDEP's August 25, 2015 Comments on the April 2015 Underground Storage Tanks within ECP Parcel 79, Fort Monmouth, New Jersey.*
- 4. NJDEP letter to Army dated 30 March 2016, Subject: *Response to NJDEP's August 25, 2015 Comments on the April 2015 Underground Storage Tanks within ECP Parcel 79 and Work Plan Addendum for Former Storage Tank Sites, Fort Monmouth, Oceanport, Monmouth County.*

Dear Ms. Range:

The U.S. Army Fort Monmouth (FTMM) Team has prepared this addendum to present the results of additional field sampling at the two Area 75 former Aboveground Storage Tanks (ASTs; designated as AST-1 and AST-2) and thirteen former Underground Storage Tanks (USTs) 142B, 202A, 202D, 437, 440, 441, 444, 445, 448, 449, 450, 451, and 490, all located within Environmental Condition of Property (ECP) Parcel 79 (Figure 1 of **Attachment A**). These USTs were unregulated heating oil tanks (UHOTs) that were identified as requiring additional sampling of groundwater. The Area 75 ASTs and USTs 202A, 202D, and 490 were also identified as requiring additional soil sampling, as described in the 10 February 2016 Parcel 79 Work Plan Addendum (Correspondence 3) and in the following subsection 1.0, 2.0, and 3.0.

One temporary groundwater monitor well was installed with a Geoprobe<sup>®</sup> rig immediately downgradient of Parcel 79 USTs 142B, 202A, 202D, 437, 440, 441, 444, 445, 448, 449, 450, and 451, and a groundwater sample was collected from each well to determine if a fuel oil release had impacted groundwater. For the Area 75 ASTs, a temporary well was installed immediately downgradient of each former tank. Three temporary wells were installed at UST 490 to delineate the extent of groundwater contamination. Groundwater samples were also collected from three permanent monitor wells (202MW01 at UST 202A, M16MW01 at 202D, and 490MW01 at UST 490). Field sampling for temporary wells was completed on 3, 4, and 5 August 2016. Field sampling for permanent wells was completed on 25 May 2016. All groundwater samples were analyzed for volatile organic compounds (VOCs) and semivolatile organic compounds (SVOCs) plus tentatively identified compounds (TICs), in accordance with the requirements for No. 2 Fuel Oil in Table 2-1 of the New Jersey Administrative Code (NJAC) 7:26E Technical Requirements for Site Remediation.

Soil samples were also collected from borings advanced with a Geoprobe<sup>®</sup> rig at the Area 75 ASTs and USTs 202A, 202D, and 490 to assess current concentrations and vertical extent of extractable petroleum hydrocarbons (EPH) in soil. Field sampling was completed on 12 and 13 April 2016. One soil sample from boring PAR-79-490-SB-04 (at UST 490) was also analyzed for the additional contingency SVOC analytes naphthalene and 2-methylnaphthalene due to EPH concentration exceeding 1,000 mg/kg (NJDEP, 2010<sup>1</sup>).

It is important to note that the occurrence of polycyclic aromatic hydrocarbons (PAHs) in Parcel 79 groundwater warrants additional explanation. Exceedances of the NJDEP Ground Water Quality Criteria (GWQC) for multiple PAHs occurred at 12 of the 17 temporary wells during the August 2016 sampling. In contrast, none of the seven groundwater samples collected at permanent monitor wells 290MW01, M16MW01, and 490MW01 had any PAH exceedances. Furthermore, another nearby permanent well within Parcel 79 (430MW01; see Figure 3 of **Attachment A**) had no PAHs detected in samples collected in 1995, as reported in Attachment O of Correspondence 1. These relatively low solubility, high molecular weight PAHs such as benzo(a)pyrene have been

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<sup>1</sup> NJDEP, 2010. *Protocol for Addressing Extractable Petroleum Hydrocarbons*. Site Remediation Program. Version 5.0. August 9.

encountered at other FTMM locations within surficial soils and fill that are unrelated to fuel oil USTs. Evidence of soil fill including brick and coal fragments were encountered within several Parcel 79 soil borings; please see **Attachment D**. Therefore, the PAH groundwater exceedances at Parcel 79 temporary wells were most likely the result of entrainment of soil resulting in sample turbidity, which is common with temporary well grab groundwater samples. In contrast, fuel oil releases are typically characterized by the specific PAHs naphthalene and 2-methylnaphthalene in groundwater. Therefore, temporary monitor wells with PAH exceedances that were not characteristic of fuel oil (i.e., without signature exceedances of naphthalene and 2-methylnaphthalene) are not considered indicative of a fuel oil release to groundwater.

The locations of the field samples are presented in Figures 1 through 6 of **Attachment A**. The analytical results and exceedances of applicable NJDEP criteria are provided in **Attachment B**. Field notes are provided in **Attachment C**, and boring logs are provided in **Attachment D**. The samples were analyzed by ALS Environmental; analytical data packages are provided in **Attachment E**.

#### 1.0 AREA 75 ABOVE-GROUND STORAGE TANKS

AST-1 and AST-2 were bulk above-ground fuel oil tanks that were removed in 1995 as described in Attachment E of Correspondence 1. Four soil borings were sampled in response to NJDEP comments on the 10 February 2016 Work Plan Addendum (Correspondence 4). Soil samples were analyzed for EPH; additional contingency SVOC analysis for naphthalene and 2-methylnaphthalene was not required due to EPH concentrations not exceeding 1,000 mg/kg (NJDEP, 2010).

Soil analytical results are presented in Table 2 (**Attachment B**). The maximum total EPH concentration encountered in soil was 319 mg/kg, which is below the NJ Residential Direct Contact Soil Remediation Standard (RDCSRS) of 5,100 mg/kg. The results from the soil borings at AST-1 and AST-2 indicate that further soil investigation is not warranted.

Temporary well PAR-79-A75-TMW-01 was installed, sampled, and subsequently abandoned at the location of AST-2, and temporary well PAR-79-A75-TMW-02 was installed, sampled, and subsequently abandoned at the location of AST-1 (see Figure 2 of **Attachment A**). Groundwater was encountered at approximately 3 to 4 feet below ground surface (ft bgs) in the soil borings, and at 4 ft bgs and 9 ft bgs at the two wells; please see **Attachments C and D**. As shown on Table 2 of **Attachment B**, there were seven PAH exceedances of the GWQC (benzo[a]anthracene, benzo[a]pyrene, benzo[b]fluoranthene, benzo[k]fluoranthene, chrysene, dibenz[a,h]anthracene, and indeno[1,2,3-cd]pyrene) in the primary sample and four exceedances (benzo[a]anthracene, benzo[a]pyrene, benzo[b]fluoranthene, and indeno[1,2,3-cd]pyrene) in the duplicate sample at PAR-79-A75-TMW01. There were three exceedances (benzo[a]anthracene, benzo[a]pyrene, and benzo[b]fluoranthene) of the GWQC in the groundwater sample at PAR-79-A75-TMW02. As indicated above, the PAH exceedances are attributable to entrainment of soil resulting in sample turbidity associated with the installation of the temporary wells. None of the groundwater samples collected in May 2016 from permanent monitor wells associated with Parcel 79 had any PAH exceedances. Another nearby permanent well within Parcel 79 (430MW01) had no PAHs detected

in samples collected in 1995. There were no exceedances of the GWQC indicative of fuel oil (i.e., naphthalene or 2-methylnaphthalene).

## **2.0 MULTIPLE PARCEL 79 UNDERGROUND STORAGE TANKS**

The results of the sampling and analyses are provided below for each of the ten UHOT sites shown on Figures 3 and 4 in **Attachment A**.

### **UST 142B**

UST 142B was a residential fuel oil tank that was removed in 1994 as described in Attachment H of Correspondence 1. Temporary well PAR-79-142-TMW-01 was installed, sampled, and subsequently abandoned (Figure 4 of **Attachment A**). Groundwater was encountered at approximately 7 ft bgs; please see **Attachment C**. As shown on Table 2 of **Attachment B**, there were seven GWQC exceedances (benzo[a]anthracene, benzo[a]pyrene, benzo[b]fluoranthene, benzo[k]fluoranthene, chrysene, dibenz[a,h]anthracene, and indeno[1,2,3-cd]pyrene). As previously discussed, the PAH exceedances in this temporary well sample are attributable to entrainment of soil resulting in sample turbidity. There were no exceedances of the GWQC indicative of fuel oil (i.e., naphthalene or 2-methylnaphthalene)

### **UST 437**

UST 437 was a residential fuel oil tank that was removed in 2010 as described in Attachment Q of Correspondence 1. Temporary well PAR-79-MP-TMW-08 was installed, sampled, and subsequently abandoned (Figure 3 of **Attachment A**). Groundwater was encountered at approximately 6 ft bgs; please see **Attachment C**. As shown on Table 2 of **Attachment B**, there were no exceedances of the GWQC.

### **UST 440**

UST 440 was a residential fuel oil tank that was removed in 2010 as described in Attachment R of Correspondence 1. Temporary well PAR-79-MP-TMW-01 was installed, sampled, and subsequently abandoned (Figure 3 of **Attachment A**). Groundwater was encountered at approximately 5 ft bgs; please see **Attachment C**. As shown on Table 2 of **Attachment B**, benzo(a)anthracene (0.23 µg/l) and benzo(a)pyrene (0.13 µg/l) slightly exceeded the GWQC (0.1 µg/l) neither of which are indicative of fuel oil. As previously discussed, the PAH exceedances are attributable to entrainment of soil resulting in sample turbidity associated with the installation of the temporary well. There were no exceedances of the GWQC indicative of fuel oil (i.e., naphthalene or 2-methylnaphthalene).

### **UST 441**

UST 441 was a residential fuel oil tank that was removed in 2010 as described in Attachment D of Correspondence 1. Temporary well PAR-79-MP-TMW-07 was installed, sampled, and subsequently abandoned (Figure 3 of **Attachment A**). Groundwater was encountered at approximately 8 ft bgs; please see **Attachment C**. As shown on Table 2 of **Attachment B**,

benzo(a)anthracene (0.34 µg/l), benzo(a)pyrene (0.29 µg/l), and benzo(b)fluoranthene (0.31 µg/l) slightly exceeded the GWQC (0.1, 0.1, and 0.2 µg/l, respectively). As previously discussed, the PAH exceedances are attributable to entrainment of soil resulting in sample turbidity associated with the installation of the temporary well. There were no exceedances of the GWQC indicative of fuel oil (i.e., naphthalene or 2-methylnaphthalene).

#### UST 444

UST 444 was a residential fuel oil tank that was removed in 2010 as described in Attachment V of Correspondence 1. Temporary well PAR-79-MP-TMW-02 was installed, sampled, and subsequently abandoned (Figure 3 of **Attachment A**). Groundwater was encountered at approximately 4 ft bgs; please see **Attachment C**. As shown on Table 2 of **Attachment B**, one VOC (benzene) and three SVOCs (2-methylnaphthalene, benzo[a]anthracene, and benzo[a]pyrene) exceeded the GWQC. The total sum of SVOC TICs also exceeded the GWQC. There were no exceedances of the GWQC indicative of fuel oil (i.e., naphthalene or 2-methylnaphthalene).

#### UST 445

UST 445 was a residential fuel oil tank that was removed in 2010 as described in Attachment U of Correspondence 1. Temporary well PAR-79-MP-TMW-06 was installed, sampled, and subsequently abandoned (Figure 3 of **Attachment A**). Groundwater was encountered at approximately 5 ft bgs; please see **Attachment C**. As shown on Table 2 of **Attachment B**, there were no exceedances of the GWQC.

#### UST 448

UST 448 was a residential fuel oil tank that was removed in 2010 as described in Attachment W of Correspondence 1. Temporary well PAR-79-MP-TMW-03 was installed, sampled, and subsequently abandoned (Figure 3 of **Attachment A**). Groundwater was encountered at approximately 4 ft bgs; please see **Attachment C**. As shown on Table 2 of **Attachment B**, there were no exceedances of the GWQC.

#### UST 449

UST 449 was assumed to be a residential fuel oil tank because of information identified during a records review. Soil samples were collected in 2010, and a soil sample for a test trench was excavated in May 2010. The results of the test trench and visual evidence indicated that a release had occurred, but no tank was found. The soils had a strong petroleum odor as described in Attachment X of Correspondence 1. Temporary well PAR-79-MP-TMW-04 was installed, sampled, and subsequently abandoned (Figure 3 of **Attachment A**). Groundwater was encountered at approximately 5 ft bgs; please see **Attachment C**. As shown on Table 2 of **Attachment B**, benzo(a)anthracene (0.25 µg/l), benzo(a)pyrene (0.13 µg/l), and benzo(b)fluoranthene (0.22 µg/l) slightly exceeded the GWQC (0.1, 0.1, and 0.2, respectively). As previously discussed, the PAH exceedances are attributable to entrainment of soil resulting in

sample turbidity associated with the installation of the temporary well. There were no exceedances of the GWQC indicative of fuel oil (i.e., naphthalene or 2-methylnaphthalene).

#### **UST 450**

UST 450 was a residential fuel oil tank that was removed in 2010 as described in Attachment Y of Correspondence 1. Temporary well PAR-79-MP-TMW-05 was installed, sampled, and subsequently abandoned (Figure 3 of **Attachment A**). Groundwater was encountered at approximately 5 ft bgs; please see **Attachment C**. As shown on Table 2 of **Attachment B**, there were no exceedances of the GWQC.

#### **UST 451**

UST 451 was a residential fuel oil tank that was removed in 2010 as described in Attachment Z of Correspondence 1. Temporary well PAR-79-MP-TMW-09 was installed, sampled, and subsequently abandoned (Figure 3 of **Attachment A**). Groundwater was encountered at approximately 4 ft bgs; please see **Attachment C**. As shown on Table 2 of **Attachment B**, benzo(a)anthracene (0.18 µg/l) slightly exceeded the GWQC (0.1 µg/l) in this groundwater sample. As previously discussed, the PAH exceedances are attributable to entrainment of soil resulting in sample turbidity associated with the installation of the temporary wells. There were no exceedances of the GWQC indicative of fuel oil (i.e., naphthalene or 2-methylnaphthalene).

### **3.0 USTS 202A AND 202D**

USTs 202A and 202D were residential fuel oil tanks that were removed in 2001 as described in Attachment J of Correspondence 1. Three soil borings (see Figure 5 of **Attachment A**) were sampled in response to NJDEP comments on the 10 February 2016 Work Plan Addendum (Correspondence 4). Soil samples were analyzed for EPH; additional contingency SVOC analyses for naphthalene and 2-methylnaphthalene was not required (NJDEP, 2010). Soil analytical results are presented in Table 2 (Attachment B). The maximum total EPH concentration encountered in soil was 345 mg/kg. The results from the soil borings at USTs 202A and 202D indicate that further soil investigation is not warranted.

Temporary well PAR-79-202-TMW-01 was installed, sampled, and subsequently abandoned (Figure 5 of **Attachment A**). Groundwater was encountered at approximately 2 to 5 ft bgs; please see **Attachments C and D**. Permanent monitor wells 202MW01 and M16MW02 were previously installed at this site, and were also sampled (Figure 5 of **Attachment A**). Well 202MW01 was installed near the former location of UST 202D in August 2011 but apparently was never previously sampled. Well M16MW02 was constructed in March 2011 and is located downgradient of USTs 202A and 202D.

As shown on Table 2 of **Attachment B**, there was one slight PAH exceedance (benzo[a]anthracene at 0.19 µg/l) of the GWQC (0.1 µg/l) in the temporary well sample. There were no exceedances of the GWQC in the permanent well samples. As previously discussed, the PAH exceedances are attributable to entrainment of soil resulting in sample turbidity associated with the installation of

the temporary well. There were no exceedances of the GWQC indicative of fuel oil (i.e., naphthalene or 2-methylnaphthalene).

#### 4.0 UST 490

UST 490 was a residential fuel oil tank that was removed in 1990 as described in Attachment CC of Correspondence 1. Four soil borings were sampled in response to NJDEP comments on the 10 February 2016 Work Plan Addendum (Correspondence 4), and soil samples were analyzed for EPH.

Total EPH concentrations of 1,600 mg/kg in one of the soil samples (the 3.5 to 4 ft bgs interval of boring PAR-79-490-SB-04; see Table 2 of **Attachment B**) exceeded the contingency analysis threshold of 1,000 mg/kg (NJDEP, 2010), and therefore this sample was also analyzed for naphthalene and 2-methylnaphthalene. The 2-methylnaphthalene concentration of 9,000  $\mu\text{g}/\text{kg}$  in this sample exceeded the NJDEP IGW screening level of 8,000  $\mu\text{g}/\text{kg}$ , but did not exceed the RDCSRS. Additional Synthetic Precipitation Leachate Procedure (SPLP) analysis of this soil sample was not performed, as prescribed in NJDEP (2010).

Three temporary wells (PAR-79-490-TMW-01, PAR-79-490-TMW-02, and PAR-79-490-TMW-03) were installed, sampled for groundwater, and subsequently abandoned (Figure 6 of **Attachment A**). Existing monitor well 490MW01, installed in August 2011, was also sampled. (**Attachment A**). Groundwater was encountered at approximately 2 to 3.5 ft bgs; please see **Attachments C and D**.

As shown on Table 2 of **Attachment B**, PAH exceedances of the GWQC were encountered at temporary wells PAR-79-490-TMW01 (benzo[a]anthracene) and PAR-79-490-TMW02 (benzo[a]anthracene and benzo[b]fluoranthene). As previously discussed, the PAH exceedances are attributable to entrainment of soil resulting in sample turbidity associated with the installation of the temporary wells. There were no exceedances of the GWQC indicative of fuel oil (i.e., naphthalene or 2-methylnaphthalene). There were no exceedances of the GWQC in the three groundwater samples collected from permanent well 490MW01. However, there were GWQC exceedances for 2-methylnaphthalene and the sum of SVOC TICs in the groundwater sample from PAR-79-490-TMW03, which was located downgradient of the former UST 490.

#### 5.0 SUMMARY

No Further Action determinations are requested for soil and groundwater for the two ASTs at Area 75 and USTs 202A and 202D. No Further Action determinations are requested for groundwater for USTs 142 B, 437, 440, 441, 445, 448, 449, 450, and 451. Additional work would be needed for NFA determinations to be made at USTs 490 and 444. The technical Point of Contact (POC) for this matter is Kent Friesen at (732) 383-7201 or [kent.friesen@parsons.com](mailto:kent.friesen@parsons.com). Should you have any questions or require additional information, please contact me by phone at (732) 380-7064 or [william.r.colvin18.civ@mail.mil](mailto:william.r.colvin18.civ@mail.mil).

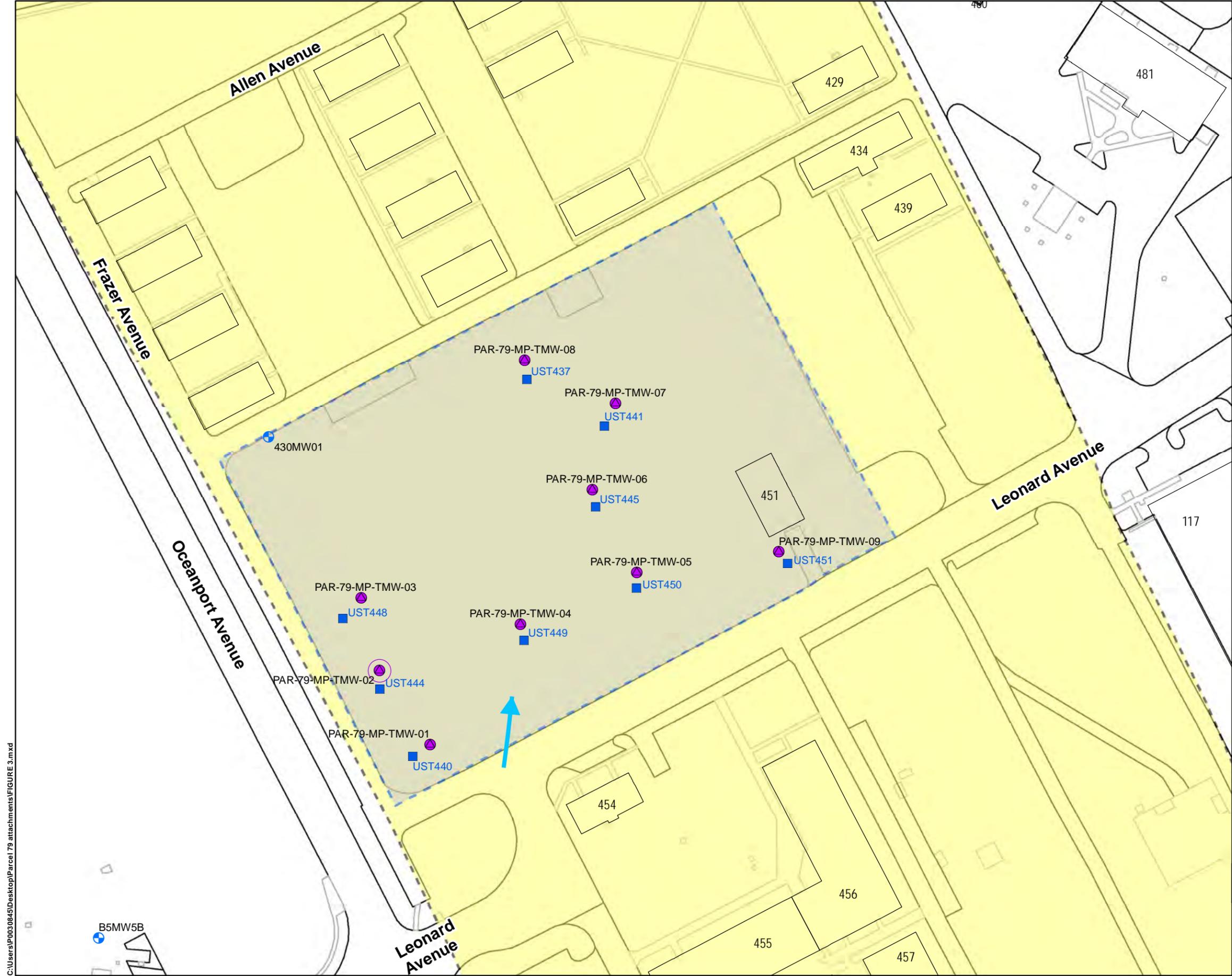
Linda S. Range, NJDEP  
Request for NFA at Multiple Parcel 79 Storage Tanks  
08 February 2017  
Page 8 of 8

Sincerely,

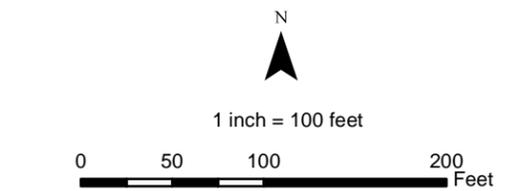


William R. Colvin, PMP, CHMM, PG  
BRAC Environmental Coordinator

cc: Linda Range, NJDEP (3 hard copies)  
Delight Balducci, HQDA ACSIM (CD)  
Joseph Pearson, Calibre (CD)  
James Moore, USACE (CD)  
Jim Kelly, USACE (CD)  
Cris Grill, Parsons (CD)



- LEGEND:**
- Parcel 79 Boundary
  - Municipal Boundary
  - Multiple UST Area
  - Former UST Location
  - Groundwater Sample
  - Exceedance of Groundwater Quality Criteria
  - Estimated Groundwater Flow Direction
  - Shallow Monitoring Well



Source: FTMM Supplied CAD, 2013; U.S. Army BRAC, 2008; 2008 SI Report; USGS NHD, 2012.

<b>PARSONS</b> 401 Diamond Drive NW, Huntsville AL		<b>Fort Monmouth</b> <b>New Jersey</b>	
<b>GROUNDWATER SAMPLE LOCATIONS FOR MULTIPLE USTS AT PARCEL 79</b>			
CREATED BY: <b>RR</b>		REVIEWED BY: <b>KF</b>	
DATE: <b>JAN. 2017</b>		FIGURE NUMBER: <b>FIGURE 3</b>	
PROJECT NUMBER: <b>748810-06010</b>		FILE: <b>FIGURE 3.mxd</b>	

C:\Users\p0030845\Desktop\Parcel 79 attachments\FIGURE 3.mxd

B5MW5B



## DEPARTMENT OF THE ARMY

OFFICE OF ASSISTANT CHIEF OF STAFF FOR INSTALLATION MANAGEMENT  
U.S. ARMY FORT MONMOUTH  
P.O. 148  
OCEANPORT, NEW JERSEY 07757

February 10, 2016

Ms. Linda Range  
New Jersey Department of Environmental Protection  
Bureau of Case Management  
401 East State Street  
PO Box 420/Mail Code 401-05F  
Trenton, NJ 08625-0028

**Re: Response to NJDEP's August 25, 2015 Comments on the April 2015 *Underground Storage Tanks Within ECP Parcel 79, Fort Monmouth, New Jersey*  
PI G000000032**

Dear Ms. Range:

Fort Monmouth and Parsons have reviewed the New Jersey Department of Environmental Protection (NJDEP) comments on the subject submittal for ECP Parcel 79, as documented in your letter dated August 25, 2015. We appreciate this opportunity to work with you on Parcel 79. Responses to your comments are provided below, for your review and concurrence or further comments.

**A. Attachment E – Areas 74 and 75, Aboveground Storage Tanks and Associated Piping**

**A1. COMMENT:** *Area 75 – Aboveground Storage Tanks: Two 210,000 gallon aboveground storage tanks, utilized from the 1940s through the 1980s, were removed in May of 1995. Based upon a review of the analytical results and chain of custody (COC) as well as a conversation with Joe Fallon this date, who collected the samples, it appears 13 samples were collected in the proximity of AST A - all analytical results were below 1000 ppm, and 15 samples in the proximity of AST B. Per Mr. Fallon, the samples would have been collected both at/along the perimeter and within the footprint/center of the former ASTs, mainly at 0-6", but also at deeper intervals (as indicated on the COCs). Although it appears sampling frequency and location may have been adequate, it is unclear the analytical parameter requirements, either those in effect at the time of sampling or currently in effect, were met as regarding contingency analysis for AST B. Of the 15 samples apparently collected for AST B, 5 exceeded the trigger for additional analyses on 25% of those exceeding 1000 ppm (VOs+ 10 at the time of sampling, 2-methylnaphthalene and naphthalene per current guidance). It is also unclear where the ground water sampling points referenced for Area 74 were located relative to the former ASTs of Area 75?*

**A1. RESPONSE:** Additional soil and groundwater sampling is proposed at Area 75 as described in the attached *Parcel 79 Work Plan Addendum*. Soil sample results from 1995 were reported in the April 2015 *Underground Storage Tanks Within ECP Parcel 79* submittal; however, there is some uncertainty regarding the sample locations because a sample map was not located. For example, the highest Total Petroleum Hydrocarbons (TPH) concentrations in soil were encountered in samples labeled as "AST-B," but it is unclear to which of the two ASTs these sample designations referred. Further, there was uncertainty regarding the locations of groundwater samples collected for adjoining

Area 74. Therefore, soil and groundwater from both former AST locations (AST-1 and AST-2 as described in the attached **Parcel 79 Work Plan Addendum**) will be re-sampled to characterize the current concentration of TPH constituents in this area and, if necessary, the need for any contingency analyses in soil. Soil samples from 4 boring locations within the vicinity of the former ASTs, and groundwater samples from two of these four locations, will be collected as described in the attached **Parcel 79 Work Plan Addendum**.

**A2: COMMENT:** *Area 74 -Associated Piping: As per Enclosure 4 of Attachment E, the underground piping was previously NFAed.*

**A2: RESPONSE:** Agreed.

**B. Underground Storage Tanks**

**B1. COMMENT:** *In addition to those USTs previously granted a designation of NFA, it is agreed no further action is necessary for the following #2 fuel USTs:*

*UST 29-1 – 1000 gallon steel*

*UST 142A – 1000 gallon steel; C93-3714*

*UST 401-26 – 1000 gallon steel*

*UST 416-32 – 1000 gallon steel*

*UST 430B-45 – 550 gallon tank\*; C93-3987*

*\*note – page 1, Section 1.1 and scrap receipt each indicate UST was steel; Att B states fiberglass*

*UST 443-49 – 1080 gallon steel*

*UST 474 – 1000 gallon steel*

**B1. RESPONSE:** Agreed. File photographs of UST 430B-45 confirm that it was a steel tank.

**B2. COMMENT:** *Although the 2008 Site Investigation previously performed did include ground water sampling, a review of the sampling points did not indicate they were placed within distances sufficient to allow for adequate evaluation of the USTs referenced below. Based upon soil contamination extending to within 2' of, and in many cases, into the ground water table (GWT), a ground water investigation is necessary at the following UST locations (the elimination of the sheen via excavation, as referenced for USTs 441, 444 is insufficient):*

*UST 142B (Attachment H)*

*UST 437 (Attachment Q)*

*UST 440 (Attachment R)*

*UST 441 (Attachment S)*

*UST 444 (Attachment U)*

*UST 448 (Attachment W); please specify if well P79-E2 is sufficiently proximate to comply with regulations/guidance*

*UST 449 (Attachment X)*

*UST 450 (Attachment Y)*

*UST 451 (Attachment Z)*

**B2. RESPONSE:** Additional groundwater sampling is proposed to assess the potential for impacts to groundwater from each of the UST sites listed above, as described in the attached **Parcel**

**79 Work Plan Addendum.** The 2008 SI sample P79-E2 was slightly displaced from the former UST 448 location and so additional sampling near this UST location will be performed. Also, UST 445 has been added to this list (see Response B3 below). A total of 10 groundwater samples will be collected from temporary well locations downgradient of these former USTs.

**B3. COMMENT:** *Though it is understood no evidence was found of a tank remaining in the below referenced locations during geophysical or trenching activities, a tank was noted as present in historic Army material, e.g. 1956 Fuel Storage Map, while Attachment 1 indicates heating oil USTs may remain between Tilly Avenue and Leonard Avenue. No soil sampling was apparently performed in any of these locations. Unless all tanks, former or current, have been evaluated in accordance with the applicable Departmental regulations and guidance documents, the NJDEP cannot comment as to the absence or presence of a petroleum discharge. The request on page 7 of 7 for designation of an NFA for the following USTs cannot be granted unless the necessary sampling is performed at each:*

*UST/Bldg. No. 168 (Attachment I)*

*UST/Bldg. No. 169 (Attachment I)*

*UST/Bldg. No. 407*

*UST/Bldg. No. 415*

*UST/Bldg. No. 424*

*UST/Bldg. No. 425*

*UST/Bldg. No. 435 (Attachment P)*

*UST/Bldg. No. 438*

*UST/Bldg. No. 442*

*UST/Bldg. No. 455 (Attachment V)*

*UST/Bldg. No. 456 (Attachment AA consisted of only analytical data, from a single sample – 6-12”; information provided is insufficient for evaluation/comment)*

*USTs/Bldg. No.s 457 through 467*

*UST/Bldg. No.s 469 through 473*

*UST/Bldg. No. 476*

*UST/Bldg. No. 488*

*UST/Bldg. No. 489*

**B3. RESPONSE:** As discussed in the April 2015 *Underground Storage Tanks Within ECP Parcel 79* submittal, the Army has conducted adequate due diligence to assess the presence of USTs within Parcel 79, including the use of geophysical survey techniques, historical maps and metal detectors to locate USTs. Since there were no indications of USTs at these sites, the Army is not proposing additional assessment work at the above locations.

Note that Attachment V in the April 2015 *Underground Storage Tanks Within ECP Parcel 79* submittal provides analytical data for UST 445, not UST 455 as noted above. There was no tank removed or analytical data collected at the Building 455 location; however, the Army removed an UST and collected analytical data in support of closure at UST 445. Therefore, we request that NJDEP re-evaluate UST/Bldg. No. 445 as described in Attachment V of the April 2015 *Underground Storage Tanks Within ECP Parcel 79* submittal. In anticipation of NJDEP’s request to address a potential data need, one additional groundwater sample is proposed from a location

downgradient of UST 445 to assess the potential for impact to groundwater, as described in the attached *Parcel 79 Work Plan Addendum*.

Although Building 433 was not specifically mentioned in the above comment, the Army has no record or geophysical evidence of an UST at former Building 433, and therefore the Army is not proposing additional assessment work at the Building 433 location.

**B4. COMMENT:** *While not indicated as present on the 1956 Fuel Storage map, nor found during geophysical survey activities, the 2014 ECP UHOT Report indicates a potential for the presence of an UST at several additional locations. Although no tank was found, insufficient information (sampling) has been submitted to allow for comment as to the presence or absence of a discharge for the following:*

*UST/Bldg. No. 170 (Attachment I)*

*UST/Bldg. No. 171 (Attachment I)*

*UST/Bldg. No. 408*

*UST/Bldg. No. 436*

*UST/Bldg. No. 468*

**B4. RESPONSE:** Comment acknowledged. As discussed in the April 2015 *Underground Storage Tanks Within ECP Parcel 79* submittal, the Army has conducted adequate due diligence to assess the presence of USTs within Parcel 79, including the use of geophysical survey techniques, historical maps and metal detectors to locate USTs. Since there were no indications of USTs at these sites, the Army is not proposing additional assessment work at the above locations. If the Army has creditable evidence of a potential release, then we will evaluate these locations to achieve regulatory acceptance and site/parcel closure. However, in absence of any new evidence, we believe that the Army has done an adequate level of due diligence.

**C. Attachments J, K & L – USTs at Former Building 202**

**C1. COMMENT:** *Four USTs were noted as present, and removed (although the ECP UHOT report indicates high potential for the continued presence of two USTs), at the former building, the specific locations of which two (202A & 202B), were not indicated. Although apparently no discharge was associated with USTs 202B or 202C (the submittal implies no soils were removed at either UST prior to the sampling which indicated non-detect TPH levels), discharges were associated with both USTs 202A and 202D.*

*The affected soils at UST 202A were removed to 5.5', likely extending to within 2' of or into the ground water table, in this area, and contained almost 8,000 ppm TPHC, the level referenced in the Department's guidance (<http://www.nj.gov/dep/srp/guidance/rs/#phc>) as the residual product/free product limit. As such, it is possible former UST 202A could have contributed to the levels of ground water contamination noted at UST 202D. An NFA at this time is, therefore, not appropriate.*

*As indicated in the submittal, ground water was found to contain benzene at low levels, 2-methylnaphthalene, and BN TICs in a sampling event performed in June of 2011 at UST 202D. An NFA of the soils, as requested, is not appropriate at this time. Insufficient information is known relative to the ground water contamination in the area, including the current extent or levels of contamination.*

**C1. RESPONSE:** Additional soil and groundwater sampling is proposed at former USTs 202A and 202D to assess the potential for impacts to groundwater, as described in the attached *Parcel 79 Work Plan Addendum*. This will include sampling from existing well 202MW01, which was installed in August 2011 but apparently not yet sampled. Soil samples from 3 boring locations near the former USTs 202A and 202D, and groundwater samples from one of these borings and two existing monitor wells, will be collected as described in the attached *Parcel 79 Work Plan Addendum*.

We respectfully request that NJDEP reconsider approving NFA for USTs 202B and 202C based on the soil results previously submitted (Attachments K and L of the April 2015 *Underground Storage Tanks Within ECP Parcel 79*). Following tank removals, there was no requirement for contaminated soil excavation, and all TPH soil results were nondetected for each of these tank sites.

**D. Attachment CC/UST 490- aka UST 490-58**

**D1. COMMENT:** *Although a Site Assessment Compliance Statement and Standard Reporting Form for tank removal are reported in Attachment CC as submitted to the DEP in 1991, as indicated in the submittal, there is no record of NFA approval from the NJDEP; no soil sampling had been performed at that time.*

*Soil sampling collected from the 6-6.5' interval was performed in 2005, indicating levels of TPH ranged from 2981 to 8762 ppm, with VOs below criteria. Ground water samples were below the Ground Water Quality Standards (GWQS) in effect at the time, however, no report was submitted; 2-methylnaphthalene was found at 32.13 ppb. Additional sampling (actual locations of which are unclear) performed in May of 2010 (prior to phase-in of EPH), at the 3.5-4' interval – the rationale for selection of that interval is unreported – found TPH ranging from ND to 5941.76 ppm. Although the required contingency sampling was reported as exhibiting no exceedences in the submittal, the Impact to Ground Water Standard for 2-methylnaphthalene of 8 ppm was exceeded in Sample B4, with a result of 30.32 ppm. Ground water sampling conducted in May and July of 2010 found elevated levels of 2-methylnaphthalene, as well as elevated BN TICs.*

*No figure identifying the location of the May 2010 sampling was provided, however, it appears contamination above the 5100 ppm criterion may be present from at least the 3.5 to the 6.5' interval, and deeper. TPH/EPH cannot exceed the residual product/free product limit of 8,000 mg for No. 2 fuel; 2-methylnaphthalene above standard in the soil as well as the ground water is present. Compliance averaging of the soils is not appropriate. Additional characterization of the ground water contamination is required. The current conditions of the ground water and the extent of any contamination must be determined, at which time further decisions regarding remedial requirements may be determined.*

**D1. RESPONSE:** Additional soil and groundwater sampling is proposed at former UST 490, as described in the attached *Parcel 79 Work Plan Addendum*. This will include sampling from existing well 490MW01, which was installed in August 2011 but not yet sampled. Soil samples from 3 boring locations near the former UST 490, and groundwater samples from these three borings and one existing monitor well, will be collected as described in the attached *Parcel 79 Work Plan Addendum*.

Linda S. Range, NJDEP  
Response to Comments  
Underground Storage Tanks Within ECP Parcel 79  
February 10, 2016  
Page 6 of 6

We look forward to your review of these responses and approval or additional comments. The technical Point of Contact (POC) for this matter is Kent Friesen at (732) 383-7201 or by email at [kent.friesen@parsons.com](mailto:kent.friesen@parsons.com). Should you have any questions or require additional information, please contact me by phone at (732) 380-7064 or by email at [william.r.colvin18.civ@mail.mil](mailto:william.r.colvin18.civ@mail.mil).

Sincerely,



William R. Colvin, PMP, PG, CHMM  
BRAC Environmental Coordinator

Attachment:

Parcel 79 Work Plan Addendum for Former Storage Tank Sites

cc: Delight Balducci, HQDA ACSIM (e-mail)  
Joseph Pearson, Calibre (e-mail)  
James Moore, USACE (e-mail)  
Jim Kelly, USACE (e-mail)  
Cris Grill, Parsons (e-mail)

**Fort Monmouth**  
**Oceanport and Monmouth County, New Jersey**  
**Parcel 79 Work Plan Addendum for Former Storage Tank Sites**  
**Date: February 2016**

## **1.0 PURPOSE**

The purpose of this Parcel 79 Work Plan is to outline the site-specific Scope of Work (SOW) for the investigation of former underground storage tank (UST) and above-ground storage tanks (AST) sites within Parcel 79 at Fort Monmouth. In general, the scope consists of supplemental soil and groundwater sampling at select UST and AST sites to assess the potential for impacts to groundwater, as requested by the New Jersey Department of Environmental Protection (NJDEP) in their comment letter dated August 25, 2015. The field activities will involve:

- Advancement of approximately 10 shallow soil borings using a Geoprobe rig to depths below shallow groundwater, and collection of soil samples from select boring intervals for chemical analysis of petroleum constituents.
- Installation of temporary monitor wells within approximately 16 Geoprobe borings, and collection of “grab” groundwater samples for chemical analysis of petroleum constituents.
- Re-development and sampling of 3 existing monitor wells for chemical analysis of petroleum constituents.

Additional details on the rationale for the proposed work are provided in Parsons response to NJDEP’s comment letter dated February 9, 2016.

## **2.0 REFERENCE DOCUMENTS**

**HEALTH AND SAFETY** - All Site personnel are required to read, understand, and comply with the safety guidelines in the Accident Prevention Plan (APP) including the Site Health and Safety Plan (SHASP), which is included as Appendix A of the APP.

**FIELD PROCEDURES** – The detailed field procedures to be used for the activities described in this sampling plan are described in the March 2013 Final Sampling and Analysis Plan (SAP).

## **3.0 SITE BACKGROUND**

Parcel 79 is located within the eastern portion of the Main Post at Fort Monmouth, just east of Oceanport Avenue (**Figure 1**). Available information for multiple USTs at Parcel 79 was previously provided to NJDEP in the Army’s submittal dated April 22, 2015 and entitled *Underground Storage Tanks Within ECP Parcel 79, Fort Monmouth, New Jersey*. The NJDEP responded in their letter dated August 25, 2015 approving No Further Action (NFA) for some USTs, but requiring assessment of groundwater at other UST sites prior to determining if NFA was appropriate. NJDEP’s rationale for requiring additional

groundwater assessment included the potential for soil contamination extending to within 2 ft of or into groundwater.

One round of depth-to-water measurements was previously collected from multiple existing monitor wells within Parcel 79 in October 2015 to support this supplemental field evaluation (see **Figure 2**). Groundwater flow directions are interpreted to be towards the northeast in the northern portion, towards the southeast in the southern portion, and towards the east in the central portion of Parcel 79.

## 4.0 SAMPLING LOCATIONS

General locations for additional sampling were identified in the Army's recent responses to NJDEP comments, and are shown on **Figure 1**. A description of the field sampling and analytical activities to be performed is presented below. A summary of the field sampling and analytical activities is presented in **Table 1**.

### 4.1 Area 75 Above-Ground Storage Tanks

The NJDEP (2010) guidance entitled "*Protocol For Addressing Extractable Petroleum Hydrocarbons*" specifies contingency analysis for naphthalene and 2-methylnaphthalene in the event that extractable petroleum hydrocarbon (EPH) concentrations exceed 1,000 mg/kg. In their comment letter dated August 25, 2015, NJDEP noted that contingency analysis was not previously performed for soil samples from "AST-B" that had TPH concentrations in excess of 1,000 mg/kg. Therefore, soil and groundwater from two former AST locations (AST-1 and AST-2) in Area 75 will be re-sampled to characterize the current concentrations of constituents in these areas. Additional samples are proposed at four locations (four borings and two temporary wells) as shown on **Figure 3**.

Soil samples will be collected from four Geoprobe<sup>®</sup> borings (two from the former tank centers, and two downgradient) completed to at least 4 feet below the water table to assess current concentrations and vertical extent of extractable petroleum hydrocarbons (EPH). Three soil samples will be collected from each boring. Previous surface soil samples were collected from 0 to 0.5 ft bgs, but slightly deeper near-surface soil samples will be collected to allow for the potential that some backfill was placed over the site during tank demolition. Samples will be collected from 0.5-1.0 ft bgs, from a deeper 6-inch interval that is below any field evidence of contamination to delineate vertical extent, and from the most contaminated intermediate interval encountered (between 0.5-1.0 ft bgs and the deeper vertical extent sample) based on field evidence (visual, olfactory, [photoionization detector [PID] screening). Each soil sample will be analyzed for EPH and, if necessary, for any contingency analyses (naphthalene and 2-methylnaphthalene) required by Table 2.1 of the Technical Requirements for Site Remediation.

Groundwater samples will be collected from the two Geoprobe<sup>®</sup> borings located north (downgradient) of the former AST locations, as shown on **Figure 3**. Groundwater from these locations will be sampled using temporary wells within the Geoprobe borings, and then the borings will be abandoned. Each groundwater sample will be analyzed for volatile organic compounds (VOCs) and semivolatile organic compounds (SVOCs) plus tentatively identified compounds (TICs), as specified in Table 2-1 of the NJAC 7:26E Technical Requirements for Site Remediation.

## **4.2 Multiple Parcel 79 Underground Storage Tanks**

NJDEP noted that groundwater assessment was not performed for USTs 437, 440, 441, 444, 445, 448, 449 (where no tank was found), 450, and 451 (**Figure 4**), and for UST 142B (**Figure 5**). Therefore, additional sampling of groundwater is proposed from immediately downgradient of each of these former tank locations. A Geoprobe® boring will be completed to approximately 4 feet below the water table. Groundwater from these locations will be sampled using temporary wells within the Geoprobe borings, and then the borings will be abandoned. Each groundwater sample will be analyzed for VOCs and SVOCs plus TICs.

## **4.3 USTs 202A and 202D**

NJDEP noted that groundwater assessment was not performed for USTs 202A and 202D. Therefore, additional sampling of groundwater is proposed from the vicinity of each former tank location. Soil sampling will also be performed because NJDEP commented that soil contamination encountered at UST 202A could have contributed to impacts to groundwater.

Additional Geoprobe soil sampling is proposed for three locations as shown on **Figure 6**. Each Geoprobe boring will be completed to at least 4 feet below the water table to assess current concentrations and vertical extent of EPH. Three soil samples will be collected from each boring. Samples will be collected from approximately 3.0-3.5 ft bgs (or another interval representative of clean overburden), from a deeper 6-inch interval that is below any field evidence of contamination to delineate vertical extent, and from the most contaminated intermediate interval encountered (between 3.0-3.5 ft bgs and the deeper vertical extent sample) based on field evidence (visual, olfactory, PID screening). Each soil sample will be analyzed for EPH, with additional contingency SVOC analysis for naphthalene and 2-methylnaphthalene in the event that EPH concentrations exceed 1,000 mg/kg.

Groundwater from one downgradient boring location will be sampled using a temporary well within the Geoprobe boring, and then the boring will be abandoned. This groundwater sample will be analyzed for VOCs and SVOCs plus TICs.

Existing monitor well 202MW01 was constructed by the Army at this site in 2011 to monitor groundwater contamination from the UST 202D site, but was never sampled. Well 202MW01 and downgradient well M16MW02 will be re-developed and sampled using the NJDEP low-flow purge and sample method, and analyzed for VOCs and SVOCs plus TICs.

## **4.4 UST 490**

NJDEP noted that groundwater assessment was not performed for UST 490, and that TPH in soil exceeded the residential standard. Therefore, additional sampling of soil and groundwater is proposed at this former tank location.

Additional Geoprobe soil and groundwater sampling is proposed for three locations as shown on **Figure 7**. The purpose of the two Geoprobe locations north of Building 490 is to supplement the existing soil and groundwater analyses for delineation of TPH contamination in excess of soil and groundwater comparison criteria towards the east and north. The purpose of the third Geoprobe location south of Building 490 is for delineation of petroleum contamination in the downgradient direction (south). Each Geoprobe boring will be completed to at least 4 feet below the water table to assess current concentrations

and vertical extent of EPH. Three soil samples will be collected from each boring. Samples will be collected from approximately 2.0-2.5 ft bgs (or another interval representative of clean overburden), from a deeper 6-inch interval that is below any field evidence of contamination to delineate vertical extent, and from the most contaminated intermediate interval encountered (between 2.0-2.5 ft bgs and the deeper vertical extent sample) based on field evidence (visual, olfactory, PID screening). Each soil sample will be analyzed for EPH, with additional contingency SVOC analysis for naphthalene and 2-methylnaphthalene in the event that EPH concentrations exceed 1,000 mg/kg.

Groundwater samples from these three boring locations will be sampled using temporary wells within the Geoprobe borings, and then the borings will be abandoned. Each groundwater sample will be analyzed for VOCs and SVOCs plus TICs.

Existing monitor well 490MW01 was constructed by the Army at this site in 2011 to monitor groundwater contamination from the UST 490 site, but was never sampled. Well 490MW01 will be re-developed and sampled using the NJDEP low-flow purge and sample method, and analyzed for VOCs and SVOCs plus TICs.

## **5.0 OTHER ITEMS**

Additional sampling of soil or groundwater may be performed to further delineate the extent of contamination in excess of applicable regulatory levels, based on the results of the sampling proposed in Section 4.0.



## State of New Jersey

CHRIS CHRISTIE  
Governor

DEPARTMENT OF ENVIRONMENTAL PROTECTION  
Bureau of Case Management  
401 East State Street  
P.O. Box 420/Mail Code 401-05F  
Trenton, NJ 08625-0028  
Phone #: 609-633-1455  
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BOB MARTIN  
Commissioner

KIM GUADAGNO  
Lt. Governor

August 25, 2015

John Occhipinti  
BRAC Environmental Coordinator  
OACSIM – U.S. Army Fort Monmouth  
PO Box 148  
Oceanport, NJ 07757

Re: *Underground Storage Tanks Within ECP Parcel 79 dated April 2015*  
Fort Monmouth  
Oceanport, Monmouth County  
PI G000000032

Dear Mr. Occhipinti:

The New Jersey Department of Environmental Protection (Department) has completed review of the referenced report, received April 28, 2015, prepared by Department of the Army Office of Assistant Chief of Staff for Installation Management to provide responses to NJDEP letters of July 10, 2012 and May 30, 2013, and to provide a comprehensive documentation of the location and “closure status” of USTs identified within ECP Parcel 79.

Identification of the USTs in the submittal was made based upon review of historic records as well as the past performance of various geophysical/magnetometer surveys. As indicated in the report (and substantiated in Attachment D), twenty nine (29) USTs have previously received a designation of No Further Action (NFA) necessary from the Department. The submittal (page 7 of 7) proposes sufficient activity has taken place to allow for NFA of the entire Parcel 79 with the exception of an unused UST at Building 446 (which apparently did not undergo sampling) and the ground water at two of the USTs (UST 202D and UST 490), however, this office does not agree with same, and additional comment is warranted.

### **Attachment E -Areas 74 & 75 – Aboveground Storage Tanks & Associated Piping**

#### *Area 75 – Aboveground Storage Tanks*

Two 210,000 gallon aboveground storage tanks, utilized from the 1940s through the 1980s, were removed in May of 1995. Based upon a review of the analytical results and chain of custody

(COC) as well as a conversation with Joe Fallon this date, who collected the samples, it appears 13 samples were collected in the proximity of AST A – all analytical results were below 1000 ppm, and 15 samples in the proximity of AST B. Per Mr. Fallon, the samples would have been collected both at/along the perimeter and within the footprint/center of the former ASTs, mainly at 0-6", but also at deeper intervals (as indicated on the COCs). Although it appears sampling frequency and location may have been adequate, it is unclear the analytical parameter requirements, either those in effect at the time of sampling or currently in effect, were met as regarding contingency analysis for AST B. Of the 15 samples apparently collected for AST B, 5 exceeded the trigger for additional analyses on 25% of those exceeding 1000 ppm (VOs+10 at the time of sampling, 2-methylnaphthalene and naphthalene per current guidance). It is also unclear where the ground water sampling points referenced for Area 74 were located relative to the former ASTs of Area 75?

#### *Area 74 – Associated Piping*

As per Enclosure 4 of Attachment E, the underground piping was previously NFAed.

### **Underground Storage Tanks**

In addition to those USTs previously granted a designation of NFA, it is agreed no further action is necessary for the following #2 fuel USTs:

- UST 29-1 – 1000 gallon steel
- UST 142A – 1000 gallon steel; C93-3714
- UST 401-26 – 1000 gallon steel
- UST 416-32 – 1000 gallon steel
- UST 430B-45 – 550 gallon tank\*; C93-3987

\*note – page 1, Section 1.1 and scrap receipt each indicate UST was steel; Att B states fiberglass

- UST 443-49 – 1080 gallon steel
- UST 474 – 1000 gallon steel

Although the 2008 Site Investigation previously performed did include ground water sampling, a review of the sampling points did not indicate they were placed within distances sufficient to allow for adequate evaluation of the USTs referenced below. Based upon soil contamination extending to within 2' of, and in many cases, into the ground water table (GWT), a ground water investigation is necessary at the following UST locations (the elimination of the sheen via excavation, as referenced for USTs 441, 444 is insufficient):

- UST 142B (Attachment H)
- UST 437 (Attachment Q)
- UST 440 (Attachment R)
- UST 441 (Attachment S)
- UST 444 (Attachment U)
- UST 448 (Attachment W); please specify if well P79-E2 is sufficiently proximate to comply with regulations/guidance
- UST 449 (Attachment X)

UST 450 (Attachment Y)  
UST 451 (Attachment Z)

Though it is understood no evidence was found of a tank remaining in the below referenced locations during geophysical or trenching activities, a tank was noted as present in historic Army material, e.g. 1956 Fuel Storage Map, while Attachment 1 indicates heating oil USTs may remain between Tilly Avenue and Leonard Avenue. No soil sampling was apparently performed in any of these locations. Unless all tanks, former or current, have been evaluated in accordance with the applicable Departmental regulations and guidance documents, the NJDEP cannot comment as to the absence or presence of a petroleum discharge. The request on page 7 of 7 for designation of an NFA for the following USTs cannot be granted unless the necessary sampling is performed at each:

- UST/Bldg. No. 168 (Attachment I)
- UST/Bldg. No. 169 (Attachment I)
- UST/Bldg. No. 407
- UST/Bldg. No. 415
- UST/Bldg. No. 424
- UST/Bldg. No. 425
- UST/Bldg. No. 435 (Attachment P)
- UST/Bldg. No. 438
- UST/Bldg. No. 442
- UST/Bldg. No. 455 (Attachment V)
- UST/Bldg. No. 456 (Attachment AA consisted of only analytical data, from a single sample - 6-12"; information provided is insufficient for evaluation/comment)
- USTs/Bldg. No.s 457 through 467
- UST/Bldg. No.s 469 through 473
- UST/Bldg. No. 476
- UST/Bldg. No. 488
- UST/Bldg. No. 489

While not indicated as present on the 1956 Fuel Storage map, nor found during geophysical survey activities, the 2014 ECP UHOT Report indicates a potential for the presence of an UST at several additional locations. Although no tank was found, insufficient information (sampling) has been submitted to allow for comment as to the presence or absence of a discharge for the following:

- UST/Bldg. No. 170 (Attachment I)
- UST/Bldg. No. 171 (Attachment I)
- UST/Bldg. No. 408
- UST/Bldg. No. 436
- UST/Bldg. No. 468

### *Attachments J, K & L – USTs at Former Building 202*

Four USTs were noted as present, and removed (although the ECP UHOT report indicates high potential for the continued presence of two USTs), at the former building, the specific locations of which two (202A & 202B), were not indicated. Although apparently no discharge was associated with USTs 202B or 202C (the submittal implies no soils were removed at either UST prior to the sampling which indicated non-detect TPH levels), discharges were associated with both USTs 202A and 202D.

The affected soils at UST 202A were removed to 5.5', likely extending to within 2' of or into the ground water table, in this area, and contained almost 8,000 ppm TPHC, the level referenced in the Department's guidance (<http://www.nj.gov/dep/srp/guidance/rs/#phc>) as the residual product/free product limit. As such, it is possible former UST 202A could have contributed to the levels of ground water contamination noted at UST 202D. An NFA at this time is, therefore, not appropriate.

As indicated in the submittal, ground water was found to contain benzene at low levels, 2-methylnaphthalene, and BN TICs in a sampling event performed in June of 2011 at UST 202D. An NFA of the soils, as requested, is not appropriate at this time. Insufficient information is known relative to the ground water contamination in the area, including the current extent or levels of contamination.

### *Attachment CC/UST 490- aka UST 490-58*

Although a Site Assessment Compliance Statement and Standard Reporting Form for tank removal are reported in Attachment CC as submitted to the DEP in 1991, as indicated in the submittal, there is no record of NFA approval from the NJDEP; no soil sampling had been performed at that time.

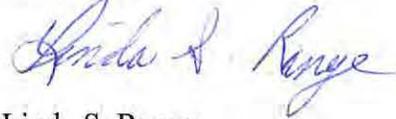
Soil sampling collected from the 6-6.5' interval was performed in 2005, indicating levels of TPH ranged from 2981 to 8762 ppm, with VOs below criteria. Ground water samples were below the Ground Water Quality Standards (GWQS) in effect at the time, however, no report was submitted; 2-methylnaphthalene was found at 32.13 ppb. Additional sampling (actual locations of which are unclear) performed in May of 2010 (prior to phase-in of EPH), at the 3.5-4' interval – the rationale for selection of that interval is unreported - found TPH ranging from ND to 5941.76 ppm. Although the required contingency sampling was reported as exhibiting no exceedences in the submittal, the Impact to Ground Water Standard for 2-methylnaphthalene of 8 ppm was exceeded in Sample B4, with a result of 30.32 ppm. Ground water sampling conducted in May and July of 2010 found elevated levels of 2-methylnaphthalene, as well as elevated BN TICs.

No figure identifying the location of the May 2010 sampling was provided, however, it appears contamination above the 5100 ppm criterion may be present from at least the 3.5 to the 6.5' interval, and deeper. TPH/EPH cannot exceed the residual product/free product limit of 8,000 mg for No. 2 fuel; 2-methylnaphthalene above standard in the soil as well as the ground water is

present. Compliance averaging of the soils is not appropriate. Additional characterization of the ground water contamination is required. The current conditions of the ground water and the extent of any contamination must be determined, at which time further decisions regarding remedial requirements may be determined..

Please contact this office if you have any questions.

Sincerely,



Linda S. Range

C: Joe Pearson, Calibre  
Rich Harrison, FMERA  
Joe Fallon, FMERA  
James Moore, USACE  
Frank Barricelli, RAB



## DEPARTMENT OF THE ARMY

OFFICE OF ASSISTANT CHIEF OF STAFF FOR INSTALLATION MANAGEMENT  
U.S. ARMY FORT MONMOUTH  
P.O. 148  
OCEANPORT, NEW JERSEY 07757

April 22, 2015

Ms. Linda Range  
New Jersey Department of Environmental Protection  
Case Manager  
Bureau of Southern Field Operations  
401 East State Street, 5<sup>th</sup> Floor  
PO Box 407  
Trenton, NJ 08625

**Re: Underground Storage Tanks within Parcel 79  
Fort Monmouth, NJ**

**Attachments:**

- A. Correspondence
- B. Summary Table of Parcel 79 Underground Storage Tanks
- C. Site Layout Drawings of Parcel 79 (Recent and Historical)
- D. No Further Action Letters from NJDEP
- E. Areas 74 and 75 ASTs File Review and Analyses
- F. UST 29 File Review
- G. UST 142A Report
- H. UST 142B Report
- I. Bldgs. 168, 169, 170 and 171 File Review
- J. UST 202A File Review
- K. UST 202B File Review
- L. USTs 202C and 202D File Reviews and Report
- M. UST 401 Report
- N. UST 416 Report
- O. UST 430B Report
- P. UST 435 Notes
- Q. UST 437 File Review and Analyses
- R. UST 440 File Review and Analyses
- S. UST 441 File Review and Analyses
- T. UST 443 Report
- U. UST 444 File Review and Analyses
- V. UST 445 File Review and Analyses
- W. UST 448 File Review and Analyses
- X. UST 449 File Review and Analyses
- Y. UST 450 File Review and Analyses
- Z. UST 451 File Review and Analyses
- AA. Bldg. 456 Analyses
- BB. UST 474 File Review and Analyses
- CC. UST 490 File Review, Report and Analyses

DD. Geophysical Survey Report

**Previous Correspondence (provided in Attachment A):**

1. NJDEP letter to the Army dated July 10, 2012, re: *March 2012 Army Response to NJDEP Correspondence Letter Dated October 28, 2008.*
2. Army letter to NJDEP dated January 31, 2013, re: *NJDEP's Response to Army Correspondence (Dated March 16, 2012).*
3. NJDEP letter to the Army dated May 30, 2013, re: *Army's January 31, 2013 Correspondence – Miscellaneous USTs.*

Dear Ms. Range:

The U.S. Army Fort Monmouth (FTMM) has reviewed existing file information for underground storage tank (UST) sites at Fort Monmouth within Environmental Condition of Property (ECP) Parcel 79. One purpose of this review was to provide a comprehensive response to NJDEP's previous comments on Parcel 79 (Correspondence 1); these responses (Attachment A) supplement the information previously provided in Correspondence (2) and (3). In addition, this submittal provides comprehensive documentation of the location and closure status of all USTs identified within this parcel, which we believe will be useful for the future Phase II property transfer.

Responses to NJDEP's comments concerning Parcel 79 in Correspondence (1) are provided in Attachment A, as well as the previous correspondence concerning Parcel 79 (Correspondence 1 through 3). The majority of the removed and potential USTs were used for residential heating oil, or were less than 2000 gallons in size and used to store heating oil for nonresidential buildings, and are therefore considered unregulated heating oil tanks (UHOTs). A summary table of UHOTs identified within Parcel 79 is provided as Attachment B, and the locations of these UHOTs within Parcel 79 are presented in Attachment C. All but one of the UHOTs that have been positively identified within Parcel 79 have been removed; the exception is UST 446, which was left in place as described further below. Additional "potential" UHOTs associated with former barracks (as shown on historical drawings; see Attachment C) are also described in this summary that have not been located. The table of UHOTs in Attachment B describes which UHOTs were identified by each of the relevant sources of information, including the Addendum ECP UHOT Report (Parsons, 2014), the 1956 fuel storage tanks map (presented in Attachment C; also previously provided as Appendix O of the 2007 ECP Report, and within Appendix G of the ECP Site Investigation Report), and NJDEP's July 10, 2012 letter (Correspondence 1).

Multiple UHOTs within Parcel 79 have been identified that were previously approved for No Further Action (NFA) by NJDEP; documentation of this approval is provided in Attachment D, and referenced below for specific UHOTs. In these cases, there is generally a supporting investigation report that was previously submitted to NJDEP and that describes the basis for closure. For the sake of brevity, we have not included these reports for UHOTs where NFA has already been approved. However, these reports are available within the FTMM environmental records.

In the Attachment B table, the term "Case Closed" has been used (consistent with previous FTMM procedures) to indicate the Army determined that no further sampling or remedial actions were warranted for a specific UST site. "Case Open" indicates the Army determined that

ongoing monitoring, reporting or possibly even remedial action was warranted. In contrast, "No Further Action" has been reserved for NJDEP approval that no further sampling or remedial actions are warranted. "Case Open" sites previously identified within Parcel 79 in Attachment B can now be considered as "Closed" by this submittal.

The Parcel 79 area generally includes that portion of Fort Monmouth bounded by Parker Creek to the northwest, Oceanport Avenue to the southwest, Oceanport Creek to the southeast, and Burns Avenue (and its southerly extension) to the northeast (see Attachment C). Several discrete areas that are designated as Installation Restoration Program (IRP) sites or as separate ECP parcels are also located within the same general area as Parcel 79, but are excluded from this submittal. These excluded sites are shown on Attachment C and include:

- FTMM-15 Water Tank, also known as Parcel 78.
- FTMM-16 Former Pesticide Storage Area (Bldg. 498), also known as Parcel 81.
- Parcel 80 Former Bldgs. 105 and 106.
- Parcel 82 Residential Communities Initiative (RCI) 400 Area.
- Parcel 95 PCB Transformer Leak near Bldgs. 454 and 456.

These excluded IRP sites and ECP Parcels will be addressed under separate cover as needed.

Bulk fuel oil aboveground storage tanks (ASTs) were previously located in the northeastern portion of Parcel 79 (see the current layout drawing in Attachment C). The two 210,000 gallon fuel oil ASTs were removed in 1995, and associated piping was removed in 1997. Soil samples were collected both for the AST site (designated as Area 75) and the associated piping (designated as Area 74), as well as groundwater samples for Area 74. A file review summary and the results of the investigations are presented in Attachment E. Based upon the results of the analyses, we request No Further Action for this Area 74 and 75 AST site.

Regarding the multiple USTs that were previously removed from Parcel 79, we are submitting the following documentation, and we request a No Further Action determination for each site (site that have been previously approved by NJDEP are highlighted in green):

- UST 29 File Review summary and analyses is presented in Attachment F.
- UST 104 NFA was approved by NJDEP on 1/10/2003 (Attachment D).
- UST 142A investigation report is presented in Attachment G.
- UST 142B investigation report is presented in Attachment H.
- Bldgs. 168, 169, 170 and 171 File Review is presented in Attachment I; these are demolished buildings where USTs are not likely to be present.
- UST 197-2 NFA was approved by NJDEP on 2/24/2000 (Attachment D).
- UST 202A File Review is presented in Attachment J.
- UST 202B File Review is presented in Attachment K.
- UST 202C File Review and Report are presented in Attachment L.
- UST 202D File Review summary, report and additional analyses are presented in Attachment L. NFA for soils at this site is warranted. Benzene and 2-methylnaphthalene in groundwater exceeded the NJDEP Ground Water Quality Criteria.
- UST 400 NFA was approved by NJDEP on 2/24/2000 (Attachment D).
- UST 401 investigation report is presented in Attachment M.
- Bldg. 407 is a demolished building where there were no geophysical survey indications of an underground storage tank found.

- Bldg. 408 is a demolished building where there were no geophysical survey indications of an underground storage tank found.
- UST 410 NFA was approved by NJDEP on 7/10/1998 (Attachment D).
- UST 411 NFA was approved by NJDEP on 5/30/2013 (Attachment D).
- UST 412 NFA was approved by NJDEP on 8/29/2000 (Attachment D).
- UST 413 NFA was approved by NJDEP on 8/29/2000 (Attachment D).
- UST 414 NFA was approved by NJDEP on 8/29/2000 (Attachment D).
- Bldg. 415 is a demolished building where there were no geophysical survey indications of an underground storage tank found.
- UST 416 investigation report is presented in Attachment N.
- UST 417 NFA was approved by NJDEP on 8/29/2000 (Attachment D).
- UST 418 NFA was approved by NJDEP on 7/10/1998 (Attachment D).
- UST 419 NFA was approved by NJDEP on 8/29/2000 (Attachment D).
- UST 420 NFA was approved by NJDEP on 7/10/1998 (Attachment D).
- UST 421 NFA was approved by NJDEP on 5/30/2013 (Attachment D).
- UST 422 NFA was approved by NJDEP on 7/10/1998 (Attachment D).
- UST 423 NFA was approved by NJDEP on 5/30/2013 (Attachment D).
- Bldg. 424 is a demolished building where there were no geophysical survey indications of an underground storage tank found.
- Bldg. 425 is a demolished building where there were no geophysical survey indications of an underground storage tank found.
- UST 426 NFA was approved by NJDEP on 1/10/2003 (Attachment D).
- UST 427 NFA was approved by NJDEP on 7/10/1998 (Attachment D).
- UST 428 NFA was approved by NJDEP on 8/29/2000 (Attachment D).
- UST 429 NFA was approved by NJDEP on 10/23/2000 (Attachment D).
- UST 430A NFA was approved by NJDEP on 7/10/1998 (Attachment D).
- UST 430B investigation report is presented in Attachment O.
- UST 430C NFA was approved by NJDEP on 2/24/2000 (Attachment D).
- Bldg. 433 is a demolished building where there were no geophysical survey indications of an underground storage tank found.
- UST 434 NFA was approved by NJDEP on 8/29/2000 (Attachment D).
- Bldg. 435 is a demolished building where there were no geophysical survey indications of an underground storage tank found; test trenching was performed as described in Attachment P; no tank was found.
- Bldg. 436 is a demolished building where there were no geophysical survey indications of an underground storage tank found; field studies were performed that discovered USTs at other locations in this general area, but no tank was found at this location.
- UST 437 File Review and Analyses is presented in Attachment Q.
- Bldg. 438 is a demolished building where there were no geophysical survey indications of an underground storage tank found; field studies were performed that discovered USTs at other locations in this general area, but no tank was found at this location.
- UST 439 NFA was approved by NJDEP on 8/29/2000 (Attachment D).
- UST 440 File Review and Analyses is presented in Attachment R.
- UST 441 File Review and Analyses is presented in Attachment S.

- Bldg. 442 is a demolished building where there were no geophysical survey indications of an underground storage tank found; field studies were performed that discovered USTs at other locations in this general area, but no tank was found at this location.
- UST 443 investigation report is presented in Attachment T.
- UST 444 File Review and Analyses is presented in Attachment U.
- UST 445 File Review and Analyses is presented in Attachment V.
- UST 446 is a steel 1000 gallon fuel oil tank that was partially excavated in 2010, but was left in place because it was partially covered by the existing Bldg. 451 foundation, and therefore could not be removed without damaging the overlying structure.
- UST 447 NFA was approved by NJDEP on 8/29/2000 (Attachment D).
- UST 448 File Review and Analyses is presented in Attachment W.
- UST 449 File Review and Analyses is presented in Attachment X.
- UST 450 File Review and Analyses is presented in Attachment Y.
- UST 451 File Review and Analyses is presented in Attachment Z.
- UST 453 NFA was approved by NJDEP on 7/10/1998 (Attachment D).
- UST 454 NFA was approved by NJDEP on 7/10/1998 (Attachment D).
- Bldg. 455 is a demolished building where there were no geophysical survey indications of an underground storage tank found. Note that this is a different location than existing Bldg. 455.
- Bldg. 456 is a demolished building where there were no geophysical survey indications of an underground storage tank found. Note that existing Bldg. 456 partially overlies this former Bldg. 456. A single soil sample was collected at Bldg. 456 as presented in Attachment AA.
- Bldg. 457 is a demolished building where there were no geophysical survey indications of an underground storage tank found. Note that existing Bldg. 455 partially overlies this former Bldg. 457.
- Bldg. 458 is a demolished building where there were no geophysical survey indications of an underground storage tank found.
- Bldg. 459 is a demolished building where there were no geophysical survey indications of an underground storage tank found.
- Former Bldg. 460 is a demolished building where there were no geophysical survey indications of an underground storage tank found. Note that existing Bldg. 456 partially overlies this former Bldg. 460.
- Bldg. 460 is an existing building where there were no geophysical survey indications of an underground storage tank found.
- Former Bldg. 461 is a demolished building where there were no geophysical survey indications of an underground storage tank found. Note that existing Bldg. 457 overlies this former Bldg. 461.
- Former Bldg. 462 is a demolished building where there were no geophysical survey indications of an underground storage tank found. Note that existing Bldg. 457 partially overlies this former Bldg. 462.
- Bldg. 463 is a demolished building where there were no geophysical survey indications of an underground storage tank found.
- Bldg. 464 is a demolished building where there were no geophysical survey indications of an underground storage tank found.

- Bldg. 465 is a demolished building where there were no geophysical survey indications of an underground storage tank found.
- Bldg. 466 is a demolished building where there were no geophysical survey indications of an underground storage tank found.
- Bldg. 467 is a demolished building where there were no geophysical survey indications of an underground storage tank found.
- Bldg. 468 is a demolished building where there were no geophysical survey indications of an underground storage tank found. Further, there is no tank shown on the 1956 fuel storage drawing (Attachment C).
- Bldg. 469 is a demolished building where there were no geophysical survey indications of an underground storage tank found.
- Bldg. 470 is a demolished building where there were no geophysical survey indications of an underground storage tank found.
- Bldg. 471 is a demolished building where there were no geophysical survey indications of an underground storage tank found.
- Bldg. 472 is a demolished building where there were no geophysical survey indications of an underground storage tank found.
- Bldg. 473 is a demolished building where there were no geophysical survey indications of an underground storage tank found.
- UST 474 File Review and Analyses is presented in Attachment BB.
- UST 475 NFA was approved by NJDEP on 10/23/2000 (Attachment D).
- Bldg. 476 is a demolished building where there were no geophysical survey indications of an underground storage tank found.
- Bldg. 488 is a demolished building where there were no geophysical survey indications of an underground storage tank found.
- Bldg. 489 is a demolished building where there were no geophysical survey indications of an underground storage tank found.
- UST 490 File Review, Report and Analyses is presented in Attachment CC. NFA for soils at this site is warranted. 2-Methylnaphthalene in groundwater exceeded the NJDEP Ground Water Quality Criteria.
- UST 491 NFA was approved by NJDEP on 1/10/2003 (Attachment D).
- UST 492 NFA was approved by NJDEP on 8/29/2000 (Attachment D).

Many of the Parcel 79 UHOTs were steel fuel oil tanks associated with former barracks that have been demolished. Geophysical surveys were performed to locate potential USTs that may have remained after the buildings were removed, as described in Attachment DD. A combination of the geophysical surveys as well as the historical maps and metal detectors were used to locate multiple UHOTs within the Parcel 79 area, which were subsequently removed in 2010.

However, for multiple building numbers listed in the Attachment B summary table (for example, 407, 408, etc.), there were no geophysical anomalies identified that were potentially related to underground tanks, and consequently no tanks were found at multiple locations.

Groundwater samples were collected from multiple petroleum tank sites during site investigation activities, including the Area 74 bulk fuel oil AST piping area, and USTs 29, 401, 416, and 430B. Groundwater VOC and SVOC analytes from these sites were either non-detected or detected at concentrations below the NJDEP Ground Water Quality Criteria.

Groundwater samples were also collected from 8 locations within Parcel 79 during the ECP Site

Investigation (SI; Shaw, 2008); all VOC and SVOC analytes from these samples were also either non-detected or detected at concentrations below the NJDEP Ground Water Quality Criteria. An oily sheen on groundwater was observed within the tank excavations at USTs 441, 444, and 448 during 2010 removal activities; soil remediation was completed at each of these sites, which eliminated the source of the oily sheen. At UST 202D, benzene (1.61 µg/L) and 2-methylnaphthalene (233 µg/L) were present in groundwater at concentrations that exceeded the NJDEP interim Ground Water Quality Criteria (1 and 30 µg/L, respectively). At UST 490, 2-methylnaphthalene was present in groundwater at concentrations up to 115 µg/L, which exceeded the NJDEP interim Ground Water Quality Criteria of 30 µg/L. In summary, the results of previous investigations do not indicate the presence of widespread groundwater contamination at Parcel 79, although two localized areas with exceedance of NJDEP Ground Water Quality Criteria have been identified at USTs 202D and 490.

This information supports the conclusion that UST contamination issues identified within Parcel 79 have been adequately addressed by previous environmental activities. Numerous UHOT sites were identified within this Parcel and were addressed under the FTMM tank removal and assessment program over the past approximately 20 years. Three unresolved issues remain:

- One fuel oil UHOT was partially uncovered and then left in place at former Bldg. 446 due to structural concerns with the overlying Bldg. 451 foundation.
- Groundwater at UST 202D exceeded the NJDEP Ground Water Quality Criteria for benzene and 2-methylnaphthalene.
- Groundwater at UST 490 exceeded the NJDEP Ground Water Quality Criteria for 2-methylnaphthalene.

In summary, we submit that the Army has provided adequate due diligence with regards to the environmental condition of this Parcel, and we request that NJDEP approve No Further Action for Parcel 79, with the exception of the UHOT remaining at Bldg. 446, and groundwater at UST 202D and UST 490. Should you have any questions or require additional information, please contact me at (732) 380-7064 or by email at [wanda.s.green2.civ@mail.mil](mailto:wanda.s.green2.civ@mail.mil).

Sincerely,



Wanda Green  
BRAC Environmental Coordinator

cc: Delight Balducci, HQDA ACSIM  
Joseph Pearson, Calibre  
James Moore, USACE  
Cris Grill, Parsons

ATTACHMENT U

UST 444 File Review and Analyses

UNDERGROUND STORAGE TANK FILE REVIEW  
 FORT MONMOUTH BRAC 05 FACILITY  
 OCEANPORT, NEW JERSEY

Date: March 2, 2014 Review Performed By: Kent Friesen, Parsons

Site ID: **Bldg. 444** Registration ID: *None*

Recommended Status of Site: **Change to Case Closed**

UST Probability (from May 2014 "Addendum 1 ECP UHOT Report"): **NFA**

Based on the file review, were there indications of a contaminant release?  Yes  No

NJDEP Release No. or DICAR (If applicable): 10-01-27-1916-11

Did NJDEP approve No Further Action (NFA) for this site?  Yes  No  Not Applicable

Tank Description:  Steel  Fiberglass Size: 1000 gals. Contents: No. 2 Fuel Oil

Residential  Commercial/Industrial

Tank Removed?  Yes  No If "yes," removal date: 1/19/2010

Were closure soil samples taken?  Yes  No Analyses: TPH

Comparison criteria: 5,100 mg/kg TPH

Were closure soil sample results less than comparison criteria?  Yes  No

**Brief Narrative**

Soil samples were collected from the tank excavation in 2010 and analyzed by the Fort Monmouth Environmental Laboratory for total petroleum hydrocarbons (TPH). Visual indications of petroleum contamination were observed in overburden soils, and holes were noted in the tank upon removal and inspection. Five soil samples from the excavation bottom and four side walls (plus one field duplicate) were collected on January 27, 2010. The soil sample results from this excavation ranged from non-detected (ND) to 3100 mg/kg for TPH, with elevated TPH measured in the east sidewall of the tank excavation. The east sidewall soil sample was also analyzed for semi-volatile organic compounds (SVOCs), and 2-methylnaphthalene, fluorene, and phenanthrene were detected at concentrations less than the current Residential Direct Contact Soil Remediation Standard (RDCSRS), while naphthalene (6.98 mg/kg) slightly exceeded the RDCSRS of 6 mg/kg in one sample. 2-Methylnaphthalene (28.17 mg/kg) exceeded the impact-to-groundwater screening level of 5 mg/kg in this soil sample. Fingerprint analysis of an oily sheen collected from the groundwater in the tank excavation was consistent with "diesel fuel No. 2," which is similar to No. 2 fuel oil.

Additional soil was removed from the east sidewall of the excavation, and final soil samples were collected on February 4, 2010; these results were ND for TPH. The final results were less than 5,100 mg/kg for TPH, which is the current remediation criterion. Therefore, soil remediation was completed, and no additional sampling or remedial action was warranted.

In conclusion, the analytical results support changing the UST Case Status to "Case Closed."

Recommendations (if any): Change to "Case Closed", request NFA from NJDEP

Signed:   
 Kent A. Friesen, Parsons

**Attachment B**  
**Soil Boring Logs and Well Construction Details**

# Soil Boring Log

CLIENT: <u>USACE</u> PROJECT NAME: <u>FTMM - ECP</u> PROJECT LOCATION: <u>FTMM Parcel</u> PROJECT NUMBER: <u>748810-</u>	INSPECTOR: <u>Zohar Lavy</u> DRILLER: <u>See Barnack</u> WEATHER: <u>Clear, up to high 70s</u> CONTRACTOR: <u>East Coast Drilling, Inc. (ECDI)</u>	BORINGWELL ID: <u>PALE-79-MP-TM02</u> LOCATION DESCRIPTION: LOCATION PLAN: Oceanport, New Jersey
GROUNDWATER OBSERVATIONS WATER LEVEL: _____ DATE: _____ TIME: _____ MEAS. FROM: _____		RIG TYPE: <u>Geoprobe(R) 7822DT</u> DATE/TIME START: <u>8/3/16 @ 1000</u> DATE/TIME FINISH: <u>8/3/16 @ 1015</u> WEIGHT OF HAMMER: <u>N/A</u> DROP OF HAMMER: <u>N/A</u> TYPE OF HAMMER: <u>N/A</u>

DEPTH (feet)	SAMPLE I.D.	BLOWS per 6"	ADV/REC	PID (ppm)	FIELD IDENTIFICATION OF MATERIAL	STRATA	COMMENTS
0			60/60	0	Dry, m. dense, dark brown f. sand, some silt, little		
1					f. m. sub round gravel, tr. organics (0"-6")		
2					6"-22" - SAA (no organics)		
3					22"-54" - Moist, stiff, light brown-light green clay		
4					54"-60" - SAA (little orange f. sand), solvent odor		
5			60/60	73.5	0"-12" - Dry, m. dense, grey/brown clay and f. sand, slight solvent odor		
6					(clay lenses)		
7				2.5	12"-36" - Wet, loose, orange tan, f. c. sand, & little f.		
8					sub. round - sub. org. gravel		
9				0.0	24"-28" - SAA (some gravel)		
10					36"-60" - Wet, loose, dark brown, f. sand, little silt		

Remarks:

Sample Types	Consistency vs. Blowcount / Foot		
S - Split-Spoon	<b>Granular (Sand &amp; Gravel)</b>	<b>Fine Grained (Silt &amp; Clay)</b>	and - 35-50%
U - Undisturbed Tube	V. Loose: 0-4    Dense: 30-50	V. Soft: <2    Stiff: 8-15	some - 20-35%
C - Rock Core	Loose: 4-10    V. Dense: >50	Soft: 2-4    V. Stiff: 15-30	little - 10-20%
A - Auger Cuttings	M. Dense: 10-30	M. Stiff: 4-8    Hard: >30	trace - <10%
			moisture, density, color, gradation

### Soil Boring Log

CLIENT: USACE PROJECT NAME: FTMM - ECP PROJECT LOCATION: FTMM Parcel PROJECT NUMBER: 748810-	INSPECTOR: <i>Zaker Lavy</i> DRILLER: <i>Col. Pj. 1</i> WEATHER: <i>Col. Pj. 1</i> CONTRACTOR: East Coast Drilling, Inc. (ECDI)	BORINGWELL ID: <i>PAR-79-118711W-02</i> LOCATION DESCRIPTION: LOCATION PLAN: Oceanport, New Jersey
GROUNDWATER OBSERVATIONS  WATER LEVEL: _____ DATE: _____ TIME: _____ MEAS. FROM: _____	RIG TYPE: Geoprobe(R) 7822DT DATE/TIME START: _____ DATE/TIME FINISH: _____ WEIGHT OF HAMMER: N/A DROP OF HAMMER: N/A TYPE OF HAMMER: N/A	

DEPTH (feet)	SAMPLE I.D.	BLOWS per 6"	ADV/REC.	PID (ppm)	FIELD IDENTIFICATION OF MATERIAL	STRATA	COMMENTS
10				0.0	0"-6" - wet, v. loose, gray / dark brown, f. sand, some gravel, tr. silt.		
11					6"-30" - wet, n. dense, black f. sand, some silt		
12					30"-60" - wet, m. dense, black, f. sand, tr. silt		
13							
14							
15					EOB @ 15'		
16							
17							
18							
19							
20							

Remarks: *Driller installed 1" temp. well w/ screen from 4-14' bgs.*

Sample Types	Consistency vs. Blowcount / Foot			
S - Split-Spoon U - Undisturbed Tube C - Rock Core A - Auger Cuttings	Granular (Sand & Gravel)		Fine Grained (Silt & Clay)	
	V. Loose: 0-4	Dense: 30-50	V. Soft: <2	Stiff: 8-15
	Loose: 4-10	V. Dense: >50	Soft: 2-4	V. Stiff: 15-30
	M. Dense: 10-30		M. Stiff: 4-8	Hard: > 30
				and - 35-50% some - 20-35% little - 10-20% trace - <10%
				moisture, density, color, gradation

### Soil Boring Log

CLIENT: USACE PROJECT NAME: FTMM - ECP PROJECT LOCATION: FTMM Parcel 79-444 PROJECT NUMBER: 748810-	INSPECTOR: F. ACCORSI DRILLER: J. BARMEK WEATHER: SUNNY, 60's CONTRACTOR: East Coast Drilling, Inc. (ECDI)	BORING/WELL ID: PAR-79-444-SCREEN 1 LOCATION DESCRIPTION LOCATION PLAN Oceanport, New Jersey
GROUNDWATER OBSERVATIONS  WATER LEVEL: ~ 6.5' DATE: TIME: MEAS. FROM:	RIG TYPE: Geoprobe(R) 7822DT DATE/TIME START: 11-2-17 0850 DATE/TIME FINISH: 11-2-17 0940 WEIGHT OF HAMMER: N/A DROP OF HAMMER: N/A TYPE OF HAMMER: N/A	

DEPTH (feet)	SAMPLE I.D.	BLOWS per 6"	ADV/ REC.	PID (ppm)	FIELD IDENTIFICATION OF MATERIAL	STRATA	COMMENTS
0			60/54	0	0-61" TOPSOIL		
1				0	6"-24" moist, Brn m f SAND, L. silt, L. mf. Gravel	SW	
2				0	24"-59" moist, Or. brn-gray-grn silty CLAY, mottled	MH/CH	
3				0			
4				0			
5			60/60	0	0-18" (same as above)		
6				0	18"-24" wet, grn-brn m f SAND	SW	
7				0	24"-30" wet, brn m f Gravel, 2nd sand	GM	
8				0	24"-60" wet, Brn m f SAND, some silt	GP	
9				0			
10				0			

Remarks:

Sample Types	Consistency vs. Blowcount / Foot	
S - Split-Spoon U - Undisturbed Tube C - Rock Core A - Auger Cuttings	Granular (Sand & Gravel) V. Loose: 0-4    Dense: 30-50 Loose: 4-10    V. Dense: >50 M. Dense: 10-30	Fine Grained (Silt & Clay) V. Soft: <2    Stiff: 8-15 Soft: 2-4    V. Stiff: 15-30 M. Stiff: 4-8    Hard: >30
		and - 35-50% some - 20-35% little - 10-20% trace - <10% moisture, density, color, gradation

### Soil Boring Log

CLIENT: USACE PROJECT NAME: <u>ETMM PARCEL 79-444</u> PROJECT LOCATION: PROJECT NUMBER: 748810-	INSPECTOR: <u>F. ACCORSI</u> DRILLER: WEATHER: CONTRACTOR: Cascade RIG TYPE: Geoprobe(R) 7822DT DATE/TIME START: <u>11-2-17</u> DATE/TIME FINISH: <u>11-2-17</u> WEIGHT OF HAMMER: N/A DROP OF HAMMER: N/A TYPE OF HAMMER: N/A	BORING/WELL ID: <u>PAR-79-444-SCREEN1</u> LOCATION DESCRIPTION: LOCATION PLAN: Oceanport, New Jersey
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DEPTH (feet)	SAMPLE I.D.	BLOWS per 6"	ADV/ REC.	PID (ppm)	FIELD IDENTIFICATION OF MATERIAL	STRATA	COMMENTS
1.0			60/60	0	0-60" wet, blk. M.F. SAND, some clayey silt	SM	
1.1				0			
1.2				0			
1.3				0			
1.4				0			
1.5					TOTAL DEPTH IS FT. END OF BORING		
1.6							
1.7							
1.8							
1.9							
1.0							

Remarks: NO SAMPLES COLLECTED

Sample Types	Consistency vs. Blowcount / Foot		
S -- Split-Spoon	Granular (Sand & Gravel)		and - 35-50%
U -- Undisturbed Tube	Fine Grained (Silt & Clay)		some - 20-35%
C -- Rock Core	V. Loose: 0-4    Dense: 30-50	V. Soft: <2    Stiff: 8-15	little - 10-20%
A -- Auger Cuttings	Loose: 4-10    V. Dense: >50	Soft: 2-4    V. Stiff: 15-30	trace - <10%
	M. Dense: 10-30	M. Stiff: 4-8    Hard: > 30	moisture, density, color, gradation

### Soil Boring Log

CLIENT: <u>USACE</u> PROJECT NAME: <u>FTMM - ECP</u> PROJECT LOCATION: <u>FTMM Parcel 79-444</u> PROJECT NUMBER: <u>748810</u>	INSPECTOR: <u>FIACCORSI</u> DRILLER: _____ WEATHER: _____ CONTRACTOR: <u>East Coast Drilling, Inc. (ECDI)</u> RIG TYPE: <u>Geoprobe(R) 7822DT</u> DATE/TIME START: <u>11-2-17 0950</u> DATE/TIME FINISH: <u>11-2-17 1015</u> WEIGHT OF HAMMER: <u>N/A</u> DROP OF HAMMER: <u>N/A</u> TYPE OF HAMMER: <u>N/A</u>	BORING/WELL ID: <u>PAR-79-444-SCREEN 2</u> LOCATION DESCRIPTION: _____ LOCATION PLAN: _____ Oceanport, New Jersey
GROUNDWATER OBSERVATIONS WATER LEVEL: <u>~ 7.5'</u> DATE: _____ TIME: _____ MEAS. FROM: _____		

DEPTH (feet)	SAMPLE I.D.	BLOWS per 6"	ADV/ REC.	PID (ppm)	FIELD IDENTIFICATION OF MATERIAL	STRATA	COMMENTS
0			<u>60/60</u>	<u>0</u>	<u>0-2" TOPSOIL</u>		
				<u>0</u>	<u>2"-10" moist, or. brn cmf SAND, tr. silt</u>	<u>SW</u>	
1				<u>0</u>	<u>10"-21" moist, brn mf SAND, L. clayey silt. DEBRIS-BRICK @ 24"-26"</u>		
				<u>0</u>	<u>26"-60" moist, gnn-yel brn CLAY, mottled</u>	<u>CH</u>	
2				<u>0</u>			
				<u>0</u>			
3				<u>0</u>			
				<u>0</u>			
4				<u>0</u>			
				<u>0</u>			
5			<u>60/60</u>	<u>0</u>	<u>0-36" (same as above)</u>		
				<u>0</u>			
6				<u>0</u>			
				<u>0</u>			
7				<u>0</u>	<u>30"-60" wet or. brn mf SAND, some silt</u>	<u>SW</u>	
				<u>0</u>			
8				<u>0</u>			
				<u>0</u>			
9				<u>0</u>			
				<u>0</u>			
10							

Remarks: \_\_\_\_\_

Sample Types	Consistency vs. Blowcount / Foot		
S -- Split-Spoon	Granular (Sand & Gravel)		and - 35-50% some - 20-35% little - 10-20% trace - <10% moisture, density, color, gradation
U -- Undisturbed Tube	Fine Grained (Silt & Clay)		
C -- Rock Core	V. Loose: 0-4    Dense: 30-50	V. Soft: <2    Stiff: 8-15	
A -- Auger Cuttings	Loose: 4-10    V. Dense: >50	Soft: 2-4    V. Stiff: 15-30	
	M. Dense: 10-30	M. Stiff: 4-8    Hard: >30	

### Soil Boring Log

CLIENT: USACE PROJECT NAME: <u>PTM PARCEL 79-444</u> PROJECT LOCATION: PROJECT NUMBER: 748810-	INSPECTOR: <u>F. ACCORSI</u> DRILLER: WEATHER: CONTRACTOR: Cascade	BORINGWELL ID: <u>PAR-79-444-SCREEN 2</u> LOCATION DESCRIPTION: LOCATION PLAN: Oceanport, New Jersey
GROUNDWATER OBSERVATIONS  WATER LEVEL: DATE: TIME: MEAS. FROM:	RIG TYPE: Geoprobe(R) 7822DT DATE/TIME START: <u>11-2-17</u> DATE/TIME FINISH: <u>11-2-17</u> WEIGHT OF HAMMER: <u>N/A</u> DROP OF HAMMER: <u>N/A</u> TYPE OF HAMMER: <u>N/A</u>	

DEPTH (feet)	SAMPLE I.D.	BLOWS per 6"	ADV/ REC.	PID (ppm)	FIELD IDENTIFICATION OF MATERIAL	STRATA	COMMENTS
1.0			60/60	0	0-29" (same)		
1.1				0			
1.2				0	29"-60 wet, blk f SAND, some clayey silt	SM	
1.3				0			
1.4				0			
1.5				0			
1.6				0			
1.7							
1.8							
1.9							
1.0							
					TOTAL DEPTH 15 FT. END OF BORING		

Remarks: NO SAMPLES COLLECTED

Sample Types	Consistency vs. Blowcount / Foot	moisture, density, color, gradation																
S -- Split-Spoon U -- Undisturbed Tube C -- Rock Core A -- Auger Cuttings	<table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <th colspan="2">Granular (Sand &amp; Gravel)</th> <th colspan="2">Fine Grained (Silt &amp; Clay)</th> </tr> <tr> <td>V. Loose: 0-4</td> <td>Dense: 30-50</td> <td>V. Soft: &lt;2</td> <td>Stiff: 8-15</td> </tr> <tr> <td>Loose: 4-10</td> <td>V. Dense: &gt;50</td> <td>Soft: 2-4</td> <td>V. Stiff: 15-30</td> </tr> <tr> <td>M. Dense: 10-30</td> <td></td> <td>M. Stiff: 4-8</td> <td>Hard: &gt;30</td> </tr> </table>	Granular (Sand & Gravel)		Fine Grained (Silt & Clay)		V. Loose: 0-4	Dense: 30-50	V. Soft: <2	Stiff: 8-15	Loose: 4-10	V. Dense: >50	Soft: 2-4	V. Stiff: 15-30	M. Dense: 10-30		M. Stiff: 4-8	Hard: >30	and - 35-50% some - 20-35% little - 10-20% trace - <10%
Granular (Sand & Gravel)		Fine Grained (Silt & Clay)																
V. Loose: 0-4	Dense: 30-50	V. Soft: <2	Stiff: 8-15															
Loose: 4-10	V. Dense: >50	Soft: 2-4	V. Stiff: 15-30															
M. Dense: 10-30		M. Stiff: 4-8	Hard: >30															

### Soil Boring Log

CLIENT: USACE PROJECT NAME: FTMM - ECP PROJECT LOCATION: FTMM Parcel 79-444 PROJECT NUMBER: 748810-	INSPECTOR: F. ACCORSI DRILLER: J. BARNEK WEATHER: SUNNY, 60's CONTRACTOR: East Coast Drilling, Inc. (ECDI) RIG TYPE: Geoprobe(R) 7822DT DATE/TIME START: 11-2-17 1000 DATE/TIME FINISH: 11-2-17 1040 WEIGHT OF HAMMER: N/A DROP OF HAMMER: N/A TYPE OF HAMMER: N/A	BORING/WELL ID: PAR-79-444-SCREEN 3 LOCATION DESCRIPTION LOCATION PLAN Oceanport, New Jersey
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GROUNDWATER OBSERVATIONS					FIELD IDENTIFICATION OF MATERIAL			STRATA	COMMENTS
DEPTH (feet)	SAMPLE I.D.	BLOWS per 6"	ADV/ REC.	PID (ppm)					
0			60/60	0	0-2" TOPSOIL				
				0	2"-24" moist, brn-blk cmf SAND, little silt, l. f gravel			FILL SW	COAL PIECES @ 18"
1				0					
				0					
2				0	24"-60" moist, gray-brn silty CLAY, tr. f. sand, Mottled			CL	
				0					
				0					
				0					
5			60/60	0	0-30" (SAME AS ABOVE)				
				0					
				0					
				0					
7				0	30"-48" Wet, or. brn-gray grn cmf SAND, some f gravel			SP	
				0					
				0					
9				0	48"-60 wet, brn-gray grn. f SAND some silt			SM	
				0					
10					TOTAL DEPTH 10 FT. END OF BORING				

Remarks: NO SAMPLES COLLECTED

Sample Types	Consistency vs. Blowcount / Foot			
	Granular (Sand & Gravel)		Fine Grained (Silt & Clay)	
S - Split-Spoon	V. Loose: 0-4	Dense: 30-50	V. Soft: <2	Stiff: 8-15
U - Undisturbed Tube	Loose: 4-10	V. Dense: >50	Soft: 2-4	V. Stiff: 15-30
C - Rock Core	M. Dense: 10-30		M. Stiff: 4-8	Hard: >30
A - Auger Cuttings				

and - 35-50%  
 some - 20-35%  
 little - 10-20%  
 trace - <10%  
 moisture, density, color, gradation

### Soil Boring Log

CLIENT: USACE PROJECT NAME: FTMM - ECP PROJECT LOCATION: FTMM Parcel 79-444 PROJECT NUMBER: 748810-	INSPECTOR: E. ACCORSI DRILLER: J. BARNEK WEATHER: PT. SUNNY, 60'S CONTRACTOR: East Coast Drilling, Inc. (ECDI)	BORING/WELL ID: PAR-79-444-SCREEN 4 LOCATION DESCRIPTION LOCATION PLAN Oceanport, New Jersey
GROUNDWATER OBSERVATIONS WATER LEVEL: ~ 7.5' DATE: TIME: MEAS. FROM:	RIG TYPE: Geoprobe(R) 7822DT DATE/TIME START: 11-2-17 1045 DATE/TIME FINISH: 11-2-17 1110 WEIGHT OF HAMMER: N/A DROP OF HAMMER: N/A TYPE OF HAMMER: N/A	

DEPTH (feet)	SAMPLE I.D.	BLOWS per 6"	ADV/ REC.	PID (ppm)	FIELD IDENTIFICATION OF MATERIAL	STRATA	COMMENTS
0			60/60	0	0'-2" TOP SOIL 2"-30" moist brn cmf SAND, L. silt	SW	COAL @ 18"-20"
1				0			
2				0			
3				0	30"-60" moist or. brn - grn grey silty CLAY, mottled	CH	
4				0			
5			60/60	0	0-18" (same as above)		
6				0	18"-30" wet, brn-grn brn cmf SAND, L. silt, some f. gravel	SW	WOOD + COAL @ 18"-20"
7				0			
8				0	30"-44" wet, grn-or. brn silty CLAY, 44"-60 wet, grn brn cmf SAND, some f. gravel, iron staining	CH	
9				1.9	SLIGHT PETROLEUM ODORS	SW	
10				0	TOTAL DEPTH 10 FT. END OF BORING		

Remarks: NO SAMPLES COLLECTED

Sample Types	Consistency vs. Blowcount / Foot			
	Granular (Sand & Gravel)		Fine Grained (Silt & Clay)	
S - Split-Spoon	V. Loose: 0-4	Dense: 30-50	V. Soft: <2	Stiff: 8-15
U - Undisturbed Tube	Loose: 4-10	V. Dense: >50	Soft: 2-4	V. Stiff: 15-30
C - Rock Core	M. Dense: 10-30		M. Stiff: 4-8	Hard: >30
A - Auger Cuttings				and - 35-50% some - 20-35% little - 10-20% trace - <10% moisture, density, color, gradation

### Soil Boring Log

CLIENT: USACE PROJECT NAME: FTMM - ECP PROJECT LOCATION: FTMM Parcel <b>79-444</b> PROJECT NUMBER: 748810-	INSPECTOR: <u>F. ACCORSI</u> DRILLER: <u>J. BARNEK</u> WEATHER: <u>PT. SUNNY, 70'S</u> CONTRACTOR: <u>East Coast Drilling, Inc. (ECDI)</u> RIG TYPE: <u>Geoprobe(R) 7822DT</u> DATE/TIME START: <u>11-2-17 1115</u> DATE/TIME FINISH: <u>11-2-17 1135</u> WEIGHT OF HAMMER: <u>N/A</u> DROP OF HAMMER: <u>N/A</u> TYPE OF HAMMER: <u>N/A</u>	BORING/WELL ID: <u>PAR-79-444-SCREEN 5</u> LOCATION DESCRIPTION LOCATION PLAN Oceanport, New Jersey
GROUNDWATER OBSERVATIONS WATER LEVEL: <u>≈ 7.5'</u> DATE: TIME: MEAS. FROM:		

DEPTH (feet)	SAMPLE I.D.	BLOWS per 6"	ADV/ REC.	PID (ppm)	FIELD IDENTIFICATION OF MATERIAL	STRATA	COMMENTS
0			60/58	0	0-2" TOP SOIL		
				0	2"-30" moist, brn cmt SAND, some f. Gravel	SW	
1				0			
				0			
2				0	30"-38" moist, gran-brn silty CLAY, some f. gravel mottled	CH	COAL + DEBRIS @ 18" + 28"
				0			
3				0			
				0			
4				0			
				0			
5			60/60	0	0-30" (same as above)		
				0			
6				0			
				0			
7				0			
				0	30"-40" wet, gran brn cmt SAND, some f Gravel	SW	
8				0	40"-60" wet, brn, mf SAND, some silt	SM	
				0			
9				0			
				0			
10					TOTAL DEPTH 10 FT. END OF BORING		

Remarks: NO SAMPLES COLLECTED

Sample Types	Consistency vs. Blowcount / Foot		
S - Split-Spoon U - Undisturbed Tube C - Rock Core A - Auger Cuttings	Granular (Sand & Gravel)	Fine Grained (Silt & Clay)	
	V. Loose: 0-4 Loose: 4-10 M. Dense: 10-30	Dense: 30-50 V. Dense: >50	V. Soft: <2 Soft: 2-4 M. Stiff: 4-8 Hard: > 30
			Stiff: 8-15 V. Stiff: 15-30 Hard: > 30
			and - 35-50% some - 20-35% little - 10-20% trace - <10% moisture, density, color, gradation

### Soil Boring Log

CLIENT: USACE PROJECT NAME: FTMM - ECP PROJECT LOCATION: FTMM Parcel <u>79-444</u> PROJECT NUMBER: 748810-	INSPECTOR: <u>F. ACCORSI</u> DRILLER: <u>J. BARNEK</u> WEATHER: <u>PT. SUNNY, 60's</u> CONTRACTOR: East Coast Drilling, Inc. (ECDI)	BORINGWELL ID: <u>PAR-79-444-SCREEN 6</u> LOCATION DESCRIPTION LOCATION PLAN Oceanport, New Jersey
GROUNDWATER OBSERVATIONS  WATER LEVEL: <u>≈ 7'</u> DATE: TIME: MEAS. FROM:	RIG TYPE: Geoprobe(R) 7822DT DATE/TIME START: <u>11-2-17 1200</u> DATE/TIME FINISH: <u>11-2-17 1245</u> WEIGHT OF HAMMER: <u>N/A</u> DROP OF HAMMER: <u>N/A</u> TYPE OF HAMMER: <u>N/A</u>	

DEPTH (feet)	SAMPLE I.D.	BLOWS per 6"	ADV/ REC.	PID (ppm)	FIELD IDENTIFICATION OF MATERIAL	STRATA	COMMENTS
0			<u>60/60</u>	<u>0</u>	<u>TOP SOIL 2"</u> <u>2"-30" moist, brn cmf SAND, some f. gravel</u>	<u>SW</u>	
1				<u>0</u>			
2				<u>0</u>			<u>COAL @ 12", 18", 24"</u>
3				<u>0</u>	<u>30"-60" moist, gray-gan-brn silty CLAY, mottled</u>	<u>CH</u>	<u>CONCRETE @ 30"</u> <u>BRICK @ 36"</u>
4				<u>0</u>			
5			<u>60/60</u>	<u>0</u>	<u>0"-24" (same as above)</u>		
6				<u>0</u>			
7				<u>0</u>	<u>24"-36" wet, brn-gran-brn org brn cmf SAND, little f. gravel</u>	<u>SW</u>	
8				<u>0</u>	<u>36"-60" wet, brn af SAND, some silt</u>	<u>SP</u>	
9				<u>0</u>			
10					<u>TOTAL DEPTH 10 FT. END OF BORING</u>		

Remarks: NO SAMPLES COLLECTED

Sample Types	Consistency vs. Blowcount / Foot		
S - Split-Spoon	Granular (Sand & Gravel)	Fine Grained (Silt & Clay)	
U - Undisturbed Tube	V. Loose: 0-4    Dense: 30-50	V. Soft: <2    Stiff: 8-15	and - 35-50%
C - Rock Core	Loose: 4-10    V. Dense: >50	Soft: 2-4    V. Stiff: 15-30	some - 20-35%
A - Auger Cuttings	M. Dense: 10-30	M. Stiff: 4-8    Hard: > 30	little - 10-20%
			trace - <10%
			moisture, density, color, gradation

### Soil Boring Log

CLIENT: USACE PROJECT NAME: FTMM - ECP PROJECT LOCATION: FTMM Parcel <u>79-444</u> PROJECT NUMBER: 748810-	INSPECTOR: <u>F. ACCORSI</u> DRILLER: <u>J. BARNEK</u> WEATHER: <u>PT. SUNNY, 60'S</u> CONTRACTOR: East Coast Drilling, Inc. (ECDI)	BORINGWELL ID: <u>PAR-79-444-TMW-01</u> LOCATION DESCRIPTION LOCATION PLAN Oceanport, New Jersey
GROUNDWATER OBSERVATIONS WATER LEVEL: <u>≈ 7.5'</u> DATE: TIME: MEAS. FROM:		RIG TYPE: Geoprobe(R) 7822DT DATE/TIME START: <u>11-2-17 1330</u> DATE/TIME FINISH: <u>11-2-17 1405</u> WEIGHT OF HAMMER: <u>N/A</u> DROP OF HAMMER: <u>N/A</u> TYPE OF HAMMER: <u>N/A</u>

DEPTH (feet)	SAMPLE I.D.	BLOWS per 6"	ADV/ REC.	PID (ppm)	FIELD IDENTIFICATION OF MATERIAL	STRATA	COMMENTS
0			<u>60/59</u>	<u>0</u>	<u>0-3" TOPSOIL</u>		
				<u>0</u>	<u>3"-18" moist, brn cmf SAND, l. silt</u>	<u>SW</u>	
1				<u>0</u>	<u>18"-54" moist, brn clayey silt, some f. sand, mottled</u>	<u>SC</u>	
				<u>0</u>			
2				<u>0</u>			
				<u>0</u>			
3				<u>0</u>			
				<u>0</u>			
4				<u>0</u>			
				<u>0</u>			
5			<u>60/60</u>	<u>0</u>	<u>0-32" (same as above)</u>		
				<u>0</u>			
6				<u>0</u>			
				<u>0</u>			
7				<u>0</u>			
				<u>0</u>	<u>32"-44" wet, grabr cmf GRAVEL, and cmf SAND</u>	<u>GM</u>	
8				<u>0</u>			
				<u>0</u>	<u>44"-60" wet brn m.f. SAND, some silt</u>	<u>SP</u>	
9				<u>0</u>			
				<u>0</u>			
10							

Remarks:

Sample Types	Consistency vs. Blowcount / Foot		
S - Split-Spoon U - Undisturbed Tube C - Rock Core A - Auger Cuttings	Granular (Sand & Gravel)	Fine Grained (Silt & Clay)	
	V. Loose: 0-4 Loose: 4-10 M. Dense: 10-30	Dense: 30-50 V. Dense: >50	V. Soft: <2 Soft: 2-4 M. Stiff: 4-8 Stiff: 8-15 V. Stiff: 15-30 Hard: >30
			and - 35-50% some - 20-35% little - 10-20% trace - <10% moisture, density, color, gradation

### Soil Boring Log

CLIENT: USACE PROJECT NAME: <del>PMH</del> PARCEL 79.444 PROJECT LOCATION: PROJECT NUMBER: 748810-	INSPECTOR: F. ACCORSI DRILLER: WEATHER: CONTRACTOR: <del>Cascade</del> ECDI RIG TYPE: Geoprobe(R) 7822DT DATE/TIME START: 11-2-17 DATE/TIME FINISH: 11-2-17 WEIGHT OF HAMMER: N/A DROP OF HAMMER: N/A TYPE OF HAMMER: N/A	BORING/WELL ID: PAR-79-444-TMW-01 LOCATION DESCRIPTION: LOCATION PLAN: Oceanport, New Jersey
GROUNDWATER OBSERVATIONS WATER LEVEL: $\approx 7.5'$ DATE: TIME: MEAS. FROM:		

DEPTH (feet)	SAMPLE I.D.	BLOWS per 6"	ADV/ REC.	PID (ppm)	FIELD IDENTIFICATION OF MATERIAL	STRATA	COMMENTS
1.0			60/60	0	0-12" (SAME)		
1.1	PAR-79-444-TMW-01-11			0	12"-24" wet, cm f SAND, and mt Gravel	SW	
1.2				0	24"-60 wet, blk, dk, grn mt SAND, Little silt	SM	
1.3				0			
1.4				0			
1.5				0			
1.6							
1.7							
1.8							
1.9							
1.0							
					TOTAL DEPTH 15 FT END OF BORING		

Remarks:  
 TMW SCREEN (10FT) SET FROM 5' TO 15'

Sample Types	Consistency vs. Blowcount / Foot			
S - Split-Spoon U - Undisturbed Tube C - Rock Core A - Auger Cuttings	Granular (Sand & Gravel)		Fine Grained (Silt & Clay)	
	V. Loose: 0-4	Dense: 30-50	V. Soft: <2	Stiff: 8-15
	Loose: 4-10	V. Dense: >50	Soft: 2-4	V. Stiff: 15-30
	M. Dense: 10-30		M. Stiff: 4-8	Hard: >30
and - 35-50% some - 20-35% little - 10-20% trace - <10% moisture, density, color, gradation				

### Soil Boring Log

CLIENT: USACE PROJECT NAME: FTMM - ECP PROJECT LOCATION: FTMM Parcel <u>79-444</u> PROJECT NUMBER: 748810-	INSPECTOR: <u>F. ACCORSI</u> DRILLER: <u>J. BARNEK</u> WEATHER: _____ CONTRACTOR: East Coast Drilling, Inc. (ECDI) RIG TYPE: Geoprobe(R) 7822DT DATE/TIME START: <u>11-2-17 1415</u> DATE/TIME FINISH: <u>11-2-17 1500</u> WEIGHT OF HAMMER: <u>N/A</u> DROP OF HAMMER: <u>N/A</u> TYPE OF HAMMER: <u>N/A</u>	BORINGWELL ID: <u>PAR-79-444-TMW-02</u> LOCATION DESCRIPTION LOCATION PLAN Oceanport, New Jersey
GROUNDWATER OBSERVATIONS WATER LEVEL: <u>~7.5'</u> DATE: _____ TIME: _____ MEAS. FROM: _____		

DEPTH (feet)	SAMPLE I.D.	BLOWS per 6"	ADV/ REC.	PID (ppm)	FIELD IDENTIFICATION OF MATERIAL	STRATA	COMMENTS
0			<u>60/32</u>	<u>0</u>	<u>0-3" TOP SOIL</u>		
				<u>0</u>	<u>3"-24" moist, cmf SAND, some mf Gravel, L. silt</u>	<u>SW</u>	<u>SLAG @ 12"</u>
1				<u>0</u>			
				<u>0</u>			
2				<u>0</u>	<u>24"-52" moist, gray brn Silty Clay</u>	<u>SC</u>	
				<u>0</u>			
3				<u>0</u>			
				<u>0</u>			
4				<u>0</u>			
				<u>0</u>			
5			<u>60/60</u>	<u>0</u>	<u>0-36" (same as above)</u>		
				<u>0</u>			
6				<u>0</u>			
				<u>0</u>			
7				<u>0</u>	<u>36"-48" wet, brn, cmf SAND, some f. gravel, L. silt</u>	<u>SW</u>	<u>WOOD DEBRIS @ 2.5'</u>
				<u>0</u>			
8				<u>0</u>	<u>48"-60" wet, brn-yel brn P. SAND, some silt</u>	<u>SP</u>	
				<u>0</u>			
9				<u>0</u>			
				<u>0</u>			
10				<u>0</u>			

Remarks:

<b>Sample Types</b> S -- Split-Spoon U -- Undisturbed Tube C -- Rock Core A -- Auger Cuttings	<b>Consistency vs. Blowcount / Foot</b> <table style="width: 100%; border-collapse: collapse;"> <tr> <th colspan="2">Granular (Sand &amp; Gravel)</th> <th colspan="2">Fine Grained (Silt &amp; Clay)</th> </tr> <tr> <td>V. Loose: 0-4</td> <td>Dense: 30-50</td> <td>V. Soft: &lt;2</td> <td>Stiff: 8-15</td> </tr> <tr> <td>Loose: 4-10</td> <td>V. Dense: &gt;50</td> <td>Soft: 2-4</td> <td>V. Stiff: 15-30</td> </tr> <tr> <td>M. Dense: 10-30</td> <td></td> <td>M. Stiff: 4-8</td> <td>Hard: &gt;30</td> </tr> </table>	Granular (Sand & Gravel)		Fine Grained (Silt & Clay)		V. Loose: 0-4	Dense: 30-50	V. Soft: <2	Stiff: 8-15	Loose: 4-10	V. Dense: >50	Soft: 2-4	V. Stiff: 15-30	M. Dense: 10-30		M. Stiff: 4-8	Hard: >30	and - 35-50% some - 20-35% little - 10-20% trace - <10% moisture, density, color, gradation
Granular (Sand & Gravel)		Fine Grained (Silt & Clay)																
V. Loose: 0-4	Dense: 30-50	V. Soft: <2	Stiff: 8-15															
Loose: 4-10	V. Dense: >50	Soft: 2-4	V. Stiff: 15-30															
M. Dense: 10-30		M. Stiff: 4-8	Hard: >30															

### Soil Boring Log

CLIENT: USACE PROJECT NAME: <u>FTMH - PARCEL 794A</u> PROJECT LOCATION: PROJECT NUMBER: 748810-	INSPECTOR: <u>F. ACCORSI</u> DRILLER: <u>J. BARBER</u> WEATHER: CONTRACTOR: <u>Cascade ECDI</u> RIG TYPE: <u>Geoprobe(R) 7822DT</u> DATE/TIME START: <u>11-2-17</u> DATE/TIME FINISH: <u>11-2-17</u> WEIGHT OF HAMMER: <u>N/A</u> DROP OF HAMMER: <u>N/A</u> TYPE OF HAMMER: <u>N/A</u>	BORING/WELL ID: <u>PAR-79-444-TMW-02</u> LOCATION DESCRIPTION LOCATION PLAN Oceanport, New Jersey
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DEPTH (feet)	SAMPLE I.D.	BLOWS per 6"	ADV/ REC.	PID (ppm)	FIELD IDENTIFICATION OF MATERIAL	STRATA	COMMENTS
1.0			60/60	0	0-60" wet, gm-blk f SAND, some silt	SP	
1.1	PAR-79-444-TMW-02-11			0			
1.2				0			
1.3				0			
1.4				0			
1.5				0	TOTAL DEPTH 15 FT. END OF BORING		
6							
7							
8							
9							
0							

Remarks: TMW (10 FT. SCREEN) SET FROM 5' TO 15'

Sample Types S -- Split-Spoon U -- Undisturbed Tube C -- Rock Core A -- Auger Cuttings	Consistency vs. Blowcount / Foot Granular (Sand & Gravel)      Fine Grained (Silt & Clay) V. Loose: 0-4      Dense: 30-50      V. Soft: <2      Stiff: 8-15 Loose: 4-10      V. Dense: >50      Soft: 2-4      V. Stiff: 15-30 M. Dense: 10-30                              M. Stiff: 4-8      Hard: > 30	and - 35-50% some - 20-35% little - 10-20% trace - <10% moisture, density, color, gradation
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### Soil Boring Log

CLIENT: USACE PROJECT NAME: FTMM - ECP PROJECT LOCATION: FTMM Parcel 79-444 PROJECT NUMBER: 748810-	INSPECTOR: F. ACCORSI DRILLER: J. BARNEK WEATHER: CONTRACTOR: East Coast Drilling, Inc. (ECDI) RIG TYPE: Geoprobe(R) 7822DT DATE/TIME START: 11-2-17 1300 DATE/TIME FINISH: 11-2-17 1550 WEIGHT OF HAMMER: N/A DROP OF HAMMER: N/A TYPE OF HAMMER: N/A	BORING/WELL ID: PAR-79-444-TMW-03 LOCATION DESCRIPTION LOCATION PLAN Oceanport, New Jersey
GROUNDWATER OBSERVATIONS WATER LEVEL: $\approx 7.5'$ DATE: TIME: MEAS. FROM:		

DEPTH (feet)	SAMPLE I.D.	BLOWS per 6"	ADV/ REC.	PID (ppm)	FIELD IDENTIFICATION OF MATERIAL	STRATA	COMMENTS
0			60/56	0	0-3" TOP SOIL		
				0	3"-18" moist, brn cmf SAND, some cmf Gravel	SW	
1				0	18"-36" moist, grn brn-or. brn silty CLAY, mottled	SC	
				0			
2				0			
				0			
3				0	36"-52" moist brn-grn brn cmf SAND, tr. silt	SW	
				0			
4				0			
				0			
5			60/60	0	0-18" moist, grn brn silty CLAY		
				0			
6				0	18"-36" wet, brn-grn brn cmf SAND, tr. silt	SW	
				0			
7				0			
				0			
8				0	36"-42" wet gray brn silty CLAY	SC	
				0	42"-60" wet brn mf SAND, some silt	SW	
9				0			
				0			
10							

Remarks:

Sample Types	Consistency vs. Blowcount / Foot		
S - Split-Spoon	Granular (Sand & Gravel)	Fine Grained (Silt & Clay)	and - 35-50% some - 20-35% little - 10-20% trace - <10% moisture, density, color, gradation
U - Undisturbed Tube	V. Loose: 0-4    Dense: 30-50	V. Soft: <2    Stiff: 8-15	
C - Rock Core	Loose: 4-10    V. Dense: >50	Soft: 2-4    V. Stiff: 15-30	
A - Auger Cuttings	M. Dense: 10-30	M. Stiff: 4-8    Hard: >30	

# Soil Boring Log

CLIENT: USACE PROJECT NAME: <u>FTMM PARCEL 79-444</u> PROJECT LOCATION: PROJECT NUMBER: 748810-	INSPECTOR: <u>F. ACCORSI</u> DRILLER: <u>J. BARNEK</u> WEATHER: CONTRACTOR: <u>Geoprobe ECDI</u> RIG TYPE: <u>Geoprobe(R) 7822DT</u> DATE/TIME START: <u>11-2-17</u> DATE/TIME FINISH: <u>11-2-17</u> WEIGHT OF HAMMER: <u>N/A</u> DROP OF HAMMER: <u>N/A</u> TYPE OF HAMMER: <u>N/A</u>	BORING/WELL ID: <u>PAR-79-444-TMW-03</u> LOCATION DESCRIPTION LOCATION PLAN Oceanport, New Jersey
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DEPTH (feet)	SAMPLE I.D.	BLOWS per 6"	ADV/ REC.	PID (ppm)	FIELD IDENTIFICATION OF MATERIAL	STRATA	COMMENTS
1.0			60/60	0	0-30" (same)		
1.1	PAR-79-444-TMW-03-11			0			
1.2				0			
1.3				0	32"-60" wet, blk f. SAND, some silt		SP
1.4				0			
1.5				0	TOTAL DEPTH 15 FT. END OF BORING		
1.6							
1.7							
1.8							
1.9							
1.0							

Remarks: TMW (10 FT. SCREEN) SET FROM 5' TO 15'

Sample Types	Consistency vs. Blowcount / Foot	moisture, density, color, gradation																
S -- Split-Spoon U -- Undisturbed Tube C -- Rock Core A -- Auger Cuttings	<table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <th colspan="2">Granular (Sand &amp; Gravel)</th> <th colspan="2">Fine Grained (Silt &amp; Clay)</th> </tr> <tr> <td>V. Loose: 0-4</td> <td>Dense: 30-50</td> <td>V. Soft: &lt;2</td> <td>Stiff: 8-15</td> </tr> <tr> <td>Loose: 4-10</td> <td>V. Dense: &gt;50</td> <td>Soft: 2-4</td> <td>V. Stiff: 15-30</td> </tr> <tr> <td>M. Dense: 10-30</td> <td></td> <td>M. Stiff: 4-8</td> <td>Hard: &gt; 30</td> </tr> </table>	Granular (Sand & Gravel)		Fine Grained (Silt & Clay)		V. Loose: 0-4	Dense: 30-50	V. Soft: <2	Stiff: 8-15	Loose: 4-10	V. Dense: >50	Soft: 2-4	V. Stiff: 15-30	M. Dense: 10-30		M. Stiff: 4-8	Hard: > 30	and - 35-50% some - 20-35% little - 10-20% trace - <10%
Granular (Sand & Gravel)		Fine Grained (Silt & Clay)																
V. Loose: 0-4	Dense: 30-50	V. Soft: <2	Stiff: 8-15															
Loose: 4-10	V. Dense: >50	Soft: 2-4	V. Stiff: 15-30															
M. Dense: 10-30		M. Stiff: 4-8	Hard: > 30															

## Well Construction Detail (Single Cased - Stickup)

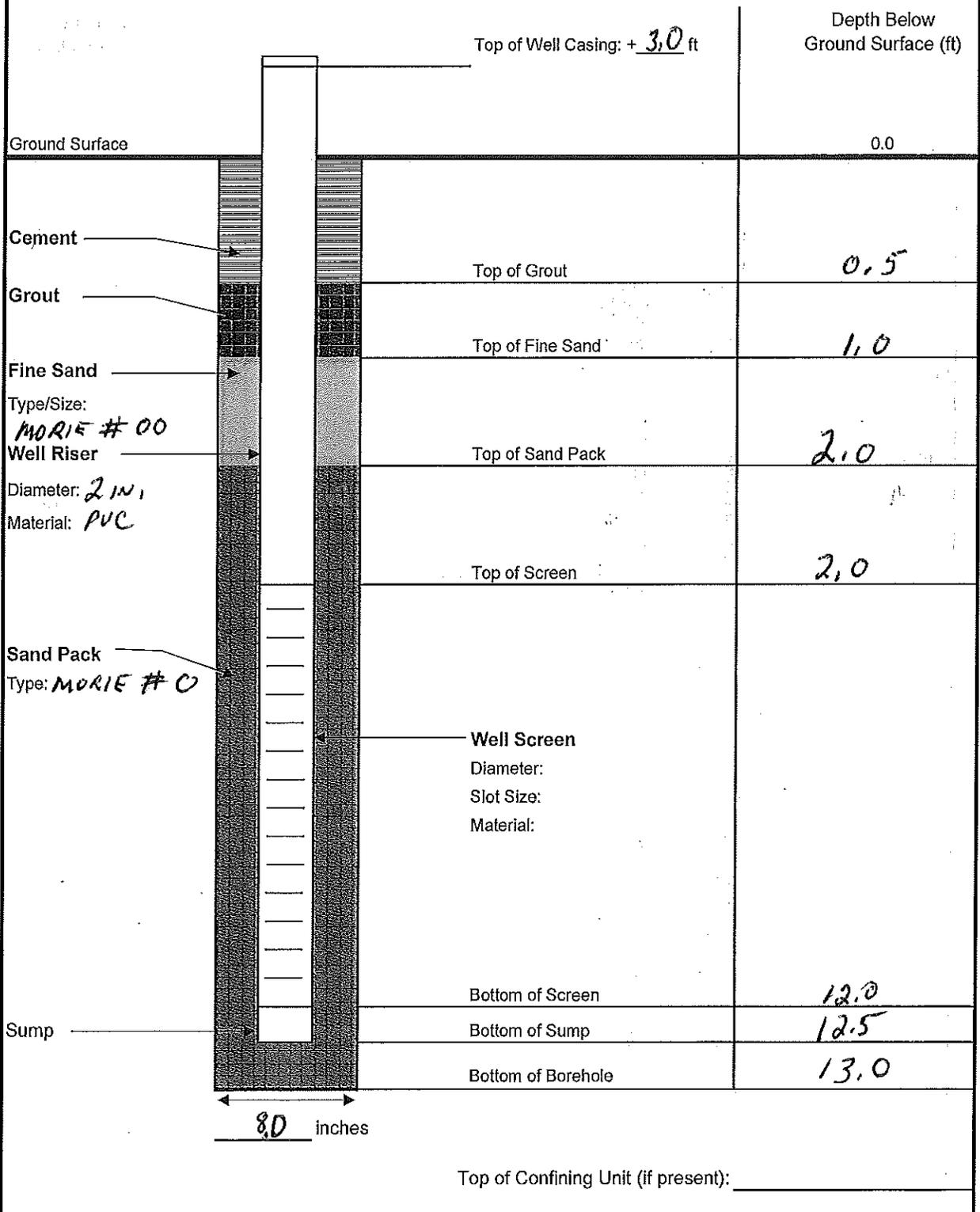
Client: USACE

Well ID: *PAR-79-444-MW-01*

NJBWA Permit No.

Date Well Installed: *12-15-17*

Location: *PARCEL 79, UST 444*



# Soil Boring Log

CLIENT: USACE PROJECT NAME: FTMM - ECP PROJECT LOCATION: FTMM Parcel 79-444 PROJECT NUMBER: 748810-	INSPECTOR: F. ACCORSI DRILLER: K. ATWOOD, T. McNALLY WEATHER: 20's, snow CONTRACTOR: East Coast Drilling, Inc. (ECDI)	BORING/WELL ID: PAR-79-444-MW-01 LOCATION DESCRIPTION LOCATION PLAN Oceanport, New Jersey
GROUNDWATER OBSERVATIONS  WATER LEVEL: DATE: TIME: MEAS. FROM:	RIG TYPE: Geoprobe(R) 7822DT DATE/TIME START: 12-15-17 1800 DATE/TIME FINISH: 12-15-17 1500 WEIGHT OF HAMMER: N/A DROP OF HAMMER: N/A TYPE OF HAMMER: N/A	

DEPTH (feet)	SAMPLE I.D.	BLOWS per 6"	ADV/ REC.	PID (ppm)	FIELD IDENTIFICATION OF MATERIAL	STRATA	COMMENTS
0					HOLLOW STEM AUGER TO 13' SET SCREEN FROM 2'-12' (BASED ON WATER LEVEL @ MW-02 OF 4.6') MOIST TO WET GREEN BROWN SANDY SILTY CLAY PID READINGS FROM CUTTINGS @ PPM		WET @ 6'
1							
2							
3							
4							
5					END OF BORING @ 13'		
6					SEE WELL CONSTRUCTION DETAIL		
7							
8							
9							
10							

Remarks:

Sample Types	Consistency vs. Blowcount / Foot	
S - Split-Spoon U - Undisturbed Tube C - Rock Core A - Auger Cuttings	Granular (Sand & Gravel)      Fine Grained (Silt & Clay)	
	V. Loose: 0-4      Dense: 30-50      V. Soft: <2      Stiff: 8-15	and - 35-50% some - 20-35%
	Loose: 4-10      V. Dense: >50      Soft 2-4      V. Stiff: 15-30	little - 10-20%
	M. Dense: 10-30      M. Stiff: 4-8      Hard: >30	trace - <10% moisture, density, color, gradation

## Well Construction Detail (Single Cased - Stickup)

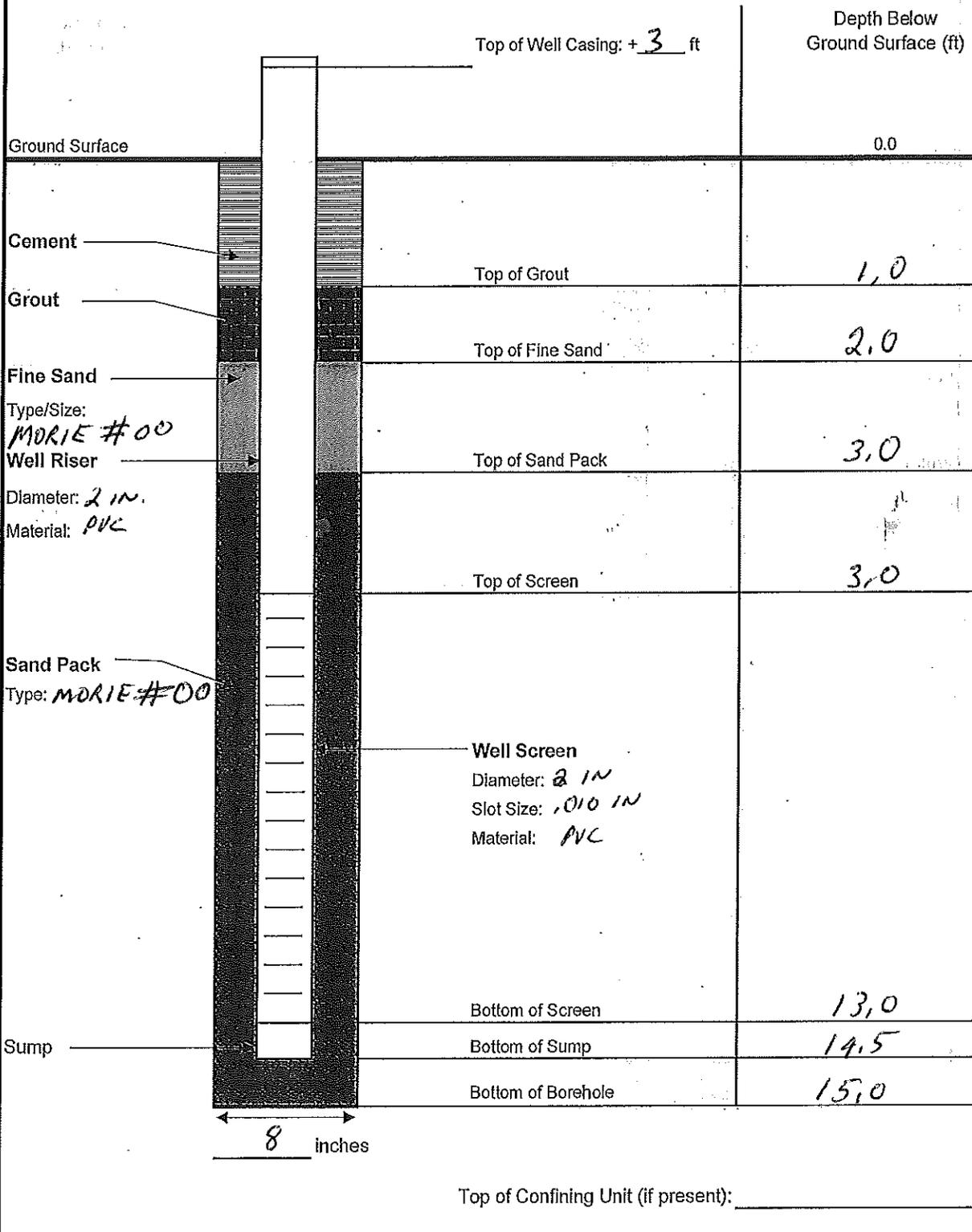
Client: USACE

Well ID: *PAR-79-444-MW-02*

NJBWA Permit No.

Date Well Installed: *12-15-17*

Location: *PARCEL 79, UST 444*



## Soil Boring Log

CLIENT: <u>USACE</u> PROJECT NAME: <u>FTMM - ECP</u> PROJECT LOCATION: <u>FTMM Parcel 79-444</u> PROJECT NUMBER: <u>748810-</u>	INSPECTOR: <u>F. ACCORSI</u> DRILLER: <u>K. ATWOOD, T. McNAUL</u> WEATHER: <u>30° CLOUDY, FLURRIES</u> CONTRACTOR: <u>East Coast Drilling, Inc. (ECDI)</u>	BORINGWELL ID: <u>PAR-79-444-MW-02</u> LOCATION DESCRIPTION: LOCATION PLAN: Oceanport, New Jersey
GROUNDWATER OBSERVATIONS <u>4.6' FROM WELL</u> WATER LEVEL: <u>7-7.5' PREVIOUS T.M.W.'S</u> DATE: TIME: MEAS. FROM:	RIG TYPE: <u>Geoprobe(R) 7822DT</u> DATE/TIME START: <u>12-15-17 1020</u> DATE/TIME FINISH: <u>12-15-17 1200</u> WEIGHT OF HAMMER: <u>N/A</u> DROP OF HAMMER: <u>N/A</u> TYPE OF HAMMER: <u>N/A</u>	

DEPTH (feet)	SAMPLE I.D.	BLOWS per 6"	ADV/ REC.	PID (ppm)	FIELD IDENTIFICATION OF MATERIAL	STRATA	COMMENTS
0					FOLLOW STRM AUGER TO 15 FT. SET SCREEN FROM <u>4'-0" TO 4'-3"</u> MOIST GREEN BROWN CLAY AND SILT, SANDY  PID READING FROM CUTTINGS <u>0 PPM</u>		
1							
2							
3							
4							
5					END OF BORING AT 15 FT SEE WELL CONSTRUCTION DETAIL		
6							
7							
8							
9							
10							

Remarks:

<b>Sample Types</b> S - Split-Spoon U - Undisturbed Tube C - Rock Core A - Auger Cuttings	<b>Consistency vs. Blowcount / Foot</b>	and - 35-50% some - 20-35% little - 10-20% trace - <10% moisture, density, color, gradation																
	<table style="width: 100%; border-collapse: collapse;"> <tr> <th colspan="2" style="text-align: left;">Granular (Sand &amp; Gravel)</th> <th colspan="2" style="text-align: left;">Fine Grained (Silt &amp; Clay)</th> </tr> <tr> <td style="font-size: x-small;">V. Loose: 0-4</td> <td style="font-size: x-small;">Dense: 30-50</td> <td style="font-size: x-small;">V. Soft: &lt;2</td> <td style="font-size: x-small;">Stiff: 8-15</td> </tr> <tr> <td style="font-size: x-small;">Loose: 4-10</td> <td style="font-size: x-small;">V. Dense: &gt;50</td> <td style="font-size: x-small;">Soft: 2-4</td> <td style="font-size: x-small;">V. Stiff: 15-30</td> </tr> <tr> <td style="font-size: x-small;">M. Dense: 10-30</td> <td></td> <td style="font-size: x-small;">M. Stiff: 4-8</td> <td style="font-size: x-small;">Hard: &gt;30</td> </tr> </table>	Granular (Sand & Gravel)		Fine Grained (Silt & Clay)		V. Loose: 0-4	Dense: 30-50	V. Soft: <2	Stiff: 8-15	Loose: 4-10	V. Dense: >50	Soft: 2-4	V. Stiff: 15-30	M. Dense: 10-30		M. Stiff: 4-8	Hard: >30	
Granular (Sand & Gravel)		Fine Grained (Silt & Clay)																
V. Loose: 0-4	Dense: 30-50	V. Soft: <2	Stiff: 8-15															
Loose: 4-10	V. Dense: >50	Soft: 2-4	V. Stiff: 15-30															
M. Dense: 10-30		M. Stiff: 4-8	Hard: >30															

**Attachment C**  
**Field Notes**

## GW & Soil Sampling

Nov 2 2017

personnel: F. Accorsi, B. Dietert, ECDI

Task: GW & Soil Sampling, PID Screening  
at UHOT, Parcel, & IRP sites.

Weather: 60-70°, partly cloudy to sun

0730: ECDI on site

0745: H&S meeting

0815: Prep coolers, Load Eqipt,  
Calibrate PID.

0840: Mob to Parcel 79-UST 444

0900: Start drilling PAR-79-444-SCREEN1

0910: Begin PID screening SCREEN1

0930: No PID recording over 0.00 ppm ~0-15 ft.

0945: Begin drilling PAR-79-444-SCREEN2

0952: Begin PID screening SCREEN2

1008: No PID recordings over 0.00 ppm 0-15 ft.

1015: Start drilling PAR-79-444-SCREEN3

1032: No PID recordings over 0.00 ppm 0-10 ft.

1045: Start drilling PAR-79-444-SCREEN4

1058: Begin PID screening SCREEN4

1107: Recorded 1.9 ppm at 9 ft., no  
readings above 0.0 from 9-10 ft. or  
0-9 ft.

1118: Start drilling PAR-79-444-SCREEN5

1130: Begin PID on SCREEN5

1145: No PID recordings over 0.00 ppm 0-10 ft.

1200: Start drilling PAR-79-444-SCREEN6

1211: Begin PID screens on SCREEN6

Nov 2 2017 (cont)

1223: No PID recordings over 0.00 ppm 0-10 ft.

1240: Lunch

1330: Decommissioned screening wells 1-6,  
filled in with soil cuttings.

1337: Start drilling PAR-79-444-TMW-01

1345: No PID reading above 0 ppm ~0-15 ft.

1400: Collect samples VOC+TICS & SVOCs+TICS,  
PAR-79-444-TMW-01-11

1410: Begin drilling PAR-79-444-TMW-02

1420: No PID readings above 0 ppm ~0-15 ft.

1430: Collect samples VOCs+TICS & SVOCs+TICS,  
PAR-79-444-TMW-02-11

1500: Start drilling PAR-79-444-TMW-03

1515: No PID readings above 0 ppm ~0-15 ft.

1530: Collect samples VOCs+TICS & SVOCs+TICS,  
PAR-79-444-TMW-03-11

1550: Decommissioned PAR-79-444-TMW-1-3,  
filled hole with soil cuttings.

1600: Mob to office, prepare COCs,  
Quality Control Report, Unpack cooler,  
Clean-up.

11/2/17

BD

12-14-17 MW INSTALLATION 30° FLOARIES

0705 ECDL ARRIVED, CONDUCTED H+S MEETING.

0755 MOBILIZE TO PAR-55-800-12-MW-02. HSA

DRILLING TO 21 FT BGS. (K. ATWOOD, T. McNALLY)

SCREEN SET FROM 10' TO 20'. 8' TO 18" BASED ON

GW LEVEL TAKEN AT MW-03, WHICH IS 10.2 FT

BAS. USED 6 BAGS MORIE #0, 1 BAG #00, 1/2 BAG

BENTONITE GROUT, 0930 DONE

0930-1030 DECON AUGERS, MOBILIZE TO PAR-

54-884-MW-03. GW ELEV. IN MW-01 IS

5.9', SCREEN IN THE WELL IS FROM 5' TO 15'

BASED ON THAT AND GW IN TMW-02 WAS 5.1'

AND GW IN TMW-04 WAS 4.6'. DISCUSSED

RAISING THE SCREEN INTERVAL IN MW-03

AND MW-02 TO 2'-12' WITH KENT + JULIEN

IN WHICH WAS A UNANIMOUS DECISION TO DO SO.

1140 WELL FINISHED (NOT COMPLETED) MOVE 2 DRUMS

SOIL TO B.699 STAGING AREA. LUNCH BREAK

1255 MOB. TO PAR-884-MW-02 TO DRILL MW

W/SAME SPECS. AS MW-03. EACH USED

6 BAGS #0 MORIE, 1 BAG #00 MORIE, 1/2 BAG BENT.

GROUT.

1400 ONE-WELL FINISHED, CLEAN UP SITE AND

PREVIOUS 2 MW INSTALLATION AREAS. MOB. TO

699 STAGING AREA, UNLOAD 1/2 FULL DRUM,

DECON AUGERS, STAGE MATERIALS FOR 3 MW

INSTALLATION. ECDL OFFSITE 1545

12-15-17 MW INSTALLATION 30° FLOARIES

0710 ECDL ARRIVED (K. ATWOOD, T. McNALLY)

HELD H+S MEETING.

0800 MOB TO PAR-68-906A-MW-03 LOCATION

CHECKED STATIC WATER LEVELS IN WELLS;

MW-01: 6.6', MW-02: 6.4', M12MW1: 6.4'

DISCUSSED W/JULIEN AND DECIDED TO SET SCREEN

AT 3' TO 13'. USED 5 BAGS #0 MORIE, 1 BAG

#00 MORIE, 1/4 BAG BENTONITE. WELL FINISHED

(BUT NOT COMPLETED) @ 0940, LOAD RIG, MOB.

TO B.699. DECON AUGERS ~~MOB TO~~

1010 MOB TO PAR-79-444-MW-02 LOCATION

BEGAN DRILLING. COULD NOT LOCATE 30 MW-1

FOR STATIC WATER LEVELS, BASED ON PREVIOUS

TEMP, MW'S AND SCREEN BORINGS WITH GW

AT APPROX. 7-7.5. WILL SET SCREEN @ 4' TO 14'

6 BAGS MORIE #0, 1 BAG MORIE #00, 1/2 BAG BENTONITE

1200-1300 LUNCH BREAK

1300 MOB TO PAR-79-444-MW-01, DRILL TO 15'

SET SCREEN FROM 4' TO 12' TO 12' BASED

ON WATER LEVEL IN MW-02 @ 4.6', DISCUSSED

AND CONCURRED W/JULIEN C.

5 BAGS #0 MORIE 1 BAG #00 MORIE, 1/3 BAG BENTONITE

1500-MOB TO B.699 TO DECON AUGERS. 1530-OFF SITE

DUE TO INCREASING SNOWFALL.

12-18-17 MW INSTALLATION 40'S, FT. CLOY

0710 ECDI ARRIVED (K. ATWOOD, T. McNALLY, COLIN R. CARROLL). HED Z. LEVY ON SITE 0700. HELD HHS MEETING, ALSO DISCUSSED ANTICIPATED WORK GOALS FOR THE DAY (COMPLETE + DEVELOP 4 WELLS), ZOHAR WENT W/ CREW 2 - MOB. TO 800-20, 800-12 TO DEV. + COMPLETE WELLS.

0800 MOB. GEOPROBE CREW 1 TO PAR-83-482-MW-02 TO INSTALL MW'S W/ HOLLOW STEM AUGER. DRILLED TO 13 FT. SET SCREEN FROM 2' TO 12'. BASED ON GW LEVEL OF 3.5 FT IN 108 MW 04. USED:

5 BAGS MORIE #0, 1 BAG MORIE #00, 1/4 BAG BENTONITE.

0940 MOB TO PAR-83-482-MW-01, MUST FIRST HAMMER THRU 8 IN. CONCRETE TO START. AUGERED TO 13 FT. SET SCREEN FROM 2 FT TO 12 FT. USED SAME QTY. MATERIALS AS MW-02.

1120 MOB. TO 699 TO DECON AUGERS, MOVE 1 SOIL DRUM.

1200-1230 LUNCH

1240 MOB. TO PAR-29-490-MW-03, INSTALL MW W/ HSA TO 13 FT. SET SCREEN FROM 2'-12'. USED:

5 BAGS MORIE #0, 1 BAG MORIE #00, 1/4 BAG BENTONITE

1400 FINISH WELL, CLEAN AUGERS, MOB TO:

1415 PAR-29-490-MW-02 LOCATION, AUGER TO 13 FT. SET SCREEN @ 2' TO 12' USED SAME QTY. MATERIALS AS MW-03 FINISH WELL @ 1520

MOB TO 699 TO DECON AUGERS

12-19-17 MW INSTALLATION 40'S, FT. SONNY

0700 ECDI ARRIVED (K. ATWOOD, T. McNALLY, CREW 2: COLNICHIE, ROMAN C.) Z. LEVY ON SITE 710. HELD HHS MEETING. DISCUSSED WORK GOALS - INSTALL 3 MW'S, COMPLETE/DEVELOP 4 MW). ZOHAR MOB. W/ CREW 2 TO 884 - MW 2,3.

0800 MOB TO PAR-72-211-MW-02 LOCATION, HSA TO 16 FT. SET WELL SCREEN FROM 5 FT TO 15 FT. USED 6 BAGS MORIE #0, 1 BAG MORIE #00, 1/4 BAG BENTONITE

0940 FINISH WELL MOB TO PAR-72-211-MW-03 LOCATION HSA TO 14 FT. SET SCREEN FROM 3' TO 13'. USED:

5 BAGS MORIE #0, 1 BAG MORIE #00, 1/4 BAG BENTONITE  
1030 CLEAN AUGERS, MOB TO PAR-72-211-MW-04

1100 HSA TO 215 FT. DISCOVERED STORM SEWER PIPE THAT AUGERS WERE ALONG SIDE OF. MOVED MW LOCATION 6 FT. TO NORTH TO AVOID STORM SEWER PIPE AND ELECTRIC WIRES FROM LIGHT POLES.

1115 HSA TO 14 FT. SET SCREEN FROM 3' TO 13' 5 BAGS MORIE #0, 1 BAG MORIE #00, 1/4 BAG BENTONITE

1240 WELL FINISHED, LUNCH BREAK, DECON AUGERS

1330 MOB TO M5 MW 19 LOCATION W/ GEOPROBE TO PULL STEEL STICK UP CASING, + CONCRETE

MOB TO M5 MW 19 (18 FT. DEEP) PULLED OUTER STEEL STICK-UP ROSEAL CASING W/ GEOPROBE, LOOSENED PVC WELL CASING, WILL RETURN TOMORROW TO GROUT WELLS

1500 ECDI DEPART

Location FTMM Date 12/13/17  
 Project / Client MW Development / USACE

Weather - Cloudy, up to mid 40's  
 Activity - MW Development + pad construction  
 Equipment - 1x Water level; 1x Hoist; 1x  
 CalPatta; 1x PED; 9PE; hand tools  
 Personnel - Calvin Tighe > ECOT  
 Ramon Carrasquilla  
 Zakar Lavy - Parsons

0700 - All on-site + H&S meeting  
 0745 - ECOT loading/getting up  
 0835 - Begin development at MW-02  
 (800-20)  
 1035 - Complete development at MW-02 (37 gal purged)  
 1045 - Begin development at (800-12) MW-04  
 1210 - Complete MW-04 development -  
 37 gallons purged  
 1230 lunch  
 1315 - Cutting pad at MW-02 (800-12)  
 1350 - Begin development at MW-02  
 1512 - Complete development at MW-02  
 (400-12)  
 - ~ 33.5 gallons purged.  
 - Clean up  
 1530 - ECOT off-site  
 1545 - Z. Lavy off-site  
 / ZL

Location FTMM Date 12/19/17  
 Project / Client MW Development / USACE

Weather - P. Cloudy, up to mid 50's  
 Activity - MW Development + pad construction  
 Equipment - 1x Water level; 1x Hoist; 1x CalPatta;  
 1x PED; 9PE; hand tools  
 Personnel - Calvin Tighe > ECOT  
 Ramon Carrasquilla  
 Zakar Lavy - Parsons

0715 - Z. Lavy on-site + H&S meeting  
 0735 - Set up on MW-03 (800-12)  
 0745 - Begin development at MW-03  
 0825 - Complete development at 800-12-  
 MW-03 30 gall. purged.  
 0940 - Begin development at 884-MW-03  
 1015 - Complete development at 884-MW-03  
 - purged @ 35 gallons  
 1020 - Begin development at 884-MW-02  
 1055 - Complete development at 884-MW-02  
 - purged 35 gallons.  
 1110 - Lunch  
 1200 - Loading truck  
 1215 - Setting up at 444-MW-2 + setting pad  
 1245 - Begin development at 444-MW-2  
 1335 - Complete development at 444-MW-2  
 - purged 35 gallons.  
 1345 - Begin purge/lev @ 444-MW-1

Location FTMM Date 12/19/17  
 Project / Client MW Development / USACE

- 1456 - Complete development of
- 444 - MW-DI
- 1500 - Purged 30 gallons
- 1515 - Clean up.
- 1515 - ECHI off-site
- 1530 - 2. Lany off-site.

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Location \_\_\_\_\_ Date \_\_\_\_\_

Project / Client \_\_\_\_\_