United States Army
Fort Monmouth, New Jersey

Army Response to N.J. Department of Environmental Protection Correspondence Letter Dated October 28, 2008

U.S. Army
Fort Monmouth, New Jersey

Prepared by

U.S. Army, Office of the Assistant Chief of Staff for Installation Management

Fort Monmouth, New Jersey

March 2012

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

March 16, 2012

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: Army's Response to NJDEP correspondence (Dated October 28, 2008), Draft Site Investigation
Fort Monmouth, NJ

Attachments:

A. Letter from NJDEP dated October 28, 2008, regarding the Draft Site Investigation Report.
B. Letter from Army dated April 28, 2009, regarding the initial response to the NJDEP letter dated October 28, 2008.
C. Letter from the Army dated November 16, 2011, regarding the Army's response to NJDEP's comments for Parcel 15.
D. Unregulated Heat Oil Tank Brief Summary and Closure Reports for Parcels 14, 28, 51, 76, and 79.
E. Letters from NJDEP, regarding UST Closure Approval/NFA, dated July 23, 1993; September 21, 1995; July 10, 1998; February 24, 2000; August 20, 2000; April 20, 2001; and January 10, 2003.
F. Parcel 28 Map – Septic Tank
G. Site Plan depicting from buildings 105 and 106 off of Riverside Drive.
H. Parcel 83 former Structures Map.

Dear Ms. Range:

The U.S. Army Fort Monmouth has reviewed the subject comments as submitted by the NJDEP on 28 October 2008, in regards to the Draft Site Investigation Report dated July 21, 2008 by Shaw Environmental Inc. Referenced below is a line by line response in bold print, to each comment and request for an "No Further Action" (NFA) determination where appropriate.

General Comments

1. USTs at Parcels 14, 28, 51, 76, and 79. The recommendation of no further action (NFA) for the suspected underground storage tanks (USTs) is not acceptable to the NJDEP. The suspected USTs are subject to New Jersey regulations N.J.A.C. 7:26E *Technical*

Requirements, Fort Monmouth is required to do at least the following in regard to the suspected USTs:
a) Verify the tank contents and collect a sample of any contents for analysis as specified at 7:26E-3.9(a)3.iii,
b) Collect and analyze at least 4 soil samples within 2 feet of each tank as specified at 7:26E-3.9(a)3.i,
c) Conduct a site investigation for ground water in accordance with 7:26E-3.7 and 3.4,
d) Implement remedial action and tank closure in accordance with 7:26E-6.3(b),

The soil and ground water sampling conducted during the Army's Site Investigation (SI) are a good starting point. However, since suspected USTs have been identified by geophysical surveys, the specific sampling requirements of 7:26E-3.4, 3.7, and 3.9 must now be followed.

The suspected USTs are also subject to N.J.A.C. 7:14B - Underground Storage Tanks. Under 7:14B-1.4(b)3, tanks of any size used to store heating oil for onsite consumption in a residential building (such as a barracks) are exempted from the requirements of the UST regulations. However, all other hazardous substance USTs of any size are regulated due to the aggregate volume provision found in the definition of "Tank capacity" in 7:14B-1.6. All confirmed regulated USTs at Fort Monmouth must be registered and closed in accordance with 7:14B.

The Army performed complete investigations of the suspected USTs at Parcels 14, 28, 51, 76 and 79. A summary of each site can be found at Attachment D.

2. Septic System at Parcel 28. Similarly, the recommendation of NFA for the septic tank, septic box, and septic piping at Parcel 28 is also unacceptable. The septic system components must be sampled as specified at 7:26E - 3.9(e)3 and the ground water sampling requirements of 7:26E-3.7 must also be followed.

According to the Parcel 28 Summary and Conclusions section of Shaw's July 21, 2008 SIR (Section 3.5.5 , page 3-96):

"The locations of a suspected UST, a suspected former septic holding tank, a suspected septic distribution box, and suspected supply piping associated with the suspected septic distribution box were identified from a geophysical survey. Soil and groundwater analytical results suggest that a release has not occurred. In light of the absence of evidence of a release to the environment, NFA for the suspected UST, suspected former septic holding tank, suspected septic distribution box, and suspected supply piping associated with the suspected septic distribution box is recommended."

The Army contends that a satisfactory remedial investigation was performed for the former septic system at Parcel 28, in accordance with N.J.A.C. 7:26E - 3.9(e)3 and 7:26E-3.7. To evaluate known and/or suspected former septic system components, the Army conducted a remedial investigation consisting of a geophysical survey, collection of sediment samples, and collection of soil and ground water samples from Geoprobe®

borings and test pits. All soil, sediment, and ground water sampling locations were chosen in reference to the findings of the geophysical survey. The soil, sediment, and ground water analytical results from the Army's remedial investigation of the former septic system confirmed that no release to environment occurred. Thus, the Army contends that NFA for the former septic system at Parcel 28 is warranted.

3. Action Levels, page 2-14. Analytical results were compared to NJDEP criteria, specifically the non-residential direct contact soil cleanup criteria (NRDCSCC) and the impact-to-ground water soil cleanup criteria (IGWSCC). Subsequent to the start of the site investigation, NJDEP has promulgated new Soil Remediation Standards (SRS). The NJDEP has provided for a phase-in period for the new SRS. If a Remedial Action Work Plan (RAW) is submitted to the Department on or before December 2, 2008 (6 months after the June 2, 2008 promulgation date) then the subsequent cleanup may be conducted using the previous SCC. However, any remedial actions not approved by NJDEP by the December 2, 2008 deadline must follow the new SRS. Detailed guidance can be found at the following website: http://www.nj.gov/dep/srp/guidance/rs/.

The Army will apply the June 2, 2008 NJDEP Soil Remediation Standards to all Fort Monmouth sites that did not have a NJDEP-approved RAW in place prior to June 2, 2008.

4. Sediments at Parcels 15, 27, 28, 39, 43, 49, 61, and 69. NJDEP concurs with the recommendations to further evaluate sediments at these Parcels as part of a facility-wide baseline ecological evaluation.

Sediments at Parcels 15, 27, 28, 39, 43, 49, 61, and 69 were sampled, evaluated, and discussed in the Baseline Ecological Evaluation Report submitted to the NJDEP in May 2011.

5. Indoor Air at Parcels 15, 34, 43, 50, and 52. NJDEP concurs with the recommendations to conduct one additional round of indoor air sampling at these Parcels.

The Army evaluated the requirements for additional vapor intrusion assessment in accordance with the NJDEP's October 2005 *Vapor Intrusion Guidance* (VIG) and *Technical Requirements*. For the parcels referenced above, the Army plans to conduct follow-up vapor intrusion investigations at Parcel 15 (Building 2700), Parcel 52 (Site 699), and Parcel 50 [FTMM-61 (Site 283)]. Based on the most recent ground water sampling results, no additional vapor intrusion assessments are required for the following parcels: Parcel 34 (Site 2567), Parcel 43 (Site 1122), and Parcel 50 [IRP Sites FTMM-54 (Site 296) and FTMM-55 (Site 290)]. In addition, the following sites were added to the Vapor Intrusion Survey Work Plan: Buildings 602, 700, and 1001.

6. Section 4.1.2, Surface and Subsurface Soil Investigations. This section discusses the results of soil sampling at multiple areas of concern (AOCs) relative to the NJDEP Non-Residential Direct Contact Soil Cleanup Criteria (NRDCSCC). Further evaluation of soil contamination is recommended at some, but not all, soil AOCs.

The future use of most Parcels at Fort Monmouth is not yet certain. Since future residential use is possible, all areas of soil contamination must be delineated to the Residential Direct Contact Soil Cleanup Criteria (RDCSCC). Remediation of soils by the Army to the NRDCSCC prior to property transfer would be acceptable, but deed notices would be required to document remaining soil contamination above the RDCSCC, and appropriate engineering controls must be implemented and documented.

For Fort Monmouth sites without a NJDEP-approved RAW in place prior to June 2, 2008, the Army will delineate soil to the NJDEP Residential Direct Contact Soil Remediation Standards (RDCSRS). For Fort Monmouth sites with an approved RAW in place prior to June 2, 2008, the Army will delineate soil to the NJDEP Residential Direct Contact Soil Cleanup Criteria (RDCSCC).

The Army plans to remediate sites to current usage – i.e. residential areas will be remediated to comply with NJDEP residential soil criteria; non-residential areas will be remediated to comply with NJDEP non-residential soil criteria.

Parcel-Specific Comments

Parcel 13 - Former Barracks (Buildings 2004-2016)

1. The recommendations of NFA for soil and ground water are acceptable based upon the sampling results and the results of the geophysical survey.

The Army acknowledges the NJDEP's approval of NFA for soil and ground water for Parcel 13.

2. The Report states that no suspected USTs were located by the geophysical surveys, however it further indicates that no UST removals have been documented at the locations of numerous former barracks within Parcel 13. The Report should provide a possible explanation(s) for why no USTs were found.

Regarding the NJDEP's request for a possible explanation for why no USTs were discovered at Parcel 13, the Army believes that all USTs at Parcel 13 were removed during demolition of the barracks, circa 1963.

Parcel 14 - Northwest Portion of CWA

1. See General Comment #1 above.

See response to General Comment #1 above, at Attachment C.

Parcel 15 - Building 2700

1. The Report states that no suspected USTs were located by the geophysical surveys, however it further indicates that no UST removals have been documented at the locations of numerous former barracks within Parcel 15. The Report should provide a possible explanation(s) for why no USTs were found.

See response to General Comment #1 above, at Attachment C.

2. It is unclear why an NFA for ground water is being recommended when ground water remediation is currently being implemented for the CW-1 area. If the Army wants to identify individual AOCs within Parcel 15 for an NFA designation, they should make that case for those individual AOCs.

See response to General Comment #1 above, at Attachment C.

3. The recommendation of NFA for soil is acceptable based upon the sampling results and the results of the geophysical survey.

The Army acknowledges the NJDEP's approval of NFA for soil for Parcel 15 (Building 2700).

4. The report states that well UST-2337-65 could not be located. If the well has been surveyed, an attempt shall be made to locate the well using the State Plane Coordinates.

See response to General Comment #1 above, at Attachment C.

Parcel 27 - Southwestern Corner CWA

1. The report states that numerous USTs were removed from this parcel and are summarized in the Phase I ECP Report. Appendix A of that document states that the Department sent UST closure approval letters for 7 of the 12 USTs that were removed, and that the Army is waiting for Department approval of the remaining 5 UST closures.

This answer is included in the answer to Comment #2 below.

2. NFA for soil and ground water cannot be approved until documentation on all 12 USTs, including the closure reports for the remaining 5 USTs, are reviewed by the NJDEP project team. NJDEP requests that the Army provide a brief summary of the 7 USTs that received Department approval. This summary should include a figure showing the former UST locations and the soil and ground water sampling locations and results.

The information found in the ECP Phase I- Appendix A regarding 12 USTs with 5 of the 12 sites pending NJDEP review, is incorrect. Figure- 16 of the ECP Phase I, is a map which depicts the locations of 19 USTs that were removed from the Parcel 27 area. When cross-referencing the USTs from the Figure-16 map with Appendix G, 2 of the 19 USTs were pending an approval for closure from NJDEP. The two UST sites are UST 2707-47 and UST 2707-51. However, this information is also incorrect. The NJDEP submitted a NFA letter for these two sites on January 10, 2003. See Attachment E of this letter for all NJDEP NFA approval letters. The USTs removed from Parcel 27 are listed below:

PARCEL 27 USTs REMOVED

UST Label #	Building	UST Removal Date	NJDEP UST Closure Approval Date
UST 2500-52	2500	3/25/1993	4/20/2001
UST 2500-53	2500	3/25/1993	4/20/2001
UST 2500-54	2500	3/25/1993	4/20/2001
UST 2500-55	2500	3/25/1993	4/20/2001
UST 2500-56	2500	3/25/1993	4/20/2001
UST 2502-13	2502	4/23/1996	8/29/2000
UST 2503-14	2503	4/23/1996	7/10/1998
UST 2504-15	2504	9/20/1995	10/23/2000
UST 2504-16	2504	5/13/1997	7/10/1998
UST 2506-17	2506	6/12/1997	7/10/1998
UST 2507-18	2507	6/5/1997	7/10/1998
UST 2508-19	2508	4/19/1996	7/10/1998
UST 2624-34	2624	3/25/1993	7/23/1993
UST 2624-57	2624	3/25/1993	9/21/1995
UST 2624-58	2624	3/25/1993	9/21/1995
UST 2624-59	2624	3/25/1993	9/21/1995
UST 2707-40	2707	8/10/1998	2/24/2000
UST 2707-47	2707	9/15/1998	1/10/2003
UST 2707-51	2707	8/26/1998	10/10/2003

Parcel 28 - Former Eatontown Laboratory

1. See General Comment #2 above.

Please refer to the Army's response to the NJDEP's General Comment #2 provided above.

2. Former installation plans and figures show three separate septic tanks and leach fields and one underground transformer vault. These potential AOCs must be shown on Figure 3.5-1 to allow comparison with sample locations.

A figure depicting the approximate locations of former structures at Parcel 28, including the three septic tanks, associated leach fields, and the subsurface transformer vault is provided at Attachment F.

3. Figure 3.5-2 shows that only one suspected septic tank, one suspected septic distribution tank, and one suspected pipe were found. The Report should provide a possible explanation(s) for why the suspected three septic tanks and leach fields and one underground transformer vault weren't located.

Regarding the NJDEP's request for a possible explanation for why three suspected septic tanks, their associated leach fields, and one underground transformer vault were not able located at Parcel 28, the Army believes that all septic system and transformer vault components were removed during renovation of the buildings associated with the Eatontown Laboratories, circa 1951.

4. There is no recommendation or proposal for the former storage areas and possible former tank pads.

As detailed in Shaw's July 21, 2008 SIR, analytical results for soil samples collected from the near-surface as well as within six inches of the ground water table confirmed that no release to the environmental occurred at Parcel 28. Former above-ground storage areas and tank pads were removed and/or reconfigured during renovation of the buildings associated with the Eatontown Laboratories, circa 1951.

Parcel 34 - Building 2567

No specific comments. NJDEP hopes to review the Remedial Investigation Report and Remedial Action Work Plan (dated 10-28-05) on Building 2567 in the coming months.

Regarding Site 2567, the Army acknowledges receipt of NJDEP comments dated March 18, 2011. The NJDEP's March 18, 2011 comments do not require a response from the Army.

Parcel 38 - Former Outdoor Pistol Range (1940-1955)

1. The NFA proposal is not acceptable. Since the site may have been re-worked, the surface soil sampling results are not a reliable indicator of potential ground water contamination, and a site investigation for ground water must be performed in accordance with 7:26E-3.7. Ground water samples should be analyzed for lead.

The Army plans to conduct a temporary well point investigation at Parcel 38, with collection and analysis of ground water samples for lead. The Army will submit the results of this ground water investigation in a future letter report to the NJDEP.

Parcel 39 - Building 1150 (Vail Hall)

1. The report states that no metal contaminants were detected in soil above the NJDEP NRDCSCC. The recommendation of NFA for soil is acceptable, however, soil contaminants must be compared to and delineated to the RDCSCC, so that a deed notice can be filed when necessary.

The Army will review all soil data for Parcel 39 and prepare a revised Soil Sample Location Map that depicts RDCSCC delineation boundaries. The Army plans to submit the revised Soil Sample Location Map, along with a proposed deed notice, as deemed necessary, prior to transfer of ownership of Parcel 39.

Parcel 43 - Building 1122 (Do-it-yourself Auto Repair)

No specific comments. NJDEP recently provided comments on reports specific to Building 1122.

The Army acknowledges receipt of NJDEP comments for FTMM-59 (Site 1122) dated August 27, 2008 and March 18, 2011. The NJDEP's March 18, 2011 comments do not require a response from the Army.

Parcel 49 - Former Squier Laboratory Complex

1. NJDEP concurs with the recommendations to conduct additional sampling of surface soils to delineate contaminants above NJDEP criteria.

Analytical results for Aroclor 1260 and BNs [benzo(a)anthracene, benzo(a)pyrene, benzo(b)fluoranthene, benzo(k)fluoranthene, chrysene, dibenz(a,h)anthracene, and indeno(1,2,3-cd) pyrene] exceeded NJDEP NRDCSRS in surface soil samples collected directly beneath the asphalt pavement at Parcel 49. The BNs that were detected at concentrations above the NRDCSCC are constituents of asphalt and are commonly detected in soil directly beneath asphalt pavement. Thus, the Army does not plan to collect additional soil samples at Parcel 49 for BN analysis. The Army plans to re-sample the location where Arcolor 1260 was detected at a concentration exceeding NJDEP NRDCSRS and provide the results to the NJDEP in a future letter report.

Arsenic was detected at concentrations exceeding the NJDEP NRDCSRS of 20 mg/kg in four subsurface soil samples collected at Parcel 49 at concentrations ranging from 21.5 mg/kg in souk sample P49-SB5-C to 24.3 mg/kg in soil sample P49-SB2-C. The presence of arsenic in soil is attributed to naturally-occurring background conditions. Thus, the Army does not plan to collect additional soil samples at Parcel 49for metals analysis.

2. The proposal to add benzene and bromodichloromethane to the proposed CEA for the M-18 Landfill should be included in a future CEA proposal.

Since benzene is considered a contaminant of concern (COC) at the M-18 Landfill, the Army plans to include benzene in a proposed CEA.

On December 8, 2007, in a ground water sample collected from temporary well point P49-GW-2, bromodichloromethane was detected at a concentration of 1.35 µg/L, exceeding the NJDEP Ground Water Quality Standard (GWQS) of 1 µg/L. Bromodichloromethane has never been detected in M-18 Landfill monitoring wells, both prior to and subsequent to the December 8, 2007 temporary well point investigation. Thus, bromodichloromethane is not considered a COC and the Army does not plan to include it in a proposed CEA for the M-18 Landfill.

3. The SI Report must include some discussion regarding the source of the VOC contaminants in ground water or the remediation of the contamination, as required by N.J.A.C. 7:26E-3.13(b)4ii(1) and N.J.A.C. 7:26E-3.13(b)4ii(4).

Further discussion of volatile organic compounds detected in ground water monitoring wells at the M-18 Landfill will be discussed in a Remedial Investigation Report (RIR) currently being prepared by the Army. The RIR will detail remedial activities conducted from 2nd Quarter 2001 – 3rd Quarter 2010.

Parcel 50, IRP Sites FTMM-54, FTMM-55 and FTMM-61

No specific comments. The comments previously provided by NJDEP on the M-18 Landfill, Building 296, and Building 290 sites in a letter dated August 14, 2007 need to be addressed.

The Army acknowledges receipt of NJDEP comments for Parcel 50 (IRP Sites FTMM-54, FTMM-55, and FTMM-61) dated August 14, 2007. The August 14, 2007 NJDEP letter will be addressed in Remedial Investigation Report Addendums currently being prepared for IRP Sites FTMM-54 (Site 296), FTMM-55 (Site 290), and FTMM-61 (Site 283).

Parcel 51 - 750 Area, 500 Area, 600 Area, 1100 Area - Former Buildings.

1. See General Comment # 1 above.

See response to the General Comment #1 at Attachment D.

Parcel 52 - Building 699 - Army Exchange Services Gas Station

No specific comments. NJDEP hopes to begin reviewing the available Remedial Action Progress Reports on Building 699 in the coming months.

The Army acknowledges receipt of NJDEP comments for FTMM-53 (Site 699) dated March 13, 2009, February 23, 2011, and March 18, 2011. The NJDEP's March 18, 2011 comments do not require a response from the Army.

Parcel 57 - Former Coal Storage and Railroad Unloading - 800 Area

1. NJDEP concurs with the general recommendation to conduct additional soil and ground water sampling. A remedial investigation (RI) of ground water is required pursuant to NJ.A.C. 7:26E-4.4. A RI work plan for all proposed investigation work shall be submitted for NJDEP approval.

Results of the Shaw SI found that base neutral compounds (BNs) were detected in shallow soil samples at concentrations exceeding NJDEP NRDCSRS. In addition, several metals were detected in ground water samples at concentrations exceeding NJDEP GWQS.

All soil samples where BNs concentrations exceeded NJDEP NRDCSCC were collected from the 0-6 -inch interval below the asphalt pavement sub-base. The four BNs (benzo[a]anthracene, benzo[a]pyrene, benzo[b]fluoranthene, and benzo[k]fluoranthene) that were detected at concentrations exceeding NJDEP NRDCSRS are constituents of asphalt and are commonly detected in soil directly beneath asphalt pavement. Thus, the Army does not plan to collect additional soil samples at Parcel 57/800 area for BN analysis.

Ten metals (aluminum, arsenic, beryllium, cadmium, cobalt, iron, lead, manganese, nickel, and sodium) were detected in ground water samples collected from two temporary well points at concentrations exceeding NJDEP GWQS. The presence of these metals is attributed to naturally-occurring background conditions. Metals detected in ground water are due to a combination of a natural, dissolved component along with input from sample turbidity. Thus, the Army does not plan to collect additional soil samples at Parcel 57/800 area for metals analysis.

2. Previous NJDEP comments requested that the analytical parameters for soils include PCBs, due to reported historical coal storage and fuel unloading activities. The requested PCB analyses were not performed. Soil sample collection and analysis for PCBs must be included in the RI work plan.

Historical operations at Parcel 57/800 area (coal storage/railroad unloading) did not involve usage or disposal of PCB-containing products. Thus, the Army did not analyze for PCBs in soil samples collected in the Parcel 57/800 area. The Army does not plan to collect additional soil samples for PCB analysis.

<u>Parcel 61 - Building 1075 - Patterson Health Clinic</u>

1. NJDEP concurs with the recommendations to conduct additional soil sampling to evaluate base neutral contamination.

The three BNs [benzo(a)anthracene, benzo(b)fluoranthene, and benzo(a)pyrene) detected in one surface soil sample (P61-SS1) at concentrations exceeding NJDEP NRDCSRS are constituents of asphalt and are commonly detected in soil directly beneath asphalt pavement. Soil sample P61-SS1 was collected from the 18-24-inch interval; asphalt sub-base was observed to be present in the soil sample. Thus, the Army does not plan to collect additional soil samples at Parcel 61/Building 1075 for BN analysis.

2. Previous NJDEP comments requested that the analytical parameters for soils include PCBs, due to reported historical coal storage and fuel unloading activities. The requested PCB analyses were not performed. Soil samples must be re-collected and analyzed for PCBs.

Historical operations at Parcel 61/Building 1075 area (Patterson Health Clinic) did not involve usage or disposal of PCB-containing products. Thus, the Army did not analyze for PCBs in soil samples collected in the Parcel 61/1075 area. The Army does not plan to collect additional soil samples for PCB analysis.

Parcel 69 - Building 900 Former Vehicle Repair/Motor Pool

1. The proposed NFA for soil is not acceptable. Sample analysis at this AOC should have included analysis for PCBs, due to the former waste oil tank, as stated in previous NJDEP comments. Soil samples must be re-collected and analyzed for PCBs.

Historical operations at Building 900 (tactical motor pool/vehicle repair) did not involve usage of PCB-containing products and PCBs are not suspected to have been disposed of in the former waste oil above-ground storage tank (AST) at Building 900. Thus, the Army did not analyze for PCBs in the soil samples that were collected. In addition, there is no evidence that a historical release occurred from the waste oil AST at Building 900. Thus, the Army does not plan to collect additional soil samples for PCB analysis.

2. All sediment samples collected adjacent to Parcel 69 must include PCB analysis.

The nearest surface water body to Parcel 69 is Oceanport Creek, which is 250 feet to the north of Building 900. As part of the Baseline Ecological Evaluation (BEE) report prepared by Shaw Environmental, Inc. and submitted to NJDEP on May 2011, one surface water sample was collected from Oceanport Creek and analyzed for PCBs, plus additional parameters. PCB concentrations were non-detect in the surface water sample. The findings of the BEE indicated that PCBs were not a Contaminant of Potential Ecological Concern (COPEC) at Parcel 69/Building 900. Historical operations at Building 900 did not involve usage of PCB-containing products and PCBs are not suspected to have been disposed of in the former waste oil AST at Building 900. Thus, the Army does not plan to collect additional sediment samples from Oceanport Creek for PCB analysis.

3. NJDEP concurs with the recommendations to further evaluate ground water. Pursuant to N.J.A.C. 7:26E-4.4, a remedial investigation of ground water is required. An investigation work plan must be submitted for NJDEP review and approval.

Based on PCE concentrations detected in excess of the NJDEP GWQS (1.0 µg/L) in ground water samples collected from temporary well point P69GW-1 (1.02 µg/L) during the Shaw SI, the Army plans re-sample ground water at the location of temporary well point P69GW-1. Results of the temporary well point re-sampling will be provided to the NJDEP in a future letter report.

Parcel 70 – Building 551 - Former Photoprocessing

1. NJDEP concurs with the recommendations for no further action (NFA).

The Army acknowledges the NJDEP's approval of NFA for Parcel 70 (Building 551).

Parcel 76 - 200 Area, 300 Area - Former Barracks

1. See General Comment #1 above.

See response to the General Comment #1 at Attachment D.

Parcel 79 - 400 Area Former Barracks

1. See General Comment # 1 above.

See response to the General Comment #1 at Attachment D.

Parcel 80 - Former Buildings 105 and 106 – Photoprocessing

1. The footprint of the former building 105 and 106 should be shown on Figure 3.20-1. On the current Figure, it cannot be determined where the former buildings were located in relation to the Geoprobe borings, so NFA for soil cannot be approved.

A figure depicting the approximate locations of former buildings 105 and 106 in relation to the soil borings is attached at Attachment G.

2. The NJDEP concurs with the recommendation for further evaluation of ground water. Pursuant to N.J.A.C. 7:26E-4.4, a remedial investigation of ground water is required. An RI work plan must be submitted for NJDEP review and approval.

On December 14, 2007, four metals (aluminum, beryllium, iron, and manganese) were detected at concentrations exceeding NJDEP GWQS in ground water samples collected from two temporary well points. The presence of these metals is attributed to naturally-occurring background conditions. Metals detected in ground water are due to a combination of a natural, dissolved component along with input from sample turbidity.

No VOCs or base neutral compounds were detected at concentrations exceeding NJDEP GWQS in the temporary ground water samples.

Based on the absence of COCs in ground water at Parcel 80, NFA for ground water is warranted.

Parcel 83 - Northeast MP

1. Former structures, buildings, and other areas of concern are discussed in the text and in the tables but are not indicated on the Figure 3.21-1. All areas of concern, whether existing or former structures, must be depicted on the site figures.

A figure depicting the approximate locations of former structures at Parcel 83 is provided at Attachment H. This map can also be found in the ECP Phase I – Appendix O.

2. The NFA proposal for ground water is acceptable, based on the ground water sampling results presented in the report.

No comments.
The Army acknowledges the NJDEP's response regarding the sanitary sewer system.
Electrical Substations

1. As discussed in General Comment #6, a Deed Notice and engineering controls are required at the two locations where PCBs were found above the RDCSCC of 0.49 ppm.

In December 2007, Aroclor 1260 concentrations exceeded the RDCSRS of 0.50 mg/kg in soil samples 978SS-2 (0-6") and 2700SS-D2 (0-6") at 0.84 mg/kg and 0.65 mg/kg, respectively. Both soil samples were in compliance with the NJDEP NRDCSRS of 1.0 mg/kg. The Army plans to re-sample these two locations to confirm the detected concentrations. The Army plans to provide the results to the NJDEP in a future letter report.

Should you have any questions or require additional information, please contact Ms. Wanda Green at (732)380-7064 or by email at wanda.s.green2.civ@mail.mil.

Sincerely,

John E. Occhipinti
Fort Monmouth Site Manager

cf: Wanda Green, BRAC Environmental Coordinator

ATTACHMENT A

Letter from NJDEP dated October 28, 2008, regarding the Draft Site Investigation Report.

State of New Jersey
DEPARTMENT OF ENVIRONMENTAL PROTECTION
PUBLICLY FUNDED REMEDIATION ELEMENT
P.O. BOX 413
TRENTON, NJ 08625-0413

JON S. CORZINE
Governor

LISA P. JACKSON
Commissioner

October 28, 2008

Mr. Joseph Fallon, CHMM
Directorate of Public Works
ATTN: IMNE-MON-PWE
167 Riverside Ave.
Fort Monmouth, NJ 07703

RE: Draft Site Investigation Report
Fort Monmouth, NJ

Dear Mr. Fallon:

The NJDEP Division of Remediation Management & Response (DRMR) has reviewed the Draft Site Investigation Report dated July 21, 2008 by Shaw Environmental, Inc., which was prepared under Phase II of the Environmental Condition of Property (ECP) assessment of Fort Monmouth. Our comments are attached.

You or your staff may contact me at 609-633-0766 with any questions on the enclosed comments, or any other site remediation matters at Fort Monmouth.

Sincerely,

Larry Quinn, P.E., CHMM, Site Manager
Bureau of Design and Construction

Attachment

NJDEP COMMENTS on
SITE INVESTIGATION REPORT
FORT MONMOUTH, NJ

General Comments

1. USTs at Parcels 14, 28, 51, 76, and 79. The recommendation of no further action (NFA) for the suspected underground storage tanks (USTs) is not acceptable to the NJDEP. The suspected USTs are subject to New Jersey regulations N.J.A.C. 7:26E – Technical Requirements for Site Remediation (the Technical Requirements). Under the Technical Requirements, Fort Monmouth is required to do at least the following in regard to the suspected USTs:

   a) Verify the tank contents and collect a sample of any contents for analysis as specified at 7:26E-3.9(a)3.iii,
   b) Collect and analyze at least 4 soil samples within 2 feet of each tank as specified at 7:26E-3.9(a)3.i,
   c) Conduct a site investigation for ground water in accordance with 7:26E-3.7 and 3.4,
   d) Implement remedial action and tank closure in accordance with 7:26E-6.3(b).

   The soil and ground water sampling conducted during the Army's Site Investigation (SI) are a good starting point. However, since suspected USTs have been identified by geophysical surveys, the specific sampling requirements of 7:26E-3.4, 3.7, and 3.9 must now be followed.

   The suspected USTs are also subject to N.J.A.C. 7:14B - Underground Storage Tanks. Under 7:14B-1.4(b)3, tanks of any size used to store heating oil for onsite consumption in a residential building (such as a barracks) are exempted from the requirements of the UST regulations. However, all other hazardous substance USTs of any size are regulated due to the aggregate volume provision found in the definition of "Tank capacity" in 7:14B-1.6. All confirmed regulated USTs at Fort Monmouth must be registered and closed in accordance with 7:14B.

2. Septic System at Parcel 28. Similarly, the recommendation of NFA for the septic tank, septic box, and septic piping at Parcel 28 is also unacceptable. The septic system components must be sampled as specified at 7:26E – 3.9(e)3 and the ground water sampling requirements of 7:26E-3.7 must also be followed.

3. Action Levels, page 2-14. Analytical results were compared to NJDEP criteria, specifically the non-residential direct contact soil cleanup criteria (NRDCSCC) and the impact-to-ground water soil cleanup criteria (IGWSCC). Subsequent to the start of the site investigation, NJDEP has promulgated new Soil Remediation Standards (SRS). The NJDEP has provided for a phase in period for the new SRS. If a Remedial Action Workplan (RAW) is submitted to the Department on or before December 2, 2008 (6 months after the June 2, 2008 promulgation date) then the

subsequent cleanup may be conducted using the previous SCC. However, any remedial actions not approved by NJDEP by the December 2, 2008 deadline must follow the new SRS. Detailed guidance can be found at the following website: http://www.nj.gov/dep/srp/guidance/rs/.

4. Sediments at Parcels 15, 27, 28, 39, 43, 49, 61, and 69. NJDEP concurs with the recommendations to further evaluate sediments at these Parcels as part of a facility-wide baseline ecological evaluation.

5. Indoor Air at Parcels 15, 34, 43, 50, and 52. NJDEP concurs with the recommendations to conduct one additional round of indoor air sampling at these Parcels.

6. Section 4.1.2, Surface and Subsurface Soil Investigations. This section discusses the results of soil sampling at multiple areas of concern (AOCs) relative to the NJDEP **Non-Residential** Direct Contact Soil Cleanup Criteria (NRDCSCC). Further evaluation of soil contamination is recommended at some, but not all, soil AOCs.

   The future use of most Parcels at Fort Monmouth is not yet certain. Since future residential use is possible, **all** areas of soil contamination must be delineated to the **Residential** Direct Contact Soil Cleanup Criteria (RDCSCC). Remediation of soils by the Army to the NRDCSCC prior to property transfer would be acceptable, but deed notices would be required to document remaining soil contamination above the RDCSCC, and appropriate engineering controls must be implemented and documented.

Parcel-Specific Comments

Parcel 13 – Former Barracks (Buildings 2004-2016)

1. The recommendations of NFA for soil and ground water are acceptable based upon the sampling results and the results of the geophysical survey.

2. The Report states that no suspected USTs were located by the geophysical surveys, however it further indicates that no UST removals have been documented at the locations of numerous former barracks within Parcel 13. The Report should provide a possible explanation(s) for why no USTs were found.

Parcel 14 – Northwest Portion of CWA

1. See General Comment #1 above.

Parcel 15 – Building 2700

1. The Report states that no suspected USTs were located by the geophysical surveys, however it further indicates that no UST removals have been documented at the locations of numerous former barracks within Parcel 15. The Report should provide a possible explanation(s) for why no USTs were found.

2. It is unclear why an NFA for ground water is being recommended when a ground water remediation is currently being implemented for the CW-1 area. If the Army wants to identify individual AOCs within Parcel 15 for an NFA designation, they should make that case for those individual AOCs.

3. The recommendation of NFA for soil is acceptable based upon the sampling results and the results of the geophysical survey.

4. The report states that well UST-2337-65 could not be located. If the well has been surveyed, an attempt shall be made to locate the well using the State Plane Coordinates.

Parcel 27 – Southwestern Corner CWA

1. The report states that numerous USTs were removed from this parcel and are summarized in the Phase I ECP Report. Appendix A of that document states that the Department sent UST closure approval letters for 7 of the 12 USTs that were removed, and that the Army is waiting for Department approval of the remaining 5 UST closures.

   NFA for soil and ground water cannot be approved until documentation on all 12 USTs, including the closure reports for the remaining 5 USTs, are reviewed by the NJDEP project team. NJDEP requests that the Army provide a brief summary of the 7 USTs that received Department approval. This summary should include a figure showing the former UST locations and the soil and ground water sampling locations and results.

Parcel 28 - Former Eatontown Laboratory

1. See General Comment #2 above.

2. Former installation plans and figures show three separate septic tanks and leach fields and one underground transformer vault. These potential AOCs must be shown on Figure 3.5-1 to allow comparison with sample locations.

3. Figure 3.5-2 shows that only one suspected septic tank, one suspected septic distribution tank, and one suspected pipe were found. The Report should provide a possible explanation(s) for why the suspected three septic tanks and leach fields and one underground transformer vault weren't located.

4. There is no recommendation or proposal for the former storage areas and possible former tank pads.

Parcel 34 – Building 2567

No specific comments. NJDEP hopes to review the Remedial Investigation Report and Remedial Action Workplan (dated 10-28-05) on Building 2567 in the coming months.

Parcel 38 – Former Outdoor Pistol Range (1940-1955)

1. The NFA proposal is not acceptable. Since the site may have been re-worked, the surface soil sampling results are not a reliable indicator of potential ground water contamination, and a site investigation for ground water must be performed in accordance with 7:26E-3.7. Ground water samples should be analyzed for lead.

Parcel 39 - Building 1150 (Vail Hall)

1. The report states that no metal contaminants were detected in soil above the NJDEP NRDCSCC. The recommendation of NFA for soil is acceptable, however, soil contaminants must be compared to and delineated to the RDCSCC, so that a deed notice can be filed when necessary.

Parcel 43 – Building 1122 (Do-it-yourself Auto Repair)

No specific comments. NJDEP recently provided comments on reports specific to Building 1122.

Parcel 49 - Former Squier Laboratory Complex

1. NJDEP concurs with the recommendations to conduct additional sampling of surface soils to delineate contaminants above NJDEP criteria.

2. The proposal to add benzene and bromodichloromethane to the proposed CEA for the M-18 Landfill should be included in a future CEA proposal.

3. The SI Report must include some discussion regarding the source of the VOC contaminants in ground water or the remediation of the contamination, as required by N.J.A.C. 7:26E-3.13(b)4ii(1) and N.J.A.C. 7:26E-3.13(b)4ii(4).

Parcel 50, IRP Sites FTMM-54, FTMM-55 and FTMM-61

No specific comments. The comments previously provided by NJDEP on the M-18 Landfill, Building 296, and Building 290 sites in a letter dated August 14, 2007 need to be addressed.

Parcel 51 – 750 Area, 500 Area, 600 Area, 1100 Area – Former Buildings

1. See General Comment #1 above.

Parcel 52 – Building 699 - Army Exchange Services Gas Station

No specific comments. NJDEP hopes to begin reviewing the available Remedial Action Progress Reports on Building 699 in the coming months.

Parcel 57 – Former Coal Storage and Railroad Unloading – 800 Area

1. NJDEP concurs with the general recommendation to conduct additional soil and ground water sampling. A remedial investigation (RI) of ground water is required pursuant to N.J.A.C. 7:26E-4.4. A RI workplan for all proposed investigation work shall be submitted for NJDEP approval.

2. Previous NJDEP comments requested that the analytical parameters for soils include PCBs, due to reported historical coal storage and fuel unloading activities. The requested PCB analyses were not performed. Soil sample collection and analysis for PCBs must be included in the RI work plan.

Parcel 61 – Building 1075 - Patterson Health Clinic

1. NJDEP concurs with the recommendations to conduct additional soil sampling to evaluate base neutral contamination.

2. Previous NJDEP comments requested that the analytical parameters for soils include PCBs, due to reported historical coal storage and fuel unloading activities. The requested PCB analyses were not performed. Soil samples must be re-collected and analyzed for PCBs.

Parcel 69 - Building 900 Former Vehicle Repair/Motor Pool

1. The proposed NFA for soil is not acceptable. Sample analysis at this AOC should have included analysis for PCBs, due to the former waste oil tank, as stated in previous NJDEP comments. Soil samples must be re-collected and analyzed for PCBs.

2. All sediment samples collected adjacent to Parcel 69 must include PCB analysis.

3. NJDEP concurs with the recommendations to further evaluate ground water. Pursuant to N.J.A.C. 7:26E-4.4, a remedial investigation of ground water is required. An investigation workplan must be submitted for NJDEP review and approval.

Parcel 70 – Building 551 – Former Photoprocessing

1. NJDEP concurs with the recommendations for no further action (NFA).

Parcel 76 – 200 Area, 300 Area – Former Barracks

1. See General Comment #1 above.

Parcel 79 – 400 Area Former Barracks

1. See General Comment #1 above.

Parcel 80 – Former Buildings 105 and 106 – Photoprocessing

1. The footprint of the former building 105 and 106 should be shown on Figure 3.20-1. On the current Figure, it cannot be determined where the former buildings were located in relation to the Geoprobe borings, so NFA for soil can't be approved.

2. The NJDEP concurs with the recommendation for further evaluation of ground water. Pursuant to N.J.A.C. 7:26E-4.4, a remedial investigation of ground water is required. An RI workplan must be submitted for NJDEP review and approval.

Parcel 83 - Northeast MP

1. Former structures, buildings and other areas of concern are discussed in the text and in the tables but are not indicated on the Figure 3.21-1. All areas of concern, whether existing or former structures, must be depicted on the site figures.

2. The NFA proposal for ground water is acceptable, based on the ground water sampling results presented in the report.

Sanitary Sewer System

No comments.

Electrical Substations

1. As discussed in General Comment #6, a Deed Notice and engineering controls are required at the 2 locations where PCBs were found above the RDCSCC of 0.49 ppm.

ATTACHMENT B

Letter from Army dated April 28, 2009, regarding the initial response to the NJDEP letter dated October 28, 2008.

FILE COPY

DEPARTMENT OF THE ARMY
US ARMY INSTALLATION MANAGEMENT COMMAND
HEADQUARTERS, UNITED STATES ARMY GARRISON, FORT MONMOUTH
286 SANGER AVENUE
FORT MONMOUTH, NEW JERSEY 07703-5101

Directorate of Public Works

April 28, 2009

Mr. Larry Quinn, Site Manager
New Jersey Department of Environmental Protection
Bureau of Investigation, Design and Construction
401 East State Street, P.O. Box 413
Trenton, New Jersey 08625-0413

Re: U.S. Army BRAC 2005 Site Investigation Report, Fort Monmouth, NJ, Dated 21 July 2008

NJDEP Letter, Draft Site Investigation Report, Fort Monmouth, NJ, General Comment # 1 (page 1), Dated 28 October 2008

Dear Mr. Quinn:

By way of this letter, the U.S. Army Fort Monmouth, New Jersey is responding to the above referenced comment only. Additional responses to your other comments will be forthcoming as they are developed. A copy of your letter dated 28 October 2008 is attached for reference.

The Army has evaluated the Federal and State regulatory requirements which govern the underground storage of heating oil used for onsite consumption for both residential and non-residential buildings and concluded further assessment activities are prudent at this time. Based on the facts that the subject tanks are documented in the Army Real Property Inventory records and geophysical surveys of the areas have identified tanks as highly probable to exist, further assessment and delineation of the areas will be performed.

With regard to the subject tanks, the Directorate of Public Works will conduct necessary assessment, delineation, remedial action and reporting activities in accordance with the *Technical Requirements for Site Remediation (TRSR)*, New Jersey Administrative Code (N.J.A.C.) 7:26E-(February 2002). Specific work plans and schedules will be developed and provided to the NJDEP for review and approval as required.

Should you have any questions or require any additional information, please contact Mr. Charles Appleby, Environmental Protection Specialist, at 732-532-2692 or email: Charles.Appleby@US.Army.mil

Sincerely,

Barbara A. Folk
Director, Public Works

Encl. 1: NJDEP Comments to Draft Site Investigation Report Letter dated 28, October 2008

ATTACHMENT C

Letter from the Army dated November 16, 2011, regarding the Army's response to NJDEP's comments for Parcel 15.

DEPARTMENT OF THE ARMY

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

November 16, 2011

New Jersey Department of Environmental Protection
Division of Site Remediation
Bureau of Case Management
401 East State Street, P.O Box 028
Trenton, New Jersey 08625-0028
ATTN: Matthew Turner

Re: NJDEP Correspondence (Dated October 28, 2008), Draft Site Investigation Report, Fort Monmouth, NJ

Subject: Parcel 15 – Response to Comments

Dear Mr. Turner:

The U.S. Army, Office of the Assistant Chief of Staff for Installation Management (OACSIM), has reviewed the subject comments as submitted by the NJDEP on October 28, 2008. Referenced below is a line by line response to each comment.

Background:

A review of documented UST removal locations versus the location of former buildings within Parcel 15 was conducted. Based on this review, it was determined that no UST removals have been documented at the locations of numerous former barracks within Parcel 15. In order to determine the absence/presence of formerly utilized USTs and the potential release from the USTs to the environment, geophysical surveys, soil sampling, and groundwater sampling were conducted north, northeast, and southwest of Bldg. 2700.

Geophysical Survey Investigation:

An EM survey was conducted throughout the area of Parcel 15 where former barracks were identified to determine if USTs are present. Follow-up GPR surveys were conducted where anomalies were identified during the EM surveys.

Background: Continued

• Nine targets that were associated with surface metal/debris (previously unaccounted for).

• Thirty-one targets with moderate-amplitude near-surface point target reflections indicative of areas containing small pieces of buried debris; not indicative of a UST.

• One target with the moderate-amplitude parabolic scattered reflections indicative of small pieces of scattered debris; not indicative of a UST.

Please refer to the Site Investigation Report, Fort Monmouth, (Dated July 21, 2008) for specific tables, figures, and appendices.

Geoprobe® Investigation Results:

Surface and subsurface soil samples were analyzed for TPHC. Corresponding surface and subsurface soil samples were collected for contingent VO+10 analysis. Groundwater samples were analyzed for VO+10, B/N+15, and TAL metals.

Soil:

Soil TPHC analytical results are presented in **Table 3.3-7**. TPHC was detected in seven of the 53 surface soil samples and in two of the 59 subsurface soil samples. None of the TPHC results exceeded the NJDEP NRDCSCC and RDCSCC of 10,000 mg/kg, and no detections were greater than 1,000 mg/kg; therefore, no VO analysis for soil was required.

Groundwater:

One VO, toluene, was detected at a concentration of 0.65 µg/L, which is below the GWQC of 600 µg/L.

One B/N, bis(2-ethylhexyl)phthalate, was detected in Parcel 15 groundwater samples. As shown in **Table 3.3-8**, bis(2-ethylhexyl)phthalate was detected in 15GW-3 at a concentration of 3.74 µg/L and in 15GW-4 at a concentration of 4.04 µg/L, which exceed the NJDEP GWQC of 3 µg/L. Bis(2-ethylhexyl)phthalate was not detected in the duplicate sample collected at 15GW-3 (15GW-3DUP). A commonly used plasticizer, bis(2-ethylhexyl)phthalate, is present in a wide variety of plastic products, is commonly detected in field and laboratory QC samples, and was detected in the field blank associated with Parcel 15 groundwater sampling. The contamination in the field blank was most likely the result of the polyethylene sampling tube that is commonly used for sampling wells. Therefore, it is not considered a COC in groundwater at Parcel 15.

A total of 19 metals were detected in Parcel 15 groundwater samples. Of the 19 metals detected, six (aluminum, arsenic, iron, lead, manganese, and sodium) were detected above the respective GWQC. All sample results are presented in **Table 3.3-8**. As discussed in the 1995 Site Investigation Report (47), several natural and anthropogenic factors contribute to the wide range in concentrations of metals in soils, which further impact the concentration of metals in

Background: Continued

groundwater. Soils derived from glauconitic sands contain abundant aluminum, calcium, potassium, iron, magnesium, manganese, and sodium (among others), which are likely to be present at elevated concentrations in the groundwater, particularly when sediments are entrained

in the collected groundwater samples. Aluminum, iron, manganese, and sodium were detected in Parcel 15 groundwater samples, collected from temporary wells, at concentrations above the NJDEP GWQC. Aluminum, iron, manganese, and sodium are regarded as naturally occurring metals within the native soil types at FTMM and are not considered COCs. The remaining metals detected in samples collected from temporary wells were compared to the respective GWQC and MBCs to determine COCs requiring further evaluation. The COCs are presented on **Figure 3.3-1.**

Arsenic was detected at concentrations exceeding the NJDEP GWQC of 3 µg/L in two samples, 15GW-1 (4.41 µg/L) and 15GW-4 (7.47 µg/L). However, these concentrations did not exceed the CWBC of 25.1 µg/L. In addition, arsenic is associated with the native glauconitic sands (48). The elevated arsenic concentrations in the native soil in turn influence the arsenic levels in groundwater. Lead was detected at a concentration exceeding the NJDEP GWQC of 5 µg/L in one sample (15GW-6) at a concentration of 6.41 µg/L. However, the lead concentration did not exceed the CWBC of 7.3 µg/L. Thus, arsenic and lead are not considered COCs in Parcel 15 groundwater.

Please refer to the Site Investigation Report, Fort Monmouth, (Dated July 21, 2008) for specific tables, figures, and appendices.

Summary and Conclusions

No suspected USTs were identified as a result of the geophysical surveys, and no constituents were identified above applicable NJDEP criteria in surface or subsurface soil. Four naturally occurring metal constituents common to local soils, aluminum, iron, manganese, and sodium, were detected at concentrations greater than the NJDEP GWQC. As discussed in detail in **Section 2.3.1**, high concentrations of aluminum, iron, manganese, and sodium are expected to occur due to the chemical nature of glauconitic quartzose sands deposited throughout FTMM. Since these native metals are attributed to the aquifer material and are not site-related, these metals are not considered COCs.

Two metal constituents, arsenic and lead, were detected at concentrations slightly above the NJDEP GWQC, but were detected at sporadic locations and at low concentrations from temporary well points. In addition, arsenic and lead were detected at concentrations below the CWBC. Furthermore, arsenic and lead are not constituents of # 2 fuel oil. NFA is recommended for soil and groundwater within Parcel 15.

Response to NJDEP Comments:

1. The Report states that no suspected USTs were located by the geophysical surveys, however it further indicates that no UST removals have been documented at the locations of numerous former barracks within Parcel 15. The Report should provide a possible explanation(s) for why no USTs were found.

Response: The Army can only theorize as to the disposition of the USTs associated with the former barracks located within Parcel 15. One possible scenario is that the Army removed the USTs when the barracks were demolished in order to make room for the construction of the Myer Center in 1954. Another possible scenario is that the Army may have used aboveground storage tanks to store # 2 fuel oil at the former barracks buildings. With these possible scenarios in mind, the Army developed an investigative strategy that included a comprehensive soil and groundwater investigation which was not dependent upon the results of the geophysical survey. Based upon the results of the geophysical survey, the Army can report that no abandoned USTs were detected within any of the three zones (i.e. A, B-E, and F-K) surveyed. In addition, it was also concluded, based on the results of the soil and groundwater investigation, that a "No Further Action" determination be requested from the NJDEP.

2. It is unclear why an NFA for ground water is being recommended when a ground water remediation is currently being implemented for the CW-1 area. If the Army wants to identify individual AOCs within Parcel 15 for an NFA designation, they should make that case for those individual AOCs.

Response: The NFA for groundwater does not apply to Sites CW-1 and CW-2 which are being managed under the Army's Installation Restoration Program. Numerous reports have been submitted to the NJDEP, under separate cover, for these two sites. The Army seeks an NFA for groundwater within Parcel 15 to exclude Sites CW-1 and CW-2.

3. The recommendation of NFA for soil is acceptable based upon the sampling results and the results of the geophysical survey.

Response: Agreed.

4. The report states that well UST-2337-65 could not be located. If the well has been surveyed, an attempt shall be made to locate the well using the State Plane Coordinates.

Response: The Army will do everything in its power to locate monitoring well "UST-2337-65" and properly close said well in accordance with NJDEP regulations.

Should you have any questions or require additional information, please contact Ms. Wanda Green at (732) 380-7064 or by email: Wanda.S.Green2.civ@mail.mil.

Sincerely,

John E. Occhipinti
BRAC Transition Coordinator

cf: Wanda Green, BRAC Environmental Coordinator

ATTACHMENT D

Unregulated Heat Oil Tank Summary for Parcels 14, 28, 51, 76, and 79.

Unregulated Heating Oil Tank (UHOT)
Summary

PARCEL 14
SUMMARY:

- **1 anomaly was investigated.**
- **No UHOTs were found**

PARCEL 28
SUMMARY:

- **1 anomaly was investigated.**
- **1 UHOT (550 gallon) was found and removed.**
- **No contamination was found.**
- **Site was backfilled and clean soil.**

On April 28, 2009, a single wall steel unregulated heating oil tank (UHOT) was closed by removal in accordance with the Directorate of Public Works (DPW) UHOT Management Plan for the U.S. Army Garrison, Fort Monmouth, New Jersey. The UHOT was located in an open field to the south east of Building 2525 at the Charles Wood area of Fort Monmouth. It was identified during a geophysical investigation of suspected underground anomalies conducted as part of the Phase II Environmental Condition of Property (ECP). The UHOT was a 550-gallon No. 2 heating oil tank. The fill port, vent pipe and associated supply/return piping were not present in the excavation. The tank closure and removal were performed by TECOM-Vinnell Services, Inc. (TVS).

The 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*. Soils surrounding the tank were screened visually and with air monitoring instruments for evidence of contamination. Following removal, the UHOT was inspected for holes. Holes were not noted in the UHOT and no contaminated soils were observed surrounding the tank.

Post removal samples were all less than NJDEP soil clean up criteria and as such demonstrated that no discharge had occurred.

Following receipt of the soil sampling results, the excavation was backfilled to grade with excavated soil and clean fill in compacted lifts. The excavation site was then restored to its original grade with four inches of topsoil and seeded.

Based on the post-remediation soil sampling results, there are no soils with TPH concentrations exceeding the NJDEP health based criterion of 5,100 mg/kg for total organic contaminants in the former location of the UHOT.

No Further Action is proposed in regard to the closure and site assessment of the UHOT at Bldg. 2525.

PARCEL 51

SUMMARY:

- **11 anomalies investigated.**
- **9 UHOTs were found and removed.**
- **2 of the 9 sites were cleaned and backfilled with clean soil.**
- **7 of the 9 tanks were leakers.**
- **The 7 areas were investigated, remediated and backfilled with clean soil**
- **4 new groundwater monitoring wells were installed. A total of 9 new wells will be installed.**

In order to determine the absence/presence of formerly utilized UHOTs and the potential release from the UHOTs, geophysical surveys, soil sampling, and groundwater sampling were conducted throughout the 750 Area (former motor pool), within the northern portion of the 1100 Area, and around the east and south perimeter of the 600 Area.

An electromagnetic (EM) survey was conducted throughout the three identified former buildings areas to determine if UHOTs were present. Follow-up ground penetrating radar (GPR) surveys were conducted at anomalies identified from the EM surveys. The Geophysical investigation was performed by Enviroscan. The entire geophysical report can be found as an appendix to the ECP Phase II.

The EM survey identified a total of 74 targeted EM anomalies in the part of the 750 area and several anomalies in the vicinity of 1123. The area was scanned with the EM-61 because of a large amount of surface metal, and the parking lots which comprise most of the area could only be cordoned off in small portions. The EM-61 towing rig was better suited for the necessary tight turns. Several areas in this parcel were scanned with the TW-6 only due to interference of the GPR signal by nearby buildings and trees and the presence of parked cars during the EM survey.

No anomalies indicative of UHOTs were located within the TW-6 scanning areas. Targets located on the asphalt-covered portions within the 750 Area could not be scanned with the TW-6 due to suspected high metal content fill material; therefore, only GPR was utilized in these areas.

Eleven suspected UHOTs were identified during the geophysical survey. No constituents were identified above applicable NJDEP criteria in surface or subsurface soil. Soil and analytical results suggest that a release has not occurred. In light of the absence of evidence of a release to the environment, NFA for soil and the suspected UHOTs in Parcel 51 is recommended. One COC, 2-methylnaphthalene, was detected in groundwater above the NJDEP GWQS. Further evaluation of 2-methylnaphthalene in groundwater is recommended. The 2-methylnaphthalene was detected in a well but the well is not located in the vicinity of Bldg. 750.

The analytical results for all of post-remediation soil samples collected from the closure excavation at UHOTs No. 1123 B & 1123 C were below the NJDEP soil cleanup standards for total organic contaminants and semi-volatile organic compounds. As part of Fort Monmouth's

soil remediation program, soils are to be excavated to below 1,000 mg/kg. This ensures that the contingency analysis is not performed and eliminates any potential of chasing one of the surrogate fuel oil base/neutral compounds, thus reducing the volume soils excavated and cost of UHOT removals. No post remedial samples collected from the individual UHOT removals were in excess of the contingency value of 1,000 mg/kg necessary for additional base/neutral analysis.

The findings of glauconite sands and clays at the excavations coincide with lithological data at other borings and excavations post wide. A more detailed and in depth discussion of the underlying glauconite will be presented to NJDEP at a later time.

Based upon the analytical data from the post excavation samples for 1123B & 1123C, No Further Action (NFA) is proposed in regard to the closure and remedial investigation of UHOT No.1123B & 1123 C at Building 1123, ECP Parcel 51.

PARCEL 76

SUMMARY:

- **8 anomalies investigated.**
- **7 UHOTs were found and removed.**
- **5 of the 7 tanks removed were leakers.**
- **4 GW monitoring wells were installed.**

The suspected UHOT locations were gridded and flagged out. Based upon the GPS locations, test trenches were excavated. The UHOTs were found between three and five feet below ground surface, with the typical depth of the excavation to approximately nine feet.

UHOTs 538, 541, 542, 540, 544, 543, and 539 were removed in accordance with established protocol, if any discharges were noted, the Army notified NJDEP. In all cases, post excavation samples were collected. If releases were noted they were collected after the removal of visible petroleum impacted soils.

UHOTs 540 and 544 were removed without any observed releases or discharges. A test trench was excavated at 537 in an attempt to locate a potential UHOT as indicated by the geophysical survey. No UHOT was found to be present at this location. Five of the seven UHOTs were found to be leaking into the surrounding soils.

Following receipt of all post-excavation soil sampling analytical results, each excavation was backfilled to grade with a combination of uncontaminated excavated soil, bank run clean sands, and crushed stone. The excavation site was then restored to its original condition with top soil and grass seed.

Groundwater was encountered in the excavations and upon completion of backfilling four monitoring wells were installed to ascertain any impact to groundwater as a result of the discharges from the UHOTs. Two consecutive rounds of groundwater samples were collected in a 30 day period to demonstrate on adverse impact of the groundwater in the vicinity of the leaking UHOTs.

Prior to the installation of the monitoring wells associated with the UHOT excavations, one upgradient and one downgradient well was installed. The initial round of groundwater sampling indicated that three VOCs were detected in the upgradient well (200MW01). Of the three compounds, one was in excess of GWQS. Bromodichloromethane was found to be in excess of the standard. This compound in excess of the GWQS is a trihalomethane. Trihalomethanes are associated with drinking water disinfection. An investigation of drinking water lines in proximity to the upgradient well found one of the drinking water supply lines to be leaking. The DPW ordered the line repaired and in subsequent lab analysis, the trihalomethanes were not-detected (ND) in the monitoring well.

Analytical data from the post excavation samples and groundwater samples demonstrated that there were no compounds in excess of the total organic compound values for soil or the groundwater quality standards.

PARCEL 79

SUMMARY:

- **8 anomalies were investigated.**
- **8 tanks were found and removed.**
- **7 of the 8 tanks were leakers.**
- **The 8 areas were investigated, remediated and backfilled with clean soil.**

The UHOTs were identified during a geophysical survey conducted by Enviroscan of several ECP Parcels where USTs and/or UHOTs may be present.
The re-evaluation of the Environmental Condition of Property (ECP) Parcel 79 Area (400 - Area) was completed by examining the locations of the previously identified USTs. A determination was made from historic aerial photos and documents where four USTs, if present, were most likely to be located. Enviroscan then mobilized a Geonics EM- 61 MK2 metal detector to collect background data, including areas known to contain targets previously labeled "Possible USTs" and to scan the area most likely to contain the undelineated UST.

The areas where the potential unregulated heating oil tanks (UHOTs) were marked out based up the data from the geophysical report. In the 400 – Area (ECP Parcel 79), four potential anomalies were identified. The suspected UHOT locations were gridded and flagged out. Based upon the GPS locations test trenches were excavated. The UHOTs were found between three and five feet below ground surface, with the typical depth of the excavation to approximately nine feet. Based on other available information, three additional UHOTs were identified and removed. One was masked by the electronic noise of subsurface utilities, the other was masked by the footprint of a building, and the third was mischaracterized as a subsurface anomaly.

UHOTs 450, 444, 448, 440, 437, 441, 451 and 445 were removed in accordance with established protocol, if any discharges were noted, it was reported to the US Army and in turn they were called into NJDEP, at the tank removal locations; in all cases post excavation samples were collected. If releases were noted they were collected after the removal of visible petroleum impacted soils.

Following receipt of all post-excavation soil sampling analytical results, each excavation was backfilled to grade with a combination of uncontaminated excavated soil, bank run clean sands,

and crushed stone. The excavation site was then restored to its original condition with top soil and grass seed.

Groundwater was encountered in the excavations and upon completion of backfilling. The DPW is currently in the process of having monitoring wells installed to ascertain the affects that the diesel fuel releases had on the local groundwater conditions.

UHOT 445 contained approximately 75 gallons of material, and when removed from the ground, no breaches, holes or signs of release were observed by the subsurface evaluator.

At Bldg. 449, no UHOT was found; however, olfactory and visual evidence of a release was evident. Samples were collected and the results indicated that TPH were in excess of the NJDEP health based soil criteria. NJDEP was notified of the release.

Following receipt of all post-excavation soil sampling Total Petroleum Hydrocarbon (TPH) results, the excavations were backfilled to grade with a combination of uncontaminated overburden soil, clean bank run sand, and crushed stone. The crushed stone was placed at depth below the water table; sand was placed on top of the stone and non-contaminated overburden was placed over the sand. The excavation sites were then restored to its original condition top soil and grass seed.

Based on the post-excavation soil sampling results, soils present are below the NJDEP health based criteria for total organic compounds and there are no detected semi-volatile organic compounds (SVOCs) that exceed the NJDEP Residential Direct Contact Soil Cleanup Standards.

Decommissioning activities for the UHOTs complied with all applicable federal, state, and local laws and ordinances in effect at the date of decommissioning. These laws included, but were not limited to: N.J.A.C. 7:14B-1 et seq., N.J.A.C. 5:23-1 et seq., and Occupational Safety and Health Administration (OSHA) 1910.146 & 1910.120. The closure and subsurface evaluation of the UHOTs were conducted by a NJDEP licensed US ARMY employee.

Approximately 6,900 gallons of liquid was pumped out of the UHOTs by Lorco Petroleum Services, Inc. of Elizabeth, New Jersey into a tank truck and transported to their NJDEP-approved petroleum recycling and disposal facility.

After the UHOTs were removed from the excavations, they were staged on an impervious surface, labeled and examined for holes. Holes in the tank were observed during the inspection by the Subsurface Evaluator. Soils surrounding the UHOTs were screened both visually and with an OVM for evidence of petroleum contamination. Where soil staining and an odor of petroleum hydrocarbons were observed; it was determined that remedial soil excavation would be conducted prior to post excavation sampling.

U.S. Army Garrison
Fort Monmouth, New Jersey

Underground Storage Tank Closure Report

Charles Wood Area – Bldg. 2525 (ECP Parcel 28)

NJDEP UHOT Registration No.:
UHOT No. 2525

June 2011

UNDERGROUND STORAGE TANK CLOSURE REPORT

CHARLES WOOD AREA – BLDG. 2525 (ECP PARCEL 28)
NJDEP UHOT REGISTRATION NO.:

JUNE 2011

PREPARED FOR:

U.S. ARMY GARRISON, FORT MONMOUTH, NJ
DIRECTORATE OF PUBLIC WORKS
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EXECUTIVE SUMMARY

On April 28, 2009, a single wall steel unregulated heating oil tank (UHOT) was closed by removal in accordance with the Directorate of Public Works (DPW) UHOT Management Plan for the U.S. Army Garrison, Fort Monmouth, New Jersey. The UHOT was located in an open field to the south east of Building 2525 at the Charles Wood area of Fort Monmouth. It was identified during a geophysical investigation of suspected underground anomalies conducted as part of the Phase II Environmental Condition of Property (ECP). The UHOT was a 550-gallon No. 2 heating oil tank. The fill port, vent pipe and associated supply/return piping were not present in the excavation. The tank closure and removal were performed by TECOM-Vinnell Services, Inc. (TVS).

The 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*. Soils surrounding the tank were screened visually and with air monitoring instruments for evidence of contamination. Following removal, the UHOT was inspected for holes. Holes were not noted in the UHOT and no contaminated soils were observed surrounding the tank.

Post removal samples were all less than NJDEP soil clean up criteria and as such demonstrated that no discharge had occurred.

The post removal samples showed unequivocally that no petroleum release had occurred.

Following receipt of the soil sampling results, the excavation was backfilled to grade with excavated soil and clean fill in compacted lifts. The excavation site was then restored to its original grade with four inches of topsoil and seeded.

Based on the post-remediation soil sampling results, there are no soils with TPH concentrations exceeding the NJDEP health based criterion of 5,100 mg/kg for total organic contaminants in the former location of the UHOT.

No Further Action is proposed in regard to the closure and site assessment of the UHOT at Bldg. 2525.

1.0 UNDERGROUND STORAGE TANK DECOMMISSIONING ACTIVITIES

1.1 OVERVIEW

ECP Parcel 28 is located in the Charles Wood Area (CWA) and encompasses Bldg 2525 – the former Eatontown Laboratory complex. Bldg 2525 was constructed in 1941-1942. The Eatontown Signal Laboratory was renamed Watson Laboratories in 1945 and subsequently moved to Rome, New York in 1951. It was reported that Bldg 2525 had been a chemical laboratory known as Eatontown Labs around the 1940s. This information was confirmed by Fort Monmouth (FTMM) site plans showing the Eatontown Laboratory complex. Plan No. 6148/1015 dated September 3, 1941, shows the Eatontown Laboratory complex, including Bldg 2525 (numbered 1 through 6 for the six bays) and nine other buildings numbered 7 through 15. This plan also depicts three separate septic tanks and leach fields and one underground transformer vault. The main sanitary sewer line from the building is shown to discharge to a septic tank and leach field east of the building. A review of the Directorate of Public Works (DPW) map and engineering drawings repository indicated a 2-inch "acid proof drain" leading from Bay 1 to a dry well southeast of the building. Floor drains were shown to discharge to the brook northwest of the building. Building revitalization plans show all floor drains were later connected to the sanitary sewer system. Bldg 2525 was included in the Watson Laboratory complex in the mid-1940s. Crystal growing and processing operations were conducted in the Watson Laboratory building located in the southwest portion of the CWA in the early 1950s. Operations included cleaning of crystals, quartz etching, soldering, and gold (and other metal) plating, which was conducted in Bldg 2532. These operations involved chemicals such as carbon tetrachloride, ammonium bifluoride, cadmium sulfate, and sulfuric acid. Crystal etching was also noted in Bldg 2538 using ammonium bifluoride. Other processes associated with the Watson Laboratories included machining of metals and re-melting lead in Bldg 2533; growing of crystals and physical chemistry in Bldg 2534; and machining of crystals in Bldg 2538. In 1951, the laboratories were moved to Rome, New York.

Following the 1951 Watson Laboratories move, the Aviation Research and Development Command Laboratory was moved from the Myer Center to Bldg 2525. This laboratory operation occupied the building until 1978. A 1978 IH Survey reported ozalid reproduction in Room 5101 of Bldg 2525. Building revitalization plans show all floor drains connected to the sanitary sewer system. No sumps or floor drains were noted during the 2006 Visual Site Inspection (VSI). The use of the building has been strictly administrative since the late 1990s, as confirmed during the VSI. Prior to 1997, the building was used to house electronics laboratories. No chemical usage was associated with the electronics laboratories. Geothermal well fields used for the heating of facilities within Parcel 28 are present at multiple locations throughout the area.

In order to determine if any contamination exists resulting from former septic tank discharges that once serviced Bldg 2525, four test pits were excavated in an open field east of Bldg 2525 and Heliport Drive. Test pits P28-TP1; 3 were excavated within the boundaries of the former leaching field, and test pits P28TP-2; 4 were excavated directly downgradient of former leaching pool structures. Top soil was observed to extend from ground surface to a depth of 0.5 ft bgs. The former leaching field was confirmed to still be in place through the observance of a 2-ft layer of sand and gravel underlain by a layer of engineered gravel 4 ft in thickness that extended to a depth of 6.5 ft bgs. Soil sample depths at P28-TP1; 3, for non-VO and VO analysis, were contingent upon visual observations (i.e., depth to water table, thickness of layered engineered gravel) and field screening results. Based upon field observations at P28-TP1;3, three soil samples (including one duplicate sample) were collected at the 6-inch interval below the layer of engineered gravel, approximately 6.5 to 7.0 ft bgs. This depth coincided with the 6-inch interval directly above the water table. Soil sample depths at P28-TP2; 4, for non-VO and VO analysis, were contingent upon visual observations (i.e., depth to water table, depth below leaching pool structure) and field screening results. Based upon field observations at P28-TP2, one soil sample was collected below the leaching pool structure at approximately 4.5 to 5.0 ft bgs, and one soil sample, P28-TP2-B, was collected at the 6-inch interval directly above the water table (5.5 to 6.0 ft bgs). Due to the close proximity of groundwater to the leaching pool

Test Pit 5 (P28-TP5) was excavated within the boundaries of a former leaching field. P28-TP5 was originally planned to be located southeast of Bldg 2525 in order to investigate the location of a former drywell. This test pit was relocated upon preliminary evaluation of geophysical survey results that did not reveal any anomalous features that would represent a dry well. The test pit was relocated northeast of Bldg 2525 in order to investigate the septic system and leach field that was associated with former Bldgs T-7 and T-10 Soil sample depths for non-VO and VO analysis were contingent upon visual observations (i.e., depth to water table, thickness of layered engineered gravel) and field screening results. Based upon field observations at P28-TP5, two soil samples (including one duplicate sample) were collected at the 6-inch interval below the layer of engineered gravel, approximately 6.0 to 6.5 ft bgs. This depth coincided with the 6-inch interval directly above the water table. No visual or olfactory evidence of impacted soil was noted.

The results of this sampling event found no contamination above the NJDEP soil and groundwater criteria.

The geophysical surveys identified a total of 23 target EM anomalies. In summary, GPR scanning of the 23 targets revealed:

- Seven targets that could not be relocated with the TW-6 because the targets were too small to be re-occupied, and therefore are most likely not a drywell, UHOT, or septic tank. • Three targets with the characteristics of a utility.

- • Two targets with moderate-amplitude near-surface point target/anomaly indicative of small pieces of buried debris; not indicative of a UHOT, drywell, or septic tank.

- • One target with the high-amplitude parabolic reflections indicating a possible UHOT (P28-8).

These areas are thought to contain possible remnant septic system features. Several anomalies were delineated. In Area A, a roughly 4-ft x 6-ft non-metallic anomaly was delineated and may represent a former septic holding tank reported to have been in place in that area. In Area B, a high-amplitude non-metallic linear anomaly was partially delineated and is suspected to be the former supply pipe to a septic distribution box which was delineated in the EM survey. Follow-up GPR scanning showed a 10-ft x 10-ft high-amplitude flat anomaly characteristic of a boxshaped septic tank. No other features of the suspected septic systems in Areas A and B were observed. In summary, no drywell was identified within Parcel 28; however, one possible UHOT (P28-8), one suspected septic holding tank, and one suspected septic distribution box and associated piping were identified.

Based upon the findings of the geophysical survey, TVS investigated the subsurface anomaly. Based on the GPS locations of the metallic object, an investigation was conducted. Upon removing the overburden, the UHOT was identified.

Decommissioning activities for UHOT No.: 2525a complied with all applicable federal, state and local laws and ordinances in effect at the date of decommissioning. These laws included but were not limited o: *N.J.A.C. 7:14B-1 et seq., N.J.A.C. 5:23-1 et seq.*, and Occupational Safety and Health Administration (OSHA) 1910.146 & 1910.120. The closure and subsurface evaluation of the UHOT was conducted by a NJDEP licensed TVS employee.

This UHOT Closure and Remedial Investigation 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 report provides a summary of the UHOT decommissioning activities. Section 2 describes the remedial investigation activities. Conclusions and recommendations, including the results of the soil sampling investigation, are presented in Section 3.

1.2 SITE DESCRIPTION

Building 2525 is located in the eastern portion of the Charles Wood Area of Fort Monmouth, as shown on Figure 1. UHOT No. 2525a was located 50 feet southwest of Building 2525. The fill port, vent pipe and appurtenant piping was not encountered in the excavation. A site map is provided on Figure 2. The previously unknown tank was discovered during a geophysical investigation of the general area. Review of historical maps concluded that the tank was used to supply heating oil to former building 2525.

1.2.1 Geological/Hydrogeological Setting

The following is a description of the geological/hydrogeological setting of Bldg. 2525. 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.

Fort Monmouth lies within the Outer Coastal Plain subprovince of the New Jersey section of the Atlantic Coastal Plain physiographic province, which generally consists of a seaward-dipping wedge of unconsolidated sediments including interbedded clay, silt, sand, and gravel. To the northwest is the boundary between the Outer and Inner Coastal Plains, marked by a line of hills extending southwest, from the Atlantic Highlands overlooking Sandy Hook Bay, to a point southeast of Freehold, New Jersey, and then across the state to the Delaware Bay. These formations of clay, silt, sand, and gravel formations were deposited on Precambrian and lower Paleozoic rocks and typically strike northeast-southwest, with a dip that ranges from 10 – 60 feet per mile. Coastal Plain sediments date from the Cretaceous through the Quaternary Periods and are predominantly derived from deltaic, shallow marine, and continental shelf environments.

The property is located within the outer fringe of the Atlantic Coastal Plain Physiographic Province, of New Jersey, approximately 20 miles south of Raritan Bay. This province is characterized by a wedge-shaped mass of unconsolidated to semi-consolidated marine, marginal marine and non-marine deposits of clay, silt, sand, and gravel. These sediments range in age from Cretaceous to Holocene and lie unconformably on pre-Cretaceous bedrock consisting of metamorphic schists and gneiss, with local occurrences of basalts, sandstone, and shale (Zapecza, 1984). These sediments trend northeast-southwest and dip southeast toward the Atlantic Ocean. These sediments thicken southeastward from the Piedmont-Coastal Plain Province boundary to approximately 4,500 feet near Atlantic City, New Jersey. During the Cretaceous and Tertiary time period, sediments were deposited alternately in flood plains and in marine environments during sea transgression and sea regression periods. The formations record several major transgressive/regressive cycles and contain units that 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).

Regressive upward coarsening deposits, such as Englishtown and Kirkwood Formations and the Cohansey Sand are usually aquifers, while transgressive deposits, such as the Merchantville, Marshalltown, and Navesink Formations, act as confining units. The thicknesses of these units vary greatly, ranging from several feet to several hundred feet, and thicken to the southeast.

The eastern half of the Main Post is underlain by the Red Bank Formation, ranging in thickness from 20-30 feet, while the western half is underlain by the Hornerstown Formation, ranging in thickness from 20-30 feet. The predominant formation underlying the Charles Wood Area is also the Hornerstown, with small areas of Vincentown Formation intruding in the southwest corner. Sand and gravel deposited in recent geologic times lie above these formations. Interbedded sequences of clay serve as semi-confining units for groundwater. The mineralogy ranges from quartz to glauconite.

Udorthents-Urban land is the primary classification of soils on Fort Monmouth, which have been modified by excavating or filling. Soils at the Main Post include Freehold sandy loam, Downer sandy loam, and Kresson loam. Freehold and Downer are somewhat well drained, while Kresson is a poorly drained soil. The Charles Wood Area has sandy loams of the Freehold, Shrewsbury, and Holmdel types. Shrewsbury is a hydric soil; Kresson and Holmdel are hydric due to inclusions of Shrewsbury. Downer is not generally hydric, but can be.

Local Geology

Fort Monmouth lies in the Atlantic and Eastern Gulf Coastal Plain groundwater region and is underlain by underformed, unconsolidated to semi-consolidated sedimentary deposits. The chemistry of the water near the surface is variable with generally low dissolved solids and high iron concentrations. In areas underlain by glauconitic sediments, the water chemistry is dominated by calcium, magnesium, and iron (*e.g.* Red Bank and Tinton sands). The sediments in the vicinity of Fort Monmouth were deposited in fluvial-deltaic to nearshore environments. The water table is generally shallow at the installation; water is typically encountered at depths ranging from 2 to 9 feet below ground surface (bgs) and in certain areas fluctuates with the tidal action in Parkers and Oceanport creeks at the Main Post.

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 (Minard).

"Arsenic and lead are naturally occurring in soil and can vary widely. All soils contain naturally-occurring arsenic and lead in some amount (Kabata-Pendias and Pendias, 1984). In general, the concentrations of arsenic in any particular soil are dependent upon the parent material and the soil forming processes. Because the soil forming processes are relatively consistent in New Jersey, differences in arsenic concentrations depend primarily on the soil parent material and past and present land use (Motto, Personal comm., 1997).

Because the underlying geologic materials vary widely throughout New Jersey, naturally occurring concentrations of metals in New Jersey soils also vary widely. Even though soils within a specific soil series can be similar in texture and color, the mineral and organic matter composition of soil tend to be heterogeneous. As a result, concentrations of metals in adjacent soil samples can vary substantially over distances of a few feet.

Based on a Department (NJDEP) survey of background concentrations of metals in soil in rural and suburban areas of the state, non-agricultural soils contained 0.02 – 22.7 ppm of arsenic with an average 3.25 ppm and less than 1.2- 150 ppm of lead with an average of 19.2 ppm (Fields, et al., 1993). A statistical test was conducted to determine the correlation between sand, silt and clay content of the samples and metal concentrations. Samples containing higher clay content tended to have higher concentrations of most metals, including arsenic and lead (Fields, et al., 1993).

While naturally-occurring lead concentrations have not been detected above the Department's residential soil cleanup criteria in New Jersey, elevated arsenic concentrations have been found. Higher concentrations of naturally-occurring arsenic have been specifically associated with soils containing glauconite. The US Geological Survey found arsenic concentrations generally lower than 10 ppm in sandy soils from undeveloped areas, but concentrations were as large as 40 ppm in samples containing higher clay content (Barringer, et al., 1998).

Soil sampling conducted as part of site remediation activities have shown glauconite soils to commonly contain arsenic concentrations of 20-40 ppm and range as high as 260 ppm (Schick, Personal comm., 1998).

The Department is currently involved in a research project with the New Jersey Geological Survey investigating metal levels in glauconite soils." *Findings and Recommendations for Remediation of Historic Pesticide Contamination, Historic Pesticide Contamination Task Force, Final Report March 1999*

Currently, the US Army at Fort Monmouth is conducting a correlation study to determine the relative impact of the ubiquitous glauconitic silty sands and clays and the concentrations of dissolved arsenic observed in a number of monitoring wells on the post. Upon the completion of the study, the results will be provided to NJDEP for review and comment. It is the intent of the US Army to demonstrate that the preponderance of the dissolved arsenic is a function of soil type and chemistry and is not anthropogenic in nature.

Hydrogeology

The water table aquifer in the Main Post and Charles Wood areas are 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. The Hornerstown Formation acts as an upper boundary of the Red Bank aquifer, but it might yield enough water within its outcrop to supply individual household needs. The Red Bank outcrops along the northern edges of the Installation, and contains two members, an upper sand member and a lower clayey sand member. The upper sand member functions as the aquifer and is probably present on some of the surface of the Main Post and at a shallow depth below the Charles Wood Area. The Hornerstown and Red Bank formations overlay the larger Wenonah-Mount Laurel aquifer.

Based on records of wells drilled in the Main Post area, water is typically encountered at depths ranging from 2 to 9 feet below ground surface (bgs). According to Jablonski, wells drilled in the Red Bank and Tinton Sands may yield 2 to 25 gallons per minute (gpm). Some local well owners have reported acidic water that requires treatment to remove iron. Acid sulfate soils are naturally occurring soils, sediments or organic substrates (e.g. peat) that are formed under waterlogged conditions. Soil and sediment materials rich in iron sulfide tend to be very dark and soft. Iron sulfides can react rapidly when they are disturbed (i.e. exposed to oxygen). Pyrite will tend to occur as more discrete crystals in soil and organic matter matrices and will react more slowly when disturbed.

The oxidation of iron sulfide in the potential acid sulfate soil materials (sulfidic material) may result in the formation of actual acid sulfate soil material or sulfuric material.

These soils contain iron sulfide minerals (predominantly as the mineral pyrite) or their oxidation products. Soil horizons that contain sulfides are called 'sulfidic materials' (Isbell 1996; Soil Survey Staff 2003) and can be environmentally damaging if exposed to air by disturbance. Exposure results in the oxidation of pyrite.

1.3 HEALTH AND SAFETY

Work site health and safety hazards were minimized during all decommissioning activities. All areas which posed a vapor hazard were monitored by a qualified individual utilizing a calibrated photo-ionization 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).

1.4 REMOVAL OF UNDERGROUND STORAGE TANK

1.4.1 General Procedures

- All underground utilities were marked out by the respective trade shops or utility contractor prior to excavation activities.
- All activities were carried out with high regard to safety and health and safeguarding of the environment.
- All excavated soils were visually examined and screened with an OVM for evidence of contamination. Potentially contaminated soils were identified and logged during closure activities.
- An NJDEP certified Subsurface Evaluator was present during all closure and remediation activities.

1.4.2 Underground Storage Tank Excavation

During decommissioning activities, surficial soil was carefully removed to expose the UHOT. No liquids were encountered in the tank upon being exposed.

After the UHOT was removed from the excavation, it was staged on an impervious surface, labeled and examined for holes. Holes in the tank were observed during the inspection by the Subsurface Evaluator. Soils surrounding the UHOT were screened visually and with an OVM for evidence of contamination. No soil staining or an odor of petroleum hydrocarbons were observed upon the removal of the UHOT.

1.5 UNDERGROUND STORAGE TANK DECOMMISSIONING AND DISPOSAL

Subsequent to disposal, the UHOT was purged with air to remove vapors prior to cutting. A 4 foot by 3 foot access hole was made in the UHOT using a pneumatic ripper gun with a non-sparking bit. The UHOT was cleaned first with rubber squeegees and then with adsorbent material broomed on the sidewalls and bottom.

The adsorbent material was then drummed and subsequently placed into Ft. Monmouth's 'Oil Spill Debris' roll-off container for proper disposal. The atmosphere in and around the tank was monitored using an OVM and an Oxygen/Lower Explosive Level (LEL) meter to ensure safe working conditions during cutting and cleaning activities.

The tank was then transported by TVS to Red Bank Recycling Auto Wreckers, Inc. 64 Central Ave. Red Bank, NJ for disposal in compliance with all applicable regulations and laws. Refer to Appendix C for UHOT disposal certificate.

The Subsurface Evaluator labeled the UHOT with the following information:

- site of origin
- NJDEP UHOT Facility ID number
- date of removal
- size of tank
- previous contents of tank

1.6 MANAGEMENT OF EXCAVATED SOILS

Based on OVM air monitoring and visual observations, no petroleum impacted soils were found. Overburden soils and non-impacted materials were segregated and used as fill materials.

2.0 REMEDIAL INVESTIGATION ACTIVITIES

2.1 OVERVIEW

The Remedial Investigation was managed by U.S. Army DPW personnel. All analyses were performed and reported by Fort Monmouth Environmental Testing Laboratory (FTMEL), 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 (2005). Sampling frequency and parameters analyzed complied with the NJDEP document *Technical Requirements for Site Remediation, 7:26E-3.9* (June 7, 1993 and revisions dated June 2, 2008) which was the applicable regulation at the date of the closure. All records of the Remedial Investigation activities are maintained by the Fort Monmouth DPW Environmental Office.

The following Parties participated in Closure and Remedial Investigation Activities.

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

- Subsurface Evaluator, Tank Closure: 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 (FTETL)
  Contact Person: Dean Tardiff
  Phone Number: (732) 532-4359
  NJDEP Laboratory Certification No.: 13461

2.2 FIELD SCREENING/MONITORING

Field screening was performed by a NJDEP certified Subsurface Evaluator using an OVM and visual observations to identify potentially contaminated material. Soils were removed from the excavation surrounding UHOT, and when the UHOT was removed from the ground, no evidence of holes, breeches or other defects were found. No evidence of a release was observed in the soils surrounding the UHOT.

2.3 SOIL SAMPLING

On April 28, 2009 post-excavation samples were collected to confirm that no discharge had occurred.

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 post-removal soil samples were collected using stainless steel trowels. After collection, the samples were immediately placed on ice in a cooler and delivered to FTMETL for analysis.

3.0 CONCLUSIONS AND RECOMMENDATIONS

3.1 SOIL SAMPLING RESULTS

The post removal samples were collect from three locations on April 28, 2009, to evaluate soil conditions following removal of the UHOT. All samples were analyzed for TPH. The post-remediation soil sample results were compared to the NJDEP health based criterion of 5,100 mg/kg for total organic contaminants (N.J.A.C. 7:26D and revisions dated June 2, 2008). 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 D.

The post tank removal samples demonstrated that none was in excess of 5,100 mg/kg or even the contingency analytical threshold of 1,000 mg/kg. As such no release was evidenced.

3.2 CONCLUSIONS AND RECOMMENDATIONS

The analytical results for all of post-remediation soil samples collected from the UHOT closure excavation at UHOT No. 2525 were below the NJDEP soil cleanup criteria for total organic contaminants and semi-volatile organic compounds.

No Further Action is proposed in regard to the closure and remedial investigation of UHOT No. 2525 at Bldg. 2525 at the Charles Wood Area, Fort Monmouth, NJ.

APPENDIX A

CERTIFICATIONS

APPENDIX B

WASTE MANIFEST

APPENDIX C

UHOT DISPOSAL CERTIFICATE

APPENDIX D

PHOTO DOCUMENTATION

APPENDIX E

SOIL ANALYTICAL DATA PACKAGE

TABLE 1

SUMMARY OF LABORATORY ANALYSIS
FT. MONMOUTH, BUILDING 2525 (ECP Parcel 28)
April 28, 2009

SAMPLE ID	LAB SAMPLE ID	SAMPLE DATE	SAMPLE MATRIX	ANALYTICAL PARAMETER	ANALYTICAL METHOD
P28-8 A N. End	9017001	28-Apr.-09	Soil	TPH	NJDEP Method OQA-QAM-025
P28-8-B S. End	9017002	28-Apr.-09	Soil	TPH	NJDEP Method OQA-QAM-025
P28-8 Piping	9017003	28-Apr.-09	Soil	TPH	NJDEP Method OQA-QAM-025

ABBREVIATIONS:
TPH = Total Petroleum Hydrocarbons, NJDEP Method OQA-QAM-025 (10/97)

TABLE 2

SUMMARY OF LABORATORY ANALYTICAL RESULTS
SUMMARY OF LABORATORY ANALYSIS

FT. MONMOUTH, BUILDING 2525 (ECP Parcel 28)
April 28, 2009

TOTAL PETROLEUM HYDROCARBONS

SAMPLE ID	LAB SAMPLE ID	SAMPLE LOCATION	SAMPLE DEPTH (in feet)	MATRIX	TPH RESULT S mg/kg
P28-8 A	9017001	North End	6.0 – 6.5'	Soil	ND
P28-8 B	9017002	South End	6.0 – 6.5'	Soil	ND
P28-8 C	9017003	Piping	6.0 – 6.5'	Soil	ND

ABBREVIATIONS:
mg/kg = milligrams per kilogram = parts per million (ppm)
ND = Compound Not Detected

Gray shading indicates exceedance of NJDEP health based criterion of 5,100 ppm total organic contaminants

Top tank exposed, note no piping found at tank

Tank removed from excavation, no visible holes present

Clean excavation after removal of UHOT

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U.S. Army Garrison

Fort Monmouth, New Jersey

Unregulated Heating Oil Tank Remedial Investigation and Closure Report

ECP Parcel 51

Main Post – Bldg. 1123

NJDEP UST Registration No. 1123B & 1123C

NJDEP Spill No.: 09-09-1611-16/09-09-21-1213-31

June 2011

UNDERGROUND STORAGE TANK CLOSURE AND REMEDIAL INVESTIGATION REPORT

ECP PARCEL 51

MAIN POST – BLDG. 1123
NJDEP UST REGISTRATION NO.: 1123B &1123C
NJDEP SPILL NO.: 09-09-1611-16/09-09-1213-13

JUNE 2011

PREPARED FOR:

U.S. ARMY GARRISON, FORT MONMOUTH, NJ

DIRECTORATE OF PUBLIC WORKS
BUILDING 173
FORT MONMOUTH, NJ 07703

PREPARED BY:

TECOM-VINNELL SERVICES, INC.
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EXECUTIVE SUMMARY

Parcel 51 is located in the central portion of the Main Post and encompasses the 500 Area, 600 Area, 750 Area, and 1100 Area former buildings. Plan No. 506, "Gas and Fuel Storage Tanks Distribution System" dated January 22, 1956, was reviewed for the Main Post as part of the Phase I Environmental Condition of Property (ECP). The plan depicts numerous fuel oil UHOTs that existed within Parcel 51 in 1956 in association with the former buildings.

Numerous UHOTs associated with former and current buildings within the 500, 600, and 1100 Area have been removed under the FTMM UST program and are summarized within the FTMM Phase I ECP Report. A review of documented UST removal locations versus the location of former buildings within ECP Parcel 51 was conducted.

Based on this review, it was determined that no UHOT removals have been documented at the locations of numerous former buildings within Parcel 51 throughout the 750 Area (current motor pool), within the northern portion of the 1100 Area, and around the east and south perimeter of the 600 Area. At the time of the generation of the FTMM Phase II ECP Report, a soil investigation and remedial action was recently conducted in portions of the 400, 700, and 800 Bldg areas. The only portion of Parcel 51 that was included within this investigation was the southwestern corner of the parcel associated with Bldgs 787, 788, and 789.

In order to determine the absence/presence of formerly utilized UHOTs and the potential release from the UHOTs, geophysical surveys, soil sampling, and groundwater sampling were conducted throughout the 750 Area (current motor pool), within the northern portion of the 1100 Area, and around the east and south perimeter of the 600 Area.

An electromagnetic (EM) survey was conducted throughout the three identified former buildings areas to determine if UHOTs were present. Follow-up ground penetrating radar (GPR) surveys were conducted at anomalies identified from the EM surveys. The Geophysical investigation was performed by Enviroscan. The entire geophysical report can be found as an appendix to the ECP Phase II.

The EM survey identified a total of 74 targeted EM anomalies in the part of the 750 area and several anomalies in the vicinity of 1123. The area was scanned with the EM-61 because of a large amount of surface metal, and the parking lots which comprise most of the area could only be cordoned off in small portions. The EM-61 towing rig was better suited for the necessary tight turns. Several areas in this parcel were scanned with the TW-6 only due to interference of the GPR signal by nearby buildings and trees and the presence of parked cars during the EM survey.

No anomalies indicative of UHOTs were located within the TW-6 scanning areas. Targets located on the asphalt-covered portions within the 750 Area could not be scanned with the TW-6 due to suspected high metal content fill material; therefore, only GPR was utilized in these areas.

Geoprobe® soil samples were collected in October and November 2007, and groundwater samples were collected in November 2007 in Parcel 51 in order to investigate potential releases from historic USTs associated with the former 600, 750, and 1100 Area buildings. A total of 122 surface soils and 136 subsurface soil (including 12 duplicate samples) were collected from 122 distinct Geoprobe® borings. Soil boring locations were conducted on 100-ft centers. Surface soil samples for non-Volatile Organic (VOC) analysis were collected from the 0- to 6-inch interval bgs. For borings located in paved areas, non-VOC surface soil samples were collected from the 0- to 6- inch interval directly below the pavement sub-base.

Surface soil samples collected for VOC analysis were collected from the 18- to 24-inch bgs interval. Subsurface soil samples were collected from the 6-inch interval directly above the water table from each boring. Due to high water table conditions encountered at three boring locations, subsurface soil samples were collected from the 18- to 24-inch bgs interval. No additional VOC sample was collected as the sample interval coincided with the 18- to 24-inch surface soil VOC sampling interval.

Field screening of the soil boring cores was conducted using a PID and FID meter. Two additional soil samples were collected based on elevated results from field screening tests. A total of 26 groundwater samples (including four duplicate samples) were collected from 22 distinct temporary wells. Temporary wells were installed along the downgradient boundaries of the soil boring grids and were constructed of PVC with a minimum of 5 ft of factory-slotted screen (0.01mm).

Surface and subsurface soil samples were analyzed for Total Petroleum Hydrocarbons (TPHC). Corresponding surface and subsurface soil samples were collected for contingent volatile organic compound (VOC) +10 analyses. Groundwater samples were analyzed for VOC+10 and Base/Neutral+15 (B/N+15).

In addition to the subsurface soil samples collected from the interval directly above the water table, two supplementary subsurface soil samples were collected for TPHC and contingent VO analysis based on elevated field screening measurements. TPHC was detected in 41 of the 122 surface soil samples and in 18 of the 137 subsurface soil samples. A total of six subsurface soil samples contained TPHC at concentrations greater than 1,000 mg/kg, and VOC analysis was conducted. No VOCs or TPHC were detected in soil above the NJDEP Non-Residential Direct Contact Soil Clean-up Criteria (NRDCSCC).

A total of 11 VOCs were detected at concentrations below NJDEP Groundwater Quality Standard (GWQS) in groundwater samples collected from temporary wells at Parcel 51. A total of eight B/Ns were detected in Parcel 51 groundwater samples.

Bis([2-ethylhexyl]phthalate) was detected at a concentration exceeding the NJDEP GWQC of 3.0 µg/L in three groundwater samples. Bis([2-ethylhexyl]phthalate) is present in a wide variety of plastic products, is commonly detected in field and laboratory QC samples, and was detected in the field blank associated with the Parcel 51 groundwater samples. Therefore, it is not considered a COC in groundwater at Parcel 51.

Eleven suspected UHOTs were identified during the geophysical survey. No constituents were identified above applicable NJDEP criteria in surface or subsurface soil. Soil and analytical results suggest that a release has not occurred. In light of the absence of evidence of a release to the environment, NFA for soil and the suspected UHOTs in Parcel 51 is recommended. One COC, 2-methylnaphthalene, was detected in groundwater above the NJDEP GWQS. Further evaluation of 2-methylnaphthalene in groundwater is recommended. The 2-methylnaphthalene was detected in a well but the well is not located in the vicinity of Bldg. 750 and as such will not be addressed in this report.

In June of 2009, Fort Monmouth's Base Operations Contractor, TECOM-Vinnell Services (TVS), using the information developed in the Environmental Condition of Property (ECP) Phase II, began to investigate the area just to the north of Building 750 (motor pool) for the presence of potential unregulated heating oil tanks (UHOTs) as indicated by the geophysical survey conducted earlier by Enviroscan (The geophysical subcontractor responsible for the Geophysical findings in the EPC Phase II). The UHOTs located at Bldg. 750 are addressed under separate cover.

The areas where the potential UHOTs had been were marked out and based up the data from the geophysical report as series of test trenches were excavated in an attempt to locate the buried UHOTs. The suspected UHOT locations were gridded out and based upon the GPS locations test trenches were excavated.

Tanks 1123B &1123C were found in the locations identified by the geophysical survey and removed in accordance with established protocol, discharges were noted, reported to the US Army and in turn they were called into NJDEP. In all cases post excavation samples were collected after the removal of visibly petroleum impacted soils.

Following receipt of all post-excavation soil sampling analytical results, each excavation was backfilled to grade with a combination of uncontaminated excavated soil and/or crushed stone. The excavation site was then restored to its original condition with four inches of top soil and grass seed.

Ground water was not encountered in either excavation and no impact to groundwater was anticipated due to the high content of glauconitic clay.

Analytical data from the post excavation samples demonstrated that there were no compounds in excess of the total organic compound values for soil quality standards.

1.0 Underground Storage Tank Decommissioning Activities

1.1 Overview

In June of 2009, Fort Monmouth's Base Operations Contractor, TECOM-Vinnell Services (TVS), using the information developed in the Environmental Condition of Property (ECP) Phase II, began to investigate the area just to the north of Building 750 (motor pool) for the presence of potential unregulated heating oil tanks (UHOTs) as indicated by the geophysical survey conducted earlier by Enviroscan (The geophysical subcontractor responsible for the Geophysical findings in the EPC Phase II).

The areas where the potential UHOTs had been were marked out and based up the data from the geophysical report as series of test trenches were excavated in an attempt to locate the buried UHOTs. At Building 1123, two potential anomalies were identified. The suspected UHOT locations were gridded out and based upon the GPS locations test trenches were excavated.

On September 16-22, 2009, two-single wall steel unregulated heating oil tanks (UHOTs) were located and subsequently closed by removal in accordance with the Directorate of Public Works (DPW) UST Management Plan for the U.S. Army Garrison, Fort Monmouth, New Jersey. The UHOTs were located in the grass medium directly behind Building 1123 as indicated by the geophysical investigation.

UHOT No. 1123B was a 1,000-gallon No. 2 heating oil tank. 1123B was the first of the two (2) UHOTs to be found and subsequently removed in this area. The fill port, vent pipe and associated supply/return piping were not present in the excavation. Both tanks were deep in the ground with the tops of the tanks found at five (5) below ground surface.

The site assessment was performed by TECOM-Vinnell Services (TVS) personnel in accordance with the New Jersey Department of Environmental Protection (NJDEP) *Technical Requirements for Site Remediation* (N.J.A.C. 7:26E) and the NJDEP *Field Sampling Procedures Manual.* Soils surrounding the tanks were screened visually and with a calibrated hand held Mini-Rae® Photo-Ionization air monitoring instrument for evidence of contamination. Following removal, the UST was inspected for holes. Holes were noted in the UHOT and potentially contaminated soils were observed surrounding the tank.

All sampling was performed by a NJDEP Certified Subsurface Evaluator according to the methods described in the NJDEP *Field Sampling Procedures Manual* (August 2005 edition- updated 15 February 2008). Sampling frequency and parameters analyzed complied with the NJDEP document *Technical*

Requirements for Site Remediation, 7:26E-3.9 (December 17, 2007 and revisions dated June 2, 2008) which was the applicable regulation at the date of the closure.

UHOTs 1123B & 1123C were removed in accordance with established protocol, discharges were noted at the following tank removal locations; upon the investigation of the UHOT (1123B), several holes were noted and approximately 12 cubic yards of petroleum impacted soils were removed from the excavation. Following the removal of the second UHOT (1123C) several holes were noted in the exterior and approximately 25 cubic yards of petroleum impacted soils were removed to the soil staging area at Bldg. 108.

Groundwater was not observed in either of the excavations. No groundwater sample was warranted or required.

Following receipt of all post-excavation soil sampling Total Petroleum Hydrocarbon (TPH) results, the excavations were backfilled to grade with a combination of uncontaminated excavated soil and crushed stone. The excavation sites were then restored to its original condition with four inches of asphalt and/or top soil and grass seed.

Based on the post-excavation soil sampling results, soils present are below the NJDEP health based criteria for total organic compounds and as such there are no detected semi-volatile organic compounds (SVOCs) exceeding the NJDEP Residential Direct Contact Soil Cleanup Standards.

Decommissioning activities for the UHOTs complied with all applicable federal, state, and local laws and ordinances in effect at the date of decommissioning. These laws included, but were not limited to: N.J.A.C. 7:14B-1 et seq., N.J.A.C. 5:23-1 et seq., and Occupational Safety and Health Administration (OSHA) 1910.146 & 1910.120. The closure and subsurface evaluation of the UHOTs were conducted by a NJDEP licensed US ARMY employee.

This UST Closure and Remedial Investigation Report (RIR) has been prepared by TVS to assist the US Army Garrison DPW in complying with the NJDEP - Underground Storage Tanks (USTs) 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 provides a summary of the UHOT decommissioning activities. Section 2 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 1123 is located in the central portion of the Main Post area of Fort Monmouth, as shown on Figure 1. The UHOTs were located to the South of Building 1123. The areas to the immediate north of the structure are two landfill areas which are not addressed or are a part of this document. The physical location of Building 1123 and its surrounding environs can be found on Figure 2.

The fill ports and appurtenant piping were not encountered in the excavations during the tank removal phase. The piping was removed prior to the excavation of the tanks during the demolition of the previous structures. A site map is provided as Figure 2.

1.2.1 Geological/Hydrogeological Setting

The following is a description of the geological/hydrogeological setting of the Bldg. 1123. 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.

Fort Monmouth lies within the Outer Coastal Plain subprovince of the New Jersey section of the Atlantic Coastal Plain physiographic province, which generally consists of a seaward-dipping wedge of unconsolidated sediments including interbedded clay, silt, sand, and gravel. To the northwest is the boundary between the Outer and Inner Coastal Plains, marked by a line of hills extending southwest, from the Atlantic Highlands overlooking Sandy Hook Bay, to a point southeast of Freehold, New Jersey, and then across the state to the Delaware Bay. These formations of clay, silt, sand, and gravel formations were deposited on Precambrian and lower Paleozoic rocks and typically strike northeast-southwest, with a dip that ranges from 10 – 60 feet per mile. Coastal Plain sediments date from the Cretaceous through the Quaternary Periods and are predominantly derived from deltaic, shallow marine, and continental shelf environments.

The property is located within the outer fringe of the Atlantic Coastal Plain Physiographic Province, of New Jersey, approximately 20 miles south of Raritan Bay. This province is characterized by a wedge-shaped mass of unconsolidated to semi-consolidated marine, marginal marine and non-marine deposits of clay, silt, sand, and gravel. These sediments range in age from Cretaceous to Holocene and lie unconformably on pre-Cretaceous bedrock consisting of metamorphic schists and gneiss, with local occurrences of basalts, sandstone, and shale (Zapecza, 1984). These sediments trend northeast-southwest and dip southeast toward the Atlantic Ocean. These sediments thicken southeastward from the Piedmont-Coastal Plain Province boundary to approximately 4,500 feet near Atlantic City, New Jersey. During the Cretaceous and Tertiary time period, sediments were deposited alternately in flood plains and in marine environments during sea transgression and sea regression periods. The formations record several major transgressive/regressive cycles and contain units that 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).

Regressive upward coarsening deposits, such as Englishtown and Kirkwood Formations and the Cohansey Sand are usually aquifers, while transgressive deposits, such as the Merchantville, Marshalltown, and Navesink Formations, act as confining units. The thicknesses of these units vary greatly, ranging from several feet to several hundred feet, and thicken to the southeast.

The eastern half of the Main Post is underlain by the Red Bank Formation, ranging in thickness from 20-30 feet, while the western half is underlain by the Homerstown Formation, ranging in thickness from 20-30 feet. Sand and gravel deposited in recent geologic times lie above these formations. Interbedded sequences of clay serve as semi-confining units for groundwater. The mineralogy ranges from quartz to glauconite.

Udorthents-Urban land is the primary classification of soils on Fort Monmouth, which have been modified by excavating or filling. Soils at the Main Post include Freehold sandy loam, Downer sandy loam, and Kresson loam. Freehold and Downer are somewhat well drained, while Kresson is a poorly drained soil. The Charles Wood Area has sandy loams of the Freehold, Shrewsbury, and Holmdel types. Shrewsbury is a hydric soil; Kresson and Holmdel are hydric due to inclusions of Shrewsbury. Downer is not generally hydric, but can be.

Local Geology

Fort Monmouth lies in the Atlantic and Eastern Gulf Coastal Plain groundwater region and is underlain by underformed, unconsolidated to semi-consolidated sedimentary deposits. The chemistry of the water near the surface is variable with generally low dissolved solids and high iron concentrations. In areas underlain by glauconitic sediments, the water chemistry is dominated by calcium, magnesium, and iron (*e.g.* Red Bank and Tinton sands). The sediments in the vicinity of Fort Monmouth were deposited in fluvial-deltaic to nearshore environments. The water table is generally shallow (ranging in depth from 3 – 12') and in certain areas fluctuates with the tidal action in Parkers and Oceanport creeks at the Main Post.

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. 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. The Hornerstown Formation acts as an upper boundary of the Red Bank aquifer, but it might yield enough water within its outcrop to supply individual household needs. The Red Bank outcrops along the northern edges of the Installation, and contains two members, an upper sand member and a lower clayey sand member. The upper sand member functions as the aquifer and is probably present on some of the surface of the Main Post. The Hornerstown and Red Bank formations overlay the larger Wenonah-Mount Laurel aquifer.

The area of Bldg. 1123 is located approximately 400 feet southeast of Parkers Creek. Based on the Main Post groundwater model, groundwater in this section of the Main Post is flowing north toward Parkers Creek.

1.3 HEALTH AND SAFETY

Work site health and safety hazards were minimized during all decommissioning activities. All areas which posed a vapor hazard were monitored by a qualified individual utilizing a calibrated photo-ionization 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 applicable permissible exposure limits (PEL's).

1.4 REMOVAL OF UNREGULATED HEATING OIL TANK

1.4.1 General Procedures

- All underground utilities were marked out by the respective trade shops or utility contractor prior to excavation activities.
- All activities were carried out with high regard to safety and health and safeguarding of the environment.
- All excavated soils were visually examined and screened with an OVM for evidence of contamination. Any potentially contaminated soils were identified and logged during closure activities.
- An NJDEP certified Subsurface Evaluator was present during all closure and remediation activities.

1.4.2 Unregulated Heating Oil Tank Excavation

During decommissioning activities, surficial soil was carefully removed to expose the UHOTs. The tanks were emptied of all liquids prior to removal from the ground. Approximately 800 gallons of liquid was pumped out of the UHOTs by Lorco Petroleum Services, Inc. into a tank truck and transported to their NJDEP-approved petroleum recycling and disposal facility located in Elizabeth, New Jersey. See the bill of lading in Section C of this document.

After the UHOTs were removed from the excavations, they were staged on an impervious surface, labeled and examined for holes. Holes in the tank were observed during the inspection by the Subsurface Evaluator. Soils surrounding the UHOTs were screened visually and with an OVM for evidence of contamination. Soil staining and an odor of petroleum hydrocarbons were observed and approximately 40 yards of petroleum impacted soils were removed from the excavation. Post-excavation samples were collected after the tank inspection and the inspection of the excavation.

1.5 UNREGULATED HEATING OIL TANK DECOMMISSIONING AND DISPOSAL

Subsequent to disposal, the UHOTs were purged with air to remove residual vapors prior to cutting. A 4-foot by 3-foot access hole was made in each UHOT using a pneumatic ripper gun with a non-sparking bit. The USTs were cleaned first with rubber squeegees and then with adsorbent material broomed on the sidewalls and bottom. The adsorbent material was then drummed and subsequently placed into Fort Monmouth's 'Oil Spill Debris' roll-off container for proper disposal. The atmosphere in and around the tank was monitored using an OVM and an Oxygen/Lower Explosive Level (LEL) meter to ensure safe working conditions during cutting and cleaning activities.

The tanks were then transported by TVS to Red Bank Recycling, Auto Wreckers, Red Bank, NJ for disposal in compliance with all applicable regulations and laws. Refer to Appendix C for UHOT disposal certificate.

Any liquid content of the individual UHOTs discovered was pumped out and transported to the LORCO Petroleum Services facility in Elizabeth, NJ. Copies of the bills of lading can be found in Appendix B of this document.

The Subsurface Evaluator labeled the UHOT with the following information:

- Site of origin
- NJDEP UST Facility ID number
- Date of removal
- Size of tank
- Previous contents of tank

1.6 MANAGEMENT OF EXCAVATED SOILS

Overburden soils were used as fill materials. Clean bank run sands and/or crushed stone were used as fill material when additional soils were required at each of the individual UHOT excavations.

2.0 REMEDIAL INVESTIGATION ACTIVITIES

2.1 OVERVIEW

The Remedial Investigation was managed by U.S. Army DPW personnel. All analyses were performed and reported by Fort Monmouth Environmental Testing Laboratory (FTMEL), 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 (2005). Sampling frequency and parameters analyzed complied with the NJDEP document *Technical Requirements for Site Remediation, 7:26E-3.9* (December 17, 2007 and revisions dated June 2, 2008) which was the applicable regulation at the date of the closure. All records of the Remedial Investigation activities are maintained by the Fort Monmouth DPW Environmental Office.

The following Parties participated in Closure and Remedial Investigation Activities.

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

- Subsurface Evaluator, Tank Closure: 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 (FTETL)
  Contact Person: Dean Tardiff
  Phone Number: (732) 532-4359
  NJDEP Laboratory Certification No.: 13461

- Hazardous Waste Hauler: Lorco Petroleum Services, Inc., Elizabeth, NJ
  Contact Person: Dan MacKay
  Phone Number: (908) 820-8800
  Manifest No.: NHZ-33887/33888
  US EPA ID No.: NJR000023036

2.2 FIELD SCREENING/MONITORING

Field screening was performed by a NJDEP certified Subsurface Evaluator using an OVM and visual observations to identify potentially contaminated material. Soils were removed from the excavation surrounding the individual UHOTs until no evidence of contamination remained.

2.3 SOIL SAMPLING

The post-excavation soil sample results were compared to the NJDEP health based criterion of 4,800 mg/kg for total organic contaminants (December 17, 2007 and revisions dated June 2, 2008). Each excavation was over excavated to ensure TPH concentrations remaining would be below the 1,000 mg/kg contingency analytical threshold. A summary of the analytical results and comparison to the NJDEP soil cleanup standards are provided on Table 1 and Table 2. The soil analytical data packages, including associated quality control data, are provided in Appendix E.

3.0 CONCLUSIONS AND RECOMMENDATIONS

3.1 SOIL SAMPLING RESULTS

Post excavation samples were collected from the individual UIHOT excavations (1123B &1123C) to evaluate soil conditions following removal of the UHOTs.

All samples were analyzed for TPH. The post-remediation soil sample results were compared to the NJDEP health based criterion of 5,100 mg/kg for total organic contaminants (December 17, 2007 and revisions dated June 2, 2008). 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 D.

3.2 CONCLUSIONS AND RECOMMENDATIONS

The analytical results for all of post-remediation soil samples collected from the closure excavation at UHOTs No. 1123 B & 1123 C were below the NJDEP soil cleanup standards for total organic contaminants and semi-volatile organic compounds. As part of Fort Monmouth's soil remediation program, soils are to be excavated to below 1,000 mg/kg. This ensures that the contingency analysis is not performed and eliminates any potential of chasing one of the surrogate fuel oil base/neutral compounds, thus reducing the volume soils excavated and cost of UHOT removals. No post remedial samples collected from the individual UHOT removals were in excess of the contingency value of 1,000 mg/kg necessary for additional base/neutral analysis.

The findings of glauconite sands and clays at the excavations coincide with lithological data at other borings and excavations post wide. A more detailed and in depth discussion of the underlying glauconite will be presented to NJDEP at a later time.

Based upon the analytical data from the post excavation samples for 1123B & 1123C, No Further Action (NFA) is proposed in regard to the closure and remedial investigation of UHOT No.1123B & 1123 C at Building 1123, ECP Parcel 51.

TABLE 1

SUMMARY OF LABORATORY ANALYSIS
FT. MONMOUTH, BUILDING 1123B & 1123C
September 2009

SAMPLE ID	LABORATORY SAMPLE ID	SAMPLE DATE	SAMPLE MATRIX	ANALYTICAL PARAMETER	ANALYTICAL METHOD
1123B PX1 Bottom	9038301	9/16/09	Soil	TPH	OQA-QAM-25
1123B PX2 South Wall	9038302	9/16/09	Soil	TPH	OQA-QAM-25
1123B PX3 East Wall	9038303	9/16/09	Soil	TPH	OQA-QAM-25
1123B PX4 West Wall	9038304	9/16/09	Soil	TPH	OQA-QAM-25
11123B PX5 North Wall	9038305	9/16/09	Soil	TPH	OQA-QAM-25
1123C PX1 North Wall	9038801	9/18/09	Soil	TPH	OQA-QAM-25
1123C PX2 South Wall	9038802	9/18/09	Soil	TPH	OQA-QAM-25
1123C PX3 East Wall	9038803	9/18/09	Soil	TPH	OQA-QAM-25
1123C PX4 West Wall	9038804	9/18/09	Soil	TPH	OQA-QAM-25
1123C PX5 Bottom	9038805	9/18/09	Soils	TPH	OQA-QAM-25
1123B PX6 East Wall	9038901	9/18/09	Soils	TPH	OQA-QAM-25
1123C PX 6 East Wall	9039501	9/22/09	Soils	TPH	OQA-QAM-25
1123C PX 7 West Wall	9039502	9/22/09	Soils	TPH	OQA-QAM-25

ABBREVIATIONS:

TPH = Total Petroleum Hydrocarbons, Method NJDEP OQA-QAM-25

TABLE 2
SUMMARY OF LABORATORY ANALYTICAL RESULTS
FT. MONMOUTH, BUILDING 1123B & 1123C, September 2009
TOTAL PETROLEUM HYDROCARBONS (results in mg/kg)

SAMPLE ID	LABORATORY SAMPLE ID	SAMPLE LOCATION	SAMPLE DEPTH (in feet)	MATRIX	TPH RESULTS
1123B PX1	9038301	Bottom	10-10.5'	Soil	912.49
1123B PX2	9038302	South Wall	8.5-90.'	Soil	ND
1123B PX3	9038303	East Wall	8.5-9.0'	Soil	9832.44
1123B PX4	9038304	West Wall	8.5-9.0'	Soil	430.84
1123B PX5	9038305	North Wall	8.5-9.0'	Soil	628.40
1123C PX1	9038801	North Wall	8.0-8.5'	Soil	ND
1123C PX2	9038802	South Wall	8.0-8.5'	Soil	322.72
1123C PX3	9038803	East Wall	8.0-8.5'	Soil	1526.93
1123C PX4	9038804	West Wall	8.0-8.5'	Soil	1532.25
1123C PX5	9038805	Bottom	9.0-9.5'	Soil	ND
1123B PX6	9038806	East Wall	8.5-9.0'	Soil	718.93
1123C PX6	9039501	East Wall	8.5-9.0	Soil	ND
1123C PX7	9039502	West Wall	8.5-9.0	Soil	ND

ABBREVIATIONS:
mg/kg = milligrams per kilogram = parts per million
ND = Compound Not Detected

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CERTIFICATIONS

APPENDIX B

WASTE MANIFEST

APPENDIX C

UST DISPOSAL CERTIFICATE

APPENDIX D

PHOTO - DOCUMENTATION

APPENDIX E

SOIL ANALYTICAL DATA PACKAGES

FIGURES

Bibliography

Roy F. Weston May 1994, *Underground Storage Tank System Piping Closure and Site Investigation Report Building 750*

NJDEP, *Findings and Recommendations for Remediation of Historic Pesticide Contamination, Historic Pesticide Contamination Task Force, Final Report March 1999*

Environment Canada, Air Pollution Prevention Directorate, Oil, Gas, and Energy Branch, May 2002, *Research Strategies Relevant to Heating Oil Specifications: Fuel Oil Sulfur Aspects Literature Review*

UHOT at Bldg. 1123

UHOT removed from excavation

Historical discharge visible

Second UHOT removed from Bldg. 1123

Excavation of second UHOT, note staining in bottom left of photo

Completed remediation at 1123

U.S. Army Garrison

Fort Monmouth, New Jersey

Unregulated Heating Oil Tank Remedial Investigation and Closure Report

Main Post – ECP Parcel 76
(200 Area)
NJDEP Release #'s:

09-11-04-1553-32/10- 04-28-1333-57/10-04-13-1710-23/09-11-19-1710-57/10-01-06-1342-44

NJDEP UST Registration No. 538 - 543

June 2011

UNREGULATED HEATING OIL TANK CLOSURE AND REMEDIAL INVESTIGATION REPORT

MAIN POST – ECP PARCEL 76 (200 AREA)
NJDEP RELEASE #'S
09-11-04-1553-32/10- 04-28-1333-57/10-04-13-1710-23/09-11-19-1710-57/10-01-06-1342-44

June 2011

PREPARED FOR:

U.S. ARMY GARRISON, FORT MONMOUTH, NJ
DIRECTORATE OF PUBLIC WORKS
BUILDING 173
FORT MONMOUTH, NJ 07703

PREPARED BY:

TECOM-VINNELL SERVICES, INC.
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EXECUTIVE SUMMARY

During the initial site meeting for the re-evaluation geophysical survey data on August 15, 2008, the current Directorate of Public Works (DPW) director, Joseph Fallon, requested a more in-depth geophysical scan by Enviroscan of the Environmental Condition of Property (ECP) Parcel 76 Area to confirm that only seven unregulated heat oil tanks (UHOTs) are present, out of a possible eight noted in client-supplied historic documents. The geophysical data previously collected by Enviroscan was reprocessed through a new software package, Oasis Montaj© by Geosoft, Inc., in October of 2008. This software package has different processing and contouring routines than those used in the past (Excel by Microsoft Corp. and Surfer by Golden Software, Inc.). The newly processed and contoured data were then reexamined for EM anomalies exhibiting characteristics of a UST that may not have been previously delineated.

The re-evaluation of the ECP Parcel 76 Area (200 - Area) was completed by examining the location of the previously identified USTs and determining from historic aerial photos and documents where the eighth UST, if present, was most likely to be located. Enviroscan then mobilized a Geonics EM- 61 MK2 metal detector to collect background data, including areas known to contain targets previously labeled "Possible USTs" (see 060706 report), and to scan the area most likely to contain the undelineated UST. Please note that the old "Possible UST" label has been modified for this report and equates to "Suspected UST".

The areas where the UHOTs were marked out based up the data from the geophysical report. In the 200 – Area (ECP Parcel 76), eight potential anomalies were identified. The suspected UHOT locations were gridded and flagged out; based upon the GPS locations test trenches were excavated. The UHOTs were found between three and five feet below ground surface, with the typical depth of the excavation to approximately nine feet.

UHOTs 538, 541, 542, 540, 544, 543, and 539 were removed in accordance with established protocol, if any discharges were noted, it was reported to the US Army and in turn they were called into NJDEP, at the tank removal locations; in all cases post excavation samples were collected. If releases were noted they were collected after the removal of visibly petroleum impacted soils.

UHOTs 540 and 544 were removed without any observed releases or discharges. A test trench was excavated at 537 in an attempt to locate a potential UHOT as indicated by the geophysical survey. No UHOT was found to be present at this location. Five of the seven UHOTs were found to be leaking into the surrounding soils.

Following receipt of all post-excavation soil sampling analytical results, each excavation was backfilled to grade with a combination of uncontaminated excavated soil, bank run clean sands, and crushed stone. The excavation site was then restored to its original condition with top soil and grass seed.

Groundwater was encountered in the excavations and upon completion of backfilling four monitoring wells were installed to ascertain any impact to groundwater as a result of the discharges from the UHOTs. Two consecutive rounds of groundwater samples were collected in a 30 day period to demonstrate on adverse impact of the groundwater in the vicinity of the leaking UHOTs.

Prior to the installation of the monitoring wells associated with the UHOT excavations, one upgradient and one downgradient well were installed. The initial round of groundwater sampling indicated that three VOCs were detected in the upgradient well (200MW01). Of the three compounds, one was in excess of GWQS. Bromodichloromethane was found to be in excess of the standard. This compound in excess of the GWQS is a trihalomethane. Trihalomethanes are associated with drinking water disinfection. The analytical results were provided to Ft. Monmouth Directorate of Public Works (DPW). An investigation of drinking water lines in proximity to the upgradient well found one of the drinking water supply lines to be leaking. The DPW ordered the line repaired and in subsequent lab analysis, the trihalomethanes were not-detected (ND) in the monitoring well.

Analytical data from the post excavation samples and groundwater samples demonstrated that there were no compounds in excess of the total organic compound values for soil or the groundwater quality standards.

1.0 Unregulated Heating Oil Tank Decommissioning Activities

1.1 Overview

On October 21, 2009, Fort Monmouth's Base Operations Contractor, TECOM-Vinnell Services (TVS), using the information developed in the Environmental Condition of Property (ECP) Phase II report (Parcel 76), began to investigate the area just to the north of the residential structures in the "200 Area" for the presence of potential unregulated heating oil tanks (UHOTs) as indicated by the geophysical survey conducted earlier by Enviroscan (The geophysical subcontractor responsible for the Geophysical findings in the EPC Phase II and its subsequent amendments). Due to the presence of multiple USTs/UHOTs in this general area of the Main Post, a regional groundwater investigation has been proposed by DPW to NJDEP. A Remedial Action Report for the 200/400/800 was developed and submitted to NJDEP in order to obtain a letter of no further action (NFA) for each of the parcels. NJDEP responded to the report and required both horizontal and vertical delineation of the groundwater in each of the individual parcels.

The areas where the potential UHOTs had been were marked out and based up the data from the geophysical report as series of test trenches were excavated in an attempt to locate the buried UHOTs. In the 200 - Area, eight (8) potential anomalies were identified by the geophysical survey performed by Enviroscan. The suspected UHOT locations were gridded out and based upon the GPS locations test trenches were excavated.

On, October 20, 2009, Tank - 544, a single wall steel UHOT was located and subsequently closed by removal in accordance with the Directorate of Public Works (DPW) UST Management Plan for the U.S. Army Garrison, Fort Monmouth, New Jersey. The UHOTs were located in an open field to the north of the residential structures in the 200 Area.

UHOT 544 was a 1,000-gallon No. 2 heating oil tank. 544 was the first in the series of UHOTs to be found and subsequently removed in this area. The fill port, vent pipe and associated supply/return piping were not present in the excavation. No discharges or releases were noted with this UHOT. UHOT 540 was removed on October 22, 2009; no discharges or releases were noted with this UHOT. Of the seven UHOTs removed these two were the only ones without a corresponding release or discharge.

The site assessment was performed by TECOM-Vinnell Services (TVS) personnel in accordance with the New Jersey Department of Environmental Protection (NJDEP) *Technical Requirements for Site Remediation* (N.J.A.C. 7:26E) and the NJDEP *Field Sampling Procedures Manual*. Soils surrounding the tanks were screened visually and with a calibrated hand held Mini-Rae® Photo-Ionization air monitoring instrument for evidence of contamination. Following removal, the UHOT was inspected for holes. If holes were noted in the UHOT then the remediation of potentially contaminated soils were observed surrounding the tank was performed.

All sampling was performed by a NJDEP Certified Subsurface Evaluator according to the methods described in the NJDEP *Field Sampling Procedures Manual* (August 2005 edition- updated 15 February 2008). Sampling frequency and parameters analyzed complied with the NJDEP document *Technical Requirements for Site Remediation*, 7:26E-3.9 (December 17, 2007 and revisions dated June 2, 2008) which was the applicable regulation at the date of the closure.

UHOTs 544, 543, 542, 541, 540, 539 and 538 were removed in accordance with established protocol, discharges were noted at the following tank removal locations; when a release was observed a US Army employee was notified and subsequently a discharge was reported to NJDEP.

The following discharge numbers are associated with the following UHOTs:

- 544: No discharge/release observed
- 540: No discharge/release observed
- 543: 09-11-04-1553-32
- 542: 10- 04-28-1333-57
- 541: 10-04-13-1710-23
- 539: 09-11-19-1710-57
- 538: 10-01-06-1342-44
- 537: No UHOT found

Groundwater was encountered in the individual UHOT excavations and upon completion of backfilling of the excavations; four (4) monitoring wells were installed to ascertain any impact to groundwater as a result of the discharge from the UHOTs.

Following receipt of all post-excavation soil sampling Total Petroleum Hydrocarbon (TPH) results, the excavations were backfilled to grade with a combination of uncontaminated excavated soil, clean bank run sand, and crushed stone. The crushed stone was placed at depth below the water table; sand was placed on top of the stone and non-contaminated overburden was placed over the sand. The excavation sites were then restored to its original condition top soil and grass seed.

Based on the post-excavation soil sampling results, soils present are below the NJDEP health based criteria for total organic compounds and there are no detected semi-volatile organic compounds (SVOCs) that exceed the NJDEP Residential Direct Contact Soil Cleanup Standards.

Decommissioning activities for the UHOTs complied with all applicable federal, state, and local laws and ordinances in effect at the date of decommissioning. These laws included, but were not limited to: N.J.A.C. 7:14B-1 et seq., N.J.A.C. 5:23-1 et seq., and Occupational Safety and Health Administration (OSHA) 1910.146 & 1910.120. The closure and subsurface evaluation of the UHOTs were conducted by a NJDEP licensed US ARMY employee.

This UHOT Closure and Remedial Investigation Report (RIR) has been prepared by TVS to assist the US Army Garrison DPW in complying with the NJDEP - Underground Storage Tanks (USTs) 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 provides a summary of the UHOT decommissioning activities. Section 2 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

The "200 - Area" (ECP Parcel 76) is located in the north-central portion of the Main Post area of Fort Monmouth. The UHOTs were located to the North of the residential structures along Allen Avenue. The area to the immediate north of the structures is an open field beyond which is Parkers Creek. The exact physical location of the buildings and excavations can be found in Figure 1. Due to the presence of an underground network of sanitary sewer and drinking water lines, extensive excavation and replacement of these utilities was required. The area where the UHOTs were excavated, once served as part of the Fort Monmouth housing stock, and as such is still tied into the underground utility network.

The UHOT removals were divided over time to allow for changes in TVS scheduling and to minimize the disruption of the residences during the holiday season. The first four UHOTs were removed prior to the end of the 2009 calendar year; the remaining three were removed in the winter and spring of 2010. The soil remediation was concluded in July 2010.

The fill ports and appurtenant piping were not encountered in the excavations during the tank removal phase. The piping was removed prior to the excavation of the tanks during the demolition of the previous structures. A site map is provided as Figure 2.

1.2.1 Geological/Hydrogeological Setting

The following is a description of the geological/hydrogeological setting of the 200 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.

Fort Monmouth lies within the Outer Coastal Plain subprovince of the New Jersey section of the Atlantic Coastal Plain physiographic province, which generally consists of a seaward-dipping wedge of unconsolidated sediments including interbedded clay, silt, sand, and gravel.

To the northwest is the boundary between the Outer and Inner Coastal Plains, marked by a line of hills extending southwest, from the Atlantic Highlands overlooking Sandy Hook Bay, to a point southeast of Freehold, New Jersey, and then across the state to the Delaware Bay.

These formations of clay, silt, sand, and gravel formations were deposited on Precambrian and lower Paleozoic rocks and typically strike northeast-southwest, with a dip that ranges from 10 – 60 feet per mile. Coastal Plain sediments date from the Cretaceous through the Quaternary Periods and are predominantly derived from deltaic, shallow marine, and continental shelf environments.

The Fort is located within the outer fringe of the Atlantic Coastal Plain Physiographic Province, of New Jersey, approximately 20 miles south of Raritan Bay. This province is characterized by a wedge-shaped mass of unconsolidated to semi-consolidated marine, marginal marine and non-marine deposits of clay, silt, sand, and gravel. These sediments range in age from Cretaceous to Holocene and lie unconformably on pre-Cretaceous bedrock consisting of metamorphic schists and gneiss, with local occurrences of basalts, sandstone, and shale (Zapecza, 1984). These sediments trend northeast-southwest and dip southeast toward the Atlantic Ocean. These sediments thicken southeastward from the Piedmont-Coastal Plain Province boundary to approximately 4,500 feet near Atlantic City, New Jersey. During the Cretaceous and Tertiary time period, sediments were deposited alternately in flood plains and in marine environments during sea transgression and sea regression periods. The formations record several major transgressive/regressive cycles and contain units that 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).

Regressive upward coarsening deposits, such as Englishtown and Kirkwood Formations and the Cohansey Sand are usually aquifers, while transgressive deposits, such as the Merchantville, Marshalltown, and Navesink Formations, act as confining units. The thicknesses of these units vary greatly, ranging from several feet to several hundred feet, and thicken to the southeast.

The eastern half of the Main Post is underlain by the Red Bank Formation, ranging in thickness from 20-30 feet, while the western half is underlain by the Homerstown Formation, ranging in thickness from 20-30 feet. Sand and gravel deposited in recent geologic times lie above these formations. Interbedded sequences of clay serve as semi-confining units for groundwater. The mineralogy ranges from quartz to glauconite.

Udorthents-Urban land is the primary classification of soils on Fort Monmouth, which have been modified by excavating or filling. Soils at the Main Post include Freehold sandy loam, Downer sandy loam, and Kresson loam. Freehold and Downer are somewhat well drained, while Kresson is a poorly drained soil. The Charles Wood Area has sandy loams of the Freehold, Shrewsbury, and Holmdel types. Shrewsbury is a hydric soil; Kresson and Holmdel are hydric due to inclusions of Shrewsbury. Downer is not generally hydric, but can be.

Local Geology

Fort Monmouth lies in the Atlantic and Eastern Gulf Coastal Plain groundwater region and is underlain by underformed, unconsolidated to semi-consolidated sedimentary deposits. The chemistry of the water near the surface is variable with generally low dissolved solids and high iron concentrations. In areas underlain by glauconitic sediments, the water chemistry is dominated by calcium, magnesium, and iron (*e.g.* Red Bank and Tinton sands). The sediments in the vicinity of Fort Monmouth were deposited in fluvial-deltaic to nearshore environments. The water table is generally shallow (ranging in depth from 3 – 12'bgs.) and in certain areas fluctuates with the tidal action in Parkers and Oceanport creeks at the Main Post. Significant tidal influence is observed in monitoring wells within 25 feet of the mean high tide mark.

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. 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.

The Hornerstown Formation acts as an upper boundary of the Red Bank aquifer, but it might yield enough water within its outcrop to supply individual household needs. The Red Bank outcrops along the northern edges of the Installation, and contains two members, an upper sand member and a lower clayey sand member. The upper sand member functions as the aquifer and is probably present on some of the surface of the Main Post. The Hornerstown and Red Bank formations overlay the larger Wenonah-Mount Laurel aquifer.

The 200 - Area and the locations of the tank excavations are approximately 150 feet south of Parkers Creek. Based on the topography and the groundwater flow model, groundwater has been shown to flow towards Parkers Creek

1.3 HEALTH AND SAFETY

Work site health and safety hazards were minimized during all decommissioning activities. All areas which posed a vapor hazard were monitored by a qualified individual utilizing a calibrated photo-ionization 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 applicable permissible exposure limits (PEL's). Due to the proximity of occupied residential structures to the excavations, TVS agreed to have only two excavations open at one time and that each would be fenced off using chain link fence. The extensive soil remediation was performed in multiple phases to minimize the impact to the surrounding residences.

1.4 REMOVAL OF UNREGULATED HEATING OIL TANK

1.4.1 General Procedures

- All underground utilities were marked out by the respective trade shops or utility contractor prior to excavation activities. Due to the extensive network of underground utilities present in the area of the excavations, the sewer and water supplies needed to be diverted and rerouted.

- All activities were carried out with high regard to safety and health and safeguarding of the environment.

- All excavated soils were visually examined and screened with an OVM for evidence of contamination. Potentially contaminated soils were identified and logged during closure activities. These soils were removed to the Fort Monmouth ID – 27 soil pile upon excavation.

- An NJDEP certified Subsurface Evaluator was present during all closure and remediation activities.

1.4.2 Unregulated Heating Oil Tank Excavation

During decommissioning activities, surficial soil was carefully removed to expose the UHOTs. The tanks were emptied of all liquids prior to removal from the ground. Approximately 4,300 gallons of liquid was pumped out of the UHOTs by Lorco Petroleum Services, Inc. of Elizabeth, New Jersey into a tank truck and transported to their NJDEP-approved petroleum recycling and disposal facility.

After the UHOTs were removed from the excavations, they were staged on an impervious surface, labeled and examined for holes. Holes in the tank were observed during the inspection by the Subsurface Evaluator. Soils surrounding the UHOTs were screened both visually and with an OVM for evidence of petroleum contamination. Where soil staining and an odor of petroleum hydrocarbons were observed; it was determined that remedial soil excavation would be conducted prior to post excavation sampling.

1.5 UNREGULATED HEATING OIL TANK DECOMMISSIONING AND DISPOSAL

Subsequent to disposal, the UHOTs were purged with air to remove vapors prior to cutting. A 4-foot by 3-foot access hole was made in each UHOT using a pneumatic ripper gun with a non-sparking bit. The USTs were cleaned first with rubber squeegees and then with adsorbent material broomed on the sidewalls and bottom.
The adsorbent material was then drummed and subsequently placed into Ft. Monmouth's 'Oil Spill Debris' roll-off container for proper disposal. The atmosphere in and around the tank was monitored using an OVM and an Oxygen/Lower Explosive Level (LEL) meter to ensure safe working conditions during cutting and cleaning activities.

The tanks were then transported by TVS to Red Bank Recycling, Auto Wreckers, Red Bank, NJ for disposal in compliance with all applicable regulations and laws. Refer to Appendix C for UHOT disposal certificate.

Any liquid content of the individual UHOTs discovered was pumped out and transported to the LORCO Petroleum Services facility in Elizabeth, NJ. Copies of the bills of lading can be found in Appendix B of this document.

The Subsurface Evaluator labeled the UHOT with the following information:

- Site of origin
- NJDEP UST Facility ID number
- Date of removal
- Size of tank
- Previous contents of tank

1.6 MANAGEMENT OF EXCAVATED SOILS

Based on OVM air monitoring and visual observations, approximately 608 cubic yards of potentially petroleum contaminated soil was excavated from the area surrounding the leaking UHOTs. All soils were loaded into a dump truck and transported to the Main Post ID 27 Soil Staging Area (located behind Bldg.166).

The soil was stockpiled on an impervious concrete pad and covered with heavy duty reinforced polyethylene tarps, prior to recycling at Pure Soil of Jackson, New Jersey. Overburden soils and non-impacted materials were segregated and used as fill materials. Clean bank run sands were also used as fill material when additional soils were required at each of the individual UHOT excavations.

2.0 REMEDIAL INVESTIGATION ACTIVITIES

2.1 OVERVIEW

The Remedial Investigation was managed by U.S. Army Directorate of Public Works (DPW) personnel. All analyses were performed and reported by Fort Monmouth Environmental Testing Laboratory (FTMEL), 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 (2005).
Sampling frequency and parameters analyzed complied with the NJDEP document *Technical Requirements for Site Remediation, 7:26E-3.9* (December 17, 2007 and revision dated June 2, 2008) which was the applicable regulation at the date of the closure. All records of the Remedial Investigation activities are maintained by the Fort Monmouth DPW Environmental Office.

The following Parties participated in Closure and Remedial Investigation Activities.

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

- Subsurface Evaluator, Tank Closure: Frank Accorsi/Robert Youhas
  Employer: TECOM-Vinnell Services, Inc. (TVS)
  Phone Number: (732) 532-5241/ (732) 532-6037
  NJDEP License No.: 0010042/ 265843
  (TVS) NJDEP License No.: US252302

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

- Hazardous Waste Hauler: Lorco Petroleum Services, Inc., Elizabeth, NJ
  Contact Person: Dan MacKay
  Phone Number: (908) 820-8800
  Manifest No.: NHZ-33887/33888
  US EPA ID No.: NJR000023036

2.2 FIELD SCREENING/MONITORING

Field screening was performed by a NJDEP certified Subsurface Evaluator using an OVM and visual observations to identify potentially contaminated material. Soils were removed from the excavation surrounding the individual UHOTs until no visual or olfactory evidence of contamination remained.

2.3 SOIL SAMPLING

The post-excavation soil sample results were compared to the NJDEP health based criterion of 5,100 mg/kg for total organic contaminants (December 17, 2007 and revisions dated June 2, 2008). Each excavation was over-excavated to ensure Total Petroleum Hydrocarbon (TPH) concentrations remaining would be below the 1,000 mg/kg contingency analytical threshold.

If the initial sample was in excess of the NJDEP soil clean up criteria; additional soils were removed until both visual and olfactory evidence was minimalized. The OVM or an equivalent air monitoring instrument was used to confirm that a sufficient volume of soils had been removed. All samples with analytical results in excess of 1,000 mg/kg were re-excavated to levels less than the contingency analytical threshold of 1,000 mg/kg. A summary of the analytical results and comparison to the NJDEP soil cleanup standards are provided on Table 1 and Table 2. The soil analytical data packages, including associated quality control data, are provided in Appendix E.

2.4 GROUNDWATER SAMPLING

One upgradient and one downgradient monitoring were installed prior to the monitoring wells associated with the UHOT excavations. Four monitoring wells were installed in conjunction with the UHOT removals to confirm groundwater quality. In accordance with Table 2.1 of TRSR, the monitoring wells were sampled for volatile organic compounds plus 15 tentatively identified compounds (VOC+15), base/neutral extractable compounds plus 15 tentatively identified compounds (B/N+15). The results of the last sampling events can be found on Table 3 and 4. The groundwater analytical packages including associated quality control data are provided in Appendix E. See Figure 3 for the locations of the monitoring wells.

3.0 CONCLUSIONS AND RECOMMENDATIONS

3.1 SOIL SAMPLING RESULTS

Post excavation samples were collected from the individual UIHOT excavations (538 through 545) to evaluate soil conditions following removal of the UHOTs. All samples were analyzed for TPH. The post-remediation soil sample results were compared to the NJDEP health based criterion of 5,100 mg/kg for total organic contaminants (December 17, 2007 and revisions dated June 2, 2008).

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 D.

Although, a significant number (five of the seven removed) of UHOTs were observed with holes and had corresponding discharges, the effect remained localized and one excavation did not impact any of the other excavations. The tight glauconitic soils with little horizontal and vertical migration retained contaminants close to their source.

3.2 GROUNDWATER SAMPLING RESUTLS

The initial sampling round of upgradient and downgradient wells was collected prior to the UHOT remediation. These wells were installed to provide an overview of the general groundwater quality in the region of the UHOT excavations. There were three Volatile Organic Compounds (VOCs) analytical anomalies of which only one was in excess of groundwater quality standards were observed in the upgradient monitoring well. The three anomalies were trihalomethane compounds. These trihalomethanes are typically associated with potable water disinfection. The information was passed along to the Fort Monmouth Directorate of Public Works (DPW) and upon their investigation a leak in a potable water line in close proximity to the upgradient well was discovered. The repair to leak in the potable water line was completed; subsequent analytical results have shown these compounds to be Non-Detect. The analytical report and NJDEP's response to the findings can be found in Appendix E of this document.

Two rounds of groundwater samples were collected from the four (4) monitoring wells installed at Parcel 76 to the north of the buildings in the 200 Area. The monitoring wells were installed in the excavations of the leaking UHOTs.

The well locations provide coverage to demonstrate whether product released from the discovered leaking UHOTs had migrated and/or negatively impacted the surrounding groundwater. The results of the sampling events can be found on Table 4.

The groundwater analytical packages including associated quality control data is provided in Appendix E. The monitoring wells are also used as part of the base-wide groundwater model.

3.3 CONCLUSIONS AND RECOMMENDATIONS

The analytical results for all of post-remediation soil samples collected from the closure excavation at UHOTs No. 538 through 545 were below the NJDEP soil cleanup standards for total organic contaminants and semi-volatile organic compounds. As part of Fort Monmouth's petroleum soil remediation program; impacted soils are to be excavated to below 1,000 mg/kg TPH.

This ensures that the contingency analysis is not performed and thusly eliminates any potential of chasing one of the fuel oil base/neutral surrogate compounds, reducing the volume soils excavated and cost of UHOT removals. No post remedial samples collected from the individual UHOT removals were in excess of the threshold value of 1,000 mg/kg necessary for contingency base/neutral analysis.

The two rounds of groundwater collected from the four monitoring wells installed in conjunction with the UHOT removals indicated that all parameters are below NJDEP Groundwater Quality Standards (GWQS) or not detected.

No Further Action is proposed in regard to the closure and remedial investigation of UHOT No.538 - 545 at ECP Parcel 76 (200 - Area).

TABLE 1
SUMMARY OF LABORATORY ANALYSIS
FT. MONMOUTH, 200 - AREA
October 2009 through July 2010

SAMPLE ID	LABORATORY SAMPLE ID	SAMPLE DATE	SAMPLE MATRIX	ANALYTICAL PARAMETER	ANALYTICAL METHOD
76-3-A, North Wall	9042201	10/20/09	Soil	TPH	OQA-QAM-25
76-3-B, South Wall	9042202	10/20/09	Soil	TPH	OQA-QAM-25
76-3-C, East Wall	9042203	10/20/09	Soil	TPH	OQA-QAM-25
76-3-D, West Wall	9042204	10/20/09	Soil	TPH	OQA-QAM-25
73-3-E, Bottom	9042205	10/20/09	Soil	TPH	OQA-QAM-25
540-A, North Wall	9042501	10/22/09	Soil	TPH	OQA-QAM-25
540-B, South Wall	9042502	10/22/09	Soil	TPH	OQA-QAM-25
540-C East Wall	9042503	10/22/09	Soil	TPH	OQA-QAM-25
540-D West Wall	9042504	10/22/09	Soil	TPH	OQA-QAM-25
540-E Bottom	9042505	10/22/09	Soil	TPH	OQA-QAM-25
543-A North Wall	9044801	11/17/09	Soil	TPH	OQA-QAM-25
543-B South Wall	90444802	11/17/09	Soil	TPH	OQA-QAM-25
543-C East Wall	9044803	11/17/09	Soil	TPH	OQA-QAM-25
543-D West Wall	9044804	11/17/09	Soil	TPH	OQA-QAM-25
543-E Bottom	9044805	11/17/09	Soil	TPH	OQA-QAM-25
539-A/Bottom	9047101	12/4/09	Soil	TPH	OQA-QAM-25
539-B/East Wall	9047102	12/4/09	Soil	TPH	OQA-QAM-25
539-C/South Wall	9047103	12/4/09	Soil	TPH	OQA-QAM-25
539-D/North Wall	9047104	12/4/09	Soil	TPH	OQA-QAM-25
539 E/West Wall	9048201	12/15/09	Soil	TPH	OQA-QAM-25
539-F/Bottom	9048202	12/15/09	Soil	TPH	OQA-QAM-25

ABBREVIATIONS: TPH = Total Petroleum Hydrocarbons, Method NJDEP OQA-QAM-25

TABLE 1
SUMMARY OF LABORATORY ANALYSIS
FT. MONMOUTH, 200 - AREA
October 2009 through July 2010

SAMPLE ID	LABORATORY SAMPLE ID	SAMPLE DATE	SAMPLE MATRIX	ANALYTICAL PARAMETER	ANALYTICAL METHOD
538-A/Bottom	1000301	1/5/10	Soil	TPH	OQA-QAM-25
538-B/North Wall	1000302	1/5/10	Soil	TPH	OQA-QAM-25
538-C/East Wall-	1000303	1/5/10	Soil	TPH	OQA-QAM-25
538-D/West Wall	1000601	1/7/10	Soil	TPH	OQA-QAM-25
538-E/East Wall	1000602	1/7/10	Soil	TPH	OQA-QAM-25
538-F/East Wall	1000603	1/7/10	Soil	TPH	OQA-QAM-25
538-G/South Wall	1000604	1/7/10	Soil	TPH	OQA-QAM-25
538-H/South Wall	1000605	1/7/10	Soil	TPH	OQA-QAM-25
548-I/South Wall	1000606	1/7/10	Soil	TPH	OQA-QAM-25
542-A/South Wall	1016901	4/29/10	Soil	TPH	OQA-QAM-25
542-B/West Wall	1016902	4/29/10	Soil	TPH	OQA-QAM-25
542-C/Bottom	1016903	4/29/10	Soil	TPH	OQA-QAM-25
542-D	1016904	4/29/10	Soil	TPH	OQA-QAM-25
541 – PE1	1017401	5/4/10	Soil	TPH	OQA-QAM-25
541 – PE2	1017402	5/4/10	Soil	TPH	OQA-QAM-25
541 – PE3	1017403	5/4/10	Soil	TPH	OQA-QAM-25
541 – PE4	1017403	5/4/10	Soil	TPH	OQA-QAM-25
541 – PE5	1017404	5/4/10	Soil	TPH	OQA-QAM-25
541 East Center (11.5 – 12')	1021401	5/25/10	Soil	TPH	OQA-QAM-25
541/South Wall	1022401	6/2/10	Soil	TPH	OQA-QAM-25
543/East Wall WP	1024103	6/7/10	Soil	TPH	OQA-QAM-25
543/North wall C	1024104	6/7/10	Soil	TPH	OQA-QAM-25
543/north wall C	1024105	6/7/10	Soil	TPH	OQA-QAM-25
543/North Wall D	1024106	6/7/10	Soil	TPH	OQA-QAM-25

ABBREVIATIONS: TPH = Total Petroleum Hydrocarbons, Method NJDEP OQA-QAM-25

TABLE 1
SUMMARY OF LABORATORY ANALYSIS
FT. MONMOUTH, 200 - AREA
October 2009 through July 2010

SAMPLE ID	LABORATORY SAMPLE ID	SAMPLE DATE	SAMPLE MATRIX	ANALYTICAL PARAMETER	ANALYTICAL METHOD
543/North Wall A	1024101	6/7/10	Soil	TPH	OQA-QAM-25
543/North Wall B	1024102	6/7/10	Soil	TPH	OQA-QAM-25
543/West Wall	1024107	6/7/10	Soil	TPH	OQA-QAM-25
543/S. Line trench A	1024108	6/7/10	Soil	TPH	OQA-QAM-25
543/South Wall	1024109	6/7/10	Soil	TPH	OQA-QAM-25
543/S. Line Trench B	1024110	6/7/10	Soil	TPH	OQA-QAM-25
541/N. Wall A	1024701	6/8/10	Soil	TPH	OQA-QAM-25
541/N. Wall B	1024702	6/8/10	Soil	TPH	OQA-QAM-25
541/N. Wall C	1024703	6/8/10	Soil	TPH	OQA-QAM-25
541/N. Wall D	1024704	6/8/10	Soil	TPH	OQA-QAM-25
542/N. Wall A	1024705	6/8/10	Soil	TPH	OQA-QAM-25
542/E. Wall	1024706	6/8/10	Soil	TPH	OQA-QAM-25
542/W. Wall	1024707	6/8/10	Soil	TPH	OQA-QAM-25
542/S. Wall	1024708	6/8/10	Soil	TPH	OQA-QAM-25
542/N. Wall	1024709	6/8/10	Soil	TPH	OQA-QAM-25
542/N. Wall C	1024710	6/8/10	Soil	TPH	OQA-QAM-25
543/W. Wall A	1025301	6/9/10	Soil	TPH	OQA-QAM-25
543/W. Wall A	1025302	6/9/10	Soil	TPH	OQA-QAM-25
542/Sewer Pipe Trench A	1025303	6/9/10	Soil	TPH	OQA-QAM-25
542/Sewer Pipe Trench B	1025304	6/9/10	Soil	TPH	OQA-QAM-25
543/N. Wall C	1025305	6/9/10	Soil	TPH	OQA-QAM-25

ABBREVIATIONS: TPH = Total Petroleum Hydrocarbons, Method NJDEP OQA-QAM-25

TABLE 1
SUMMARY OF LABORATORY ANALYSIS
FT. MONMOUTH, 200 - AREA
October 2009 through July 2010

SAMPLE ID	LABORATORY SAMPLE ID	SAMPLE DATE	SAMPLE MATRIX	ANALYTICAL PARAMETER	ANALYTICAL METHOD
543 – S. Ctr. A	1025801	6/10/10	Soil	TPH	OQA-QAM-25
543 – S. Ctr. B	1025802	6/10/10	Soil	TPH	OQA-QAM-25
542/N. Wall D	1026001	6/11/10	Soil	TPH	OQA-QAM-25
542/ N. Wall E	1026002	6/11/10	Soil	TPH	OQA-QAM-25
538/W. Wall SS	1026003	6/11/10	Soil	TPH	OQA-QAM-25
538/NW Wall	1026004	6/11/10	Soil	TPH	OQA-QAM-25
538/East Wall SS	1026005	6/11/10	Soil	TPH	OQA-QAM-25
543/West Wall B	1026303	6/14/10	Soil	TPH	OQA-QAM-25
541/Sewer Trench A	1026301	6/14/10	Soil	TPH	OQA-QAM-25
541/Sewer Trench B	1026302	6/14/10	Soil	TPH	OQA-QAM-25
541/Sewer Trench C	1026303	614//10	Soil	TPH	OQA-QAM-25
543/N. Wall F	1026702	6/16/10	Soil	TPH	OQA-QAM-25
543/S. Center A	1026703	6/16/10	Soil	TPH	OQA-QAM-25
542/North wall F	1027801	6/22/10	Soil	TPH	OQA-QAM-25
542/North wall G	1027802	6/22/10	Soil	TPH	OQA-QAM-25
542/N. Wall H	1028401	6/24/10	Soil	TPH	OQA-QAM-25
542/N. Wall I	1028403	6/24/10	Soil	TPH	OQA-QAM-25
542/N. Wall J	1028405	6/24/10	Soil	TPH	OQA-QAM-25
542/N. Wall K	1028406	6/24/10	Soil	TPH	OQA-QAM-25
541/Sewer Trench B	1028601	6/25/10	Soil	TPH	OQA-QAM-25
541/N. SPT NW	1028602	6/25/10	Soil	TPH	OQA-QAM-25
541/N. SPT WW	1028603	6/25/10	Soil	TPH	OQA-QAM-25
541/N. SPT EW	1028604	6/25/10	Soil	TPH	OQA-QAM-25
SPT -1	1029001	6/28/10	Soil	TPH	OQA-QAM-25
SPT-2	1029002	6/28/10	Soil	TPH	OQA-QAM-25

ABBREVIATIONS: TPH = Total Petroleum Hydrocarbons, Method NJDEP OQA-QAM-25

TABLE 1
SUMMARY OF LABORATORY ANALYSIS
FT. MONMOUTH, 200 - AREA
October 2009 through July 2010

SAMPLE ID	LABORATORY SAMPLE ID	SAMPLE DATE	SAMPLE MATRIX	ANALYTICAL PARAMETER	ANALYTICAL METHOD
538/SB-1	1029201	6/29/10	Soil	TPH	OQA-QAM-25
538/SB-1	1029202	6/29/10	Soil	TPH	OQA-QAM-25
538/SB-2	1029203	6/29/10	Soil	TPH	OQA-QAM-25
538/SB-2	1029204	6/29/10	Soil	TPH	OQA-QAM-25
538/SB-3	1029205	6/29/10	Soil	TPH	OQA-QAM-25
538/SB-3	1029206	6/29/10	Soil	TPH	OQA-QAM-25
538/SB-4	1029207	6/29/10	Soil	TPH	OQA-QAM-25
538/SB-4	1029208	6/29/10	Soil	TPH	OQA-QAM-25
538/SB-5	1029209	6/29/10	Soil	TPH	OQA-QAM-25
538/SB-5	1029210	6/29/10	Soil	TPH	OQA-QAM-25
SPT-3	1029211	6/29/10	Soil	TPH	OQA-QAM-25
SPT	1029901	7/1/10	Soil	TPH	OQA-QAM-25
SPT-4	1029902	7/1/10	Soil	TPH	OQA-QAM-25
SPT-5	1029903	7/1/10	Soil	TPH	OQA-QAM-25
SPT-6	1029904	7/1/10	Soil	TPH	OQA-QAM-25
SPT-7	1030401	7/11/10	Soil	TPH	OQA-QAM-25
SPT-8	1030402	7/11/10	Soil	TPH	OQA-QAM-25
SPT-9	1030403	7/11/10	Soil	TPH	OQA-QAM-25
538/S. Wall W	1030404	7/11/110	Soil	TPH	OQA-QAM-25
538/S. Wall E	1031901	7/24/10	Soil	TPH	OQA-QAM-25
538/E. Wall	1031902	7/24/10	Soil	TPH	OQA-QAM-25
538/E. Wall	1031903	7/24/10	Soil	TPH	OQA-QAM-25
SPT-10	1031905	7/24/10	Soil	TPH	OQA-QAM-25
SPT-11	1031906	7/24/10	Soil	TPH	OQA-QAM-25
SPT-12	1031907	7/24/10	Soil	TPH	OQA-QAM-25

ABBREVIATIONS: TPH = Total Petroleum Hydrocarbons, Method NJDEP OQA-QAM-25

TABLE 2
SUMMARY OF LABORATORY ANALYTICAL RESULTS
FT. MONMOUTH, BUILDING 200 - AREA, October 2009 – May 2010
TOTAL PETROLEUM HYDROCARBONS (results in mg/kg)

SAMPLE ID	LABORATORY SAMPLE ID	SAMPLE LOCATION	SAMPLE DEPTH (in feet)	MATRIX	TPH RESULTS
76-3-A	9042201	North Wall	5.5 – 6.0'	Soil	ND
76-3-B	9042202	South Wall	5.5 – 6.0'	Soil	ND
76-3-C	9042203	East Wall	5.5 – 6.0'	Soil	ND
76-3-D	90422204	West Wall	5.5 – 6.0'	Soil	ND
76-3-E	9042205	Bottom	6.0 – 6.5'	Soil	ND
540-A	9042501	North Wall	6.0 – 6.5'	Soil	ND
540-B	9042502	South Wall	6.0 – 6.5'	Soil	ND
540-C	9042503	East Wall	6.0 – 6.5'	Soil	ND
540-D	9048504	West Wall	6.0 – 6.5'	Soil	ND
540-E	9042505	Bottom	6.5 – 7.0'	Soil	ND
539-A	9047101	Bottom	9.0 – 9.5'	Soil	ND
539-B	9047102	East Wall	7.5 – 8.0'	Soil	ND
539-C	9047103	South Wall	7.5 – 8.0'	Soil	ND
539-D	9047104	North Wall	7.5 – 8.0'	Soil	ND
539-E	9048201	West Wall	7.5 – 8.0'	Soil	ND
539 F	9048202	Bottom	9.5 – 10.0'	Soil	ND
543 A	9044801	North Wall	8.5 – 9.0'	Soil	**8205.4**
543 B	9044802	South Wall	8.5 – 9.0'	Soil	1428.6
543C	9044803	East Wall	8.5 – 9.0'	Soil	1403.11
543 D	9044804	West Wall	8.0 – 8.5'	Soil	ND
543 E	9044805	Bottom	9.5 – 10'	Soil	ND

ABBREVIATIONS:
mg/kg = milligrams per kilogram = parts per million
ND = Compound Not Detected
Grey shading = soils in excess of NJDEP soil clean up standard

TABLE 2
SUMMARY OF LABORATORY ANALYTICAL RESULTS
FT. MONMOUTH, BUILDING 200 - AREA, October 2009 – May 2010
TOTAL PETROLEUM HYDROCARBONS (results in mg/kg)

SAMPLE ID	LABORATORY SAMPLE ID	SAMPLE LOCATION	SAMPLE DEPTH (in feet)	MATRIX	TPH RESULTS
538-A	1000301	Bottom	7.5 - 8.0'	Soil	ND
538-B	1000302	North Wall	7.0 – 7.5'	Soil	ND
538-C	1000303	East wall	6.0 – 6.5'	Soil	2533.02
538-D	1000601	West Wall	6.0 – 6.5'	Soil	625.58
538-E	1000602	East Wall - Pipe North	6.0 – 6.5'	Soil	2900.36
538-F	1000603	East Wall – Pipe South	6.0 – 6.5'	Soil	4117.53
538-G	1000604	South Wall – Pipe East	6.0 – 6.5'	Soil	**8786.85**
538-H	1000605	South Wall – Pipe Middle	6.0 – 6.5'	Soil	**16550.24**
538-I	1000606	South Wall – Pipe West	6.0 – 6.5'	Soil	3359.32
542-A	1016901	South Wall	6.0 – 6.5'	Soil	ND
542-B	1016902	West Wall	6.5 – 7.0'	Soil	ND
542-C	1016903	Bottom	8.5 – 9.0'	Soil	ND
542-D	1016904	East Wall	6.0 – 6.5'	Soil	ND
541 – PE1	1017401	Pipe Excavation sample	9.0'	Soil	ND
541 – PE2	1017402	Pipe Excavation sample	11.0'	Soil	ND
541 – PE3	1017403	Pipe Excavation sample	6.5'	Soil	2189
541 – PE4	1017404	Pipe Excavation sample	7.5'	Soil	ND
541 – PE5	1017405	Pipe Excavation sample	6.5'	Soil	ND
541	1021401	East Center (11.5 -12')	11.5 – 12'	Soil	ND
542	1026001	North Wall D	(8.0 – 8.5')	Soil	**5421.21**
542	1026002	North Wall E	(8.0 – 8.5')	Soil	1698.45
538	1026003	West wall SS	(4.0 – 4.5')	Soil	ND
538	1026004	Northwest Wall	(4.0 – 4.5')	Soil	ND
538	1026005	East Wall SS	(4.0 – 4.5')	Soil	3116..05
543	1025801	South Ctr. A	9.0 – 9.5'	Soil	41.4
543	1025802	South Ctr. B	9.0 – 9.5'	Soil	579.46
541	1022401	South Wall	7.5 – 8.0'	Soil	290.38
543	1024101	North Wall A	7.0 – 7.5'	Soil	ND
543	1024102	North Wall B	7.0 – 7.5'	Soil	114.54
543	1024103	East Wall WP	7.0 – 7.5'	Soil	ND
543	1024104	North wall C	7.0 – 7.5'	Soil	**9944.55**
543	1024105	North wall C	9.0 – 9.5'	Soil	1093.33
543	1024106	North wall D	7.0 – 7.5'	Soil	ND
543	1024107	West Wall	7.0 – 7.5'	Soil	**9835.33**

ABBREVIATIONS:

mg/kg = milligrams per kilogram = parts per million

ND = Compound Not Detected

Grey shading = soils in excess of NJDEP soil clean up standard

TABLE 2
SUMMARY OF LABORATORY ANALYTICAL RESULTS
FT. MONMOUTH, BUILDING 200 - AREA, October 2009 – July 2010
TOTAL PETROLEUM HYDROCARBONS (results in mg/kg)

SAMPLE ID	LABORATORY SAMPLE ID	SAMPLE LOCATION	SAMPLE DEPTH (in feet)	MATRIX	TPH RESULTS
543	1024108	Line Trench A	7.0 – 7.5'	Soil	448.47
543	1024109	South wall	7.0 – 7.5'	Soil	ND
543	1024110	S. Line Trench B	7.0 – 7.5'	Soil	215.39
542	1027801	North Wall F	11.0 – 11.5'	Soil	ND
542	1027802	North wall G	11.0 – 11.5'	Soil	ND
541	1026301	Sewer Trench A	7.0 – 7.5'	Soil	ND
541	1026302	Sewer Trench B	7.0 – 7.5'	Soil	2314.3
541	1026303	Sewer Trench C	7.0 – 7.5'	Soil	ND
543	1026304	West Wall B	9.0 – 9.5'	Soil	ND
541	1024701	North Wall A	7.0 – 7.5'	Soil	ND
541	1024702	North Wall B	7.0 – 7.5'	Soil	462.41
541	1024703	North Wall C	7.0 – 7.5'	Soil	337.91
542	1024704	North Wall D	7.0 – 7.5'	Soil	228.49
542	1024705	North Wall A	9.0 – 9.5'	Soil	285.16
542	1024706	East Wall	7.0 – 7.5'	Soil	288.47
542	1024707	West Wall	7.0 – 7.5'	Soil	315.95
542	1024708	South Wall	7.0 – 7.5'	Soil	ND
542	1024709	North Wall B	8.0 – 8.5'	Soil	2510
542	1024710	North Wall C	8.0 – 8.5'	Soil	ND
543	1025301	West Wall A	7.0 – 7.5'	Soil	ND
543	1025302	West Wall A	9.0 – 9.5'	Soil	1281.62
542	1025303	Sewer Pipe Trench A	7.0 – 7.5'	Soil	ND
542	105304	Sewer Pipe Trench B	7.0 – 7.5'	Soil	ND
543	105305	North Wall C	10.5 – 11.0'	Soil	2345.88
543	1026701	North Wall E	11.5 – 12.0'	Soil	231.06
543	1026702	North Wall F	11.5 – 12.0'	Soil	ND
543	1026703	South Center A	11.5 – 12.0'	Soil	ND
541	1028601	Sewer Trench B	9.0 – 9.5'	Soil	163.20
541	1026802	North SPT-NW	7.0 – 7.5'	Soil	ND
541	1026803	North SPT-WW	7.0 – 7.5'	Soil	311.71
541	1026804	North SPT EW	7.0 – 7.5'	Soil	ND

ABBREVIATIONS:
mg/kg = milligrams per kilogram = parts per million
ND = Compound Not Detected
Grey shading = soils in excess of NJDEP soil clean up standard

TABLE 2
SUMMARY OF LABORATORY ANALYTICAL RESULTS
FT. MONMOUTH, BUILDING 200 – AREA, October 2009 – July 2010
TOTAL PETROLEUM HYDROCARBONS (results in mg/kg)

SAMPLE ID	LABORATORY SAMPLE ID	SAMPLE LOCATION	SAMPLE DEPTH (in feet)	MATRIX	TPH RESULTS
542	1028401	North Wall H	7.0 – 7.5'	Soil	ND
542	1028403	North Wall I	8.0 – 8.5'	Soil	ND
542	1028405	North Wall J	7.0 – 7.5'	Soil	ND
542	1028406	North Wall K	8.0 – 8.5'	Soil	ND
SPT-1	1029001	SPT-1	7.0 – 7.5'	Soil	241.66
SPT-2	1029002	SPT-2	7.0 – 7.5'	Soil	ND
538	1029201	SB-1	4.0 – 4.5'	Soil	449.14
538	1029202	SB-1	7.0 – 7.5'	Soil	ND
538	1029203	SB-2	4.0 - 4.5'	Soil	2067.2
538	1029204	SB-2	7.0 – 7.5'	Soil	ND
538	1029205	SB-3	4.0 – 4.5'	Soil	697.67
538	1029206	SB-3	7.0 – 7.5'	Soil	ND
538	1029207	SB-4	4.0 – 4.5'	Soil	ND
538	1029208	SB-4	7.0 – 7.5'	Soil	ND
538	1029209	SB-5	4.0 – 4.5'	Soil	128.22
538	1029210	SB-5	7.0 – 7.5'	Soil	ND
SPT-3	1029211	SPT-3	7.0 – 7.5'	Soil	ND
SPT	1029901	SPT	7.0 – 7.5'	Soil	ND
SPT-4	1029902	SPT-4	7.0 – 7.5'	Soil	ND
SPT-5	1029903	SPT-5	7.0 – 7.5'	Soil	ND
SPT-6	1029904	SPT-6	7.0 – 7.5'	Soil	ND
SPT-7	1030401	SPT-7	7.0 – 7.5'	Soil	ND
SPT-8	1030402	SPT-8	7.0 – 7.5'	Soil	ND
SPT-9	1030403	SPT-9	7.0 – 7.5'	Soil	ND
538	1030404	South Wall W.	7.0 – 7.5'	Soil	ND
538	1031901	South Wall E	7.0 – 7.5'	Soil	273.84
538	1031902	East Wall	4.0 – 4.5'	Soil	562.92
538	1031903	East Wall	7.0 – 7.5'	Soil	331.17
SPT-10	1031904	SPT-10	7.0 – 7.5'	Soil	ND
SPT-11	1031905	SPT-11	7.0 – 7.5'	Soil	ND
SPT-12	1031906	SPT-12	7.0 – 7.5'	Soil	ND

ABBREVIATIONS:
mg/kg = milligrams per kilogram = parts per million
ND = Compound Not Detected
SPT = Sewer Pipe Trench
Grey shading = soils in excess of NJDEP soil clean up standard

TABLE 3
SUMMARY OF LABORATORY ANALYSIS
FT. MONMOUTH, BUILDING 200 MW01 – MW06
August 2010

SAMPLE ID	LABORATORY SAMPLE ID	SAMPLE DATE	SAMPLE MATRIX	ANALYTICAL PARAMETER	ANALYTICAL METHOD
200MW01	1034401	8/16/10	Groundwater	VOC+15/B/N+15	EPA method 624/EPA methods 3510/8270
200MW02	1034402	8/16/10	Groundwater	VOC+15/B/N+15	EPA method 624/EPA methods 3510/8270
200MW03	1034403	8/16/10	Groundwater	VOC+15/B/N+15	EPA method 624/EPA methods 3510/8270
200MW04	1034404	8/16/10	Groundwater	VOC+15/B/N+15	EPA method 624/EPA methods 3510/8270
200MW05	1034405	8/16/10	Groundwater	VOC+15/B/N+15	EPA method 624/EPA methods 3510/8270
200MW06	10334406	8/16/10	Groundwater	VOC+15/B/N+15	EPA method 624/EPA methods 3510/8270
200MW01	1037104	8/30/10	Groundwater	VOC+15/B/N+15	EPA method 624/EPA methods 3510/8270
200MW02	1037105	8/30/10	Groundwater	VOC+15/B/N+15	EPA method 624/EPA methods 3510/8270
200MW03	1037106	8/30/10	Groundwater	VOC+15/B/N+15	EPA method 624/EPA methods 3510/8270
200MW04	1037107	8/30/10	Groundwater	VOC+15/B/N+15	EPA method 624/EPA methods 3510/8270
200MW05	1037108	8/30/10	Groundwater	VOC+15/B/N+15	EPA method 624/EPA methods 3510/8270
200MW06	1037109	8/30/10	Groundwater	VOC+15/B/N+15	EPA method 624/EPA methods 3510/8270

ABBREVIATIONS:

VOC = volatile organic compounds
B/N = base neutral compounds

TABLE 4
SUMMARY OF LABORATORY ANALYTICAL RESULTS
FT. MONMOUTH, 200 AREA MW01 – MW06
August 2010
All aqueous results expressed in ug/kg

SAMPLE ID	LABORATORY SAMPLE ID	MATRIX	VOC RESULTS	B/N RESULTS
200MW01	1034401	Groundwater	All ND	All ND
200MW02	1034402	Groundwater	All <GWQS	All <GWQS
200MW03	1034403	Groundwater	All ND	All ND
200MW04	1034404	Groundwater	All <GWQS	All <GWQS
200MW05	1034405	Groundwater	All ND	All ND
200MW06	1034406	Groundwater	All ND	All <GWQS
200MW01	1037104	Groundwater	All ND	All ND
200MW02	1037105	Groundwater	All <GWQS	All ND
200MW03	1037106	Groundwater	All ND	All ND
200MW04	1037107	Groundwater	All ND	All ND
200MW05	1037108	Groundwater	All ND	All ND
200MW06	1037109	Groundwater	All ND	All <GWQS

ABBREVIATIONS:
ug/kg = micrograms per kilogram = parts per billion
ND = Compound Not Detected
GWQS = NJDEP Groundwater quality standards

APPENDIX A

CERTIFICATIONS

APPENDIX B

WASTE MANIFEST

APPENDIX C

UST DISPOSAL CERTIFICATE

APPENDIX D

PHOTO - DOCUMENTATION

APPENDIX E

SOIL AND GROUNDWATER ANALYTICAL DATA PACKAGES

FIGURES

Bibliography

Geophysical Survey – Final Report Reevaluation of Previous Survey Data for 200, 400, 700, and 800 Areas, Fort Monmouth, NJ, Enviroscan Project Number 100814

Test Pit at 537 looking for potential UHOT

Top of UHOT at 541, removing product from UHOT before removal

Pipe run at 538

UHOT ready to be removed, note wet soil around UHOT (in this case it is an oil/water mix)

UHOT excavation after removal behind 542

ATTACHMENT E

Letters from NJDEP, regarding UST Closure Approval/NFA, dated July 23, 1993; September 21, 1995; August 20, 2000; October 23, 2000; July 10, 1998; February 24, 2000; April 20, 2001; and January 10, 2003.

State of New Jersey

Department of Environmental Protection

Christine Todd Whitman
Governor

Robert C. Shinn, Jr.
Commissioner

Mr. James Ott
Director – Public Works
U.S. Army, Fort Monmouth
Fort Monmouth, NJ 07703

JUL 10 1998

Re: UST Closure Reports
Fort Monmouth Army Base
Tinton Falls, Monmouth County

Dear Mr. Ott:

The NJDEP is in receipt of UST closure reports noted below. These documents have been reviewed by the NJDEP throughout the closure process and the documents submitted were discussed throughout their drafting and in great detail upon submittal. Based on these steps and the final review conducted by me, the NJDEP accepts the closure reports and all of the NFA requests commensurate with these submittals.

NJDEP REG. NO.	BUILDING	CONTENTS	CAPACITY	PROPOSAL	DEP APPROVAL
90010-10	116C-MP/E	No. 2 Fuel Oil	2000	NFA	YES
81535-134	836-MP/W	No. 2 Fuel Oil	550	NFA	YES
81535-164	902-MP/W	No. 2 Fuel Oil	1000	NFA	YES
81515-20	2503-CW	No. 2 Fuel	1000	NFA	YES
81515-22	2532-CW	No. 2 Fuel Oil	550	NFA	YES
81515-23	2535-CW	No. 2 Fuel Oil	1000	NFA	YES
81515-31	2561-CW	No. 2 Fuel Oil	550	NFA	YES
90010-27	410-MP/E	No. 2 Fuel Oil	1080	NFA	YES
81535-206	1075	NOT	SUBMITTED	WITH	PACKAGE
81515-16	2504B-CW	No. 2 Fuel Oil	1000	NFA	YES
81515-18	2507-CW	No. 2 Fuel Oil	1080	NFA	YES
81515-26	2536-CW	No. 2 Fuel Oil	1000	NFA	YES
81515-14	2501-CW	No. 2 Fuel Oil	1000	NFA	YES
90010-12	117B-MP/E	No. 2 Fuel Oil	2000	NFA	YES
90010-34	418-MP/E	No. 2 Fuel Oil	1080	NFA	YES
90010-36	420-MP/E	No. 2 Fuel Oil	1080	NFA	YES
90010-38	422-MP/E	No. 2 Fuel Oil	1080	NFA	YES
90010-41	425-MP/E	No. 2 Fuel Oil	1080	NFA	YES
90010-44	430A-MP/E	No. 2 Fuel Oil	550	NFA	YES
90010-50	453-MP/E	No. 2 Fuel Oil	1080	NFA	YES

[illegible]	250-CW	No. 2 Fuel Oil	550	NFA	YES
[illegible]	2048-3-IP-SW	No. 2 Fuel Oil	1000	NFA	YES
[illegible]	900B-MPAV	No. 2 Fuel Oil	1000	NFA	YES

The efforts made to assure protection of human health and the environment as well as the efforts made to make the entire closure process efficient and consistent with the NJDEP's Technical Requirements for Site Remediation (N.J.A.C. 7:9-6 et seq.) has been exceptional.

If I can be of any assistance, please do not hesitate to contact me should you have any questions or comments.

Sincerely,

Ian R. Curtis, Case Manager
Bureau of Federal Case Management
ICURTIS@DEP.STATE.NJ.US

cc. Kevin Kratina, BUST

FTMMTH51.DOC

State of New Jersey

DONALD T. DiFRANCESCO
Acting Governor

Department of Environmental Protection

Robert C. Shinn, Jr.
Commissioner

Mr. Dinker Desai
DEPARTMENT OF THE ARMY
Headquarters, U.S. Army Communications-Electronics Command
Fort Monmouth, New Jersey 07703-5000

APR 20 2001

Re: Building 2500 UST Closures
Fort Monmouth Army Base
Tinton Falls, Monmouth County

Dear Mr. Desai:

The New Jersey Department of Environmental Protection has reviewed the final Building 2500 underground storage tank investigations submitted by Versar, Inc. dated April 20,2001 on behalf of Fort Monmouth and we approve the *no further action* request. The ARMY has reported the closure of five USTs associated with Building 2500. These tanks are noted below:

NJDEP Reg. #	Bldg. #
0081515-52	2500
0081515-53	2500
0081515-54	2500
0081515-55	2500
0081515-56	2500

The investigation was subsequent to excavation of the tank and potentially contaminated material. Sampling revealed no contamination above the residential soil cleanup criteria or the Ground Water Quality Standards. No further action is an appropriate remedial alternative.

If you should have any question or comments, please do not hesitate to contact me via E-mail or telephone at (609-633-7232).

Sincerely,

Ian R. Curtis, Case Manager
Bureau of Case Management
ICURTIS@DEP.STATE.NJ.US

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State of New Jersey

Department of Environmental Protection

Christine Todd Whitman
Governor

Robert C. Shinn, Jr.
Commissioner

Mr. James Ott
C/O: Dinker Desai
Director – Public Works
U.S. Army, Fort Monmouth
Fort Monmouth, NJ 07703

FEB 24 2000

Re: UST Closure Reports - Closure Approvals
Fort Monmouth Army Base
Fort Monmouth, Monmouth County

Dear Mr. Ott:

The NJDEP has reviewed the UST Closure and Site Investigation Reports for the Fort Monmouth underground storage tank sites noted below. Based on the NJDEP review of these documents, your request that the NJDEP approve the closure reports for those tanks listed below.

The following tanks were removed, sampled and analyzed in accordance with State and Federal requirements. Additionally, the reports consistently state the Fort Monmouth Public Works Department policy of removing all soils which are determined to have total petroleum hydrocarbon contamination (TPHC) greater than 1000 ppm. NJDEP criteria requires similar removal for TPHC contamination greater than 10,000 ppm. These activities are conservative and therefore further assure the NJDEP that no further action is necessary at these sites.

NJDEP Req. #	Bldg. #	NJDEP Req. #	Bldg. #
0090016-16	165	0081533-151	913
0090010-69	170D	0081533-155	917
0090010-20	197	0081533-165	1105
0081533-54	270	0081533-169	1109
0081533-60	286	0081533-173	1213A
0081533-65	291	0081533-208	1221
0090010-70	400	00192486-34	2018
0081533-103	671A	00192486-35	2021A
0081533-138	876A	0081515-30	2543
0081533-149	911	0081515-40	2707
0081533-150	912		

If you should have any questions or comments, please do not hesitate to contact me at (609) 633-7232 or via E-mail.

Sincerely,

Ian R. Curtis, Case Manager
Bureau of Case Management
ICURTIS@DEP.STATE.NJ.US

FTMMTH06\IRC.DOC

State of New Jersey

Christine Todd Whitman
Governor

Department of Environmental Protection

Robert C. Shinn, Jr.
Commissioner

Mr. Dinkerral Desai
DEPARTMENT OF THE ARMY
HEADQUARTERS, U.S. ARMY COMMUNICATIONS-ELECTRONIC COMMAND
FORT MONMOUTH, NJ 07703-5000

AUG 2 9 2000

Re: UST Closure Approval/NFA
Fort Monmouth Main Post
Monmouth County

Dear Mr. Desai:

The NJDEP is in receipt of seventeen (17) UST closure reports dated June 1, 2000. The Army has requested to receive No Further Action approval letters for each of these reports. This letter approves the NFA requests for the following 17 UST located on the Main Post of the Fort Monmouth site:

NJDEP Req. #	Bldg. #	NJDEP Req. #	Bldg. #
0090010—06	80	0081533—226	707
0090010—17	166	0081533—119	745
0081533—5	207A	0081533—160	1076
0081533—211	207B	0081533—161	1076
0081533—57	282	0081533—168	1108
0081533—64	290	00192486—1	2000
0081533—68	295	0081515—62	2700.4
0081533—108	689A	00192486—30	3050
0081533—109	689B		

The NJDEP has determined that the Army has performed the remedial actions in a manner consistent or in excess of the regulatory requirements, specifically the Technical Requirements For Site Remediation (N.J.A.C. 7:26E et seq.). Soils with contamination in excess of the NJDEP residential cleanup criteria have been excavated and the Army has taken great care to provide documentation which assures us that all sources of contamination have been remediated.

The NJDEP has one comment in that we request that future reports provide ground water flow direction indications on the well location maps.

If you should have any questions or comments, please do not hesitate to contact me at (609) 633-7232 or via E-mail.

Sincerely,

Ian R. Curtis, Case Manager
Bureau of Case Management
ICURTIS@DEP.STATE.NJ.US

State of New Jersey

Christine Todd Whitman
Governor

Department of Environmental Protection

Robert C. Shinn, Jr.
Commissioner

Mr. Dinkerrai Desai
DEPARTMENT OF THE ARMY
HEADQUARTERS, U.S. ARMY COMMUNICATIONS-ELECTRONIC COMMAND
FORT MONMOUTH, NJ 07703-5000

Re: UST Closure Approval/NFA
Fort Monmouth Main Post
Monmouth County

OCT 2 3 2000

Dear Mr. Desai:

The NJDEP is in receipt of forty [redacted] UST closure reports dated September 11, 2000. The Army has requested to receive No Further Action approval letters for each of these reports. This letter approves the NFA requests for the following 40 UST located on the Main Post of the Fort Monmouth site:

NJDEP Req. #	Bldg. #	NJDEP Req. #	Bldg. #	NJDEP Req. #	Bldg. #
0090010—04	64B	0081533—79	550	0081533—179	1220F
0090010—09	116B	0081533—116	718	0081533—180	1220E
0090010—09	206B	0081533—202	752	0081533—181	1220D
0081533—56	275	0081533—147	909	0081533—182	1220C
0090010-23	276	0081533—152	914	0081533—183	1220B
0090010-25	280	0081533—153	915	00192486—36	2043
0081533—201	286/548A	0081533—204	977	0081515—15	2504A
0081533—62	288	0081533—205	979	0081515—35	2700
0081533—63	289	0081533—167	1107	0081515—36	2700
0081533—66	292	0081533—233	1107B	0081515—37	2700
0090010-43	429	0081533—175	1220J	0081515—38	2700
0090010-52	475	0081533—176	1220I	0081515—39	2700
0090010-55	483	0081533—177	1220H		
0081533—75	500	0081533—178	1220G		

The NJDEP has determined that the Army has performed the remedial actions in a manner consistent with the regulatory requirements, specifically the Technical Requirements For Site Remediation (N.J.A.C. 7:26E et seq.). Soils with contamination in excess of the NJDEP residential cleanup criteria have been excavated and the Army has taken great care to provide documentation that assures us that all sources of contamination have been remediated.

If you should have any questions or comments, please do not hesitate to contact me at (609) 633-7232 or via E-mail.

Sincerely,

Ian R. Curtis, Case Manager
Bureau of Case Management
ICURTIS@DEP.STATE.NJ.US

FTMMTH71IRC.DOC

State of New Jersey

James E. McGreevey
Governor

Department of Environmental Protection

Bradley M. Campbell
Commissioner

Mr. Dinkerrai Desai
DEPARTMENT OF THE ARMY
HEADQUARTERS, U.S. ARMY COMMUNICATIONS-ELECTRONIC COMMAND
FORT MONMOUTH, NJ 07703-5000

Re: UST Closure Approval/NFA
Fort Monmouth Main Post
Monmouth County

JAN 10 2003

Dear Mr. Desai:

The NJDEP is in receipt of sixty-eight (68) underground storage tank (UST) closure reports dated between July 17, 2001 and May 15, 2002. The Army has requested to receive No Further Action (NFA) approval letters for each of these reports. This letter approves the NFA requests for the following 68 UST that are located on the Main Post of the Fort Monmouth site:

Submittal Date	Building No.	NJDEP Reg. #	Residential
07/17/2001	104	90010-75	NO
07/17/2001	699A	81533-112	NO
07/17/2001	800A	81533-127	NO
07/17/2001	875	81533-234	NO
07/17/2001	949	81533-203	NO
07/17/2001	1220A	81533-184	NO
07/17/2001	2000B	192486-38	NO
01/02/2002	257	81533-200	NO
01/02/2002	283C	81533-229	NO
01/02/2002	290B	81533-224	NO
01/02/2002	290B	81533-225	NO
01/02/2002	491	90010-71	NO
01/02/2002	605	81533-85	NO
01/02/2002	678	81533-105	NO
01/02/2002	699	81533-236	NO
01/02/2002	699	81533-238	NO
01/02/2002	699	81533-237	NO
01/02/2002	699	81533-235	NO
01/02/2002	801B	81533-129	NO
01/02/2002	804A	81533-130	NO
01/02/2002	2337	81515-65	NO
01/02/2002	2562A	81515-41	NO
01/02/2002	2707	81515-50	NO
01/02/2002	2707	81515-49	NO
01/02/2002	2707	81515-51	NO
01/02/2002	2707	81515-47	NO
01/02/2002	2707	81515-48	NO

Submittal Date	Building No.	NJDEP Reg. #	Residential
02/13/2002	2044	192486-24	NO
02/13/2002	2044	192486-32	NO
02/13/2002	2044	192486-33	NO
02/26/2002	208B	81533-210	YES
03/05/2002	246	N/A	YES
03/05/2002	261B	N/A	YES
05/15/2002	106	90010-74	NO
05/15/2002	164	90010-15	NO
05/15/2002	173	90010-19	NO
05/15/2002	200	81533-2	NO
05/15/2002	208A	81533-6	YES
05/15/2002	233	81533-21	YES
05/15/2002	237	81533-25	YES
05/15/2002	271	81533-55	YES
05/15/2002	277	90010-24	NO
05/15/2002	296B	81533-217	NO
05/15/2002	296B	81533-223	NO
05/15/2002	296B	81533-221	NO
05/15/2002	296B	81533-220	NO
05/15/2002	296B	81533-222	NO
05/15/2002	296B	81533-218	NO
05/15/2002	296B	81533-216	NO
05/15/2002	296B	81533-215	NO
05/15/2002	296B	81533-214	NO
05/15/2002	296B	81533-213	NO
05/15/2002	296B	81533-219	NO
05/15/2002	426	90010-40	NO
05/15/2002	482	90010-54	NO
05/15/2002	600 A	81533-83	NO
05/15/2002	600 B	81533-212	NO
05/15/2002	611	81533-87	NO
05/15/2002	615	81533-89	NO
05/15/2002	618	81533-91	NO
05/15/2002	619	81533-92	NO
05/15/2002	621	81533-94	NO
05/15/2002	634	N/A	NO
05/15/2002	638	N/A	NO
05/15/2002	639-2	N/A	NO
05/15/2002	640	N/A	NO
05/15/2002	641	N/A	NO
05/15/2002	644	N/A	NO
05/15/2002	664	N/A	NO
05/15/2002	666	N/A	NO
05/15/2002	686	81533-107	NO
05/15/2002	697	81533-194	NO
05/15/2002	697	81533-195	NO

Submittal Date	Building No.	NJDEP Reg. #	Residential
05/15/2002	697	81533-196	NO
05/15/2002	876B	81533-139	NO
05/15/2002	886	81533-140	NO
05/15/2002	905	81533-145	NO
05/15/2002	1102	81533-162	NO
05/15/2002	1104	81533-164	NO
05/15/2002	2067	192486-37	NO
05/15/2002	2534	81515-24	NO
05/15/2002	2603	81515-60	NO
05/15/2002	2700 2,6	81515-61	NO

The NJDEP has determined that the Army has performed the remedial actions in a manner consistent with the regulatory requirements, specifically the Technical Requirements For Site Remediation (N.J.A.C. 7:26E et seq.). Soils with contamination in excess of the NJDEP residential cleanup criteria have been excavated and the Army has taken great care to provide documentation that assures us that all sources of contamination have been remediated.

If you should have any questions or comments, please do not hesitate to contact me at (609) 633-7232 or via E-mail.

Sincerely,

Ian R. Curtis, Case Manager
Bureau of Case Management
ICURTIS@DEP.STATE.NJ.US

FTMMTH116IRC.DOC

ATTACHMENT F

Parcel 28 Map – Septic Tank

Sample ID	Media	Depth (ft bgs)	Compound	Concentration (mg/kg)	Criteria	Criteria Value (mg/kg)
P28SD-2D	SD	1-1.5	Chromium	50.6	LEL/SEL	26/110

Sample ID	Media	Depth (ft bgs)	Compound	Concentration (mg/kg)	Criteria	Criteria Value (mg/kg)
P28SD-1	SD	0-0.5	Chromium	43.0	LEL/SEL	26/110
P28SD-1D	SD	1-1.5	Chromium	48.7	LEL/SEL	26/110

LEGEND

- Geoprobe Soil Sample Location
- Geoprobe Soil & Groundwater Sample Location
- Geoprobe Groundwater Sample Location
- Test Pit Soil Sample Location
- Surface Soil Sample Location
- Sediment Sample Location
- Generalized Groundwater Flow Direction. Direction of Generalized Groundwater Flow derived from qualitative evaluation of surface topography, surface water features, and pre-existing IRP site groundwater potentiometric maps where available.
- Geophysical Investigation Area (Electromagnetic Survey Followed by Targeted Ground Pentrating Radar of Anomalies)
- Geophysical Investigation Area - Ground Penetrating Radar (GPR)
- Building
- Installation Boundary

ECP PARCEL CATEGORY DEFINITIONS

7 Areas that are not evaluated or require additional evaluation.

* Parcel not included in Site Investigation. Information pertaining to parcels not included in this Site Investigation is presented in the Fort Monmouth Phase I ECP Report (January 2007).

BRAC PARCEL LABEL DEFINITIONS

8(2)PS
- CONTAMINATION DESCRIPTION
  - HS - Hazardous Substance Storage
  - HR - Hazardous Substance Release
  - PS - Petroleum Storage
  - PR - Petroleum Release
  - (P) - Possible Release or Disposal
- CATEGORY NUMBER
- PARCEL NUMBER

- Former Septic Tank
- Former Septic Leach Field
- Former Underground Concrete Transformer Vault

N

SCALE:
0 100 200 400 Feet

Base Realignment and Closure 2005

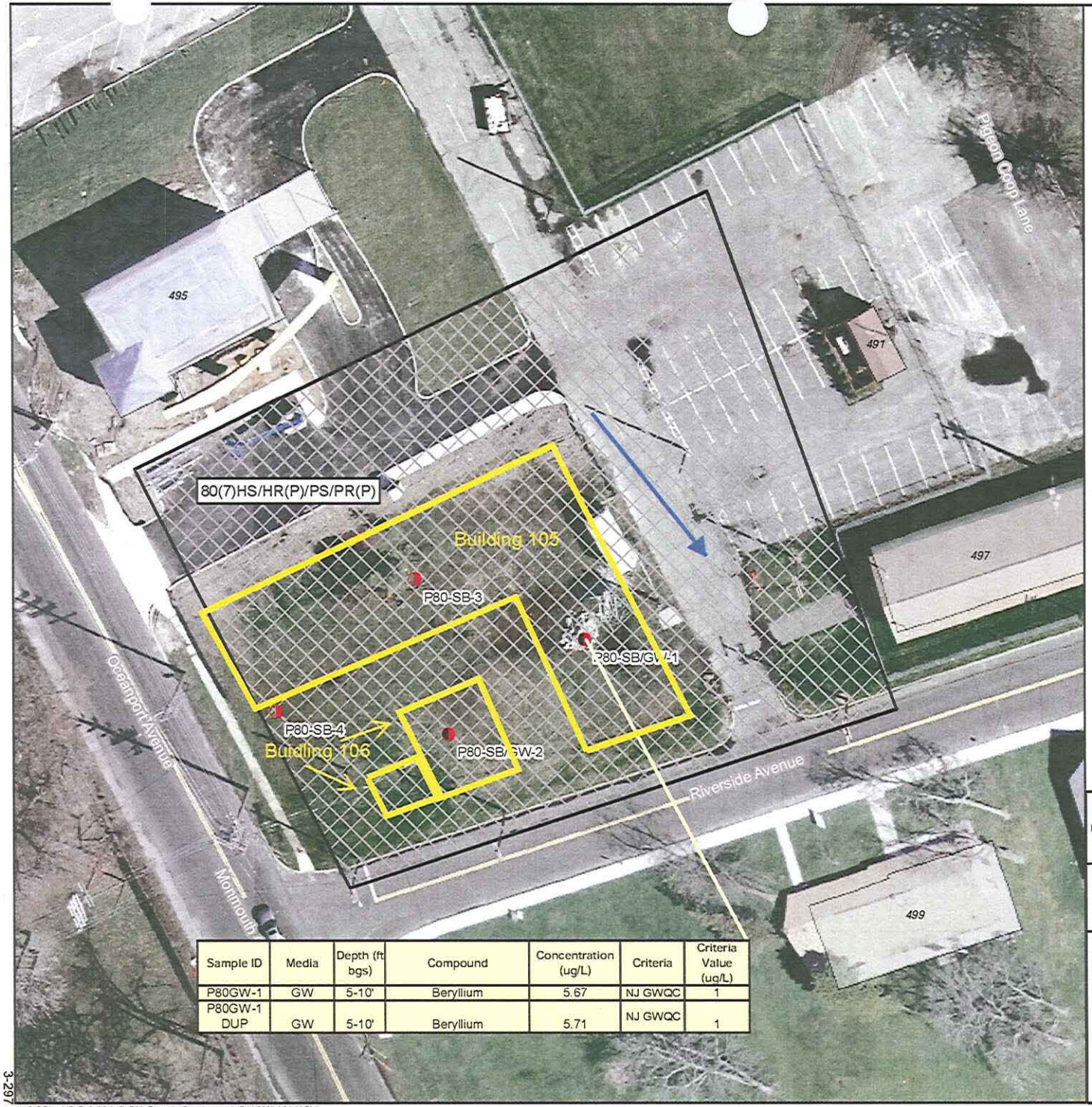
Shaw Shaw Environmental, Inc.

FIGURE 3.5-1

FORT MONMOUTH ECP
SITE INVESTIGATION
PARCEL 28 SAMPLE LOCATIONS
AND CONSTITUENTS OF CONCERN
CHARLES WOOD AREA
FORT MONMOUTH
NEW JERSEY

ATTACHEMENT G

Site Plan depicting form buildings 105 and 106 off of Riverside Drive.



Sample ID	Media	Depth (ft bgs)	Compound	Concentration (ug/L)	Criteria	Criteria Value (ug/L)
P80GW-1	GW	5-10'	Beryllium	5.67	NJ GWQC	1
P80GW-1 DUP	GW	5-10'	Beryllium	5.71	NJ GWQC	1

LEGEND

- Geoprobe Soil Sample Location
- Geoprobe Soil & Groundwater Sample Location
- Road Centerline
- Direction of Generalized Groundwater Flow derived from qualitative evaluation of surface topography, surface water features, and pre-existing IRP site groundwater potentiometric maps where available.
- Building
- Installation Boundary
- Locations of Former Buildings 105 & 106

ECP PARCEL CATEGORY DEFINITIONS

7 Areas that are not evaluated or require additional evaluation.

BRAC PARCEL LABEL DEFINITIONS

8(2)PS
- CONTAMINATION DESCRIPTION
  - HS - Hazardous Substance Storage
  - HR - Hazardous Substance Release
  - PS - Petroleum Storage
  - PR - Petroleum Release
  - (P) - Possible Release or Disposal
- CATEGORY NUMBER
- PARCEL NUMBER

N

SCALE:

0 25 50 100 Feet

Base Realignment and Closure 2005

U.S. Army Corps of Engineers

Shaw® Shaw Environmental, Inc.

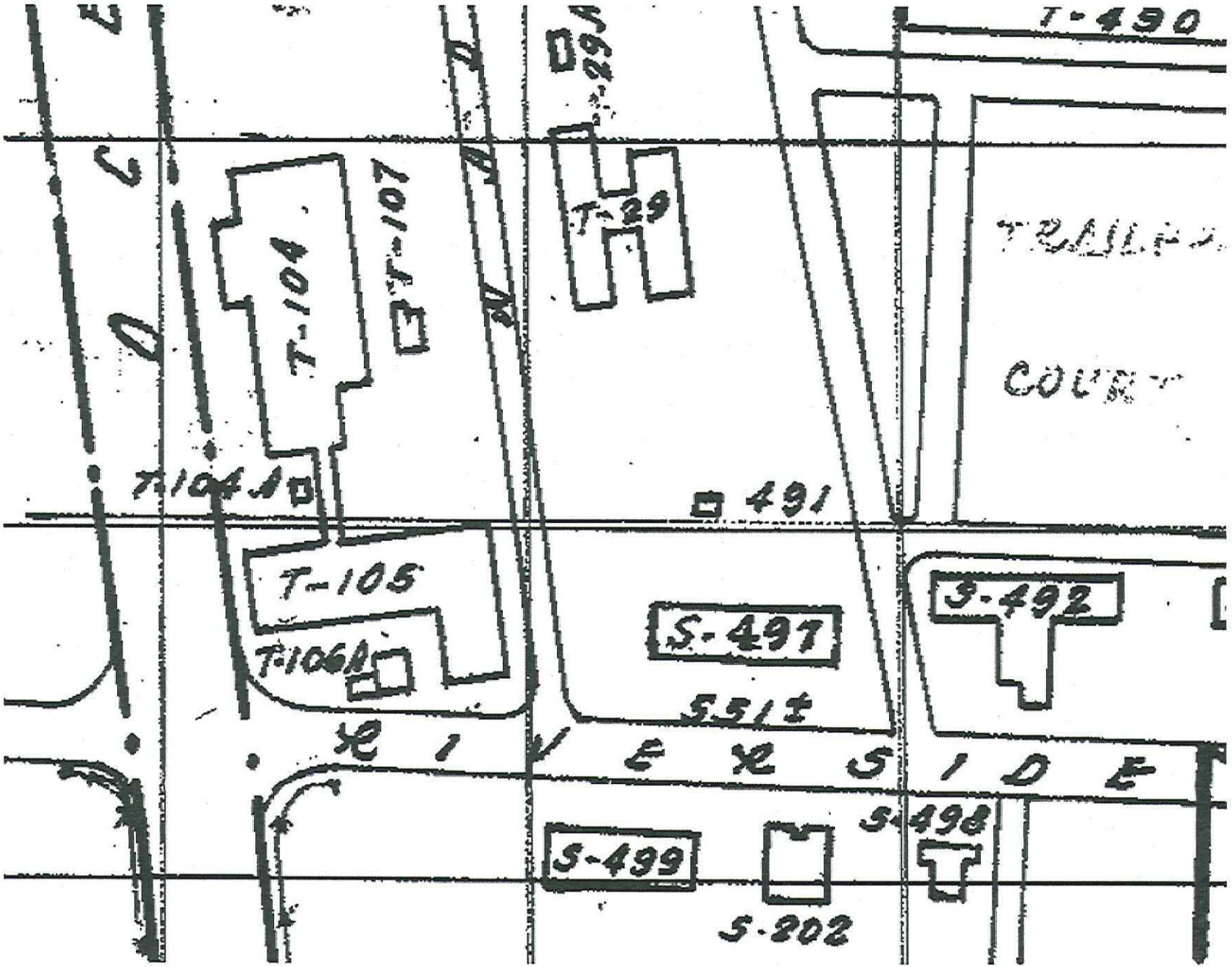
FIGURE 3.20-1

FORT MONMOUTH ECP SITE INVESTIGATION

PARCEL 80 SAMPLE LOCATIONS AND CONSTITUENTS OF CONCERN

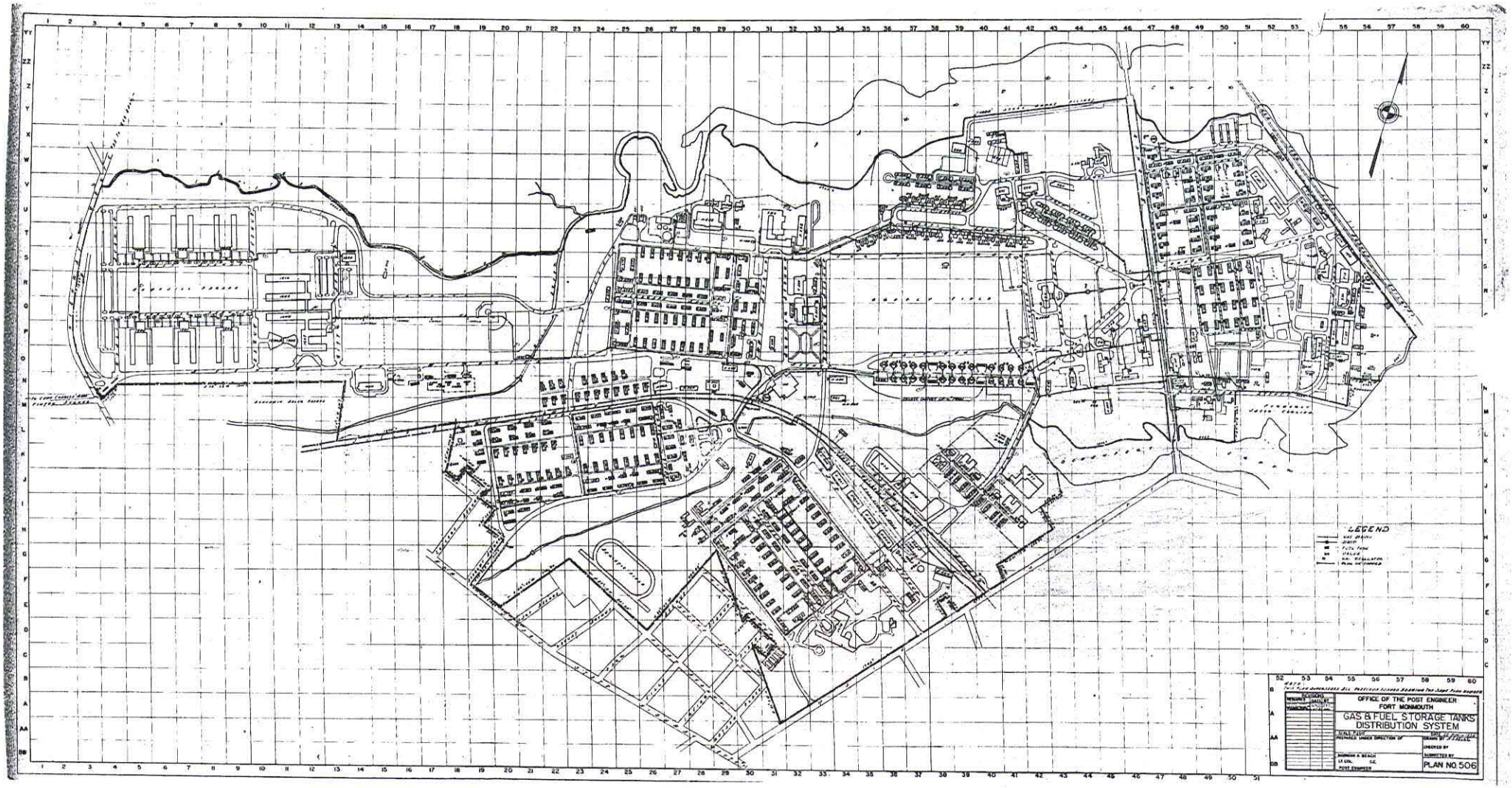
MAIN POST
FORT MONMOUTH
NEW JERSEY

ArcGIS File: MP_Fig3_20-1_SI_P80_Exceeds_SampLoc.mxd (7/14/2008 4:24:41 PM)


T-490
T-107
T-104
T-29
T-104A
491
T-105
T-106A
S-497
551±
S-492
S-498
S-499
S-202

ATTACHMENT H

Parcel 83 former Structures Map.


LEGEND
OFFICE OF THE POST ENGINEER
FORT MONMOUTH
GAS & FUEL STORAGE TANKS
DISTRIBUTION SYSTEM
PLAN NO. 506