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

22 July 2019

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

SUBJECT: UST 490 Site Investigation Report
Fort Monmouth, Monmouth County, Oceanport, New Jersey
PI G000000032

Dear Mr. Joshi:

The U.S. Army Fort Monmouth (FTMM) Team has reviewed and summarized previous investigations conducted at the former Underground Storage Tank (UST) 490. This site investigation (SI) report provides an overview of historical information, the results of recent field investigations between April 2016 and January 2018, and a recommendation for addressing exceedances of applicable New Jersey Department of Environmental Protection (NJDEP) criteria for this site.

1.0 OBJECTIVES

Groundwater sampling was conducted in 2016, 2017 and 2018 to delineate groundwater contamination at former UST 490. Soil sampling was conducted in 2016 to supplement the existing soil and groundwater analyses for delineation of petroleum contamination in soil. Proposed field investigation activities were documented in two work plans: the Parcel 79 Work Plan Addendum for a Former Storage Tank Sites (February 2016) approved by the NJDEP in March 2016 and the Unregulated Heating Oil Tank (UHOT) Work Plan (August 2017) approved by the NJDEP in October 2017 (**Attachment A, Correspondences 1 through 6**).

2.0 SITE DESCRIPTION

UST 490 was a 1,000-gallon steel No. 2 fuel oil UST (Registration ID No. 90010-58) that was removed by the Army in May 1990. The former location of UST 490 is shown on **Figure 1**. No closure samples were collected in 1990 because soil contamination was not observed. In 2005, a subsurface investigation was conducted to assess the site for petroleum contamination. Three soil samples and one duplicate sample were collected from three locations along the former tank centerline. The soil samples were analyzed for total petroleum hydrocarbons (TPH). A groundwater sample was also collected and analyzed for VOCs and SVOCs. As documented in the closure report for UST 490 (**Reference 1**; provided in **Attachment A, Correspondence 8**), TPH in these soil samples did not exceed the NJDEP TPH criterion of 10,000 milligrams/kilogram (mg/kg) in effect in 2007. The groundwater sample results were also below the NJDEP Ground Water Quality Criteria (GWQC) in effect in 2007. When No Further Action (NFA) was requested

in April 2015, NJDEP did not grant the request because the soil samples exhibited TPH levels up to 8,762 ppm, which were above the current soil remediation standard of 5,100 mg/kg (**Reference 2**); note that reference to "current" comparison criteria or standards within this SI report refers to the criteria/standards in effect at the time this document was prepared. The 2-methylnaphthalene concentration in groundwater was also above the current NJDEP interim GWQC, and in soil was above the current NJDEP Impact to Groundwater (IGW) Soil Screening Level (SSL) standard; therefore, additional characterization of groundwater was required **(Attachment A, Correspondence 7)**.

2.1 Site Land Use

Former UST 490 was located adjacent to Building 490 within Parcel 79 in the eastern portion of the Main Post (MP) of FTMM. The UST 490 site is surrounded by Building 490 to the south, a paved parking area to the west, and open grassy areas in other directions. Future land use of the UST 490 area is proposed to be a residential district, with low to medium density housing (**Reference 3**).

2.2 Site Geology and Hydrogeology

The Hornerstown Formation underlies much of the MP including the UST 490 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.

Soil encountered in borings at UST 490 were primarily moist to saturated gray-green and brown sand with some sand/silt and traces of clay/gravel. Deeper soils below approximately four feet (ft) typically consisted of saturated light gray, orange, and brown mottled sand with some silt. Indications of fill (coal and brick) were observed in the boring log for PAR-79-490-SCREEN1 down to 40 inches. PAR-79-490-TMW-04 had coal pieces under the asphalt and PAR-79-490-TMW-07 also had coal fragments down to 18 inches. Soil borings logs are provided in **Attachment B.** The depth to groundwater at UST 490 ranged from approximately 2 to 4 ft below ground surface (bgs) (**Table 1**). Groundwater is typically encountered in the gray, green, and brown sand and flows southeast **(Figure 2).**

3.0 PREVIOUS INVESTIGATIONS

Soil samples were collected from three locations (490-A, 490-B, and 490-C; also 490-D was collected as a field duplicate of 490-B) along the former tank centerline in December 2005 and analyzed for TPH, as reported in **Reference 1**; provided in **Attachment A, Correspondence 8.** Soil samples 490-A, 490-B, 490-C, and 490-D (duplicate of 490-B) had TPH concentrations of 8,762 mg/kg, 2,981 mg/kg, 4,523 mg/kg, and 4,145 mg/kg, respectively. One grab groundwater sample was collected in soil boring 490-B and analyzed for VOCs and SVOCs. There were no exceedances of the current GWQC.

Additional soil and groundwater sampling were conducted in 2010. Six soil samples were collected and analyzed for VOCs, SVOCs, and TPH. TPH results ranged from ND to 5,942 mg/kg. 2-Methylnaphthalene was detected in groundwater sample TMP-1 at 70.8 µg/L; above the current GWQC of 30 µg/L. Three temporary wells were sampled again in July 2010. Detections of 2-

methylnaphthalene ranged from ND to 115 µg/L; above the current GWQC of 30 µg/L. In 2015, the Army identified UST 490 as a site where unresolved groundwater issues remained (as also discussed in **Attachment A, Correspondence 7 and 8)**.

4.0 SITE INVESTIGATION RESULTS

Additional site investigations were completed in 2016, 2017, and 2018. Soil and groundwater sampling were performed at former UST 490 to provide an updated assessment of the extent of contaminated soil and determine the potential for impact to groundwater (**Attachment A, Correspondence 2 and Correspondence 6**). Boring logs and field notes are provided in **Attachments B and C**; there were field indications of fuel oil (petroleum odors and elevated photoionization detector [PID] results) in multiple soil borings. Permanent wells were installed to a depth of 12 to 13 ft bgs after the analytical data from the temporary wells (PAR-79-490-TMW-01through PAR-79-490-TMW-08) were evaluated to address the NJDEP's concerns.

Soil and groundwater analytical results were compared to the current NJDEP Residential Direct Contact Soil Remediation Standard (RDCSRS), Non-Residential Direct Contact Soil Remediation Standard (NRDCSRS), and IGW SSLs, and groundwater concentrations were compared to the current NJDEP GWQC. Groundwater samples were analyzed for VOCs and SVOCs in accordance with NJDEP requirements for No. 2 fuel oil (**Table 2** and **Table 3**). Soil samples were analyzed for total extractable petroleum hydrocarbons (EPH) with additional contingency SVOC analyses for naphthalene and 2-methylnapthalene (**Table 4**).

A summary of groundwater and soil sampling results are provided below.

4.1 Groundwater Results

Recent groundwater analytical results are shown on **Table 2** and **Figure 3** (temporary wells) and **Table 3** and **Figure 4** (permanent wells) for the following wells:

- Temporary well PAR-79-490-TMW-01 sampled August 2016;
- Temporary well PAR-79-490-TMW-02 sampled August 2016;
- Temporary well PAR-79-490-TMW-03 sampled August 2016;
- Temporary well PAR-79-490-TMW-04 sampled November 2017;
- Temporary well PAR-79-490-TMW-05 sampled November 2017;
- Temporary well PAR-79-490-TMW-06 sampled November 2017;
- Temporary well PAR-79-490-TMW-07 sampled November 2017;
- Temporary well PAR-79-490-TMW-08 sampled November 2017;
- Existing permanent well 490MW01 sampled January 2018;
- New permanent well PAR-79-490-MW-02 sampled January 2018; and
- New permanent well PAR-79-490-MW-03 sampled January 2018.

4.1.1 Exceedances of NJDEP Comparison Criteria

Exceedances of the current NJDEP GWQC occurred at five temporary wells during the 2016 and 2017 sampling (see **Figure 3** and **Table 2**).

- Temporary well PAR-79-490-TMW-01:

  - Benzo(a)anthracene concentration of 0.14 µg/L exceeded the NJDEP GWQC of 0.1 µg/L.
- Temporary well PAR-79-490-TMW-02:
  - Benzo(a)anthracene concentration of 0.26 µg/L exceeded the NJDEP GWQC of 0.1 µg/L.
  - Benzo(b)fluoranthene exceedance concentration of 0.21 µg/L that exceeded the NJDEP GWQC of 0.2 µg/L.
- Temporary well PAR-79-490-TMW-03:
  - 2-methylnaphthalene concentration of 63.5 µg/L exceeded the NJDEP GWQC of 30 µg/L.
  - Total SVOC TICs exceedance concentration of 1,323 µg/L that exceeded the NJDEP GWQC of 500 µg/L.
- Temporary well PAR-79-490-TMW-05:
  - 1,1,2-Trichloroethane concentration of 4.5 µg/L exceeded the NJDEP GWQC of 3 µg/L.
  - 2-methylnaphthalene concentration of 102 µg/L exceeded the NJDEP GWQC of 30 µg/L.
- Temporary well PAR-79-490-TMW-08:
  - 2-methylnaphthalene concentration of 907 µg/L exceeded the NJDEP GWQC of 30 µg/L.
  - Benzo(a)anthracene concentration of 0.67 µg/L exceeded the NJDEP GWQC of 0.1 µg/L.
  - Benzo(a)pyrene concentration of 0.48 µg/L exceeded the NJDEP GWQC of 0.1 µg/L.
  - Benzo(b)fluoranthene exceedance concentration of 0.62 µg/L that exceeded the NJDEP GWQC of 0.2 µg/L.
  - Indeno(1,2,3-cd) pyrene exceedance concentration of 0.23 µg/L that exceeded the NJDEP GWQC of 0.2 µg/L.
  - Naphthalene exceedance concentration of 499 µg/L that exceeded the NJDEP GWQC of 300 µg/L.
  - Total SVOC TICs exceedance concentration of 797 µg/L that exceeded the NJDEP GWQC of 500 µg/L.

One existing permanent monitoring well and two new permanent monitoring wells were sampled in January 2018 based on the results observed in the 2016 and 2017 temporary well sampling activities. There were no exceedances of the current NJDEP GWQC at any of the three permanent wells during the 2018 sampling (see **Figure 4** and **Table 3**).

4.1.2 Constituents of Potential Concern (COPCs)

Select VOCs and SVOCs (see section 4.1.1) were detected at concentrations above their current GWQC within five temporary wells (PAR-79-490-TMW-01, PAR-79-490-TMW-02, PAR-79-490-TMW-03, PAR-79-490-TMW-05 and PAR-79-490-TMW-08) in August 2016 and November 2017. However, there were no exceedances of the current GWGC in the permanent wells sampled

in 2018. In comparison to temporary well results, the results from the permanent wells are much more representative of groundwater conditions because the permanent wells are developed and purged prior to the implementation of low flow groundwater sampling. Therefore, the Army has concluded that there are no COPCs in groundwater at UST 490.

4.2 Soil Results

Four soil borings (PAR-79-490-SB-01 to PAR-79-490-SB-04) were advanced around the former UST 490 tank area in 2016. The locations of these soil borings and the historical (2005 and 2010) soil samples are shown on **Figure 5**. Three soil samples were collected from each boring and analyzed for EPH, and two samples with EPH concentrations greater than 1,000 mg/kg were analyzed for the SVOCs 2-methylnaphthalene and naphthalene. The soil analytical results are shown on **Table 4** and **Figure 5**.

4.2.1 Exceedances of NJDEP Comparison Criteria

Exceedances of the Impact to Groundwater Soil Screening Level (IGW SSL) occurred at one boring location during the 2016 sampling (see **Figure 5** and **Table 4)**.

- EPH concentrations at one soil boring (1,600 mg/kg at PAR-79-490-SB-04) exceeded 1,000 mg/kg and therefore was analyzed for contingency analysis of the SVOCs 2-methylnaphthalene and naphthalene; the 2-methylnaphthalene concentration (9 mg/kg) exceeded the NJDEP IGW SSL of 8 mg/kg.

EPH concentrations in samples collected in 2016 did not exceed the current soil remediation standard of 5,100 mg/kg for fuel oil (**Reference 2**). Therefore the 2016 results did not confirm the previous exceedances of the NJDEP soil remediation standard for TPH (which is comparable to EPH concentrations) reported in the 2005 and 2010 soil samples.

4.2.2 Constituents of Potential Concern (COPCs)

EPH concentrations did not exceed the current soil remediation standard in soil samples collected in 2016, and therefore EPH is not a COPC in soil at UST 490. However, since concentrations of 2-methylnaphthalene exceeded the current NJDEP IGW SSL in one soil sample, the potential for groundwater to become contaminated with 2-methylnaphthalene from petroleum-contaminated soil cannot be discounted.

Soil boring logs (**Attachment B**) indicate elevated PID results from approximately 3 ft bgs to 7 ft bgs near former UST 490. The soil sample with IGW SSL exceedances was collected from within this 3 ft bgs to 7 ft bgs depth interval.

5.0 RECOMMENDATIONS

Additional measures are recommended to address 2-methylnaphthalene in soil at UST 490 (**Figure 6**). There were no exceedances of the current NJDEP GWQC at any of the permanent wells, and therefore no further action for groundwater is warranted.

It is recommended to excavate and remove petroleum-contaminated soil to address the exceedance of the current NJDEP IGW SSL for 2-methylnaphthalene (**Figure 6**). Under this recommendation and based on analytical results as well as elevated PID results in the boring logs (**Attachment B**),

approximately 50 bank (in place) cubic yards of petroleum-contaminated soil should be removed from approximately 2.5 to 7 ft bgs to the approximate limits shown in **Figure 6**. This action will eliminate the government's liability associated with the UST 490 site. After the planned removal of petroleum-contaminated soil, confirmatory samples should be collected from the bottom of the excavation to document that the remaining soil meets the RDCSRS and IGW SSL. Contaminated soil should be containerized and disposed of offsite in accordance with state and federal regulations. Clean backfill should be used and the excavation area should be restored with grass seed and straw over the areas impacted. Characterization, transportation, and offsite disposal of petroleum-contaminated soil should comply with all appropriate Federal and state laws.

We look forward to working with the Department on any questions and comments and thank you for reviewing this document. Our technical Point of Contact is Kent Friesen who you may contact directly at (512) 719-6877. I can be reached at (732) 383-5104; william.r.colvin18.civ@mail.mil.

Sincerely,

William R Colvin

William R. Colvin
Fort Monmouth 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)

References

1. U.S. Army, 2007. *Underground Storage Tank Closure Report, Main Post – Building 490.* Prepared by Tecom-Vinnell Services for U.S. Army Garrison, Fort Monmouth, Directorate of Public Works. August.
2. New Jersey Department of Environmental Quality (NJDEP). 2010. *Protocol for Addressing Extractable Petroleum Hydrocarbons.* Site Remediation Program. Version 5.0, August 9.
3. Fort Monmouth Economic Revitalization Authority (FMERA), 2019. E-mail from Joseph Fallon to William Colvin; re: Future Land Use. July 9.

Attachments:

Figure 1 – UST 490 Site Location
Figure 2 – UST 490 Groundwater Contours – January 15, 2018
Figure 3 – UST 490 Site Layout, Temporary Monitoring Well Groundwater Sampling Locations, and Results
Figure 4 – UST 490 Site Layout, Permanent Monitoring Well Groundwater Sampling Locations, and Results
Figure 5 – UST 490 Site Layout, Soil Sampling Locations, and Results
Figure 6 – UST 490 Recommended Extent of Excavation

Table 1 - Groundwater Gauging Data and Elevations (January 15, 2018)
Table 2 – Ground Water Sampling Results from Temporary Wells – Comparison to NJDEP Ground Water Quality Criteria
Table 3 – Ground Water Sampling Results from Permanent Wells – Comparison to NJDEP Ground Water Quality Criteria
Table 4 – Soil Sampling Results – Comparison to NJDEP Soil Remediation Standards

Attachment A - Regulatory Correspondence
Attachment B –Boring Logs and Well Construction Details
Attachment C – Field Notes

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.

Document:

- "UST 490 Site Investigation Report, Fort Monmouth, Monmouth County, Oceanport, New Jersey" (22 July 2019)

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: William R Colvin Date: 22 July 2019

Name/Title: William R. Colvin
Fort Monmouth 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

This page intentionally left blank.

Little Silver Borough

Shrewsbury Borough

Tinton Falls Borough

Eatontown Borough

Oceanport Borough

West Long Branch Borough

Parkers Creek

North Branch Parkers Creek

Lafetra Creek

Mill Creek

Husky Brook (Culvert)

Oceanport Creek

Wampum Lake

Wampum Brook

Husky Brook

Turtle Mill Brook

UST490

LEGEND:

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

N

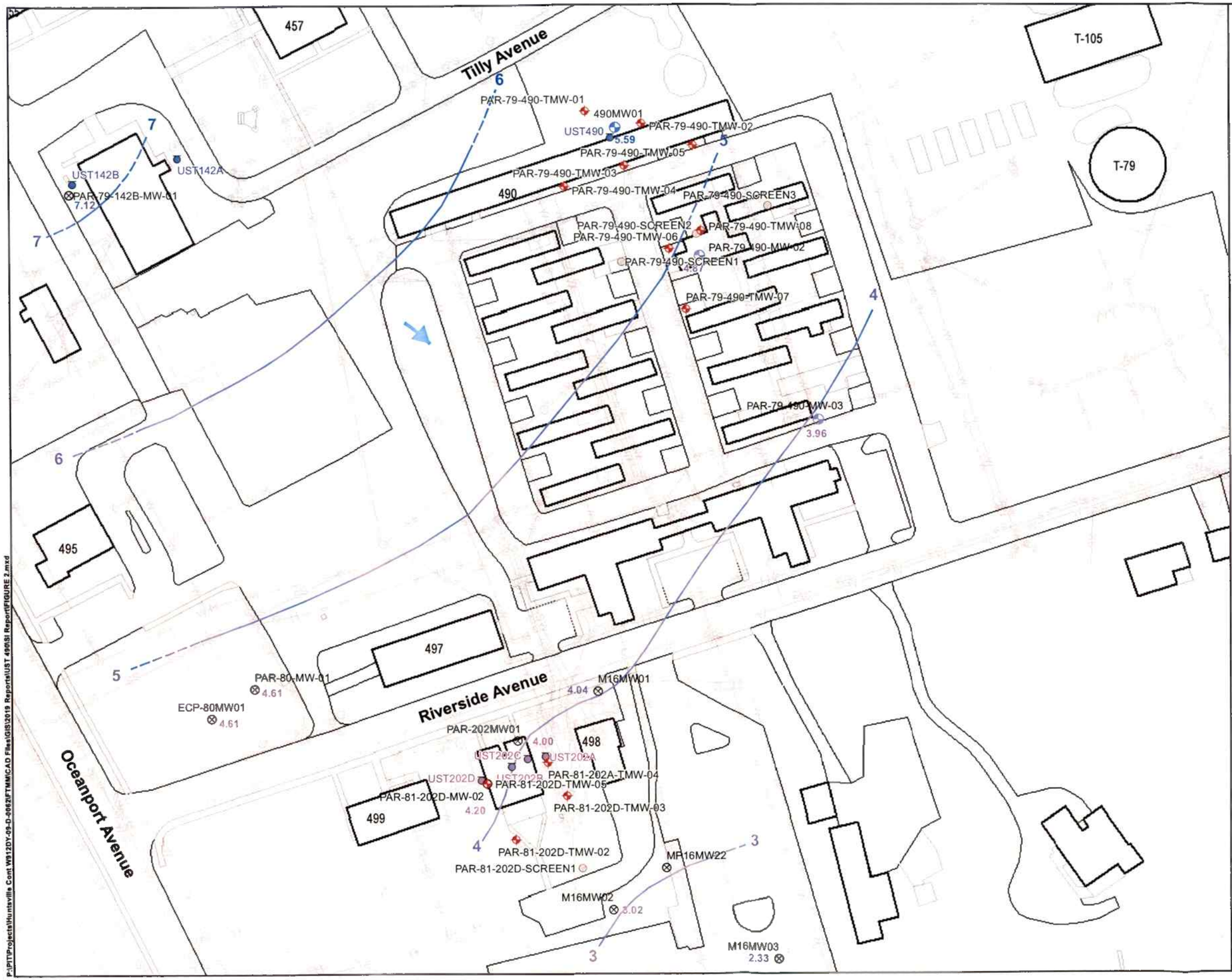
1 inch = 1,000 feet

0 500 1,000 2,000 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
UST490 SITE LOCATION	
CREATED BY: RR	REVIEWED BY: JC
DATE: FEB. 2018	FIGURE NUMBER: FIGURE 1
PROJECT NUMBER: 748810-02130	FILE: FIGURE 1.mxd

P:\PIT\Projects\Huntsville Cen\W912DY-09-D-0052\FTMM\CAD Files\GIS\2018 Reports\UST 490\FIGURE 1.mxd 3/20/2018 11:07:02 AM



LEGEND:

- Temporary Monitoring Well
- Soil Boring
- Shallow Monitoring Well
- Shallow Monitoring Well (Abandoned)
- Former UST Location (Estimated)
- W Water Line
- S Sanitary Sewer Line
- SW Storm Sewer Line
- G Gas Line
- Estimated Groundwater Flow Direction
- Potentiometric Surface Elevation Contour
- Inferred Potentiometric Surface Elevation Contour
- 8.57 Groundwater Elevation Recorded on January 15, 2018 (NAD88) (ft.)

N

1 inch = 80 feet

0 40 80 160 Feet

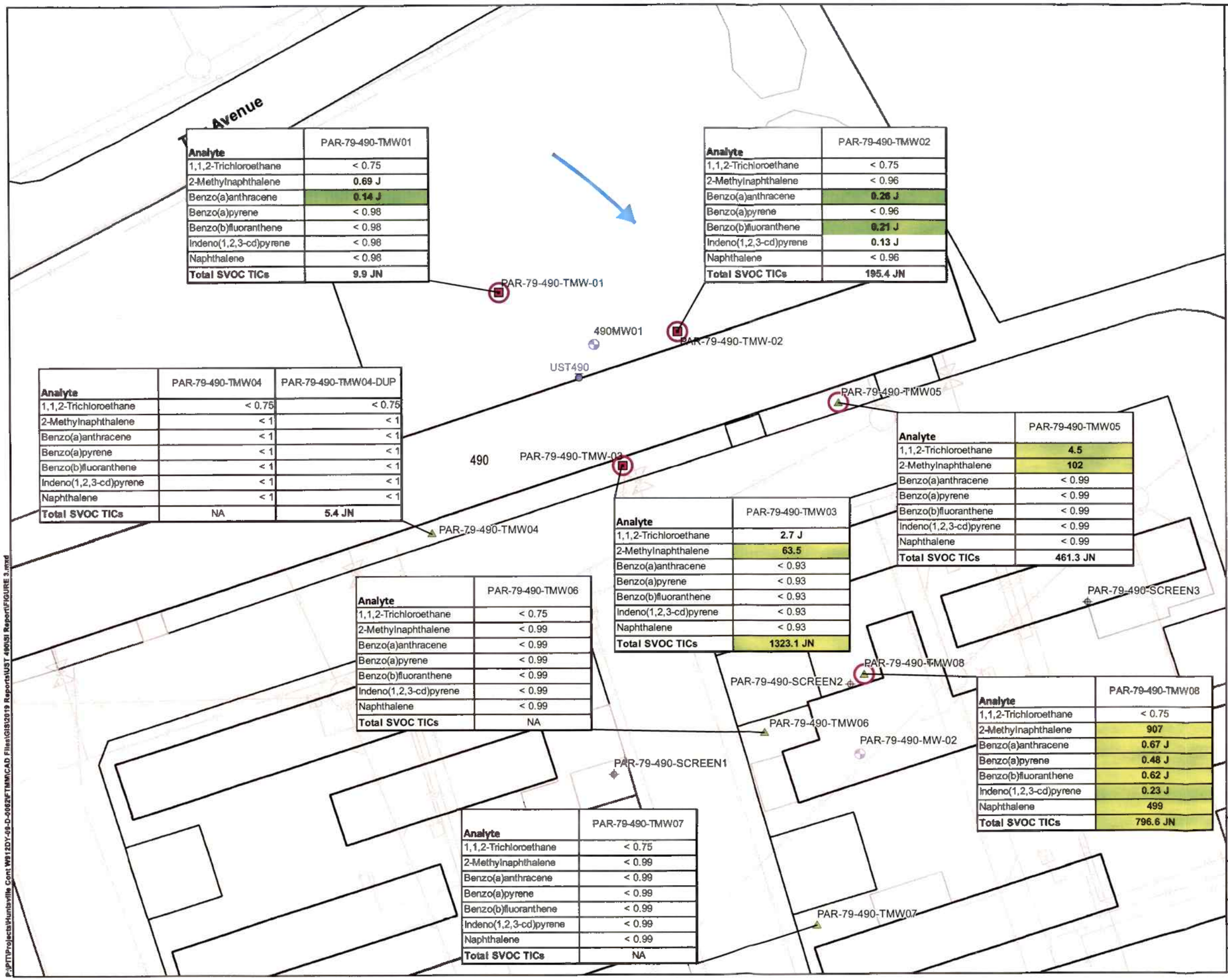
Source: FTMM Supplied CAD, 2013; U.S. Army BRAC, 2008; 2006 SI Report; USGS NHD, 2012.

PARSONS 401 Diamond Drive NW, Huntsville AL	Fort Monmouth New Jersey

UST 490 GROUNDWATER CONTOURS - JANUARY 15, 2018

CREATED BY:	REVIEWED BY:
RR	JC
DATE: JUL. 2019	FIGURE NUMBER: FIGURE 2
PROJECT NUMBER: 748810-06031	FILE: FIGURE 2.mxd

P:\PIT\Projects\Huntsville Cont W912DY-09-D-0062\FTMM\CAD Files\GIS\2019 Reports\UST 490SI Report\FIGURE 2.mxd



Analyte	PAR-79-490-TMW01
1,1,2-Trichloroethane	< 0.75
2-Methylnaphthalene	0.69 J
Benzo(a)anthracene	0.14 J
Benzo(a)pyrene	< 0.98
Benzo(b)fluoranthene	< 0.98
Indeno(1,2,3-cd)pyrene	< 0.98
Naphthalene	< 0.98
Total SVOC TICs	9.9 JN

Analyte	PAR-79-490-TMW02
1,1,2-Trichloroethane	< 0.75
2-Methylnaphthalene	< 0.96
Benzo(a)anthracene	0.26 J
Benzo(a)pyrene	< 0.96
Benzo(b)fluoranthene	0.21 J
Indeno(1,2,3-cd)pyrene	0.13 J
Naphthalene	< 0.96
Total SVOC TICs	195.4 JN

Analyte	PAR-79-490-TMW04	PAR-79-490-TMW04-DUP
1,1,2-Trichloroethane	< 0.75	< 0.75
2-Methylnaphthalene	< 1	< 1
Benzo(a)anthracene	< 1	< 1
Benzo(a)pyrene	< 1	< 1
Benzo(b)fluoranthene	< 1	< 1
Indeno(1,2,3-cd)pyrene	< 1	< 1
Naphthalene	< 1	< 1
Total SVOC TICs	NA	5.4 JN

Analyte	PAR-79-490-TMW05
1,1,2-Trichloroethane	4.5
2-Methylnaphthalene	102
Benzo(a)anthracene	< 0.99
Benzo(a)pyrene	< 0.99
Benzo(b)fluoranthene	< 0.99
Indeno(1,2,3-cd)pyrene	< 0.99
Naphthalene	< 0.99
Total SVOC TICs	461.3 JN

Analyte	PAR-79-490-TMW03
1,1,2-Trichloroethane	2.7 J
2-Methylnaphthalene	63.5
Benzo(a)anthracene	< 0.93
Benzo(a)pyrene	< 0.93
Benzo(b)fluoranthene	< 0.93
Indeno(1,2,3-cd)pyrene	< 0.93
Naphthalene	< 0.93
Total SVOC TICs	1323.1 JN

Analyte	PAR-79-490-TMW06
1,1,2-Trichloroethane	< 0.75
2-Methylnaphthalene	< 0.99
Benzo(a)anthracene	< 0.99
Benzo(a)pyrene	< 0.99
Benzo(b)fluoranthene	< 0.99
Indeno(1,2,3-cd)pyrene	< 0.99
Naphthalene	< 0.99
Total SVOC TICs	NA

Analyte	PAR-79-490-TMW08
1,1,2-Trichloroethane	< 0.75
2-Methylnaphthalene	907
Benzo(a)anthracene	0.67 J
Benzo(a)pyrene	0.48 J
Benzo(b)fluoranthene	0.62 J
Indeno(1,2,3-cd)pyrene	0.23 J
Naphthalene	499
Total SVOC TICs	796.6 JN

Analyte	PAR-79-490-TMW07
1,1,2-Trichloroethane	< 0.75
2-Methylnaphthalene	< 0.99
Benzo(a)anthracene	< 0.99
Benzo(a)pyrene	< 0.99
Benzo(b)fluoranthene	< 0.99
Indeno(1,2,3-cd)pyrene	< 0.99
Naphthalene	< 0.99
Total SVOC TICs	NA

LEGEND:

- Groundwater Sample (Temporary Well) (2017)
- Proposed Field Screening Boring
- Shallow Monitoring Well
- Groundwater Sample (2016)
- Former UST Location (Estimated)
- Exceedance of Groundwater Criteria Standard
- W Water Line
- S Sanitary Sewer Line
- SW Storm Sewer Line
- G Gas Line
- Estimated Groundwater Flow Direction
- Exceeds the NJDEP GWQC

Analyte	NJDEP GWQC
1,1,2-Trichloroethane	3
2-Methylnaphthalene	30
Benzo(a)anthracene	0.1
Benzo(a)pyrene	0.1
Benzo(b)fluoranthene	0.2
Indeno(1,2,3-cd)pyrene	0
Naphthalene	300
Total SVOC TICs	500

Units in µg/L

N

1 inch = 25 feet

0 12.5 25 50 Feet

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

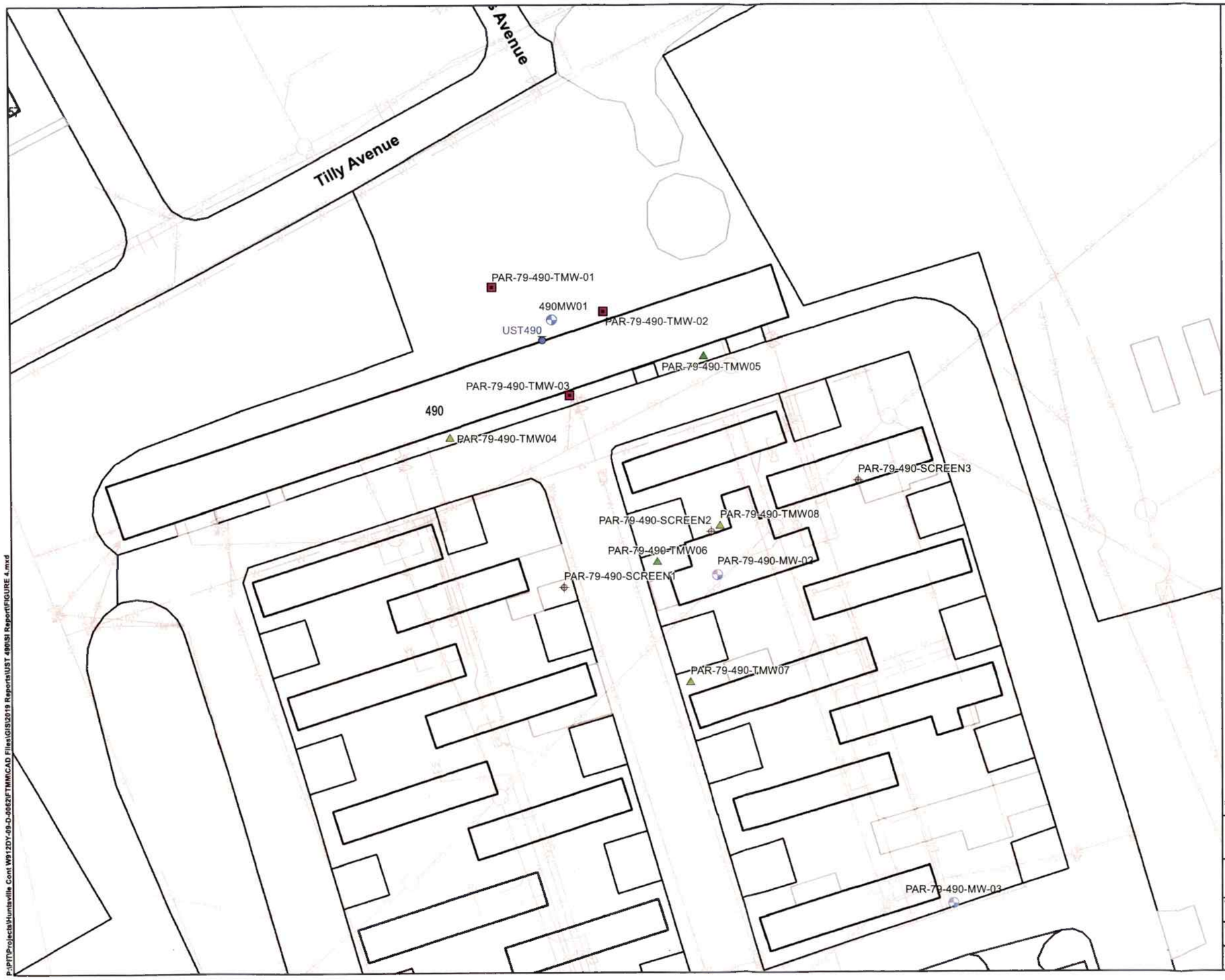
PARSONS
401 Diamond Drive NW,
Huntsville AL

Fort Monmouth
New Jersey

UST490 SITE LAYOUT, TEMPORARY MONITORING WELL GROUNDWATER SAMPLING LOCATIONS AND RESULTS

CREATED BY:	REVIEWED BY:
RR	KF
DATE: JUN. 2019	FIGURE NUMBER: FIGURE 3
PROJECT NUMBER: 748810-06031	FILE: FIGURE 3.mxd

P:\PTI\Projects\Huntsville Cont W912DY-09-D-0062\FTMM\CAD Files\GIS\2019 Reports\UST 490SI Report\FIGURE 3.mxd



LEGEND:

- Groundwater Sample (Temporary Well) (2017)
- Proposed Field Screening Boring
- Shallow Monitoring Well
- Groundwater Sample (2016)
- Former UST Location (Estimated)
- W Water Line
- S Sanitary Sewer Line
- SW Storm Sewer Line
- G Gas Line
- Estimated Groundwater Flow Direction

NOTE:

There were no exceedances of the NJDEP GWQC in the permanent well results

N

1 inch = 40 feet

0 20 40 80 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
UST490 SITE LAYOUT, PERMANENT MOINTORING WELL GROUNDWATER SAMPLING LOCATIONS AND RESULTS	
CREATED BY: RR	REVIEWED BY: KF
DATE: JUL. 2019	FIGURE NUMBER: FIGURE 4
PROJECT NUMBER: 748810-06031	FILE: FIGURE 4.mxd

P:\PITT\Projects\Huntsville Cont W912DY-09-D-0062\FTMM\CAD Files\GIS\2019 Reports\UST 490SI Report\FIGURE 4.mxd

Tilly Avenue

Depth (ft bgs)	PAR-79-490-SB-01		
	1.5-2	2-2.5	9.5-10
2-Methylnaphthalene	NA	NA	NA
EPH (C9-C40)	**4 J**	**307 J**	**3.8 J**

PAR-79-490-SB-01

PAR-79-490-SB-02

PAR-79-490-SB-04

UST490

Depth (ft bgs)	PAR-79-490-SB-02		
	2-2.5	3.5-4	8-8.5
2-Methylnaphthalene	NA	NA	NA
EPH (C9-C40)	**4.9 J**	**413**	<10.7

Depth (ft bgs)	PAR-79-490-SB-04		
	2-2.5	3.5-4	8-8.5
2-Methylnaphthalene	NA	**9**	NA
EPH (C9-C40)	**91.4**	**1,600**	**5.6 J**

490

PAR-79-490-SB-03.

Depth (ft bgs)	PAR-79-490-SB-03		
	2-2.5	6-6.5	9.5-10
2-Methylnaphthalene	NA	NA	NA
EPH (C9-C40)	**378**	**43.2**	**5.5 J**

LEGEND:

- Soil Sample (2016)
- Former UST Location (Estimated)
- W Water Line
- S Sanitary Sewer Line
- SW Storm Sewer Line
- G Gas Line
- Estimated Groundwater Flow Direction
- **Exceeds the NJDEP IGW Soil Screening Level**

Analyte	NJDEP RDCSRS	NJDEP IGW Soil
2-Methylnaphthalene	230	8
Total EPH	5,100	NLE

Units in mg/kg

N

1 inch = 25 feet

0 12.5 25 50 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

UST490 SITE LAYOUT, SOIL SAMPLING LOCATIONS AND RESULTS

CREATED BY:	REVIEWED BY:
RR	KF
DATE: MAY. 2019	FIGURE NUMBER: FIGURE 5
PROJECT NUMBER: 748810-06031	FILE: FIGURE 5.mxd

P:\PIT\Projects\Huntsville Cont W912DY-09-D-0062\FTMM\CAD Files\GIS\2019 Reports\UST 490\SI Report\FIGURE 5.mxd

Depth (ft bgs)	PAR-79-490-SB-01 -2016		
	1.5-2	2-2.5	9.5-10
EPH (C9-C40)	4 J	3.7 J	3.8 J

PAR-79-490-SB-01/TMW-01

Proposed Soil Removal Area (2.5-7' bgs)
Estimated 50 bank c.y. contaminated soil

Depth (ft bgs)	B3 - 2010
TPH	547

Depth (ft bgs)	B2 - 2010
TPH	ND

Depth (ft bgs)	B4 - 2010
TPH	5,942

Depth (ft bgs)	PAR-79-490-SB-02 -2016		
	2-2.5	3.5-4	8-8.5
EPH (C9-C40)	4.9 J	413	<10.7

Depth (ft bgs)	B1 - 2010
TPH	1,527

Depth (ft bgs)	PAR-79-490-SB-04 - 2016		
	2-2.5	3.5-4	8-8.5
EPH (C9-C40)	91.4	1,600	5.6 J

Depth (ft bgs)	B5 - 2010
TPH	ND

Depth (ft bgs)	B6 - 2010
TPH	ND

Depth (ft bgs)	490-C - 2005
TPH	4,523

Depth (ft bgs)	490-A - 2005
TPH	8,762

Depth (ft bgs)	490-B - 2005
TPH	2,981

Depth (ft bgs)	PAR-79-490-SB-03 - 2016		
	2-2.5	6-6.5	9.5-10
EPH (C9-C40)	378	43.2	5.5 J

PAR-79-490-SB-02/TMW-02
PAR-79-490-SB-03/TMW-03
PAR-79-490-MW01
490MW01
PAR-79-490-SS-04
UST490
490

TMP1 TMP2 TMP3
B1 B2 B3 B4 B5 B6
490-A 490-B 490-C

LEGEND:

- Shallow Monitoring Well
- Soil and Groundwater Sample (2016)
- Former UST Location (Estimated)
- Historic Soil/Groundwater Sample
- W Water Line
- S Sanitary Sewer Line
- SW Storm Sewer Line
- G Gas Line
- Estimated Groundwater Flow Direction
- Extent of Excavation

NOTES:

Assumes removal of 2.5' depth of clean overburden.
EPH = Total Extractable Petroleum Hydrocarbons
Leave well 490MW01 in place.
ND = Not Detected
TPH = Total Petroleum Hydrocarbons

Analyte	NJDEP RDCSRS
Total EPH	5,100

Units in mg/kg

N

1 inch = 10 feet

0 5 10 20 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

UST490 RECOMMENDED EXTENT OF EXCAVATION

CREATED BY:	REVIEWED BY:
RR	KF
DATE: MAY. 2019	FIGURE NUMBER: FIGURE 6
PROJECT NUMBER: 748810-06031	FILE: FIGURE 6.mxd

P:\PITProjects\Huntsville Cont W912DY-09-D-0002\FTMM\CAD Files\GIS\2019 Reports\UST 490SI Report\FIGURE 6.mxd

TABLES

This page intentionally left blank.

Table 1
Groundwater Gauging Data and Elevations (January 15, 2018)
Parcel 79 UST 490
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.)	
490MW01	N/A	540868	622924	8/15/2011	20.00	5.00	15.00	9.62	0.01	UR	10.06	7.66	9:16	4.03	22.01	5.59	NS
PAR-79-490-MW-02	E201714060	540762.2	622992.3	12/18/2017	15.00	5.00	10.00	10.37	0.01	UR	10.67	7.41	9:06	5.50	15.27	4.87	1/19/2018
PAR-79-490-MW-03	E201714061	540626.4	623089.8	12/18/2017	15.00	5.00	10.00	9.04	0.01	UR	9.55	6.43	9:11	5.08	14.92	3.96	1/19/2018
PAR-81-202D-MW-02	E201712748	540325.7	622816.8	11/10/2017	14.70	4.70	10.00	8.35	0.01	UR	8.82	5.74	10:06	4.15	15.33	4.20	1/16/2018
M16MW01	E201102873	540402	622908	3/9/2011	15.00	5.00	10.00	5.58	0.01	FM	5.91	5.89	10:15	1.54	14.82	4.04	NS
M16MW02	E201102874	540222	622920	3/9/2011	15.00	5.00	10.00	6.87	0.01	UR	7.18	4.81	10:19	3.85	13.5	3.02	NS
M16MW03	E201102875	540181	623056	3/9/2011	15.00	5.00	10.00	4.11	0.01	FM	4.58	4.58	10:23	1.78	14.44	2.33	NS
202MW01	N/A	540361	622842	8/15/2011	15.00	5.00	10.00	8.65	0.01	UR	9.11	6.62	10:08	4.65	17.14	4.00	NS
ECP-80MW01	E201000904	540380.000	622590.000	3/23/2010	20.00	5.00	15.00	8.66	0.01	N/A	N/A	N/A	10:30	4.05	14.97	4.61	NS
PAR-80-MW-01	E201602886	540404.000	622626.000	4/1/2016	12.00	2.00	10.00	**8.85**	0.01	UR	9.61	6.91	10:32	4.24	22.4	4.61	NS
PAR-79-142B-MW-01	E201712750	540814.1	622475.3	11/10/2017	14.70	4.70	10.00	13.48	0.01	UR	13.97	10.81	10:36	6.36	15.13	7.12	1/17/2018

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.

This page intentionally left blank.

TABLE 2
GROUND WATER SAMPLING RESULTS FROM TEMPORARY WELLS
- COMPARISON TO NJDEP GROUND WATER QUALITY CRITERIA
SITE 490 UST -Fort Monmouth, New Jersey

Loc ID	NJ Ground Water Quality Criteria	PAR-79-490-TMW01	PAR-79-490-TMW02	PAR-79-490-TMW03	PAR-79-490-TMW-04		PAR-79-490-TMW-05	PAR-79-490-TMW-06	PAR-79-490-TMW-07	PAR-79-490-TMW-08
Sample ID		99-PAR-79-490-TMW01	99-PAR-79-490-TMW02	PAR-79-490-TMW03	PAR-79-490-TMW-04-08	PAR-79-490-TMW-104-08	PAR-79-490-TMW-05-08	PAR-79-490-TMW-06-08	PAR-79-490-TMW-07-08	PAR-79-490-TMW-08
Sample Date		8/5/2016	8/5/2016	8/4/2016	11/3/2017	11/3/2017	11/3/2017	11/3/2017	11/3/2017	11/21/2017
Filtered		Total	Total	Total	Total	Total	Total	Total	Total	Total
Volatile Organic Compounds (µg/l)										
1,1,1,2-Tetrachloroethane	1	< 0.75	< 0.75	< 0.75 UJ	< 0.75	< 0.75	< 0.75	< 0.75	< 0.75	< 0.75
1,1,1-Trichloroethane	30	< 0.75	< 0.75	< 0.75 UJ	< 0.75	< 0.75	< 0.75	< 0.75	< 0.75	< 0.75
1,1,2,2-Tetrachloroethane	1	< 0.75	< 0.75	< 0.75 UJ	< 0.75	< 0.75	< 0.75	< 0.75	< 0.75	< 0.75
1,1,2-Trichloroethane	3	< 0.75	< 0.75	**2.7 J**	< 0.75	< 0.75	**4.5**	< 0.75	< 0.75	< 0.75
1,1-Dichloroethane	50	< 0.75	< 0.75	< 0.75 UJ	< 0.75	< 0.75	< 0.75	< 0.75	< 0.75	< 0.75
1,1-Dichloroethene	1	< 0.75	< 0.75	< 0.75 UJ	< 0.75	< 0.75	< 0.75	< 0.75	< 0.75	< 0.75
1,1-Dichloropropene	100	< 0.75	< 0.75	< 0.75 UJ	< 0.75	< 0.75	< 0.75	< 0.75	< 0.75	< 0.75
1,2,3-Trichlorobenzene	100	< 0.75	< 0.75	< 0.75 UJ	< 0.75	< 0.75	< 0.75	< 0.75	< 0.75	< 0.75
1,2,3-Trichloropropane	0.03	< 2.5	< 2.5	< 2.5 UJ	< 2.5	< 2.5	< 2.5	< 2.5	< 2.5	< 2.5
1,2,4-Trichlorobenzene	9	< 0.75	< 0.75	< 0.75 UJ	< 0.75	< 0.75	< 0.75	< 0.75	< 0.75	< 0.75
1,2,4-Trimethylbenzene	100	< 0.75	< 0.75	< 0.75 UJ	< 0.75	< 0.75	< 0.75	< 0.75	< 0.75	**98.4**
1,2-Dibromo-3-chloropropane	0.02	< 2.5	< 2.5	< 2.5 UJ	< 2.5	< 2.5	< 2.5	< 2.5	< 2.5	< 2.5
1,2-Dibromoethane	0.03	< 0.75	< 0.75	< 0.75 UJ	< 0.75	< 0.75	< 0.75	< 0.75	< 0.75	< 0.75
1,2-Dichlorobenzene	600	< 0.75	< 0.75	< 0.75 UJ	< 0.75	< 0.75	< 0.75	< 0.75	< 0.75	< 0.75
1,2-Dichloroethane	2	< 0.75	< 0.75	< 0.75 UJ	< 0.75	< 0.75	< 0.75	< 0.75	< 0.75	< 0.75
1,2-Dichloropropane	1	< 0.75	< 0.75	< 0.75 UJ	< 0.75	< 0.75	< 0.75	< 0.75	< 0.75	< 0.75
1,3,5-Trimethylbenzene	100	< 0.75	< 0.75	< 0.75 UJ	< 0.75	< 0.75	< 0.75	< 0.75	< 0.75	< 0.75
1,3-Dichlorobenzene	600	< 0.75	< 0.75	< 0.75 UJ	< 0.75	< 0.75	< 0.75	< 0.75	< 0.75	< 0.75
1,3-Dichloropropane	100	< 0.75	< 0.75	< 0.75 UJ	< 0.75	< 0.75	< 0.75	< 0.75	< 0.75	< 0.75
1,4-Dichlorobenzene	75	< 0.75	< 0.75	< 0.75 UJ	< 0.75	< 0.75	< 0.75	< 0.75	< 0.75	< 0.75
2,2-Dichloropropane	100	< 0.75	< 0.75	< 0.75 UJ	< 0.75	< 0.75	< 0.75	< 0.75	< 0.75	< 0.75
2-Chlorotoluene	100	< 0.75	< 0.75	< 0.75 UJ	< 0.75	< 0.75	< 0.75	< 0.75	< 0.75	< 0.75
Acetone	6,000	**19.3 B**	**4.3 JB**	**11.4 B**	**7 B**	**9.6 B**	**7.1 B**	< 3.8	**8.4 B**	**3.7 J**
Benzene	1	< 0.75	< 0.75	< 0.75 UJ	< 0.75	< 0.75	< 0.75	< 0.75	< 0.75	< 0.75
Bromobenzene	100	< 0.75	< 0.75	< 0.75 UJ	< 0.75	< 0.75	< 0.75	< 0.75	< 0.75	< 0.75
Bromochloromethane	100	< 0.75	< 0.75	< 0.75 UJ	< 0.75	< 0.75	< 0.75	< 0.75	< 0.75	< 0.75
Bromodichloromethane	1	< 0.75	< 0.75	< 0.75 UJ	< 0.75	< 0.75	< 0.75	< 0.75	< 0.75	< 0.75
Bromoform	4	< 0.75	< 0.75	< 0.75 UJ	< 0.75	< 0.75	< 0.75	< 0.75	< 0.75	< 0.75
Carbon tetrachloride	1	< 0.75	< 0.75	< 0.75 UJ	< 0.75	< 0.75	< 0.75	< 0.75	< 0.75	< 0.75
Chlorobenzene	50	< 0.75	< 0.75	< 0.75 UJ	< 0.75	< 0.75	< 0.75	< 0.75	< 0.75	< 0.75
Chlorodibromomethane	1	< 0.75	< 0.75	< 0.75 UJ	< 0.75	< 0.75	< 0.75	< 0.75	< 0.75	< 0.75
Chloroethane	5	< 0.75	< 0.75	< 0.75 UJ	< 0.75	< 0.75	< 0.75	< 0.75	< 0.75	< 0.75
Chloroform	70	< 0.75	< 0.75	< 0.75 UJ	< 0.75	< 0.75	< 0.75	< 0.75	< 0.75	< 0.75
Cis-1,2-Dichloroethene	70	< 0.75	< 0.75	< 0.75 UJ	< 0.75	< 0.75	< 0.75	< 0.75	< 0.75	< 0.75
Cis-1,3-Dichloropropene	1	< 0.75	< 0.75	< 0.75 UJ	< 0.75	< 0.75	< 0.75	< 0.75	< 0.75	< 0.75
Cymene	100	< 0.75	< 0.75	< 0.75 UJ	< 0.75	< 0.75	< 0.75	< 0.75	< 0.75	**4.8**
Dichlorodifluoromethane	1,000	< 0.75	< 0.75	< 0.75 UJ	< 0.75	< 0.75	< 0.75	< 0.75	< 0.75	< 0.75
Ethyl benzene	700	< 0.75	< 0.75	< 0.75 UJ	< 0.75	< 0.75	< 0.75	< 0.75	< 0.75	**4.1**
Hexachlorobutadiene	1	< 0.75	< 0.75	< 0.75 UJ	< 0.75	< 0.75	< 0.75	< 0.75	< 0.75	< 3.8
Isopropylbenzene	700	< 0.75	< 0.75	**0.41 J**	< 0.75	< 0.75	**5.5**	< 0.75	< 0.75	**6.5**
Meta/Para Xylene	1,000	< 1.5	< 1.5	< 1.5 UJ	< 1.5	< 1.5	< 1.5	< 1.5	< 1.5	< 1.5
Methyl bromide	10	< 0.75	< 0.75	< 0.75 UJ	< 0.75 UJ	< 0.75 UJ	< 0.75 UJ	< 0.75 UJ	< 0.75 UJ	**0.47 J**
Methyl butyl ketone	300	< 3.8	< 3.8	< 3.8 UJ	< 3.8	< 3.8	< 3.8	< 3.8	< 3.8	< 3.8
Methyl chloride	100	< 0.75	< 0.75	< 0.75 UJ	< 0.75	< 0.75	< 0.75	< 0.75	< 0.75	< 0.75
Methyl ethyl ketone	300	**3.2 J**	< 3.8	< 3.8 UJ	< 3.8	< 3.8	< 3.8	< 3.8	< 3.8	< 3.8
Methyl isobutyl ketone	100	< 3.8	< 3.8	< 3.8 UJ	< 3.8	< 3.8	< 3.8	< 3.8	< 3.8	< 3.8
Methyl Tertbutyl Ether	70	< 0.75	< 0.75	< 0.75 UJ	< 0.75	< 0.75	< 0.75	**1.7**	< 0.75	**6.4**
Methylene chloride	3	< 0.75	< 0.75	< 0.75 UJ	< 0.75	< 0.75	< 0.75	< 0.75	< 0.75	< 0.75
Naphthalene	300	< 0.75	**0.51 J**	**7.7 J**	< 0.75	< 0.75	**2.3**	< 0.75	< 0.75	**72.2**
n-Butylbenzene	100	< 0.75	< 0.75	< 0.75 UJ	< 0.75	< 0.75	**3.1**	< 0.75	< 0.75	**11.3**
Ortho Xylene	1,000	< 0.75	< 0.75	< 0.75 UJ	< 0.75	< 0.75	< 0.75	< 0.75	< 0.75	< 0.75
p-Chlorotoluene	100	< 0.75	< 0.75	< 0.75 UJ	< 0.75	< 0.75	< 0.75	< 0.75	< 0.75	< 0.75
Propylbenzene	100	< 0.75	< 0.75	**0.61 J**	< 0.75	< 0.75	**7.1**	< 0.75	< 0.75	**13.8**
sec-Butylbenzene	100	< 0.75	**0.51 J**	**6 J**	< 0.75	< 0.75	**7.7**	< 0.75	< 0.75	**10**
Styrene	100	< 0.75	< 0.75	< 0.75 UJ	< 0.75	< 0.75	< 0.75	< 0.75	< 0.75	< 0.75
Tert Butyl Alcohol	100	< 12.5	< 12.5	< 12.5 UJ	< 12.5	< 12.5	< 12.5	< 12.5	< 12.5	< 12.5
tert-Butylbenzene	100	< 0.75	< 0.75	< 0.75 UJ	< 0.75	< 0.75	< 0.75	< 0.75	< 0.75	< 0.75
Tetrachloroethene	1	< 0.75	< 0.75	< 0.75 UJ	< 0.75	< 0.75	< 0.75	< 0.75	< 0.75	< 0.75
Toluene	600	< 0.75	< 0.75	< 0.75 UJ	< 0.75	< 0.75	< 0.75	< 0.75	< 0.75	< 0.75
Total Xylenes	1,000	NA	NA	NA	< 2.3	< 2.3	< 2.3	< 2.3	< 2.3	< 2.3
Trans-1,2-Dichloroethene	100	< 0.75	< 0.75	< 0.75 UJ	< 0.75	< 0.75	< 0.75	< 0.75	< 0.75	< 0.75
Trans-1,3-Dichloropropene	1	< 0.75	< 0.75	< 0.75 UJ	< 0.75	< 0.75	< 0.75	< 0.75	< 0.75	< 0.75
Trichloroethene	1	< 0.75	< 0.75	< 0.75 UJ	< 0.75	< 0.75	< 0.75	< 0.75	< 0.75	< 0.75
Trichlorofluoromethane	2,000	< 0.75	< 0.75	< 0.75 UJ	< 0.75	< 0.75	< 0.75	< 0.75	< 0.75	< 0.75
Vinyl chloride	1	< 0.75	< 0.75	< 0.75 UJ	< 0.75	< 0.75	< 0.75	< 0.75	< 0.75	< 0.75
TIC VOCs (µg/l)										
Total TIC VOCs	NLE	NA	**8.1 JN**	**171 JN**	NA	NA	**346.5 JN**	NA	NA	**273.1 JN**

TABLE 2
GROUND WATER SAMPLING RESULTS FROM TEMPORARY WELLS
- COMPARISON TO NJDEP GROUND WATER QUALITY CRITERIA
SITE 490 UST -Fort Monmouth, New Jersey

Loc ID	NJ Ground Water Quality Criteria	PAR-79-490-TMW01	PAR-79-490-TMW02	PAR-79-490-TMW03	PAR-79-490-TMW-04		PAR-79-490-TMW-05	PAR-79-490-TMW-06	PAR-79-490-TMW-07	PAR-79-490-TMW-08
Sample ID		99-PAR-79-490-TMW01	99-PAR-79-490-TMW02	PAR-79-490-TMW03	PAR-79-490-TMW-04-08	PAR-79-490-TMW-104-08	PAR-79-490-TMW-05-08	PAR-79-490-TMW-06-08	PAR-79-490-TMW-07-08	PAR-79-490-TMW-08
Sample Date		8/5/2016	8/5/2016	8/4/2016	11/3/2017	11/3/2017	11/3/2017	11/3/2017	11/3/2017	11/21/2017
Filtered		Total	Total	Total	Total	Total	Total	Total	Total	Total
Semivolatile Organic Compounds (µg/l)										
1,2,4-Trichlorobenzene	9	< 0.98	< 0.96	< 0.93	< 1	< 1	< 0.99	< 0.99	< 0.99	< 0.94
1,2-Dichlorobenzene	600	< 0.98	< 0.96	< 0.93	< 1	< 1	< 0.99	< 0.99	< 0.99	< 0.94
1,2-Diphenylhydrazine	20	< 0.98	< 0.96	< 0.93	< 1	< 1	< 0.99	< 0.99	< 0.99	< 0.94
1,3-Dichlorobenzene	600	< 0.98	< 0.96	< 0.93	< 1	< 1	< 0.99	< 0.99	< 0.99	< 0.94
1,4-Dichlorobenzene	75	< 0.98	< 0.96	< 0.93	< 1	< 1	< 0.99	< 0.99	< 0.99	< 0.94
2,4,5-Trichlorophenol	700	< 2.9	< 2.9	< 2.8	< 3	< 3	< 3	< 3	< 3	< 2.8
2,4,6-Trichlorophenol	20	< 0.98	< 0.96	< 0.93	< 1	< 1	< 0.99	< 0.99	< 0.99	< 0.94
2,4-Dichlorophenol	20	< 0.98	< 0.96	< 0.93	< 1	< 1	< 0.99	< 0.99	< 0.99	< 0.94
2,4-Dimethylphenol	100	< 4.9	< 4.8	< 4.6	< 5.1	< 5	< 5	< 5	< 5	< 4.7
2,4-Dinitrophenol	40	< 7.8	< 7.7	< 7.4	< 8.1	< 8	< 7.9	< 7.9	< 7.9	< 7.5
2,4-Dinitrotoluene	10	< 0.98	< 0.96	< 0.93	< 1	< 1	< 0.99	< 0.99	< 0.99	< 0.94
2,6-Dinitrotoluene	10	< 0.98	< 0.96	< 0.93	< 1	< 1	< 0.99	< 0.99	< 0.99	< 0.94
2-Chloronaphthalene	600	< 0.98	< 0.96	< 0.93	< 1	< 1	< 0.99	< 0.99	< 0.99	< 0.94
2-Chlorophenol	40	< 2	< 1.9	< 1.9	< 2	< 2	< 2	< 2	< 2	< 1.9
2-Methylnaphthalene	30	0.69 J	< 0.96	[illegible]	< 1	< 1	[illegible]	< 0.99	< 0.99	[illegible]
2-Methylphenol	100	< 0.98	< 0.96	< 0.93	< 1	< 1	< 0.99	< 0.99	< 0.99	< 0.94
2-Nitroaniline	100	< 0.98	< 0.96	< 0.93	< 1	< 1	< 0.99	< 0.99	< 0.99	< 0.94
2-Nitrophenol	100	< 2	< 1.9	< 1.9	< 2	< 2	< 2	< 2	< 2	< 1.9
3,3'-Dichlorobenzidine	30	< 2.9	< 2.9	< 2.8	< 3	< 3	< 3	< 3	< 3	< 2.8
3-Nitroaniline	100	< 2	< 1.9	< 1.9	< 2	< 2	< 2	< 2	< 2	< 1.9
4,6-Dinitro-2-methylphenol	1	< 4.9	< 4.8	< 4.6	< 5.1	< 5	< 5	< 5	< 5	< 4.7
4-Bromophenyl phenyl ether	100	< 0.98	< 0.96	< 0.93	< 1	< 1	< 0.99	< 0.99	< 0.99	< 0.94
4-Chloro-3-methylphenol	100	< 0.98	< 0.96	< 0.93	< 1	< 1	< 0.99	< 0.99	< 0.99	< 0.94
4-Chloroaniline	30	< 0.98	< 0.96	< 0.93	< 1	< 1	< 0.99	< 0.99	< 0.99	< 0.94
4-Chlorophenyl phenyl ether	100	< 0.98	< 0.96	< 0.93	< 1	< 1	< 0.99	< 0.99	< 0.99	< 0.94
4-Nitroaniline	5	< 0.98	< 0.96	< 0.93	< 1	< 1	< 0.99	< 0.99	< 0.99	< 0.94
4-Nitrophenol	100	< 4.9	< 4.8	< 4.6	< 5.1	< 5	< 5	< 5	< 5	< 4.7
Acenaphthene	400	< 0.98	0.68 J	< 0.93	< 1	< 1	6	< 0.99	< 0.99	15.8
Acenaphthylene	100	< 0.98	0.6 J	< 0.93	< 1	< 1	< 0.99	< 0.99	< 0.99	< 0.94
Anthracene	2,000	< 0.98	0.61 J	8.2	< 1	< 1	< 0.99	< 0.99	< 0.99	< 0.94
Benzidine	20	< 29.4	< 28.7	< 27.8 UJ	< 30.3	< 30	< 29.7	< 29.7	< 29.7	< 28.3
Benzo(a)anthracene	0.1	0.14 J	0.26 J	< 0.93	< 1	< 1	< 0.99	< 0.99	< 0.99	0.67 J
Benzo(a)pyrene	0.1	< 0.98	< 0.96	< 0.93	< 1	< 1	< 0.99	< 0.99	< 0.99	0.48 J
Benzo(b)fluoranthene	0.2	< 0.98	0.21 J	< 0.93	< 1	< 1	< 0.99	< 0.99	< 0.99	0.62 J
Benzo(ghi)perylene	100	< 0.98	< 0.96	< 0.93	< 1	< 1	< 0.99	< 0.99	< 0.99	0.22 J
Benzo(k)fluoranthene	0.5	< 0.98	< 0.96	< 0.93	< 1	< 1	< 0.99	< 0.99	< 0.99	0.21 J
Benzyl alcohol	2,000	< 2	< 1.9	< 1.9	< 2	< 2	< 2	< 2	< 2	< 1.9
Bis(2-Chloroethoxy)methane	100	< 0.98	< 0.96	< 0.93	< 1	< 1	< 0.99	< 0.99	< 0.99	< 0.94
Bis(2-Chloroethyl)ether	7	< 0.98	< 0.96	< 0.93	< 1	< 1	< 0.99	< 0.99	< 0.99	< 0.94
Bis(2-Chloroisopropyl)ether	300	< 0.98	< 0.96	< 0.93	< 1	< 1	< 0.99	< 0.99	< 0.99	< 0.94
Bis(2-Ethylhexyl)phthalate	3	< 0.98	0.35 J	< 0.93	< 1	< 1	< 0.99	< 0.99	< 0.99	1.4 J
Butyl benzyl phthalate	100	< 0.98	0.16 J	< 0.93	< 1	< 1	< 0.99	< 0.99	< 0.99	< 0.94
Carbazole	100	< 0.98	< 0.96	< 0.93	< 1	< 1	< 0.99	< 0.99	< 0.99	< 0.94
Chrysene	5	< 0.98	0.25 J	< 0.93	< 1	< 1	< 0.99	< 0.99	< 0.99	0.67 J
Cresol	NLE	< 0.98	< 0.96	< 0.93	< 1	< 1	< 0.99	< 0.99	< 0.99	< 0.94
Dibenz(a,h)anthracene	0.3	< 0.98	< 0.96	< 0.93	< 1	< 1	< 0.99	< 0.99	< 0.99	< 0.94
Dibenzofuran	100	0.22 J	0.73 J	< 0.93	< 1	< 1	< 0.99	< 0.99	< 0.99	< 0.94
Diethyl phthalate	6,000	< 0.98	< 0.96	< 0.93	< 1	< 1	< 0.99	< 0.99	< 0.99	< 0.94
Dimethyl phthalate	100	< 0.98	< 0.96	< 0.93	< 1	< 1	< 0.99	< 0.99	< 0.99	< 0.94
Di-n-butylphthalate	700	< 0.98	0.33 J	< 0.93	< 1	< 1	< 0.99	< 0.99	< 0.99	< 0.94
Di-n-octylphthalate	100	< 0.98	< 0.96	< 0.93	< 1	< 1	< 0.99	< 0.99	< 0.99	< 0.94
Fluoranthene	300	< 0.98	< 0.96	< 0.93	< 1	0.2 J	1.2 J	< 0.99	< 0.99	2
Fluorene	300	< 0.98	< 0.96	< 0.93	< 1	< 1	6.4	< 0.99	< 0.99	22.7
Hexachlorobenzene	0.02	< 0.98	< 0.96	< 0.93	< 1	< 1	< 0.99	< 0.99	< 0.99	< 0.94
Hexachlorobutadiene	1	< 0.98	< 0.96	< 0.93	< 1	< 1	< 0.99	< 0.99	< 0.99	< 0.94
Hexachlorocyclopentadiene	40	< 2	< 1.9	< 1.9	< 2	< 2	< 2	< 2	< 2	< 1.9
Hexachloroethane	7	< 0.98	< 0.96	< 0.93	< 1	< 1	< 0.99	< 0.99	< 0.99	< 0.94
Indeno(1,2,3-cd)pyrene	0.2	< 0.98	0.13 J	< 0.93	< 1	< 1	< 0.99	< 0.99	< 0.99	[illegible] J
Isophorone	40	< 0.98	< 0.96	< 0.93	< 1	< 1	< 0.99	< 0.99	< 0.99	< 0.94
Naphthalene	300	< 0.98	< 0.96	< 0.93	< 1	< 1	< 0.99	< 0.99	< 0.99	[illegible]
Nitrobenzene	6	< 2	< 1.9	< 1.9	< 2	< 2	< 2	< 2	< 2	< 1.9
N-Nitrosodimethylamine	0.8	< 2	< 1.9	< 1.9	< 2	< 2	< 2	< 2	< 2	< 1.9
N-Nitroso-di-n-propylamine	10	< 0.98	< 0.96	< 0.93	< 1	< 1	< 0.99	< 0.99	< 0.99	< 0.94
N-Nitrosodiphenylamine	10	< 2	< 1.9	< 1.9	< 2	< 2	< 2	< 2	< 2	< 1.9
Pentachlorophenol	0.3	< 7.8	< 7.7	< 7.4	< 8.1	< 8	< 7.9	< 7.9	< 7.9	< 7.5
Phenanthrene	100	0.29 J	1.1 J	72.4	< 1	< 1	12	< 0.99	< 0.99	10.6
Phenol	2,000	< 0.98	< 0.96	< 0.93	< 1	< 1	< 0.99	< 0.99	< 0.99	< 0.94
Pyrene	200	< 0.98	0.65 J	7.1	< 1	0.35 J	1.5 J	< 0.99	< 0.99	1.8 J
TIC SVOCs (µg/l)										
Total SVOC TICs	500	9.9 JN	195.4 JN	1323.1 JN	NA	5.4 JN	461.3 JN	NA	NA	796.6 JN

Footnote:

1) All historical data collected prior to 2013 are reported as provided by others.

2) Number of Analyses is the number of detected and non-detected results excluding rejected results. Sample duplicate pairs have not been averaged.

3) NLE = no limit established.

4) ND = not detected in any background sample, no background concentration available.

5) Bold chemical dectection

6) SS = Site Specific action level, see "Specific Chemical Class (or Parameter)" footnote for details.

7) 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.

B =Compound detected in the sample at a concentration less than or equal to 5 times (10 times for common lab contaminants) the blank concentration.

R = Rejected, data validation rejected the results.

U = non-detect, i.e. not detected at or above this value.

U-DL = Elevated sample detection limit due to difficult sample matrix.

U-ND = Analyte not detected in sample, but no detection or reporting limit provided.

J = estimated detected value due to a concetration below the reporting limit or due to discrepancies in meeting certain analyte-specific quality control.

E (or ER) = Estimated result.

D = Results from dilution of sample.

J-DL = Elevated sample detection limit due to difficult sample matrix.

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+ = The result is an estimated quantity, but the result may be biased high.

J- = The result is an estimated quantity, but the result may be biased low.

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

9) 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).

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).

10) 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

This page intentionally left blank.

TABLE 3
GROUND WATER SAMPLING RESULTS FROM PERMANENT WELLS
- COMPARISON TO NJDEP GROUND WATER QUALITY CRITERIA
SITE 490 UST -Fort Monmouth, New Jersey

Loc ID	NJ Ground Water Quality Criteria	490MW01	PAR-79-490-GW-MW-02	PAR-79-490-GW-MW-03	
Sample ID		PAR-79-490-GW-490MW01-14.5	PAR-79-490-GW-MW-02-10.3	PAR-79-490-GW-MW-03-10	PAR-79-490-GW-MW-103-10
Sample Date		1/19/2018	1/19/2018	1/19/2018	1/19/2018
Filtered		Total	Total	Total	Total
Volatile Organic Compounds (µg/l)					
1,1,1,2-Tetrachloroethane	1	< 0.75	< 0.75	< 0.75	< 0.75
1,1,1-Trichloroethane	30	< 0.75	< 0.75	< 0.75	< 0.75
1,1,2,2-Tetrachloroethane	1	< 0.75	< 0.75	< 0.75	< 0.75
1,1,2-Trichloroethane	3	< 0.75	< 0.75	< 0.75	< 0.75
1,1-Dichloroethane	50	< 0.75	< 0.75	< 0.75	< 0.75
1,1-Dichloroethene	1	< 0.75	< 0.75	< 0.75	< 0.75
1,1-Dichloropropene	100	< 0.75	< 0.75	< 0.75	< 0.75
1,2,3-Trichlorobenzene	100	< 0.75	< 0.75	< 0.75	< 0.75
1,2,3-Trichloropropane	0.03	< 2.5	< 2.5	< 2.5	< 2.5
1,2,4-Trichlorobenzene	9	< 0.75	< 0.75	< 0.75	< 0.75
1,2,4-Trimethylbenzene	100	< 0.75	**7.8**	< 0.75	< 0.75
1,2-Dibromo-3-chloropropane	0.02	< 2.5	< 2.5	< 2.5	< 2.5
1,2-Dibromoethane	0.03	< 0.75	< 0.75	< 0.75	< 0.75
1,2-Dichlorobenzene	600	< 0.75	< 0.75	< 0.75	< 0.75
1,2-Dichloroethane	2	< 0.75	< 0.75	< 0.75	< 0.75
1,2-Dichloropropane	1	< 0.75	< 0.75	< 0.75	< 0.75
1,3,5-Trimethylbenzene	100	< 0.75	**0.52 J**	< 0.75	< 0.75
1,3-Dichlorobenzene	600	< 0.75	< 0.75	< 0.75	< 0.75
1,3-Dichloropropane	100	< 0.75	< 0.75	< 0.75	< 0.75
1,4-Dichlorobenzene	75	< 0.75	< 0.75	< 0.75	< 0.75
2,2-Dichloropropane	100	< 0.75	< 0.75	< 0.75	< 0.75
2-Chlorotoluene	100	< 0.75	< 0.75	< 0.75	< 0.75
Acetone	6,000	< 3.8	**3.3 J**	< 3.8	< 3.8
Benzene	1	< 0.75	< 0.75	< 0.75	< 0.75
Bromobenzene	100	< 0.75	< 0.75	< 0.75	< 0.75
Bromochloromethane	100	< 0.75	< 0.75	< 0.75	< 0.75
Bromodichloromethane	1	< 0.75	< 0.75	< 0.75	< 0.75
Bromoform	4	< 0.75	< 0.75	< 0.75	< 0.75
Carbon tetrachloride	1	< 0.75	< 0.75	< 0.75	< 0.75
Chlorobenzene	50	< 0.75	< 0.75	< 0.75	< 0.75
Chlorodibromomethane	1	< 0.75	< 0.75	< 0.75	< 0.75
Chloroethane	5	< 0.75	< 0.75	< 0.75	< 0.75
Chloroform	70	< 0.75	< 0.75	< 0.75	< 0.75
Cis-1,2-Dichloroethene	70	< 0.75	< 0.75	< 0.75	< 0.75
Cis-1,3-Dichloropropene	1	< 0.75	< 0.75	< 0.75	< 0.75
Cymene	100	< 0.75	**0.46 J**	< 0.75	< 0.75
Dichlorodifluoromethane	1,000	< 0.75	< 0.75	< 0.75	< 0.75
Ethyl benzene	700	< 0.75	**0.9 J**	< 0.75	< 0.75
Hexachlorobutadiene	1	< 3.8	< 3.8	< 3.8	< 3.8
Isopropylbenzene	700	**0.35 J**	**0.82 J**	< 0.75	< 0.75
Meta/Para Xylene	1,000	< 1.5	< 1.5	< 1.5	< 1.5
Methyl bromide	10	< 0.75	< 0.75	< 0.75	< 0.75
Methyl butyl ketone	300	< 3.8	< 3.8	< 3.8	< 3.8
Methyl chloride	100	< 0.75	< 0.75	< 0.75	< 0.75
Methyl ethyl ketone	300	< 3.8	< 3.8	< 3.8	< 3.8
Methyl isobutyl ketone	100	< 3.8	< 3.8	< 3.8	< 3.8
Methyl Tertbutyl Ether	70	< 0.75	< 0.75	< 0.75	< 0.75
Methylene chloride	3	< 0.75	< 0.75	< 0.75	< 0.75
Naphthalene	300	**0.58 J**	**7.2**	**0.44 J**	**0.4 J**
n-Butylbenzene	100	< 0.75	< 0.75	< 0.75	< 0.75
Ortho Xylene	1,000	< 0.75	< 0.75	< 0.75	< 0.75
p-Chlorotoluene	100	< 0.75	< 0.75	< 0.75	< 0.75
Propylbenzene	100	< 0.75	**1.3**	< 0.75	< 0.75

TABLE 3
GROUND WATER SAMPLING RESULTS FROM PERMANENT WELLS
- COMPARISON TO NJDEP GROUND WATER QUALITY CRITERIA
SITE 490 UST -Fort Monmouth, New Jersey

Loc ID	NJ Ground Water Quality Criteria	490MW01	PAR-79-490-GW-MW-02	PAR-79-490-GW-MW-03	
Sample ID		PAR-79-490-GW-490MW01-14.5	PAR-79-490-GW-MW-02-10.3	PAR-79-490-GW-MW-03-10	PAR-79-490-GW-MW-103-10
Sample Date		1/19/2018	1/19/2018	1/19/2018	1/19/2018
Filtered		Total	Total	Total	Total
sec-Butylbenzene	100	**4.5**	**0.78 J**	< 0.75	< 0.75
Styrene	100	< 0.75	< 0.75	< 0.75	< 0.75
Tert Butyl Alcohol	100	< 12.5	< 12.5	< 12.5	< 12.5
tert-Butylbenzene	100	**0.77 J**	< 0.75	< 0.75	< 0.75
Tetrachloroethene	1	< 0.75	< 0.75	< 0.75	< 0.75
Toluene	600	< 0.75	< 0.75	< 0.75	< 0.75
Total Xylenes	1,000	< 2.3	< 2.3	< 2.3	< 2.3
Trans-1,2-Dichloroethene	100	< 0.75	< 0.75	< 0.75	< 0.75
Trans-1,3-Dichloropropene	1	< 0.75	< 0.75	< 0.75	< 0.75
Trichloroethene	1	< 0.75	< 0.75	< 0.75	< 0.75
Trichlorofluoromethane	2,000	< 0.75	< 0.75	< 0.75	< 0.75
Vinyl chloride	1	< 0.75	< 0.75	< 0.75	< 0.75
TIC VOCs (µg/l)					
Total TIC VOCs	NLE	**22.6 JN**	**10.7 JN**	NA	NA
Semivolatile Organic Compounds (µg/l)					
1,2,4-Trichlorobenzene	9	< 0.99	< 1	< 1	< 1.1
1,2-Dichlorobenzene	600	< 0.99	< 1	< 1	< 1.1
1,2-Diphenylhydrazine	20	< 0.99	< 1	< 1	< 1.1
1,3-Dichlorobenzene	600	< 0.99	< 1	< 1	< 1.1
1,4-Dichlorobenzene	75	< 0.99	< 1	< 1	< 1.1
2,4,5-Trichlorophenol	700	< 3	< 3	< 3	< 3.2
2,4,6-Trichlorophenol	20	< 0.99	< 1	< 1	< 1.1
2,4-Dichloropheno	20	< 0.99	< 1	< 1	< 1.1
2,4-Dimethylpheno	100	< 4.9	< 5.1	< 5.1	< 5.3
2,4-Dinitropheno	40	< 7.9	< 8.1	< 8.1	< 8.4
2,4-Dinitrotoluene	10	< 0.99	< 1	< 1	< 1.1
2,6-Dinitrotoluene	10	< 0.99	< 1	< 1	< 1.1
2-Chloronaphthalene	600	< 0.99	< 1	< 1	< 1.1
2-Chloropheno	40	< 2	< 2	< 2	< 2.1
2-Methylnaphthalene	30	< 0.99	< 1	< 1	< 1.1
2-Methylpheno	100	< 0.99	< 1	< 1	< 1.1
2-Nitroaniline	100	< 0.99	< 1	< 1	< 1.1
2-Nitrophenol	100	< 2	< 2	< 2	< 2.1
3,3'-Dichlorobenzidine	30	< 3	< 3	< 3	< 3.2
3-Nitroaniline	100	< 2	< 2	< 2	< 2.1
4,6-Dinitro-2-methylpheno	1	< 4.9	< 5.1	< 5.1	< 5.3
4-Bromophenyl phenyl ether	100	< 0.99	< 1	< 1	< 1.1
4-Chloro-3-methylpheno	100	< 0.99	< 1	< 1	< 1.1
4-Chloroaniline	30	< 0.99	< 1	< 1	< 1.1
4-Chlorophenyl phenyl ethe	100	< 0.99	< 1	< 1	< 1.1
4-Nitroaniline	5	< 0.99	< 1	< 1	< 1.1
4-Nitrophenol	100	< 4.9	< 5.1	< 5.1	< 5.3
Acenaphthene	400	**0.84 J**	< 1	< 1	< 1.1
Acenaphthylene	100	< 0.99	< 1	< 1	< 1.1
Anthracene	2,000	< 0.99	< 1	< 1	< 1.1
Benzidine	20	< 29.6	< 30.3	< 30.3	< 31.6
Benzo(a)anthracene	0.1	< 0.99	< 1	< 1	< 1.1
Benzo(a)pyrene	0.1	< 0.99	< 1	< 1	< 1.1
Benzo(b)fluoranthene	0.2	< 0.99	< 1	< 1	< 1.1
Benzo(ghi)perylene	100	< 0.99	< 1	< 1	< 1.1
Benzo(k)fluoranthene	0.5	< 0.99	< 1	< 1	< 1.1
Benzyl alcoho	2,000	< 2	< 2	< 2	< 2.1
Bis(2-Chloroethoxy)methane	100	< 0.99	< 1	< 1	< 1.1
Bis(2-Chloroethyl)ether	7	< 0.99	< 1	< 1	< 1.1

TABLE 3
GROUND WATER SAMPLING RESULTS FROM PERMANENT WELLS
- COMPARISON TO NJDEP GROUND WATER QUALITY CRITERIA
SITE 490 UST -Fort Monmouth, New Jersey

Loc ID	NJ Ground Water Quality Criteria	490MW01	PAR-79-490-GW-MW-02	PAR-79-490-GW-MW-03	
Sample ID		PAR-79-490-GW-490MW01-14.5	PAR-79-490-GW-MW-02-10.3	PAR-79-490-GW-MW-03-10	PAR-79-490-GW-MW-103-10
Sample Date		1/19/2018	1/19/2018	1/19/2018	1/19/2018
Filtered		Total	Total	Total	Total
Bis(2-Chloroisopropyl)ether	300	< 0.99	< 1	< 1	< 1.1
Bis(2-Ethylhexyl)phthalate	3	< 0.99	0.37 J	< 1	< 1.1
Butyl benzyl phthalate	100	< 0.99	< 1	0.13 J	< 1.1
Carbazole	100	< 0.99	< 1	< 1	< 1.1
Chrysene	5	< 0.99	< 1	< 1	< 1.1
Cresol	NLE	< 0.99	< 1	< 1	< 1.1
Dibenz(a,h)anthracene	0.3	< 0.99	< 1	< 1	< 1.1
Dibenzofuran	100	2.8 J	< 1	< 1	< 1.1
Diethyl phthalate	6,000	< 0.99	< 1	< 1	< 1.1
Dimethyl phthalate	100	< 0.99	< 1	< 1	< 1.1
Di-n-butylphthalate	700	< 0.99	< 1	< 1	< 1.1
Di-n-octylphthalate	100	< 0.99	< 1	< 1	< 1.1
Fluoranthene	300	< 0.99	< 1	< 1	< 1.1
Fluorene	300	1.6 J	< 1	< 1	< 1.1
Hexachlorobenzene	0.02	< 0.99	< 1	< 1	< 1.1
Hexachlorobutadiene	1	< 0.99	< 1	< 1	< 1.1
Hexachlorocyclopentadiene	40	< 2	< 2	< 2	< 2.1
Hexachloroethane	7	< 0.99	< 1	< 1	< 1.1
Indeno(1,2,3-cd)pyrene	0.2	< 0.99	< 1	< 1	< 1.1
Isophorone	40	< 0.99	< 1	< 1	< 1.1
Naphthalene	300	< 0.99	< 1	< 1	< 1.1
Nitrobenzene	6	< 2	< 2	< 2	< 2.1
N-Nitrosodimethylamine	0.8	< 2	< 2	< 2	< 2.1
N-Nitroso-di-n-propylamine	10	< 0.99	< 1	< 1	< 1.1
N-Nitrosodiphenylamine	10	< 2	< 2	< 2	< 2.1
Pentachlorophenol	0.3	< 7.9	< 8.1	< 8.1	< 8.4
Phenanthrene	100	< 0.99	< 1	< 1	< 1.1
Phenol	2,000	< 0.99	< 1	< 1	< 1.1
Pyrene	200	< 0.99	< 1	< 1	< 1.1

Footnote:

1) All historical data collected prior to 2013 are reported as provided by others.

2) Number of Analyses is the number of detected and non-detected results excluding rejected results. Sample duplicate pairs have not been averaged.

3) NLE = no limit established.

4) ND = not detected in any background sample, no background concentration available.

5) Bold chemical dectection

6) SS = Site Specific action level, see "Specific Chemical Class (or Parameter)" footnote for details.

7) 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.

B =Compound detected in the sample at a concentration less than or equal to 5 times (10 times for common lab contaminants) the blank concentration.

R = Rejected, data validation rejected the results.

U = non-detect, i.e. not detected at or above this value.

U-DL = Elevated sample detection limit due to difficult sample matrix.

U-ND = Analyte not detected in sample, but no detection or reporting limit provided.

J = estimated detected value due to a concetration below the reporting limit or due to discrepancies in meeting certain analyte-specific quality control.

E (or ER) = Estimated result.

D = Results from dilution of sample.

J-DL = Elevated sample detection limit due to difficult sample matrix.

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+ = The result is an estimated quantity, but the result may be biased high.

J- = The result is an estimated quantity, but the result may be biased low.

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

9) 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).

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).

10) 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

TABLE 4
SOIL SAMPLING RESULTS - COMPARISON TO NJDEP SOIL REMEDIATION STANDARDS
Site UST 490 - Fort Monmouth, New Jersey

Loc ID	NJ Residential Direct Contact SRS	NJ Non-Residential Direct Contact SRS	NJ Impact to GW Soil Screening Level	PAR-79-490-SB-01			PAR-79-490-SB-02		
Sample ID				PAR-79-490-SB-01-1.5-2	PAR-79-490-SB-01-2-2.5	PAR-79-490-SB-01-9.5-10	PAR-79-490-SB-02-2-2.5	PAR-79-490-SB-02-3.5-4	PAR-79-490-SB-02-8-8.5
				1.5-2	2-2.5	9.5-10	2-2.5	3.5-4	8-8.5
Sample Date				4/12/2016	4/12/2016	4/12/2016	4/12/2016	4/12/2016	4/12/2016
Semivolatile Organic Compounds (mg/kg)									
2-Methylnaphthalene	230	2,400	8	NA	NA	NA	NA	NA	NA
Naphthalene	6	17	25	NA	NA	NA	NA	NA	NA
Extractable/Volatile Petroleum Hydrocarbons (mg/kg)									
C10-C12 Aromatics	NLE	NLE	NLE	**0.74 JB**	**0.66 JB**	< 1.3	< 1.2	**1.6 B**	< 1.3
C12-C16 Aliphatics	NLE	NLE	NLE	< 1.1 UJ	< 1.1 UJ	< 1.3 UJ	< 1.2 UJ	**129**	< 1.3 UJ
C12-C16 Aromatics	NLE	NLE	NLE	**0.31 J**	**0.24 J**	**0.31 J**	**0.23 J**	**46**	< 1.3
C16-C21 Aliphatics	NLE	NLE	NLE	< 1.1 UJ	< 1.1 UJ	< 1.3 UJ	< 1.2 UJ	**92.5**	< 1.3 UJ
C16-C21 Aromatics	NLE	NLE	NLE	**0.31 J**	**0.35 J**	**0.54 J**	**0.8 J**	**109**	**0.69 J**
C21-C36 Aromatics	NLE	NLE	NLE	**0.67 J**	**1 J**	< 1.3	**0.65 J**	**10.2 J**	**0.39 J**
C21-C40 Aliphatics	NLE	NLE	NLE	**1.1 J**	**0.74 J**	**1.2 J**	**1.9 J**	**9.3 J**	< 1.3 UJ
C9-C12 Aliphatics	NLE	NLE	NLE	**0.4 J**	**0.33 J**	**0.42 J**	**0.5 J**	**15.8 J**	**0.25 J**
Total Aliphatics	NLE	NLE	NLE	**2 J**	< 4.5 UJ	**2.2 J**	**2.9 J**	**246 J**	< 5.4 UJ
Total Aromatics	NLE	NLE	NLE	**2 J**	**2.3 J**	**1.7 J**	**2 J**	**166**	**1.6 J**
Total EPH	5,100	SS	SS	**4 J**	**3.7 J**	**3.8 J**	**4.9 J**	**413**	< 10.7

TABLE 4
SOIL SAMPLING RESULTS - COMPARISON TO NJDEP SOIL REMEDIATION STANDARDS
Site UST 490 - Fort Monmouth, New Jersey

Loc ID	NJ Residential Direct Contact SRS	NJ Non-Residential Direct Contact SRS	NJ Impact to GW Soil Screening Level	PAR-79-490-SB-03			PAR-79-490-SB-04		
Sample ID				PAR-79-490-SB-03-2-2.5	PAR-79-490-SB-03-6-6.5	PAR-79-490-SB-03-9.5-10	PAR-79-490-SB-04-2-2.5	PAR-79-490-SB-04-3.5-4	PAR-79-490-SB-04-8-8.5
				2-2.5	6-6.5	9.5-10	2-2.5	3.5-4	8-8.5
Sample Date				4/12/2016	4/12/2016	4/12/2016	4/12/2016	4/12/2016	4/12/2016
Semivolatile Organic Compounds (mg/kg)									
2-Methylnaphthalene	230	2,400	8	NA	NA	NA	NA	**9 J**	NA
Naphthalene	6	17	25	NA	NA	NA	NA	< 0.17 UJ	NA
Extractable/Volatile Petroleum Hydrocarbons (mg/kg)									
C10-C12 Aromatics	NLE	NLE	NLE	**0.54 JB**	**1.5 B**	**1.1 JB**	**1.3 JB**	**19.9**	**0.94 JB**
C12-C16 Aliphatics	NLE	NLE	NLE	**0.51 J**	**9.5 J**	< 1.3 UJ	**24.6 J**	**357 J**	< 1.4 UJ
C12-C16 Aromatics	NLE	NLE	NLE	**0.58 J**	**4.3**	**0.54 J**	**13.8**	**309**	**0.74 J**
C16-C21 Aliphatics	NLE	NLE	NLE	**15.1 J**	**9.5 J**	< 1.3 UJ	**21 J**	**270 J**	< 1.4 UJ
C16-C21 Aromatics	NLE	NLE	NLE	**6.7**	**7.9**	< 1.3	**18.5**	**453**	**0.46 J**
C21-C36 Aromatics	NLE	NLE	NLE	**108**	**1.6**	**0.4 J**	**2.7**	**43.3**	**0.66 J**
C21-C40 Aliphatics	NLE	NLE	NLE	**246**	**6.5 JB**	**1.9 JB**	**3.5 JB**	**41.1 J**	**1.6 JB**
C9-C12 Aliphatics	NLE	NLE	NLE	**0.39 J**	**2.4 J**	**0.64 J**	**5.8 J**	**104 J**	**0.44 J**
Total Aliphatics	NLE	NLE	NLE	**262 J**	**27.9 J**	**3.3 J**	**55 J**	**772 J**	**2.9 J**
Total Aromatics	NLE	NLE	NLE	**116**	**15.3**	**2.2 J**	**36.3**	**825**	**2.8 J**
Total EPH	5,100	SS	SS	**378**	**43.2**	**5.5 J**	**91.4**	**1,600**	**5.6 J**

Footnote:

1) All historical data collected prior to 2013 are reported as provided by others.

2) Number of Analyses is the number of detected and non-detected results excluding rejected results. Sample duplicate pairs have not been averaged.

3) NLE = no limit established.

4) ND = not detected in any background sample, no background concentration available.

5) Bold chemical dectection

6) SS = Site Specific action level, see "Specific Chemical Class (or Parameter)" footnote for details.

7) 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.

E (or ER) = Estimated result.

B =Compound detected in the sample at a concentration less than or equal to 5 times (10 times for common lab contaminants) the blank concentration.

D = Results from dilution of sample.

R = Rejected, data validation rejected the results.

J-DL = Elevated sample detection limit due to difficult sample matrix.

U = non-detect, i.e. not detected at or above this value.

JN = Tentatively identified compound, estimated concentration.

U-DL = Elevated sample detection limit due to difficult sample matrix.

UJ=The compound was not detected: however, the results is estimated because of discrepancies in meeting certain analyte-specific QC criteria.

U-ND = Analyte not detected in sample, but no detection or reporting limit provided.

J+ = The result is an estimated quantity, but the result may be biased high.

J = estimated detected value due to a concetration below the reporting limit or due to discrepancies in meeting certain analyte-specific quality control.

J- = The result is an estimated quantity, but the result may be biased low.

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

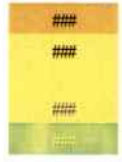
a) DELETE THIS NOTE BEFORE GOING FINAL: Refer to the NJDEP Protocol for Addressing Extractable Petroleum Hydrocarbons (Version 5.0, August 9, 2010) and the NJDEP Health Based end Ecological Screening Criteria for Petroleum Hydrocarbons (Version 4.0, August 9, 2010) to determine the category of tank being investigated and the appropriate cleanup standards or screening levels for that category of tank.

9) 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 Residential Direct Contact Soil Remediation Standard.

There are no NJDEP soil standards for individual PCB Aroclors, therefore the total PCB NJDEP standards were used for individual Aroclors.

- Cell Shade values represent a result that is above the NJ Non-Residential Direct Contact Soil Remediation Standard.



- Cell Shade values represent a result that is above the NJ Impact to GW Soil Screening Level

- Cell Shade values represent a result that is above both the NJ Residential, Non-Residential, AND NJ Impact to GW Soil Screening Level Direct Contact Soil Remediation Standard.

- Cell Shade values represent a result that is above both the NJ Residential and Non-Residential Direct Contact Soil Remediation Standard.

10) Criteria action level source document and web address.

- The NJ Residential Direct Contact Soil Remediation Standard refers to the NJDEP's Sept 18, 2017 Remediation Standards

  http://www.nj.gov/dep/rules/rules/njac7_26d.pdf

- The NJ Non-Residential Direct Contact Soil Remediation Standard refers to the NJDEP's Sept 18, 2017 Remediation Standards

  http://www.nj.gov/dep/rules/rules/njac7_26d.pdf

- The NJ Impact to GW Soil Screening Level criteria refers to the Development of Site Specific Impact to Ground Water Soil Remediation Standards - Nov 2013 revised

  http://www.nj.gov/dep/srp/guidance/rs/partition_equation.pdf

This page intentionally left blank.

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). 2016. Letter to the Army, RE: *Request for No Further Action at Multiple Parcel 79 Storage Tanks Site Investigation Report Addendum, Fort Monmouth, New Jersey*. May 8.
4. Department of the Army. 2017. *Request for No Further Action at Multiple Parcel 79 Storage Tanks Site Investigation Report.* Prepared by the Office of Assistant Chief of Staff for Installation Management, U.S. Army Fort Monmouth. February 2017.
5. New Jersey Department of Environmental Protection (NJDEP). 2016. Letter to the Army, RE: *Response to NJDEP's August 25, 2015 Comments on the April 2015 Underground Storage tanks within Parcel 79 and Work Plan Addendum for Former Storage Tank Sites, Fort Monmouth, Oceanport, Monmouth County.* March 30.
6. Department of the Army. 2016. *Response to NJDEP's August 25, 2015 Comments on the April 2015 Underground Storage tanks within Parcel 79 and Work Plan Addendum for Former Storage Tank Sites.* Prepared by the Office of Assistant Chief of Staff for Installation Management, U.S. Army Fort Monmouth. February 10.
7. New Jersey Department of Environmental Protection (NJDEP). 2015. Letter to the Army, RE: *Underground Storage Tanks within Parcel 79 dated April 2015, Fort Monmouth, Oceanport, Monmouth County.* August 25.
8. Department of the Army. 2015. *Underground Storage tanks within Parcel 79.* Prepared by the Office of Assistant Chief of Staff for Installation Management, U.S. Army Fort Monmouth. April 22.

This page intentionally left blank.

State of New Jersey

CHRIS CHRISTIE
Governor

KIM GUADAGNO
Lt. Governor

DEPARTMENT OF ENVIRONMENTAL PROTECTION
Bureau of Northern Field Operations
7 Ridgedale Avenue
Cedar Knolls, NJ 07927
Phone #: 973-631-6401
Fax #: 973-656-4440

BOB MARTIN
Commissioner

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.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 J µg/L), benzene (2.8 µg/L), naphthalene (1,450 µg/L), 2-methylnaphthalene (6,680 µg/L), total VOC Tentatively Identified Compounds (TICs; 1,302 µg/L) and total SVOC TICs (14,322 µg/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 µg/L), 2-methylnaphthalene (30.6 J µg/L), and total SVOC TICs (1,758 µg/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. 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.

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)

REFERENCES CITED:

1. Department of the Army. 2015. **Underground Storage Tanks Within Parcel 68, Fort Monmouth, New Jersey.** Prepared by the Office of Assistant Chief of Staff for Installation Management, U.S. Army Fort Monmouth. April 14.
2. Department of the Army. 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. April 22.
3. Department of the Army. 2015. **No Further Action Request, Site Investigation Report Addendum for the 800 Area Including, ECP Parcels 55 and 56, Fort Monmouth, New Jersey.** Prepared by the Office of Assistant Chief of Staff for Installation Management, U.S. Army Fort Monmouth. June 12.
4. Department of the Army. 2016. **Parcel 68 Work Plan Addendum for a Former UST Site, Fort Monmouth, Oceanport, Monmouth County, New Jersey.** Prepared by the Office of Assistant Chief of Staff for Installation Management, U.S. Army Fort Monmouth. March 2.
5. Department of the Army. 2016. **No Further Action Request, Site Investigation Report Addendum for the Howard Commons Underground Storage Tanks, Fort Monmouth, New Jersey.** Prepared by the Office of Assistant Chief of Staff for Installation Management, U.S. Army Fort Monmouth. April 26.
6. Department of the Army. 2016. **No Further Action Request, Site Investigation Report Addendum for the Building 750 Motor Pool Area Including Underground Storage Tanks, Fort Monmouth, New Jersey.** Prepared by the Office of Assistant Chief of Staff for Installation Management, U.S. Army Fort Monmouth. October 28.
7. Department of the Army. 2016. **Clarification of Underground Storage Tanks at Howard Commons, Fort Monmouth, New Jersey.** Prepared by the Office of Assistant Chief of Staff for Installation Management, U.S. Army Fort Monmouth. December 6.
8. Department of the Army. 2016. **No Further Action Request, Site Investigation Report Addendum, ECP Parcel 72 Underground Storage Tanks, Fort Monmouth, New Jersey.** Prepared by the Office of Assistant Chief of Staff for Installation Management, U.S. Army Fort Monmouth. December 13.
9. Department of the Army. 2017. **Request for No Further Action at Multiple 800 Area Underground Storage Tanks, Site Investigation Report Addendum, Fort Monmouth, New Jersey.** Prepared by the Office of Assistant Chief of Staff for Installation Management, U.S. Army Fort Monmouth. January 23.
10. Department of the Army. 2017. **Request for No Further Action at Multiple Parcel 79 Storage Tank Site Investigation Report Addendum, Fort Monmouth, Oceanport, New Jersey.** Prepared by the Office of Assistant Chief of Staff for Installation Management, U.S. Army Fort Monmouth. February 8.

11. New Jersey Department of Environmental Protection (NJDEP). 2007. Letter to the Army, RE: **Underground Storage Tank Closure & Remedial Investigation Reports, 800 Area UST No. 9, 800 Area UST No. 12, Fort Monmouth, NJ.** December 31.

12. New Jersey Department of Environmental Protection (NJDEP). 2010. **Protocol for Addressing Extractable Petroleum Hydrocarbons.** Site Remediation Program. Version 5.0. August 9.

13. 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.

14. New Jersey Department of Environmental Protection (NJDEP). 2015. Letter to the Army, RE: **Underground Storage Tanks Within ECP Parcel 68, 74, and 77 dated April 2015, Fort Monmouth, Oceanport, Monmouth County.** September 24.

15. New Jersey Department of Environmental Protection (NJDEP). 2015. Letter to the Army, RE: **Site Investigation Report Addendum for the 800 Area Including ECP Parcels 55 & 56, Fort Monmouth, Oceanport, Monmouth County.** November 10.

16. New Jersey Department of Environmental Protection (NJDEP). 2016. Letter to the Army, RE: **Parcel 68 Work Plan Addendum and Response to NJDEP's September 24, 2015 Comments on the April 2015 Underground Storage Tanks Within ECP Parcels 68, 74 and 77, Fort Monmouth, New Jersey & Parcel 68 Work Plan Addendum for a Former UST Site (March 2016).** March 29.

17. New Jersey Department of Environmental Protection (NJDEP). 2016. Letter to the Army, RE: **No Further Action Request Site Investigation Report Addendum for the Howard Commons Underground Storage Tanks dated April 2016, Fort Monmouth, Oceanport, Monmouth County.** November 28.

18. New Jersey Department of Environmental Protection (NJDEP). 2016. Letter to the Army, RE: **Clarification of Underground Storage Tanks at Howard Commons dated December 6, 2016, Fort Monmouth, Oceanport, Monmouth County.** December 20.

19. New Jersey Department of Environmental Protection (NJDEP). 2017. Letter to the Army, RE: **No Further Action Request Site Investigation Report Addendum ECP Parcel 72 Underground Storage Tanks dated December 13, 2016, Fort Monmouth, Oceanport, Monmouth County.** February 7.

20. New Jersey Department of Environmental Protection (NJDEP). 2017. Letter to the Army, RE: **Request for No Further Action at Multiple 800 Area Underground Storage Tanks, Site Investigation Report Addendum, Fort Monmouth, Oceanport, Monmouth County.** March 16.

21. New Jersey Department of Environmental Protection (NJDEP). 2017. Letter to the Army, RE: **No Further Action Request Site Investigation Report Addendum for the Building 750 Motor Pool Area Including Underground Storage Tanks, Fort Monmouth, Oceanport, Monmouth County.** April 4.

22. 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, Fort Monmouth, Oceanport, Monmouth County.** May 8.

23. Parsons. 2013. **Final Sampling and Analysis Plan, Remedial Investigation/Feasibility Study/Decision Documents, Fort Monmouth, Oceanport, Monmouth County, New Jersey.** Prepared for the U.S. Army Engineering and Support Center, Huntsville, AL. Revision 0. March.

24. Parsons. 2015. **Final Environmental Condition of Property Supplemental Phase II Site Investigation Work Plan for Parcels 28, 38, 39, 49, 57, 61 and 69.** Prepared for the U.S. Army Engineering and Support Center, Huntsville, AL. Revision 1. August.

25. Parsons. 2016. **Final Accident Prevention Plan, Remedial Investigation/Feasibility Study/Decision Documents, Fort Monmouth, Oceanport, Monmouth County, New Jersey.** Prepared for the U.S. Army Engineering and Support Center, Huntsville, AL. Revision 1. November.

State of New Jersey

CHRIS CHRISTIE
Governor

KIM GUADAGNO
Lt. 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
Fax #: 609-292-2117

BOB MARTIN
Commissioner

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® 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 at202D, 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® 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[1]).

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

[1] 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-methylnapthalene, 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 J µg/kg in this sample exceeded the NJDEP IGW screening level of 8,000 µg/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-methynaphthalene 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. 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.

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)

State of New Jersey

CHRIS CHRISTIE
Governor

KIM GUADAGNO
Lt. 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
Fax #: 609-633-1439

BOB MARTIN
Commissioner

March 30, 2016

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

Re: *Response to NJDEP's August 25, 2015 Comments on the April 2015 Underground Storage Tanks Within ECP Parcel 79 & Work Plan Addendum for Former Storage Tank Sites*
Fort Monmouth
Oceanport, Monmouth County
PI G000000032

Dear Mr. Colvin:

The New Jersey Department of Environmental Protection (Department) has completed review of the referenced submittals.

Area 75 - ASTs

Previous analytical results indicated sampling from one of the ASTs found no exceedences. It is agreed, however, the absence of a sample map renders the ability to associate sample locations with a specific AST impossible, and that additional sampling of soil and ground water from each is appropriate. Sampling as proposed is approved.

USTs

Section 4.2 - Ground water sampling at each of the locations proposed is approved.

UST 445 / Attachment V – It is agreed Attachment V provided information of UST 445, rather than 455, as had been previously indicated; the proposed ground water sample is approved.

B4. The Army has determined no further evaluation (i.e., no sampling) is to be performed if there is no indication of an existing UST, or evidence of a discharge. Although this conclusion is acknowledged, the Department's previous comments remain in effect.

Building 202

Sampling as proposed is approved. To clarify, however, it is assumed elevated levels of ground water contamination remain at UST 202D, and proposed sample located downgradient is for delineation purposes.

It is agreed, based upon information contained in Attachments K and L of the April 2015 submittal, no additional action is necessary for USTs 202B and 202C.

UST 490

Previous correspondence referenced levels of TPH previously found up to 8762 ppm, at least to 6.5' and perhaps deeper, above the residual product/free product limit of 8,000 mg for No 2 fuel, as well as 2- methylnaphthalene above standard in the soil and ground water. Although the proposed soil and ground water sample locations are approved, a vertical soil delineation sample is also necessary in the area of the original exceedance (which may also assess current conditions).

Please contact this office if you have any questions.

Sincerely,

Linda S. Range

Linda S. Range

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

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. <u>Attachment E – Areas 74 and 75, Aboveground Storage Tanks and Associated Piping</u>

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. <u>Underground Storage Tanks</u>

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. <u>Attachments J, K & L – USTs at Former Building 202</u>

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. <u>Attachment CC/UST 490- aka UST 490-58</u>

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-methylnapthalene 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***.

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. 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.

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® 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® 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.

TABLE 1
SAMPLING SUMMARY FOR PARCEL 79 WORK PLAN ADDENDUM
FORT MONMOUTH, NEW JERSEY

Parcel	Location	Field Meter Readings [a/]	VOCs + TICs by Method 8260C [b/]	SVOCs + TICs by Method 8270D [c/]	Non-Fractionated EPH [d/]
Soil					
79	Area 75 ASTs (Figure 3) - 4 soil borings, 3 samples each (assume 1 sample in each boring requires contingency SVOC analysis) [e/]	4	0	4	12
79	USTs 202A and 202D (Figure 6) - 3 soil borings, 3 samples each (assume 1 sample in each boring requires contingency SVOC analysis) [e/]	4	0	3	9
79	UST 490 - 3 soil borings, 3 samples each (assume 1 sample in each boring requires contingency SVOC analysis) [e/]	3	0	3	9
Groundwater					
79	Area 75 ASTs - 2 groundwater samples (Figure 3)	2	2	2	0
79	USTs 437, 440, 441, 444, 445, 448, 449, 450, and 451 (Figure 4) - 1 groundwater sample each	9	9	9	0
79	UST 142B (Figure 5) - 1 groundwater sample	1	1	1	0
79	USTs 202A and 202D (Figure 6) - 3 groundwater samples	3	3	3	0
79	UST 490 - 4 groundwater samples	4	4	4	0
QA/QC samples (see SAP for additional details) [f/]					
Field Duplicates (5% Sampling Frequency per media)		NA [g/]	1	2	2
Matrix Spike (5% Sampling Frequency per media)		NA	1	2	2
Matrix Spike Duplicate (5% Sampling Frequency per media)		NA	1	2	2
Trip Blank (1 per cooler of VOCs per media)		NA	1	0	0
QA Split (5% per media)		NA	1	2	2
Equipment Blank (5% Sampling Frequency per media)		NA	1	2	2
	TOTAL	**NA**	**25**	**39**	**40**

Notes:

NA = not applicable.

TBD = to be determined.

[a/] Field meter readings include, in soil samples: photoionization detector (PID) readings along entire soil column; and in groundwater: PID h pH, temperature, electrical conductivity, dissolved oxygen (DO), oxidation-reduction potential (ORP), and turbidity.

[b/] VOCs = volatile organic compounds; TICs = tentatively identified compounds.

[c/] SVOCs = semivolatile organic compounds; TICs = tentatively identified compounds.

[d/] EPH = extractable petroleum hydrocarbons.

[e/] 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

[f/] QA/QC = quality assurance/quality control; SAP = Sampling and Analysis Plan.

State of New Jersey

CHRIS CHRISTIE
Governor

KIM GUADAGNO
Lt. 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
Fax #: 609-633-1439

BOB MARTIN
Commissioner

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-methylnapthalene 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, 5th 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.

Sincerely,

Wanda Green

Wanda Green
BRAC Environmental Coordinator

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

ATTACHMENT CC

UST 490 File Review and Analyses

Contents:

- Underground Storage Tank File Review for UST 490
- Enclosure 1 - Report: *Underground Storage Tank Closure Report, Main Post – Building 490, Tilly Ave.*
- Enclosure 2 – Analyses from May 26, 2010 Sampling
- Enclosure 3 – Analyses from July 21, 2010 Sampling

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

Date: *March 3, 2015* Review Performed By: *Kent Friesen, Parsons*

Site ID: ***Bldg. 490*** Registration ID: 90010-58

Recommended Status of Site: ***Case Closed (no change)***

UST Probability (from May 2014 "Addendum 1 ECP UHOT Report"): ***None***

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

NJDEP Release No. or DICAR (If applicable): None

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

Tank Description: [X] Steel [ ] Fiberglass Size: 1000 gal. Contents: No. 2 Fuel Oil

[ ] Residential [X] Commercial/Industrial

Tank Removed? [X] Yes [ ] No If "yes," removal date: May 25, 1990

Were closure soil samples taken? [ ] Yes [X] No Analyses: _____

Comparison criteria: _____

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

Brief Narrative

This steel No. 2 fuel oil UST was located adjacent to Building 490. The tank was removed in 1990, but closure soil samples were not collected because contamination was not observed, which was the standard Army procedure at the time. A Site Assessment Compliance Statement and Standard Reporting Form (SRF) for tank removal were submitted to the State in 1991, but there is no record of NFA approval from the NJDEP.

Additional soil sampling was performed using a Geoprobe in 2005 to assess the site for petroleum contamination, and the results were reported in *Underground Storage Tank Closure Report, Main Post – Building 490, Tilly Ave.* (Tecom-Vinnell Services, Inc., 2007; attached as Enclosure 1). Three soil samples were collected from the site for total petroleum hydrocarbons (TPH) and volatile organic compounds (VOCs) analysis, and one groundwater sample for VOCs and semivolatile organic compounds (SVOCs). The soil results ranged from 2981 mg/kg to 8762 mg/kg for TPH, which was less than the then-current remediation standards of 10,000 mg/kg. The VOCs ethyl benzene and xylenes were detected in soil but at concentrations well below the current Residential Direct Contact Soil Remediation Standard (RDCSRS). The VOC benzene and SVOCs naphthalene, 2-methylnaphthalene, acenaphthene, dibenzofuran, fluorene, and phenanthrene were detected in groundwater at concentrations less than the then-current NJDEP Class II Ground Water Quality Criteria.

An additional Geoprobe soil and groundwater sampling program was conducted on May 26, 2010 at the UST 490 site; analyses are attached as Enclosure 2. The soil TPH results ranged from ND to 5941 mg/kg; one of the six sample results exceeded the current TPH remediation criterion of 5,100 mg/kg for TPH. The arithmetic average of all TPH soil results for this sampling was 1350 mg/kg, which is less than the current TPH remediation criterion of 5,100 mg/kg for TPH. The analytes 2-methylnaphthalene and phenanthrene were detected in soil SVOC results but at concentrations well below the current RDCSRS. VOCs and SVOCs detected in groundwater from one temporary well (TMP-1) included benzene, ethylbenzene, xylenes,

acenaphthene, acenaphthylene, anthracene, fluorene, naphthalene, and phenanthrene, which were detected in groundwater at concentrations less than the NJDEP Class IIA Ground Water Quality Criteria. However, 2-methylnaphthalene was detected at a concentration of 70.8 ug/L, which exceeded the NJDEP interim Ground Water Quality Criteria of 30 ug/L.

Three temporary wells were then sampled in July 21, 2010, and analyzed for SVOCs; analyses are attached as Enclosure 3. Detected analytes included naphthalene, 2-methylnaphthalene, fluorene, phenanthrene, and pyrene; all but 2-methylnapthalene were detected in groundwater at concentrations less than the NJDEP Class IIA Ground Water Quality Criteria. 2-Methylnapthalene concentrations ranged from ND to 115 ug/L, which exceeded the NJDEP interim Ground Water Quality Criteria of 30 ug/L.

In conclusion, the analytical results support the UST Case Status of "Case Closed" for soils. However, there is evidence of groundwater contamination in excess of NJDEP criteria (specifically 2-methylnaphthalene).

Recommendations (if any): Request NFA from NJDEP

Signed: _____

Kent A. Friesen, Parsons

ATTACHMENT CC, Enclosure 1

Report: *Underground Storage Tank Closure Report, Main Post – Building 490, Tilly Ave.*

U.S. Army Garrison
Fort Monmouth, New Jersey

Underground Storage Tank Closure Report

Main Post –Building 490
Tilly Ave.

NJDEP UST Registration No. 90010-58

August 2007

UNDERGROUND STORAGE TANK CLOSURE REPORT

MAIN POST –BUILDING 490
NJDEP UST REGISTRATION NO. 90010-58

AUGUST 2007

PREPARED FOR:

U.S. ARMY GARRISON, FORT MONMOUTH, NJ
DIRECTORATE OF PUBLIC WORKS
BUILDING 167
FORT MONMOUTH, NJ 07703

PREPARED BY:

TECOM-VINNELL SERVICES, INC.
P.O. BOX 60
FT. MONMOUTH, NJ 07703

TABLE OF CONTENTS

TABLE OF CONTENTS (CONTINUED)

EXECUTIVE SUMMARY

UST Closure

A single wall steel underground storage tank (UST) was closed by removal in accordance with the New Jersey Department of Environmental Protection (NJDEP) guidelines on May 25, 1990. The UST was located on the north side of Building 490 in the Main Post area of Fort Monmouth. UST No. 90010-58 was a 1,000-gallon No. 2 heating oil tank.

Site Assessment

This site assessment was performed by TVS personnel in accordance with the NJDEP *Technical Requirements for Site Remediation* (N.J.A.C. 7:26E) and the NJDEP *Field Sampling Procedures Manual.*

During the time of UST removal, no closure soil samples were collected. Soil sampling was not required at the time. However, in order to confirm that the tank did not leak, a subsurface investigation was conducted. On December 14, 2005, a Geoprobe was utilized to collect samples 490-A, 490-B, 490-C and 490-D-Duplicate from a total of three (3) locations along the tank centerline bottom. All samples were analyzed for total petroleum hydrocarbons (TPH). Groundwater was encountered at approximately 7.5 feet below surface grade in the borings and a sample of it was also collected.

Findings

The closure soil samples collected from the location associated with former UST No. 90010-58, contained TPH concentrations below the NJDEP health based criterion of 10,000 milligrams per kilogram (mg/kg) for total organic contaminants (N.J.A.C. 7:26E and revisions dated February 3, 1994). TPH concentrations of 8,762 mg/kg, 2,981 mg/kg, 4,523 mg/kg and 4,145 mg/kg were detected in samples 490-A, 490-B, 490-C and 490-D-Duplicate, respectively. A groundwater sample was analyzed for volatile organics and semi-volatile organics. This sample did not contain compounds that exceed the NJDEP Class II Ground Water Quality Criteria.

Conclusions and Recommendations

Based on the closure soil sampling results, soils with TPH concentrations exceeding the NJDEP health based criterion of 10,000 mg/kg for total organic contaminants are not present in the location of the former UST. Based on the closure groundwater sample there is no volatile organic or semi volatile organic contamination in the location of the former UST.

No Further Action is proposed in regard to the closure and site assessment of UST No. 90010-58 at Building 490.

1.0 UNDERGROUND STORAGE TANK CLOSURE SOIL SAMPLING ACTIVITIES

1.1 OVERVIEW

One underground storage tank (UST), New Jersey Department of Environmental Protection (NJDEP) Registration No. 90010-58, was closed at Building 490 of the Main Post at the U.S. Army Garrison, Fort Monmouth, New Jersey. Refer to site location map on Figure 1. This report presents the results of soil and groundwater sampling analysis to confirm that the tank did not leak. The UST was a 1,000-gallon, single-wall steel tank containing No. 2 heating oil for residential use.

The closure and removal of the UST was conducted on May 25, 1990.

This UST Closure Report has been prepared by TVS to assist the U.S. Army Garrison DPW in complying with the NJDEP - Underground Storage Tanks regulations. The applicable NJDEP regulations at the date of closure were the *Closure of Underground Storage Tank Systems* (N.J.A.C. 7:14B-9 et seq. December, 1987 and revisions dated April 20, 2003).

This report was prepared using information required by the *Technical Requirements for Site Remediation* (N.J.A.C. 7:26E) (*Technical Requirements*). Section 1 of this UST Closure Report provides a summary of the UST site. Section 2 of this report describes the site investigation activities. Conclusions and recommendations, including the results of the soil sampling investigation, are presented in Section 3 of this report.

1.2 SITE DESCRIPTION

Building 490, Tilly Ave., is located in the eastern portion (400 Area) of the Main Post of Fort Monmouth, as shown on Figure 1. UST No. 90010-58 was located on the north side of Building 490. Historical maps were used to determine the exact location of the former tank. A site location map is provided on Figure 2.

1.2.1 Geological/Hydrogeological Setting

The following is a description of the geological/hydrogeological setting of the 400 Area. Included is a description of the regional geology of the area surrounding Fort Monmouth as well as descriptions of the local geology and hydrogeology of the Main Post area.

Regional Geology

Monmouth County lies within the New Jersey Section of the Atlantic Coastal Plain physiographic province. The Main Post, Charles Wood and the Evans areas are located in what may be referred to as the Outer Coastal Plain subprovince, or the Outer Lowlands.

In general, New Jersey Coastal Plain formations consist of a seaward-dipping wedge of unconsolidated deposits of clay, silt, sand and gravel. These formations typically strike northeast-southwest with a dip ranging from 10 to 60 feet per mile and were deposited on Precambrian and lower Paleozoic rocks (Zapecza, 1989). These sediments, predominantly derived from deltaic, shallow marine, and continental shelf environments, date from Cretaceous through the Quaternary Periods. The mineralogy ranges from quartz to glauconite.

The formations record several major transgressive/regressive cycles and contain units which are generally thicker to the southeast and reflect a deeper water environment. Over 20 regional geologic units are present within the sediments of the Coastal Plain. Regressive, upward coarsening deposits are usually aquifers (e.g., Englishtown and Kirkwood Formations, and the Cohansey Sand) while the transgressive deposits act as confining units (e.g., the Merchantville, Marshalltown, and Navesink Formations). The individual thicknesses for these units vary greatly (i.e., from several feet to several hundred feet). The Coastal Plain deposits thicken to the southeast from the Fall Line to greater than 6,500 feet in Cape May County (Brown and Zapecza, 1990).

Local Geology

Based on the regional geologic map (Jablonski, 1968), the Cretaceous age Red Bank and Tinton Sands outcrop at the Main Post area. The Red Bank sand conformably overlies the Navesink Formation and dips to the southeast at 35 feet per mile. The upper member (Shrewsbury) of the Red Bank sand is a yellowish-gray to reddish brown clayey, medium- to coarse-grained sand that contains abundant rock fragments, minor mica and glauconite (Jablonski). The lower member (Sandy Hook) is a dark gray to black, medium-to-fine grained sand with abundant clay, mica, and glauconite.

The Tinton sand conformably overlies the Red Bank Sand and ranges from a clayey medium to very coarse grained feldspathic quartz and glauconite sand to a glauconitic coarse sand. The color varies from dark yellowish orange or light brown to moderate brown and from light olive to grayish olive. Glauconite may constitute 60 to 80 percent of the sand fraction in the upper part of the unit (Minard, 1969). The upper part of the Tinton is often highly oxidized and iron oxide encrusted (Minard).

Hydrogeology

The water table aquifer in the Main Post area is identified as part of the "composite confining units", or minor aquifers. The minor aquifers include the Navesink formation, Red Bank Sand, Tinton Sand, Hornerstown Sand, Vincentown Formation, Manasquan Formation, Shark River Formation, Piney Point Formation, and the basal clay of the Kirkwood Formation.

Based on records of wells drilled in the Main Post area, water is typically encountered at depths of 2 to 9 feet below ground surface (bgs). According to Jablonski, wells drilled in the Red Bank

and Tinton Sands may produce 2 to 25 gallons per minute (gpm). Some well owners have reported acidic water that requires treatment to remove iron.

Due to the proximity of the Atlantic Ocean to Fort Monmouth, shallow groundwater may be tidally influenced and may flow toward creeks and brooks as the tide goes out, and away from creeks and brooks as the tide comes in. However, an abundance of clay lenses and sand deposits were noted in borings installed throughout Fort Monmouth. Therefore the direction of shallow groundwater should be determined on a case by case basis.

Shallow groundwater is locally influenced within the Main Post area by the following factors:

- tidal influence (based on proximity to the Atlantic Ocean, rivers and tributaries)
- topography
- nature of the fill material within the Main Post area
- presence of clay and silt lenses in the natural overburden deposits
- local groundwater recharge areas (e.g., streams, lakes)

Due to the fluvial nature of the overburden deposits (e.g., sand and clay lenses), shallow groundwater flow direction is best determined on a case-by-case basis. This is consistent with lithologies observed in borings installed within the Main Post area, which primarily consisted of fine-to-medium grained sands, with occasional lenses or laminations of gravel silt and/or clay.

Building 490 is located approximately 800 feet north of Oceanport Creek, the nearest water body, which flows into the Shrewsbury River. Based on the Main Post topography, the groundwater flow in the area of the Building 490 is anticipated to be to the south.

1.3 HEALTH AND SAFETY

Work site health and safety hazards were minimized during all site investigation activities. All areas which posed a vapor hazard were monitored by a qualified individual utilizing a calibrated photo-ionizer detector : Thermo Instruments Organic Vapor Monitor (OVM) – Model #580-B. The individual ascertained if the area was properly vented to render the area safe, as defined by OSHA. All work areas were properly vented to insure that there were no contaminants present in the breathing zone above permissible exposure limits (PEL's).

2.0 SITE INVESTIGATION ACTIVITIES

2.1 OVERVIEW

The Site Investigation was managed and carried out by U.S. Army DPW personnel. All analyses were performed and reported by Fort Monmouth Environmental Testing Laboratory, a NJDEP-certified testing laboratory. All sampling was performed by a NJDEP Certified Subsurface Evaluator according to the methods described in the NJDEP Field Sampling Procedures Manual (1992). Sampling frequency and parameters analyzed complied with the NJDEP document *Technical Requirements for Site Remediation, 7:26E-3.9* (December 17, 2002 and revisions dated February 3, 2003) which was the applicable regulation at the date of the investigation. All records of the Site Investigation activities are maintained by the Fort Monmouth DPW Environmental Office.

The following Parties participated in Closure and Site Assessment Activities.

- Ft. Monmouth Directorate of Public Works-Environmental Division
  Contact Person: Joseph Fallon
  Phone Number: (732) 532-6223

- Subsurface Evaluator: Frank Accorsi
  Employer: TECOM-Vinnell Services, Inc. (TVS)
  Phone Number: (732) 532-5241
  NJDEP License No.: 0010042
  (TVS)NJDEP License No.: US252302

- Analytical Laboratory: Fort Monmouth Environmental Testing Laboratory
  Contact Person: Dan Wright
  Phone Number: (732) 532-4359
  NJDEP Laboratory Certification No.: 13461

2.2 FIELD SCREENING/MONITORING

Field screening of the soils was performed by a NJDEP certified Subsurface Evaluator using an OVM and visual observations to identify potentially contaminated material. During the field investigation, potentially contaminated soils were found.

2.3 SOIL SAMPLING

On December 14, 2005, closure soil samples 490-A, 490-B, 490-C and 490-D (Duplicate B) were collected from a total of three (3) locations along the tank centerline bottom of the former UST. Groundwater was encountered at approximately seven feet (7.0) below ground surface in the borings. All soil samples were analyzed for TPH. A soil sample site location map is provided on Figure 2.

The site assessment was performed by TVS personnel in accordance with the NJDEP *Technical Requirements for Site Remediation* and the NJDEP *Field Sampling Procedures Manual.* A summary of sampling activities including parameters analyzed is provided on Table 1. The closure soil samples were collected into laboratory prepared glassware using properly decontaminated stainless steel trowels. After collection, the samples were immediately placed on ice in a cooler and delivered to Fort Monmouth Environmental Testing Laboratory for analysis.

2.4 GROUNDWATER SAMPLING

On December 14, 2005, sample 490-Groundwater was collected from soil borehole 490-B to assess the groundwater quality in the location of the former tank. A temporary piezometer was installed in the borehole for sample collection. The sample was analyzed for volatile organic analysis (VOA) and semi-volatile organic analysis (SVOA).

3.0 CONCLUSIONS AND RECOMMENDATIONS

3.1 SOIL SAMPLING RESULTS

Closure soil samples were collected from a total of three locations on December 14, 2005 to evaluate soil conditions in the location of the former UST. All samples were analyzed for TPH. Contingient VOA analysis was conducted on the highest TPH sample (490A). The closure soil sample results were compared to the NJDEP health based criterion of 10,000 mg/kg for total organic contaminants (N.J.A.C. 7:26D and revisions dated February 3, 1994). A summary of the analytical results and comparison to the NJDEP soil cleanup criteria is provided on Table 2. The analytical data package, including associated quality control data, is provided in Appendix B.

Closure soil samples collected on December 14, 2005 from UST 90010-58 contained concentrations of TPH below the NJDEP health based criterion of 10,000 mg/kg for total organic contaminants. TPH concentrations of 8,762 mg/kg, 2,981 mg/kg, 4,523 mg/kg and 4,145 mg/kg were detected in samples 490-A, 490-B, 490-C and 490-D(Duplicate B), respectively. Sample 490-A was further analyzed for VOA in which ethylbenzene and total xylenes were detected at concentrations of 4.7 mg/kg and 3.0 mg/kg, respectively. These are below the NJDEP Residential Direct Contact Soil Cleanup Criteria of 1,000 mg/kg and 410 mg/kg, respectively.

3.2 GROUNDWATER SAMPLING RESULTS

One groundwater sample was collected via a temporary piezometer installed in soil borehole 490-B and was analyzed for VOA and SVOA. Sample 490-Groundwater contained several compounds, including some common laboratory contaminants, but all were below the NJDEP Class II Ground Water Quality Criteria. Refer to Table 4 and Appendix B for complete analytical details.

3.3 CONCLUSIONS AND RECOMMENDATIONS

The analytical results for all soil samples collected from the UST closure assessment at UST No. 90010-58 were below the NJDEP Residential Direct Contact Soil Cleanup Criteria. The analytical results for the groundwater sample are below the NJDEP Class II Ground Water Quality Criteria.

Based on the closure soil sampling results, soils with TPH concentrations exceeding the NJDEP health based criterion for total organic contaminants of 10,000 mg/kg are not present at the location of former UST No. 90010-58.

No Further Action is proposed in regard to the closure and site assessment of UST No. 90010-58 at Building 490.

This page intentionally left blank.

Attachment B
Boring Logs and Well Construction Details

This page intentionally left blank.

PARSONS

Page 1 of 1

Soil Boring Log

CLIENT: USACE
PROJECT NAME: FTMM - ECP
PROJECT LOCATION: FTMM Parcel
PROJECT NUMBER: 748810

GROUNDWATER OBSERVATIONS
WATER LEVEL: ~4'
DATE: 4/12/16
TIME:
MEAS. FROM:

INSPECTOR: CW
DRILLER: JOE BARNAK
WEATHER: 55°F RAIN/WIND
CONTRACTOR: East Coast Drilling, Inc. (ECDI)
RIG TYPE: Geoprobe(R) 7822DT
DATE/TIME START: 4/12/16 10:20
DATE/TIME FINISH: 4/12/16 10:35
WEIGHT OF HAMMER: N/A
DROP OF HAMMER: N/A
TYPE OF HAMMER: N/A

BORING/WELL ID: PAR-75-4858-01
LOCATION DESCRIPTION: Parcel
LOCATION PLAN: Oceanport, New Jersey

DEPTH (feet)	SAMPLE I.D.	BLOWS per 6"	ADV/ REC.	PID (ppm)	FIELD IDENTIFICATION OF MATERIAL	STRATA	COMMENTS
0			6/9	0	0-2" topsoil, grass		
					2-14" brn sm/mc SAND and gravel, trace brick		
1115 1	1.5-2				14-25" grey, wet, mf SAND little silt, trace clay, trace f gravel		
1120	2-2.5						
2							
3					25-40" grey/brn sat mc SAND little silt		
4					40-44" saturated, light grey/brn/grn mottled mf SAND, little silt		
5			60/60	0			
					0-60" SAA		
6							
7							
8							
9							
1125	9.5-10						
10							

Remarks:

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

PARSONS

Page 1 of 1

Soil Boring Log

CLIENT: USACE
PROJECT NAME: FTMM - ECP
PROJECT LOCATION: FTMM Parcel
PROJECT NUMBER: 748810

GROUNDWATER OBSERVATIONS
WATER LEVEL: ~2
DATE: 4/12/16
TIME:
MEAS. FROM: BGS

INSPECTOR: CW
DRILLER: JOE BARNAK
WEATHER: 55°F Hvy FAIN
CONTRACTOR: East Coast Drilling, Inc. (ECDI)
RIG TYPE: Geoprobe(R) 7822DT
DATE/TIME START: 4/12/16 0940
DATE/TIME FINISH: 4/12/16 0955
WEIGHT OF HAMMER: N/A
DROP OF HAMMER: N/A
TYPE OF HAMMER: N/A

BORING/WELL ID: PAF-79.440-SB-03
LOCATION DESCRIPTION: Parcel 79
LOCATION PLAN: Oceanport, New Jersey

DEPTH (feet)	SAMPLE I.D.	BLOWS per 6"	ADV/ REC.	PID (ppm)	FIELD IDENTIFICATION OF MATERIAL	STRATA	COMMENTS
0			60/53	0	0-6" Brown, wet, MC SAND, little silt		
				0			
1				0	6"-21" Brown, wet, M dense, f SAND, some silt, trace clay		▼
				0			
1025 2	2-2.5			0			
	2-2			0	21"-32" Brown, saturated, soft f SAND, some silt, some clay		
3				20.4			
1030	3.5-4			91.6			
4				0	32"-55" Brown, saturated, M dense MC SAND, little silt, staining 42-44"		odor
				0			
5			60/60	0	0-10" SAA		
					10-60" saturated, light grey/brown/ Brown, mottled mf SAND, little silt		
6							
7							
1035 8	7-8.5						
9							
10							

Remarks:

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

PARSONS Page 1 of 1

Soil Boring Log

CLIENT: USACE
PROJECT NAME: FTMM - ECP
PROJECT LOCATION: FTMM Parcel
PROJECT NUMBER: 748810

GROUNDWATER OBSERVATIONS
WATER LEVEL: ~3.5
DATE: 4/12/16
TIME: 1115
MEAS. FROM: BGS

INSPECTOR: GW
DRILLER: JOE BARNAK
WEATHER: 55° F RAIN
CONTRACTOR: East Coast Drilling, Inc. (ECDI)
RIG TYPE: Geoprobe(R) 7822DT
DATE/TIME START: 4/12/16 1050
DATE/TIME FINISH: 4/12/16 1110
WEIGHT OF HAMMER: N/A
DROP OF HAMMER: N/A
TYPE OF HAMMER: N/A

BORING/WELL ID: PAP-79-490-SB-03
LOCATION DESCRIPTION: Parcel 79
LOCATION PLAN: Oceanport, New Jersey

DEPTH (feet)	SAMPLE I.D.	BLOWS per 6"	ADV/ REC	PID (ppm)	FIELD IDENTIFICATION OF MATERIAL	STRATA	COMMENTS
0			6/60	0	0-3" Asphalt		
				0	3-10" Dark Brown, ME SAND, little silt, little f gravel		
1				0			
				0	10-38" grey, moist, dense, MF SAND, some silt		
1410 2	2-2.5			0			
				0			
3				0	38-56" grey, saturated, M stiff F SAND and silt, trace clay		▽
				0			
4				0			
				10.6	56-60" grey, saturated, M dense ME SAND, little silt		
5			60/60	77.6	0-15" SAA		odor
				51.8	15-60" saturated, light grey/brown/grey/ brown, mottled mf SAND, little silt		
1445 6	6-6.5			104			
				72.1			
7				13.0			
				0			
8				0			
				0			
9				0			
1450	9.5-10			0			
10							

Remarks:

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

PARSONS

Soil Boring Log

CLIENT: USACE
PROJECT NAME: FTMM - ECP
PROJECT LOCATION: FTMM Parcel
PROJECT NUMBER: 748810

GROUNDWATER OBSERVATIONS
WATER LEVEL: ~2
DATE: 4/12/16
TIME: 0915
MEAS. FROM: BGS

INSPECTOR: CW
DRILLER: JOE BARNAK
WEATHER: 55°F RAIN
CONTRACTOR: East Coast Drilling, Inc. (ECDI)
RIG TYPE: Geoprobe(R) 7822DT
DATE/TIME START: 4/12/16 0900
DATE/TIME FINISH: 4/12/16 0915
WEIGHT OF HAMMER: N/A
DROP OF HAMMER: N/A
TYPE OF HAMMER: N/A

BORING/WELL ID: PAR-79-490-SB-04
LOCATION DESCRIPTION: Parcel 79
LOCATION PLAN: Oceanport, New Jersey

DEPTH (feet)	SAMPLE I.D.	BLOWS per 6"	ADV/ REC.	PID (ppm)	FIELD IDENTIFICATION OF MATERIAL	STRATA	COMMENTS
0			60/60	0	0-15" Brown, wet, M. dense, MF SAND, some silt, trace f gravel		
				0			
1				0			
				6	15"-22" gray, wet, M. dense, f SAND, some silt, trace clay		odor
2	2-2.5			0			
				10.4	22"-38" Saturated, gray, soft, f SAND, some silt, some clay		
3				20.1			
	3.5-4			108.6	38"-60" Saturated, gray, MF SAND, little silt,		
4				20.6			
				0			
5			60/60	0	0-16" SAA, slight odor		
					16"-60" Saturated, light gray/orange/Brown Mottled f SAND, little silt		
6							
7							
8	8-8.5						
9							
	~~9.5-10~~						
10					END @ Bgs @ 10'		

Remarks:

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

LOW FLOW PURGE AND SAMPLING (LFPS) RECORD - GROUNDWATER

PARSONS | CLIENT: USACE | WELL #: 490MW01

PROJECT: Fort Monmouth ECP and UHOT Groundwater Sampling

AOC # (AREA): parcel 79

SCREENED INTERVAL (TOC): 7-22

WELL DIAMETER (in.): 2

WELL PERMIT #:

DATE: 5/26/16

SAMPLING PERSONNEL NAME: C. WATSON

SAMPLING PERSONNEL NAME:

BOREHOLE DIAMETER FACTORS

DIAMETER (INCHES):	1	1.5	2	3	4	5	6	7	8	9	10
GALLONS/FOOT:	0.041	0.092	0.163	0.367	0.654	1.02	1.47	2	2.61	3.3	5.87

WELL HEAD VOC CONCENTRATION (ppm): 0

WELL DEPTH (TOC): 22

FEET OF WATER IN WELL (ft): 17.04

FEET OF SATURATED SCREEN (ft): 15

DEPTH TO WATER BEFORE PUMP INSTALLATION (ft below TOC): 4.96

PUMP INTAKE DEPTH (ft below TOC): 9.5

PURGING AND SAMPLING

TIME	PURGING	SAMPLING	pH (pH units)		SPECIFIC CONDUCTIVITY (mS/cm)		REDOX POTENTIAL (mv)		DISSOLVED OXYGEN (mg/L)		TURBIDITY (NTU)		TEMPERATURE (degrees C)		PUMPING RATE (ml/min)	DEPTH TO WATER (ft below TOC)
			READING	CHANGE*	READING	CHANGE*	READING	CHANGE*	READING	CHANGE*	READING	CHANGE*	READING	CHANGE*		
1336	X		5.44	NA	0.728	NA	74.6	NA	4.25	NA	17.0	NA	21.97	NA	200	4.90
1335	X		5.38	0.006	0.734	0.006	80.6	6.0	2.67	1.58	19.6	2.6	18.69	3.28	200	5.01
1340	X		5.42	0.004	0.729	0.005	83.6	3.0	2.43	0.24	15.0	4.6	17.39	1.30	175	5.13
1345	X		5.43	0.001	0.729	0	82.9	0.7	1.95	0.48	16.2	1.2	18.70	1.31	175	5.13
1350	X		5.45	0.002	0.729	0	82.1	0.8	1.82	0.13	15.6	0.6	18.34	0.36	175	5.13
1355	X		5.45	0	0.725	0.004	83.6	1.5	1.75	0.07	14.9	0.7	19.08	0.74	175	5.13
1400	X		5.46	0.001	0.724	0.001	84.0	0.4	1.72	0.03	14.7	0.2	19.15	0.07	175	5.13
1405		X	5.46	0	0.725	0.001	84.2	0.2	1.68	0.04	14.5	0.2	19.20	0.05	175	5.13

*Indicator readings have stabilized when 3 consecutive readings are within: +/- 0.1 for pH; +/- 3% for Specific Conductivity and Temperature; +/- 10 mv for Redox Potential; and +/- 10% for Dissolved Oxygen and Turbidity

LOW FLOW PURGE AND SAMPLING (LFPS) RECORD - GROUNDWATER

PARSONS | CLIENT: USACE | WELL #: 450MW01-9.5

SAMPLING INFORMATION

SAMPLING DEVICE: QED Sample Pro

SAMPLE NAME (ID): 450MW01-9.5

SAMPLE PARAMETER	TIME	CONTAINER	COLOR	TURBIDITY	COMMENTS
VOCs	1405	(3) VOAs	clear	14.5	
SVOCs	1405	(2) 1L Amb	clear	14.5	

QA\QC SAMPLES:

DUPLICATE SAMPLE COLLECTED: YES or (NO)

DUPLICATE SAMPLE NAME (ID):

MS/MSD SAMPLE COLLECTED: YES or (NO)

MS / MSD SAMPLE NAME (ID):

PURGING AND SAMPLING COMMENTS:

INVESTIGATION DERIVED WASTE (IDW): GAC

Date:								
Volume Transfered to Drum:								
Drum Number:								

LOW FLOW PURGE AND SAMPLING (LFPS) RECORD - GROUNDWATER

PARSONS | CLIENT: USACE | WELL #: 490MW01

PROJECT: Fort Monmouth ECP and UHOT Groundwater Sampling | WELL PERMIT #:

AOC # (AREA): parcel 79 | DATE: 5/26/16

SCREENED INTERVAL (TOC): 7-22 | SAMPLING PERSONNEL NAME: C.Weston

WELL DIAMETER (in.): 2" | SAMPLING PERSONNEL NAME:

BOREHOLE DIAMETER FACTORS

DIAMETER (INCHES):	1	1.5	2	3	4	5	6	7	8	9	10
GALLONS/FOOT:	0.041	0.092	0.163	0.367	0.654	1.02	1.47	2	2.61	3.3	5.87

WELL HEAD VOC CONCENTRATION (ppm): 0

WELL DEPTH (TOC): 22

FEET OF WATER IN WELL (ft): 17.04

FEET OF SATURATED SCREEN (ft): 15

DEPTH TO WATER BEFORE PUMP INSTALLATION (ft below TOC): 4.96

PUMP INTAKE DEPTH (ft below TOC): 14.5

PURGING AND SAMPLING

TIME	PURGING	SAMPLING	pH (pH units) READING	pH CHANGE*	SPECIFIC CONDUCTIVITY (mS/cm) READING	SPECIFIC CONDUCTIVITY CHANGE*	REDOX POTENTIAL (mv) READING	REDOX POTENTIAL CHANGE*	DISSOLVED OXYGEN (mg/L) READING	DISSOLVED OXYGEN CHANGE*	TURBIDITY (NTU) READING	TURBIDITY CHANGE*	TEMPERATURE (degrees C) READING	TEMPERATURE CHANGE*	PUMPING RATE (ml/min)	DEPTH TO WATER (ft below TOC)
1425	X		5.41	NA	0.723	NA	95.9	NA	5.06	NA	15.2	NA	15.11	NA	175	5.13
1430	X		5.42	0.01	0.709	0.014	97.8	1.9	3.90	1.16	13.6	1.6	14.99	0.12	175	5.13
1435	X		5.43	0.01	0.706	0.003	98.6	0.8	3.76	0.14	12.9	0.7	14.94	0.05	175	5.13
1440	X		5.43	0	0.705	0.001	99.3	0.7	3.68	0.08	12.7	0.2	14.87	0.07	175	5.13
1445	X		5.43	0	0.705	0	102.6	2.3	3.61	0.07	13.1	0.4	14.84	0.03	175	5.13
1450			5.43	0	0.705	0	104.1	1.5	3.57	0.04	11.6	1.5	14.80	0.04	175	5.13

*Indicator readings have stabilized when 3 consecutive readings are within: +/- 0.1 for pH; +/- 3% for Specific Conductivity and Temperature; +/- 10 mv for Redox Potential; and +/- 10% for Dissolved Oxygen and Turbidity

LOW FLOW PURGE AND SAMPLING (LFPS) RECORD - GROUNDWATER

PARSONS	CLIENT: USACE	WELL #: 490MW01

SAMPLING INFORMATION

SAMPLING DEVICE: QED Sample Pro

SAMPLE NAME (ID): 490MW01-14.5

SAMPLE PARAMETER	TIME	CONTAINER	COLOR	TURBIDITY	COMMENTS
VOCs	1450	(3) VOA	Clear	10.8	
SVOCs	1450	(2) 1L Amb	clear	10.8	

QA\QC SAMPLES:

DUPLICATE SAMPLE COLLECTED: YES or (NO)

DUPLICATE SAMPLE NAME (ID):

MS/MSD SAMPLE COLLECTED: YES or (NO)

MS / MSD SAMPLE NAME (ID):

PURGING AND SAMPLING COMMENTS:

INVESTIGATION DERIVED WASTE (IDW):

Date:									
Volume Transfered to Drum:									
Drum Number:									

LOW FLOW PURGE AND SAMPLING (LFPS) RECORD - GROUNDWATER

PARSONS | CLIENT: USACE | WELL #: 490MW01 ~~497~~

PROJECT: Fort Monmouth ECP and UHOT Groundwator Sampling

AOC # (AREA): Area 79

SCREENED INTERVAL (TOC): 7-22

WELL DIAMETER (in.): 2"

WELL PERMIT #:

DATE: 5/25/16

SAMPLING PERSONNEL NAME: C. Watson

SAMPLING PERSONNEL NAME:

BOREHOLE DIAMETER FACTORS

DIAMETER (INCHES):	1	1.5	2	3	4	5	6	7	8	9	10
GALLONS/FOOT:	0.041	0.092	0.163	0.367	0.654	1.02	1.47	2	2.61	3.3	5.87

WELL HEAD VOC CONCENTRATION (ppm): 0

WELL DEPTH (TOC): 22

FEET OF WATER IN WELL (ft): 17.04

FEET OF SATURATED SCREEN (ft): 15

DEPTH TO WATER BEFORE PUMP INSTALLATION (ft below TOC): 4.96

PUMP INTAKE DEPTH (ft below TOC): 19.5

PURGING AND SAMPLING

TIME	PURGING	SAMPLING	pH (pH units) READING	pH CHANGE*	SPECIFIC CONDUCTIVITY (mS/cm) READING	SPECIFIC CONDUCTIVITY CHANGE*	REDOX POTENTIAL (mv) READING	REDOX POTENTIAL CHANGE*	DISSOLVED OXYGEN (mg/L) READING	DISSOLVED OXYGEN CHANGE*	TURBIDITY (NTU) READING	TURBIDITY CHANGE*	TEMPERATURE (degrees C) READING	TEMPERATURE CHANGE*	PUMPING RATE (ml/min)	DEPTH TO WATER (ft below TOC)
1520	X		5.43	NA	0.710	NA	106.7	NA	5.16	NA	10.6	NA	14.75	NA	175	5.06
1525	X		5.44	0.01	0.722	0.012	105.8	0.9	4.83	0.17	11.2	0.6	14.70	0.05	175	5.08
1530	X		5.44	0	0.725	0.003	104.6	1.2	0.63	0.20	11.8	0.6	14.62	0.08	175	5.09
1535	X		5.45	0.01	0.726	0.001	104.1	0.5	4.39	0.24	9.86	1.94	14.63	0.01	175	5.09
1540	X		5.45	0	0.726	0	103.8	0.3	4.27	0.12	9.10	0.76	14.66	0.03	175	5.10
1545		X	5.45	0	0.727	0.001	103.4	0.4	4.10	0.17	8.82	0.28	14.61	0.01	175	5.10

*Indicator readings have stabilized when 3 consecutive readings are within: +/- 0.1 for pH; +/- 3% for Specific Conductivity and Temperature; +/- 10 mv for Redox Potential; and +/- 10% for Dissolved Oxygen and Turbidity.

LOW FLOW PURGE AND SAMPLING (LFPS) RECORD - GROUNDWATER

PARSONS	CLIENT: USACE	WELL #: 450mW01

SAMPLING INFORMATION

SAMPLING DEVICE: QED Sample Pro

SAMPLE NAME (ID): 450MW01-195

SAMPLE PARAMETER	TIME	CONTAINER	COLOR	TURBIDITY	COMMENTS
VOCs	1545	(3) VOA	Clear	8.82	
SVOCs	1545	(2) 1L Amber	Clear	8.82	

QA\QC SAMPLES:

DUPLICATE SAMPLE COLLECTED: YES or (NO)

DUPLICATE SAMPLE NAME (ID):

MS/MSD SAMPLE COLLECTED: YES or (NO)

MS / MSD SAMPLE NAME (ID):

PURGING AND SAMPLING COMMENTS:

INVESTIGATION DERIVED WASTE (IDW): GAC

Date:									
Volume Transfered to Drum:									
Drum Number:									

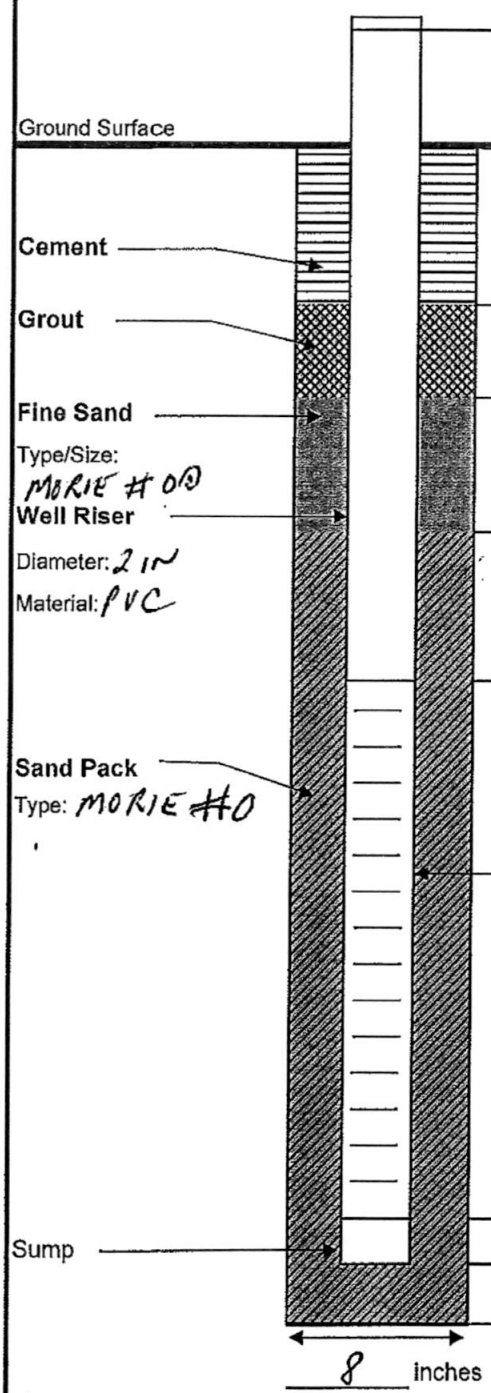
PARSONS

Well Construction Detail (Single Cased - Stickup)

Client: USACE

Well ID: PAR-79-490-MW-02 NJBWA Permit No.

Date Well Installed: 12-18-17 Location: FTMM, PARCEL 79, UST 490



	Depth Below Ground Surface (ft)
Top of Well Casing: + 3.0 ft	
Ground Surface	0.0
Top of Grout	0.5
Top of Fine Sand	1.0
Top of Sand Pack	2.0
Top of Screen	2.0
Well Screen Diameter: 2 IN Slot Size: .010 SN. Material: PVC	
Bottom of Screen	12.0
Bottom of Sump	
Bottom of Borehole	

Top of Confining Unit (if present): _____

PARSONS

Soil Boring Log

CLIENT: USACE
PROJECT NAME: FTMM - ECP
PROJECT LOCATION: ~~FTMM~~ Parcel 79-UST 490
PROJECT NUMBER: 748810-

GROUNDWATER OBSERVATIONS
WATER LEVEL: 2.7' @ 490MW01
DATE: 12-17-18
TIME:
MEAS. FROM:

INSPECTOR: F. ACLORS I
DRILLER: K. ATWOOD, T. MCNALLY
WEATHER: 45, SUNNY
CONTRACTOR: East Coast Drilling, Inc. (ECDI)
RIG TYPE: Geoprobe(R) 7822DT
DATE/TIME START: 12-18-17 1510
DATE/TIME FINISH: 12-18-17 1510
WEIGHT OF HAMMER: N/A
DROP OF HAMMER: N/A
TYPE OF HAMMER: N/A

BORING/WELL ID: PAR-79-490-MW-02
LOCATION DESCRIPTION:
LOCATION PLAN: Oceanport, New Jersey

DEPTH (feet)	SAMPLE I.D.	BLOWS per 6"	ADV/ REC.	PID (ppm)	FIELD IDENTIFICATION OF MATERIAL	STRATA	COMMENTS
0					HOLLOW STEM AUGER TO 13 FT. SET SCREEN FROM 2 FT TO 12 FT. SOILS: MOIST, GREEN TO GREEN BROWN SANDY SILTY CLAY PID READING FROM SOIL CUTTINGS: 0 PPM TO 135 PPM PETROLEUM ODORS		WET @ 3'
1							
2							
3							
4							
5					END OF BORING @ 13 FT. SEE WELL CONSTRUCTION DETAIL		
6							
7							
8							
9							
10							

Remarks:

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

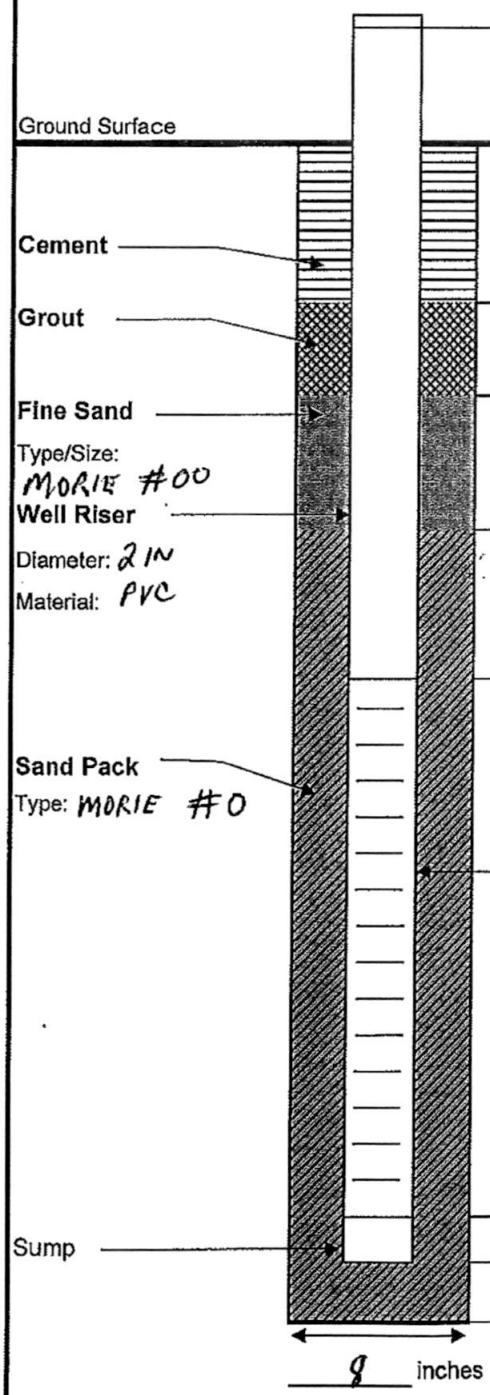
PARSONS

Well Construction Detail (Single Cased - Stickup)

Client: USACE

Well ID: PAR-79-490-MW-03 NJBWA Permit No.

Date Well Installed: 12-18-17 Location: FTMM, PARCEL 79, UST 490



	Depth Below Ground Surface (ft)
Top of Well Casing: +3.0 ft	
Ground Surface	0.0
Top of Grout	0.3
Top of Fine Sand	1.0
Top of Sand Pack	2.0
Top of Screen	2.0
Well Screen Diameter: 2 IN Slot Size: .010 IN Material: PVC	
Bottom of Screen	12.0
Bottom of Sump	12.5
Bottom of Borehole	13.0

Top of Confining Unit (if present): _____

PARSONS

Soil Boring Log

CLIENT: USACE
PROJECT NAME: FTMM - ECP
PROJECT LOCATION: ~~FTMM~~ Parcel 79 - UST 490
PROJECT NUMBER: 748810-

GROUNDWATER OBSERVATIONS
WATER LEVEL: 2.7'-490 MW-01
DATE: 12-18-17
TIME:
MEAS. FROM:

INSPECTOR: E. ACCORSI
DRILLER: K. ATWOOD, T. MCNALLY
WEATHER: 45° PT. SUNNY
CONTRACTOR: East Coast Drilling, Inc. (ECDI)
RIG TYPE: Geoprobe(R) 7822DT
DATE/TIME START: 12-18-17 1210
DATE/TIME FINISH: 12-18-17 ~~1300~~ 1400
WEIGHT OF HAMMER: N/A
DROP OF HAMMER: N/A
TYPE OF HAMMER: N/A

BORING/WELL ID: PAR-79-490-MW-03
LOCATION DESCRIPTION

LOCATION PLAN
Oceanport, New Jersey

DEPTH (feet)	SAMPLE I.D.	BLOWS per 6"	ADV/ REC.	PID (ppm)	FIELD IDENTIFICATION OF MATERIAL	STRATA	COMMENTS
0					HOLLOW STEM AUGER TO 13FT. SET SCREEN FROM 2' TO 12'		
1					YELLOW BROWN - MOIST, GREEN BROWN SILTY SANDY CLAY		WET @ 3'
2					PID READING FROM SOIL CUTTINGS 0 PPM TO 3.8 PPM		
3							
4							
5					END OF BORING @ 13 FT. SEE WELL CONSTRUCTION DETAIL		
6							
7							
8							
9							
10							

Remarks:

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

Soil Boring Log

CLIENT: USACE
PROJECT NAME: FTMM - ECP
PROJECT LOCATION: FTMM Parcel 79-490
PROJECT NUMBER: 746810-

GROUNDWATER OBSERVATIONS
WATER LEVEL: ≈ 3FT
DATE:
TIME:
MEAS. FROM:

INSPECTOR: F. ACCORSI
DRILLER: J. BARNAK
WEATHER: 60's, sunny
CONTRACTOR: East Coast Drilling, Inc. (ECDI)
RIG TYPE: Geoprobe(R) 7822DT
DATE/TIME START: 11-3-17 1440
DATE/TIME FINISH: 11-3-17 1500
WEIGHT OF HAMMER: N/A
DROP OF HAMMER: N/A
TYPE OF HAMMER: N/A

BORING/WELL ID: PAR-79-490-SCREEN 1
LOCATION DESCRIPTION:
LOCATION PLAN: Oceanport, New Jersey

DEPTH (feet)	SAMPLE I.D.	BLOWS per 6"	ADV/ REC.	PID (ppm)	FIELD IDENTIFICATION OF MATERIAL	STRATA	COMMENTS
0			60/50	0	0"-4" ASPHALT 4"-8" SUB-BASE GRAVEL 8"-20" moist, blk, cmf SAND, l. silt, l. f gravel	SW	COAL FRAGMENTS
				0			
1				0			
				0	20"-40" wet, grn, silty CLAY	CH	BRICK
2				0			
				0			
3				0	40"-50" wet, yel brn f. SAND and silt	SM	WET @ 3FT.
				0			
4							
5			60/60	0	50"-60" (SAME AS ABOVE)		
				0			
6				0			
				0			
7				0			
				0			
8				0			
				0			
9				0			
				0			
10					TOTAL DEPTH 10 FT. END OF BORING		

Remarks:

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

PARSONS

Soil Boring Log

CLIENT: USACE
PROJECT NAME: FTMM - ECP
PROJECT LOCATION: FTMM Parcel 79-490
PROJECT NUMBER: 748810-

GROUNDWATER OBSERVATIONS
WATER LEVEL: ~3 FT
DATE:
TIME:
MEAS. FROM:

INSPECTOR: F. ACCORSI
DRILLER: J. BARNEK
WEATHER: SUNNY, 60's
CONTRACTOR: East Coast Drilling, Inc. (ECDI)
RIG TYPE: Geoprobe(R) 7822DT
DATE/TIME START: 11-3-17 1440
DATE/TIME FINISH: 11-3-17 1515
WEIGHT OF HAMMER: N/A
DROP OF HAMMER: N/A
TYPE OF HAMMER: N/A

BORING/WELL ID: PAR-79-490-SCREEN 2
LOCATION DESCRIPTION:
LOCATION PLAN: Oceanport, New Jersey

DEPTH (feet)	SAMPLE I.D.	BLOWS per 6"	ADV/ REC.	PID (ppm)	FIELD IDENTIFICATION OF MATERIAL	STRATA	COMMENTS
0			60/60	0	0-36" moist, brn, cmf SAND, some cmf Gravel, l. silt	SW	
				43			
1				13.6			
				170			STRONG
2				302			
				57			PETROLEUM
3				505	36"-60" wet, brn-grnbrn mfSAND, some clayey silt	SM	ODORS
				452			
4				32			
5			60/60	302	0-60" wet, brn-or.brn f SAND, and silt	SM	
				144			
6				5			
				5			
7				2			
				2			
8				0.7			
				0			
9				0			
				0			
10					TOTAL DEPTH 10 FT. - END OF BORING		

Remarks:

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

Soil Boring Log

CLIENT: USACE
PROJECT NAME: FTMM - ECP
PROJECT LOCATION: FTMM Parcel
PROJECT NUMBER: 748810-

GROUNDWATER OBSERVATIONS
WATER LEVEL:
DATE:
TIME:
MEAS. FROM:

INSPECTOR: TOM NORD
DRILLER: ECDI WELLS REEVE
WEATHER: CLEAR, 55° F
CONTRACTOR: East Coast Drilling, Inc. (ECDI)
RIG TYPE: Geoprobe(R) 7822DT
DATE/TIME START: 11-21-17 / 1000
DATE/TIME FINISH: 11-21-17 / 1015
WEIGHT OF HAMMER: N/A
DROP OF HAMMER: N/A
TYPE OF HAMMER: N/A

BORING/WELL ID: PAR-79-490-SCREEN-03
LOCATION DESCRIPTION: GRASSY AREA
LOCATION PLAN: Oceanport, New Jersey

DEPTH (feet)	SAMPLE I.D.	BLOWS per 6"	ADV/ REC.	PID (ppm)	FIELD IDENTIFICATION OF MATERIAL	STRATA	COMMENTS
0			48/60	0.0	DRY DK-BROWN MOD DENSE SILTY SAND, LITTLE GRASS / ROOTS		
				0.0			
1				0.5	DRY LT-GRAY-BROWN V STIFF SANDY SILT.		
				0.5			
2				0.5			
				0.0	MOIST V-STIFF LT GRAY-BROWN-OLIVE SILT, LITTLE SAND, LITTLE CLAY		
3				0.0			
				0.0	MOIST REDDISH-ORANGE BROWN DENSE SAND, OR SILT.		
4				[illegible]	NO RECOVERY		
				[illegible]			
5			48/60	0.1	WET, REDDISH-ORANGE TAN V SOFT SANDY SILT OR CLAY		
				0.1			
6				0.1			
				0.2			
7				0.0	WET, MOD DENSE REDDISH-ORANGE TAN-GRAY SILTY SAND		
				0.0			
8				0.0			
				0.0			
9				0.0	NO RECOVERY		
				0.0			
10							

Remarks:

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

Soil Boring Log

CLIENT: USACE
PROJECT NAME: FTMM
PROJECT LOCATION:
PROJECT NUMBER: 746810-

GROUNDWATER OBSERVATIONS
WATER LEVEL:
DATE:
TIME:
MEAS. FROM:

INSPECTOR:
DRILLER:
WEATHER:
CONTRACTOR: Cascade
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

BORING/WELL ID: PSC-79-490-SCREEN-03
LOCATION DESCRIPTION: GRASSY AREA
LOCATION PLAN: Oceanport, New Jersey

DEPTH (feet)	SAMPLE I.D.	BLOWS per 6"	ADV/ REC.	PID (ppm)	FIELD IDENTIFICATION OF MATERIAL	STRATA	COMMENTS
0			24/24	0.0	WET V. LOOSE REDDISH - TAN SILTY SAND		
				0.0			
1				0.0	WET MOTTLED REDDISH - TAN AND DK GRAY - BLACK DENSE SILTY SAND		
				0.0			
2					end of boring		
3							
4							
5							
6							
7							
8							
9							
0							

Remarks:

Sample Types	Consistency vs. Blowcount / Foot				
S – Split-Spoon	Granular (Sand & Gravel)		Fine Grained (Silt & Clay)		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

PARSONS

Soil Boring Log

CLIENT: USACE
PROJECT NAME: FTMM - ECP
PROJECT LOCATION: FTMM Parcel
PROJECT NUMBER: 748610-

GROUNDWATER OBSERVATIONS
WATER LEVEL: ~3
DATE: 8/4/16
TIME: 1050
MEAS. FROM: BGS

INSPECTOR: C. Watson
DRILLER: J. BARNAK
WEATHER: 80°F Clear
CONTRACTOR: East Coast Drilling, Inc. (ECDI)
RIG TYPE: Geoprobe(R) 7822DT
DATE/TIME START: 1030 8/4/16
DATE/TIME FINISH: 1045 8/4/16
WEIGHT OF HAMMER: N/A
DROP OF HAMMER: N/A
TYPE OF HAMMER: N/A

BORING/WELL ID: PAR-79-490-TMW01
LOCATION DESCRIPTION: Parcel 79-490
LOCATION PLAN: Oceanport, New Jersey

DEPTH (feet)	SAMPLE I.D.	BLOWS per 6"	ADV/ REC.	PID (ppm)	FIELD IDENTIFICATION OF MATERIAL	STRATA	COMMENTS
0			60/60	0	0-3" Topsoil/grass		
				0	3"-6" Moist, orange, m. dense mf SAND, trace silt		
1				0			
				0.2	6"-18" Moist, Dark Brown and and asphalt millings		
2				0			
					18"-32" moist, grey, m. stiff clay and f SAND		
3							
4					32"-42" Saturated, grey/orange, MC SAND, trace silt.		
5			60/60	0	0-60" Saturated, orange and grey mottled f SAND, trace silt		
6							
7							
8							
9							
10							

Remarks:

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

PARSONS Page 1 of 1

Soil Boring Log

CLIENT: USACE
PROJECT NAME: FTMM - ECP
PROJECT LOCATION: FTMM Parcel
PROJECT NUMBER: 748810-

GROUNDWATER OBSERVATIONS
WATER LEVEL:
DATE: 8/4/16
TIME: 1155
MEAS. FROM:

INSPECTOR: C-Watson
DRILLER: J. BARNAK
WEATHER: 80°F Clear
CONTRACTOR: East Coast Drilling, Inc. (ECDI)
RIG TYPE: Geoprobe(R) 7822DT
DATE/TIME START: 8/4/16 1140
DATE/TIME FINISH: 8/4/16 1150
WEIGHT OF HAMMER: N/A
DROP OF HAMMER: N/A
TYPE OF HAMMER: N/A

BORING/WELL ID: PAR-79-490-TMW02
LOCATION DESCRIPTION: Parcel 79, 490
LOCATION PLAN: Oceanport, New Jersey

DEPTH (feet)	SAMPLE I.D.	BLOWS per 6"	ADV/ REC	PID (ppm)	FIELD IDENTIFICATION OF MATERIAL	STRATA	COMMENTS
0			60/45	0	0 - 13" Moist, Brown, M. Dense, M. F SAND, some silt		
1					13" - 30" Wet, light brown/ orange, Soft clay, some f SAND		
2							
3					30" - 45" Saturated, M. Dense orange/grey, MC SAND, little silt, little f gravel		
				4.7			
4				NR			
				NR			
5			60/60	1.6	0 - 10" SAA		
				0	10 - 60" Saturated, orange/light grey, mottled f SAND, trace silt		
6							
7							
8							
9							
10							

Remarks:

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

PARSONS

Soil Boring Log

CLIENT: USACE
PROJECT NAME: FTMM - ECP
PROJECT LOCATION: FTMM Parcel
PROJECT NUMBER: 748810-

GROUNDWATER OBSERVATIONS
WATER LEVEL: ~5
DATE: 8/4/16
TIME: 1125
MEAS. FROM:

INSPECTOR: C. Watson
DRILLER: J. BARNAK
WEATHER: 80°F Clear
CONTRACTOR: East Coast Drilling, Inc. (ECDI)
RIG TYPE: Geoprobe(R) 7822DT
DATE/TIME START: 1115
DATE/TIME FINISH: 1125
WEIGHT OF HAMMER: N/A
DROP OF HAMMER: N/A
TYPE OF HAMMER: N/A

BORING/WELL ID: PAR-FTMM-490-TMW3
LOCATION DESCRIPTION:
LOCATION PLAN: Oceanport, New Jersey

DEPTH (feet)	SAMPLE I.D.	BLOWS per 6"	ADV/ REC	PID (ppm)	FIELD IDENTIFICATION OF MATERIAL	STRATA	COMMENTS
0			60/60	0	0-12" Asphalt millings + mf Brown sand		
				0			
1				0	12"-35" Dark gray, moist, stiff f SAND, some clay, little silt		
				0			
2				0			
				0	35"-60" Moist, gray, soft Clay, little f SAND saturated @ 58"		
3				1.1			
				0			
4				2.0			
				10.8			
5			60/60	13.6	5-12" SAA, saturated		
				33.5	12-23" ~~Saturated~~ Saturated, gray, MC SAND, trace silt		
6				14.9			
				0			
7					23"-60" Saturated, orange and gray, mottled f SAND, trace clay.		
8							
9							
10							

Remarks:

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

PARSONS

Soil Boring Log

CLIENT: USACE
PROJECT NAME: FTMM - ECP
PROJECT LOCATION: FTMM (Parcel) 79-490
PROJECT NUMBER: 748610-

INSPECTOR: F. ACCORSI
DRILLER: J. BARNEK
WEATHER: SUNNY, 60's
CONTRACTOR: East Coast Drilling, Inc. (ECDI)
RIG TYPE: Geoprobe(R) 7822DT
DATE/TIME START: 11-3-17 0915
DATE/TIME FINISH: 11-3-17 1100
WEIGHT OF HAMMER: N/A
DROP OF HAMMER: N/A
TYPE OF HAMMER: N/A

BORING/WELL ID: PAR-79-490-TMW04
LOCATION DESCRIPTION:
LOCATION PLAN: Oceanport, New Jersey

GROUNDWATER OBSERVATIONS
WATER LEVEL: ≈3 FT.
DATE:
TIME:
MEAS. FROM:

DEPTH (feet)	SAMPLE I.D.	BLOWS per 6"	ADV/ REC.	PID (ppm)	FIELD IDENTIFICATION OF MATERIAL	STRATA	COMMENTS
0			60/50	0	0-9" ASPHALT		
				0	9"-18" moist, cm f SAND, and cm f Gravel, l. silt	SW	COAL PIECES (LAYER) UNDER ASPHALT
1				0			
				0	18"-50" moist, gray-gray, m f SAND, some silty Clay, l. f. Gravel	SC	
2				0			
				0			
3				0			3.5' wet @ 3.5'
				0			
4							
5			60/54	0	0-54" wet, or.brn-gray f. SAND, and Silt		
				0		SM	
6				0			
				0			
7				0			
				0			
8	PAR-79-490-TMW-04-08			0			
				0			
9				0			
10							

Remarks:

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

Soil Boring Log

CLIENT: USACE
PROJECT NAME: FTMM
PROJECT LOCATION:
PROJECT NUMBER: 748810-

GROUNDWATER OBSERVATIONS
WATER LEVEL:
DATE:
TIME:
MEAS. FROM:

INSPECTOR: F. ACCORSI
DRILLER:
WEATHER:
CONTRACTOR: Cascade
RIG TYPE: Geoprobe(R) 7822DT
DATE/TIME START: 11-3-17 0900
DATE/TIME FINISH: 11-3-17 1100
WEIGHT OF HAMMER: N/A
DROP OF HAMMER: N/A
TYPE OF HAMMER: N/A

BORING/WELL ID: PAR-79-490-TMW-04
LOCATION DESCRIPTION:
LOCATION PLAN: Oceanport, New Jersey

DEPTH (feet)	SAMPLE I.D.	BLOWS per 6"	ADV/ REC.	PID (ppm)	FIELD IDENTIFICATION OF MATERIAL	STRATA	COMMENTS
0			60/60	0	0-16" (SAME)		
				0			
1				0	16"-60" wet, blk, f. SAND, and silt	SM	
				0			
2				0			
				0			
3				0			
				0			
4				0			
				0			
5					TOTAL DEPTH OF BORING 15 FT.		
6							
7							
8							
9							
0							

Remarks:
TMW (10 FT, SCREEN) SET FROM 2 FT TO 12 FT

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

Soil Boring Log

CLIENT: USACE
PROJECT NAME: FTMM - ECP
PROJECT LOCATION: FTMM Parcel 79
PROJECT NUMBER: 748810-

GROUNDWATER OBSERVATIONS
WATER LEVEL: ≈ 3 FT
DATE:
TIME:
MEAS. FROM:

INSPECTOR: F. ACCORSI
DRILLER: J. BARNEK
WEATHER: SUNNY, 60's
CONTRACTOR: East Coast Drilling, Inc. (ECDI)
RIG TYPE: Geoprobe(R) 7822DT
DATE/TIME START: 11-3-17 1000
DATE/TIME FINISH: 11-3-17 1120
WEIGHT OF HAMMER: N/A
DROP OF HAMMER: N/A
TYPE OF HAMMER: N/A

BORING/WELL ID: PAR-79-490-TMW-05
LOCATION DESCRIPTION:
LOCATION PLAN: Oceanport, New Jersey

DEPTH (feet)	SAMPLE I.D.	BLOWS per 6"	ADV/ REC.	PID (ppm)	FIELD IDENTIFICATION OF MATERIAL	STRATA	COMMENTS
0			60/48	0	0-4" ASPHALT		
				0	4"-18" moist, brn cmf SAND, and Mf Gravel	SW	
1				0	18"-32" moist, blk ~~Clayey~~ SILTY CLAY		
				0			
2				0			
				17	32"-48" wet, grngray silty CLAY	CH	WET @ 3 FT, STRONG PETROLEUM ODORS
3				33			
				35			
4							
5			60/60	0	0- wet, brown - org. brn f. SAND, some silt, mottled	SP	
				0			
6				0			
				0			
7				0			
				0			
8	PAR-79-490-TMW-05-08			0			
				0			
9				0			
				0			
10							

Remarks:

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

Soil Boring Log

CLIENT: USACE
PROJECT NAME: ~~FIMW~~ PARCEL 79-490
PROJECT LOCATION:
PROJECT NUMBER: 748810-

GROUNDWATER OBSERVATIONS
WATER LEVEL:
DATE:
TIME:
MEAS. FROM:

INSPECTOR: F. ACCORSI
DRILLER:
WEATHER:
CONTRACTOR: Cascade
RIG TYPE: Geoprobe(R) 7822DT
DATE/TIME START: 11-3-17
DATE/TIME FINISH: 11-3-17
WEIGHT OF HAMMER: N/A
DROP OF HAMMER: N/A
TYPE OF HAMMER: N/A

BORING/WELL ID: PAR-79-490-TMW-05
LOCATION DESCRIPTION
LOCATION PLAN
Oceanport, New Jersey

DEPTH (feet)	SAMPLE I.D.	BLOWS per 6"	ADV/ REC.	PID (ppm)	FIELD IDENTIFICATION OF MATERIAL	STRATA	COMMENTS
10			24/24	0	0-24" (SAME)		
				0			
11				0			
				0			
12					TOTAL DEPTH 12 FT. END OF BORING		
13							
14							
15							
16							
17							
18							
19							
20							

Remarks:
TMW (10 FT. SCREEN) SET FROM 2' TO 12'

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

Soil Boring Log

CLIENT: USACE
PROJECT NAME: FTMM - ECP
PROJECT LOCATION: FTMM (Parcel) 79-490
PROJECT NUMBER: 748810-

GROUNDWATER OBSERVATIONS
WATER LEVEL: ≈ 3 FT.
DATE:
TIME:
MEAS. FROM:

INSPECTOR: F. ACCORSI
DRILLER: J. BARNEK
WEATHER: SUNNY, 60's
CONTRACTOR: East Coast Drilling, Inc. (ECDI)
RIG TYPE: Geoprobe(R) 7822DT
DATE/TIME START: 11-3-17 1100
DATE/TIME FINISH: 11-3-17 1210
WEIGHT OF HAMMER: N/A
DROP OF HAMMER: N/A
TYPE OF HAMMER: N/A

BORING/WELL ID: PAR-79-490-TMW-06
LOCATION DESCRIPTION:

LOCATION PLAN
Oceanport, New Jersey

DEPTH (feet)	SAMPLE I.D.	BLOWS per 6"	ADV/ REC.	PID (ppm)	FIELD IDENTIFICATION OF MATERIAL	STRATA	COMMENTS
0			60/54	0	0-2" CONCRETE		
				0	2"-18" Moist, brn, cvr f SAND, some clayey silt	SM	
1				0	18"-36" moist, gray silty CLAY	CH	
				0			
2				0			
				0			
3				0	36"-54" wet, brn-or.brn f. SAND, and clayey silt	SM	WET @ 3FT.
				0			
4				0			
5			60/60	0	0-60" (SAME AS ABOVE)		
				0			
6				0			
				0			
7				0			
				0			
8	PAR-79-490-TMW-06-08			0			
				0			
9				0			
				0			
10							

Remarks:

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

Soil Boring Log

CLIENT: USACE
PROJECT NAME: ~~FTMM~~ PARCEL 79-490
PROJECT LOCATION:
PROJECT NUMBER: 748810-

GROUNDWATER OBSERVATIONS
WATER LEVEL:
DATE:
TIME:
MEAS. FROM:

INSPECTOR: F. ACCORSI
DRILLER:
WEATHER:
CONTRACTOR: Cascade
RIG TYPE: Geoprobe(R) 7822DT
DATE/TIME START: 11-3-17
DATE/TIME FINISH: 11-3-17
WEIGHT OF HAMMER: N/A
DROP OF HAMMER: N/A
TYPE OF HAMMER: N/A

BORING/WELL ID: PAR-79-490-TMW-06
LOCATION DESCRIPTION
LOCATION PLAN
Oceanport, New Jersey

DEPTH (feet)	SAMPLE I.D.	BLOWS per 6"	ADV/ REC.	PID (ppm)	FIELD IDENTIFICATION OF MATERIAL	STRATA	COMMENTS
0					SAME		
1							
2					TOTAL DEPTH 12 FT.		
3							
4							
5							
6							
7							
8							
9							
10							

Remarks:
TMW (10 FT. SCREEN) SET FROM 2 FT. TO 12 FT.

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

Soil Boring Log

CLIENT: USACE
PROJECT NAME: FTMM - ECP
PROJECT LOCATION: FTMM Parcel 79-490
PROJECT NUMBER: 748810-

GROUNDWATER OBSERVATIONS
WATER LEVEL: ≈3 FT
DATE:
TIME:
MEAS. FROM:

INSPECTOR: F. ACCORSI
DRILLER: J. BARNEK
WEATHER: SUNNY, 60's
CONTRACTOR: East Coast Drilling, Inc. (ECDI)
RIG TYPE: Geoprobe(R) 7822DT
DATE/TIME START: 11-3-17 1400
DATE/TIME FINISH: 11-3-17 1490
WEIGHT OF HAMMER: N/A
DROP OF HAMMER: N/A
TYPE OF HAMMER: N/A

BORING/WELL ID: PAR-79-490-TMW-07
LOCATION DESCRIPTION:
LOCATION PLAN: Oceanport, New Jersey

DEPTH (feet)	SAMPLE I.D.	BLOWS per 6"	ADV/ REC.	PID (ppm)	FIELD IDENTIFICATION OF MATERIAL	STRATA	COMMENTS
0			60/42	0	0-4" ASPHALT		
				0	4"-12" moist, blk, cmf SAND	SW	COAL FRAGMENTS
1				0	12"-18" moist, brn cmf GRAVEL, and cmf SAND		
				0	18"-24" moist, cmf SAND, some clayey Silt		
2				0	24"-42" wet, yelbrn-brn, f SAND, and Silt	SM	WET @ 3 FT
				0			
3				0			
				0			
4							
5			60/50	0	0-50" wet, f SAND and silt, mottled		
				0		SM	
6				0			
				0			
7				0			
	PAR-79-490-TMW-07-08			0			
8				0			
				0			
9							
10							

Remarks:

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

Soil Boring Log

CLIENT: USACE
PROJECT NAME: FTMM
PROJECT LOCATION:
PROJECT NUMBER: 748810-

GROUNDWATER OBSERVATIONS
WATER LEVEL:
DATE:
TIME:
MEAS. FROM:

INSPECTOR: F. ACCORSI
DRILLER: J. BARNAIC
WEATHER:
CONTRACTOR: Cascade
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

BORING/WELL ID: PAR-79-490 TMW-07
LOCATION DESCRIPTION
LOCATION PLAN
Oceanport, New Jersey

DEPTH (feet)	SAMPLE I.D.	BLOWS per 6"	ADV/ REC.	PID (ppm)	FIELD IDENTIFICATION OF MATERIAL	STRATA	COMMENTS
10							
11							
12					TOTAL DEPTH 12 FT.		
3							
4							
5							
6							
7							
8							
9							
0							

Remarks:
TMW (10 FT. SCREEN) SET FROM 2 FT TO 10 FT.

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

PARSONS

Soil Boring Log

CLIENT: USACE
PROJECT NAME: FTMM - ECP
PROJECT LOCATION: FTMM Parcel
PROJECT NUMBER: 748810-

GROUNDWATER OBSERVATIONS
WATER LEVEL:
DATE:
TIME:
MEAS. FROM:

INSPECTOR: TOM NORN
DRILLER: ECDI WELLS PERSE
WEATHER: CLEAR 55°F
CONTRACTOR: East Coast Drilling, Inc. (ECDI)
RIG TYPE: Geoprobe(R) 7822DT
DATE/TIME START: 11-21-17/0930
DATE/TIME FINISH: 11-21-17/0945
WEIGHT OF HAMMER: N/A
DROP OF HAMMER: N/A
TYPE OF HAMMER: N/A

BORING/WELL ID: PAR-79-490-TMW-08
LOCATION DESCRIPTION: GRASSY AREA
LOCATION PLAN: Oceanport, New Jersey

DEPTH (feet)	SAMPLE I.D.	BLOWS per 6"	ADV/ REC.	PID (ppm)	FIELD IDENTIFICATION OF MATERIAL	STRATA	COMMENTS
0			48/60	0.0	DRY DK BROWN STIFF SANDY SILT, LITTLE GRASS ROOTS		
				0.2	DRY DK OLIVE-GRAY BROWN V DENSE SILTY SAND		
1				38.0			
				76.0			
2				195.0	MOIST LT GRAY OLIVE-TAN MED DENSE SILTY SAND STRONG PETROLEUM ODOR		
				227.0			
3				355.0			
				322.0			
4				[illegible]	NO RECOVERY		
				[illegible]			
5			60/60	326.0	SA.A		
				172			
6				95.0	WET, LT. GRAY-TAN-OLIVE SOFT SANDY SILT. PETRO ODOR		
				92.0			
7				76.0			
8							
					WET MOTTLED MOD LOOSE REDDISH-ORANGE BROWN AND LT GRAY OLIVE SILTY SAND PETRO ODOR		
9							
10			24/24				

Remarks: TEMPORARY WELL 490-TMW-08 INSTALLED [illegible] SCREENED FROM 0-12', BGS.

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

Soil Boring Log

CLIENT: USACE
PROJECT NAME: FTMM
PROJECT LOCATION:
PROJECT NUMBER: 748810-

GROUNDWATER OBSERVATIONS
WATER LEVEL:
DATE:
TIME:
MEAS. FROM:

INSPECTOR:
DRILLER:
WEATHER:
CONTRACTOR: Cascade
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

BORING/WELL ID: PAC-79-490-TMW-08
LOCATION DESCRIPTION
LOCATION PLAN
Oceanport, New Jersey

DEPTH (feet)	SAMPLE I.D.	BLOWS per 6"	ADV/ REC.	PID (ppm)	FIELD IDENTIFICATION OF MATERIAL	STRATA	COMMENTS
0			24/24	75.0	SAA		
				72.0			
1				58.4	WET DK GRAY BLACK MICACEOUS STIFF SANDY SILT. PEAT ODOR		
				60.0			
2					end of boring		
3							
4							
5							
6							
7							
8							
9							
0							

Remarks:

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

This page intentionally left blank.

Attachment C
Field Notes

This page intentionally left blank.

Location Oceanport, NJ Date 4/12/16

Project / Client FTMM phase II / USACE

Tech: C. Watson, J McDaniels, JOE Barack, C. Tigue

TASK: parcel 79

Weather: 55°± Rain

0730: on-site + Hasmilyser

0800: mob to 79 JM to sample temp. wells, ON to soil sample w/ ECDI

SAMPLE ID	TIME	ANALYSIS
PAR-79-410-SB-01-1.5-2	1115	EPH / 2 map/mp
PAR-79-410-SB-01-2-2.5	1120	
" " 01-5.5-10	1125	
" 02-2-2.5	1025	
" 02-3.5-4	1030	
" 03-2-2.5	1140	
" 03-6-6.5 ~~+~~	1145	
" 03-9.5-10	1150	
" 04-2-2.5	0930	
" 04-3.5-4	0935	
" 04-8-8.5	0940	
" 02-8-8.5	1035	
PAR-79-MP-TMW01	0920	VOCs+TICs+SVOCs
PAR-79-MP-TMW02	0940	" "
PAR-79-MP-TMW03	1000	" "
PAR-79-MP-TMW04	0940	" "
		" "

Location Date 4/12/16

Project / Client

SAMPLE ID	TIME	ANALYSIS
PAR-79-MP-TMW05	0900	VOCs+TICs+SVOCs
" 01-TMW06	1020	
" 11-TMW07	1100	
" 11-TMW08	1040	
" 11-TMW09	0840	

1205: Lunch + D-Mob + Mob to new Area

1320: Arrive @ Parcel 79-202

SAMPLE ID	TIME	Analysis
PAR-79-202-SB-03-2.25	1430	EPH, 2 map/mp
PAR-79-202-SB-03-3-3.5	1435	
" -03-9.5-10	1440	
" -02-3-3.5	1400	
" -02-3.5-4	1405	
" -02-8-8.5	1410	
" -01-2-2.5	1450	
" -01-3-3.5	1455	
" -01-9.5-10	1700	

1515: Demob

535: ECDI off-site

1545: finish COC's / Pack Cooler / DCAR / Onsite

1700: off-site

Aug 4 2016

Tech: S. Paralkar, C. Watson, Joe (ECOI)
Task: Temp well installation + sample
weather: 80F clear
0720: on-site
0730: H+S tailgate
0750: prep bottleware, cal PID
0815: S. Paralkar mob to ARE 800 to sample
C Watson + drillers mob to PAR-79

Sample ID	Time	gauged depth
ARE-800-TMW-09	0845	8.75
ARE-800-TMW-07	0935	10.1

0925: S.Paralkar MOB to office
0935: S Paralkar MOB to Par 79

Sample ID	Time	gauged depth
PAR-79-MP-TMW03	1010	3.73
PAR-79-MP-TMW04	1035	4.5
PAR-79-MP-TMW05	1055	4.8
PAR-79-MP-TMW06	1120	4.8
PAR-79-MP-TMW08	1145	5.45
PAR-79-MP-TMW07	1150	7.9
PAR-79-490-TMW03	1405	3.4
PAR-79-MP-TMW09	1315	3.6

TMW NAME	Time installed
PAR-79-MP-TMW08	0920
" " TMW07	0940
PAR-79-142-TMW01	1345
PAR-79-490-TMW02	1155
PAR-79-490-TMW01	1050

101.11' North of hydrant
229.3' east of fence
gauging depth: 4.49
12:20 lunch
1300: Drillers went to landfill
Z. Lary and S Paralkar tried to organize bottleware + talk to lab
1400: Mob to 79
1420: start drilling TMW05
1430: S. Paralkar sample PAR-79-MP-TWP03
1445: Install TMW05
94' ft north of utility pole line/street
140' west of building 451
gauging depth: 6.65-1.9 = ~~4.75~~ 4.75'
1445: S Paralkar sample PAR-79-MP-TWP02
1450: Start drilling TMW06
1510: Install TMW06
181' north of utility pole line/street
140' east of building 451
1520: Mob to office
1540: Prep samples, COCs, DCQR, collect EB
1620: offsite

TMW NAME	Time installed
PAR-A-490-TMW03	1130
PAR-79-A75-TMW01	1005

1445: Mob to ~~office~~
1500: Demob, drop trailer, collect EB
1520: COC's, prep samples
1545: off-site

Aug 5 2016

Tech: S. Paralkar, C. Watson, Joe (EDCI)
Task: Temp well installation + sampling
Weather: 80F clear
0725: onsite
0730: prep bottleware + coolers
0750: cal PID, load car
0800: H+S tailgate
0825: Mob to Par 79

Sample ID	time	depth
PAR-79-490-TMW01	0855	2.6
PAR-79-A90-TMW02	0915	2.9
PAR-79-142-TMW01	0945	6.8
PAR-79-202-TMW01	1030	2.9
PAR-79-A75-TMW01	1105	3.8 + Dup/MS/MSD split
PAR-79-A75-TMW02	1130	8-11

0905: Install-TMW01
0950: Install A75-TMW02
1005: Install A75-TMW01
1030: Demob out of A75
1100: ECDI Drop trailer, get material to pull and plug completed TMW's from yesterday and today
1300: A75-TMW02 completed - recharge was slow
1320: Mob to office - paperwork, COC's, prep coolers for shipment
1430: Lab on-site for pick up
1500: off-site

GW + Soil Sampling — Nov 3 2017

personnel: F. Accossi, B. Dietert, ECDI

Task: GW + Soil Sampling, PID Screening at: VHOT, Paccel, & IRP sites

Weather: 60-75°, clear / sunny, some clouds

0740: ECDI on-site (Joe Barnak, Romao C.)

0755: H+S meeting

0810: Load Equipt, prep bottleware, calibrate PID
- Equipt. - Geoprobe 7822DT (ECDI), Teflon Bailer, Mini-Rae 3000 PID

0850: Mob to PAR-79-~~490~~ 494 BD UST-490

0915: Start drilling Par-79-490-TMW-04 (QA/QC Location)

0932: Begin PID screening TMW-04

0938: No PID readings > 0.0 ppm ~ 0-15 ft.

0945: Collect samples, PAR-79-490-TMW-04-08 VOCs + TICs & SVOCs + TICs

0957: Start drilling PAR-79-490-TMW-05

1005: Collect FD1, PAR-79-490-TMW-0408, VOCs + TICs & SVOCs + TICs (PAR-79-490-TMW-04-081)

1010: Begin PID screen on PAR-79-490-TMW-05

1015: PID 3ft = 33 ppm, 2.5 ft = 17 ppm, 3.5 ft = 35 ppm, 4 ft = 0 ppm, 4-10 ft = 0.6 ppm

1030: Collect MS1, PAR-79-490-TMW-0408, VOCs + TICs & SVOCs + TICs (PAR-79-490-TMW-04-08-MS)

1048: Collect MSD1, PAR-79-490-TMW-0408, VOCs + TICs & SVOCs + TICs (PAR-79-490-TMW-04-08-MSD

Nov 3 2017 (cont.)

1055: Start drilling PAR-79-490-TMW-06

1105: Collect QA/QC-Split, PAR-79-490-TMW-0408, VOCs + TICs & SVOCs + TICs

1117: Begin PID screening on PAR-79-490-TMW-06

1135: Collect Equipment Blank 1, PAR-79-490-TMW-04, VOCs + TICs & SVOCs + TICs

1155: Collect sample PAR-79-490-TMW-05-08, VOCs + TICs & SVOCs + TICs

1225: No PID readings > 0.0 ppm ~ 0-10 ft., PAR-79-490-TMW-06

1240: Collect sample, PAR-79-490-TMW-06-08

1255: Decommisioned TMW 04-06, PAR-79-490, backfilled with ~~BD~~ soil cuttings

1300: Lunch

1345: Start drilling PAR-79-490-TMW-07

1420: Begin PID screening TMW-07

1428: No PID readings > 0.0 ppm ~ 0-10 ft., TMW-07

1435: Collect samples, PAR-79-490-TMW-07-08, VOCs + TICs & SVOCs + TICs

~~BD~~ BS 1438: PAR-79-490-SCREEN 1 + PAR-79-490-SCREEN2 drilled (no samples)

1440: Begin PID screening SCREEN1

1450: No PID readings > 0.0 ppm ~ 0-10 ft SCREEN1

1459: Decommisioned TMW-07, PAR-79-490, backfilled with soil cuttings.

Nov. 3 2017 (cont.)

1501: Begin PID screening PAR-79-490-SCREEN2

1505: 4.3 ppm at BD 0.5 ft, 13.6 at 1 ft,
170 ppm at 1.5 ft, 302 ppm at 2 ft, 57 ppm at 2.5 ft,
505 ppm at 3 ft, 452 ppm at 3.5 ft,
32 ppm at 4 ft, 302 ppm at 5 ft,
144 ppm at 5.5 ft, 5 ppm 6 ft, 5 ppm 6.5 ft,
2 ppm 7 ft, 2 ppm 7.5 ft, 0.7 ppm 8 ft,
0 ppm 8.5-10 ft.

1530: Left hole open for possible GW sampling later.

1535: Back to office.

1550: Unload cooler, COCs, Quality Control Report, clean-up

11/3/17
BD

Location FTMM Date 11-21-17

Project / Client USACE

PAR-79-490 BORING / TMW. WELL INSTALL

0730 MEET FA AND NL ONSITE, CREW CREW DELAYED.

0915 CREW ONSITE HOS KICKOFF MEETING

0940 CREW TAKES ON WATER FOR ONBOARD TANK, CALIBRATE PID, NL TO DRILLING WELLS

0900 FA LEADS CREW TO PAR-79-490-TMW-08 PROPOSED LOCATION.

0930 BEGIN PUSHING FOR SOIL BORING SAMPLE AND TEMPORARY WELL INSTALLATION AT TMW-08 LOCATION.

0945 CREW INSTALLS TEMP. WELL 1" PVC SCREENED FROM 0-12'. WATER = 4.5' DTW BGS

1000 RELOCATES TO PAR-79-490-SCREEN-03 LOCATION

1015 CREW LOADS RIG, FA. REVIEWS

1025 COLLECT GW SAMPLE FROM TMW-08

1030 CREW LOADS EQUIPMENT, F.A. LEADS US TO PAR-72-211 - TMW-08 LOCATION

1050 BEGIN PUSHING TO 20'.

1105 CREW RELOCATED TO INSTALL TEMP. WELL TMW-08 WITH THE SCREEN FROM 8-18' BGS BASED UPON REVIEW OF SOIL BORINGS.

1125 CREW RELOCATES TO PAR-72-211, BEGINS PUSHING FOR SCREEN-09.

11-21-17

Location FTMM Date 11-21-17

Project / Client USACE

PAR 72-211 BORING / TEMP / MW INSTALL

1145 DRILLERS BREAK FOR LUNCH

1155 COLLECT GW SAMPLE FROM PAR-72-211-TMW-08.

1210 PROVIDE NL WITH WL INDICATOR

1230 CREW RETURNS FOR INSTALLATION OF MONITOR WELL PAR-72-211-MW-1

1245 BEGIN BOREING. THE INITIAL CUTTINGS THAT EMERGED FROM 0-5' APPEARED MOIST, DK-BROWN SANDY SILT. THOSE FROM 5-10' WERE OLIVE-GREEN-GRAY SILT, SOME SAND, PETROLEUM-LIKE ODOR PID RESPONSE OF 12.8 ppm TO 65.0 ppm

1330 AT 15', CUTTINGS OBSERVED AS OLIVE-GREEN-GRAY SILTY SAND, PERSISTENT PETROLEUM ODOR AND PID READINGS RANGING FROM 75.0 - 362.0 ppm

1345 AT 17' WATER EMERGED, CUTTINGS WERE WET, OLIVE GRAY BROWN SILT, PID READINGS RANGED FROM 95.0 - 126.0 ppm

1355 AT 22', CREW PUSHES THE PLUG AND INSTALLS 10' OF 2" 10-SLOT SCREEN WHILE PULLING AUGERS. TO SET SCREEN FROM 11-21' BGS, RISER TO GRADE AND FLUSH-MOUNT BOX, CONTINUE ADDING #1 MORIE SAND FROM 22' BGS.

11-21-17

Location FDMM Date 11-21-17

Project / Client USACE

PAR-72-211

1410 ADD 4th BAG OF #1 MORIE WORLD PRUNE 3rd AUGER RIGHT.

1425 ADD 7th BAG (FINAL BAG) #0 MORIE

1440 ADD BENTONITE 3/8" HOLEPLUG CHIPS #1 MORIE FROM BGW TO 11' (TOP OF SCREEN)

#0 MORIE TO 10' BG

BENTONITE TO 1' BG.

1500 FLUSH MOUNT BOX - PROTECTIVE CASING INSTALLED WITH CONCRETE COLLAR.

TWO DRUMS OF CUTTINGS

1515 CREW LOADS EQUIPMENT, HEADS BACK TO STAGING AREA

1530 COMPLETE PAPERWORK INCLUDING CHAINS OF CUSTODY FORMS FOR ANALYTICAL SAMPLES COLLECTED TODAY AND DAILY REPORTING

1600 DEPART THE SITE

11/21/17

Location Date

Project / Client

Nov. 10 2017 (cont)

1349: 884-TMW-04 decommisioned, backfilled with soil cuttings.

1359: 884-TMW-03 decommisioned, backfilled with soil cuttings.

1405: 800-12 (PAR-55) - Decommision TMW-01, 02, 03, + 04 from yesterday, backfilled with soil cuttings.

1410: Mob to office, pickup supplies (soil sampling) for PAR-98

1430: mob to PAR-98, drill 3 borings, 5' each for 0-0.5' bgs, 1.5-2.0' bgs, and 2.5-3.0' bgs (on hold).

~~1515~~ 1510: Collect sample PAR-98-SB-07-0'-0.5', AROCLOR

1515: Collect sample PAR-98-SB-07-1.5'-2.0', AROCLOR

1505: Collect sample PAR-98-SB-07-2.5-3.0', AROCLOR (Hold)

1520: Collect sample PAR-98-SB-107-1.5-2.0', AROCLOR (FD)

1525: Collect sample PAR-98-SB-07-1.5-2.0' (QA/QC Split)

1530: Collect Sample PAR-98-SB-07-0'-0.5'-MS, AROCLOR

1535: Collect sample PAR-98-SB-07-0'-0.5'-MSD

1540: Collect Sample, PAR-98-EB-11102017

1600: Prepare COCs, coolers, other paperwork

11/21/2017

Personnel: D. Lozzo

Task: Develop monitoring wells

Weather: High <80°F, Clear

0700 JL on-site.

0815 ECDI on-site. Safety meeting

0845 Mob to MW PAR-56-800-20-MW-01 (development started 11/20)

0855 Continue well development @ PAR-56-800-20-MW-01 Static WL = 10.39 (below TOC)

0925 PAR-56-800-20-MW-01 purged DRY. ~6 gallons purged. Water still very turbid. Allow well to recharge

0930 Begin developing well PAR-56-800-D-MW-01. Static WL = 11.36 (below TOC)

1015 Complete development of well PAR-56-800-D-MW-01. ~30 gallons purged.

1035 Pump purgewater in drums @ gas station.

1040 Begin developing well PAR-54-884-MW-01 Static WL: 5.28 (below TOC)

1045 Well purged DRY. Allow WL to recover.

1100 WL recovered to 11.40. Continue well development (turn down purge rate to control draw-down)

1110 Well purged DRY. Allow WL to recover.

1125 WL recovered to 11.88. Continue well development

1130 Well purged DRY. Allow WL to recover.

12-14-17 MW INSTALLATION 30° FLURRIES

0705 ECO1 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 BGS. USED 6 BAGS MORIE #0, 1 BAG #00, ½ 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 (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, ½ BAG BENT. GROUT.

1700 DONE-WELL FINISHED, CLEAN UP SITE AND PREVIOUS 2 MW INSTALLATION AREAS. MOB. TO 699 STAGING AREA, UNLOAD ½ FULL DRUM, DECON AUGERS, ~~STAGE~~ LOAD MATERIALS FOR 3 MW INSTALLATION. ECO1 OFFSITE 1545

12-15-17 MW INSTALLATION 28° FLURRIES

0710 ECO1 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: 6.9', M12MW14: 6.9' DISCUSSED W/JULIEN AND DECIDED TO SET SCREEN AT 3' TO 13'. ~~SET~~ USED 5 BAGS #0 MORIE, 1 BAG #00 MORIE, ¼ BAG BENTONITE. ~~WELL~~ 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 430 MW-1 FOR STATIC WATER LEVELS, BASED ON PREVIOUS TEMP, MWS AND SCREEN BORINGS WITH GW AT APPROX. 7-7.5, WILL SET SCREEN @ 4' TO 14' 6 BAGS MORIE #0, 1 BAG MORIE #00, ½ BAG BENTONITE

1200-1300 LUNCH BREAK

1300 MOB TO PAR-79-444-MW-01, DRILL TO 15' SET SCREEN FROM ~~4' TO 14'~~ 2' 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, ⅓ BAG BENTONITE

1500- MOB TO B.699 TO DECON AUGERS. 1530 - OFFSITE DUE TO INCREASING SNOWFALL.

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

0710 ECOL ARRIVED (K. ATWOOD, T. MONALLY, COLIN R. CARRASQUILLO). ~~HELD~~ Z. LEVY ON SITE 0700. HELD H+S 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. GEORGE 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 108MW04. 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

1230 MOB. TO PAR-79-490-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-79-490-MW-02 LOCATION. AUGER TO 13 FT. SET SCREEN @ 2'-12' USED SAME QTY. MATERIALS AS MW-03 FINISH WELL @ 1520

MOB TO B. 699 TO DECON AUGERS

46

Location FTMM Date 12/18/17

Project / Client MW Development / USACE

Weather = Cloudy, up to mid 40's
Activity - MW Development & Pad construction
Equipment = 1x Water level, 1x Horiba, 1x LaMotte, 1x PID, PPE, hand tools
Personnel - Colin Tighe > ECDI
Roman Carrasquillo
Zahar Lavy - Parsons
0700 - All on-site & H&S. Meeting.
0745 - ECDI loading / setting up.
0855 - 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 - Setting pad at MW-02 (800-12)
1350 - Begin development at MW-02.
1512 - Complete development at MW-02 (800-12)
- ~ 33.5 gallons purged.
- clean up
1530 - ECDI off-site.
1545 - Z. Lavy off site.

Location Date

47

Project / Client

40's cloudy

12-20-17 MW ABANDONMENT / COMPLETION / DEVELOPMENT

0703 EDI ARRIVED (K. ATWOOD, T. McNALLY, C. TIGHE, ROMAN C.). HELD H+S MEETING: DISCUSSED DAY'S ACTIVITIES AND GOALS. CREW 1 W/FA TO DO WELL ABANDONMENT, WELL COMPLETION @ PAR-72-211

800 CREW 2 (ZOHAR, COLIN, ROMAN) MOB. TO PAR-79-490-MW-03, 02 TO DEVELOP/COMPLETE MW'S. CREW 1 MOB TO M5 MW18 TO ABANDON WELL, REMOVED 21 FT OF 4 in. PVC SCREEN + CASING, 18 FT. DEEP. GROUT MIXTURE: 35 G. H_2O W/4 BAGS (94 lb) PORTLAND TYPE II, 8:1 RATIO. GRAVITY TREMIE GROUTED HOLE (FUNNEL + PIPE) FROM BOTTOM UP.

0900 MOB TO M5 MW19 - (SAME AS MW18). WILL LET SETTLE OUT AND CHECK AND TOP OFF, IF NEC. IN 1/2 HRS.

1010 CLEAN UP SITES, MOB TO PAR-72-211-MW-02 TO COMPLETED WELL W/FLUSH MOUNT BOX, NOT DEVELOPED (CREW 2 WILL DO 12-21)

1100 MOB TO PAR-72-211-MW-04 (SAME AS MW-02) COMPLETED, NOT DEVELOPED.

1150 CLEAN UP SITE LUNCH BREAK

1230 MOB TO PAR-72-211-MW-03 COMPLETE WELL W/STEEL STICKUP RISER, CONCRETE PAD, NOT DEVELOPED

1410 WELL FINISHED, CLEANED UP SITE. MOB TO B.699, CLEAN UP SITE, LOAD MATERIAL, GET PAPERWORK W/DRILLER IN ORDER (PERMIT #'S, ETC.) CHECK SETTLING OF ABAND. WELLS - OK

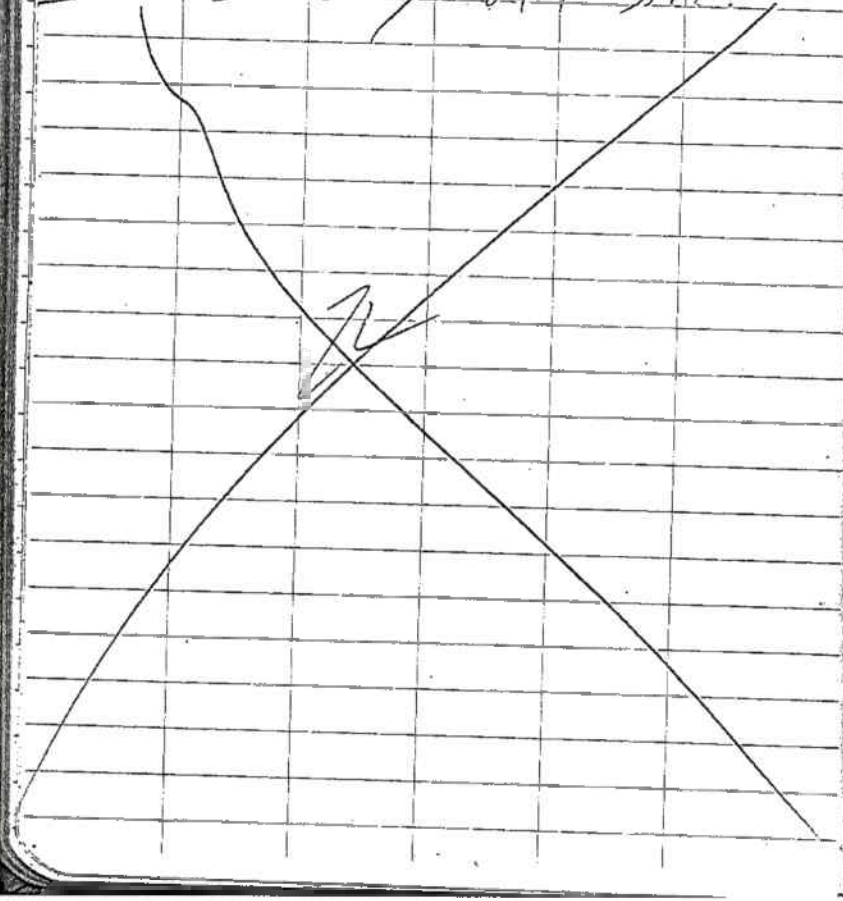
1700 EDI DEPART

48

Location FTMM Date 12/19/17

Project / Client MW Development / USACE

1456 - Complete development of 490-MW-01
- Purged 30 gallons
1500 - Clear up.
1515 - ECDI off-site.
1530 - Z. Lacy off-site.



49

Location FTMM Date 12/20/17

Project / Client MW Development / USACE

Weather - Cloudy, up to mid 40's
Activity - MW Development
Equipment - 1x Water Level, 1x Horiba, 1x Cx Matte, 1x PID, Hand tools, PPE
Personnel - Galen Tighe, Laman Cartwright > ECDI
Zahar Lacy - Parsons
0700 - All on-site & H&S Meeting
0750 - ECDI loading up.
0820 - Set up at Point 79
0835 - Begin MW development at ~~490~~-MW-03
- Setting pad.
0955 - Complete development at 490-MW-03
- purged 42 gallons
1005 - Preparing 490-MW-02 Pad & beyond.
1135 - Complete development of 490-MW-02.
1150 - Lunch.
1230 - Set up at 83-482-MW-01 (Pad)
1245 - Begin development of 482-MW-01
1331 - Complete development of MW-01
- purge 33 gal.
1358 - Begin development at 482-MW-02
1423 - Complete development of 482-MW-02

50

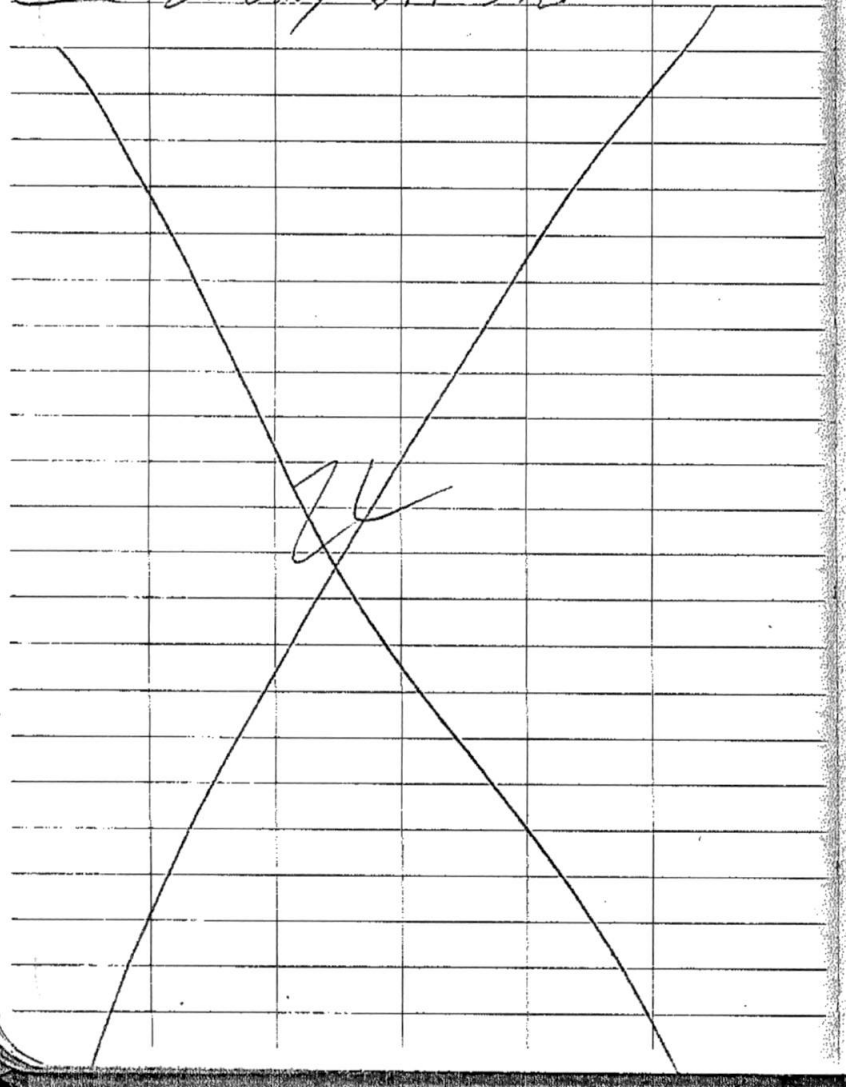
Location FTMM Date 12/20/17

Project / Client MN Development / USACE

- 4.6 gallons purged

1440 - EDI off-site.

1500 - Z-Luxy off-site.



51

Location _____ Date _____

Project / Client _____