

United States Army
Fort Monmouth, New Jersey

**Underground Storage Tank
Closure and Site Investigation
Report**

***Building 296
Main Post-West Area***

**NJDEP UST Registration No. 81533-213 thru 223
DICAR No. 93-11-02-1200-13**

May 2001

**UNDERGROUND STORAGE TANK
CLOSURE AND SITE INVESTIGATION REPORT**

BUILDING 296

**MAIN POST-WEST AREA
NJDEP UST REGISTRATION NO. 81533-213 THRU 223**

MAY 2001

PREPARED FOR:

**UNITED STATES ARMY, FORT MONMOUTH, NEW JERSEY
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PROJECT NO. 4936-127

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EXECUTIVE SUMMARY

UST Closure

Between November 2, 1993, and November 4, 1993, eleven steel underground storage tanks (USTs) were closed by removal in accordance with New Jersey Department of Environmental Protection (NJDEP) closure procedures at the Main Post-West Area of the U.S. Army Fort Monmouth, Fort Monmouth, New Jersey. The USTs, NJDEP Registration Nos. 0081533-213 thru 223 (Fort Monmouth ID No. 296), were located south of Building 296. UST Nos. 081515-213 through 221 were all 1,000-2,000 gallon tanks containing gasoline. UST Nos. 081515-222 and 223 were both 1,000-gallon tanks containing diesel.

Site Assessment-Soil

The site assessment was performed by U.S. Army personnel in accordance with the NJDEP *Technical Requirements for Site Remediation* (N.J.A.C. 7:26E) and the NJDEP *Field Sampling Procedures Manual*. The sampling and laboratory analyses conducted during the site assessment were performed in accordance with Section 7:26E-2.1 of the *Technical Requirements for Site Remediation*. Soils surrounding the tanks were screened visually and with air monitoring equipment for evidence of contamination. Following removal, the USTs were inspected for corrosion holes. Numerous holes were noted in the USTs. Soils at the location of the holes were dark in color and appeared to be contaminated. Based on the inspection of the USTs, Directorate of Public Works (DPW) concluded that a discharge of petroleum products was associated with the USTs. The NJDEP hotline was notified and the case was assigned DICAR No. 93-11-02-1200-13. Groundwater was encountered at 6.0 feet below ground surface and sheen was observed on groundwater.

- On November 5, 1993, following the removal of the USTs and 130 feet of piping, approximately 16 cubic yards of potentially contaminated soil were removed from the excavation and from the piping trench due to visible contamination. Post-excavation soil samples A thru JJ were collected from thirty-four (34) locations within the UST excavation area and from the piping trench. Each of the samples was analyzed for total petroleum hydrocarbons (TPHC), total solids, lead, and Volatile Organic Compounds (VOCs).
- On November 23, 1993, following the removal of approximately 283 feet of piping, post-excavation soil samples BA thru BV were collected from twenty-two (22) locations along the former piping length of the excavation. Each of the samples was analyzed for TPHC, total solids, lead, and VOCs.
- On December 9, 1993, following the removal of approximately 99 feet of piping, post-excavation soil samples CA thru CJ were collected from nine (9) locations along the former piping length of the excavation. Each of the samples was analyzed for TPHC, total solids, lead, and VOCs.

- On December 29, 1993, following the removal of approximately 70 feet of piping, post-excavation soil samples A thru P were collected from fourteen (14) locations within the piping excavation. Each of the samples was analyzed for lead and VOCs.
- On January 5, 1994, following the removal of approximately 35 feet of piping, post-excavation soil samples Q, R, S, V, W, and X were collected from six (6) locations within the piping excavation. Each of the samples was analyzed for lead and VOCs.

Site Assessment-Findings

Analytical results of post-excavation soil samples collected between November 5, 1993, and January 5, 1994, contained either non-detectable concentrations of contaminants or concentrations of contaminants below the NJDEP Residential Direct Contact Soil Cleanup Criteria (RDCSCC).

Site Assessment-Groundwater

In response to the observation of potentially contaminated soil near the shallow water table, seven shallow overburden monitoring wells were installed at the Building 296 area.

- Between November 8, 1994, and August 18, 2000, monitoring wells MW-7 and MW-8 were sampled on a quarterly basis. Both wells were analyzed for VOCs calibrated for xylene plus 15 TICs, SVOCs plus 15 TICs, pesticide/PCB, and TAL metals.
- Between November 22, 1995, and August 18, 2000, monitoring wells MW-2, MW-3, and MW-4 were sampled on a quarterly basis. All wells were analyzed for VOCs calibrated for xylene plus 15 TICs, SVOCs plus 15 TICs, pesticide/PCB, and TAL metals.
- Between November 29, 1994, and August 18, 2000, monitoring wells MW-1 and MW-6 were sampled on a quarterly basis. Both wells were analyzed for VOCs calibrated for xylene plus 15 TICs, SVOCs plus 15 TICs, pesticide/PCB, and TAL metals.

The seven wells were constructed in accordance with NJDEP's well construction protocols outlined in its May 1992 *Field Sampling Procedures Manual*. The NJDEP well permits and well construction logs are presented in Appendix G.

Findings-Groundwater

A review of the historical groundwater analytical results indicates that concentrations of benzene, methylene chloride, bis (2-ethylhexyl phthalate), aluminum, iron, lead, manganese, silver, chromium, and sodium have been detected during these sampling events at concentrations that exceed the respective NJDEP GWQS. The methylene chloride and bis (2-ethylhexyl phthalate) detected in the samples are attributed to sampling and analytical interference.

Discrepancies

The removal contractor collected soil samples using polystyrene scoops instead of NJDEP approved stainless steel scoops. The results of the soil samples were therefore evaluated at 50% of the actual value to compensate for any potential loss due to absorbency of the polystyrene scoop.

Conclusion and Recommendations

Based on the analytical results of the post-excavation soil samples collected between November 5, 1993, and January 5, 1994, soil quality at the Building 296 UST closure site does not exceed the NJDEP RDCSCC. Therefore, no further action is warranted.

Based on the analytical results of the groundwater samples collected from the seven monitoring wells, groundwater quality at the Building 296 UST closure site exceeds the New Jersey Groundwater Quality Standard for benzene, aluminum, iron, lead, manganese, silver, chromium, and sodium. Future work to address groundwater quality conditions at Building 296 will be addressed in a Remedial Action Work Plan (RAWP).

1.0 UNDERGROUND STORAGE TANK DECOMMISSIONING ACTIVITIES

1.1 OVERVIEW

Eleven underground storage tanks (USTs), New Jersey Department of Environmental Protection (NJDEP) Registration No. 81533-213 thru 223, were closed at Building 296 at the Main Post-West area of U.S. Army Fort Monmouth, Fort Monmouth, New Jersey between November 2, 1993, and November 4, 1993. Refer to the Site Location Map, Figure 1. This report presents the results of the Department of Public Works' (DPW) implementation of the UST Decommissioning/Closure Plan approved by the NJDEP.

Decommissioning activities for UST Nos. 81533-213 thru 223 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 and 1910.120. All permits including but not limited to the NJDEP-approved Decommissioning/Closure Plan were posted onsite for inspection. The decommissioning activities were conducted by DPW personnel who are registered and certified by the NJDEP for performing UST closure activities. Closure of UST Nos. 81533-213 thru 223 proceeded under the approval of the NJDEP Bureau of Federal Case Management (NJDEP-BFCM). The Standard Reporting Form and signed Site Assessment Summary form for UST Nos. 81533-213 thru 223 are included in Appendices A and B, respectively.

This UST Closure and Site Investigation Report has been prepared by Versar, to assist the U.S. Army DPW in complying with the NJDEP regulations. The applicable NJDEP regulations at the date of closure were the *Interim Closure Requirements for Underground Storage Tank Systems* (N.J.A.C. 7:14B-1 et seq. October 1990 and revisions dated November 1, 1991).

This report was prepared using information collected at the time of closure. Section 1 of this UST Closure and Site 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 and groundwater investigation, are presented in the final section of this report.

1.2 SITE DESCRIPTION

Building 296 is located in the Main Post-West area of the Fort Monmouth Army Base. UST Nos. 0081533-213 thru 223 were located south of Building 296. 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 area surrounding Building 296. 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 (Zapczka, 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. More than 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 Zapczka, 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 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 (i.e., streams, lakes)

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

Building 296 is located approximately 600 feet south of Parkers Creek, the nearest surface water. Based on the Main Post topography, the groundwater flow in the area of Building 296 is anticipated to be to the north.

1.3 HEALTH AND SAFETY

Before, during, and after all decommissioning activities, hazards at the work site which may have posed a threat to the Health and Safety of all personnel who were involved with, or were affected by, the decommissioning of the UST system were minimized. All areas which posed or may have been suspected to pose 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.

1.4 REMOVAL OF UNDERGROUND STORAGE TANK

1.4.1 General Procedures

- The contractor performing the closure prior to excavation activities identified all underground obstructions (utilities, etc.).
- All activities were carried out with the greatest regard to safety and health and the safeguarding of the environment.
- All excavated soils were visually examined and screened with an Organic Vapor Analyzer (OVA) for evidence of contamination. Potentially contaminated soils were identified and documented during closure activities.
- Surface materials (i.e., asphalt, concrete, etc.) were excavated and staged separately from all soil and recycled in accordance with applicable regulations and laws.
- An NJDEP certified Subsurface Evaluator from the DPW was present during all site assessment activities.

1.4.2 Underground Storage Tank Excavation and Cleaning

Prior to UST decommissioning activities, surficial soil was removed to expose the USTs and associated piping. The USTs were then completely emptied of all liquids and cleaned prior to removal from the excavation. Approximately 10,500 gallons of liquid from the UST and associated piping were transported by Freehold Cartage to the Lionetti Oil Recovery Co., Inc. facility, a NJDEP-approved petroleum recycling and disposal company located in Old Bridge, New Jersey. Refer to Appendix C for the waste manifest.

The USTs were cleaned prior to removal from the excavation in accordance with the NJDEP regulations. After the USTs were removed from the excavation, it was staged on polyethylene sheeting and examined for holes. Numerous holes were observed during the inspection by the Subsurface Evaluator. Soils surrounding the USTs were screened visually and with an OVA for evidence of contamination. Soils were stained and appeared to be contaminated. Groundwater was encountered at 6.0 feet below ground surface and sheen was observed on groundwater.

1.5 UNDERGROUND STORAGE TANK TRANSPORTATION AND DISPOSAL

The tank was transported in compliance with all applicable regulations and laws to Mazza & Sons, Inc. Refer to Appendix D for the UST Disposal Certificate.

The UST was labeled prior to transport with the following information:

- Site of origin

- Contact person
- NJDEP UST Facility ID number
- Former contents
- Destination site
- Date

1.6 MANAGEMENT OF EXCAVATED SOILS

All potentially contaminated soils were stockpiled separately from other excavated material and were placed on and covered with polyethylene sheets. Potentially contaminated soils were transported to the soil staging area. Soils that did not exhibit signs of contamination were used as backfill following the removal of the UST. Groundwater was encountered at 6.0 feet below ground surface and sheen was observed on groundwater.

2.0 SITE INVESTIGATION ACTIVITIES

2.1 OVERVIEW

The Site Investigation was managed and carried out by U.S. Army DPW personnel. All analyses were performed and reported by U.S. Army Fort Monmouth Environmental Laboratory, a NJDEP-certified testing laboratory. All sampling was performed under the direct supervision of 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, *Interim Closure Requirements for Underground Storage Tank Systems* (October 1990 and revisions dated November 1, 1991), which was the applicable regulation at the date of the closure. The Fort Monmouth DPW Environmental Office maintains all records of the Site Investigation activities.

The following Parties participated in Closure and Site Investigation Activities:

- Subsurface Evaluator: Charles Appleby
Employer: U.S. Army, Fort Monmouth
Phone Number: (732) 532-0989
NJDEP Certification No.: 002056
- Analytical Laboratory: U.S. Army Fort Monmouth Environmental laboratory
Contact Person: Brian McKee
Phone Number: (908) 532-4359
NJDEP Company Certification No.: 13461
- Hazardous Waste Hauler: Freehold Cartage
Contact Person: David Smith
Phone Number: (908) 462-1001

2.2 FIELD SCREENING/MONITORING

Field screening was performed by a NJDEP Certified Sub-Surface Evaluator using an OVA and visual observations to identify potentially contaminated material. Groundwater was encountered at 6.0 feet below ground surface and sheen was observed on groundwater.

2.3 SOIL SAMPLING

U.S. Army personnel performed the site assessment in accordance with the NJDEP Technical Requirements and the NJDEP *Field Sampling Procedures Manual*. A summary of sampling activities including parameters analyzed is provided in Table 1. The post-excavation soil samples were collected using NJDEP *Field Sampling Procedures Manual* (1992) standard sampling procedures. Following soil sampling activities, the samples were chilled and delivered to U.S. Army Fort Monmouth Environmental Laboratory located in Fort Monmouth, New Jersey, for analysis. The following soil samples were collected:

- On November 5, 1993, following the removal of the USTs and 130 feet of piping, approximately 16 cubic yards of potentially contaminated soil were removed from the excavation and from the piping trench due to visible contamination. Post-excavation soil samples A thru JJ were collected from thirty-four (34) locations within the UST excavation area and from the piping trench. Each of the samples was analyzed for total petroleum hydrocarbons (TPHC), total solids, lead, and Volatile Organic Compounds (VOCs).
- On November 23, 1993, following the removal of approximately 283 feet of piping, post-excavation soil samples BA thru BV were collected from twenty-two (22) locations along the former piping length of the excavation. Each of the samples was analyzed for TPHC, total solids, lead, and VOCs.
- On December 9, 1993, following the removal of approximately 99 feet of piping, post-excavation soil samples CA thru CJ were collected from nine (9) locations along the former piping length of the excavation. Each of the samples was analyzed for TPHC, total solids, lead, and VOCs.
- On December 29, 1993, following the removal of approximately 70 feet of piping, post-excavation soil samples A thru P were collected from fourteen (14) locations within the piping excavation. Each of the samples was analyzed for lead and VOCs.
- On January 5, 1994, following the removal of approximately 35 feet of piping, post-excavation soil samples Q, R, S, V, W, and X were collected from six (6) locations within the piping excavation. Each of the samples was analyzed for lead and VOCs.

2.4 MONITORING WELL SAMPLING

Groundwater sampling and analysis were performed in accordance with the NJDEP *Field Sampling Procedures Manual*, and the *Technical Requirements for Site Remediation*, N.J.A.C. 7:26E (*Technical Requirements*). The following groundwater samples were collected from monitoring wells at the site (see Table 1).

- Between November 8, 1994, and August 18, 2000, monitoring wells MW-7 and MW-8 were sampled on a quarterly basis. Both wells were analyzed for VOCs calibrated for xylene plus 15 TICs, SVOCs plus 15 TICs, pesticide/PCB, and TAL metals.
- Between November 22, 1995, and August 18, 2000, monitoring wells MW-2, MW-3, and MW-4 were sampled on a quarterly basis. The samples from these wells were analyzed for VOCs calibrated for xylene plus 15 TICs, SVOCs plus 15 TICs, pesticide/PCB, and TAL metals.
- Between November 29, 1994, and August 18, 2000, monitoring wells MW-1 and MW-6 were sampled on a quarterly basis. Both wells were analyzed for VOCs calibrated for xylene plus 15 TICs, SVOCs plus 15 TICs, pesticide/PCB, and TAL metals.

3.0 CONCLUSIONS AND RECOMMENDATIONS

3.1 SOIL SAMPLING RESULTS

To evaluate soil conditions following removal of the USTs and associated piping, eighty-five (85) post-excavation sample results were compared to NJDEP Residential Direct Contact Soil Cleanup Criteria (RDCSCC) and Impact to Groundwater Soil Cleanup Criteria (IGWSCC) (N.J.A.C. 7:26D and revisions dated May 12, 1999). Summaries of analytical results for soils are presented in Tables 2 to 4 and the associated soil sampling locations are shown on Figure 3. The analytical data package is provided in Appendix E.

Excavation of potentially contaminated soil from the area surrounding the UST was performed between November 5, 1993, and January 5, 1994. All potentially contaminated soils were stockpiled separately from other excavated material and were placed on and covered with polyethylene sheets. Potentially contaminated soils were transported to the soil staging area.

Analytical results of post-excavation soil samples collected between November 5, 1993, and January 5, 1994, contained either non-detectable concentrations of contaminants or concentrations of contaminants below the NJDEP RDCSCC.

3.2 GROUNDWATER SAMPLING RESULTS

A review of the historical groundwater analytical results indicates that concentrations of benzene, methylene chloride, bis (2-ethylhexyl phthalate), aluminum, iron, lead, manganese, silver, chromium, and sodium have been detected during these sampling events at concentrations that exceed the respective NJDEP GWQS. The methylene chloride and bis (2-ethylhexyl phthalate) detected in the samples are most likely due to laboratory contamination. The groundwater analytical data is summarized in Table 5. The groundwater sampling locations are shown on Figure 4. Refer to Appendix F for the groundwater analytical data package.

3.3 CONCLUSIONS AND RECOMMENDATIONS

Based on the analytical results of the post-excavation soil samples collected between November 5, 1993, and January 5, 1994, soil quality at the Building 296 UST closure site does not exceed the NJDEP RDCSCC. Therefore, no further action is warranted.

Based on the analytical results of the groundwater samples collected from the seven monitoring wells, groundwater quality at the Building 296 UST closure site exceeds the New Jersey Groundwater Quality Standard for benzene, aluminum, iron, lead, manganese, silver, chromium, and sodium. Future work to address groundwater quality conditions at Building 296 will be addressed in a Remedial Action Work Plan (RAWP). The RAWP will be recommending long term monitoring natural attenuation.