U.S. Army Garrison
Fort Monmouth, New Jersey

Underground Storage Tank Closure and Remedial Investigation Report

Main Post – 700 Area (UST No. B1 17)
Post Office (Former B.884)

NJDEP Case No. 04-04-05-1357-41
UST No. B1 17

April 2005

UNDERGROUND STORAGE TANK CLOSURE AND REMEDIAL INVESTIGATION REPORT

MAIN POST - 700 AREA (UST# B1 17)
NJDEP CASE NO. 04-04-05-1357-41

APRIL 2005

PROJECT NO.: 04-29429

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EXECUTIVE SUMMARY

UST Closure

On October 08, 2003, a single wall steel underground storage tank (UST) was 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 UST was located near 700 Area in the Main Post area of Fort Monmouth. UST No. B1 17 was a 1,000-gallon No. 2 heating oil tank. The fill port and associated supply/return piping was not present in the excavation. The tank closure was performed by TECOM-Vinnell Services, Inc. (TVS).

Site Assessment

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 UST was inspected for holes. Holes were noted in the UST and potentially contaminated soils were observed surrounding the tank.

Post-excavation soil samples were collected after the removal of the UST and approximately 10 cubic yards of potentially contaminated soils. Post-excavation samples A, B, C, D, E and F-Duplicate were collected from a total of five (5) locations along the sidewalls and bottom of the excavation. All samples were analyzed for total petroleum hydrocarbons (TPH).

On October 09, 2003, an additional 10 cubic yards of potentially contaminated soils was removed from the northeast wall of the excavation. Two post-excavation soil samples were collected from the northeast sidewall and bottom of the expanded portions of the excavation immediately above groundwater and were analyzed for TPH. Groundwater was present at approximately 11 feet below ground surface (bgs).

Findings

The initial post-excavation soil samples collected from the UST excavation associated with former UST No. B1 17, contained TPH concentrations above the NJDEP health based criterion of 10,000 milligrams per kilogram (mg/kg) for total organic contaminants (N.J.A.C. 7:26E and revisions dated February 3, 1994). Samples A, E, and F-Duplicate contained TPH concentrations of 14,911 mg/kg, 11,567 mg/kg and 14,242 mg/kg, respectively. Subsequently, after further excavation of the two areas which had these results, analytical results of samples G and H had TPH concentrations of 4,540 mg/kg and not detected, respectively.

Site Restoration

Following receipt of all post-excavation soil sampling results, the excavation was backfilled to grade with a combination of uncontaminated excavated soil and clean fill. The excavation site was then restored to its original condition with four inches of stone and four inches of asphalt.

Conclusions and Recommendations

Based on the post-excavation soil sampling results, soils with TPH concentrations exceeding the NJDEP health based criterion of 10,000 mg/kg for total organic contaminants do not remain in the former location of the UST. Of the samples analyzed for volatile organics, there are no detected compounds that exceed the NJDEP Residential Direct Contact Soil Cleanup Criteria.

No further action is proposed in regard to the closure and site assessment of UST No. B1 17 at 700 Area.

1.0 UNDERGROUND STORAGE TANK DECOMMISSIONING ACTIVITIES

1.1 OVERVIEW

One underground storage tank (UST), New Jersey Department of Environmental Protection (NJDEP) Registration No. 081533, was closed in the 700 Area of Main Post at US Army Garrison, Fort Monmouth, New Jersey on May 18, 2003. Refer to site location map on Figure 1. This report presents the results of the implementation of the DPW's UST Management Plan, March, 1996. The UST was a 1,000-gallon, single-walled steel tank containing No. 2 heating oil.

Decommissioning activities for UST No. B1 17 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 UST was conducted by a NJDEP licensed TVS employee.

This UST Closure and Remedial Investigation Report has been prepared by TVS to assist the US Army Garrison DPW in complying with the NJDEP - Underground Storage Tanks regulations. The applicable NJDEP regulations at the date of closure were the *Closure Requirements for Underground Storage Tank Systems* (N.J.A.C. 7:14B-9 et seq. September 1990 and revisions dated May 19, 2003).

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

1.2 SITE DESCRIPTION

700 Area, is located in the eastern portion of the Main Post area of Fort Monmouth, as shown on Figure 1. UST No. B1 17 was located west of Building 884. The fill port and appurtenant piping was not encountered in the excavation. A site map is provided on Figure 2. The area surrounding Building 884 was assessed for abandoned USTs using a geophysical survey and historical maps.

1.2.1 Geological/Hydrogeological Setting

The following is a description of the geological/hydrogeological setting of the 700 Area. Included is a description of the regional geology of the area surrounding Fort Monmouth as well as descriptions of the local geology and hydrogeology of the Main Post area.

Regional Geology

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

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

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

Local Geology

Based on the regional geologic map (Jablonski, 1968), the Cretaceous age Red Bank and Tinton Sands outcrop at the Main Post area. The Red Bank sand conformably overlies the Navesink Formation and dips to the southeast at 35 feet per mile. The upper member

(Shrewsbury) of the Red Bank sand is a yellowish-gray to reddish brown clayey, medium- to coarse-grained sand that contains abundant rock fragments, minor mica and glauconite (Jablonski). The lower member (Sandy Hook) is a dark gray to black, medium-to-fine grained sand with abundant clay, mica, and glauconite.

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

Hydrogeology

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

Based on records of wells drilled in the Main Post area, water is typically encountered at depths of 2 to 9 feet below ground surface (bgs). According to Jablonski, wells drilled in the Red Bank and Tinton Sands may produce 2 to 25 gallons per minute (gpm). Some well owners have reported acidic water that requires treatment to remove iron.

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

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

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

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

The 800 Area is located approximately 500 feet southeast of Husky Brook, the nearest water body, which flows into Oceanport Creek. Based on the Main Post topography, the groundwater flow in the area of the 800 Area is anticipated to be to the northwest.

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 an organic vapor analyzer (OVA). 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 shops or utility contractor prior to excavation activities.
- All activities were carried out with great regard to safety and health and the safeguarding of the environment.
- All excavated soils were visually examined and screened with an OVA for evidence of contamination. Potentially contaminated soils were identified and logged during closure activities.
- Surface materials (i.e., asphalt, concrete, etc.) were excavated and staged separately from all soil and recycled in accordance with all applicable regulations and laws.
- A certified Subsurface Evaluator was present during all closure activities.

1.4.2 Underground Storage Tank Excavation and Cleaning

During decommissioning activities, surficial soil was removed to expose the UST. The tank was completely emptied of all liquids prior to removal from the ground. Approximately 900 gallons of liquid was pumped out of the UST and transported by Lorco Petroleum Services, Inc. to their NJDEP-approved petroleum recycling and disposal facility located in Elizabeth, New Jersey. Refer to Appendix C for non-hazardous waste manifest (No. NJZ-49683).

After the UST was removed from the excavation, it was staged on polyethylene sheeting, labeled and examined for holes. Holes were observed during the inspection by the Subsurface Evaluator. Soils surrounding the UST were screened visually and with an OVA for evidence of

contamination. Soil staining and an odor of fuel was observed. It was determined that soil excavation would be conducted prior to sampling. DPW personnel were made aware of the field conditions that existed, prompting them to call the NJDEP Spill Hotline, in which Case No. 04-04-05-1357-41 was assigned.

1.5 UNDERGROUND STORAGE TANK TRANSPORTATION AND DISPOSAL

Subsequent to disposal, the UST was purged with air to remove vapors prior to cutting. An access hole was made in the UST to allow for cleaning using squeeges and adsorbents. The tank was then transported by TVS to Recycling Technology Center, Inc., Shafto Rd., Tinton Falls, NJ for disposal in compliance with all applicable regulations and laws. Refer to Appendix C for UST disposal certificate.

The Subsurface Evaluator labeled the UST 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 OVA air monitoring and visual observations, approximately 20 cubic yards of potentially contaminated soil was excavated from the area surrounding the UST. All potentially contaminated soil was loaded into a truck and transported to the Main Post ID 27 Soil Staging Area (located behind Bldg.166) prior to ultimate disposal at Soil Remediation of Philadelphia. Soils that did not exhibit signs of contamination were separated during the excavation and used as backfill following removal of the UST.

2.0 REMEDIAL INVESTIGATION ACTIVITIES

2.1 OVERVIEW

The Remedial Investigation was managed and carried out by US Army DPW personnel. All analyses were performed and reported by Fort Monmouth Environmental Testing Laboratory, a NJDEP-certified testing laboratory. All sampling was performed by a NJDEP Certified Subsurface Evaluator according to the methods described in the NJDEP Field Sampling Procedures Manual (1992). Sampling frequency and parameters analyzed complied with the NJDEP document *Technical Requirements for Site Remediation, 7:26E-3.9* (December 17, 2002 and revisions dated February 3, 2003) which was the applicable regulation at the date of the 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 Division
  Contact Person: Douglas Guenther
  Phone Number: (732) 532-0986

- Subsurface Evaluator: Frank Accorsi
  Employer: TECOM-Vinnell Services, Inc. (TVS)
  Phone Number: (732) 532-2577
  NJDEP License No.: 0010042

- Analytical Laboratory: Fort Monmouth Environmental Testing Laboratory
  Contact Person: Dan Wright
  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
  US EPA ID No.: NJR000023036

2.2 FIELD SCREENING/MONITORING

Field screening was performed by a NJDEP certified Subsurface Evaluator using an OVA and visual observations to identify potentially contaminated material. Soils were removed from the excavation surrounding UST No. B1 17 until no evidence of contamination remained.

2.3 SOIL SAMPLING

On May 18, 2004, post-excavation soil samples A, B, C, D, E and Duplicate F were collected from a total of five (5) locations along the sidewalls and the bottom of the UST excavation. Groundwater was present at approximately 11 feet below ground surface (bgs). On May 21, 2004, two (2) post-excavation soil samples (G and H) were also collected representing additional soil remediation that occurred along the bottom and northeast sidewall of the excavation. Refer to soil sampling location map in Figure 3. All samples were analyzed for TPH. Samples 800-9A and 800-9F exhibited a concentration exceeding 1,000 mg/kg and were analyzed for volatile organic compounds with a forward library search for 15 tentatively identified compounds (VO+ 15).

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-excavation soil samples were collected using stainless steel trowels. After collection, the samples were immediately placed on ice in a cooler and delivered to Fort Monmouth Environmental Testing Laboratory for analysis.

3.0 CONCLUSIONS AND RECOMMENDATIONS

3.1 SOIL SAMPLING RESULTS

Post-excavation soil samples were collected from a total of five locations on May 18, 2004 and from a total of two locations on May 21, 2004, to evaluate soil conditions following removal of the UST. All samples were analyzed for TPH. The post-excavation soil sample results were compared to the NJDEP health based criterion of 10,000 mg/kg for total organic contaminants (N.J.A.C. 7:26D and revisions dated February 3, 1994). A summary of the analytical results and comparison to the NJDEP soil cleanup criteria is provided on Table 2. The analytical data package, including associated quality control data, is provided in Appendix E.

Post-excavation soil samples collected on May 18, 2004, from the UST remedial excavation contained concentrations of TPH below the NJDEP soil cleanup criteria, with the exception of 9A, 9E and 9F-Duplicate which contained TPH concentrations of 14,911 mg/kg, 11,567 mg/kg and 14,242 mg/kg, respectively. Soil samples 9A and 9F were further analyzed for VOA in which all detected compounds were below the NJDEP Redidential Direct Contact Soil Cleanup Criteria.

All post-excavation soil samples collected on May 21, 2004 from the expanded UST remedial excavation contained concentrations of contaminants below the NJDEP soil cleanup criteria. Post-excavation samples G and H contained TPH concentrations of 4,540 mg/kg and Not Detected, respectively.

3.2 CONCLUSIONS AND RECOMMENDATIONS

The analytical results for all of post-excavation soil samples collected from the UST closure excavation at UST No. B1 17 were below the NJDEP soil cleanup criteria for total organic contaminants and volatile organic compounds.

Based on the post-excavation soil sampling results, soils with TPH concentrations exceeding the NJDEP soil cleanup criteria for total organic contaminants of 10,000 mg/kg have been excavated from the former location of UST No. B1 17.

No further action is proposed in regard to the closure and site assessment of UST No. B1 17 at Building 884.

APPENDIX A

CERTIFICATIONS

APPENDIX B

WASTE MANIFEST

APPENDIX C

UST DISPOSAL CERTIFICATE

APPENDIX D

PHOTO DOCUMENTATION

APPENDIX E

SOIL ANALYTICAL DATA PACKAGE

TABLES

TABLE 1

SUMMARY OF LABORATORY ANALYSIS
FT. MONMOUTH, 700 Area, UST No.B1 17
06, April 2004

SAMPLE ID	LABORATORY SAMPLE ID	LOCATION	SAMPLE MATRIX	ANALYSIS
B1 17-A	4024201	NORTH WALL	SOIL	TPH
B1 17-B	4024202	SOUTH WALL	SOIL	TPH
B1 17-C	4024203	EAST WALL	SOIL	TPH
B1 17-D	4024204	WEST WALL	SOIL	TPH
B1 17-E	4024205	DUPLICATE (WEST WALL)	SOIL	TPH
B1 17 GW	4024206	GROUNDWATER	AQUEOUS	TPH

ABBREVIATIONS:
TPH = Total Petroleum Hydrocarbons, Method NJDEPOQA-25
VOA = Volatile Organic Analysis, Method EPA 8260

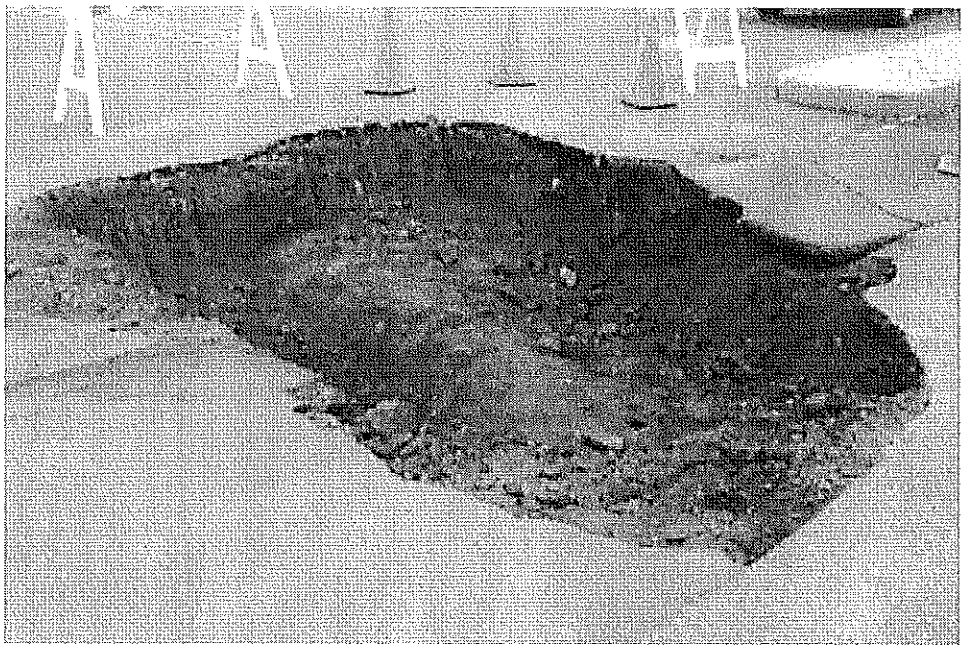
TABLE 2

SUMMARY OF LABORATORY ANALYTICAL RESULTS
FT. MONMOUTH, 700 AREA, UST No.B1 17
16, April 2004

TOTAL PETROLEUM HYDROCARBONS

SAMPLE ID	NJDEP ACTION LEVEL	LOCATION	DEPTH (IN FEET)	RESULT IN mg/kg
B1 17-A	10,000	NORTH WALL	5.0 – 5.5	ND
B1 17-B	10,000	SOUTH WALL	5.0 – 5.5	ND
B1 17-C	10,000	EAST WALL	5.0 – 5.5	ND
B1 17-D	10,000	WEST WALL	5.0 – 5.5	ND
B1 17-E	10,000	DUPLICATE (WEST WALL)	5.0 – 5.5	ND
B1 17 GW	10,000	GROUNDWATER	N/A	ND**

ABBREVIATIONS:
mg/kg = Milligrams Per Kilogram = parts per million
ND = Compound Not Detected
NA = Compound Not Analyzed
*= Further Analyzed for Volatiles
** = mg/L = Milligrams Per Liter = parts per million



Location of UST No. 800-9 in Building 1006 (Credit Union) parking lot. View looking north.

Location of former UST No. 800-9
after soil samples were collected.
Facing sidewall (northeast) was excavated
an additional six feet.

UST No. 800-9 : 1,000 gallon single wall steel

FIGURES