



## 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

6 March 2018

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

**SUBJECT: Site Investigation Report for Parcel 9 Underground Storage Tanks  
Request for Unrestricted Use, No Further Action Approval  
Fort Monmouth, New Jersey  
PI G000000032**

Dear Mr. Joshi:

The U.S. Army Fort Monmouth (FTMM) Team has prepared the subject report to provide documentation of the closure status of all underground storage tanks (USTs) identified within Parcel 9, also referred to as the Megill Housing Area; this information may be useful for future property transfers.

Parcel 9, located in the central portion of the Charles Wood Area, is completely surrounded by the FTMM Suneagles Golf Course. It is bordered by: Wampum Brook to the north; Lowther Drive to the east; Wigwag Road to the south; and Hope Road to the west. The locations of the USTs within the Parcel 9 Megill Housing Area are presented in Attachment A.

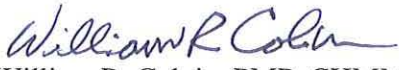
A summary table of the 21 USTs within Parcel 9 is provided in Attachment B; all of the USTs have been removed. At the time of removal, the FTMM Directorate of Public Works, Environmental Branch procedures for closure of unregulated residential heating oil tanks that exhibited no evidence of a discharge required: the collection and analysis of soil samples according to the NJDEP regulations; documentation of the results; and preparation of a closure report for the Army's files. Therefore, closure documentation was not previously submitted to NJDEP.

Each of the 21 USTs were removed in 2000. Closure Reports for each of the USTs are provided in the attachments listed below and include the sampling and analytical results performed at each UST site. As indicated in the individual Closure Reports, groundwater was not encountered during the removal operations, nor were there any indications of a release that would warrant evaluation of groundwater.

The information in this report supports the FTMM Team's conclusions that: 1) the USTs identified within Parcel 9 have been adequately addressed under the FTMM tank removal and assessment program; and 2) further action at these former UST locations is not warranted. Unrestricted Use, NFA determinations are requested for UST 2022 through UST 2042 based on the information provided in this report.

Thank you for reviewing this request; we look forward to your approval and/or comments. Our technical Point of Contact (POC) is Frank Accorsi at (732) 380-7523; [frank.accorsi@parsons.com](mailto:frank.accorsi@parsons.com). I can be reached at (732) 380-7064; [william.r.colvin18.civ@mail.mil](mailto:william.r.colvin18.civ@mail.mil).

Sincerely,

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

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

**Attachments:**

- A. Location and Site Layout Drawing of Parcel 9 Megill Housing
- B. Summary Table of Parcel 9 Megill Housing Underground Storage Tanks
- C. UST 2022 Closure Report
- D. UST 2023 Closure Report
- E. UST 2024 Closure Report
- F. UST 2025 Closure Report
- G. UST 2026 Closure Report
- H. UST 2027 Closure Report
- I. UST 2028 Closure Report
- J. UST 2029 Closure Report
- K. UST 2030 Closure Report
- L. UST 2031 Closure Report
- M. UST 2032 Closure Report
- N. UST 2033 Closure Report
- O. UST 2034 Closure Report
- P. UST 2035 Closure Report
- Q. UST 2036 Closure Report
- R. UST 2037 Closure Report
- S. UST 2038 Closure Report
- T. UST 2039 Closure Report
- U. UST 2040 Closure Report
- V. UST 2041 Closure Report
- W. UST 2042 Closure Report



**New Jersey Department of Environmental Protection**  
**Site Remediation Program**

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

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

**Document:**

- "Site Investigation Report for Parcel 9 Underground Storage Tanks, Request for Unrestricted Use, No Further Action Approval, Fort Monmouth, New Jersey" (06 March 2018)

**PERSON RESPONSIBLE FOR CONDUCTING THE REMEDIATION INFORMATION AND CERTIFICATION**

Full Legal Name of the Person Responsible for Conducting the Remediation: William R. Colvin

Representative First Name: William Representative Last Name: Colvin

Title: Fort Monmouth BRAC Environmental Coordinator (BEC)

Phone Number: (732) 380-7064

Ext: \_\_\_\_\_

Fax: \_\_\_\_\_

Mailing Address: P.O. Box 148

City/Town: Oceanport

State: NJ

Zip Code: 07757

Email Address: [william.r.colvin18.civ@mail.mil](mailto:william.r.colvin18.civ@mail.mil)

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

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

Signature: \_\_\_\_\_

Date: 06 March 2018

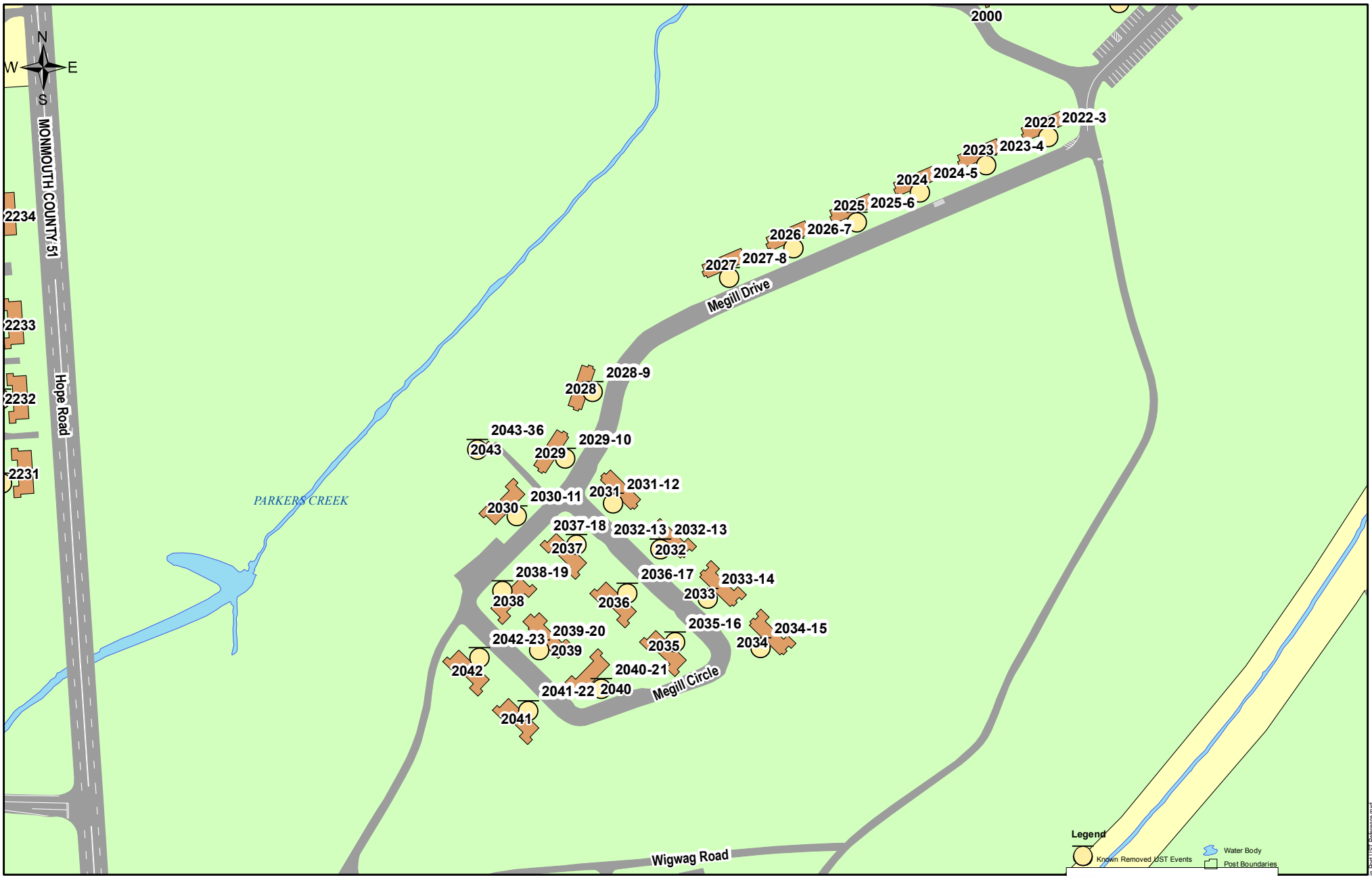
Name/Title: William R. Colvin, PMP, CHMM, PG  
BRAC Environmental Coordinator

Completed form should be sent to:

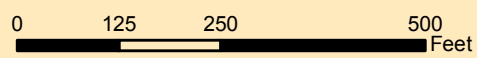
Mr. Ashish Joshi  
New Jersey Department of Environmental Protection  
Division of Remediation Management & Response  
Bureau of Northern Field Operations  
7 Ridgedale Avenue (2<sup>nd</sup> Floor)  
Cedar Knolls, New Jersey 07927-1112

**Attachment A**  
**Location and Site Layout Drawing of Parcel 9 Megill Housing**





# UST Removal Reference Map Grid C2; Charles Wood Area Fort Monmouth, New Jersey **FOUO**



**Legend**

- Known Removed UST Events
- Known Removed UST Events
- Reference Map Links
- Demolished Building
- Existing Building
- Roadway & Parking
- Water Body
- Post Boundaries

Map Created by:  
Fort Monmouth Installation GIO, Environmental Division  
Fort Monmouth, New Jersey  
Date: August 10, 2011  
All drawings must be field verified.  
New Jersey State Plane Feet, NAD83

**Attachment B**  
**Summary Table of Parcel 9 Megill Housing Underground Storage Tanks**

# Summary Table of Parcel 9 Megill Housing Underground Storage Tanks (USTs)

| Site Name                          | Residential ? | Registration ID | DICAR | Tank Size and Type* | Product     | Date Tank Removed | No Further Action (NFA) Approved or Requested Status                                                |
|------------------------------------|---------------|-----------------|-------|---------------------|-------------|-------------------|-----------------------------------------------------------------------------------------------------|
| 2022                               | YES           | 192486-3        | None  | 550 G. - FRP        | #2 FUEL OIL | 1/12/2000         | NFA requested; Closure Report prepared, supporting information included in the Attachment C report. |
| 2023                               | YES           | 192486-4        | None  | 550 G. - FRP        | #2 FUEL OIL | 1/13/2000         | NFA requested; Closure Report prepared, supporting information included in the Attachment D report. |
| 2024                               | YES           | 192486-5        | None  | 550 G. - FRP        | #2 FUEL OIL | 1/19/2000         | NFA requested; Closure Report prepared, supporting information included in the Attachment E report. |
| 2025                               | YES           | 192486-6        | None  | 550 G. - FRP        | #2 FUEL OIL | 2/4/2000          | NFA requested; Closure Report prepared, supporting information included in the Attachment F report. |
| 2026                               | YES           | 192486-7        | None  | 550 G. - FRP        | #2 FUEL OIL | 2/8/2000          | NFA requested; Closure Report prepared, supporting information included in the Attachment G report. |
| 2027                               | YES           | 192486-8        | None  | 550 G. - FRP        | #2 FUEL OIL | 2/9/2000          | NFA requested; Closure Report prepared, supporting information included in the Attachment H report. |
| 2028                               | YES           | 192486-9        | None  | 550 G. - FRP        | #2 FUEL OIL | 2/17/2000         | NFA requested; Closure Report prepared, supporting information included in the Attachment I report. |
| 2029                               | YES           | 192486-10       | None  | 550 G. - FRP        | #2 FUEL OIL | 2/22/2000         | NFA requested; Closure Report prepared, supporting information included in the Attachment J report. |
| 2030                               | YES           | 192486-11       | None  | 550 G. - FRP        | #2 FUEL OIL | 2/28/2000         | NFA requested; Closure Report prepared, supporting information included in the Attachment K report. |
| 2031                               | YES           | 192486-12       | None  | 550 G. - FRP        | #2 FUEL OIL | 3/1/2000          | NFA requested; Closure Report prepared, supporting information included in the Attachment L report. |
| 2032                               | YES           | 192486-13       | None  | 550 G. - FRP        | #2 FUEL OIL | 3/2/2000          | NFA requested; Closure Report prepared, supporting information included in the Attachment M report. |
| 2033                               | YES           | 192486-14       | None  | 550 G. - FRP        | #2 FUEL OIL | 3/17/2000         | NFA requested; Closure Report prepared, supporting information included in the Attachment N report. |
| 2034                               | YES           | 192486-15       | None  | 550 G. - FRP        | #2 FUEL OIL | 3/20/2000         | NFA requested; Closure Report prepared, supporting information included in the Attachment O report. |
| 2035                               | YES           | 192486-16       | None  | 550 G. - FRP        | #2 FUEL OIL | 3/21/2000         | NFA requested; Closure Report prepared, supporting information included in the Attachment P report. |
| 2036                               | YES           | 192486-17       | None  | 550 G. - FRP        | #2 FUEL OIL | 3/22/2000         | NFA requested; Closure Report prepared, supporting information included in the Attachment Q report. |
| 2037                               | YES           | 192486-18       | None  | 550 G. - FRP        | #2 FUEL OIL | 3/23/2000         | NFA requested; Closure Report prepared, supporting information included in the Attachment R report. |
| 2038                               | YES           | 192486-19       | None  | 550 G. - FRP        | #2 FUEL OIL | 4/11/2000         | NFA requested; Closure Report prepared, supporting information included in the Attachment S report. |
| 2039                               | YES           | 192486-20       | None  | 550 G. - FRP        | #2 FUEL OIL | 4/12/2000         | NFA requested; Closure Report prepared, supporting information included in the Attachment T report. |
| 2040                               | YES           | 192486-21       | None  | 550 G. - FRP        | #2 FUEL OIL | 4/13/2000         | NFA requested; Closure Report prepared, supporting information included in the Attachment U report. |
| 2041                               | YES           | 192486-22       | None  | 550 G. - FRP        | #2 FUEL OIL | 4/6/2000          | NFA requested; Closure Report prepared, supporting information included in the Attachment V report. |
| 2042                               | YES           | 192486-23       | None  | 550 G. - FRP        | #2 FUEL OIL | 4/7/2000          | NFA requested; Closure Report prepared, supporting information included in the Attachment W report. |
| *FRP-fiberglass reinforced plastic |               |                 |       |                     |             |                   |                                                                                                     |

**Attachment C**  
**UST 2022 Closure Report**



**U.S. Army Garrison**  
Fort Monmouth, New Jersey

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

***Charles Wood – Building 2022***

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**NJDEP UST Registration No.: 192486-3**  
**UST No.: 192486-3**

**September 2010**

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

**CHARLES WOOD – BUILDING 2022  
NJDEP UST REGISTRATION NO.: 192486-3**

**SEPTEMBER 2010**

**PROJECT NO.: 10-24949**

**PREPARED FOR:**

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

**PREPARED BY:**

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

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## EXECUTIVE SUMMARY

### UST Closure

On January 12, 2000, a fiberglass wrapped plastic 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. Installed in 1985, the tank was located adjacent to Building 2022 in Charles Wood area. UST No.: 192486-3 was a 550-gallon FRP No. 2 fuel oil tank. The tank with all associated piping was present at the time of removal. 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, of which none were found. No petroleum odors or stained soils were observed in the soils surrounding the tanks.

Closure soil samples were collected after the removal of the UST. Closure samples 2022-A and 2022-B were collected from a total of two (2) locations along the UST bottom of the excavation for the UST No.: 192486-3. Closure sample 2022-C was collected from a location along the UST piping. A duplicate of sample 2022-A was collected. All samples were analyzed for total petroleum hydrocarbons (TPH). Groundwater was not encountered in the bottom of the excavation.

### Findings

The closure soil samples collected from the UST excavation associated UST No.: 192486-3 contained TPH concentrations below the NJDEP health based criterion of 10,000 milligrams per kilogram (mg/kg) for total organic contaminants (N.J.A.C. 7:26E and revisions dated February 3, 1994). All soil samples, including the duplicate, contained a TPH concentration of Not Detected.

### Conclusions and Recommendations

Based on the closure soil sampling results, soils with TPH concentrations exceeding the NJDEP health based criterion of 10,000 mg/kg for total organic contaminants (N.J.A.C. 7:26E and revisions dated February 3, 1994) are not present in the former location of the UST.

**No Further Action** is proposed in regard to the closure and site assessment of UST No.: 192486-3 at Building 2022.

## **1.0 UNDERGROUND STORAGE TANK DECOMMISSIONING ACTIVITIES**

### **1.1 OVERVIEW**

One underground storage tank (UST), New Jersey Department of Environmental Protection (NJDEP) Registration No.: 192486-3 was closed at Building 2022 of the Charles Wood area at U.S. Army Garrison, Fort Monmouth, New Jersey. Refer to site location maps on Figure 1 & 2. This report presents the results of the implementation of the Directorate of the Public Work's UST Management Plan, March 1996. Installed in 1985, the UST was a 550-gallon, FRP, containing No. 2 fuel oil for residential use. It was removed on January 12, 2000.

Decommissioning activities for UST No.: 192486-3 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 Site 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)*.

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 UST decommissioning activities. Section 2 describes the site investigation activities. Conclusions and recommendations are presented in Section 3 of this report.

### **1.2 SITE DESCRIPTION**

Building 2022 (Megill Circle) is located in the Charles Wood area of Fort Monmouth, as shown on Figure 1 & 2. UST No.: 192486-3 and associated piping were located adjacent to the building, as shown on Figure 3.

#### **1.2.1 Geological/Hydrogeological Setting**

The following is a description of the geological/hydrogeological setting of Bldg. 2022. 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 Charles Wood 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 (Zapeczka, 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 encrusted (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 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

Fort Monmouth has been an operational military facility for in excess of ninety (90) years; and in many areas of Charles Wood, human activities have completely transformed the topography. Currently, 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 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 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 Charles Wood 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-ionizer detector: Thermo Instruments Organic Vapor Monitor (OVM) – Model #580-B. The individual ascertained if the area was properly vented to render the area safe, as defined by OSHA. All work areas were properly vented to insure that there were no contaminants present in the breathing zone above permissible exposure limits (PEL's).

### **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 great regard to safety and health and the 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.

- 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.
- 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 UST. The tank was completely empty and contained no liquids prior to removal from the ground.

After the UST was removed from the excavation, it was staged on an impervious surface, labeled and examined for holes. The Subsurface Evaluator observed no holes in the tank during the inspection. Soils surrounding the UST were screened visually and with an OVM for evidence of contamination. Soil staining or petroleum hydrocarbons were not observed.

### **1.5 UNDERGROUND STORAGE TANK DECOMMISSIONING AND DISPOSAL**

Subsequent to disposal, the UST was purged with air to remove vapors prior to cutting. A 4 feet by 3 feet access hole was made in the UST using a pneumatic ripper gun with a non-sparking bit. The UST was cleaned first with rubber squeegees and adsorbent material broomed on the sidewalls and bottom. The adsorbent material was then drummed and subsequently put 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 for disposal in compliance with all applicable regulations and laws. The UST disposal document, along with backfilling authorization, is included in Appendix B.

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

If available, photographic documentation of the UST is included in Appendix C.

## **2.0 SITE INVESTIGATION ACTIVITIES**

### **2.1 OVERVIEW**

The Site Investigation was managed by U.S. Army DPW personnel. All analyses were performed and reported by Fort Monmouth Environmental Testing Laboratory, a NJDEP-certified testing laboratory. All sampling was performed by a NJDEP Certified Subsurface Evaluator according to the methods described in the NJDEP *Field Sampling Procedures Manual* (1992). Sampling frequency and parameters analyzed complied with the NJDEP document *Technical Requirements for Site Remediation*, 7:26E-3.9 (June 7, 1993) which was the applicable regulation at the date of the closure. All records of the Site Investigation activities are maintained by the Fort Monmouth DPW Environmental Office.

The following Parties participated in Closure and Site Investigation Activities.

- Ft. Monmouth Directorate of Public Works-Environmental Division  
Contact Person: Joseph Fallon  
Phone Number: (732) 532-6223
- Subsurface Evaluator: Frank Accorsi  
Employer: TECOM-Vinnell Services, Inc. (TVS)  
Phone Number: (732) 532-5241  
NJDEP License No.: 0010042  
(TVS)NJDEP License No.: US252302
- Analytical Laboratory: Fort Monmouth Environmental Testing Laboratory  
Contact Person: Dan Wright  
Phone Number: (732) 532-4359  
NJDEP Laboratory Certification No.: 13461

### **2.2 FIELD SCREENING/MONITORING**

Field screening was performed by a NJDEP certified Subsurface Evaluator using an OVM and visual observations to identify potentially contaminated material, of which none were found.

### **2.3 SOIL SAMPLING**

On January 12, 2000, closure soil samples were collected after the removal of the UST. Closure samples 2022-A and 2022-B were collected from a total of two (2) locations along the UST bottom of the excavation for the UST No.: 192486-3. Closure sample 2022-C was collected from a location along the UST piping. A duplicate of sample 2022-A was collected.

Refer to soil sampling location map in Figure 3. All samples were analyzed for total petroleum hydrocarbons (TPH). Groundwater was not encountered in the excavation.

The site assessment was performed by TVS personnel in accordance with the NJDEP *Technical Requirements for Site Remediation* and the NJDEP *Field Sampling Procedures Manual*. A summary of sampling activities including parameters analyzed is provided on Table 1. The closure soil samples were collected. 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

Closure soil samples were collected from a total of three locations (which included the duplicate) on January 12, 2000 to evaluate soil conditions following removal of the UST and piping. All samples were analyzed for TPH. The closure soil sample results were compared to the NJDEP health based criterion of 10,000 mg/kg for total organic contaminants (*N.J.A.C. 7:26D* and revisions dated February 3, 1994). A summary of the analytical results and comparison to the NJDEP soil cleanup criteria is provided on Table 2. The analytical data package, including associated quality control data, is provided in Appendix D.

Closure soil samples collected on January 12, 2000 from the UST site excavation contained concentrations of TPH below the NJDEP soil cleanup criteria.

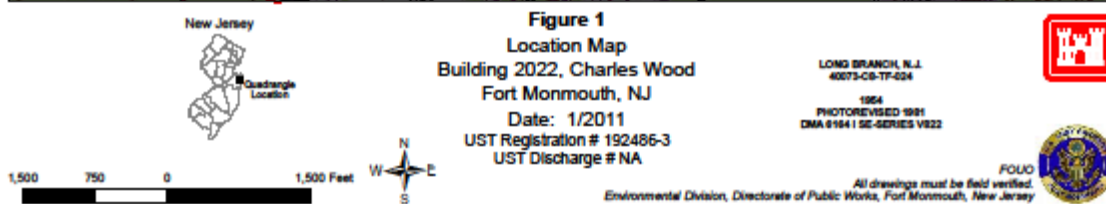
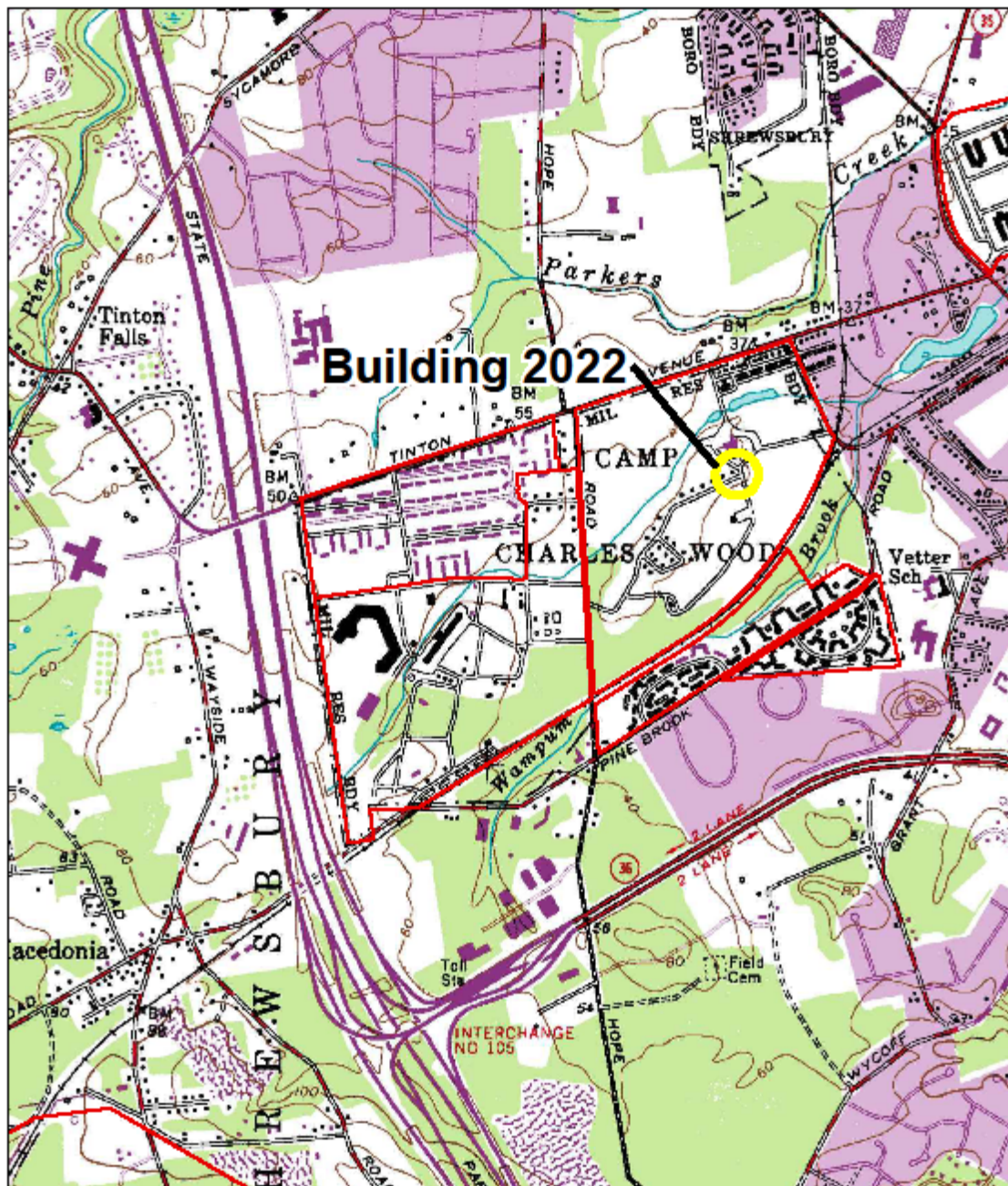
#### 3.2 CONCLUSIONS AND RECOMMENDATIONS

The analytical results for all of closure soil samples collected from the UST closure excavation at UST No.: 192486-3 were Not Detected for total petroleum hydrocarbons.

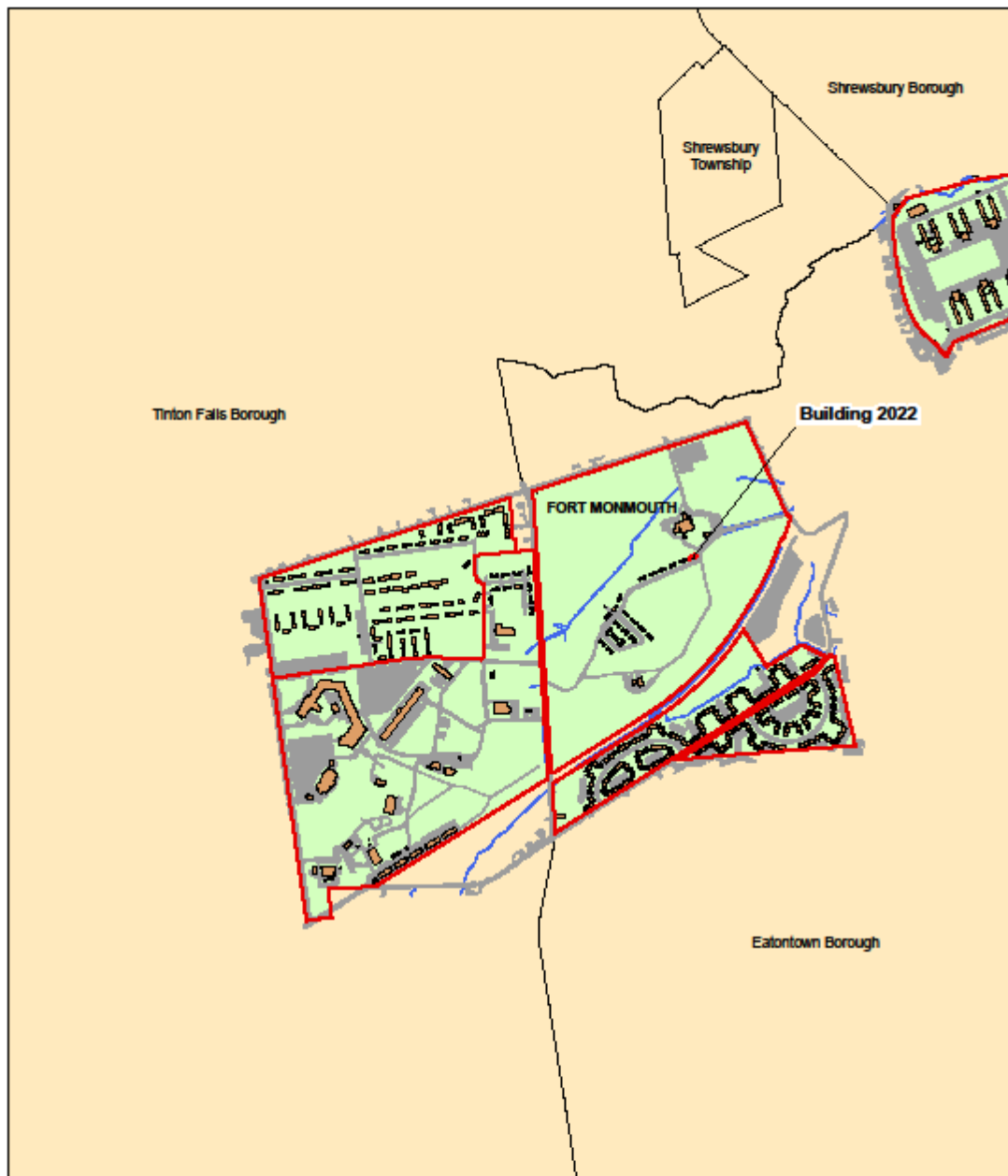
Based on the closure soil sampling results, soils with TPH concentrations exceeding the NJDEP soil cleanup criterion for total organic contaminants of 10,000 mg/kg are not present in the location of former UST No.: 192486-3.

**No Further Action** is proposed in regard to the closure and site investigation of UST No.: 192486-3 at Building 2022.

# FIGURES



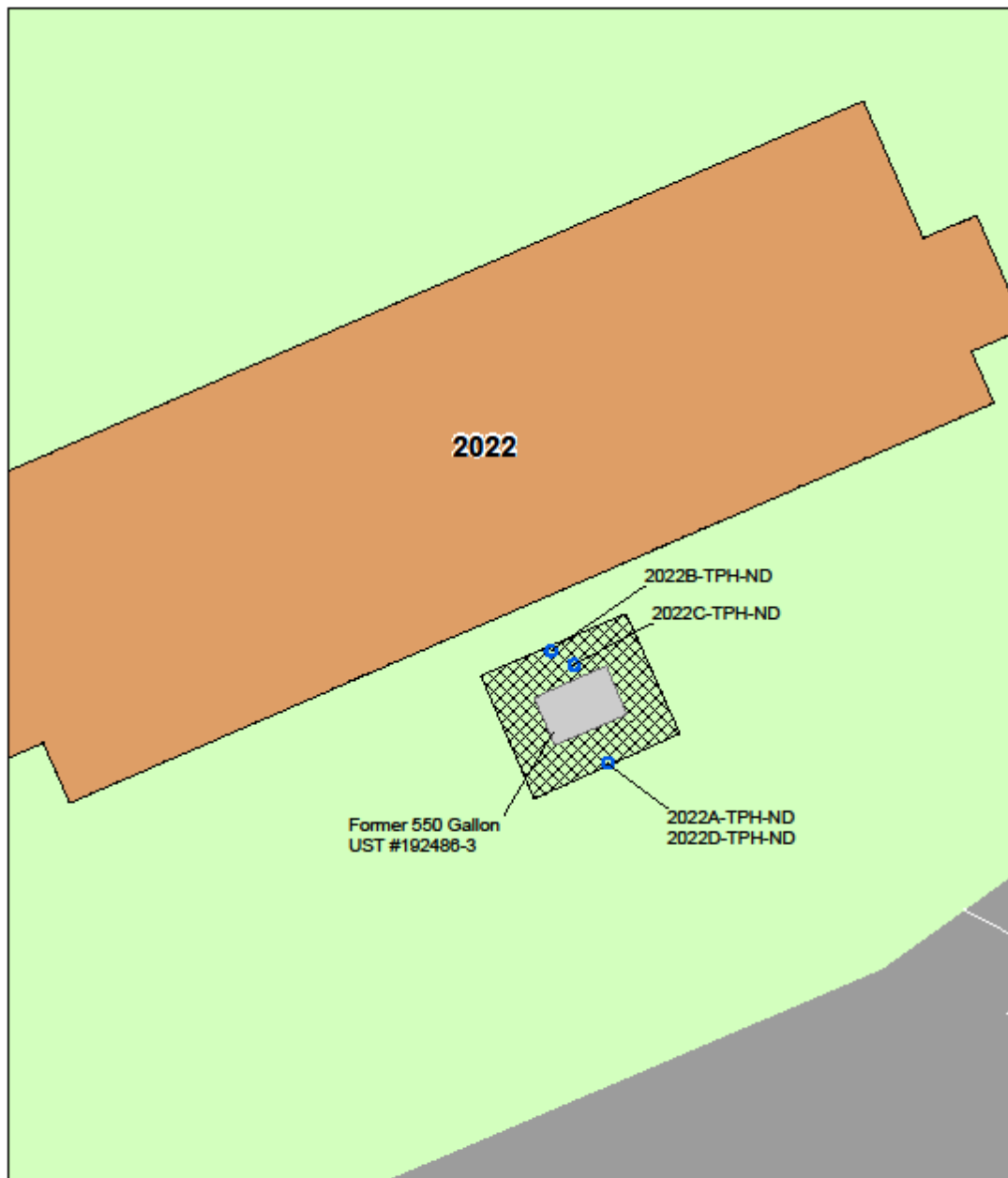




**Figure 2**  
 Location Map  
 Building 2022, Charles Wood Area  
 Fort Monmouth, NJ  
 Date: 1/2011  
 UST Registration # 192486-3  
 UST Discharge # NA



*All drawings must be field verified.*  
 Environmental Division, Directorate of Public Works, Fort Monmouth, New Jersey



**Legend**  
 UST  
 UST Excavation Limits  
 Soil Sample - 1/12/2000

10 5 0 10 Feet



**Figure 3**  
 Soil Sampling Location Map  
 Building 2022, Charles Wood Area  
 Fort Monmouth, NJ  
 Date: 1/2011  
 UST Registration # 192486-3  
 UST Discharge # NA



*All drawings must be field verified.*  
 Environmental Division, Directorate of Public Works, Fort Monmouth, New Jersey

# TABLES

# **TABLE 1**

## **SUMMARY OF LABORATORY ANALYSIS**

**FT. MONMOUTH, BUILDING 2022, UST No.: 192486-3  
12 January 2000**

| <b>SAMPLE<br/>ID</b>        | <b>LABORATORY<br/>SAMPLE ID</b> | <b>SAMPLE<br/>DATE</b> | <b>SAMPLE<br/>MATRIX</b> | <b>ANALYTICAL<br/>PARAMETER</b> | <b>ANALYTICAL<br/>METHOD</b> |
|-----------------------------|---------------------------------|------------------------|--------------------------|---------------------------------|------------------------------|
|                             |                                 |                        |                          |                                 |                              |
| <b>2022-A</b>               | 5095.01                         | 12-Jan-00              | SOIL                     | TPH                             | OQA-QAM-25                   |
| <b>2022-B</b>               | 5095.02                         | 12-Jan-00              | SOIL                     | TPH                             | OQA-QAM-25                   |
| <b>2022-C</b>               | 5095.03                         | 12-Jan-00              | SOIL                     | TPH                             | OQA-QAM-25                   |
| <b>2022-D<br/>Duplicate</b> | 5095.04                         | 12-Jan-00              | SOIL                     | TPH                             | OQA-QAM-25                   |

### **ABBREVIATIONS:**

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

## **TABLE 2**

### **SUMMARY OF LABORATORY ANALYTICAL RESULTS**

**FT. MONMOUTH, BUILDING 2022, UST No.: 192486-3**

**12 January 2000**

#### **TOTAL PETROLEUM HYDROCARBONS**

| <b>SAMPLE ID</b> | <b>LABORATORY<br/>SAMPLE ID</b> | <b>SAMPLE LOCATION</b> | <b>SAMPLE<br/>DEPTH</b> | <b>MATRIX</b> | <b>TPH<br/>RESULT S</b> |
|------------------|---------------------------------|------------------------|-------------------------|---------------|-------------------------|
|                  |                                 |                        | <b>(in feet)</b>        |               | <b>mg/kg</b>            |
| <b>2022-A</b>    | 5095.01                         | SOUTH END              | 6.5-7.0                 | Soil          | ND                      |
| <b>2022-B</b>    | 5095.02                         | NORTH END              | 6.5-7.0                 | Soil          | ND                      |
| <b>2022-C</b>    | 5095.03                         | PIPING                 | 1.5-2.0                 | Soil          | ND                      |
| <b>2022-D</b>    | 5095.04                         | DUPLICATE-SOUTH END    | 6.5-7.0                 | Soil          | ND                      |

#### ABBREVIATIONS:

mg/kg = Milligrams Per Kilogram = parts per million

ND = Compound Not Detected

Gray shading indicates exceedance of NJDEP health based criterion of 10,000 ppm total organic contaminants

# **APPENDIX A**

## **CERTIFICATIONS**

**(NOT AVAILABLE)**

## **APPENDIX B**

### **UST DISPOSAL CERTIFICATE**



**DEPARTMENT OF THE ARMY**  
Headquarters, U.S. Army Garrison Fort Monmouth  
Fort Monmouth, New Jersey 07703 - 5101



REPLY TO  
ATTENTION OF  
Directorate of Public Works

MAR 31 2000

Marpal Disposal Company, Inc.  
P.O. Box 188  
Lincroft, New Jersey 07738

Re: Non-Hazardous Waste Disposal  
Contract No. DAAB07-96-C-8252  
Location: Bldg. 166  
Roll-off container No. 2065  
Size: 30 cubic yards  
USTs from Bldgs: 2022, 2023, 2024, 2025, 2026, 2027, 2028, 2029,  
2030, 2031, 2032, 2033, 2034, 2035, 2036, and 2037

Dear Sirs:

I certify that the above referenced 30 cubic yard roll-off container provided by Marpal, Inc. contains only crushed fiberglass underground storage tanks removed from residential buildings at Fort Monmouth, NJ. The tanks only held No. 2 heating oil. The tanks were cleaned in accordance with acceptable industry standards and NJDEP protocol and then crushed. No free liquids are present in the container.

If you should require any additional information or help at this time, please contact Mr. Dinker Desai, Environmental Engineer, at (732) 532-1475.

Sincerely,

James Ott,  
Director, Public Works

Attachments: None



DIRECTORATE OF PUBLIC WORKS  
FORT MONMOUTH, NEW JERSEY 07703

Contract Management Division

SUBJECT: PWS-007, Residential UST Removal  
Contractor: TVS Inc.

RE: Backfilling of excavation,

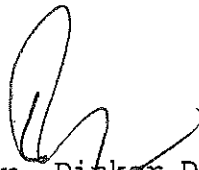
BUILDING #: 2022 (1+3 MEGILL DR.)

TVS Inc.  
Field Supervisor, PWS-007  
ATTN: Brian Finch  
Building 166  
Fort Monmouth, New Jersey 07703-5000

Dear Mr. Finch:

The above referenced area has been sampled and analyzed as described in the NJDEP Regulations. The results indicate levels of petroleum contamination below the NJDEP allowable limits ~~or that the site requires further investigation outside the scope of this contract.~~ The contractor may proceed with the backfilling of the excavation with stone to groundwater and clean fill to grade as required in the above referenced contract specification.

Regards,



Mr. Dinker Desai  
Environmental Engineer  
Directorate of Public Works

CC: UST file copy

## **APPENDIX C**

# **PHOTO DOCUMENTATION**

**(NOT AVAILABLE)**

## **APPENDIX D**

### **SOIL ANALYTICAL DATA PACKAGE**

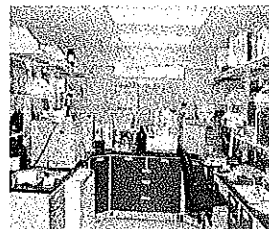
# FORT MONMOUTH ENVIRONMENTAL TESTING LABORATORY

DIRECTORATE OF PUBLIC WORKS

PHONE: (732) 532-6224 FAX: (732) 532-6263

WET-CHEM - METALS - ORGANICS - FIELD SAMPLING

CERTIFICATIONS: NJDEP #13461, NYSDOH #11699



ANALYTICAL DATA REPORT  
Fort Monmouth Environmental Laboratory  
ENVIRONMENTAL DIVISION  
Fort Monmouth, New Jersey  
PROJECT: IJO# 100004

## Bldg. 2022

| Field Sample Location   | Laboratory<br>Sample ID# | Matrix   | Date and Time<br>of Collection | Date Received |
|-------------------------|--------------------------|----------|--------------------------------|---------------|
| 2022-A South End 6.5-7' | 5095.01                  | Soil     | 12-Jan-00 13:50                | 01/12/00      |
| 2022-B North End 7-7.5' | 5095.02                  | Soil     | 12-Jan-00 14:10                | 01/12/00      |
| 2022-C Piping 1.5-2'    | 5095.03                  | Soil     | 12-Jan-00 14:30                | 01/12/00      |
| 2022-D Duplicate        | 5095.04                  | Soil     | 12-Jan-00 13:50                | 01/12/00      |
| Trip Blank              | 5095.05                  | Methanol | 12-Jan-00                      | 01/12/00      |

ANALYSIS:  
FORT MONMOUTH ENVIRONMENTAL LAB  
TPHC, %SOLIDS

ENCLOSURE:  
CHAIN OF CUSTODY  
RESULTS

  
1-28-00  
Daniel Wright/Date  
Laboratory Director

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## **Method Summary**

### **NJDEP Method OQA-QAM-025-10/97**

#### **Gas Chromatographic Determination of Total Petroleum Hydrocarbons in Soil**

Fifteen grams (15g)(wet weight) of a soil sample is added to a 125 mL acid cleaned, solvent rinsed, capped Erlenmeyer flask. 15g anhydrous sodium sulfate is added to dry sample. Surrogate standard spiking solution is then added to the flask.

Twenty five milliliters(25mL) Methylene Chloride is added to the flask and it is secured on a orbital shaker table. The agitation rate is set to 400rpm and the sample is shaken for 30 minutes. The flask is the removed from the table and the particulate matter is allowed to settle. The extract is transferred to a Teflon capped vial. A second 25mL of Methylene Chloride is added to the flask and shaken for an additional 30 minutes. The flask is again removed and allowed to settle. The extracts are combined in the vial then transferred to a 1mL autosampler vial.

The extract is then injected directly into a GC-FID for analysis. The sample is analyzed for petroleum hydrocarbons covering a range of C8-C42 including pristane and phytane. Total Petroleum Hydrocarbon concentration is determined by integrating between 5 minutes and 22 minutes. The baseline is established by starting the integration after the end of the solvent peak and stopping after the last peak.

The final concentration of Total Petroleum Hydrocarbons is calculated using percent solid, sample weight and concentration.

## TPHC Conformance/Non-conformance Summary Report

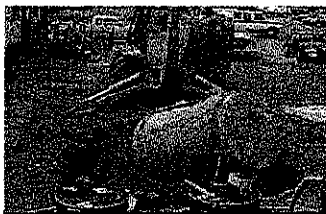
- |                                                                                                                                                                       | Indicate<br>Yes, No, N/A |
|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------|
| 1. Method Detection Limits provided.                                                                                                                                  | <u>Yes</u>               |
| 2. Method Blank Contamination -- If yes, list the sample and the corresponding concentrations in each blank.<br>_____<br>_____                                        | <u>NO</u>                |
| 3. Matrix Spike Results Summary Meet Criteria<br>(If not met, list the sample and corresponding recovery which falls outside the acceptable range).<br>_____<br>_____ | <u>Yes</u>               |
| 4. Duplicate Results Summary Meet Criteria<br>(If not met, list the sample and corresponding recovery which falls outside the acceptable range).<br>_____<br>_____    | <u>Yes</u>               |
| 5. IR Spectra submitted for standards, blanks and samples.                                                                                                            | <u>N/A</u>               |
| 6. Chromatograms submitted for standards, blanks and samples if GC fingerprinting was conducted.                                                                      | <u>Yes</u>               |
| 7. Analysis holding time met.<br>(If not met, list number of days exceeded for each sample).<br>_____<br>_____                                                        | <u>Yes</u>               |

Additional comments: \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

  
\_\_\_\_\_  
Laboratory Manager

1-28-00  
\_\_\_\_\_  
Date

000002



# Fort Monmouth Environmental Testing Laboratory

Bldg. 173, SELFM-PW-EV, Fort Monmouth, NJ 07703

Tel (732)532-4359 Fax (732)532-6263 EMail:appleby@mail1.monmouth.army.mil

NJDEP Certification #13461

## Chain of Custody Record

|                                                                                                                                                                                            |                             |              |             |                             |                |                                                                                                                                                          |                 |               |                 |                    |                                      |  |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------|--------------|-------------|-----------------------------|----------------|----------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------|---------------|-----------------|--------------------|--------------------------------------|--|
| <b>Customer: Dinker Desai</b>                                                                                                                                                              |                             |              |             | <b>Project No: 100004</b>   |                | <b>Analysis Parameters</b>                                                                                                                               |                 |               |                 |                    | <b>Comments:</b>                     |  |
| <b>Phone #: X21475</b>                                                                                                                                                                     |                             |              |             | <b>Location: BLDG. 2022</b> |                |                                                                                                                                                          |                 |               |                 |                    | * = Samples Kept <4°C                |  |
| <b>( )DERA (X)OMA UST Assessment</b>                                                                                                                                                       |                             |              |             | <b>UST#</b>                 |                |                                                                                                                                                          |                 |               |                 |                    |                                      |  |
| <b>Samplers Name / Company : Frank Accorsi/TVS</b>                                                                                                                                         |                             |              |             | <b>Sample</b>               | <b>#</b>       | <b>TPHC</b>                                                                                                                                              | <b>% SOLIDS</b> | <b>VOA+10</b> | <b>VOA ID #</b> | <b>PID Reading</b> | <b>Remarks / Preservation Method</b> |  |
| <b>Lab Sample I.D.</b>                                                                                                                                                                     | <b>Sample Location</b>      | <b>Date</b>  | <b>Time</b> | <b>Type</b>                 | <b>bottles</b> |                                                                                                                                                          |                 |               |                 |                    |                                      |  |
| 5095.01                                                                                                                                                                                    | 2022-A, SOUTH END, 6.5-7 FT | 1-12-00      | 1350        | 501L                        | 2              | X                                                                                                                                                        | X               | X             | 473             | 0                  | ICE                                  |  |
| 02                                                                                                                                                                                         | 2022-B, NORTH END, 7-7.5 FT |              | 1410        |                             | 2              | X                                                                                                                                                        | X               | X             | 474             | 0                  |                                      |  |
| 03                                                                                                                                                                                         | 2022-C, PIPING, 1.5-2 FT    |              | 1430        |                             | 2              | X                                                                                                                                                        | X               | X             | 475             | 0                  |                                      |  |
| 04                                                                                                                                                                                         | 2022-D, DUPLICATE           |              | 1350        |                             | 2              | X                                                                                                                                                        | X               | X             | 476             | 0                  |                                      |  |
| 05                                                                                                                                                                                         | TRIP BLANK                  |              | -           | AQ                          | 1              |                                                                                                                                                          |                 | X             | 477             | -                  |                                      |  |
| OVM sn#580U-64455.343 was calibrated with zero air & w/ 245ppm Isobutylene read 244 ppm. 1330 1-12-00 (time/date & initial)                                                                |                             |              |             |                             |                |                                                                                                                                                          |                 |               |                 |                    |                                      |  |
| Relinquished by (signature):                                                                                                                                                               |                             | Date/Time:   |             | Received by (signature):    |                | Relinquished by (signature):                                                                                                                             |                 | Date/Time:    |                 |                    |                                      |  |
| [Signature]                                                                                                                                                                                |                             | 1-12-00 1540 |             | [Signature]                 |                |                                                                                                                                                          |                 |               |                 |                    |                                      |  |
| Relinquished by (signature):                                                                                                                                                               |                             | Date/Time:   |             | Received by (signature):    |                | Relinquished by (signature):                                                                                                                             |                 | Date/Time:    |                 |                    |                                      |  |
|                                                                                                                                                                                            |                             |              |             |                             |                |                                                                                                                                                          |                 |               |                 |                    |                                      |  |
| Report Type: <input type="radio"/> Full, <input type="radio"/> Reduced, <input checked="" type="radio"/> Standard, <input type="radio"/> Screen / non-certified, <input type="radio"/> EDD |                             |              |             |                             |                | Remarks: *<br>VOA+10 ON 25% > 1,000 PPM TPH, ON HIGHEST, MIN. ONE                                                                                        |                 |               |                 |                    |                                      |  |
| Turnaround time: <input type="radio"/> Standard 2 wks, <input checked="" type="radio"/> Rush 1 Days, <input type="radio"/> ASAP Verbal Hrs.                                                |                             |              |             |                             |                | Dedicated Sampling Tools Used<br>All sample points have been GPS? <input checked="" type="radio"/> YES <input type="radio"/> NO <input type="radio"/> NA |                 |               |                 |                    |                                      |  |



**Report of Analysis**  
**U.S. Army, Fort Monmouth Environmental Laboratory**  
**NJDEP Certification # 13461**

**Client :** U.S. Army  
DPW. SELFM-PW-EV  
Bldg. 173  
Ft. Monmouth, NJ 07703

**Project # :** 5095  
**Location :** Bldg. 2022  
**UST Reg. # :**

**Analysis :** OQA-QAM-025  
**Matrix :** Soil  
**Inst. ID. :** GC TPHC INST. #1  
**Column Type :** RTX-5, 0.32mm ID, 30M  
**Injection Volume :** 1uL

**Date Received :** 12-Jan-00  
**Date Extracted :** 14-Jan-00  
**Extraction Method :** Shake  
**Analysis Complete :** 14-Jan-00  
**Analyst :** B. Patel

| Sample       | Field ID | Dilution Factor | Weight (g) | % Solid | MDL (mg/kg) | TPHC Result (mg/kg) |
|--------------|----------|-----------------|------------|---------|-------------|---------------------|
| 5095.01      | 2022-A   | 1.00            | 15.02      | 91.09   | 172         | ND                  |
| 5095.02      | 2022-B   | 1.00            | 15.17      | 91.23   | 170         | ND                  |
| 5095.03      | 2022-C   | 1.00            | 15.14      | 85.93   | 181         | ND                  |
| 5095.04      | 2022-D   | 1.00            | 15.25      | 90.83   | 170         | ND                  |
|              |          |                 |            |         |             |                     |
|              |          |                 |            |         |             |                     |
|              |          |                 |            |         |             |                     |
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|              |          |                 |            |         |             |                     |
|              |          |                 |            |         |             |                     |
|              |          |                 |            |         |             |                     |
| METHOD BLANK | TBLK309  | 1.00            | 15.00      | 100.00  | 157         | ND                  |

ND = Not Detected

MDL = Method Detection Limit

  
Daniel K. Wright  
Laboratory Director

000004

## LABORATORY DELIVERABLES CHECKLIST AND NON-CONFORMANCE SUMMARY

THIS FORM MUST BE COMPLETED BY THE LABORATORY OR ENVIRONMENTAL CONSULTANT  
AND ACCOMPANY ALL DATA SUBMISSIONS

The following Laboratory Deliverables checklist and Non-Conformance Summary shall be included in the data submission. All deviations from the accepted methodology and procedures, of performance values outside acceptable ranges shall be summarized in the Non-Conformance Summary. The Technical Requirements for Site Remediation, effective June 7, 1993, provides further details. The document shall be bound and paginated, contain a table of contents, and all pages shall be legible. Incomplete packages will be returned or held without review until the data package is completed.

It is recommended that the analytical results summary sheets listing all targeted and non-targeted compounds with the method detection limits, practical quantitation limits, and the laboratory and/or sample numbers be included in one section of the data package and in the main body of the report.

1. Cover page, Title Page listing Lab Certification #, facility name and address, & date of report submitted
2. Table of Contents submitted
3. Summary Sheets listing analytical results for all targeted and non-targeted compounds submitted
4. Document paginated and legible
5. Chain of Custody submitted
6. Samples submitted to lab within 48 hours of sample collection
7. Methodology Summary submitted
8. Laboratory Chronicle and Holding Time Check submitted
9. Results submitted on a dry weight basis
10. Method Detection Limits submitted
11. Lab certified by NJDEP for parameters of appropriate category of parameters or a member of the USEPA CLP

✓

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✓

Laboratory Manager or Environmental Consultant's Signature

Date 1/28/00

Laboratory Certification #13461

\*Refer to NJAC 7:26E - Appendix A, Section IV - Reduced Data Deliverables - Non-USEPA/CLP  
Methods for further guidance.

000022

## **Laboratory Authentication Statement**

I certify under penalty of law, where applicable, that this laboratory meets the Laboratory Performance Standards and Quality Control requirements specified in N.J.A.C. 7:18 and 40 CFR Part 136 for Water and Wastewater Analyses and SW-846 for Solid Waste Analysis. I have personally examined the information contained in this report and to the best of my knowledge, I believe that the submitted information is true, accurate, complete and meets the above referenced standards where applicable. I am aware that there are significant penalties for purposefully submitting falsified information, including the possibility of a fine and imprisonment.



Daniel K. Wright  
Laboratory Manager

**Attachment D**  
**UST 2023 Closure Report**

**U.S. Army Garrison**  
Fort Monmouth, New Jersey

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

***Charles Wood – Building 2023***

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**NJDEP UST Registration No.: 192486-4**  
**UST No.: 192486-4**

**September 2010**

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

**CHARLES WOOD – BUILDING 2023  
NJDEP UST REGISTRATION NO.: 192486-4**

**SEPTEMBER 2010**

**PROJECT NO.: 10-24949**

**PREPARED FOR:**

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

**PREPARED BY:**

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

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## EXECUTIVE SUMMARY

### UST Closure

On January 13, 2000, a fiberglass wrapped plastic 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. Installed in 1985, the tank was located adjacent to Building 2023 in the Charles Wood area. UST No.: 192486-4 was a 550-gallon FRP No. 2 fuel oil tank. The tank with all associated piping was present at the time of removal. 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, of which none were found. No petroleum odors or stained soils were observed in the soils surrounding the tanks.

Closure soil samples were collected after the removal of the UST. Closure samples 2023-A and 2023-B were collected from a total of two (2) locations along the UST bottom of the excavation for the UST No.: 192486-4. Closure sample 2023-C was collected from a location along the UST piping. A duplicate of sample 2023-A was collected. All samples were analyzed for total petroleum hydrocarbons (TPH). Groundwater was not encountered in the bottom of the excavation.

### Findings

The closure soil samples collected from the UST excavation associated UST No.: 192486-4 contained TPH concentrations below the NJDEP health based criterion of 10,000 milligrams per kilogram (mg/kg) for total organic contaminants (N.J.A.C. 7:26E and revisions dated February 3, 1994). All soil samples, including the duplicate, contained a TPH concentration of Not Detected.

### Conclusions and Recommendations

Based on the closure soil sampling results, soils with TPH concentrations exceeding the NJDEP health based criterion of 10,000 mg/kg for total organic contaminants (N.J.A.C. 7:26E and revisions dated February 3, 1994) are not present in the former location of the UST.

**No Further Action** is proposed in regard to the closure and site assessment of UST No.: 192486-4 at Building 2023.

## **1.0 UNDERGROUND STORAGE TANK DECOMMISSIONING ACTIVITIES**

### **1.1 OVERVIEW**

One underground storage tank (UST), New Jersey Department of Environmental Protection (NJDEP) Registration No.: 192486-4 was closed at Building 2023 of the Charles Wood area at U.S. Army Garrison, Fort Monmouth, New Jersey. Refer to site location maps on Figure 1 & 2. This report presents the results of the implementation of the Directorate of the Public Work's UST Management Plan, March 1996. Installed in 1985, the UST was a 550-gallon, FRP, containing No. 2 fuel oil for residential use. It was removed on January 13, 2000.

Decommissioning activities for UST No.: 192486-4 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 Site 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)*.

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 UST decommissioning activities. Section 2 describes the site investigation activities. Conclusions and recommendations are presented in Section 3 of this report.

### **1.2 SITE DESCRIPTION**

Building 2023 (Megill Drive) is located in the Charles Wood area of Fort Monmouth, as shown on Figure 1 & 2. UST No.: 192486-4 and associated piping were located adjacent to the building, as shown on Figure 3.

#### **1.2.1 Geological/Hydrogeological Setting**

The following is a description of the geological/hydrogeological setting of Bldg. 2023. 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 Charles Wood 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 (Zapeczka, 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 encrusted (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 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

Fort Monmouth has been an operational military facility for in excess of ninety (90) years; and in many areas of Charles Wood, human activities have completely transformed the topography. Currently, 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 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 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 Charles Wood 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-ionizer detector: Thermo Instruments Organic Vapor Monitor (OVM) – Model #580-B. The individual ascertained if the area was properly vented to render the area safe, as defined by OSHA. All work areas were properly vented to insure that there were no contaminants present in the breathing zone above permissible exposure limits (PEL’s).

### **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 great regard to safety and health and the 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.

- 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.
- 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 UST. The tank was completely empty and contained no liquids prior to removal from the ground.

After the UST was removed from the excavation, it was staged on an impervious surface, labeled and examined for holes. The Subsurface Evaluator observed no holes in the tank during the inspection. Soils surrounding the UST were screened visually and with an OVM for evidence of contamination. Soil staining or petroleum hydrocarbons were not observed.

### **1.5 UNDERGROUND STORAGE TANK DECOMMISSIONING AND DISPOSAL**

Subsequent to disposal, the UST was purged with air to remove vapors prior to cutting. A 4 feet by 3 feet access hole was made in the UST using a pneumatic ripper gun with a non-sparking bit. The UST was cleaned first with rubber squeegees and adsorbent material broomed on the sidewalls and bottom. The adsorbent material was then drummed and subsequently put 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 for disposal in compliance with all applicable regulations and laws. The UST disposal certification, along with backfilling authorization, is included in Appendix B.

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

If available, photographic documentation of the UST is included in Appendix C.

## **2.0 SITE INVESTIGATION ACTIVITIES**

### **2.1 OVERVIEW**

The Site Investigation was managed by U.S. Army DPW personnel. All analyses were performed and reported by Fort Monmouth Environmental Testing Laboratory, a NJDEP-certified testing laboratory. All sampling was performed by a NJDEP Certified Subsurface Evaluator according to the methods described in the NJDEP *Field Sampling Procedures Manual* (1992). Sampling frequency and parameters analyzed complied with the NJDEP document *Technical Requirements for Site Remediation*, 7:26E-3.9 (June 7, 1993) which was the applicable regulation at the date of the closure. All records of the Site Investigation activities are maintained by the Fort Monmouth DPW Environmental Office.

The following Parties participated in Closure and Site Investigation Activities.

- Ft. Monmouth Directorate of Public Works-Environmental Division  
Contact Person: Joseph Fallon  
Phone Number: (732) 532-6223
- Subsurface Evaluator: Frank Accorsi  
Employer: TECOM-Vinnell Services, Inc. (TVS)  
Phone Number: (732) 532-5241  
NJDEP License No.: 0010042  
(TVS)NJDEP License No.: US252302
- Analytical Laboratory: Fort Monmouth Environmental Testing Laboratory  
Contact Person: Dan Wright  
Phone Number: (732) 532-4359  
NJDEP Laboratory Certification No.: 13461

### **2.2 FIELD SCREENING/MONITORING**

Field screening was performed by a NJDEP certified Subsurface Evaluator using an OVM and visual observations to identify potentially contaminated material, of which none were found.

### **2.3 SOIL SAMPLING**

On January 13, 2000, closure soil samples were collected after the removal of the UST. Closure samples 2023-A and 2023-B were collected from a total of two (2) locations along the UST bottom of the excavation for the UST No.: 192486-4. Closure sample 2023-C was collected from a location along the UST piping. A duplicate of sample 2023-A was also collected.



Refer to soil sampling location map in Figure 3. All samples were analyzed for total petroleum hydrocarbons (TPH). Groundwater was not encountered in the excavation.

The site assessment was performed by TVS personnel in accordance with the NJDEP *Technical Requirements for Site Remediation* and the NJDEP *Field Sampling Procedures Manual*. A summary of sampling activities including parameters analyzed is provided on Table 1. The closure soil samples were collected. 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

Closure soil samples were collected from a total of three locations (which included the duplicate) on January 13, 2000 to evaluate soil conditions following removal of the UST and piping. All samples were analyzed for TPH. The closure soil sample results were compared to the NJDEP health based criterion of 10,000 mg/kg for total organic contaminants (*N.J.A.C. 7:26D* and revisions dated February 3, 1994). A summary of the analytical results and comparison to the NJDEP soil cleanup criteria is provided on Table 2. The analytical data package, including associated quality control data, is provided in Appendix D.

Closure soil samples collected on January 13, 2000 from the UST site excavation contained concentrations of TPH below the NJDEP soil cleanup criteria.

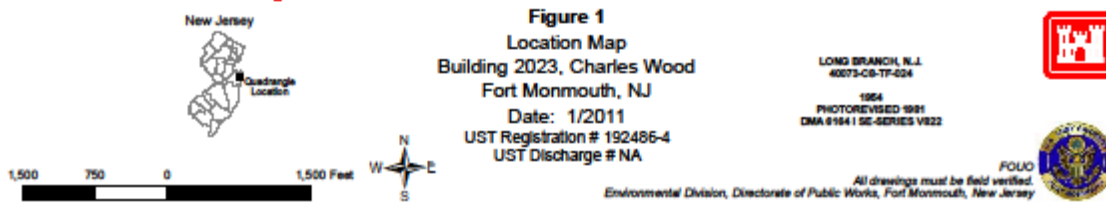
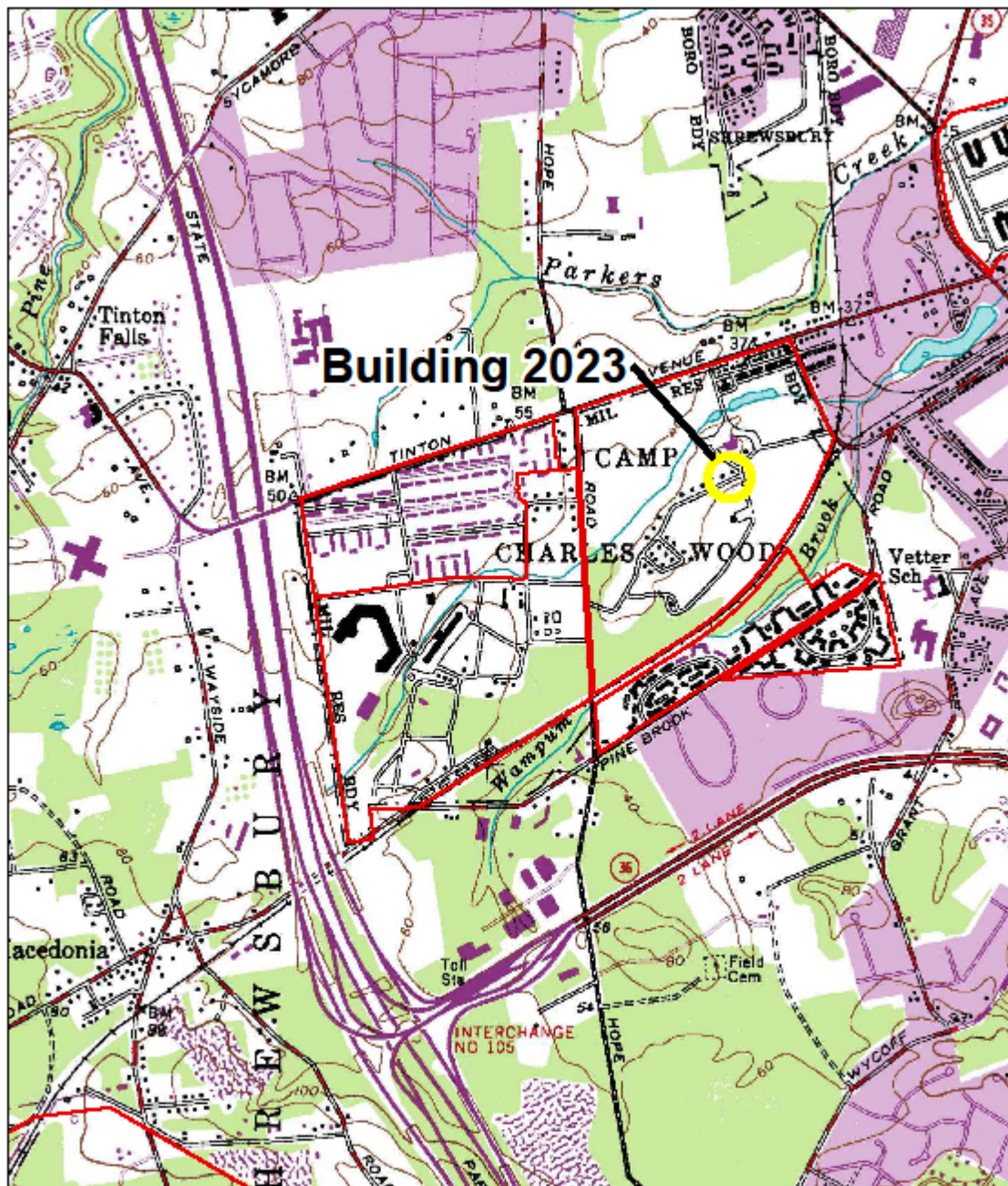
#### 3.2 CONCLUSIONS AND RECOMMENDATIONS

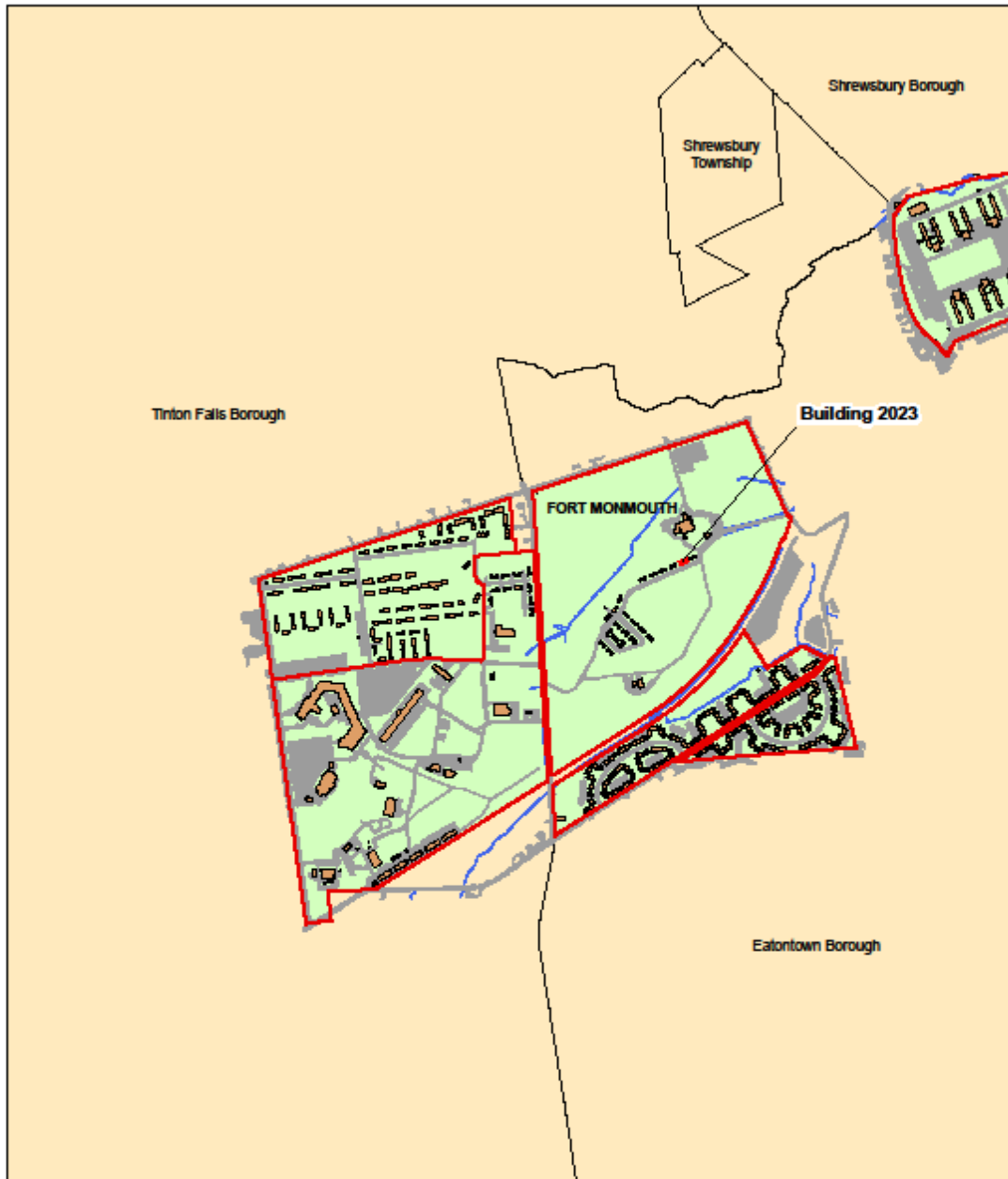
The analytical results for all of closure soil samples collected from the UST closure excavation at UST No.: 192486-4 were Not Detected for total petroleum hydrocarbons.

Based on the closure soil sampling results, soils with TPH concentrations exceeding the NJDEP soil cleanup criterion for total organic contaminants of 10,000 mg/kg are not present in the location of former UST No.: 192486-4.

**No Further Action** is proposed in regard to the closure and site investigation of UST No.: 192486-4 at Building 2023.

# FIGURES



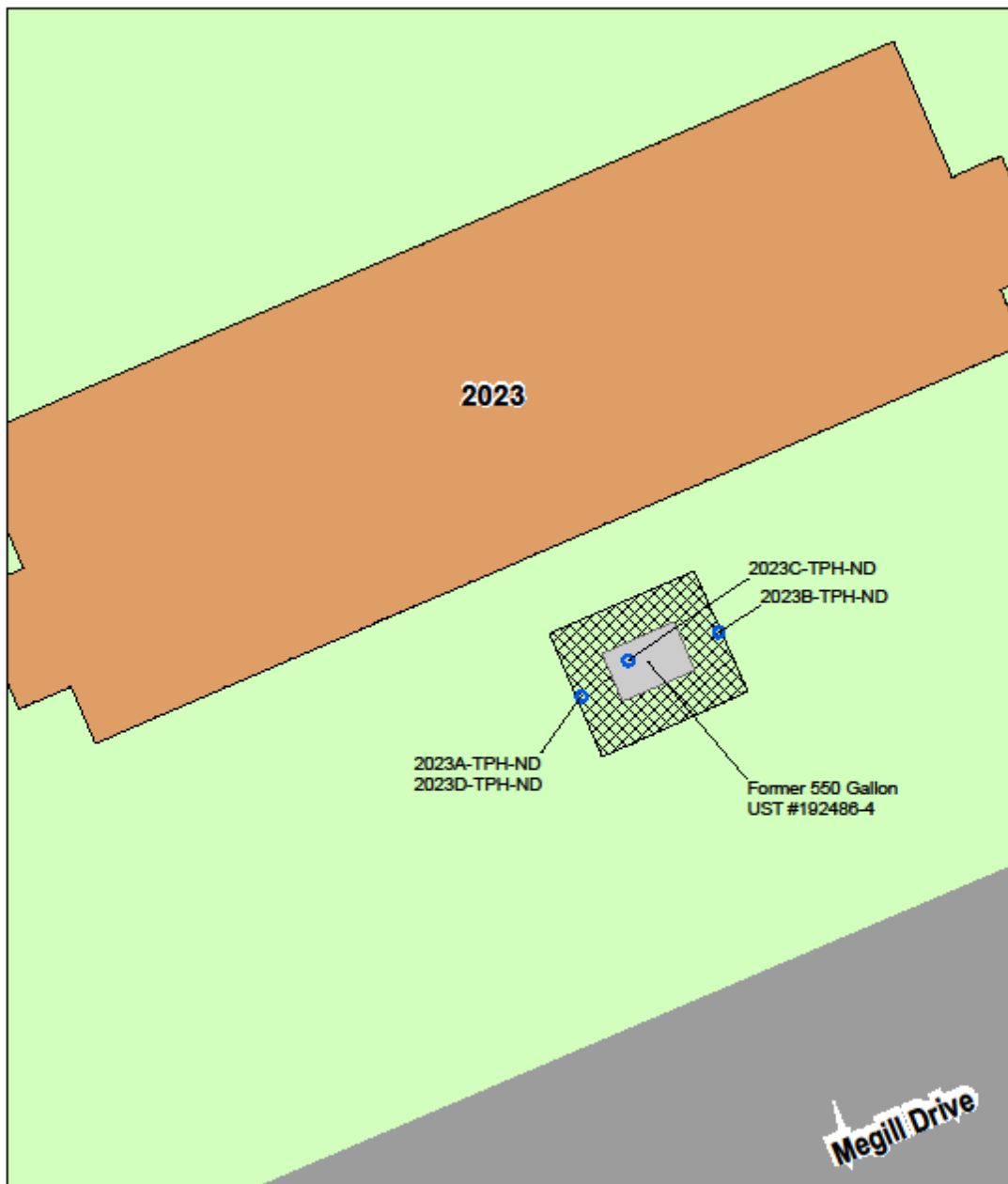


**Figure 2**  
 Location Map  
 Building 2023, Charles Wood Area  
 Fort Monmouth, NJ  
 Date: 1/2011  
 UST Registration # 192486-4  
 UST Discharge # NA



*All drawings must be field verified.*  
 Environmental Division, Directorate of Public Works, Fort Monmouth, New Jersey





**Legend**  
 [Grey Box] UST  
 [Cross-hatched Box] UST Excavation Limits  
 [Blue Dot] Soil Sample - 1/13/2000

10 5 0 10 Feet



**Figure 3**  
 Soil Sampling Location Map  
 Building 2023, Charles Wood Area  
 Fort Monmouth, NJ  
 Date: 1/2011  
 UST Registration # 192486-4  
 UST Discharge # NA



*All drawings must be field verified.*  
 Environmental Division, Directorate of Public Works, Fort Monmouth, New Jersey

# TABLES

# **TABLE 1**

## **SUMMARY OF LABORATORY ANALYSIS**

**FT. MONMOUTH, BUILDING 2023, UST No.: 192486-4**

**13 January 2000**

| <b>SAMPLE ID</b>        | <b>LABORATORY SAMPLE ID</b> | <b>SAMPLE DATE</b> | <b>SAMPLE MATRIX</b> | <b>ANALYTICAL PARAMETER</b> | <b>ANALYTICAL METHOD</b> |
|-------------------------|-----------------------------|--------------------|----------------------|-----------------------------|--------------------------|
|                         |                             |                    |                      |                             |                          |
| <b>2023-A</b>           | 5100.01                     | 13 Jan-00          | SOIL                 | TPH                         | OQA-QAM-25               |
| <b>2023-B</b>           | 5100.02                     | 13-Jan-00          | SOIL                 | TPH                         | OQA-QAM-25               |
| <b>2023-C</b>           | 5100.03                     | 13-Jan-00          | SOIL                 | TPH                         | OQA-QAM-25               |
| <b>2023-D Duplicate</b> | 5100.04                     | 13-Jan-00          | SOIL                 | TPH                         | OQA-QAM-25               |

### ABBREVIATIONS:

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

## **TABLE 2**

### **SUMMARY OF LABORATORY ANALYTICAL RESULTS**

FT. MONMOUTH, BUILDING 2023, UST No.: 192486-4

13 January 2000

#### **TOTAL PETROLEUM HYDROCARBONS**

| <b>SAMPLE ID</b>            | <b>LABORATORY<br/>SAMPLE ID</b> | <b>SAMPLE LOCATION</b> | <b>SAMPLE<br/>DEPTH</b> | <b>MATRIX</b> | <b>TPH<br/>RESULT S</b> |
|-----------------------------|---------------------------------|------------------------|-------------------------|---------------|-------------------------|
|                             |                                 |                        | <b>(in feet)</b>        |               | <b>mg/kg</b>            |
| <b>2023-A</b>               | 5100.01                         | WEST END               | 6.0-6.5                 | Soil          | ND                      |
| <b>2023-B</b>               | 5100.02                         | EAST END               | 6.5-7.0                 | Soil          | ND                      |
| <b>2023-C</b>               | 5100.03                         | PIPING                 | 2.0-2.5                 | Soil          | ND                      |
| <b>2023-D<br/>Duplicate</b> | 5100.04                         | DUPLICATE-WEST END     | 6.0-6.5                 | Soil          | ND                      |

#### ABBREVIATIONS:

mg/kg = Milligrams Per Kilogram = parts per million

ND = Compound Not Detected

Gray shading indicates exceedance of NJDEP health based criterion of 10,000 ppm total organic contaminants



**APPENDIX A**

**CERTIFICATIONS**

**(NOT AVAILABLE)**

## **APPENDIX B**

### **UST DISPOSAL CERTIFICATE**



**DEPARTMENT OF THE ARMY**  
Headquarters, U.S. Army Garrison Fort Monmouth  
Fort Monmouth, New Jersey 07703 - 5101



REPLY TO  
ATTENTION OF  
Directorate of Public Works

MAR 31 2000

Marpal Disposal Company, Inc.  
P.O. Box 188  
Lincroft, New Jersey 07738

Re: Non-Hazardous Waste Disposal  
Contract No. DAAB07-96-C-8252  
Location: Bldg. 166  
Roll-off container No. 2065  
Size: 30 cubic yards  
USTs from Bldgs: 2022, 2023, 2024, 2025, 2026, 2027, 2028, 2029,  
2030, 2031, 2032, 2033, 2034, 2035, 2036, and 2037

Dear Sirs:

I certify that the above referenced 30 cubic yard roll-off container provided by Marpal, Inc. contains only crushed fiberglass underground storage tanks removed from residential buildings at Fort Monmouth, NJ. The tanks only held No. 2 heating oil. The tanks were cleaned in accordance with acceptable industry standards and NJDEP protocol and then crushed. No free liquids are present in the container.

If you should require any additional information or help at this time, please contact Mr. Dinker Desai, Environmental Engineer, at (732) 532-1475.

Sincerely,

James Ott,  
Director, Public Works

Attachments: None

DIRECTORATE OF PUBLIC WORKS  
FORT MONMOUTH, NEW JERSEY 07703

Contract Management Division

SUBJECT: PWS-007, Residential UST Removal  
Contractor: TVS Inc.

RE: Backfilling of excavation,

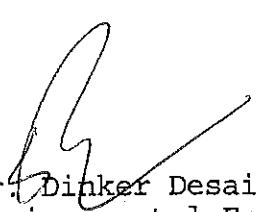
BUILDING #: 2023 (5+7 MEGILL DR.)

TVS Inc.  
Field Supervisor, PWS-007  
ATTN: Brian Finch  
Building 166  
Fort Monmouth, New Jersey 07703-5000

Dear Mr. Finch:

The above referenced area has been sampled and analyzed as described in the NJDEP Regulations. The results indicate levels of petroleum contamination below the NJDEP allowable limits ~~or that the site requires further investigation outside the scope of this contract.~~ The contractor may proceed with the backfilling of the excavation with stone to groundwater and clean fill to grade as required in the above referenced contract specification.

Regards,



Mr. Dinker Desai  
Environmental Engineer  
Directorate of Public Works

CC: UST file copy

## **APPENDIX C**

# **PHOTO DOCUMENTATION**

**(NOT AVAILABLE)**

## **APPENDIX D**

# **SOIL ANALYTICAL DATA PACKAGE**

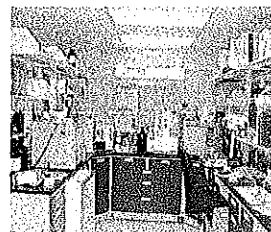
# FORT MONMOUTH ENVIRONMENTAL TESTING LABORATORY

DIRECTORATE OF PUBLIC WORKS

PHONE: (732) 532-6224 FAX: (732) 532-6263

WET-CHEM - METALS - ORGANICS - FIELD SAMPLING

CERTIFICATIONS: NJDEP #13461, NYSDOH #11699



ANALYTICAL DATA REPORT  
Fort Monmouth Environmental Laboratory  
ENVIRONMENTAL DIVISION  
Fort Monmouth, New Jersey  
PROJECT: IJO# 100004

## Bldg. 2023

| Field Sample Location  | Laboratory Sample ID# | Matrix   | Date and Time of Collection | Date Received |
|------------------------|-----------------------|----------|-----------------------------|---------------|
| 2023-A West End 6-6.5' | 5100.01               | Soil     | 13-Jan-00 15:00             | 01/13/00      |
| 2023-B East End 6.5-7' | 5100.02               | Soil     | 13-Jan-00 15:20             | 01/13/00      |
| 2023-C Piping 2-2.5'   | 5100.03               | Soil     | 13-Jan-00 15:40             | 01/13/00      |
| 2023-D Duplicate       | 5100.04               | Soil     | 13-Jan-00 15:00             | 01/13/00      |
| Trip Blank             | 5100.05               | Methanol | 13-Jan-00                   | 01/13/00      |

ANALYSIS:  
FORT MONMOUTH ENVIRONMENTAL LAB  
TPHC, %SOLIDS

ENCLOSURE:  
CHAIN OF CUSTODY  
RESULTS

  
Daniel Wright/Date  
Laboratory Director

1-27-00

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## **Method Summary**

### **NJDEP Method OQA-QAM-025-10/97**

#### **Gas Chromatographic Determination of Total Petroleum Hydrocarbons in Soil**

Fifteen grams (15g)(wet weight) of a soil sample is added to a 125 mL acid cleaned, solvent rinsed, capped Erlenmeyer flask. 15g anhydrous sodium sulfate is added to dry sample. Surrogate standard spiking solution is then added to the flask.

Twenty five milliliters(25mL) Methylene Chloride is added to the flask and it is secured on a orbital shaker table. The agitation rate is set to 400rpm and the sample is shaken for 30 minutes. The flask is the removed from the table and the particulate matter is allowed to settle. The extract is transferred to a Teflon capped vial. A second 25mL of Methylene Chloride is added to the flask and shaken for an additional 30 minutes. The flask is again removed and allowed to settle. The extracts are combined in the vial then transferred to a 1mL autosampler vial.

The extract is then injected directly into a GC-FID for analysis. The sample is analyzed for petroleum hydrocarbons covering a range of C8-C42 including pristane and phytane. Total Petroleum Hydrocarbon concentration is determined by integrating between 5 minutes and 22 minutes. The baseline is established by starting the integration after the end of the solvent peak and stopping after the last peak.

The final concentration of Total Petroleum Hydrocarbons is calculated using percent solid, sample weight and concentration.

000001

## TPHC Conformance/Non-conformance Summary Report

- |                                                                                                                                                                                              | Indicate<br>Yes, No, N/A |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------|
| 1. Method Detection Limits provided.                                                                                                                                                         | <u>yes</u>               |
| 2. Method Blank Contamination -- If yes, list the sample and the corresponding concentrations in each blank.<br>_____<br>_____                                                               | <u>NO</u>                |
| 3. Matrix Spike Results Summary Meet Criteria<br>(If not met, list the sample and corresponding recovery which falls outside the acceptable range).<br>_____<br>_____                        | <u>yes</u>               |
| 4. Duplicate Results Summary Meet Criteria<br>(If not met, list the sample and corresponding recovery which falls outside the acceptable range).<br><u>MSD 5086.04 Low at 72.7%</u><br>_____ | <u>NO</u>                |
| 5. IR Spectra submitted for standards, blanks and samples.                                                                                                                                   | <u>NA</u>                |
| 6. Chromatograms submitted for standards, blanks and samples if GC fingerprinting was conducted.                                                                                             | <u>yes</u>               |
| 7. Analysis holding time met.<br>(If not met, list number of days exceeded for each sample).<br>_____<br>_____                                                                               | <u>yes</u>               |

Additional comments: \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

  
\_\_\_\_\_  
Laboratory Manager

1-27-00  
\_\_\_\_\_  
Date

000002



Bldg. 173, SELFM-PW-EV, Fort Monmouth, NJ 07703

Tel (732)532-4359 Fax (732)532-6263 EMail:appleby@mail.monmouth.army.mil

**NJDEP Certification #13461**

## Chain of Custody Record

| Customer: Dinker Desai                                                                                                       |                            |                                                |                                            | Project No: |                          |
|------------------------------------------------------------------------------------------------------------------------------|----------------------------|------------------------------------------------|--------------------------------------------|-------------|--------------------------|
| Phone #: X21475                                                                                                              |                            |                                                |                                            |             |                          |
| ( )DERA (X)OMA UST Assessment                                                                                                |                            |                                                |                                            | UST#        |                          |
| Analysis Parameters                                                                                                          |                            |                                                |                                            |             |                          |
| Comments:<br>*= Samples Kept <4 Celsius<br><br>Remarks / Preservation Method                                                 |                            |                                                |                                            |             |                          |
| Samplers Name / Company : Frank Accorsi/TVS                                                                                  | Sample #                   | # bottles                                      | % SOLIDS                                   | VOA+10      | PID Reading              |
| Lab Sample ID.                                                                                                               | Sample Location            | Date                                           | Time                                       | Type        | bottles                  |
| 5100 .01                                                                                                                     | 2023-A WEST END 6-6.5      | 1-13-00                                        | 1500                                       | SOIL        | 2                        |
| 5100 .02                                                                                                                     | 2023-B EAST END 8.5-9      |                                                | 1520                                       |             | 2                        |
| 5100 .03                                                                                                                     | 2023-C PIPING 2-2.5        |                                                | 1540                                       |             | 2                        |
| 5100 .04                                                                                                                     | 2023-D DUPLICATE           |                                                | 1500                                       |             | 2                        |
| 5100 .05                                                                                                                     | TRIP BLANK                 |                                                | -                                          | AQ.         | 1                        |
| OVM sn#580U-64455.343 was calibrated with zero air & w/ 245 ppm Isobutylene read 247 ppm. 1350 1-13-00 (time/date & initial) |                            |                                                |                                            |             |                          |
| Relinquished by (signature):<br><i>[Signature]</i>                                                                           | Date/Time:<br>1-13-00 1600 | Received by (signature):<br><i>[Signature]</i> | Relinquished by (signature):               | Date/Time:  | Received by (signature): |
| Relinquished by (signature):                                                                                                 | Date/Time:                 | Received by (signature):                       | Relinquished by (signature):               | Date/Time:  | Received by (signature): |
| Report Type: ( ) Full, ( ) Reduced, (X) Standard, ( ) Screen / non-certified                                                 |                            |                                                | Dedicated Sampling Tools Used              |             |                          |
| Turnaround time: ( ) Standard 2 wks, (X) Rush Days, ( ) ASAP Verbal Hrs.                                                     |                            |                                                | All sample points have been GPS? YES NO NA |             |                          |

**Report of Analysis**  
**U.S.Army, Fort Monmouth Environmental Laboratory**  
**NJDEP Certification # 13461**

**Client :** U.S. Army  
 DPW. SELFM-PW-EV  
 Bldg. 173  
 Ft. Monmouth, NJ 07703

**Project # :** 5100  
**Location :** Bldg.2023  
**UST Reg. # :**

**Analysis :** OQA-QAM-025  
**Matrix :** Soil  
**Inst. ID. :** GC TPHC INST. #1  
**Column Type :** RTX-5, 0.32mm ID, 30M  
**Injection Volume :** 1uL

**Date Received :** 13-Jan-00  
**Date Extracted :** 14-Jan-00  
**Extraction Method :** Shake  
**Analysis Complete :** 14-Jan-00  
**Analyst :** B.Patel

| Sample       | Field ID | Dilution Factor | Weight (g) | % Solid | MDL (mg/kg) | TPHC Result (mg/kg) |
|--------------|----------|-----------------|------------|---------|-------------|---------------------|
| 5100.01      | 2023-A   | 1.00            | 15.12      | 92.75   | 168         | ND                  |
| 5100.02      | 2023-B   | 1.00            | 15.09      | 88.01   | 177         | ND                  |
| 5100.03      | 2023-C   | 1.00            | 15.43      | 87.14   | 175         | ND                  |
| 5100.04      | 2023-D   | 1.00            | 15.16      | 89.85   | 173         | ND                  |
|              |          |                 |            |         |             |                     |
|              |          |                 |            |         |             |                     |
|              |          |                 |            |         |             |                     |
|              |          |                 |            |         |             |                     |
|              |          |                 |            |         |             |                     |
|              |          |                 |            |         |             |                     |
|              |          |                 |            |         |             |                     |
|              |          |                 |            |         |             |                     |
|              |          |                 |            |         |             |                     |
|              |          |                 |            |         |             |                     |
|              |          |                 |            |         |             |                     |
|              |          |                 |            |         |             |                     |
|              |          |                 |            |         |             |                     |
|              |          |                 |            |         |             |                     |
| METHOD BLANK | TBLK309  | 1.00            | 15.00      | 100.00  | 157         | ND                  |

ND = Not Detected

MDL = Method Detection Limit

  
 Daniel K. Wright  
 Laboratory Director

000004

## LABORATORY DELIVERABLES CHECKLIST AND NON-CONFORMANCE SUMMARY

THIS FORM MUST BE COMPLETED BY THE LABORATORY OR ENVIRONMENTAL CONSULTANT  
AND ACCOMPANY ALL DATA SUBMISSIONS

The following Laboratory Deliverables checklist and Non-Conformance Summary shall be included in the data submission. All deviations from the accepted methodology and procedures, of performance values outside acceptable ranges shall be summarized in the Non-Conformance Summary. The Technical Requirements for Site Remediation, effective June 7, 1993, provides further details. The document shall be bound and paginated, contain a table of contents, and all pages shall be legible. Incomplete packages will be returned or held without review until the data package is completed.

It is recommended that the analytical results summary sheets listing all targeted and non-targeted compounds with the method detection limits, practical quantitation limits, and the laboratory and/or sample numbers be included in one section of the data package and in the main body of the report.

- |                                                                                                              |                                     |
|--------------------------------------------------------------------------------------------------------------|-------------------------------------|
| 1. Cover page, Title Page listing Lab Certification #, facility name and address, & date of report submitted | <input checked="" type="checkbox"/> |
| 2. Table of Contents submitted                                                                               | <input checked="" type="checkbox"/> |
| 3. Summary Sheets listing analytical results for all targeted and non-targeted compounds submitted           | <input checked="" type="checkbox"/> |
| 4. Document paginated and legible                                                                            | <input checked="" type="checkbox"/> |
| 5. Chain of Custody submitted                                                                                | <input checked="" type="checkbox"/> |
| 6. Samples submitted to lab within 48 hours of sample collection                                             | <input checked="" type="checkbox"/> |
| 7. Methodology Summary submitted                                                                             | <input checked="" type="checkbox"/> |
| 8. Laboratory Chronicle and Holding Time Check submitted                                                     | <input checked="" type="checkbox"/> |
| 9. Results submitted on a dry weight basis                                                                   | <input checked="" type="checkbox"/> |
| 10. Method Detection Limits submitted                                                                        | <input checked="" type="checkbox"/> |
| 11. Lab certified by NJDEP for parameters of appropriate category of parameters or a member of the USEPA CLP | <input checked="" type="checkbox"/> |

Laboratory Manager or Environmental Consultant's Signature

Date 1/27/00

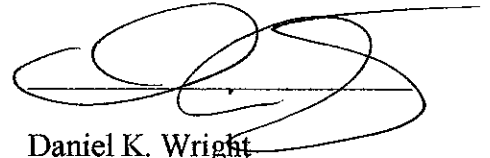
Laboratory Certification #13461

\*Refer to NJAC 7:26E - Appendix A, Section IV - Reduced Data Deliverables - Non-USEPA/CLP  
Methods for further guidance.

000002

## **Laboratory Authentication Statement**

I certify under penalty of law, where applicable, that this laboratory meets the Laboratory Performance Standards and Quality Control requirements specified in N.J.A.C. 7:18 and 40 CFR Part 136 for Water and Wastewater Analyses and SW-846 for Solid Waste Analysis. I have personally examined the information contained in this report and to the best of my knowledge, I believe that the submitted information is true, accurate, complete and meets the above referenced standards where applicable. I am aware that there are significant penalties for purposefully submitting falsified information, including the possibility of a fine and imprisonment.



Daniel K. Wright  
Laboratory Manager

000023

**Attachment E**  
**UST 2024 Closure Report**

**U.S. Army Garrison**  
Fort Monmouth, New Jersey

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

***Charles Wood – Building 2024***

---

**NJDEP UST Registration No.: 192486-5**  
**UST No.: 192486-5**

**September 2010**



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

**CHARLES WOOD – BUILDING 2024  
NJDEP UST REGISTRATION NO.: 192486-5**

**SEPTEMBER 2010**

**PROJECT NO.: 10-24949**

**PREPARED FOR:**

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

**PREPARED BY:**

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

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## EXECUTIVE SUMMARY

### UST Closure

On January 19, 2000, a fiberglass wrapped plastic 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. Installed in 1985, the tank was located adjacent to Building 2024 in the Charles Wood area. UST No.: 192486-5 was a 550-gallon, FRP, No. 2 fuel oil tank. The tank with all associated piping was present at the time of removal. 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, of which none were found. No petroleum odors or stained soils were observed in the soils surrounding the tanks.

Closure soil samples were collected after the removal of the UST. Closure samples 2024-A and 2024-B were collected from a total of two (2) locations along the UST bottom of the excavation for the UST No.: 192486-5. Closure sample 2024-C was collected from a location along the UST piping. A duplicate of sample 2024-A was collected. All samples were analyzed for total petroleum hydrocarbons (TPH). Groundwater was not encountered in the bottom of the excavation.

### Findings

The closure soil samples collected from the UST excavation associated UST No.: 192486-5 contained TPH concentrations below the NJDEP health based criterion of 10,000 milligrams per kilogram (mg/kg) for total organic contaminants (N.J.A.C. 7:26E and revisions dated February 3, 1994). All soil samples, including the duplicate, contained a TPH concentration of Not Detected.

### Conclusions and Recommendations

Based on the closure soil sampling results, soils with TPH concentrations exceeding the NJDEP health based criterion of 10,000 mg/kg for total organic contaminants (N.J.A.C. 7:26E and revisions dated February 3, 1994) are not present in the former location of the UST.

**No Further Action** is proposed in regard to the closure and site assessment of UST No.: 192486-5 at Building 2024.

## **1.0 UNDERGROUND STORAGE TANK DECOMMISSIONING ACTIVITIES**

### **1.1 OVERVIEW**

One underground storage tank (UST), New Jersey Department of Environmental Protection (NJDEP) Registration No.: 192486-5 was closed at Building 2024 of the Charles Wood area at U.S. Army Garrison, Fort Monmouth, New Jersey. Refer to site location maps on Figure 1 & 2. This report presents the results of the implementation of the Directorate of the Public Work's UST Management Plan, March 1996. Installed in 1985, the UST was a 550-gallon, FRP, containing No. 2 fuel oil for residential use. It was removed on January 19, 2000.

Decommissioning activities for UST No.: 192486-5 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 Site 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)*.

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 UST decommissioning activities. Section 2 describes the site investigation activities. Conclusions and recommendations are presented in Section 3 of this report.

### **1.2 SITE DESCRIPTION**

Building 2024 (Megill Drive) is located in the Charles Wood area of Fort Monmouth, as shown on Figure 1 & 2. UST No.: 192486-5 and associated piping were located adjacent to the building, as shown on Figure 3.

#### **1.2.1 Geological/Hydrogeological Setting**

The following is a description of the geological/hydrogeological setting of Bldg. 2024. 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 Charles Wood 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 (Zapeczka, 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 encrusted (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 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

Fort Monmouth has been an operational military facility for in excess of ninety (90) years; and in many areas of Charles Wood, human activities have completely transformed the topography. Currently, 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 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 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 Charles Wood 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-ionizer detector: Thermo Instruments Organic Vapor Monitor (OVM) – Model #580-B. The individual ascertained if the area was properly vented to render the area safe, as defined by OSHA. All work areas were properly vented to insure that there were no contaminants present in the breathing zone above permissible exposure limits (PEL’s).

### **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 great regard to safety and health and the 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.

- 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.
- 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 UST. The tank was completely empty and contained no liquids prior to removal from the ground.

After the UST was removed from the excavation, it was staged on an impervious surface, labeled and examined for holes. The Subsurface Evaluator observed no holes in the tank during the inspection. Soils surrounding the UST were screened visually and with an OVM for evidence of contamination. Soil staining or petroleum hydrocarbons were not observed.

### **1.5 UNDERGROUND STORAGE TANK DECOMMISSIONING AND DISPOSAL**

Subsequent to disposal, the UST was purged with air to remove vapors prior to cutting. A 4 feet by 3 feet access hole was made in the UST using a pneumatic ripper gun with a non-sparking bit. The UST was cleaned first with rubber squeegees and adsorbent material broomed on the sidewalls and bottom. The adsorbent material was then drummed and subsequently put 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 for disposal in compliance with all applicable regulations and laws. The UST disposal certification, along with backfilling authorization, is included in Appendix B.

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

If available, photographic documentation of the UST is included in Appendix C.

## **2.0 SITE INVESTIGATION ACTIVITIES**

### **2.1 OVERVIEW**

The Site Investigation was managed by U.S. Army DPW personnel. All analyses were performed and reported by Fort Monmouth Environmental Testing Laboratory, a NJDEP-certified testing laboratory. All sampling was performed by a NJDEP Certified Subsurface Evaluator according to the methods described in the NJDEP *Field Sampling Procedures Manual* (1992). Sampling frequency and parameters analyzed complied with the NJDEP document *Technical Requirements for Site Remediation*, 7:26E-3.9 (June 7, 1993) which was the applicable regulation at the date of the closure. All records of the Site Investigation activities are maintained by the Fort Monmouth DPW Environmental Office.

The following Parties participated in Closure and Site Investigation Activities.

- Ft. Monmouth Directorate of Public Works-Environmental Division  
Contact Person: Joseph Fallon  
Phone Number: (732) 532-6223
- Subsurface Evaluator: Frank Accorsi  
Employer: TECOM-Vinnell Services, Inc. (TVS)  
Phone Number: (732) 532-5241  
NJDEP License No.: 0010042  
(TVS)NJDEP License No.: US252302
- Analytical Laboratory: Fort Monmouth Environmental Testing Laboratory  
Contact Person: Dan Wright  
Phone Number: (732) 532-4359  
NJDEP Laboratory Certification No.: 13461

### **2.2 FIELD SCREENING/MONITORING**

Field screening was performed by a NJDEP certified Subsurface Evaluator using an OVM and visual observations to identify potentially contaminated material, of which none were found.

### **2.3 SOIL SAMPLING**

On January 19, 2000, closure soil samples were collected after the removal of the UST. Closure samples 2024-A and 2024-B were collected from a total of two (2) locations along the UST bottom of the excavation for the UST No.: 192486-5. Closure sample 2024-C was collected from a location along the UST piping. A duplicate of sample 2024-A was collected.

Refer to soil sampling location map in Figure 3. All samples were analyzed for total petroleum hydrocarbons (TPH). Groundwater was not encountered in the excavation.

The site assessment was performed by TVS personnel in accordance with the NJDEP *Technical Requirements for Site Remediation* and the NJDEP *Field Sampling Procedures Manual*. A summary of sampling activities including parameters analyzed is provided on Table 1. The closure soil samples were collected. 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

Closure soil samples were collected from a total of three locations (which included the duplicate) on January 19, 2000 to evaluate soil conditions following removal of the UST and piping. All samples were analyzed for TPH. The closure soil sample results were compared to the NJDEP health based criterion of 10,000 mg/kg for total organic contaminants (*N.J.A.C. 7:26D* and revisions dated February 3, 1994). A summary of the analytical results and comparison to the NJDEP soil cleanup criteria is provided on Table 2. The analytical data package, including associated quality control data, is provided in Appendix D.

Closure soil samples collected on January 19, 2000 from the UST site excavation contained concentrations of TPH below the NJDEP soil cleanup criteria.

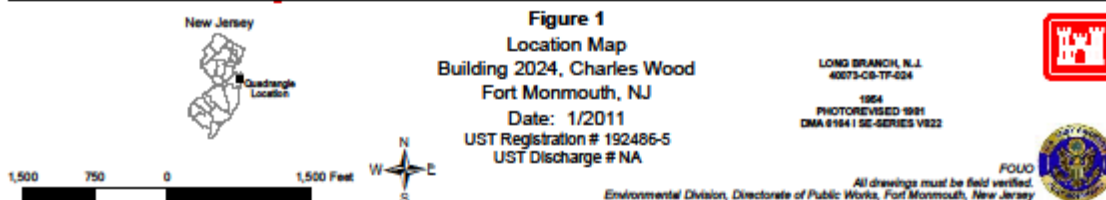
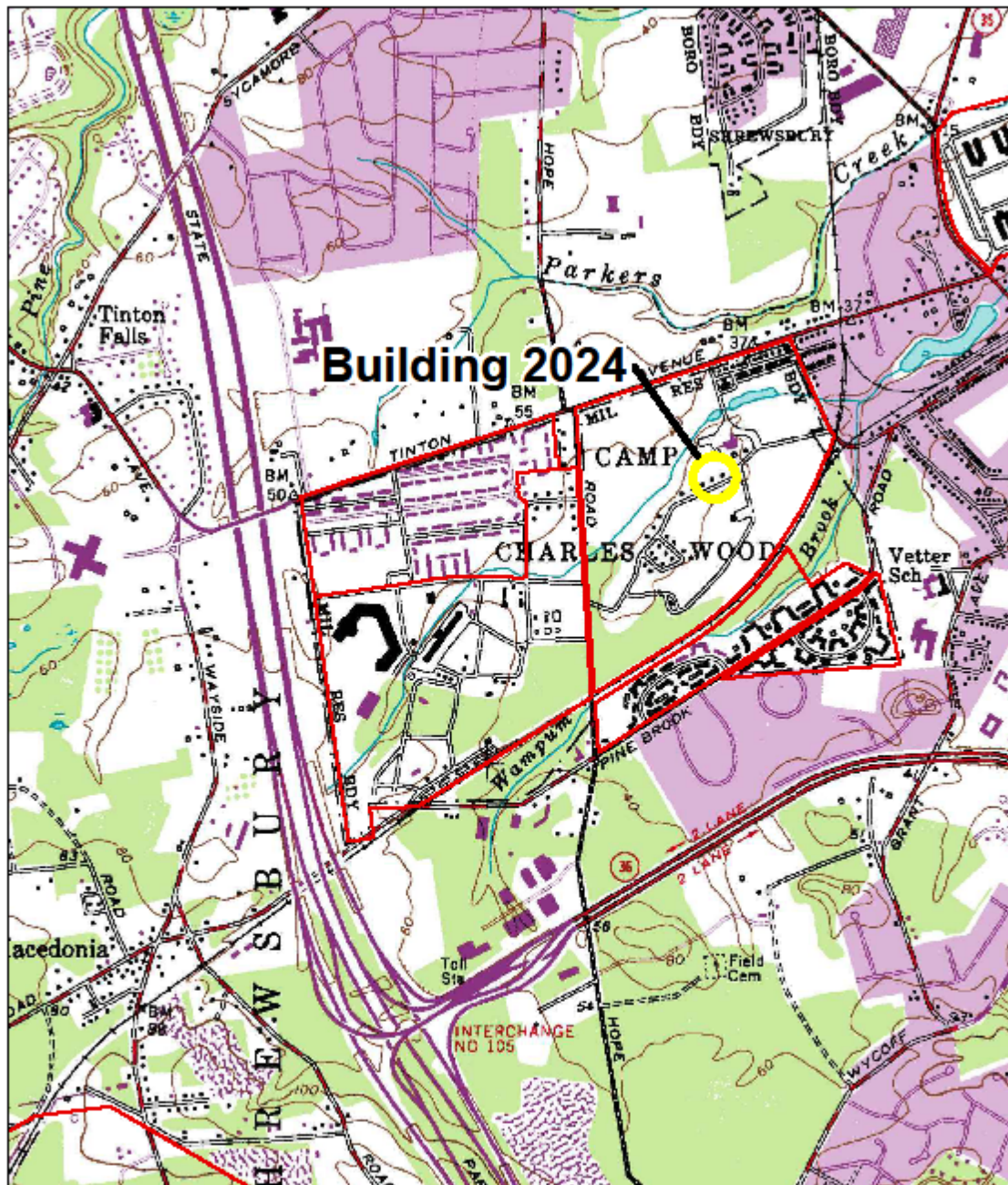
#### 3.2 CONCLUSIONS AND RECOMMENDATIONS

The analytical results for all of closure soil samples collected from the UST closure excavation at UST No.: 192486-5 were Not Detected for total petroleum hydrocarbons.

Based on the closure soil sampling results, soils with TPH concentrations exceeding the NJDEP soil cleanup criterion for total organic contaminants of 10,000 mg/kg are not present in the location of former UST No.: 192486-5.

**No Further Action** is proposed in regard to the closure and site investigation of UST No.: 192486-5 at Building 2024.

# FIGURES





**Figure 2**  
 Location Map  
 Building 2024, Charles Wood Area  
 Fort Monmouth, NJ  
 Date: 1/2011  
 UST Registration # 192486-S  
 UST Discharge # NA





**Legend**  
 [Grey Box] UST  
 [Cross-hatch Box] UST Excavation Limits  
 [Blue Dot with X] Soil Sample - 1/19/2000

10 5 0 10 Feet



**Figure 3**  
 Soil Sampling Location Map  
 Building 2024, Charles Wood Area  
 Fort Monmouth, NJ  
 Date: 1/2011  
 UST Registration # 192486-5  
 UST Discharge # NA



*All drawings must be field verified.*  
 Environmental Division, Directorate of Public Works, Fort Monmouth, New Jersey



# TABLES

# **TABLE 1**

## **SUMMARY OF LABORATORY ANALYSIS** **FT. MONMOUTH, BUILDING 2024, UST No.: 192486-5** **19 January 2000**

| <b>SAMPLE ID</b> | <b>LABORATORY SAMPLE ID</b> | <b>SAMPLE DATE</b> | <b>SAMPLE MATRIX</b> | <b>ANALYTICAL PARAMETER</b> | <b>ANALYTICAL METHOD</b> |
|------------------|-----------------------------|--------------------|----------------------|-----------------------------|--------------------------|
|                  |                             |                    |                      |                             |                          |
| <b>2024-A</b>    | 5107.01                     | 19 Jan-00          | SOIL                 | TPH                         | OQA-QAM-25               |
| <b>2024-B</b>    | 5107.02                     | 19-Jan-00          | SOIL                 | TPH                         | OQA-QAM-25               |
| <b>2024-C</b>    | 5107.03                     | 19-Jan-00          | SOIL                 | TPH                         | OQA-QAM-25               |
| <b>2024-D</b>    | 5107.04                     | 19-Jan-00          | SOIL                 | TPH                         | OQA-QAM-25               |

### ABBREVIATIONS:

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

## **TABLE 2**

### **SUMMARY OF LABORATORY ANALYTICAL RESULTS**

**FT. MONMOUTH, BUILDING 2024, UST No.: 192486-5**

**19 January 2000**

#### **TOTAL PETROLEUM HYDROCARBONS**

| <b>SAMPLE ID</b> | <b>LABORATORY<br/>SAMPLE ID</b> | <b>SAMPLE LOCATION</b> | <b>SAMPLE<br/>DEPTH</b> | <b>MATRIX</b> | <b>TPH<br/>RESULT S</b> |
|------------------|---------------------------------|------------------------|-------------------------|---------------|-------------------------|
|                  |                                 |                        | <b>(in feet)</b>        |               | <b>mg/kg</b>            |
| <b>2024-A</b>    | 5107.01                         | EAST END               | 6.5-7.0                 | Soil          | ND                      |
| <b>2024-B</b>    | 5107.02                         | WEST END               | 6.5-7.0                 | Soil          | ND                      |
| <b>2024-C</b>    | 5107.03                         | PIPING                 | 1.5-2.0                 | Soil          | ND                      |
| <b>2024-D</b>    | 5107.04                         | DUPLICATE-EAST END     | 6.5-7.0                 | Soil          | ND                      |

#### ABBREVIATIONS:

mg/kg = Milligrams Per Kilogram = parts per million

ND = Compound Not Detected

Gray shading indicates exceedance of NJDEP health based criterion of 10,000 ppm total organic contaminants

## **APPENDIX A**

### **CERTIFICATIONS** **(NOT AVAILABLE)**

## **APPENDIX B**

### **UST DISPOSAL CERTIFICATE**



**DEPARTMENT OF THE ARMY**  
Headquarters, U.S. Army Garrison Fort Monmouth  
Fort Monmouth, New Jersey 07703 - 5101



REPLY TO  
ATTENTION OF  
Directorate of Public Works

MAR 31 2000

Marpal Disposal Company, Inc.  
P.O. Box 188  
Lincroft, New Jersey 07738

Re: Non-Hazardous Waste Disposal  
Contract No. DAAB07-96-C-8252  
Location: Bldg. 166  
Roll-off container No. 2065  
Size: 30 cubic yards  
USTs from Bldgs: 2022, 2023, 2024, 2025, 2026, 2027, 2028, 2029,  
2030, 2031, 2032, 2033, 2034, 2035, 2036, and 2037

Dear Sirs:

I certify that the above referenced 30 cubic yard roll-off container provided by Marpal, Inc. contains only crushed fiberglass underground storage tanks removed from residential buildings at Fort Monmouth, NJ. The tanks only held No. 2 heating oil. The tanks were cleaned in accordance with acceptable industry standards and NJDEP protocol and then crushed. No free liquids are present in the container.

If you should require any additional information or help at this time, please contact Mr. Dinker Desai, Environmental Engineer, at (732) 532-1475.

Sincerely,

James Ott,  
Director, Public Works

Attachments: None

U.S. ARMY FORT MONMOUTH  
UST DATABASE INPUT FORM

CS

SELEM-EH-EV

DATE: 11/15/94 BUILDING #: 2024

NJDEPE REG. #: 192486 UST #: 5

PRODUCT: #2, #6, DIESEL, GASOLINE, OTHER: \_\_\_\_\_

STATUS: IN USE, NOT IN USE AS OF 11/15/94

REASON NOT IN USE: GASIFICATION, LEAKER, DEMO

GENERAL COMMENTS:

UST PRODUCT REMOVED: DATE: 11/15/94

CONTRACTOR: SERVAIR P.O.L. T. Smythe

MANIFEST #: NONE

COMMENTS: 50 GALS WASTE IN TANK

269 GALS TO BLDG 2700

NJDEPE DISCHARGE TO ENVIRONMENT NOTIFICATION  
(609) 292-7172:

CALLER NAME: \_\_\_\_\_

DATE: \_\_\_\_\_ TIME: \_\_\_\_\_

NJDEPE CASE NUMBER: \_\_\_\_\_

COMMENTS: 1

ATTACHMENTS (COPIES): HAZ-MAT MANIFEST,  
LAND BAN SERVICE ORDER PURCHASE REQ  
SPILL REPORT

SUBMITTED BY: \_\_\_\_\_

SIGNATURE: \_\_\_\_\_ DATE: \_\_\_\_\_

## **APPENDIX C**

### **PHOTO DOCUMENTATION** **(NOT AVAILABLE)**



## **APPENDIX D**

### **SOIL ANALYTICAL DATA PACKAGE**

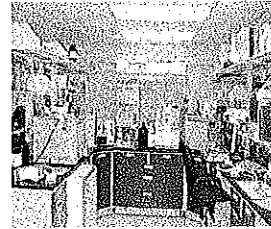
# FORT MONMOUTH ENVIRONMENTAL TESTING LABORATORY

DIRECTORATE OF PUBLIC WORKS

PHONE: (732) 532-6224 FAX: (732) 532-6263

WET-CHEM - METALS - ORGANICS - FIELD SAMPLING

CERTIFICATIONS: NJDEP #13461, NYSDOH #11699



ANALYTICAL DATA REPORT  
Fort Monmouth Environmental Laboratory  
ENVIRONMENTAL DIVISION  
Fort Monmouth, New Jersey  
PROJECT: IJO# 100004

**Bldg. 2024**

| Field Sample Location  | Laboratory Sample ID# | Matrix   | Date and Time of Collection | Date Received |
|------------------------|-----------------------|----------|-----------------------------|---------------|
| 2024-A East End 6.5-7' | 5107.01               | Soil     | 19-Jan-00 10:00             | 01/19/00      |
| 2024-B West End 6.5-7' | 5107.02               | Soil     | 19-Jan-00 10:10             | 01/19/00      |
| 2024-C Piping 1.5-2'   | 5107.03               | Soil     | 19-Jan-00 10:20             | 01/19/00      |
| 2024-D Duplicate       | 5107.04               | Soil     | 19-Jan-00 10:00             | 01/19/00      |
| Trip Blank             | 5107.05               | Methanol | 19-Jan-00                   | 01/19/00      |

ANALYSIS:  
FORT MONMOUTH ENVIRONMENTAL LAB  
TPHC, %SOLIDS

ENCLOSURE:  
CHAIN OF CUSTODY  
RESULTS

  
Daniel Wright/Date  
Laboratory Director

## **Table of Contents**

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## Method Summary

### NJDEP Method OQA-QAM-025-10/97

#### Gas Chromatographic Determination of Total Petroleum Hydrocarbons in Soil

Fifteen grams (15g)(wet weight) of a soil sample is added to a 125 mL acid cleaned, solvent rinsed, capped Erlenmeyer flask. 15g anhydrous sodium sulfate is added to dry sample. Surrogate standard spiking solution is then added to the flask.

Twenty five milliliters(25mL) Methylene Chloride is added to the flask and it is secured on a orbital shaker table. The agitation rate is set to 400rpm and the sample is shaken for 30 minutes. The flask is the removed from the table and the particulate matter is allowed to settle. The extract is transferred to a Teflon capped vial. A second 25mL of Methylene Chloride is added to the flask and shaken for an additional 30 minutes. The flask is again removed and allowed to settle. The extracts are combined in the vial then transferred to a 1mL autosampler vial.

The extract is then injected directly into a GC-FID for analysis. The sample is analyzed for petroleum hydrocarbons covering a range of C8-C42 including pristane and phytane. Total Petroleum Hydrocarbon concentration is determined by integrating between 5 minutes and 22 minutes. The baseline is established by starting the integration after the end of the solvent peak and stopping after the last peak.

The final concentration of Total Petroleum Hydrocarbons is calculated using percent solid, sample weight and concentration.

## TPHC Conformance/Non-conformance Summary Report

- |                                                                                                                                                                       | Indicate<br>Yes, No, N/A |
|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------|
| 1. Method Detection Limits provided.                                                                                                                                  | <u>yes</u>               |
| 2. Method Blank Contamination – If yes, list the sample and the corresponding concentrations in each blank.<br>_____<br>_____                                         | <u>NO</u>                |
| 3. Matrix Spike Results Summary Meet Criteria<br>(If not met, list the sample and corresponding recovery which falls outside the acceptable range).<br>_____<br>_____ | <u>yes</u>               |
| 4. Duplicate Results Summary Meet Criteria<br>(If not met, list the sample and corresponding recovery which falls outside the acceptable range).<br>_____<br>_____    | <u>yes</u>               |
| 5. IR Spectra submitted for standards, blanks and samples.                                                                                                            | <u>NA</u>                |
| 6. Chromatograms submitted for standards, blanks and samples if GC fingerprinting was conducted.                                                                      | <u>yes</u>               |
| 7. Analysis holding time met.<br>(If not met, list number of days exceeded for each sample).<br>_____<br>_____                                                        | <u>yes</u>               |

Additional comments: \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

  
\_\_\_\_\_  
Laboratory Manager

1-27-00  
\_\_\_\_\_  
Date

000002



# Fort Monmouth Environmental Testing Laboratory

Bldg. 173, SELFM-PW-EV, Fort Monmouth, NJ 07703

Tel (732)532-4359 Fax (732)532-6263 EMail:appleby@mail1.monmouth.army.mil

NJDEP Certification #13461

## Chain of Custody Record

|                                                                                                                              |                              |                             |             |                                                |                |                                                        |               |                               |                                       |                                      |     |
|------------------------------------------------------------------------------------------------------------------------------|------------------------------|-----------------------------|-------------|------------------------------------------------|----------------|--------------------------------------------------------|---------------|-------------------------------|---------------------------------------|--------------------------------------|-----|
| <b>Customer: Dinker Desai</b>                                                                                                |                              | <b>Project No: 100004</b>   |             | <b>Analysis Parameters</b>                     |                |                                                        |               |                               | <b>Comments:</b>                      |                                      |     |
| <b>Phone #: X21475</b>                                                                                                       |                              | <b>Location: BLDG. 2024</b> |             |                                                |                |                                                        |               |                               | <b>* = Samples Kept &lt;4 Celsius</b> |                                      |     |
| <b>( ) DERA (X) OMA UST Assessment</b>                                                                                       |                              | <b>UST# 192486-5</b>        |             |                                                |                |                                                        |               |                               |                                       |                                      |     |
| <b>Samplers Name / Company : Frank Accorsi/TVS</b>                                                                           |                              |                             |             | <b>Sample #</b>                                | <b>TPHC</b>    | <b>% SOLIDS</b>                                        | <b>VOA+10</b> | <b>VOA ID Number</b>          | <b>PID Reading</b>                    | <b>Remarks / Preservation Method</b> |     |
| <b>Lab Sample I.D.</b>                                                                                                       | <b>Sample Location</b>       | <b>Date</b>                 | <b>Time</b> | <b>Type</b>                                    | <b>bottles</b> |                                                        |               |                               |                                       |                                      |     |
| 5107. 01                                                                                                                     | 2024-A, EAST END<br>6.5-7 FT | 1-19-00                     | 1000        | SOIL                                           | 2              | X                                                      | X             | X                             | 521                                   | 0                                    | ICE |
| 02                                                                                                                           | 2024-B, WEST END<br>6.5-7 FT |                             | 1010        |                                                | 2              | X                                                      | X             | X                             | 522                                   | 0                                    |     |
| 03                                                                                                                           | 2024-C, PIPING<br>1.5-2 FT   |                             | 1020        |                                                | 2              | X                                                      | X             | X                             | 523                                   | 0                                    |     |
| 04                                                                                                                           | 2024-D, DUPLICATE            |                             | 1000        |                                                | 2              | X                                                      | X             | X                             | 524                                   | 0                                    |     |
| 05                                                                                                                           | TRIP BLANK                   |                             |             | AQ                                             | 1              |                                                        |               | X                             | 525                                   | 1                                    |     |
| OVM sn#580U-64455.343 was calibrated with zero air & w/ 245 ppm Isobutylene read 246 ppm. 0930 1-19-00 (time/date & initial) |                              |                             |             |                                                |                |                                                        |               |                               |                                       |                                      |     |
| Relinquished by (signature):<br><i>Frank Accorsi</i>                                                                         |                              | Date/Time:<br>1-19-00 1122  |             | Received by (signature):<br><i>[Signature]</i> |                | Relinquished by (signature):                           |               | Date/Time:                    |                                       | Received by (signature):             |     |
| Relinquished by (signature):                                                                                                 |                              | Date/Time:                  |             | Received by (signature):                       |                | Relinquished by (signature):                           |               | Date/Time:                    |                                       | Received by (signature):             |     |
| Report Type: ( ) Full, (X) Reduced, ( ) Standard, ( ) Screen / non-certified                                                 |                              |                             |             |                                                |                | Remarks:                                               |               | Dedicated Sampling Tools Used |                                       |                                      |     |
| Turnaround time: ( ) Standard 2 wks, ( ) Rush 2 Days, ( ) ASAP Verbal ____ Hrs.                                              |                              |                             |             |                                                |                | All sample points have been GPS? ( ) YES ( ) NO ( ) NA |               |                               |                                       |                                      |     |

**Report of Analysis**  
**U.S.Army, Fort Monmouth Environmental Laboratory**  
**NJDEP Certification # 13461**

**Client :** U.S. Army  
DPW. SELFM-PW-EV  
Bldg. 173  
Ft. Monmouth, NJ 07703

**Project # :** 5107  
**Location :** Bldg.2024  
**UST Reg. # :**

**Analysis :** OQA-QAM-025  
**Matrix :** Soil  
**Inst. ID. :** GC TPHC INST. #1  
**Column Type :** RTX-5, 0.32mm ID, 30M  
**Injection Volume :** 1uL

**Date Received :** 19-Jan-00  
**Date Extracted :** 20-Jan-00  
**Extraction Method :** Shake  
**Analysis Complete :** 20-Jan-00  
**Analyst :** B.Patel

| Sample       | Field ID | Dilution Factor | Weight (g) | % Solid | MDL (mg/kg) | TPHC Result (mg/kg) |
|--------------|----------|-----------------|------------|---------|-------------|---------------------|
| 5107.01      | 2024-A   | 1.00            | 15.01      | 90.69   | 173         | ND                  |
| 5107.02      | 2024-B   | 1.00            | 15.29      | 91.03   | 169         | ND                  |
| 5107.03      | 2024-C   | 1.00            | 15.24      | 82.49   | 187         | ND                  |
| 5107.04      | 2024-D   | 1.00            | 15.38      | 87.63   | 174         | ND                  |
|              |          |                 |            |         |             |                     |
|              |          |                 |            |         |             |                     |
|              |          |                 |            |         |             |                     |
|              |          |                 |            |         |             |                     |
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|              |          |                 |            |         |             |                     |
|              |          |                 |            |         |             |                     |
|              |          |                 |            |         |             |                     |
| METHOD BLANK | TBLK313  | 1.00            | 15.00      | 100.00  | 157         | ND                  |

ND = Not Detected

MDL = Method Detection Limit

  
Daniel K. Wright  
Laboratory Director

000004

## LABORATORY DELIVERABLES CHECKLIST AND NON-CONFORMANCE SUMMARY

THIS FORM MUST BE COMPLETED BY THE LABORATORY OR ENVIRONMENTAL CONSULTANT  
AND ACCOMPANY ALL DATA SUBMISSIONS

The following Laboratory Deliverables checklist and Non-Conformance Summary shall be included in the data submission. All deviations from the accepted methodology and procedures, of performance values outside acceptable ranges shall be summarized in the Non-Conformance Summary. The Technical Requirements for Site Remediation, effective June 7, 1993, provides further details. The document shall be bound and paginated, contain a table of contents, and all pages shall be legible. Incomplete packages will be returned or held without review until the data package is completed.

It is recommended that the analytical results summary sheets listing all targeted and non-targeted compounds with the method detection limits, practical quantitation limits, and the laboratory and/or sample numbers be included in one section of the data package and in the main body of the report.

1. Cover page, Title Page listing Lab Certification #, facility name and address, & date of report submitted ☒
2. Table of Contents submitted ☒
3. Summary Sheets listing analytical results for all targeted and non-targeted compounds submitted ☒
4. Document paginated and legible ☒
5. Chain of Custody submitted ☒
6. Samples submitted to lab within 48 hours of sample collection ☒
7. Methodology Summary submitted ☒
8. Laboratory Chronicle and Holding Time Check submitted ☒
9. Results submitted on a dry weight basis ☒
10. Method Detection Limits submitted ☒
11. Lab certified by NJDEP for parameters of appropriate category of parameters or a member of the USEPA CLP ☒

Laboratory Manager or Environmental Consultant's Signature

Date 1/27/00

Laboratory Certification #13461

\*Refer to NJAC 7:26E - Appendix A, Section IV - Reduced Data Deliverables - Non-USEPA/CLP  
Methods for further guidance.

000021



## **Laboratory Authentication Statement**

I certify under penalty of law, where applicable, that this laboratory meets the Laboratory Performance Standards and Quality Control requirements specified in N.J.A.C. 7:18 and 40 CFR Part 136 for Water and Wastewater Analyses and SW-846 for Solid Waste Analysis. I have personally examined the information contained in this report and to the best of my knowledge, I believe that the submitted information is true, accurate, complete and meets the above referenced standards where applicable. I am aware that there are significant penalties for purposefully submitting falsified information, including the possibility of a fine and imprisonment.

A handwritten signature in black ink, consisting of a series of loops and a long horizontal stroke extending to the right.

Daniel K. Wright  
Laboratory Manager

**Attachment F**  
**UST 2025 Closure Report**

**U.S. Army Garrison**  
Fort Monmouth, New Jersey

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

*Charles Wood – Building 2025*

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**NJDEP UST Registration No.: 192486-6**  
**UST No.: 192486-6**

**September 2010**

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

**CHARLES WOOD – BUILDING 2025  
NJDEP UST REGISTRATION NO.: 192486-6**

**SEPTEMBER 2010**

**PROJECT NO.: 10-24949**

**PREPARED FOR:**

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

**PREPARED BY:**

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

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## EXECUTIVE SUMMARY

### UST Closure

On February 4, 2000, a fiberglass wrapped plastic 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. Installed in 1985, the tank was located adjacent to Building 2025 in the Charles Wood area. UST No.: 192486-6 was a 550-gallon FRP No. 2 fuel oil tank. The tank with all associated piping was present at the time of removal. 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, of which none were found. No petroleum odors or stained soils were observed in the soils surrounding the tanks.

Closure soil samples were collected after the removal of the UST. Closure samples 2025-A and 2025-B were collected from a total of two (2) locations along the UST bottom of the excavation for the UST No.: 192486-6. Closure sample 2025-C was collected from a location along the UST piping. A duplicate of sample 2025-A was collected. All samples were analyzed for total petroleum hydrocarbons (TPH). Groundwater was not encountered in the bottom of the excavation.

### Findings

The closure soil samples collected from the UST excavation associated UST No.: 192486-6 contained TPH concentrations below the NJDEP health based criterion of 10,000 milligrams per kilogram (mg/kg) for total organic contaminants (N.J.A.C. 7:26E and revisions dated February 3, 1994). Closure sample 2025-C contained a TPH concentration of 179.21 mg/kg. Closure samples 2025-A, 2025-B and duplicate sample contained TPH concentration of Not Detected.

### Conclusions and Recommendations

Based on the closure soil sampling results, soils with TPH concentrations exceeding the NJDEP health based criterion of 10,000 mg/kg for total organic contaminants (N.J.A.C. 7:26E and revisions dated February 3, 1994) are not present in the former location of the UST.

**No Further Action** is proposed in regard to the closure and site assessment of UST No.: 192486-6 at Building 2025.

## **1.0 UNDERGROUND STORAGE TANK DECOMMISSIONING ACTIVITIES**

### **1.1 OVERVIEW**

One underground storage tank (UST), New Jersey Department of Environmental Protection (NJDEP) Registration No.: 192486-6 was closed at Building 2025 of the Charles Wood area at U.S. Army Garrison, Fort Monmouth, New Jersey. Refer to site location maps on Figure 1 & 2. This report presents the results of the implementation of the Directorate of the Public Work's UST Management Plan, March 1996. Installed in 1985, the UST was a 550-gallon, FRP, containing No. 2 fuel oil for residential use. It was removed on February 4, 2000.

Decommissioning activities for UST No.: 192486-6 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 Site 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)*.

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 UST decommissioning activities. Section 2 describes the site investigation activities. Conclusions and recommendations are presented in Section 3 of this report.

### **1.2 SITE DESCRIPTION**

Building 2025 (Megill Drive) is located in the Charles Wood area of Fort Monmouth, as shown on Figure 1 & 2. UST No.: 192486-6 and associated piping were located adjacent to the building, as shown on Figure 3.

#### **1.2.1 Geological/Hydrogeological Setting**

The following is a description of the geological/hydrogeological setting of Bldg. 2025. 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 Charles Wood 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 (Zapeczka, 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 encrusted (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 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

Fort Monmouth has been an operational military facility for in excess of ninety (90) years; and in many areas of Charles Wood, human activities have completely transformed the topography. Currently, 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 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 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 Charles Wood 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-ionizer detector: Thermo Instruments Organic Vapor Monitor (OVM) – Model #580-B. The individual ascertained if the area was properly vented to render the area safe, as defined by OSHA. All work areas were properly vented to insure that there were no contaminants present in the breathing zone above permissible exposure limits (PEL's).

### **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 great regard to safety and health and the 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.

- 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.
- 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 UST. The tank was completely empty and contained no liquids prior to removal from the ground.

After the UST was removed from the excavation, it was staged on an impervious surface, labeled and examined for holes. The Subsurface Evaluator observed no holes in the tank during the inspection. Soils surrounding the UST were screened visually and with an OVM for evidence of contamination. Soil staining or petroleum hydrocarbons were not observed.

### **1.5 UNDERGROUND STORAGE TANK DECOMMISSIONING AND DISPOSAL**

Subsequent to disposal, the UST was purged with air to remove vapors prior to cutting. A 4 feet by 3 feet access hole was made in the UST using a pneumatic ripper gun with a non-sparking bit. The UST was cleaned first with rubber squeegees and adsorbent material broomed on the sidewalls and bottom. The adsorbent material was then drummed and subsequently put 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 for disposal in compliance with all applicable regulations and laws. The UST disposal certification, along with backfilling authorization, is included in Appendix B.

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

If available, photographic documentation of the UST is included in Appendix C.

## **2.0 SITE INVESTIGATION ACTIVITIES**

### **2.1 OVERVIEW**

The Site Investigation was managed by U.S. Army DPW personnel. All analyses were performed and reported by Fort Monmouth Environmental Testing Laboratory, a NJDEP-certified testing laboratory. All sampling was performed by a NJDEP Certified Subsurface Evaluator according to the methods described in the NJDEP *Field Sampling Procedures Manual* (1992). Sampling frequency and parameters analyzed complied with the NJDEP document *Technical Requirements for Site Remediation*, 7:26E-3.9 (June 7, 1993) which was the applicable regulation at the date of the closure. All records of the Site Investigation activities are maintained by the Fort Monmouth DPW Environmental Office.

The following Parties participated in Closure and Site Investigation Activities.

- Ft. Monmouth Directorate of Public Works-Environmental Division  
Contact Person: Joseph Fallon  
Phone Number: (732) 532-6223
- Subsurface Evaluator: Frank Accorsi  
Employer: TECOM-Vinnell Services, Inc. (TVS)  
Phone Number: (732) 532-5241  
NJDEP License No.: 0010042  
(TVS)NJDEP License No.: US252302
- Analytical Laboratory: Fort Monmouth Environmental Testing Laboratory  
Contact Person: Dan Wright  
Phone Number: (732) 532-4359  
NJDEP Laboratory Certification No.: 13461

### **2.2 FIELD SCREENING/MONITORING**

Field screening was performed by a NJDEP certified Subsurface Evaluator using an OVM and visual observations to identify potentially contaminated material, of which none were found.

### **2.3 SOIL SAMPLING**

On February 4, 2000, closure soil samples were collected after the removal of the UST. Closure samples 2025-A and 2025-B were collected from a total of two (2) locations along the UST bottom of the excavation for the UST No.: 192486-6. Closure sample 2025-C was collected from a location along the UST piping. A duplicate of sample 2025-A was collected. Refer to

soil sampling location map in Figure 3. All samples were analyzed for total petroleum hydrocarbons (TPH). Groundwater was not encountered in the excavation.

The site assessment was performed by TVS personnel in accordance with the NJDEP *Technical Requirements for Site Remediation* and the NJDEP *Field Sampling Procedures Manual*. A summary of sampling activities including parameters analyzed is provided on Table 1. The closure soil samples were collected. 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

Closure soil samples were collected from a total of three locations (which included the duplicate) on February 4, 2000 to evaluate soil conditions following removal of the UST and piping. All samples were analyzed for TPH. The closure soil sample results were compared to the NJDEP health based criterion of 10,000 mg/kg for total organic contaminants (*N.J.A.C. 7:26D* and revisions dated February 3, 1994). A summary of the analytical results and comparison to the NJDEP soil cleanup criteria is provided on Table 2. The analytical data package, including associated quality control data, is provided in Appendix D.

Closure soil samples collected on February 4, 2000 from the UST site excavation contained concentrations of TPH below the NJDEP soil cleanup criteria.

#### 3.2 CONCLUSIONS AND RECOMMENDATIONS

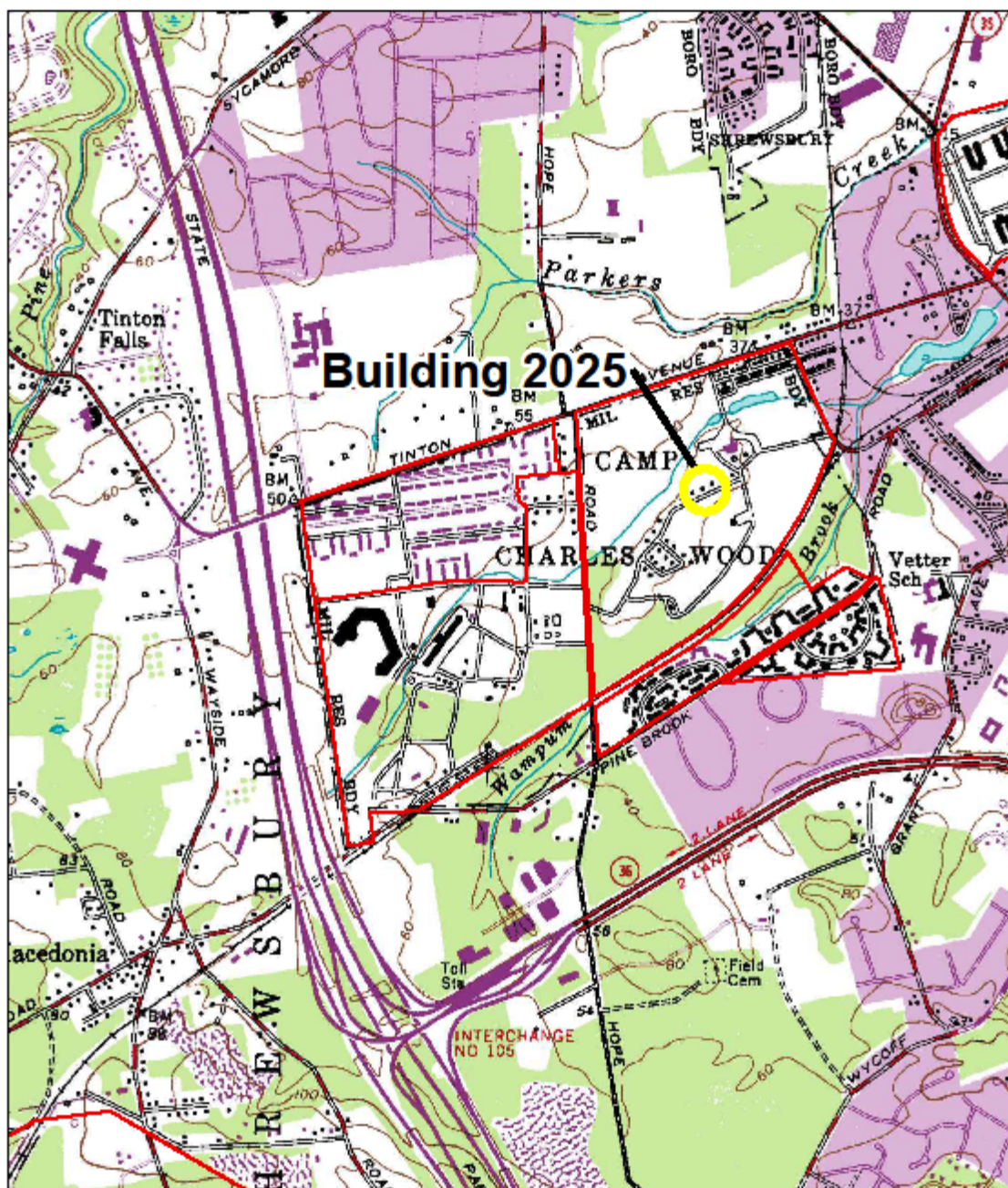
The analytical results for closure soil sample 2025-C contained a TPH concentration of 179.21 mg/kg. Closure samples 2025-A, 2025-B, and duplicate sample contained TPH concentration of Not Detected for the UST closure excavation at UST No.: 192486-6.

Based on the closure soil sampling results, soils with TPH concentrations exceeding the NJDEP soil cleanup criterion for total organic contaminants of 10,000 mg/kg are not present in the location of former UST No.: 192486-6.

**No Further Action** is proposed in regard to the closure and site investigation of UST No.: 192486-6 at Building 2025.

# FIGURES





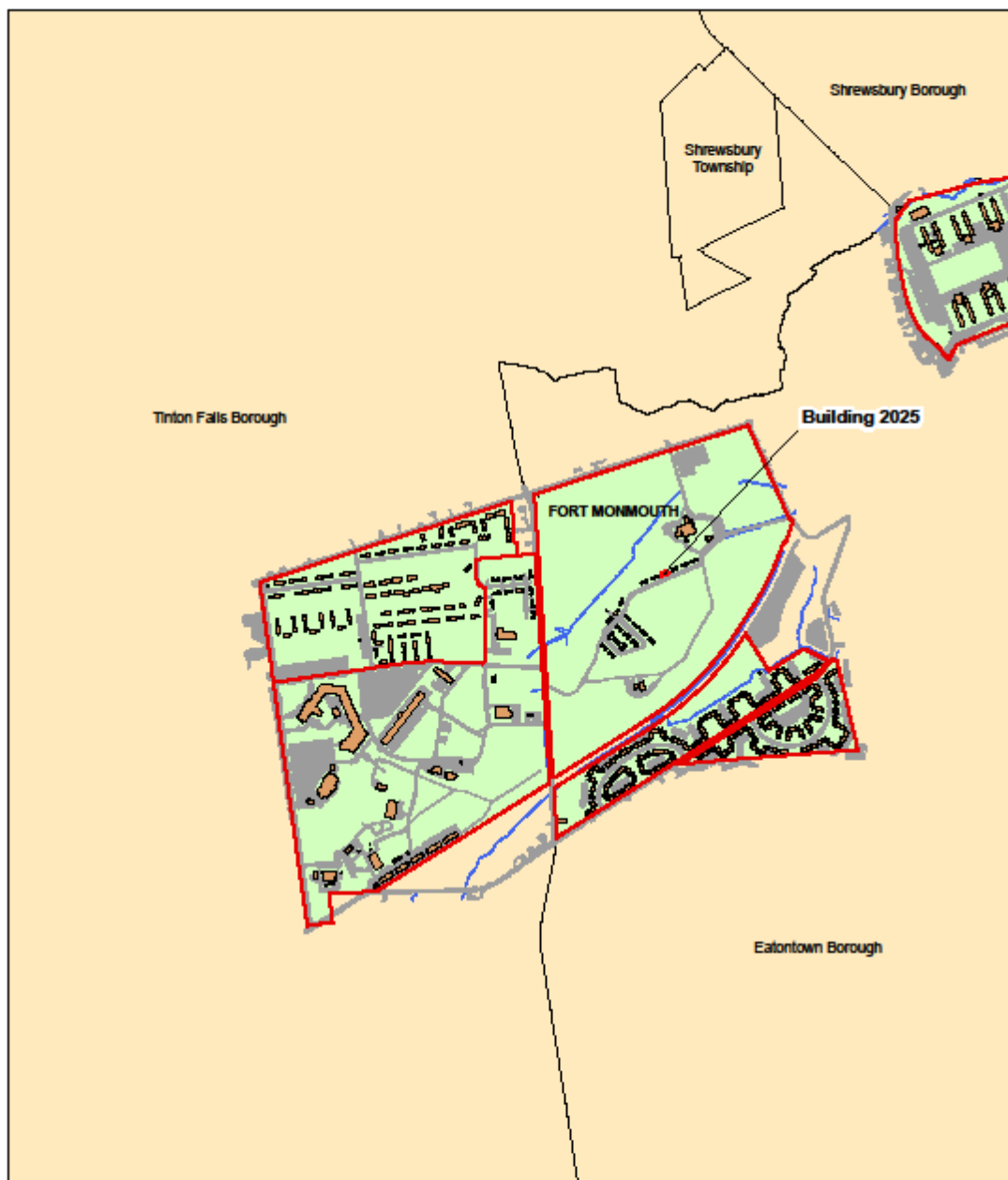
**Figure 1**  
Location Map  
Building 2025, Charles Wood  
Fort Monmouth, NJ  
Date: 1/2011  
UST Registration # 192486-6  
UST Discharge # NA

LONG BRANCH, N.J.  
40873-CB-TF-024

1984  
PHOTOREVISED 1981  
DMA 6164 | SE-SERIES V822



FOUO  
All drawings must be field verified.  
Environmental Division, Directorate of Public Works, Fort Monmouth, New Jersey



**Figure 2**  
 Location Map  
 Building 2025, Charles Wood Area  
 Fort Monmouth, NJ  
 Date: 1/2011  
 UST Registration # 192486-6  
 UST Discharge # NA



*All drawings must be field verified.*  
 Environmental Division, Directorate of Public Works, Fort Monmouth, New Jersey



**Legend**

- UST
- UST Excavation Limits
- Soil Sample - 2/4/2000

10 5 0 10 Feet



**Figure 3**  
 Soil Sampling Location Map  
 Building 2025, Charles Wood Area  
 Fort Monmouth, NJ  
 Date: 1/2011  
 UST Registration # 192486-6  
 UST Discharge # NA



*All drawings must be field verified.*  
 Environmental Division, Directorate of Public Works, Fort Monmouth, New Jersey

# TABLES

# **TABLE 1**

## **SUMMARY OF LABORATORY ANALYSIS**

**FT. MONMOUTH, BUILDING 2025, UST No.: 192486-6**

**04 February 2000**

| <b>SAMPLE<br/>ID</b>        | <b>LABORATORY<br/>SAMPLE ID</b> | <b>SAMPLE<br/>DATE</b> | <b>SAMPLE<br/>MATRIX</b> | <b>ANALYTICAL<br/>PARAMETER</b> | <b>ANALYTICAL<br/>METHOD</b> |
|-----------------------------|---------------------------------|------------------------|--------------------------|---------------------------------|------------------------------|
|                             |                                 |                        |                          |                                 |                              |
| <b>2025-A</b>               | 5144.01                         | 04-Feb-00              | SOIL                     | TPH                             | OQA-QAM-25                   |
| <b>2025-B</b>               | 5144.02                         | 04-Feb-00              | SOIL                     | TPH                             | OQA-QAM-25                   |
| <b>2025-C</b>               | 5144.03                         | 04-Feb-00              | SOIL                     | TPH                             | OQA-QAM-25                   |
| <b>2025-D<br/>Duplicate</b> | 5144.04                         | 04-Feb-00              | SOIL                     | TPH                             | OQA-QAM-25                   |

### ABBREVIATIONS:

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

## **TABLE 2**

### **SUMMARY OF LABORATORY ANALYTICAL RESULTS**

FT. MONMOUTH, BUILDING 2025, UST No.: 192486-6

04 February 2000

#### **TOTAL PETROLEUM HYDROCARBONS**

| <b>SAMPLE ID</b>            | <b>LABORATORY<br/>SAMPLE ID</b> | <b>SAMPLE LOCATION</b> | <b>SAMPLE<br/>DEPTH</b> | <b>MATRIX</b> | <b>TPH<br/>RESULT S</b> |
|-----------------------------|---------------------------------|------------------------|-------------------------|---------------|-------------------------|
|                             |                                 |                        | <b>(in feet)</b>        |               | <b>mg/kg</b>            |
| <b>2025-A</b>               | 5144.01                         | WEST END               | 6.5-7.0                 | Soil          | ND                      |
| <b>2025-B</b>               | 5144.02                         | EAST END               | 6.5-7.0                 | Soil          | ND                      |
| <b>2025-C</b>               | 5144.03                         | PIPING                 | 1.5-2.0                 | Soil          | 179.21                  |
| <b>2025-D<br/>Duplicate</b> | 5144.04                         | DUPLICATE-WEST END     | 6.5-7.0                 | Soil          | ND                      |

#### ABBREVIATIONS:

mg/kg = Milligrams Per Kilogram = parts per million

ND = Compound Not Detected

**Gray shading** indicates exceedance of NJDEP health based criterion of 10,000 ppm total organic contaminants

**APPENDIX A**

**CERTIFICATIONS**

**(NOT AVAILABLE)**

## **APPENDIX B**

### **UST DISPOSAL CERTIFICATE**



**DIRECTORATE OF PUBLIC WORKS  
FORT MONMOUTH, NEW JERSEY 07703**

Contract Management Division

SUBJECT: PWS-007, Residential UST Removal  
Contractor: TVS Inc.

RE: Backfilling of excavation,

BUILDING #: 2025 (13+15 MEGILL DRIVE)

TVS Inc.  
Field Supervisor, PWS-007  
ATTN: Brian Finch  
Building 166  
Fort Monmouth, New Jersey 07703-5000

Dear Mr. Finch:

The above referenced area has been sampled and analyzed as described in the NJDEP Regulations. The results indicate levels of petroleum contamination below the NJDEP allowable limits ~~or that the site requires further investigation outside the scope of this contract.~~ The contractor may proceed with the backfilling of the excavation with stone to groundwater and clean fill to grade as required in the above referenced contract specification.

Regards,



Mr. Dinker Desai  
Environmental Engineer  
Directorate of Public Works

CC: UST file copy



**DEPARTMENT OF THE ARMY**  
Headquarters, U.S. Army Garrison Fort Monmouth  
Fort Monmouth, New Jersey 07703 - 5101



REPLY TO  
ATTENTION OF  
Directorate of Public Works

MAR 31 2000

Marpal Disposal Company, Inc.  
P.O. Box 188  
Lincroft, New Jersey 07738

Re: Non-Hazardous Waste Disposal  
Contract No. DAAB07-96-C-8252  
Location: Bldg. 166  
Roll-off container No. 2065  
Size: 30 cubic yards  
USTs from Bldgs: 2022, 2023, 2024, 2025, 2026, 2027, 2028, 2029,  
2030, 2031, 2032, 2033, 2034, 2035, 2036, and 2037

Dear Sirs:

I certify that the above referenced 30 cubic yard roll-off container provided by Marpal, Inc. contains only crushed fiberglass underground storage tanks removed from residential buildings at Fort Monmouth, NJ. The tanks only held No. 2 heating oil. The tanks were cleaned in accordance with acceptable industry standards and NJDEP protocol and then crushed. No free liquids are present in the container.

If you should require any additional information or help at this time, please contact Mr. Dinker Desai, Environmental Engineer, at (732) 532-1475.

Sincerely,

James Ott,  
Director, Public Works

Attachments: None

## **APPENDIX C**

# **PHOTO DOCUMENTATION**

**(NOT AVAILABLE)**

## **APPENDIX D**

### **SOIL ANALYTICAL DATA PACKAGE**

# FORT MONMOUTH ENVIRONMENTAL TESTING LABORATORY

DIRECTORATE OF PUBLIC WORKS

PHONE: (732) 532-6224 FAX: (732) 532-6263

WET-CHEM - METALS - ORGANICS - FIELD SAMPLING

CERTIFICATIONS: NJDEP #13461, NYSDOH #11699



ANALYTICAL DATA REPORT  
Fort Monmouth Environmental Laboratory  
ENVIRONMENTAL DIVISION  
Fort Monmouth, New Jersey  
PROJECT: IJO# 100004

## Bldg. 2025

| Field Sample Location  | Laboratory<br>Sample ID# | Matrix | Date and Time<br>of Collection | Date Received |
|------------------------|--------------------------|--------|--------------------------------|---------------|
| 2025-A West End 6.5-7' | 5144.01                  | Soil   | 04-Feb-00 09:00                | 02/04/00      |
| 2025-B East End 6.5-7' | 5144.02                  | Soil   | 04-Feb-00 09:10                | 02/04/00      |
| 2025-C Piping 1.5-2'   | 5144.03                  | Soil   | 04-Feb-00 09:20                | 02/04/00      |
| 2025-D Duplicate       | 5144.04                  | Soil   | 04-Feb-00 09:00                | 02/04/00      |
| Trip Blank             | 5144.05                  | Soil   | 04-Feb-00                      | 02/04/00      |

ANALYSIS:  
FORT MONMOUTH ENVIRONMENTAL LAB  
TPHC, %SOLIDS

ENCLOSURE:  
CHAIN OF CUSTODY  
RESULTS

Daniel Wright/Date  
Laboratory Director

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## **Method Summary**

### **NJDEP Method OQA-QAM-025-10/97**

#### **Gas Chromatographic Determination of Total Petroleum Hydrocarbons in Soil**

Fifteen grams (15g)(wet weight) of a soil sample is added to a 125 mL acid cleaned, solvent rinsed, capped Erlenmeyer flask. 15g anhydrous sodium sulfate is added to dry sample. Surrogate standard spiking solution is then added to the flask.

Twenty five milliliters(25mL) Methylene Chloride is added to the flask and it is secured on a orbital shaker table. The agitation rate is set to 400rpm and the sample is shaken for 30 minutes. The flask is the removed from the table and the particulate matter is allowed to settle. The extract is transferred to a Teflon capped vial. A second 25mL of Methylene Chloride is added to the flask and shaken for an additional 30 minutes. The flask is again removed and allowed to settle. The extracts are combined in the vial then transferred to a 1mL autosampler vial.

The extract is then injected directly into a GC-FID for analysis. The sample is analyzed for petroleum hydrocarbons covering a range of C8-C42 including pristane and phytane. Total Petroleum Hydrocarbon concentration is determined by integrating between 5 minutes and 22 minutes. The baseline is established by starting the integration after the end of the solvent peak and stopping after the last peak.

The final concentration of Total Petroleum Hydrocarbons is calculated using percent solid, sample weight and concentration.

## TPHC Conformance/Non-conformance Summary Report

- |                                                                                                                                                                       | Indicate<br>Yes, No, N/A |
|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------|
| 1. Method Detection Limits provided.                                                                                                                                  | <u>Yes</u>               |
| 2. Method Blank Contamination -- If yes, list the sample and the corresponding concentrations in each blank.<br>_____<br>_____                                        | <u>No</u>                |
| 3. Matrix Spike Results Summary Meet Criteria<br>(If not met, list the sample and corresponding recovery which falls outside the acceptable range).<br>_____<br>_____ | <u>Yes</u>               |
| 4. Duplicate Results Summary Meet Criteria<br>(If not met, list the sample and corresponding recovery which falls outside the acceptable range).<br>_____<br>_____    | <u>Yes</u>               |
| 5. IR Spectra submitted for standards, blanks and samples.                                                                                                            | <u>NA</u>                |
| 6. Chromatograms submitted for standards, blanks and samples if GC fingerprinting was conducted.                                                                      | <u>Yes</u>               |
| 7. Analysis holding time met.<br>(If not met, list number of days exceeded for each sample).<br>_____<br>_____                                                        | <u>Yes</u>               |

Additional comments: \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

  
\_\_\_\_\_  
Laboratory Manager

2-10-00  
\_\_\_\_\_  
Date

000002





# Fort Monmouth Environmental Testing Laboratory

Bldg. 173, SELFM-PW-EV, Fort Monmouth, NJ 07703

Tel (732)532-4359 Fax (732)532-6263 EMail:appleby@mail1.monmouth.army.mil

NJDEP Certification #13461

## Chain of Custody Record

|                                                                                                                                                  |                          |                              |             |                                             |                |                                                                                                                            |          |            |               |                          |                             |                                      |
|--------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------|------------------------------|-------------|---------------------------------------------|----------------|----------------------------------------------------------------------------------------------------------------------------|----------|------------|---------------|--------------------------|-----------------------------|--------------------------------------|
| <b>Customer: Dinker Desai</b>                                                                                                                    |                          |                              |             | <b>Project No:</b> 100004                   |                | <b>Analysis Parameters</b>                                                                                                 |          |            |               |                          | <b>Comments:</b>            |                                      |
| <b>Phone #: X21475</b>                                                                                                                           |                          |                              |             | <b>Location:</b> <u>BLOG. 2025</u>          |                | TPHC                                                                                                                       | % SOLIDS | VOA+10     | VOA ID Number | PID Reading              | * = Samples Kept <4 Celsius |                                      |
| <b>( ) DERA (X) OMA UST Assessment</b>                                                                                                           |                          |                              |             | <b>UST#</b> <u>192486-6</u>                 |                |                                                                                                                            |          |            |               |                          |                             |                                      |
| <b>Samplers Name / Company : Frank Accorsi/TVS</b>                                                                                               |                          |                              |             |                                             |                | <b>Sample #</b>                                                                                                            |          |            |               |                          |                             | <b>Remarks / Preservation Method</b> |
| <b>Lab Sample I.D.</b>                                                                                                                           | <b>Sample Location</b>   | <b>Date</b>                  | <b>Time</b> | <b>Type</b>                                 | <b>bottles</b> |                                                                                                                            |          |            |               |                          |                             |                                      |
| 5144-01                                                                                                                                          | 2025-A WEST END 6.5-7 FT | 2-4-00                       | 0900        | SOIL                                        | 2              | X                                                                                                                          | X        | X          | 569           | 0                        | ICE                         |                                      |
| 02                                                                                                                                               | 2025-B EAST END 6.5-7 FT |                              | 0910        |                                             | 2              | X                                                                                                                          | X        | X          | 570           | 0                        |                             |                                      |
| 03                                                                                                                                               | 2025-C PIPING 1.5-2 FT   |                              | 0920        |                                             | 2              | X                                                                                                                          | X        | X          | 571           | 0                        |                             |                                      |
| 04                                                                                                                                               | 2025-D DUPLICATE         |                              | 0900        |                                             | 2              | X                                                                                                                          | X        | X          | 572           | 0                        |                             |                                      |
| 05                                                                                                                                               | TRIP BLANK               |                              |             | AQ.                                         | 1              |                                                                                                                            |          | X          | 573           | -                        |                             |                                      |
| OVM sn#580U-64455.343 was calibrated with zero air & w/ <u>245</u> ppm Isobutylene read <u>247</u> ppm. <u>0830 2-4-00</u> (time/date & initial) |                          |                              |             |                                             |                |                                                                                                                            |          |            |               |                          |                             |                                      |
| Relinquished by (signature): <u>Frank Accorsi</u>                                                                                                |                          | Date/Time: <u>04-00 1025</u> |             | Received by (signature): <u>[Signature]</u> |                | Relinquished by (signature):                                                                                               |          | Date/Time: |               | Received by (signature): |                             |                                      |
| Relinquished by (signature):                                                                                                                     |                          | Date/Time:                   |             | Received by (signature):                    |                | Relinquished by (signature):                                                                                               |          | Date/Time: |               | Received by (signature): |                             |                                      |
| Report Type: ( ) Full, (X) Reduced, ( ) Standard, ( ) Screen / non-certified                                                                     |                          |                              |             |                                             |                | Remarks: *<br>VOA+10 on 25% 7,1000 ppm TPH, OR HIGHEST, MIN. ONE<br>All sample points have been GPS? (X) YES ( ) NO ( ) NA |          |            |               |                          |                             |                                      |
| Turnaround time: ( ) Standard 2 wks, ( ) Rush <u>2</u> Days, ( ) ASAP Verbal <u>2</u> Hrs.                                                       |                          |                              |             |                                             |                | Dedicated Sampling Tools Used                                                                                              |          |            |               |                          |                             |                                      |

**Report of Analysis**  
**U.S.Army, Fort Monmouth Environmental Laboratory**  
**NJDEP Certification # 13461**

**Client :** U.S. Army  
 DPW. SELFM-PW-EV  
 Bldg. 173  
 Ft. Monmouth, NJ 07703

**Project # :** 5144  
**Location :** Bldg. 2025  
**UST Reg. # :** 192486-6

**Analysis :** OQA-QAM-025  
**Matrix :** Soil  
**Inst. ID. :** GC TPHC INST. #1  
**Column Type :** RTX-5, 0.32mm ID, 30M  
**Injection Volume :** 1uL

**Date Received :** 04-Feb-00  
**Date Extracted :** 07-Feb-00  
**Extraction Method :** Shake  
**Analysis Complete :** 07-Feb-00  
**Analyst :** B.Patel

| Sample       | Field ID | Dilution Factor | Weight (g) | % Solid | MDL (mg/kg) | TPHC Result (mg/kg) |
|--------------|----------|-----------------|------------|---------|-------------|---------------------|
| 5144.01      | 2025-A   | 1.00            | 15.16      | 90.29   | 172         | ND                  |
| 5144.02      | 2025-B   | 1.00            | 15.01      | 88.90   | 176         | ND                  |
| 5144.03      | 2025-C   | 1.00            | 15.14      | 86.64   | 179         | 179.21              |
| 5144.04      | 2025-D   | 1.00            | 15.30      | 88.45   | 174         | ND                  |
|              |          |                 |            |         |             |                     |
|              |          |                 |            |         |             |                     |
|              |          |                 |            |         |             |                     |
|              |          |                 |            |         |             |                     |
|              |          |                 |            |         |             |                     |
|              |          |                 |            |         |             |                     |
|              |          |                 |            |         |             |                     |
|              |          |                 |            |         |             |                     |
|              |          |                 |            |         |             |                     |
|              |          |                 |            |         |             |                     |
|              |          |                 |            |         |             |                     |
|              |          |                 |            |         |             |                     |
|              |          |                 |            |         |             |                     |
|              |          |                 |            |         |             |                     |
|              |          |                 |            |         |             |                     |
|              |          |                 |            |         |             |                     |
| METHOD BLANK | TBLK323  | 1.00            | 15.00      | 100.00  | 157         | ND                  |

ND = Not Detected  
 MDL = Method Detection Limit

  
 Daniel K. Wright  
 Laboratory Director

## LABORATORY DELIVERABLES CHECKLIST AND NON-CONFORMANCE SUMMARY

THIS FORM MUST BE COMPLETED BY THE LABORATORY OR ENVIRONMENTAL CONSULTANT  
AND ACCOMPANY ALL DATA SUBMISSIONS

The following Laboratory Deliverables checklist and Non-Conformance Summary shall be included in the data submission. All deviations from the accepted methodology and procedures, of performance values outside acceptable ranges shall be summarized in the Non-Conformance Summary. The Technical Requirements for Site Remediation, effective June 7, 1993, provides further details. The document shall be bound and paginated, contain a table of contents, and all pages shall be legible. Incomplete packages will be returned or held without review until the data package is completed.

It is recommended that the analytical results summary sheets listing all targeted and non-targeted compounds with the method detection limits, practical quantitation limits, and the laboratory and/or sample numbers be included in one section of the data package and in the main body of the report.

- |                                                                                                              |                                     |
|--------------------------------------------------------------------------------------------------------------|-------------------------------------|
| 1. Cover page, Title Page listing Lab Certification #, facility name and address, & date of report submitted | <input checked="" type="checkbox"/> |
| 2. Table of Contents submitted                                                                               | <input checked="" type="checkbox"/> |
| 3. Summary Sheets listing analytical results for all targeted and non-targeted compounds submitted           | <input checked="" type="checkbox"/> |
| 4. Document paginated and legible                                                                            | <input checked="" type="checkbox"/> |
| 5. Chain of Custody submitted                                                                                | <input checked="" type="checkbox"/> |
| 6. Samples submitted to lab within 48 hours of sample collection                                             | <input checked="" type="checkbox"/> |
| 7. Methodology Summary submitted                                                                             | <input checked="" type="checkbox"/> |
| 8. Laboratory Chronicle and Holding Time Check submitted                                                     | <input checked="" type="checkbox"/> |
| 9. Results submitted on a dry weight basis                                                                   | <input checked="" type="checkbox"/> |
| 10. Method Detection Limits submitted                                                                        | <input checked="" type="checkbox"/> |
| 11. Lab certified by NJDEP for parameters of appropriate category of parameters or a member of the USEPA CLP | <input checked="" type="checkbox"/> |

Laboratory Manager or Environmental Consultant's Signature

Date 2 / 10 / 00

Laboratory Certification #13461

\*Refer to NJAC 7:26E - Appendix A, Section IV - Reduced Data Deliverables - Non-USEPA/CLP  
Methods for further guidance.

000020

## **Laboratory Authentication Statement**

I certify under penalty of law, where applicable, that this laboratory meets the Laboratory Performance Standards and Quality Control requirements specified in N.J.A.C. 7:18 and 40 CFR Part 136 for Water and Wastewater Analyses and SW-846 for Solid Waste Analysis. I have personally examined the information contained in this report and to the best of my knowledge, I believe that the submitted information is true, accurate, complete and meets the above referenced standards where applicable. I am aware that there are significant penalties for purposefully submitting falsified information, including the possibility of a fine and imprisonment.



Daniel K. Wright  
Laboratory Manager

**Attachment G**  
**UST 2026 Closure Report**

**U.S. Army Garrison**  
Fort Monmouth, New Jersey

---

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

***Charles Wood – Building 2026***

---

**NJDEP UST Registration No.: 192486-7**  
**UST No.: 192486-7**

**September 2010**

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

**CHARLES WOOD – BUILDING 2026  
NJDEP UST REGISTRATION NO.: 192486-7**

**SEPTEMBER 2010**

**PROJECT NO.: 10-24949**

**PREPARED FOR:**

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

**PREPARED BY:**

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

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## EXECUTIVE SUMMARY

### UST Closure

On February 8, 2000, a fiberglass wrapped plastic 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. Installed in 1985, the tank was located adjacent to Building 2026 in the Charles Wood area. UST No.: 192486-7 was a 550-gallon FRP No. 2 fuel oil tank. The tank with all associated piping was present at the time of removal. 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, of which none were found. No petroleum odors or stained soils were observed in the soils surrounding the tanks.

Closure soil samples were collected after the removal of the UST. Closure samples 2026-A and 2026-B were collected from a total of two (2) locations along the UST bottom of the excavation for the UST No.: 192486-7. Closure sample 2026-C was collected from a location along the UST piping. A duplicate sample was collected. All samples were analyzed for total petroleum hydrocarbons (TPH). Groundwater was not encountered in the bottom of the excavation.

### Findings

The closure soil samples collected from the UST excavation associated UST No.: 192486-7 contained TPH concentrations below the NJDEP health based criterion of 10,000 milligrams per kilogram (mg/kg) for total organic contaminants (N.J.A.C. 7:26E and revisions dated February 3, 1994). All soil samples, including duplicate, contained a TPH concentration of Not Detected.

### Conclusions and Recommendations

Based on the closure soil sampling results, soils with TPH concentrations exceeding the NJDEP health based criterion of 10,000 mg/kg for total organic contaminants (N.J.A.C. 7:26E and revisions dated February 3, 1994) are not present in the former location of the UST.

**No Further Action** is proposed in regard to the closure and site assessment of UST No.: 192486-7 at Building 2026.

## **1.0 UNDERGROUND STORAGE TANK DECOMMISSIONING ACTIVITIES**

### **1.1 OVERVIEW**

One underground storage tank (UST), New Jersey Department of Environmental Protection (NJDEP) Registration No.: 192486-7 was closed at Building 2026 of the Charles Wood area at U.S. Army Garrison, Fort Monmouth, New Jersey. Refer to site location maps on Figure 1 & 2. This report presents the results of the implementation of the Directorate of the Public Work's UST Management Plan, March 1996. Installed in 1985, the UST was a 550-gallon, FRP, containing No.2 fuel oil for residential use. It was removed on February 8, 2000.

Decommissioning activities for UST No.: 192486-7 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 Site 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)*.

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 UST decommissioning activities. Section 2 describes the site investigation activities. Conclusions and recommendations are presented in Section 3 of this report.

### **1.2 SITE DESCRIPTION**

Building 2026 (Megill Drive) is located in the Charles Wood area of Fort Monmouth, as shown on Figure 1 & 2. UST No.: 192486-7 and associated piping were located adjacent to the building, as shown on Figure 3.

#### **1.2.1 Geological/Hydrogeological Setting**

The following is a description of the geological/hydrogeological setting of Bldg. 2026. 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 Charles Wood 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 (Zapeczka, 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 encrusted (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 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

Fort Monmouth has been an operational military facility for in excess of ninety (90) years; and in many areas of Charles Wood, human activities have completely transformed the topography. Currently, 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 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 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 Charles Wood 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-ionizer detector: Thermo Instruments Organic Vapor Monitor (OVM) – Model #580-B. The individual ascertained if the area was properly vented to render the area safe, as defined by OSHA. All work areas were properly vented to insure that there were no contaminants present in the breathing zone above permissible exposure limits (PEL’s).

### **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 great regard to safety and health and the 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.

- 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.
- 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 UST. The tank was completely empty and contained no liquids prior to removal from the ground.

After the UST was removed from the excavation, it was staged on an impervious surface, labeled and examined for holes. The Subsurface Evaluator observed no holes in the tank during the inspection. Soils surrounding the UST were screened visually and with an OVM for evidence of contamination. Soil staining or petroleum hydrocarbons were not observed.

### **1.5 UNDERGROUND STORAGE TANK DECOMMISSIONING AND DISPOSAL**

Subsequent to disposal, the UST was purged with air to remove vapors prior to cutting. A 4 feet by 3 feet access hole was made in the UST using a pneumatic ripper gun with a non-sparking bit. The UST was cleaned first with rubber squeegees and adsorbent material broomed on the sidewalls and bottom. The adsorbent material was then drummed and subsequently put 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 for disposal in compliance with all applicable regulations and laws. The UST disposal certification, along with backfilling authorization, is included in Appendix B.

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

If available, photographic documentation of the UST is included in Appendix C.



## **2.0 SITE INVESTIGATION ACTIVITIES**

### **2.1 OVERVIEW**

The Site Investigation was managed by U.S. Army DPW personnel. All analyses were performed and reported by Fort Monmouth Environmental Testing Laboratory, a NJDEP-certified testing laboratory. All sampling was performed by a NJDEP Certified Subsurface Evaluator according to the methods described in the NJDEP *Field Sampling Procedures Manual* (1992). Sampling frequency and parameters analyzed complied with the NJDEP document *Technical Requirements for Site Remediation*, 7:26E-3.9 (June 7, 1993) which was the applicable regulation at the date of the closure. All records of the Site Investigation activities are maintained by the Fort Monmouth DPW Environmental Office.

The following Parties participated in Closure and Site Investigation Activities.

- Ft. Monmouth Directorate of Public Works-Environmental Division  
Contact Person: Joseph Fallon  
Phone Number: (732) 532-6223
- Subsurface Evaluator: Frank Accorsi  
Employer: TECOM-Vinnell Services, Inc. (TVS)  
Phone Number: (732) 532-5241  
NJDEP License No.: 0010042  
(TVS)NJDEP License No.: US252302
- Analytical Laboratory: Fort Monmouth Environmental Testing Laboratory  
Contact Person: Dan Wright  
Phone Number: (732) 532-4359  
NJDEP Laboratory Certification No.: 13461

### **2.2 FIELD SCREENING/MONITORING**

Field screening was performed by a NJDEP certified Subsurface Evaluator using an OVM and visual observations to identify potentially contaminated material, of which none were found.

### **2.3 SOIL SAMPLING**

On February 8, 2000, closure soil samples were collected after the removal of the UST. Closure samples 2026-A and 2026-B were collected from a total of two (2) locations along the UST bottom of the excavation for the UST No.: 192486-7. Closure sample 2026-C was collected from a location along the UST piping. A duplicate sample, D, was also collected.

Refer to soil sampling location map in Figure 3. All samples were analyzed for total petroleum hydrocarbons (TPH). Groundwater was not encountered in the excavation.

The site assessment was performed by TVS personnel in accordance with the NJDEP *Technical Requirements for Site Remediation* and the NJDEP *Field Sampling Procedures Manual*. A summary of sampling activities including parameters analyzed is provided on Table 1. The closure soil samples were collected. 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

Closure soil samples were collected from a total of three locations (which included the duplicate) on February 8, 2000 to evaluate soil conditions following removal of the UST and piping. All samples were analyzed for TPH. The closure soil sample results were compared to the NJDEP health based criterion of 10,000 mg/kg for total organic contaminants (*N.J.A.C. 7:26D* and revisions dated February 3, 1994). A summary of the analytical results and comparison to the NJDEP soil cleanup criteria is provided on Table 2. The analytical data package, including associated quality control data, is provided in Appendix D.

Closure soil samples collected on February 8, 2000 from the UST site excavation contained concentrations of TPH below the NJDEP soil cleanup criteria.

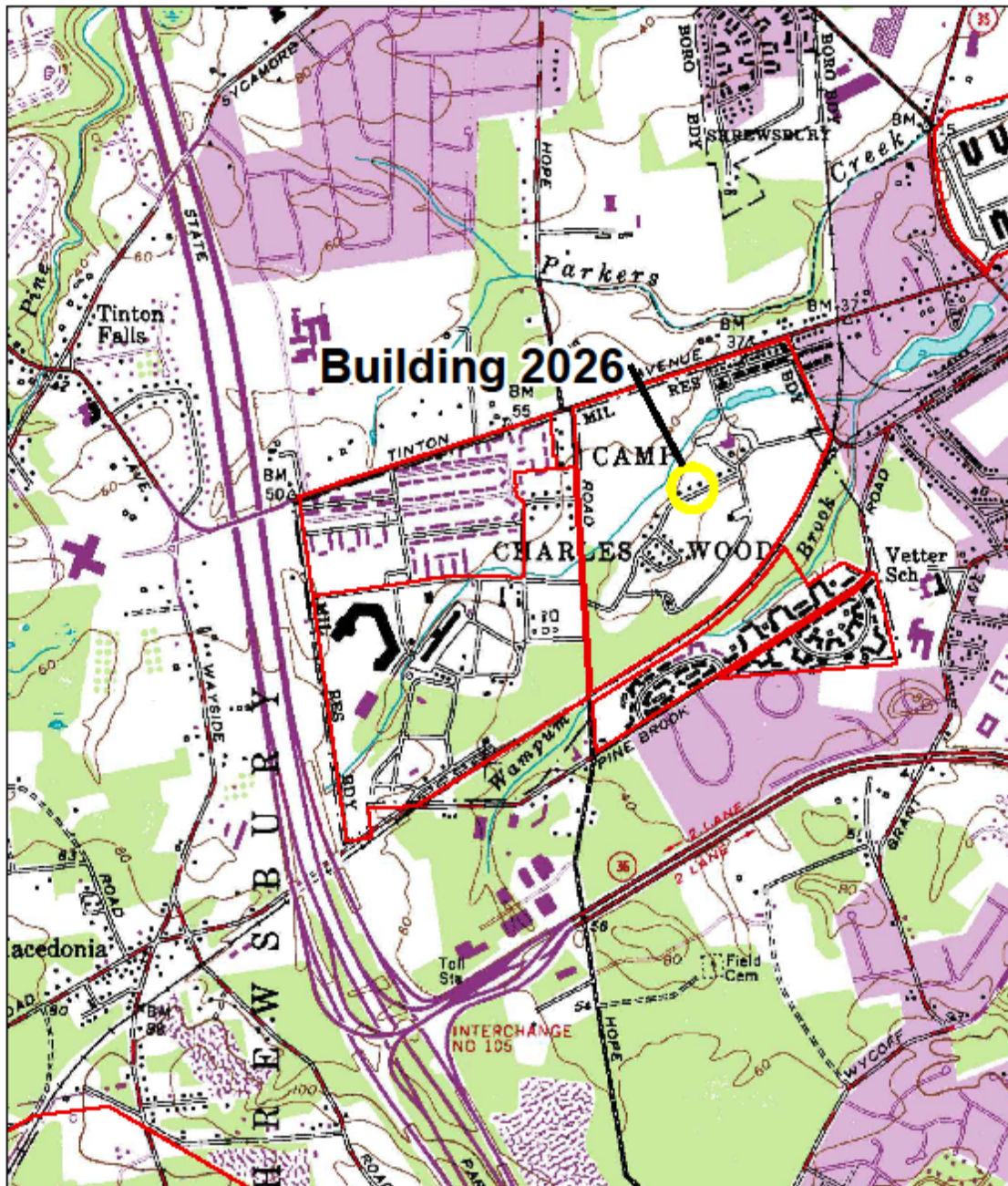
#### 3.2 CONCLUSIONS AND RECOMMENDATIONS

The analytical results for all of closure soil samples collected from the UST closure excavation at UST No.: 192486-7 were Not Detected for total petroleum hydrocarbons.

Based on the closure soil sampling results, soils with TPH concentrations exceeding the NJDEP soil cleanup criterion for total organic contaminants of 10,000 mg/kg are not present in the location of former UST No.: 192486-7.

**No Further Action** is proposed in regard to the closure and site investigation of UST No.: 192486-7 at Building 2026.

# FIGURES



**Figure 1**  
 Location Map  
 Building 2026, Charles Wood  
 Fort Monmouth, NJ  
 Date: 1/2011  
 UST Registration # 192486-7  
 UST Discharge # NA

LONG BRANCH, N.J.  
 40275-C6-TF-004  
 1984  
 PHOTO REVISSED 1991  
 DMA 91641 SC-SERIES V822



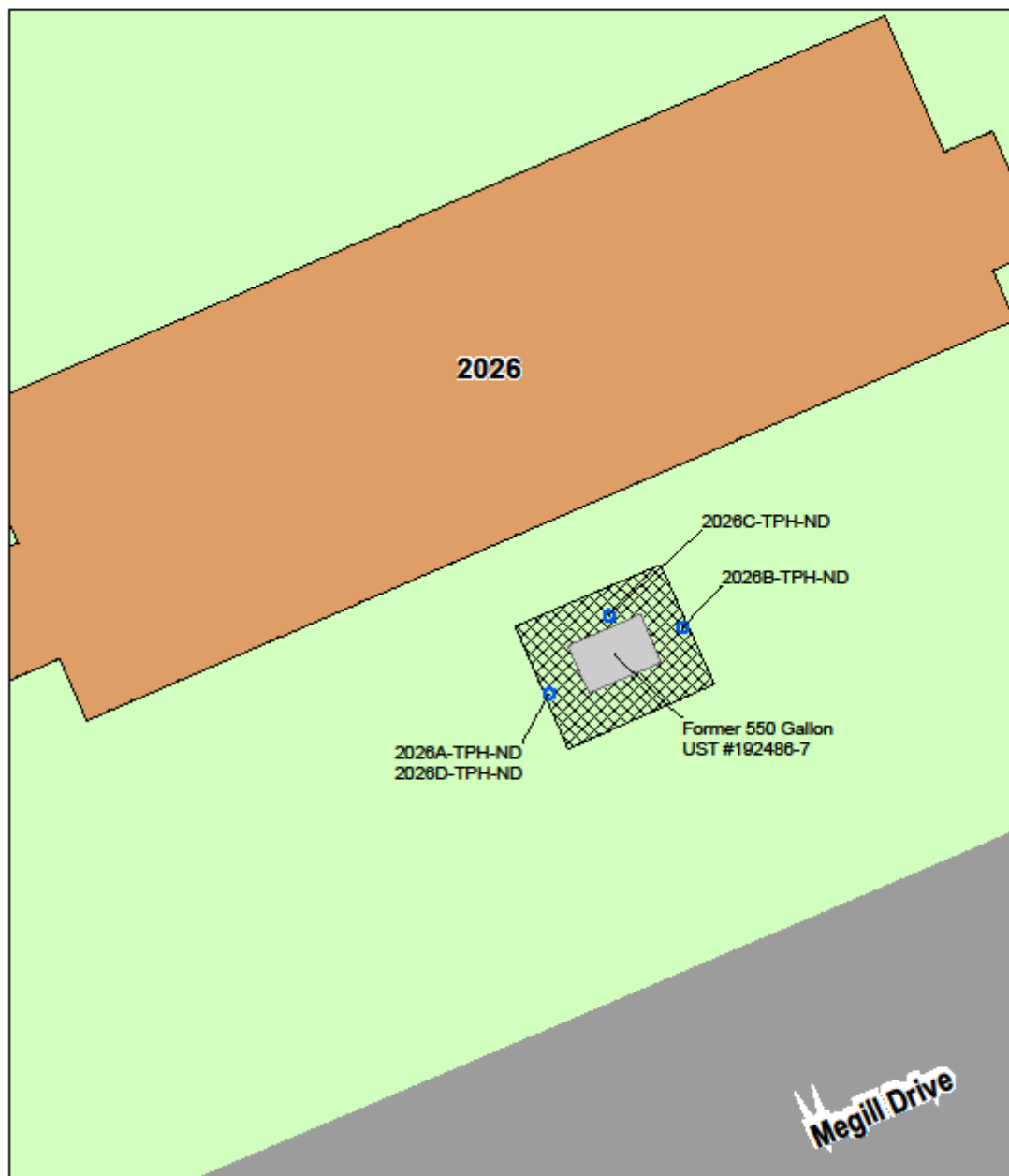
FOUO  
 All drawings must be field verified.  
 Environmental Division, Directorate of Public Works, Fort Monmouth, New Jersey



**Figure 2**  
 Location Map  
 Building 2026, Charles Wood Area  
 Fort Monmouth, NJ  
 Date: 1/2011  
 UST Registration # 192486-7  
 UST Discharge # NA



All drawings must be field verified.  
 Environmental Division, Directorate of Public Works, Fort Monmouth, New Jersey



**Legend**  
 [Grey Box] UST  
 [Cross-hatched Box] UST Excavation Limits  
 [Blue Circle with S] Soil Sample - 2/8/2000

10 5 0 10 Feet



**Figure 3**  
 Soil Sampling Location Map  
 Building 2026, Charles Wood Area  
 Fort Monmouth, NJ  
 Date: 1/2011  
 UST Registration # 192486-7  
 UST Discharge # NA



*All drawings must be field verified.*  
 Environmental Division, Directorate of Public Works, Fort Monmouth, New Jersey

# **TABLES**

# **TABLE 1**

## **SUMMARY OF LABORATORY ANALYSIS** **FT. MONMOUTH, BUILDING 2026, UST No.: 192486-7** **08 February 2000**

| <b>SAMPLE ID</b> | <b>LABORATORY SAMPLE ID</b> | <b>SAMPLE DATE</b> | <b>SAMPLE MATRIX</b> | <b>ANALYTICAL PARAMETER</b> | <b>ANALYTICAL METHOD</b> |
|------------------|-----------------------------|--------------------|----------------------|-----------------------------|--------------------------|
|                  |                             |                    |                      |                             |                          |
| <b>2026-A</b>    | 5157.01                     | 08-Feb-00          | SOIL                 | TPH                         | OQA-QAM-25               |
| <b>2026-B</b>    | 5157.02                     | 08-Feb-00          | SOIL                 | TPH                         | OQA-QAM-25               |
| <b>2026-C</b>    | 5157.03                     | 08-Feb-00          | SOIL                 | TPH                         | OQA-QAM-25               |
| <b>2026-D</b>    | 5157.04                     | 08-Feb-00          | SOIL                 | TPH                         | OQA-QAM-25               |
| <b>Duplicate</b> |                             |                    |                      |                             |                          |

### ABBREVIATIONS:

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



## **TABLE 2**

### **SUMMARY OF LABORATORY ANALYTICAL RESULTS**

FT. MONMOUTH, BUILDING 2026, UST No.: 192486-7

08 February 2000

#### **TOTAL PETROLEUM HYDROCARBONS**

| <b>SAMPLE ID</b>            | <b>LABORATORY<br/>SAMPLE ID</b> | <b>SAMPLE LOCATION</b> | <b>SAMPLE<br/>DEPTH</b> | <b>MATRIX</b> | <b>TPH<br/>RESULT S</b> |
|-----------------------------|---------------------------------|------------------------|-------------------------|---------------|-------------------------|
|                             |                                 |                        | <b>(in feet)</b>        |               | <b>mg/kg</b>            |
| <b>2026-A</b>               | 5157.01                         | WEST END               | 6.5-7.0                 | Soil          | ND                      |
| <b>2026-B</b>               | 5157.02                         | EAST END               | 6.5-7.0                 | Soil          | ND                      |
| <b>2026-C</b>               | 5157.03                         | PIPING                 | 2.0-2.5                 | Soil          | ND                      |
| <b>2026-D<br/>Duplicate</b> | 5157.04                         | DUPLICATE              | -                       | Soil          | ND                      |

**ABBREVIATIONS:**

mg/kg = Milligrams Per Kilogram = parts per million

ND = Compound Not Detected

**Gray shading** indicates exceedance of NJDEP health based criterion of 10,000 ppm total organic contaminants

**APPENDIX A**

**CERTIFICATIONS**

**(NOT AVAILABLE)**

## **APPENDIX B**

### **UST DISPOSAL CERTIFICATE**

## **APPENDIX C**

### **PHOTO DOCUMENTATION**

**(NOT AVAILABLE)**

## **APPENDIX D**

# **SOIL ANALYTICAL DATA PACKAGE**

# FORT MONMOUTH ENVIRONMENTAL TESTING LABORATORY

DIRECTORATE OF PUBLIC WORKS

PHONE: (732) 532-6224 FAX: (732) 532-6263

WET-CHEM - METALS - ORGANICS - FIELD SAMPLING

CERTIFICATIONS: NJDEP #13461, NYSDOH #11699



ANALYTICAL DATA REPORT  
Fort Monmouth Environmental Laboratory  
ENVIRONMENTAL DIVISION  
Fort Monmouth, New Jersey  
PROJECT: IJO# 100004

## Bldg. 2026

| Field Sample Location  | Laboratory<br>Sample ID# | Matrix   | Date and Time<br>of Collection | Date Received |
|------------------------|--------------------------|----------|--------------------------------|---------------|
| 2026-A West End 6.5-7' | 5157.01                  | Soil     | 08-Feb-00 10:00                | 02/08/00      |
| 2026-B East End 6.5-7' | 5157.02                  | Soil     | 08-Feb-00 10:20                | 02/08/00      |
| 2026-C Piping 2-2.5'   | 5157.03                  | Soil     | 08-Feb-00 10:30                | 02/08/00      |
| 2026-D Duplicate       | 5157.04                  | Soil     | 08-Feb-00 10:00                | 02/08/00      |
| Trip Blank             | 5157.05                  | Methanol | 08-Feb-00                      | 02/08/00      |

ANALYSIS:  
FORT MONMOUTH ENVIRONMENTAL LAB  
TPHC, %SOLIDS

ENCLOSURE:  
CHAIN OF CUSTODY  
RESULTS

 2.16.00  
Daniel Wright/Date  
Laboratory Director

## **Table of Contents**

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## **Method Summary**

### **NJDEP Method OQA-QAM-025-10/97**

#### **Gas Chromatographic Determination of Total Petroleum Hydrocarbons in Soil**

Fifteen grams (15g)(wet weight) of a soil sample is added to a 125 mL acid cleaned, solvent rinsed, capped Erlenmeyer flask. 15g anhydrous sodium sulfate is added to dry sample. Surrogate standard spiking solution is then added to the flask.

Twenty five milliliters(25mL) Methylene Chloride is added to the flask and it is secured on a orbital shaker table. The agitation rate is set to 400rpm and the sample is shaken for 30 minutes. The flask is the removed from the table and the particulate matter is allowed to settle. The extract is transferred to a Teflon capped vial. A second 25mL of Methylene Chloride is added to the flask and shaken for an additional 30 minutes. The flask is again removed and allowed to settle. The extracts are combined in the vial then transferred to a 1mL autosampler vial.

The extract is then injected directly into a GC-FID for analysis. The sample is analyzed for petroleum hydrocarbons covering a range of C8-C42 including pristane and phytane. Total Petroleum Hydrocarbon concentration is determined by integrating between 5 minutes and 22 minutes. The baseline is established by starting the integration after the end of the solvent peak and stopping after the last peak.

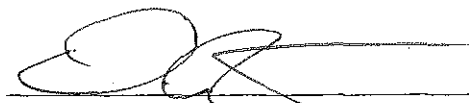
The final concentration of Total Petroleum Hydrocarbons is calculated using percent solid, sample weight and concentration.



## TPHC Conformance/Non-conformance Summary Report

- |                                                                                                                                                                    | Indicate<br>Yes, No, N/A |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------|
| 1. Method Detection Limits provided.                                                                                                                               | <u>yes</u>               |
| 2. Method Blank Contamination – If yes, list the sample and the corresponding concentrations in each blank.<br>_____<br>_____                                      | <u>NO</u>                |
| 3. Matrix Spike Results Summary Meet Criteria<br>(If not met, list the sample and corresponding recovery which falls outside the acceptable range).<br>_____       | <u>yes</u>               |
| 4. Duplicate Results Summary Meet Criteria<br>(If not met, list the sample and corresponding recovery which falls outside the acceptable range).<br>_____<br>_____ | <u>yes</u>               |
| 5. IR Spectra submitted for standards, blanks and samples.                                                                                                         | <u>NA</u>                |
| 6. Chromatograms submitted for standards, blanks and samples if GC fingerprinting was conducted.                                                                   | <u>yes</u>               |
| 7. Analysis holding time met.<br>(If not met, list number of days exceeded for each sample).<br>_____<br>_____                                                     | <u>yes</u>               |

Additional comments: \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

  
\_\_\_\_\_  
Laboratory Manager

2-16-00  
\_\_\_\_\_  
Date

000002



# Fort Monmouth Environmental Testing Laboratory

Bldg. 173, SELFM-PW-EV, Fort Monmouth, NJ 07703

Tel (732)532-4359 Fax (732)532-6263 EMail:appleby@mail1.monmouth.army.mil

NJDEP Certification #13461

## Chain of Custody Record

|                                                                                                                                |                          |             |             |                             |                |                                                            |                 |               |                      |                                       |                                      |
|--------------------------------------------------------------------------------------------------------------------------------|--------------------------|-------------|-------------|-----------------------------|----------------|------------------------------------------------------------|-----------------|---------------|----------------------|---------------------------------------|--------------------------------------|
| <b>Customer: Dinker Desai</b>                                                                                                  |                          |             |             | <b>Project No: 100004</b>   |                | <b>Analysis Parameters</b>                                 |                 |               |                      | <b>Comments:</b>                      |                                      |
| <b>Phone #: X21475</b>                                                                                                         |                          |             |             | <b>Location: BLDG. 2026</b> |                |                                                            |                 |               |                      | <b>* = Samples Kept &lt;4 Celsius</b> |                                      |
| <b>( ) DERA (X) OMA UST Assessment</b>                                                                                         |                          |             |             | <b>UST# 192486-7</b>        |                |                                                            |                 |               |                      |                                       |                                      |
| <b>Samplers Name / Company : Frank Accorsi/TVS</b>                                                                             |                          |             |             | <b>Sample</b>               | <b>#</b>       | <b>TPHC</b>                                                | <b>% SOLIDS</b> | <b>VOA+10</b> | <b>VOA ID Number</b> | <b>PID Reading</b>                    | <b>Remarks / Preservation Method</b> |
| <b>Lab Sample ID.</b>                                                                                                          | <b>Sample Location</b>   | <b>Date</b> | <b>Time</b> | <b>Type</b>                 | <b>bottles</b> |                                                            |                 |               |                      |                                       |                                      |
| 5157. 01                                                                                                                       | 2026-A WEST END 6.5-7 FT | 2-8-00      | 1000        | SOIL                        | 2              | X                                                          | X               | X             | 576                  | 0                                     | ICE                                  |
| 02                                                                                                                             | 2026-B EAST END 6.5-7 FT |             | 1020        |                             | 2              | X                                                          | X               | X             | 577                  | 0                                     |                                      |
| 03                                                                                                                             | 2026-C PIPING 2-2.5 FT   |             | 1030        |                             | 2              | X                                                          | X               | X             | 578                  | 0                                     |                                      |
| 04                                                                                                                             | 2026-D DUPLICATE         |             | 1000        |                             | 2              | X                                                          | X               | X             | 579                  | 0                                     |                                      |
| 05                                                                                                                             | TRIP BLANK               |             | -           | AQ.                         | 1              |                                                            |                 | X             | 580                  | -                                     |                                      |
| OVM sn#580U-64455.343 was calibrated with zero air & w/ 245 ppm Isobutylene read 244 ppm. 0930 2-8-00 FA (time/date & initial) |                          |             |             |                             |                |                                                            |                 |               |                      |                                       |                                      |
| Relinquished by (signature):                                                                                                   |                          | Date/Time:  |             | Received by (signature):    |                | Relinquished by (signature):                               |                 | Date/Time:    |                      | Received by (signature):              |                                      |
| Frank Accorsi                                                                                                                  |                          | 2-8-00 1130 |             | J. Murphy                   |                |                                                            |                 |               |                      |                                       |                                      |
| Relinquished by (signature):                                                                                                   |                          | Date/Time:  |             | Received by (signature):    |                | Relinquished by (signature):                               |                 | Date/Time:    |                      | Received by (signature):              |                                      |
|                                                                                                                                |                          |             |             |                             |                |                                                            |                 |               |                      |                                       |                                      |
| Report Type: ( ) Full, ( ) Reduced, (X) Standard, ( ) Screen / non-certified                                                   |                          |             |             |                             |                | Remarks: * VOA ON 25% > 1,000 PPM TPH MIN. ONE, ON HIGHEST |                 |               |                      |                                       |                                      |
| Turnaround time: ( ) Standard 2 wks, (X) Rush 2 Days, ( ) ASAP Verbal Hrs.                                                     |                          |             |             |                             |                | All sample points have been GPS? (X) YES ( ) NO ( ) NA     |                 |               |                      |                                       |                                      |

**Report of Analysis**  
**U.S. Army, Fort Monmouth Environmental Laboratory**  
**NJDEP Certification # 13461**

**Client :** U.S. Army  
 DPW. SELFM-PW-EV  
 Bldg. 173  
 Ft. Monmouth, NJ 07703

**Project # :** 5157  
**Location :** Bldg. 2026  
**UST Reg. # :** 192486-7

**Analysis :** OQA-QAM-025  
**Matrix :** Soil  
**Inst. ID. :** GC TPHC INST. #1  
**Column Type :** RTX-5, 0.32mm ID, 30M  
**Injection Volume :** 1uL

**Date Received :** 08-Feb-00  
**Date Extracted :** 09-Feb-00  
**Extraction Method :** Shake  
**Analysis Complete :** 10-Feb-00  
**Analyst :** D. Costagliola

| Sample       | Field ID | Dilution Factor | Weight (g) | % Solid | MDL (mg/kg) | TPHC Result (mg/kg) |
|--------------|----------|-----------------|------------|---------|-------------|---------------------|
| 5157.01      | 2026-A   | 1.00            | 15.41      | 89.49   | 170         | ND                  |
| 5157.02      | 2026-B   | 1.00            | 15.35      | 88.56   | 173         | ND                  |
| 5157.03      | 2026-C   | 1.00            | 15.20      | 87.96   | 176         | ND                  |
| 5157.04      | 2026-D   | 1.00            | 15.06      | 91.12   | 171         | ND                  |
|              |          |                 |            |         |             |                     |
|              |          |                 |            |         |             |                     |
|              |          |                 |            |         |             |                     |
|              |          |                 |            |         |             |                     |
|              |          |                 |            |         |             |                     |
|              |          |                 |            |         |             |                     |
|              |          |                 |            |         |             |                     |
|              |          |                 |            |         |             |                     |
|              |          |                 |            |         |             |                     |
|              |          |                 |            |         |             |                     |
|              |          |                 |            |         |             |                     |
|              |          |                 |            |         |             |                     |
|              |          |                 |            |         |             |                     |
|              |          |                 |            |         |             |                     |
| METHOD BLANK | TBLK325  | 1.00            | 15.00      | 100.00  | 157         | ND                  |

ND = Not Detected

MDL = Method Detection Limit

  
 Daniel K. Wright  
 Laboratory Director

000004

## LABORATORY DELIVERABLES CHECKLIST AND NON-CONFORMANCE SUMMARY

THIS FORM MUST BE COMPLETED BY THE LABORATORY OR ENVIRONMENTAL CONSULTANT  
AND ACCOMPANY ALL DATA SUBMISSIONS

The following Laboratory Deliverables checklist and Non-Conformance Summary shall be included in the data submission. All deviations from the accepted methodology and procedures, of performance values outside acceptable ranges shall be summarized in the Non-Conformance Summary. The Technical Requirements for Site Remediation, effective June 7, 1993, provides further details. The document shall be bound and paginated, contain a table of contents, and all pages shall be legible. Incomplete packages will be returned or held without review until the data package is completed.

It is recommended that the analytical results summary sheets listing all targeted and non-targeted compounds with the method detection limits, practical quantitation limits, and the laboratory and/or sample numbers be included in one section of the data package and in the main body of the report.

- |                                                                                                              |                                     |
|--------------------------------------------------------------------------------------------------------------|-------------------------------------|
| 1. Cover page, Title Page listing Lab Certification #, facility name and address, & date of report submitted | <input checked="" type="checkbox"/> |
| 2. Table of Contents submitted                                                                               | <input checked="" type="checkbox"/> |
| 3. Summary Sheets listing analytical results for all targeted and non-targeted compounds submitted           | <input checked="" type="checkbox"/> |
| 4. Document paginated and legible                                                                            | <input checked="" type="checkbox"/> |
| 5. Chain of Custody submitted                                                                                | <input checked="" type="checkbox"/> |
| 6. Samples submitted to lab within 48 hours of sample collection                                             | <input checked="" type="checkbox"/> |
| 7. Methodology Summary submitted                                                                             | <input checked="" type="checkbox"/> |
| 8. Laboratory Chronicle and Holding Time Check submitted                                                     | <input checked="" type="checkbox"/> |
| 9. Results submitted on a dry weight basis                                                                   | <input checked="" type="checkbox"/> |
| 10. Method Detection Limits submitted                                                                        | <input checked="" type="checkbox"/> |
| 11. Lab certified by NJDEP for parameters of appropriate category of parameters or a member of the USEPA CLP | <input checked="" type="checkbox"/> |

Laboratory Manager or Environmental Consultant's Signature \_\_\_\_\_  
Date 2/16/00

Laboratory Certification #13461

\*Refer to NJAC 7:26E - Appendix A, Section IV - Reduced Data Deliverables - Non-USEPA/CLP Methods for further guidance.

000021

## Laboratory Authentication Statement

I certify under penalty of law, where applicable, that this laboratory meets the Laboratory Performance Standards and Quality Control requirements specified in N.J.A.C. 7:18 and 40 CFR Part 136 for Water and Wastewater Analyses and SW-846 for Solid Waste Analysis. I have personally examined the information contained in this report and to the best of my knowledge, I believe that the submitted information is true, accurate, complete and meets the above referenced standards where applicable. I am aware that there are significant penalties for purposefully submitting falsified information, including the possibility of a fine and imprisonment.



Daniel K. Wright  
Laboratory Manager

001022

**Attachment H**  
**UST 2027 Closure Report**

**U.S. Army Garrison**  
Fort Monmouth, New Jersey

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

*Charles Wood – Building 2027*

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**NJDEP UST Registration No.: 192486-8**  
**UST No.: 192486-8**

**September 2010**

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

**CHARLES WOOD – BUILDING 2027  
NJDEP UST REGISTRATION NO.: 192486-8**

**SEPTEMBER 2010**

**PROJECT NO.: 10-24949**

**PREPARED FOR:**

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

**PREPARED BY:**

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



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## EXECUTIVE SUMMARY

### UST Closure

On February 9, 2000, a fiberglass wrapped plastic 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. Installed in 1985, the tank was located adjacent to Building 2027 in the Charles Wood area. UST No.: 192486-8 was a 550-gallon, FRP, No. 2 fuel oil tank. The tank with all associated piping was present at the time of removal. 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, of which none were found. No petroleum odors or stained soils were observed in the soils surrounding the tanks.

Closure soil samples were collected after the removal of the UST. Closure samples 2027-A and 2027-B were collected from a total of two (2) locations along the UST bottom of the excavation for the UST No.: 192486-8. Closure sample 2027-C was collected from a location along the UST piping. A duplicate of sample 2027-A was collected. All samples were analyzed for total petroleum hydrocarbons (TPH). Groundwater was not encountered in the bottom of the excavation.

### Findings

The closure soil samples collected from the UST excavation associated UST No.: 192486-8 contained TPH concentrations below the NJDEP health based criterion of 10,000 milligrams per kilogram (mg/kg) for total organic contaminants (N.J.A.C. 7:26E and revisions dated February 3, 1994). All soil samples, including the duplicate, contained a TPH concentration of Not Detected.

### Conclusions and Recommendations

Based on the closure soil sampling results, soils with TPH concentrations exceeding the NJDEP health based criterion of 10,000 mg/kg for total organic contaminants (N.J.A.C. 7:26E and revisions dated February 3, 1994) are not present in the former location of the UST.

**No Further Action** is proposed in regard to the closure and site assessment of UST No.: 192486-8 at Building 2027.

## **1.0 UNDERGROUND STORAGE TANK DECOMMISSIONING ACTIVITIES**

### **1.1 OVERVIEW**

One underground storage tank (UST), New Jersey Department of Environmental Protection (NJDEP) Registration No.: 192486-8 was closed at Building 2027 of the Charles Wood area at U.S. Army Garrison, Fort Monmouth, New Jersey. Refer to site location maps on Figure 1 & 2. This report presents the results of the implementation of the Directorate of the Public Work's UST Management Plan, March 1996. Installed in 1985, the UST was a 550-gallon, FRP, containing No.2 fuel oil for residential use. It was removed on February 9, 2000.

Decommissioning activities for UST No.: 192486-8 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 Site 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)*.

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 UST decommissioning activities. Section 2 describes the site investigation activities. Conclusions and recommendations are presented in Section 3 of this report.

### **1.2 SITE DESCRIPTION**

Building 2027 (Megill Drive) is located in the Charles Wood area of Fort Monmouth, as shown on Figure 1 & 2. UST No.: 192486-8 and associated piping were located adjacent to the building, as shown on Figure 3.

#### **1.2.1 Geological/Hydrogeological Setting**

The following is a description of the geological/hydrogeological setting of Bldg. 2027. 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 Charles Wood 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 (Zapeczka, 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 encrusted (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 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

Fort Monmouth has been an operational military facility for in excess of ninety (90) years; and in many areas of Charles Wood, human activities have completely transformed the topography. Currently, 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 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 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 Charles Wood 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-ionizer detector: Thermo Instruments Organic Vapor Monitor (OVM) – Model #580-B. The individual ascertained if the area was properly vented to render the area safe, as defined by OSHA. All work areas were properly vented to insure that there were no contaminants present in the breathing zone above permissible exposure limits (PEL's).

### **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 great regard to safety and health and the 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.



- 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.
- 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 UST. The tank was completely empty and contained no liquids prior to removal from the ground.

After the UST was removed from the excavation, it was staged on an impervious surface, labeled and examined for holes. The Subsurface Evaluator observed no holes in the tank during the inspection. Soils surrounding the UST were screened visually and with an OVM for evidence of contamination. Soil staining or petroleum hydrocarbons were not observed.

### **1.5 UNDERGROUND STORAGE TANK DECOMMISSIONING AND DISPOSAL**

Subsequent to disposal, the UST was purged with air to remove vapors prior to cutting. A 4 feet by 3 feet access hole was made in the UST using a pneumatic ripper gun with a non-sparking bit. The UST was cleaned first with rubber squeegees and adsorbent material broomed on the sidewalls and bottom. The adsorbent material was then drummed and subsequently put 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 for disposal in compliance with all applicable regulations and laws. The UST disposal certification, along with backfilling authorization, is included in Appendix B.

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

If available, photographic documentation of the UST is included in Appendix C.

## **2.0 SITE INVESTIGATION ACTIVITIES**

### **2.1 OVERVIEW**

The Site Investigation was managed by U.S. Army DPW personnel. All analyses were performed and reported by Fort Monmouth Environmental Testing Laboratory, a NJDEP-certified testing laboratory. All sampling was performed by a NJDEP Certified Subsurface Evaluator according to the methods described in the NJDEP *Field Sampling Procedures Manual* (1992). Sampling frequency and parameters analyzed complied with the NJDEP document *Technical Requirements for Site Remediation*, 7:26E-3.9 (June 7, 1993) which was the applicable regulation at the date of the closure. All records of the Site Investigation activities are maintained by the Fort Monmouth DPW Environmental Office.

The following Parties participated in Closure and Site Investigation Activities.

- Ft. Monmouth Directorate of Public Works-Environmental Division  
Contact Person: Joseph Fallon  
Phone Number: (732) 532-6223
- Subsurface Evaluator: Frank Accorsi  
Employer: TECOM-Vinnell Services, Inc. (TVS)  
Phone Number: (732) 532-5241  
NJDEP License No.: 0010042  
(TVS)NJDEP License No.: US252302
- Analytical Laboratory: Fort Monmouth Environmental Testing Laboratory  
Contact Person: Dan Wright  
Phone Number: (732) 532-4359  
NJDEP Laboratory Certification No.: 13461

### **2.2 FIELD SCREENING/MONITORING**

Field screening was performed by a NJDEP certified Subsurface Evaluator using an OVM and visual observations to identify potentially contaminated material, of which none were found.

### **2.3 SOIL SAMPLING**

On February 9, 2000, closure soil samples were collected after the removal of the UST. Closure samples 2027-A and 2027-B were collected from a total of two (2) locations along the UST bottom of the excavation for the UST No.: 192486-8. Closure sample 2027-C was collected from a location along the UST piping. A duplicate of sample 2027-A was also collected.

Refer to soil sampling location map in Figure 3. All samples were analyzed for total petroleum hydrocarbons (TPH). Groundwater was not encountered in the excavation.

The site assessment was performed by TVS personnel in accordance with the NJDEP *Technical Requirements for Site Remediation* and the NJDEP *Field Sampling Procedures Manual*. A summary of sampling activities including parameters analyzed is provided on Table 1. The closure soil samples were collected. 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

Closure soil samples were collected from a total of three locations (which included the duplicate) on February 9, 2000 to evaluate soil conditions following removal of the UST and piping. All samples were analyzed for TPH. The closure soil sample results were compared to the NJDEP health based criterion of 10,000 mg/kg for total organic contaminants (*N.J.A.C.* 7:26D and revisions dated February 3, 1994). A summary of the analytical results and comparison to the NJDEP soil cleanup criteria is provided on Table 2. The analytical data package, including associated quality control data, is provided in Appendix D.

Closure soil samples collected on February 9, 2000 from the UST site excavation contained concentrations of TPH below the NJDEP soil cleanup criteria.

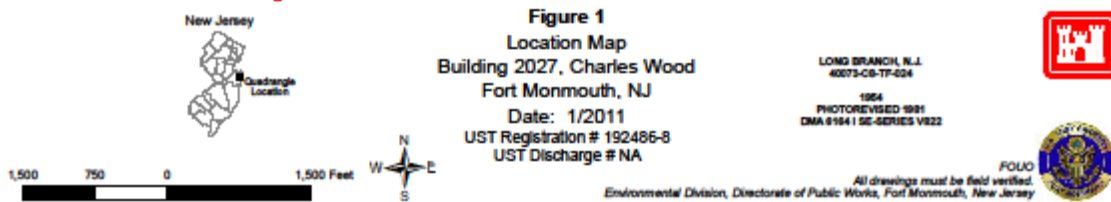
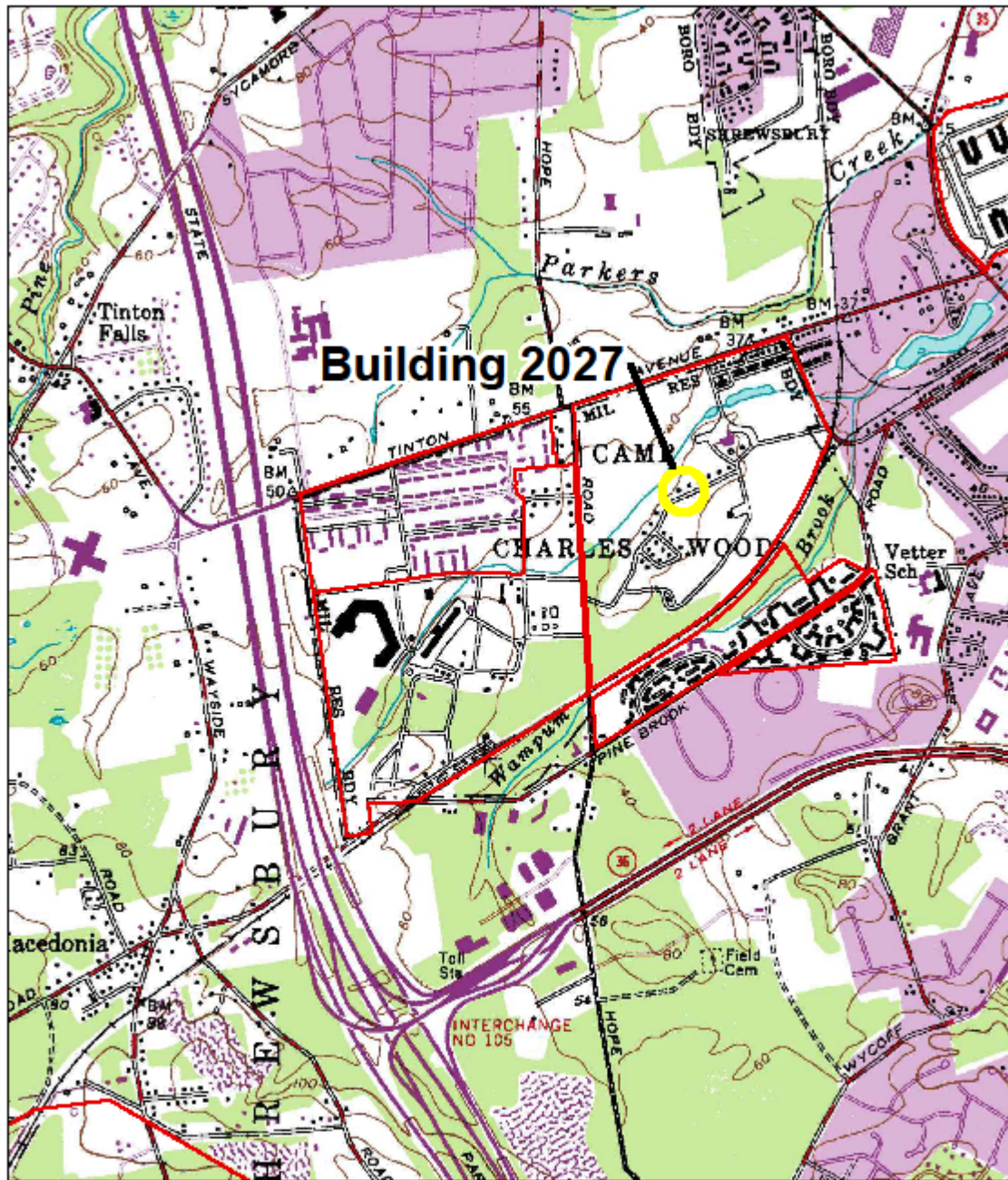
#### 3.2 CONCLUSIONS AND RECOMMENDATIONS

The analytical results for all of closure soil samples collected from the UST closure excavation at UST No.: 192486-8 were Not Detected for total petroleum hydrocarbons.

Based on the closure soil sampling results, soils with TPH concentrations exceeding the NJDEP soil cleanup criterion for total organic contaminants of 10,000 mg/kg are not present in the location of former UST No.: 192486-8.

**No Further Action** is proposed in regard to the closure and site investigation of UST No.: 192486-8 at Building 2027.

# FIGURES

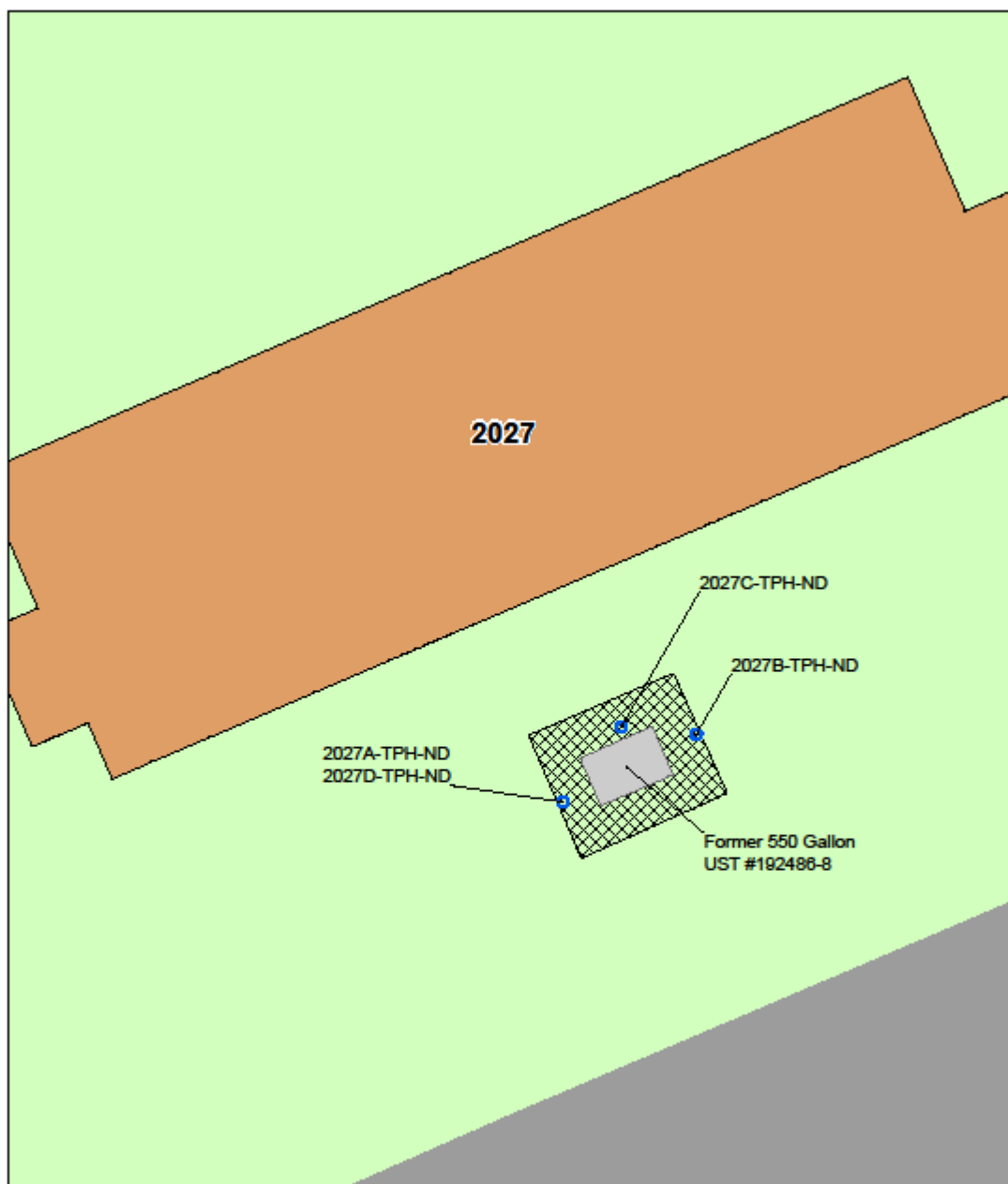




**Figure 2**  
 Location Map  
 Building 2027, Charles Wood Area  
 Fort Monmouth, NJ  
 Date: 1/2011  
 UST Registration # 192486-8  
 UST Discharge # NA



*All drawings must be field verified.*  
 Environmental Division, Directorate of Public Works, Fort Monmouth, New Jersey



**Legend**

-  UST
-  UST Excavation Limits
-  Soil Sample - 2/9/2000

10 5 0 10 Feet



**Figure 3**

Soil Sampling Location Map  
Building 2027, Charles Wood Area  
Fort Monmouth, NJ  
Date: 1/2011  
UST Registration # 192486-8  
UST Discharge # NA



*All drawings must be field verified.*  
Environmental Division, Directorate of Public Works, Fort Monmouth, New Jersey

# TABLES



# **TABLE 1**

## **SUMMARY OF LABORATORY ANALYSIS**

**FT. MONMOUTH, BUILDING 2027, UST No.: 192486-8**

**09 February 2000**

| <b>SAMPLE ID</b>        | <b>LABORATORY SAMPLE ID</b> | <b>SAMPLE DATE</b> | <b>SAMPLE MATRIX</b> | <b>ANALYTICAL PARAMETER</b> | <b>ANALYTICAL METHOD</b> |
|-------------------------|-----------------------------|--------------------|----------------------|-----------------------------|--------------------------|
|                         |                             |                    |                      |                             |                          |
| <b>2027-A</b>           | 5161.01                     | 09-Feb-00          | SOIL                 | TPH                         | OQA-QAM-25               |
| <b>2027-B</b>           | 5161.02                     | 09-Feb-00          | SOIL                 | TPH                         | OQA-QAM-25               |
| <b>2027-C</b>           | 5161.03                     | 09-Feb-00          | SOIL                 | TPH                         | OQA-QAM-25               |
| <b>2027-D Duplicate</b> | 5161.04                     | 09-Feb-00          | SOIL                 | TPH                         | OQA-QAM-25               |

### ABBREVIATIONS:

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

## **TABLE 2**

### **SUMMARY OF LABORATORY ANALYTICAL RESULTS**

FT. MONMOUTH, BUILDING 2027, UST No.: 192486-8

09February 2000

#### **TOTAL PETROLEUM HYDROCARBONS**

| <b>SAMPLE ID</b>            | <b>LABORATORY<br/>SAMPLE ID</b> | <b>SAMPLE LOCATION</b> | <b>SAMPLE<br/>DEPTH</b> | <b>MATRIX</b> | <b>TPH<br/>RESULT S</b> |
|-----------------------------|---------------------------------|------------------------|-------------------------|---------------|-------------------------|
|                             |                                 |                        | <b>(in feet)</b>        |               | <b>mg/kg</b>            |
| <b>2027-A</b>               | 5161.01                         | WEST END               | 6.5-7.0                 | Soil          | ND                      |
| <b>2027-B</b>               | 5161.02                         | EAST END               | 6.5-7.0                 | Soil          | ND                      |
| <b>2027-C</b>               | 5161.03                         | PIPING                 | 2.0.-2.5                | Soil          | ND                      |
| <b>2028-D<br/>Duplicate</b> | 5161.04                         | DUPLICATE-WEST END     | 6.5-7.0                 | Soil          | ND                      |

#### ABBREVIATIONS:

mg/kg = Milligrams Per Kilogram = parts per million

ND = Compound Not Detected

Gray shading indicates exceedance of NJDEP health based criterion of 10,000 ppm total organic contaminants

# **APPENDIX A**

## **CERTIFICATIONS**

**(NOT AVAILABLE)**

## **APPENDIX B**

### **UST DISPOSAL CERTIFICATE**



**DEPARTMENT OF THE ARMY**  
Headquarters, U.S. Army Garrison Fort Monmouth  
Fort Monmouth, New Jersey 07703 - 5101



REPLY TO  
ATTENTION OF  
Directorate of Public Works

MAR 31 2000

Marpal Disposal Company, Inc.  
P.O. Box 188  
Lincroft, New Jersey 07738

Re: Non-Hazardous Waste Disposal  
Contract No. DAAB07-96-C-8252  
Location: Bldg. 166  
Roll-off container No. 2065  
Size: 30 cubic yards  
USTs from Bldgs: 2022, 2023, 2024, 2025, 2026, 2027, 2028, 2029,  
2030, 2031, 2032, 2033, 2034, 2035, 2036, and 2037

Dear Sirs:

I certify that the above referenced 30 cubic yard roll-off container provided by Marpal, Inc. contains only crushed fiberglass underground storage tanks removed from residential buildings at Fort Monmouth, NJ. The tanks only held No. 2 heating oil. The tanks were cleaned in accordance with acceptable industry standards and NJDEP protocol and then crushed. No free liquids are present in the container.

If you should require any additional information or help at this time, please contact Mr. Dinker Desai, Environmental Engineer, at (732) 532-1475.

Sincerely,

James Ott,  
Director, Public Works

Attachments: None

DIRECTORATE OF PUBLIC WORKS  
FORT MONMOUTH, NEW JERSEY 07703

Contract Management Division

SUBJECT: PWS-007, Residential UST Removal  
Contractor: TVS Inc.

RE: Backfilling of excavation,

BUILDING #: 2027 (21+23 MEZILL DR.)

TVS Inc.  
Field Supervisor, PWS-007  
ATTN: Brian Finch  
Building 166  
Fort Monmouth, New Jersey 07703-5000

Dear Mr. Finch:

The above referenced area has been sampled and analyzed as described in the NJDEP Regulations. The results indicate levels of petroleum contamination below the NJDEP allowable limits ~~or that the site requires further investigation outside the scope of this contract~~. The contractor may proceed with the backfilling of the excavation with stone to groundwater and clean fill to grade as required in the above referenced contract specification.

Regards,

  
Mr. Dinker Desai  
Environmental Engineer  
Directorate of Public Works

CC: UST file copy

## **APPENDIX C**

# **PHOTO DOCUMENTATION**

**(NOT AVAILABLE)**

## **APPENDIX D**

# **SOIL ANALYTICAL DATA PACKAGE**



# FORT MONMOUTH ENVIRONMENTAL TESTING LABORATORY

DIRECTORATE OF PUBLIC WORKS

PHONE: (732) 532-6224 FAX: (732) 532-6263

WET-CHEM - METALS - ORGANICS - FIELD SAMPLING

CERTIFICATIONS: NJDEP #13461, NYSDOH #11699



ANALYTICAL DATA REPORT  
Fort Monmouth Environmental Laboratory  
ENVIRONMENTAL DIVISION  
Fort Monmouth, New Jersey  
PROJECT: IJO# 100004

**Bldg. 2027**

| Field Sample Location  | Laboratory<br>Sample ID# | Matrix   | Date and Time<br>of Collection | Date Received |
|------------------------|--------------------------|----------|--------------------------------|---------------|
| 2027-A West End 6.5-7' | 5161.01                  | Soil     | 09-Feb-00 15:00                | 02/09/00      |
| 2027-B East End 6.5-7' | 5161.02                  | Soil     | 09-Feb-00 15:10                | 02/09/00      |
| 2027-C Piping 2-2.5'   | 5161.03                  | Soil     | 09-Feb-00 15:30                | 02/09/00      |
| 2027-D Duplicate       | 5161.04                  | Soil     | 09-Feb-00 15:00                | 02/09/00      |
| Trip Blank             | 5161.05                  | Methanol | 09-Feb-00                      | 02/09/00      |

ANALYSIS:  
FORT MONMOUTH ENVIRONMENTAL LAB  
TPHC, %SOLIDS

ENCLOSURE:  
CHAIN OF CUSTODY  
RESULTS

  
Daniel Wright/Date  
Laboratory Director

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## **Method Summary**

**NJDEP Method OQA-QAM-025-10/97**

### **Gas Chromatographic Determination of Total Petroleum Hydrocarbons in Soil**

Fifteen grams (15g)(wet weight) of a soil sample is added to a 125 mL acid cleaned, solvent rinsed, capped Erlenmeyer flask. 15g anhydrous sodium sulfate is added to dry sample. Surrogate standard spiking solution is then added to the flask.

Twenty five milliliters(25mL) Methylene Chloride is added to the flask and it is secured on a orbital shaker table. The agitation rate is set to 400rpm and the sample is shaken for 30 minutes. The flask is the removed from the table and the particulate matter is allowed to settle. The extract is transferred to a Teflon capped vial. A second 25mL of Methylene Chloride is added to the flask and shaken for an additional 30 minutes. The flask is again removed and allowed to settle. The extracts are combined in the vial then transferred to a 1mL autosampler vial.

The extract is then injected directly into a GC-FID for analysis. The sample is analyzed for petroleum hydrocarbons covering a range of C8-C42 including pristane and phytane. Total Petroleum Hydrocarbon concentration is determined by integrating between 5 minutes and 22 minutes. The baseline is established by starting the integration after the end of the solvent peak and stopping after the last peak.

The final concentration of Total Petroleum Hydrocarbons is calculated using percent solid, sample weight and concentration.

## TPHC Conformance/Non-conformance Summary Report

Indicate  
Yes, No, N/A

1. Method Detection Limits provided. yes
2. Method Blank Contamination – If yes, list the sample and the corresponding concentrations in each blank. NO  
\_\_\_\_\_  
\_\_\_\_\_
3. Matrix Spike Results Summary Meet Criteria  
(If not met, list the sample and corresponding recovery which falls outside the acceptable range). yes  
\_\_\_\_\_  
\_\_\_\_\_
4. Duplicate Results Summary Meet Criteria  
(If not met, list the sample and corresponding recovery which falls outside the acceptable range). yes  
\_\_\_\_\_  
\_\_\_\_\_
5. IR Spectra submitted for standards, blanks and samples. NA
6. Chromatograms submitted for standards, blanks and samples if GC fingerprinting was conducted. yes
7. Analysis holding time met. yes  
(If not met, list number of days exceeded for each sample).  
\_\_\_\_\_  
\_\_\_\_\_

Additional comments: \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

  
Laboratory Manager

2-16-00  
Date

000002



# Fort Monmouth Environmental Testing Laboratory

Bldg. 173, SELFM-PW-EV, Fort Monmouth, NJ 07703

Tel (732)532-4359 Fax (732)532-6263 EMail:appleby@mail1.monmouth.army.mil

NJDEP Certification #13461

## Chain of Custody Record

|                                                                                                                          |                            |                             |             |                            |                |                                                                    |               |                      |                             |                                      |     |
|--------------------------------------------------------------------------------------------------------------------------|----------------------------|-----------------------------|-------------|----------------------------|----------------|--------------------------------------------------------------------|---------------|----------------------|-----------------------------|--------------------------------------|-----|
| <b>Customer: Dinker Desai</b>                                                                                            |                            | <b>Project No: 100004</b>   |             | <b>Analysis Parameters</b> |                |                                                                    |               |                      | <b>Comments:</b>            |                                      |     |
| <b>Phone #: X21475</b>                                                                                                   |                            | <b>Location: BLDG. 2027</b> |             |                            |                |                                                                    |               |                      | * = Samples Kept <4 Celsius |                                      |     |
| <b>( ) DERA (X) OMA UST Assessment</b>                                                                                   |                            | <b>UST# 192486-8</b>        |             |                            |                |                                                                    |               |                      |                             |                                      |     |
| <b>Samplers Name / Company : Frank Accorsi/TVS</b>                                                                       |                            |                             |             | <b>Sample #</b>            | <b>TPHC</b>    | <b>% SOLIDS</b>                                                    | <b>VOA+10</b> | <b>VOA ID Number</b> | <b>PID Reading</b>          | <b>Remarks / Preservation Method</b> |     |
| <b>Lab Sample I.D.</b>                                                                                                   | <b>Sample Location</b>     | <b>Date</b>                 | <b>Time</b> | <b>Type</b>                | <b>bottles</b> |                                                                    |               |                      |                             |                                      |     |
| Site 01                                                                                                                  | 2027-A, WEST END, 6.5-7 FT | 2-9-00                      | 1500        | 50/L                       | 2              | X                                                                  | X             | X                    | 585                         | 0                                    | ICE |
| 02                                                                                                                       | 2027-B, EAST END, 6.5-7 FT |                             | 1510        |                            | 2              | X                                                                  | X             | X                    | 586                         | 0                                    |     |
| 03                                                                                                                       | 2027-C, PIPING, 2-2.5 FT   |                             | 1530        |                            | 2              | X                                                                  | X             | X                    | 587                         | 0                                    |     |
| 04                                                                                                                       | 2027-D, DUPLICATE          |                             | 1500        | V                          | 2              | X                                                                  | X             | X                    | 588                         | 0                                    |     |
| 05                                                                                                                       | TRIP BLANK                 | V                           | —           | AQ.                        | 1              |                                                                    |               | X                    | 589                         | —                                    | V   |
| OVM sn#580U-64455.343 was calibrated with zero air & w/ 245 ppm Isobutylene read 244 ppm 2-8-00 FA (time/date & initial) |                            |                             |             |                            |                |                                                                    |               |                      |                             |                                      |     |
| Relinquished by (signature):                                                                                             |                            | Date/Time:                  |             | Received by (signature):   |                | Relinquished by (signature):                                       |               | Date/Time:           |                             | Received by (signature):             |     |
| Frank Accorsi                                                                                                            |                            | 2-9-00 1600                 |             | [Signature]                |                |                                                                    |               |                      |                             |                                      |     |
| Relinquished by (signature):                                                                                             |                            | Date/Time:                  |             | Received by (signature):   |                | Relinquished by (signature):                                       |               | Date/Time:           |                             | Received by (signature):             |     |
|                                                                                                                          |                            |                             |             |                            |                |                                                                    |               |                      |                             |                                      |     |
| Report Type: ( ) Full, ( ) Reduced, (X) Standard, ( ) Screen / non-certified                                             |                            |                             |             |                            |                | Remarks: *<br>VOA+10 ON 2570 > 1,000 ppm TPH, ON HIGHEST, MIN. ONE |               |                      |                             |                                      |     |
| Turnaround time: ( ) Standard 2 wks, (X) Rush 2 Days, ( ) ASAP Verbal Hrs.                                               |                            |                             |             |                            |                | All sample points have been GPS? (X) YES ( ) NO ( ) NA             |               |                      |                             |                                      |     |

**Report of Analysis**  
**U.S.Army, Fort Monmouth Environmental Laboratory**  
**NJDEP Certification # 13461**

**Client :** U.S. Army  
 DPW. SELFM-PW-EV  
 Bldg. 173  
 Ft. Monmouth, NJ 07703

**Project # :** 5161  
**Location :** Bldg.2027  
**UST Reg. # :** 192486-8

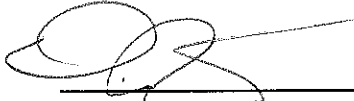
**Analysis :** OQA-QAM-025  
**Matrix :** Soil  
**Inst. ID. :** GC TPHC INST. #1  
**Column Type :** RTX-5, 0.32mm ID, 30M  
**Injection Volume :** 1uL

**Date Received :** 09-Feb-00  
**Date Extracted :** 10-Feb-00  
**Extraction Method :** Shake  
**Analysis Complete :** 11-Feb-00  
**Analyst :** D. Costagliola

| Sample       | Field ID | Dilution Factor | Weight (g) | % Solid | MDL (mg/kg) | TPHC Result (mg/kg) |
|--------------|----------|-----------------|------------|---------|-------------|---------------------|
| 5161.01      | 2027-A   | 1.00            | 15.14      | 90.57   | 171         | ND                  |
| 5161.02      | 2027-B   | 1.00            | 15.03      | 92.44   | 169         | ND                  |
| 5161.03      | 2027-C   | 1.00            | 15.37      | 90.77   | 168         | ND                  |
| 5161.04      | 2027-C   | 1.00            | 15.18      | 91.24   | 170         | ND                  |
|              |          |                 |            |         |             |                     |
|              |          |                 |            |         |             |                     |
|              |          |                 |            |         |             |                     |
|              |          |                 |            |         |             |                     |
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|              |          |                 |            |         |             |                     |
|              |          |                 |            |         |             |                     |
|              |          |                 |            |         |             |                     |
|              |          |                 |            |         |             |                     |
|              |          |                 |            |         |             |                     |
| METHOD BLANK | TBLK326  | 1.00            | 15.00      | 100.00  | 157         | ND                  |

ND = Not Detected

MDL = Method Detection Limit

  
 Daniel K. Wright  
 Laboratory Director

000004

## LABORATORY DELIVERABLES CHECKLIST AND NON-CONFORMANCE SUMMARY

THIS FORM MUST BE COMPLETED BY THE LABORATORY OR ENVIRONMENTAL CONSULTANT  
AND ACCOMPANY ALL DATA SUBMISSIONS

The following Laboratory Deliverables checklist and Non-Conformance Summary shall be included in the data submission. All deviations from the accepted methodology and procedures, of performance values outside acceptable ranges shall be summarized in the Non-Conformance Summary. The Technical Requirements for Site Remediation, effective June 7, 1993, provides further details. The document shall be bound and paginated, contain a table of contents, and all pages shall be legible. Incomplete packages will be returned or held without review until the data package is completed.

It is recommended that the analytical results summary sheets listing all targeted and non-targeted compounds with the method detection limits, practical quantitation limits, and the laboratory and/or sample numbers be included in one section of the data package and in the main body of the report.

- |                                                                                                              |                                     |
|--------------------------------------------------------------------------------------------------------------|-------------------------------------|
| 1. Cover page, Title Page listing Lab Certification #, facility name and address, & date of report submitted | <input checked="" type="checkbox"/> |
| 2. Table of Contents submitted                                                                               | <input checked="" type="checkbox"/> |
| 3. Summary Sheets listing analytical results for all targeted and non-targeted compounds submitted           | <input checked="" type="checkbox"/> |
| 4. Document paginated and legible                                                                            | <input checked="" type="checkbox"/> |
| 5. Chain of Custody submitted                                                                                | <input checked="" type="checkbox"/> |
| 6. Samples submitted to lab within 48 hours of sample collection                                             | <input checked="" type="checkbox"/> |
| 7. Methodology Summary submitted                                                                             | <input checked="" type="checkbox"/> |
| 8. Laboratory Chronicle and Holding Time Check submitted                                                     | <input checked="" type="checkbox"/> |
| 9. Results submitted on a dry weight basis                                                                   | <input checked="" type="checkbox"/> |
| 10. Method Detection Limits submitted                                                                        | <input checked="" type="checkbox"/> |
| 11. Lab certified by NJDEP for parameters of appropriate category of parameters or a member of the USEPA CLP | <input checked="" type="checkbox"/> |

Laboratory Manager or Environmental Consultant's Signature \_\_\_\_\_  
Date 2/16/00

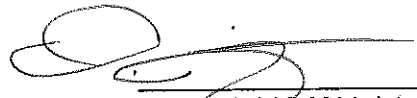
Laboratory Certification #13461

\*Refer to NJAC 7:26E - Appendix A, Section IV - Reduced Data Deliverables - Non-USEPA/CLP  
Methods for further guidance.

000025

## Laboratory Authentication Statement

I certify under penalty of law, where applicable, that this laboratory meets the Laboratory Performance Standards and Quality Control requirements specified in N.J.A.C. 7:18 and 40 CFR Part 136 for Water and Wastewater Analyses and SW-846 for Solid Waste Analysis. I have personally examined the information contained in this report and to the best of my knowledge, I believe that the submitted information is true, accurate, complete and meets the above referenced standards where applicable. I am aware that there are significant penalties for purposefully submitting falsified information, including the possibility of a fine and imprisonment.

  
\_\_\_\_\_  
Daniel K. Wright  
Laboratory Manager

000025



**Attachment I**  
**UST 2028 Closure Report**

**U.S. Army Garrison**  
Fort Monmouth, New Jersey

---

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

***Charles Wood – Building 2028***

---

**NJDEP UST Registration No.: 192486-9**  
**UST No.: 192486-9**

**September 2010**

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

**CHARLES WOOD – BUILDING 2028  
NJDEP UST REGISTRATION NO.: 192486-9**

**SEPTEMBER 2010**

**PROJECT NO.: 10-24949**

**PREPARED FOR:**

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

**PREPARED BY:**

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

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## EXECUTIVE SUMMARY

### UST Closure

On February 17, 2000, a fiberglass wrapped plastic 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. Installed in 1985, the tank was located adjacent to Building 2028 in the Charles Wood area. UST No.: 192486-9 was a 550-gallon FRP No. 2 fuel oil tank. The tank with all associated piping was present at the time of removal. 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, of which none were found. No petroleum odors or stained soils were observed in the soils surrounding the tanks.

Closure soil samples were collected after the removal of the UST. Closure samples 2028-A and 2028-B were collected from a total of two (2) locations along the UST bottom of the excavation for the UST No.: 192486-9. Closure sample 2028-C was collected from a location along the UST piping. A duplicate sample, D, was also collected. All samples were analyzed for total petroleum hydrocarbons (TPH). Groundwater was not encountered in the bottom of the excavation.

### Findings

The closure soil samples collected from the UST excavation associated UST No.: 192486-9 contained TPH concentrations below the NJDEP health based criterion of 10,000 milligrams per kilogram (mg/kg) for total organic contaminants (N.J.A.C. 7:26E and revisions dated February 3, 1994). All soil samples, including duplicate, contained a TPH concentration of Not Detected.

### Conclusions and Recommendations

Based on the closure soil sampling results, soils with TPH concentrations exceeding the NJDEP health based criterion of 10,000 mg/kg for total organic contaminants (N.J.A.C. 7:26E and revisions dated February 3, 1994) are not present in the former location of the UST.

**No Further Action** is proposed in regard to the closure and site assessment of UST No.: 192486-9 at Building 2028.

## **1.0 UNDERGROUND STORAGE TANK DECOMMISSIONING ACTIVITIES**

### **1.1 OVERVIEW**

One underground storage tank (UST), New Jersey Department of Environmental Protection (NJDEP) Registration No.: 192486-9 was closed at Building 2028 of the Charles Wood area at U.S. Army Garrison, Fort Monmouth, New Jersey. Refer to site location maps Figure 1 & 2. This report presents the results of the implementation of the Directorate of the Public Work's UST Management Plan, March 1996. Installed in 1985, the UST was a 550-gallon, FRP, containing No.2 fuel oil for residential use. It was removed on February 17, 2000.

Decommissioning activities for UST No.: 192486-9 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 Site 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)*.

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 UST decommissioning activities. Section 2 describes the site investigation activities. Conclusions and recommendations are presented in Section 3 of this report.

### **1.2 SITE DESCRIPTION**

Building 2028 (Megill Drive) is located in the Charles Wood area of Fort Monmouth, as shown on Figure 1 & 2. UST No.: 192486-9 and associated piping were located adjacent to the building, as shown on Figure 3.

#### **1.2.1 Geological/Hydrogeological Setting**

The following is a description of the geological/hydrogeological setting of Bldg. 2028. 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 Charles Wood 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 (Zapeczka, 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 encrusted (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 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

Fort Monmouth has been an operational military facility for in excess of ninety (90) years; and in many areas of Charles Wood, human activities have completely transformed the topography. Currently, 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 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 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 Charles Wood 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-ionizer detector: Thermo Instruments Organic Vapor Monitor (OVM) – Model #580-B. The individual ascertained if the area was properly vented to render the area safe, as defined by OSHA. All work areas were properly vented to insure that there were no contaminants present in the breathing zone above permissible exposure limits (PEL's).

### **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 great regard to safety and health and the 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.

- 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.
- 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 UST. The tank was completely empty and contained no liquids prior to removal from the ground.

After the UST was removed from the excavation, it was staged on an impervious surface, labeled and examined for holes. The Subsurface Evaluator observed no holes in the tank during the inspection. Soils surrounding the UST were screened visually and with an OVM for evidence of contamination. Soil staining or petroleum hydrocarbons were not observed.

### **1.5 UNDERGROUND STORAGE TANK DECOMMISSIONING AND DISPOSAL**

Subsequent to disposal, the UST was purged with air to remove vapors prior to cutting. A 4 feet by 3 feet access hole was made in the UST using a pneumatic ripper gun with a non-sparking bit. The UST was cleaned first with rubber squeegees and adsorbent material broomed on the sidewalls and bottom. The adsorbent material was then drummed and subsequently put 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 for disposal in compliance with all applicable regulations and laws. The UST disposal certification, along with backfilling authorization, is included in Appendix B.

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

If available, photographic documentation of the UST is included in Appendix C.

## **2.0 SITE INVESTIGATION ACTIVITIES**

### **2.1 OVERVIEW**

The Site Investigation was managed by U.S. Army DPW personnel. All analyses were performed and reported by Fort Monmouth Environmental Testing Laboratory, a NJDEP-certified testing laboratory. All sampling was performed by a NJDEP Certified Subsurface Evaluator according to the methods described in the NJDEP *Field Sampling Procedures Manual* (1992). Sampling frequency and parameters analyzed complied with the NJDEP document *Technical Requirements for Site Remediation*, 7:26E-3.9 (June 7, 1993) which was the applicable regulation at the date of the closure. All records of the Site Investigation activities are maintained by the Fort Monmouth DPW Environmental Office.

The following Parties participated in Closure and Site Investigation Activities.

- Ft. Monmouth Directorate of Public Works-Environmental Division  
Contact Person: Joseph Fallon  
Phone Number: (732) 532-6223
- Subsurface Evaluator: Frank Accorsi  
Employer: TECOM-Vinnell Services, Inc. (TVS)  
Phone Number: (732) 532-5241  
NJDEP License No.: 0010042  
(TVS)NJDEP License No.: US252302
- Analytical Laboratory: Fort Monmouth Environmental Testing Laboratory  
Contact Person: Dan Wright  
Phone Number: (732) 532-4359  
NJDEP Laboratory Certification No.: 13461

### **2.2 FIELD SCREENING/MONITORING**

Field screening was performed by a NJDEP certified Subsurface Evaluator using an OVM and visual observations to identify potentially contaminated material, of which none were found.

### **2.3 SOIL SAMPLING**

On February 17, 2000, closure soil samples were collected after the removal of the UST. Closure samples 2028-A and 2028-B were collected from a total of two (2) locations along the UST bottom of the excavation for the UST No.: 192486-9. Closure sample 2028-C was collected from a location along the UST piping. A duplicate sample, D, was also collected. Refer to soil sampling location map in Figure 3.

All samples were analyzed for total petroleum hydrocarbons (TPH). Groundwater was not encountered in the excavation.

The site assessment was performed by TVS personnel in accordance with the NJDEP *Technical Requirements for Site Remediation* and the NJDEP *Field Sampling Procedures Manual*. A summary of sampling activities including parameters analyzed is provided on Table 1. The closure soil samples were collected. 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

Closure soil samples were collected from a total of three locations (which included the duplicate) on February 17, 2000 to evaluate soil conditions following removal of the UST and piping. All samples were analyzed for TPH. The closure soil sample results were compared to the NJDEP health based criterion of 10,000 mg/kg for total organic contaminants (*N.J.A.C. 7:26D* and revisions dated February 3, 1994). A summary of the analytical results and comparison to the NJDEP soil cleanup criteria is provided on Table 2. The analytical data package, including associated quality control data, is provided in Appendix D.

Closure soil samples collected on February 17, 2000 from the UST site excavation contained concentrations of TPH below the NJDEP soil cleanup criteria.

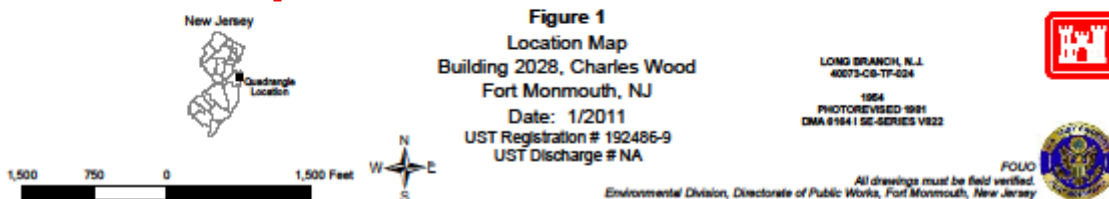
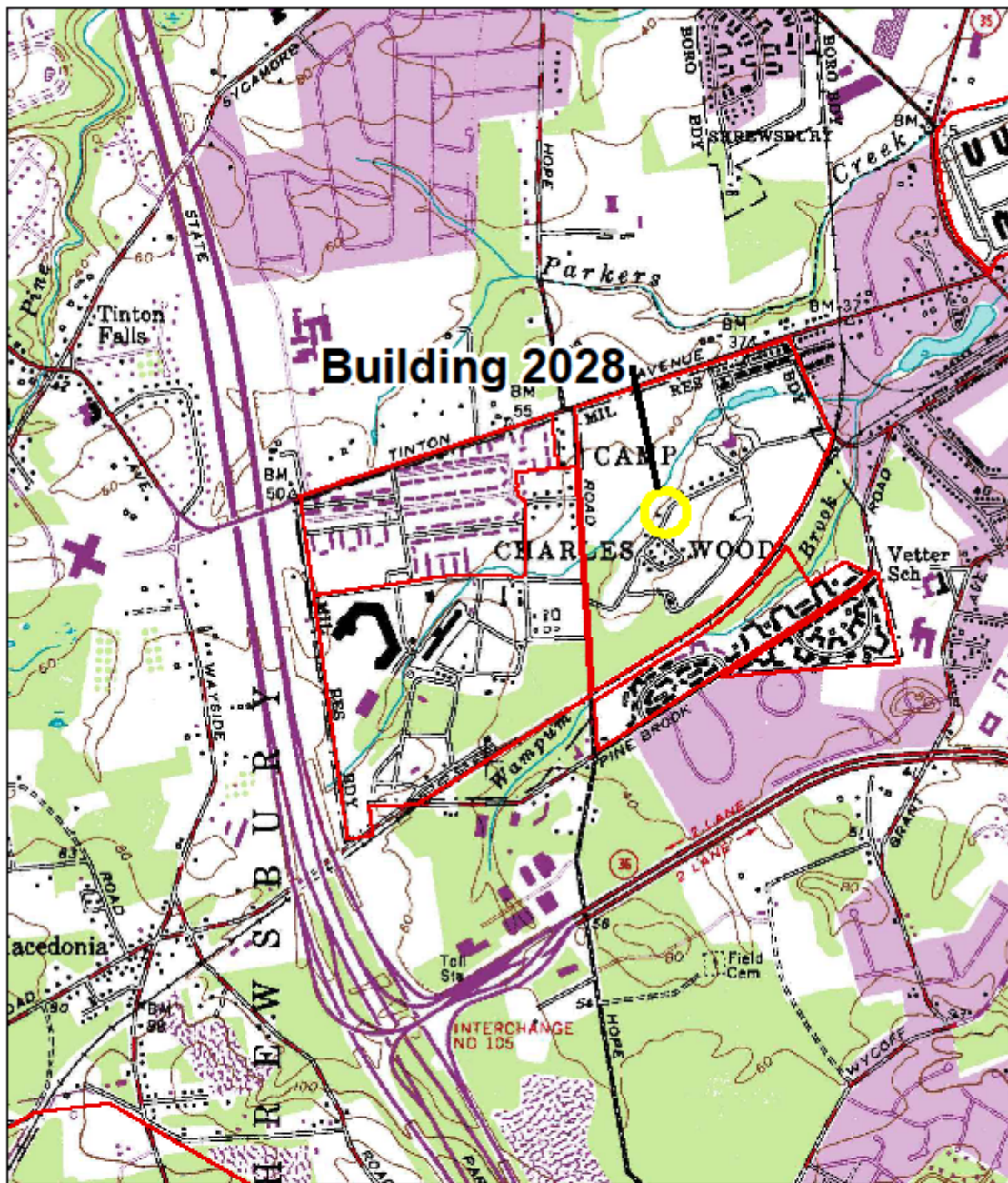
#### 3.2 CONCLUSIONS AND RECOMMENDATIONS

The analytical results for all of closure soil samples collected from the UST closure excavation at UST No.: 192486-9 were Not Detected for total petroleum hydrocarbons.

Based on the closure soil sampling results, soils with TPH concentrations exceeding the NJDEP soil cleanup criterion for total organic contaminants of 10,000 mg/kg are not present in the location of former UST No.: 192486-9.

**No Further Action** is proposed in regard to the closure and site investigation of UST No.: 192486-9 at Building 2028.

# FIGURES







**Figure 2**  
 Location Map  
 Building 2028, Charles Wood Area  
 Fort Monmouth, NJ  
 Date: 1/2011  
 UST Registration # 192486-9  
 UST Discharge # NA





**Legend**  
 [Gray Box] UST  
 [Hatched Box] UST Excavation Limits  
 [Blue Dot with S] Soil Sample - 2/17/2000

10 5 0 10 Feet



**Figure 3**  
 Soil Sampling Location Map  
 Building 2028, Charles Wood Area  
 Fort Monmouth, NJ  
 Date: 1/2011  
 UST Registration # 192486-9  
 UST Discharge # NA



*All drawings must be field verified.*  
 Environmental Division, Directorate of Public Works, Fort Monmouth, New Jersey

# TABLES

# **TABLE 1**

## **SUMMARY OF LABORATORY ANALYSIS** **FT. MONMOUTH, BUILDING 2028, UST No.: 192486-9** **17 February 2000**

| <b>SAMPLE ID</b> | <b>LABORATORY SAMPLE ID</b> | <b>SAMPLE DATE</b> | <b>SAMPLE MATRIX</b> | <b>ANALYTICAL PARAMETER</b> | <b>ANALYTICAL METHOD</b> |
|------------------|-----------------------------|--------------------|----------------------|-----------------------------|--------------------------|
|                  |                             |                    |                      |                             |                          |
| <b>2028-A</b>    | 5185.01                     | 17-Feb-00          | SOIL                 | TPH                         | OQA-QAM-25               |
| <b>2028-B</b>    | 5185.02                     | 17-Feb-00          | SOIL                 | TPH                         | OQA-QAM-25               |
| <b>2028-C</b>    | 5185.03                     | 17-Feb-00          | SOIL                 | TPH                         | OQA-QAM-25               |
| <b>2028-D</b>    | 5185.04                     | 17-Feb-00          | SOIL                 | TPH                         | OQA-QAM-25               |
| <b>Duplicate</b> |                             |                    |                      |                             |                          |

### ABBREVIATIONS:

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

## **TABLE 2**

### **SUMMARY OF LABORATORY ANALYTICAL RESULTS**

FT. MONMOUTH, BUILDING 2028, UST No.: 192486-9

17 February 2000

#### **TOTAL PETROLEUM HYDROCARBONS**

| <b>SAMPLE ID</b>            | <b>LABORATORY<br/>SAMPLE ID</b> | <b>SAMPLE LOCATION</b> | <b>SAMPLE<br/>DEPTH</b> | <b>MATRIX</b> | <b>TPH<br/>RESULT S</b> |
|-----------------------------|---------------------------------|------------------------|-------------------------|---------------|-------------------------|
|                             |                                 |                        | <b>(in feet)</b>        |               | <b>mg/kg</b>            |
| <b>2028-A</b>               | 5185.01                         | WEST END               | 6.5-7.0                 | Soil          | ND                      |
| <b>2028-B</b>               | 5185.02                         | EAST END               | 6.5-7.0                 | Soil          | ND                      |
| <b>2028-C</b>               | 5185.03                         | PIPING                 | 2.0-2.5                 | Soil          | ND                      |
| <b>2028-D<br/>Duplicate</b> | 5185.04                         | DUPLICATE              | N/A                     | Soil          | ND                      |

**ABBREVIATIONS:**

mg/kg = Milligrams Per Kilogram = parts per million

ND = Compound Not Detected

**Gray shading** indicates exceedance of NJDEP health based criterion of 10,000 ppm total organic contaminants

# **APPENDIX A**

## **CERTIFICATIONS**

**(NOT AVAILABLE)**

## **APPENDIX B**

### **UST DISPOSAL CERTIFICATE**

**DIRECTORATE OF PUBLIC WORKS  
FORT MONMOUTH, NEW JERSEY 07703**

Contract Management Division

SUBJECT: PWS-007, Residential UST Removal  
Contractor: TVS Inc.

RE: Backfilling of excavation,

BUILDING #: 2028(25+27 MEGILL DR.)

TVS Inc.  
Field Supervisor, PWS-007  
ATTN: Brian Finch  
Building 166  
Fort Monmouth, New Jersey 07703-5000

Dear Mr. Finch:

The above referenced area has been sampled and analyzed as described in the NJDEP Regulations. The results indicate levels of petroleum contamination below the NJDEP allowable limits ~~or that the site requires further investigation outside the scope of this contract.~~ The contractor may proceed with the backfilling of the excavation with stone to groundwater and clean fill to grade as required in the above referenced contract specification.

Regards,



Mr. Dinker Desai  
Environmental Engineer  
Directorate of Public Works

CC: UST file copy





**DEPARTMENT OF THE ARMY**  
Headquarters, U.S. Army Garrison Fort Monmouth  
Fort Monmouth, New Jersey 07703 - 5101



REPLY TO  
ATTENTION OF  
Directorate of Public Works

MAR 31 2000

Marpal Disposal Company, Inc.  
P.O. Box 188  
Lincroft, New Jersey 07738

Re: Non-Hazardous Waste Disposal  
Contract No. DAAB07-96-C-8252  
Location: Bldg. 166  
Roll-off container No. 2065  
Size: 30 cubic yards  
USTs from Bldgs: 2022, 2023, 2024, 2025, 2026, 2027, 2028, 2029,  
2030, 2031, 2032, 2033, 2034, 2035, 2036, and 2037

Dear Sirs:

I certify that the above referenced 30 cubic yard roll-off container provided by Marpal, Inc. contains only crushed fiberglass underground storage tanks removed from residential buildings at Fort Monmouth, NJ. The tanks only held No. 2 heating oil. The tanks were cleaned in accordance with acceptable industry standards and NJDEP protocol and then crushed. No free liquids are present in the container.

If you should require any additional information or help at this time, please contact Mr. Dinker Desai, Environmental Engineer, at (732) 532-1475.

Sincerely,

James Ott,  
Director, Public Works

Attachments: None

## **APPENDIX C**

# **PHOTO DOCUMENTATION**

**(NOT AVAILABLE)**

## **APPENDIX D**

### **SOIL ANALYTICAL DATA PACKAGE**

# FORT MONMOUTH ENVIRONMENTAL TESTING LABORATORY

DIRECTORATE OF PUBLIC WORKS

PHONE: (732) 532-6224 FAX: (732) 532-6263

WET-CHEM - METALS - ORGANICS - FIELD SAMPLING

CERTIFICATIONS: NJDEP #13461, NYSDOH #11699



ANALYTICAL DATA REPORT  
Fort Monmouth Environmental Laboratory  
ENVIRONMENTAL DIVISION  
Fort Monmouth, New Jersey  
PROJECT: IJO# 100004

**Bldg. 2028**

| Field Sample Location  | Laboratory<br>Sample ID# | Matrix   | Date and Time<br>of Collection | Date Received |
|------------------------|--------------------------|----------|--------------------------------|---------------|
| 2028-A West End 6.5-7' | 5185.01                  | Soil     | 17-Feb-00 14:40                | 02/17/00      |
| 2028-B East End 6.5-7' | 5185.02                  | Soil     | 17-Feb-00 14:50                | 02/17/00      |
| 2028-C Piping 2-2.5'   | 5185.03                  | Soil     | 17-Feb-00 15:10                | 02/17/00      |
| 2028-D Duplicate       | 5185.04                  | Soil     | 17-Feb-00 14:40                | 02/17/00      |
| Trip Blank             | 5185.05                  | Methanol | 17-Feb-00                      | 02/17/00      |

ANALYSIS:  
FORT MONMOUTH ENVIRONMENTAL LAB  
TPHC, %SOLIDS

ENCLOSURE:  
CHAIN OF CUSTODY  
RESULTS

 2-24-00  
Daniel Wright/Date  
Laboratory Director

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## **Method Summary**

### **NJDEP Method OQA-QAM-025-10/97**

#### **Gas Chromatographic Determination of Total Petroleum Hydrocarbons in Soil**

Fifteen grams (15g)(wet weight) of a soil sample is added to a 125 mL acid cleaned, solvent rinsed, capped Erlenmeyer flask. 15g anhydrous sodium sulfate is added to dry sample. Surrogate standard spiking solution is then added to the flask.

Twenty five milliliters(25mL) Methylene Chloride is added to the flask and it is secured on a orbital shaker table. The agitation rate is set to 400rpm and the sample is shaken for 30 minutes. The flask is the removed from the table and the particulate matter is allowed to settle. The extract is transferred to a Teflon capped vial. A second 25mL of Methylene Chloride is added to the flask and shaken for an additional 30 minutes. The flask is again removed and allowed to settle. The extracts are combined in the vial then transferred to a 1mL autosampler vial.

The extract is then injected directly into a GC-FID for analysis. The sample is analyzed for petroleum hydrocarbons covering a range of C8-C42 including pristane and phytane. Total Petroleum Hydrocarbon concentration is determined by integrating between 5 minutes and 22 minutes. The baseline is established by starting the integration after the end of the solvent peak and stopping after the last peak.

The final concentration of Total Petroleum Hydrocarbons is calculated using percent solid, sample weight and concentration.

## TPHC Conformance/Non-conformance Summary Report

- |                                                                                                                                                                       | Indicate<br>Yes, No, N/A |
|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------|
| 1. Method Detection Limits provided.                                                                                                                                  | <u>yes</u>               |
| 2. Method Blank Contamination -- If yes, list the sample and the corresponding concentrations in each blank.<br>_____<br>_____                                        | <u>NO</u>                |
| 3. Matrix Spike Results Summary Meet Criteria<br>(If not met, list the sample and corresponding recovery which falls outside the acceptable range).<br>_____<br>_____ | <u>yes</u>               |
| 4. Duplicate Results Summary Meet Criteria<br>(If not met, list the sample and corresponding recovery which falls outside the acceptable range).<br>_____<br>_____    | <u>yes</u>               |
| 5. IR Spectra submitted for standards, blanks and samples.                                                                                                            | <u>NA</u>                |
| 6. Chromatograms submitted for standards, blanks and samples if GC fingerprinting was conducted.                                                                      | <u>yes</u>               |
| 7. Analysis holding time met.<br>(If not met, list number of days exceeded for each sample).<br>_____<br>_____                                                        | <u>yes</u>               |

Additional comments: \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

  
\_\_\_\_\_  
Laboratory Manager

2-29-00  
\_\_\_\_\_  
Date

000002



# Fort Monmouth Environmental Testing Laboratory

Bldg. 173, SELFM-PW-EV, Fort Monmouth, NJ 07703

Tel (732)532-4359 Fax (732)532-6263 EMail:appleby@mail1.monmouth.army.mil

NJDEP Certification #13461

## Chain of Custody Record

25+27 MEGILL DR.

|                                                                                                                              |                           |                             |             |                            |                |                                                            |               |                      |     |                                       |                                      |
|------------------------------------------------------------------------------------------------------------------------------|---------------------------|-----------------------------|-------------|----------------------------|----------------|------------------------------------------------------------|---------------|----------------------|-----|---------------------------------------|--------------------------------------|
| <b>Customer: Dinker Desai</b>                                                                                                |                           | <b>Project No: 100004</b>   |             | <b>Analysis Parameters</b> |                |                                                            |               |                      |     | <b>Comments:</b>                      |                                      |
| <b>Phone #: X21475</b>                                                                                                       |                           | <b>Location: BLDG. 2028</b> |             |                            |                |                                                            |               |                      |     | <b>* = Samples Kept &lt;4 Celsius</b> |                                      |
| <b>( ) DERA (X) OMA UST Assessment</b>                                                                                       |                           | <b>UST# 192486-9</b>        |             |                            |                |                                                            |               |                      |     |                                       |                                      |
| <b>Samplers Name / Company : Frank Accorsi/TVS</b>                                                                           |                           |                             |             | <b>Sample #</b>            | <b>TPHC</b>    | <b>% SOLIDS</b>                                            | <b>VOA+10</b> | <b>VOA ID Number</b> |     | <b>PID Reading</b>                    | <b>Remarks / Preservation Method</b> |
| <b>Lab Sample I.D.</b>                                                                                                       | <b>Sample Location</b>    | <b>Date</b>                 | <b>Time</b> | <b>Type</b>                | <b>bottles</b> |                                                            |               |                      |     |                                       |                                      |
| 5185.01                                                                                                                      | 2028-A, WEST END 6.5-7 FT | 2-17-00                     | 1440        | 301L                       | 2              | X                                                          | X             | X                    | 597 | 0                                     | ICE                                  |
| 02                                                                                                                           | 2028-B, WEST END 6.5-7 FT |                             | 1450        |                            | 1              | X                                                          | X             | X                    | 598 | 0                                     |                                      |
| 03                                                                                                                           | 2028-C, PIPING 2-2.5 FT   |                             | 1510        |                            | 1              | X                                                          | X             | X                    | 599 | 0                                     |                                      |
| 04                                                                                                                           | 2028-D, DUPLICATE         |                             | 1440        |                            | 1              | X                                                          | X             | X                    | 600 | 0                                     |                                      |
| 05                                                                                                                           | TRIP BLANK                |                             | -           | AQ                         | 1              |                                                            |               | X                    | 601 | -                                     |                                      |
| OVM sn#580U-64455.343 was calibrated with zero air & w/ 245 ppm Isobutylene read 245 ppm. 6800 2-16-00 (time/date & initial) |                           |                             |             |                            |                |                                                            |               |                      |     |                                       |                                      |
| Relinquished by (signature):                                                                                                 |                           | Date/Time:                  |             | Received by (signature):   |                | Relinquished by (signature):                               |               | Date/Time:           |     | Received by (signature):              |                                      |
| Frank Accorsi                                                                                                                |                           | 11545 2-17-00               |             | J. Murphy                  |                |                                                            |               |                      |     |                                       |                                      |
| Relinquished by (signature):                                                                                                 |                           | Date/Time:                  |             | Received by (signature):   |                | Relinquished by (signature):                               |               | Date/Time:           |     | Received by (signature):              |                                      |
|                                                                                                                              |                           |                             |             |                            |                |                                                            |               |                      |     |                                       |                                      |
| Report Type: ( ) Full, (X) Reduced, ( ) Standard, ( ) Screen / non-certified                                                 |                           |                             |             |                            |                | Remarks: * 10+10 on 25% 71,000 PPM TPH ON HIGHEST, MIN ONE |               |                      |     |                                       |                                      |
| Turnaround time: ( ) Standard 2 wks, (X) Rush 1 Days, ( ) ASAP Verbal Hrs.                                                   |                           |                             |             |                            |                | All sample points have been GPS? (X) YES ( ) NO ( ) NA     |               |                      |     |                                       |                                      |

0000003



**Report of Analysis**  
**U.S.Army, Fort Monmouth Environmental Laboratory**  
**NJDEP Certification # 13461**

**Client :** U.S. Army  
 DPW. SELFM-PW-EV  
 Bldg. 173  
 Ft. Monmouth, NJ 07703

**Project # :** 5185  
**Location :** Bldg.2028  
**UST Reg. # :** 192486-9

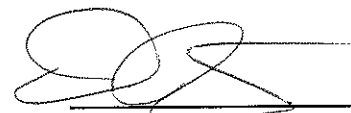
**Analysis :** OQA-QAM-025  
**Matrix :** Soil  
**Inst. ID. :** GC TPHC INST. #1  
**Column Type :** RTX-5, 0.32mm ID, 30M  
**Injection Volume :** 1uL

**Date Received :** 17-Feb-00  
**Date Extracted :** 18-Feb-00  
**Extraction Method :** Shake  
**Analysis Complete :** 22-Feb-00  
**Analyst :** D. Costagliola

| Sample       | Field ID | Dilution Factor | Weight (g) | % Solid | MDL (mg/kg) | TPHC Result (mg/kg) |
|--------------|----------|-----------------|------------|---------|-------------|---------------------|
| 5185.01      | 2028-A   | 1.00            | 15.30      | 82.21   | 187         | ND                  |
| 5185.02      | 2028-B   | 1.00            | 15.13      | 84.50   | 184         | ND                  |
| 5185.03      | 2028-C   | 1.00            | 15.09      | 86.34   | 180         | ND                  |
| 5185.04      | 2028-D   | 1.00            | 15.28      | 82.52   | 186         | ND                  |
|              |          |                 |            |         |             |                     |
|              |          |                 |            |         |             |                     |
|              |          |                 |            |         |             |                     |
|              |          |                 |            |         |             |                     |
|              |          |                 |            |         |             |                     |
|              |          |                 |            |         |             |                     |
|              |          |                 |            |         |             |                     |
|              |          |                 |            |         |             |                     |
|              |          |                 |            |         |             |                     |
|              |          |                 |            |         |             |                     |
|              |          |                 |            |         |             |                     |
|              |          |                 |            |         |             |                     |
|              |          |                 |            |         |             |                     |
|              |          |                 |            |         |             |                     |
|              |          |                 |            |         |             |                     |
|              |          |                 |            |         |             |                     |
|              |          |                 |            |         |             |                     |
| METHOD BLANK | TBLK329  | 1.00            | 15.00      | 100.00  | 157         | ND                  |

ND = Not Detected

MDL = Method Detection Limit

  
 Daniel K. Wright  
 Laboratory Director

000004

## LABORATORY DELIVERABLES CHECKLIST AND NON-CONFORMANCE SUMMARY

THIS FORM MUST BE COMPLETED BY THE LABORATORY OR ENVIRONMENTAL CONSULTANT  
AND ACCOMPANY ALL DATA SUBMISSIONS

The following Laboratory Deliverables checklist and Non-Conformance Summary shall be included in the data submission. All deviations from the accepted methodology and procedures, of performance values outside acceptable ranges shall be summarized in the Non-Conformance Summary. The Technical Requirements for Site Remediation, effective June 7, 1993, provides further details. The document shall be bound and paginated, contain a table of contents, and all pages shall be legible. Incomplete packages will be returned or held without review until the data package is completed.

It is recommended that the analytical results summary sheets listing all targeted and non-targeted compounds with the method detection limits, practical quantitation limits, and the laboratory and/or sample numbers be included in one section of the data package and in the main body of the report.

- |                                                                                                              |                                     |
|--------------------------------------------------------------------------------------------------------------|-------------------------------------|
| 1. Cover page, Title Page listing Lab Certification #, facility name and address, & date of report submitted | <input checked="" type="checkbox"/> |
| 2. Table of Contents submitted                                                                               | <input checked="" type="checkbox"/> |
| 3. Summary Sheets listing analytical results for all targeted and non-targeted compounds submitted           | <input checked="" type="checkbox"/> |
| 4. Document paginated and legible                                                                            | <input checked="" type="checkbox"/> |
| 5. Chain of Custody submitted                                                                                | <input checked="" type="checkbox"/> |
| 6. Samples submitted to lab within 48 hours of sample collection                                             | <input checked="" type="checkbox"/> |
| 7. Methodology Summary submitted                                                                             | <input checked="" type="checkbox"/> |
| 8. Laboratory Chronicle and Holding Time Check submitted                                                     | <input checked="" type="checkbox"/> |
| 9. Results submitted on a dry weight basis                                                                   | <input checked="" type="checkbox"/> |
| 10. Method Detection Limits submitted                                                                        | <input checked="" type="checkbox"/> |
| 11. Lab certified by NJDEP for parameters of appropriate category of parameters or a member of the USEPA CLP | <input checked="" type="checkbox"/> |

Laboratory Manager or Environmental Consultant's Signature \_\_\_\_\_  
Date 2/19/00

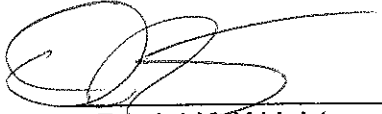
Laboratory Certification #13461

\*Refer to NJAC 7:26E - Appendix A, Section IV - Reduced Data Deliverables - Non-USEPA/CLP  
Methods for further guidance.

000022

## Laboratory Authentication Statement

I certify under penalty of law, where applicable, that this laboratory meets the Laboratory Performance Standards and Quality Control requirements specified in N.J.A.C. 7:18 and 40 CFR Part 136 for Water and Wastewater Analyses and SW-846 for Solid Waste Analysis. I have personally examined the information contained in this report and to the best of my knowledge, I believe that the submitted information is true, accurate, complete and meets the above referenced standards where applicable. I am aware that there are significant penalties for purposefully submitting falsified information, including the possibility of a fine and imprisonment.

  
Daniel K. Wright  
Laboratory Manager

**Attachment J**  
**UST 2029 Closure Report**

**U.S. Army Garrison**  
Fort Monmouth, New Jersey

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

***Charles Wood – Building 2029***

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**NJDEP UST Registration No.: 192486-10**  
**UST No.: 192486-10**

**September 2010**

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

**CHARLES WOOD – BUILDING 2029  
NJDEP UST REGISTRATION NO.: 192486-10**

**SEPTEMBER 2010**

**PROJECT NO.: 10-24949**

**PREPARED FOR:**

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

**PREPARED BY:**

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

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## EXECUTIVE SUMMARY

### UST Closure

On February 22, 2000, a fiberglass wrapped plastic 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. Installed in 1985, the tank was located adjacent to Building 2029 in the Charles Wood area. UST No.: 192486-10 was a 550-gallon FRP No. 2 fuel oil tank. The tank with all associated piping was present at the time of removal. 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, of which none were found. No petroleum odors or stained soils were observed in the soils surrounding the tanks.

Closure soil samples were collected after the removal of the UST. Closure samples 2029-A and 2029-B were collected from a total of two (2) locations along the UST bottom of the excavation for the UST No.: 192486-10. Closure sample 2029-C was collected from a location along the UST piping. A duplicate of sample 2029-B was collected. All samples were analyzed for total petroleum hydrocarbons (TPH). Groundwater was not encountered in the bottom of the excavation.

### Findings

The closure soil samples collected from the UST excavation associated UST No.: 192486-10 contained TPH concentrations below the NJDEP health based criterion of 10,000 milligrams per kilogram (mg/kg) for total organic contaminants (N.J.A.C. 7:26E and revisions dated February 3, 1994). All soil samples, including the duplicate, contained a TPH concentration of Not Detected.

### Conclusions and Recommendations

Based on the closure soil sampling results, soils with TPH concentrations exceeding the NJDEP health based criterion of 10,000 mg/kg for total organic contaminants (N.J.A.C. 7:26E and revisions dated February 3, 1994) are not present in the former location of the UST.

**No Further Action** is proposed in regard to the closure and site assessment of UST No.: 192486-10 at Building 2029.

## **1.0 UNDERGROUND STORAGE TANK DECOMMISSIONING ACTIVITIES**

### **1.1 OVERVIEW**

One underground storage tank (UST), New Jersey Department of Environmental Protection (NJDEP) Registration No.: 192486-10 was closed at Building 2029 of the Charles Wood area at U.S. Army Garrison, Fort Monmouth, New Jersey. Refer to site location maps on Figure 1 & 2. This report presents the results of the implementation of the Directorate of the Public Work's(DPW) UST Management Plan, March 1996. Installed in 1985, the UST was a 550-gallon, FRP, containing No. 2 fuel oil for residential use. It was removed on February 22, 2000.

Decommissioning activities for UST No.: 192486-10 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 Site 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)*.

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 UST decommissioning activities. Section 2 describes the site investigation activities. Conclusions and recommendations are presented in Section 3 of this report.

### **1.2 SITE DESCRIPTION**

Building 2029 (Megill Drive) is located in the Charles Wood area of Fort Monmouth, as shown on Figure 1 & 2. UST No.: 192486-10 and associated piping were located adjacent to the building, as shown on Figure 3.

#### **1.2.1 Geological/Hydrogeological Setting**

The following is a description of the geological/hydrogeological setting of Bldg. 2029. 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 Charles Wood 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 (Zapeczka, 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 encrusted (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 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

Fort Monmouth has been an operational military facility for in excess of ninety (90) years; and in many areas of Charles Wood, human activities have completely transformed the topography. Currently, 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 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 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 Charles Wood 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-ionizer detector: Thermo Instruments Organic Vapor Monitor (OVM) – Model #580-B. The individual ascertained if the area was properly vented to render the area safe, as defined by OSHA. All work areas were properly vented to insure that there were no contaminants present in the breathing zone above permissible exposure limits (PEL’s).

### **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 great regard to safety and health and the 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.

- 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.
- 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 UST. The tank was completely empty and contained no liquids prior to removal from the ground.

After the UST was removed from the excavation, it was staged on an impervious surface, labeled and examined for holes. The Subsurface Evaluator observed no holes in the tank during the inspection. Soils surrounding the UST were screened visually and with an OVM for evidence of contamination. Soil staining or petroleum hydrocarbons were not observed.

### **1.5 UNDERGROUND STORAGE TANK DECOMMISSIONING AND DISPOSAL**

Subsequent to disposal, the UST was purged with air to remove vapors prior to cutting. A 4 feet by 3 feet access hole was made in the UST using a pneumatic ripper gun with a non-sparking bit. The UST was cleaned first with rubber squeegees and adsorbent material broomed on the sidewalls and bottom. The adsorbent material was then drummed and subsequently put 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 for disposal in compliance with all applicable regulations and laws. The UST disposal certification, along with backfilling authorization, is included in Appendix B.

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

If available, photographic documentation of the UST is included in Appendix C.

## **2.0 SITE INVESTIGATION ACTIVITIES**

### **2.1 OVERVIEW**

The Site Investigation was managed by U.S. Army DPW personnel. All analyses were performed and reported by Fort Monmouth Environmental Testing Laboratory, a NJDEP-certified testing laboratory. All sampling was performed by a NJDEP Certified Subsurface Evaluator according to the methods described in the NJDEP *Field Sampling Procedures Manual* (1992). Sampling frequency and parameters analyzed complied with the NJDEP document *Technical Requirements for Site Remediation*, 7:26E-3.9 (June 7, 1993) which was the applicable regulation at the date of the closure. All records of the Site Investigation activities are maintained by the Fort Monmouth DPW Environmental Office.

The following Parties participated in Closure and Site Investigation Activities.

- Ft. Monmouth Directorate of Public Works-Environmental Division  
Contact Person: Joseph Fallon  
Phone Number: (732) 532-6223
- Subsurface Evaluator: Frank Accorsi  
Employer: TECOM-Vinnell Services, Inc. (TVS)  
Phone Number: (732) 532-5241  
NJDEP License No.: 0010042  
(TVS)NJDEP License No.: US252302
- Analytical Laboratory: Fort Monmouth Environmental Testing Laboratory  
Contact Person: Dan Wright  
Phone Number: (732) 532-4359  
NJDEP Laboratory Certification No.: 13461

### **2.2 FIELD SCREENING/MONITORING**

Field screening was performed by a NJDEP certified Subsurface Evaluator using an OVM and visual observations to identify potentially contaminated material, of which none were found.

### **2.3 SOIL SAMPLING**

On February 22, 2000, closure soil samples were collected after the removal of the UST. Closure samples 2029-A and 2029-B were collected from a total of two (2) locations along the UST bottom of the excavation for the UST No.: 192486-10. Closure sample 2029-C was collected from a location along the UST piping. A duplicate of sample 2029-B was also collected. Refer to soil sampling location map in Figure 3.



All samples were analyzed for total petroleum hydrocarbons (TPH). Groundwater was not encountered in the excavation.

The site assessment was performed by TVS personnel in accordance with the NJDEP *Technical Requirements for Site Remediation* and the NJDEP *Field Sampling Procedures Manual*. A summary of sampling activities including parameters analyzed is provided on Table 1. The closure soil samples were collected. 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

Closure soil samples were collected from a total of three locations (which included the duplicate) on February 22, 2000 to evaluate soil conditions following removal of the UST and piping. All samples were analyzed for TPH. The closure soil sample results were compared to the NJDEP health based criterion of 10,000 mg/kg for total organic contaminants (*N.J.A.C. 7:26D* and revisions dated February 3, 1994). A summary of the analytical results and comparison to the NJDEP soil cleanup criteria is provided on Table 2. The analytical data package, including associated quality control data, is provided in Appendix D.

Closure soil samples collected on February 22, 2000 from the UST site excavation contained concentrations of TPH below the NJDEP soil cleanup criteria.

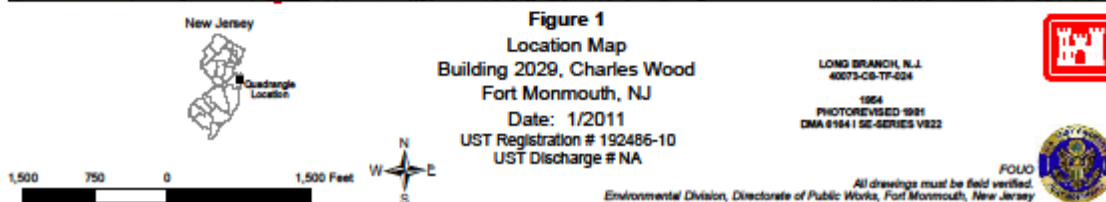
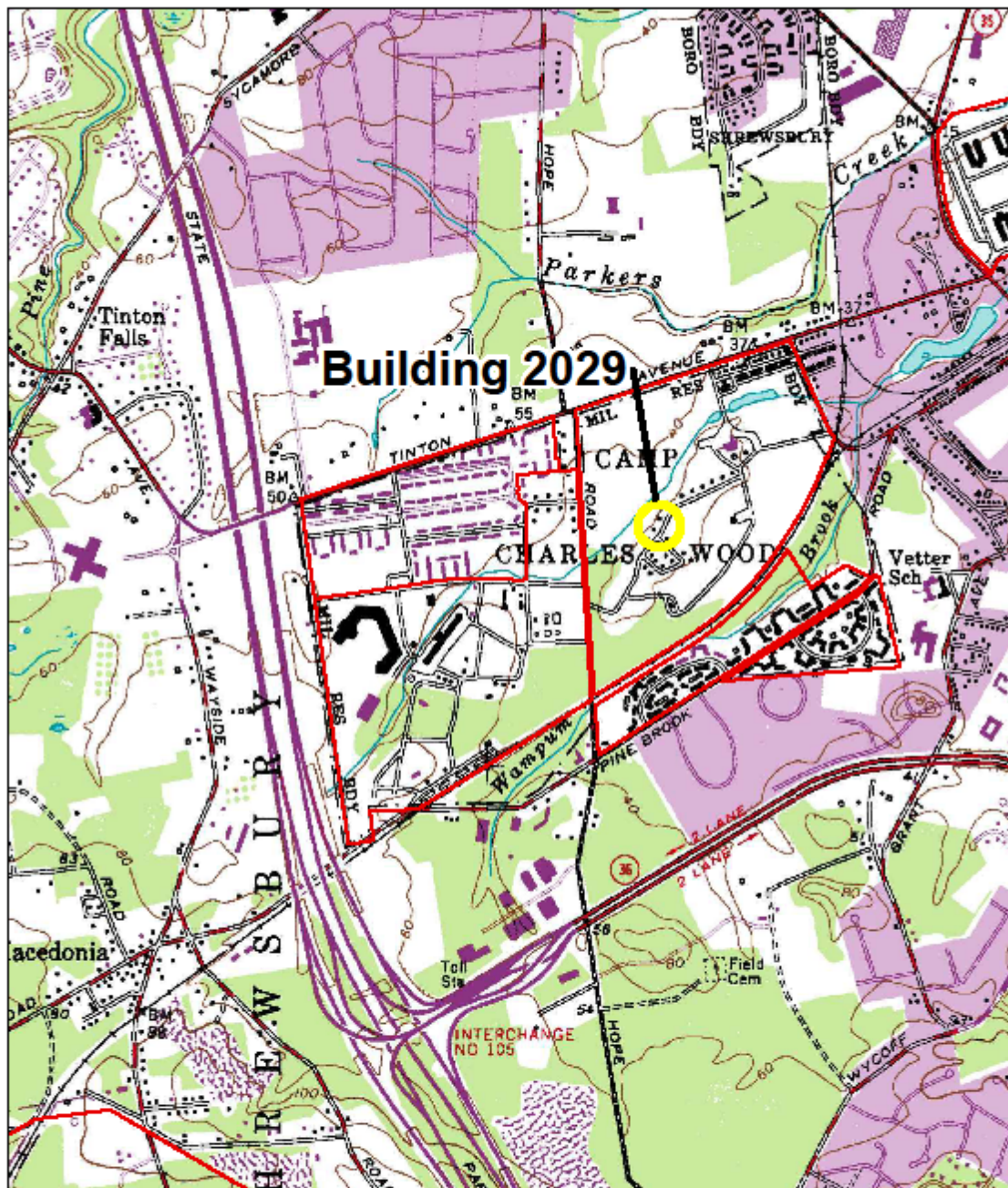
#### 3.2 CONCLUSIONS AND RECOMMENDATIONS

The analytical results for all of closure soil samples collected from the UST closure excavation at UST No.: 192486-10 were Not Detected for total petroleum hydrocarbons.

Based on the closure soil sampling results, soils with TPH concentrations exceeding the NJDEP soil cleanup criterion for total organic contaminants of 10,000 mg/kg are not present in the location of former UST No.: 192486-10.

**No Further Action** is proposed in regard to the closure and site investigation of UST No.: 192486-10 at Building 2029.

# FIGURES

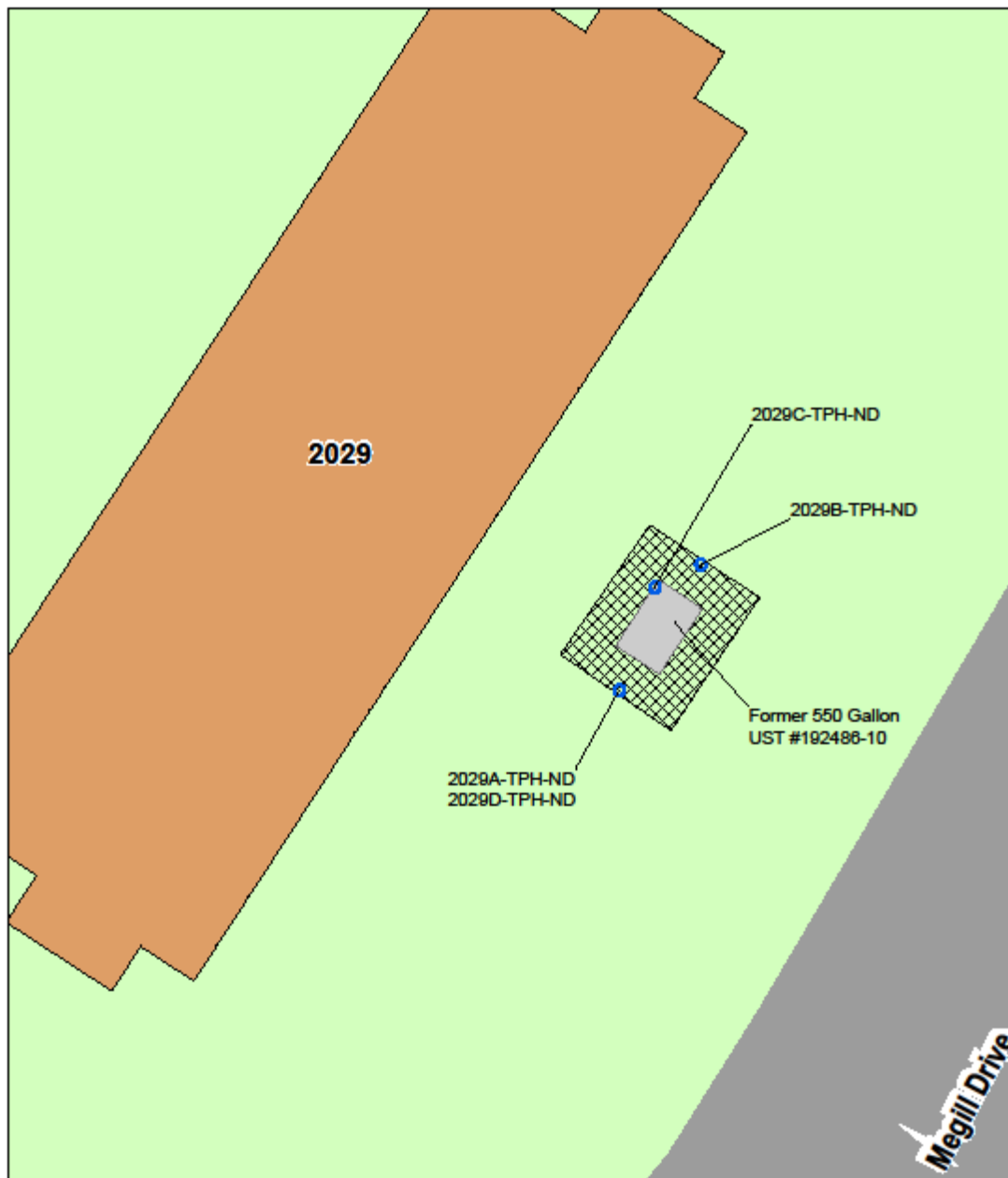




**Figure 2**  
 Location Map  
 Building 2029, Charles Wood Area  
 Fort Monmouth, NJ  
 Date: 1/2011  
 UST Registration # 192486-10  
 UST Discharge # NA



*All drawings must be field verified.*  
 Environmental Division, Directorate of Public Works, Fort Monmouth, New Jersey



**Legend**  
 [Grey Box] UST  
 [Hatched Box] UST Excavation Limits  
 [Blue Dot] Soil Sample - 2/22/2000

10 5 0 10 Feet



**Figure 3**  
 Soil Sampling Location Map  
 Building 2029, Charles Wood Area  
 Fort Monmouth, NJ  
 Date: 1/2011  
 UST Registration # 192486-10  
 UST Discharge # NA



*All drawings must be field verified.*  
 Environmental Division, Directorate of Public Works, Fort Monmouth, New Jersey

# TABLES

# **TABLE 1**

## **SUMMARY OF LABORATORY ANALYSIS** **FT. MONMOUTH, BUILDING 2029, UST No.: 192486-10** **22 February 2000**

| <b>SAMPLE ID</b>        | <b>LABORATORY SAMPLE ID</b> | <b>SAMPLE DATE</b> | <b>SAMPLE MATRIX</b> | <b>ANALYTICAL PARAMETER</b> | <b>ANALYTICAL METHOD</b> |
|-------------------------|-----------------------------|--------------------|----------------------|-----------------------------|--------------------------|
|                         |                             |                    |                      |                             |                          |
| <b>2029-A</b>           | 5191.01                     | 22-Feb-00          | SOIL                 | TPH                         | OQA-QAM-25               |
| <b>2029-B</b>           | 5191.02                     | 22-Feb-00          | SOIL                 | TPH                         | OQA-QAM-25               |
| <b>2029-C</b>           | 5191.03                     | 22-Feb-00          | SOIL                 | TPH                         | OQA-QAM-25               |
| <b>2029-D Duplicate</b> | 5191.04                     | 22-Feb-00          | SOIL                 | TPH                         | OQA-QAM-25               |

### ABBREVIATIONS:

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

## **TABLE 2**

### **SUMMARY OF LABORATORY ANALYTICAL RESULTS**

**FT. MONMOUTH, BUILDING 2029, UST No.: 192486-10**

**22 February 2000**

#### **TOTAL PETROLEUM HYDROCARBONS**

| <b>SAMPLE ID</b>            | <b>LABORATORY<br/>SAMPLE ID</b> | <b>SAMPLE LOCATION</b> | <b>SAMPLE<br/>DEPTH</b> | <b>MATRIX</b> | <b>TPH<br/>RESULT S</b> |
|-----------------------------|---------------------------------|------------------------|-------------------------|---------------|-------------------------|
|                             |                                 |                        | <b>(in feet)</b>        |               | <b>mg/kg</b>            |
| <b>2029-A</b>               | 5191.01                         | WEST END               | 6.5-7.0                 | Soil          | ND                      |
| <b>2029-B</b>               | 5191.02                         | EAST END               | 6.5-7.0                 | Soil          | ND                      |
| <b>2029-C</b>               | 5191.03                         | PIPING                 | 1.5-2.0                 | Soil          | ND                      |
| <b>2029-D<br/>Duplicate</b> | 5191.04                         | DUPLICATE-WEST END     | 6.5-7.0                 | Soil          | ND                      |

#### ABBREVIATIONS:

mg/kg = Milligrams Per Kilogram = parts per million

ND = Compound Not Detected

Gray shading indicates exceedance of NJDEP health based criterion of 10,000 ppm total organic contaminants



**APPENDIX A**

**CERTIFICATIONS**

## **APPENDIX B**

### **UST DISPOSAL CERTIFICATE**

**DIRECTORATE OF PUBLIC WORKS  
FORT MONMOUTH, NEW JERSEY 07703**

Contract Management Division

SUBJECT: PWS-007, Residential UST Removal  
Contractor: TVS Inc.

RE: Backfilling of excavation,

BUILDING #: 2029 (29+31 METILL DR.)

TVS Inc.  
Field Supervisor, PWS-007  
ATTN: Brian Finch  
Building 166  
Fort Monmouth, New Jersey 07703-5000

Dear Mr. Finch:

The above referenced area has been sampled and analyzed as described in the NJDEP Regulations. The results indicate levels of petroleum contamination below the NJDEP allowable limits ~~or that the site requires further investigation outside the scope of this contract.~~ The contractor may proceed with the backfilling of the excavation with stone to groundwater and clean fill to grade as required in the above referenced contract specification.

Regards,



Mr. Dinker Desai  
Environmental Engineer  
Directorate of Public Works

CC: UST file copy



**DEPARTMENT OF THE ARMY**  
Headquarters, U.S. Army Garrison Fort Monmouth  
Fort Monmouth, New Jersey 07703 - 5101



REPLY TO  
ATTENTION OF  
Directorate of Public Works

MAR 31 2000

Marpal Disposal Company, Inc.  
P.O. Box 188  
Lincroft, New Jersey 07738

Re: Non-Hazardous Waste Disposal  
Contract No. DAAB07-96-C-8252  
Location: Bldg. 166  
Roll-off container No. 2065  
Size: 30 cubic yards  
USTs from Bldgs: 2022, 2023, 2024, 2025, 2026, 2027, 2028, 2029,  
2030, 2031, 2032, 2033, 2034, 2035, 2036, and 2037

Dear Sirs:

I certify that the above referenced 30 cubic yard roll-off container provided by Marpal, Inc. contains only crushed fiberglass underground storage tanks removed from residential buildings at Fort Monmouth, NJ. The tanks only held No. 2 heating oil. The tanks were cleaned in accordance with acceptable industry standards and NJDEP protocol and then crushed. No free liquids are present in the container.

If you should require any additional information or help at this time, please contact Mr. Dinker Desai, Environmental Engineer, at (732) 532-1475.

Sincerely,

James Ott,  
Director, Public Works

Attachments: None

## **APPENDIX C**

### **PHOTO DOCUMENTATION**

## **APPENDIX D**

# **SOIL ANALYTICAL DATA PACKAGE**

# FORT MONMOUTH ENVIRONMENTAL TESTING LABORATORY

DIRECTORATE OF PUBLIC WORKS

PHONE: (732) 532-6224 FAX: (732) 532-6263

WET-CHEM - METALS - ORGANICS - FIELD SAMPLING

CERTIFICATIONS: NJDEP #13461, NYSDOH #11699



ANALYTICAL DATA REPORT  
Fort Monmouth Environmental Laboratory  
ENVIRONMENTAL DIVISION  
Fort Monmouth, New Jersey  
PROJECT: IJO# 100004

**Bldg. 2029**

| Field Sample Location  | Laboratory Sample ID# | Matrix   | Date and Time of Collection | Date Received |
|------------------------|-----------------------|----------|-----------------------------|---------------|
| 2029-A West End 6.5-7' | 5191.01               | Soil     | 22-Feb-00 10:50             | 02/22/00      |
| 2029-B East End 6.5-7' | 5191.02               | Soil     | 22-Feb-00 11:20             | 02/22/00      |
| 2029-C Piping 1.5-2'   | 5191.03               | Soil     | 22-Feb-00 11:30             | 02/22/00      |
| 2029-D Duplicate       | 5191.04               | Soil     | 22-Feb-00 11:20             | 02/22/00      |
| Trip Blank             | 5191.05               | Methanol | 22-Feb-00                   | 02/22/00      |

ANALYSIS:  
FORT MONMOUTH ENVIRONMENTAL LAB  
TPHC, %SOLIDS

ENCLOSURE:  
CHAIN OF CUSTODY  
RESULTS

  
Daniel Wright/Date  
Laboratory Director

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## **Method Summary**

**NJDEP Method OQA-QAM-025-10/97**

### **Gas Chromatographic Determination of Total Petroleum Hydrocarbons in Soil**

Fifteen grams (15g)(wet weight) of a soil sample is added to a 125 mL acid cleaned, solvent rinsed, capped Erlenmeyer flask. 15g anhydrous sodium sulfate is added to dry sample. Surrogate standard spiking solution is then added to the flask.

Twenty five milliliters(25mL) Methylene Chloride is added to the flask and it is secured on a orbital shaker table. The agitation rate is set to 400rpm and the sample is shaken for 30 minutes. The flask is the removed from the table and the particulate matter is allowed to settle. The extract is transferred to a Teflon capped vial. A second 25mL of Methylene Chloride is added to the flask and shaken for an additional 30 minutes. The flask is again removed and allowed to settle. The extracts are combined in the vial then transferred to a 1mL autosampler vial.

The extract is then injected directly into a GC-FID for analysis. The sample is analyzed for petroleum hydrocarbons covering a range of C8-C42 including pristane and phytane. Total Petroleum Hydrocarbon concentration is determined by integrating between 5 minutes and 22 minutes. The baseline is established by starting the integration after the end of the solvent peak and stopping after the last peak.

The final concentration of Total Petroleum Hydrocarbons is calculated using percent solid, sample weight and concentration.

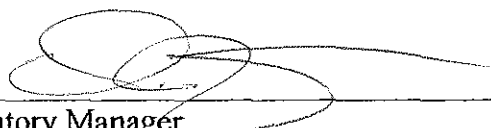
000001

## TPHC Conformance/Non-conformance Summary Report

Indicate  
Yes, No, N/A

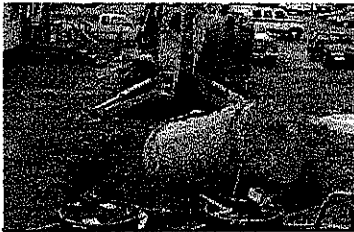
1. Method Detection Limits provided. yes
2. Method Blank Contamination – If yes, list the sample and the corresponding concentrations in each blank. NO  
\_\_\_\_\_  
\_\_\_\_\_
3. Matrix Spike Results Summary Meet Criteria  
(If not met, list the sample and corresponding recovery which falls outside the acceptable range). yes  
\_\_\_\_\_  
\_\_\_\_\_
4. Duplicate Results Summary Meet Criteria  
(If not met, list the sample and corresponding recovery which falls outside the acceptable range). yes  
\_\_\_\_\_  
\_\_\_\_\_
5. IR Spectra submitted for standards, blanks and samples. NA
6. Chromatograms submitted for standards, blanks and samples if GC fingerprinting was conducted. yes
7. Analysis holding time met. yes  
(If not met, list number of days exceeded for each sample).  
\_\_\_\_\_  
\_\_\_\_\_

Additional comments: \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

  
\_\_\_\_\_  
Laboratory Manager

2-29-00  
Date

000002



**Report of Analysis**  
**U.S. Army, Fort Monmouth Environmental Laboratory**  
**NJDEP Certification # 13461**

**Client :** U.S. Army  
 DPW. SELFM-PW-EV  
 Bldg. 173  
 Ft. Monmouth, NJ 07703

**Project # :** 5191  
**Location :** Bldg. 2029  
**UST Reg. # :** 192486-10

**Analysis :** OQA-QAM-025  
**Matrix :** Soil  
**Inst. ID. :** GC TPHC INST. #1  
**Column Type :** RTX-5, 0.32mm ID, 30M  
**Injection Volume :** 1uL

**Date Received :** 22-Feb-00  
**Date Extracted :** 24-Feb-00  
**Extraction Method :** Shake  
**Analysis Complete :** 24-Feb-00  
**Analyst :** D. Costagliola

| Sample       | Field ID | Dilution Factor | Weight (g) | % Solid | MDL (mg/kg) | TPHC Result (mg/kg) |
|--------------|----------|-----------------|------------|---------|-------------|---------------------|
| 5191.01      | 2029-A   | 1.00            | 15.07      | 88.66   | 176         | ND                  |
| 5191.02      | 2029-B   | 1.00            | 15.24      | 89.23   | 173         | ND                  |
| 5191.03      | 2029-C   | 1.00            | 15.34      | 87.40   | 175         | ND                  |
| 5191.04      | 2029-D   | 1.00            | 15.06      | 88.34   | 177         | ND                  |
|              |          |                 |            |         |             |                     |
|              |          |                 |            |         |             |                     |
|              |          |                 |            |         |             |                     |
|              |          |                 |            |         |             |                     |
|              |          |                 |            |         |             |                     |
|              |          |                 |            |         |             |                     |
|              |          |                 |            |         |             |                     |
|              |          |                 |            |         |             |                     |
|              |          |                 |            |         |             |                     |
|              |          |                 |            |         |             |                     |
|              |          |                 |            |         |             |                     |
|              |          |                 |            |         |             |                     |
|              |          |                 |            |         |             |                     |
|              |          |                 |            |         |             |                     |
|              |          |                 |            |         |             |                     |
|              |          |                 |            |         |             |                     |
| METHOD BLANK | TBLK332  | 1.00            | 15.00      | 100.00  | 157         | ND                  |

ND = Not Detected

MDL = Method Detection Limit

  
 Daniel K. Wright  
 Laboratory Director

000004

## LABORATORY DELIVERABLES CHECKLIST AND NON-CONFORMANCE SUMMARY

THIS FORM MUST BE COMPLETED BY THE LABORATORY OR ENVIRONMENTAL CONSULTANT  
AND ACCOMPANY ALL DATA SUBMISSIONS

The following Laboratory Deliverables checklist and Non-Conformance Summary shall be included in the data submission. All deviations from the accepted methodology and procedures, of performance values outside acceptable ranges shall be summarized in the Non-Conformance Summary. The Technical Requirements for Site Remediation, effective June 7, 1993, provides further details. The document shall be bound and paginated, contain a table of contents, and all pages shall be legible. Incomplete packages will be returned or held without review until the data package is completed.

It is recommended that the analytical results summary sheets listing all targeted and non-targeted compounds with the method detection limits, practical quantitation limits, and the laboratory and/or sample numbers be included in one section of the data package and in the main body of the report.

- |                                                                                                              |                                     |
|--------------------------------------------------------------------------------------------------------------|-------------------------------------|
| 1. Cover page, Title Page listing Lab Certification #, facility name and address, & date of report submitted | <input checked="" type="checkbox"/> |
| 2. Table of Contents submitted                                                                               | <input checked="" type="checkbox"/> |
| 3. Summary Sheets listing analytical results for all targeted and non-targeted compounds submitted           | <input checked="" type="checkbox"/> |
| 4. Document paginated and legible                                                                            | <input checked="" type="checkbox"/> |
| 5. Chain of Custody submitted                                                                                | <input checked="" type="checkbox"/> |
| 6. Samples submitted to lab within 48 hours of sample collection                                             | <input checked="" type="checkbox"/> |
| 7. Methodology Summary submitted                                                                             | <input checked="" type="checkbox"/> |
| 8. Laboratory Chronicle and Holding Time Check submitted                                                     | <input checked="" type="checkbox"/> |
| 9. Results submitted on a dry weight basis                                                                   | <input checked="" type="checkbox"/> |
| 10. Method Detection Limits submitted                                                                        | <input checked="" type="checkbox"/> |
| 11. Lab certified by NJDEP for parameters of appropriate category of parameters or a member of the USEPA CLP | <input checked="" type="checkbox"/> |

Laboratory Manager or Environmental Consultant's Signature \_\_\_\_\_  
Date 2/29/00

Laboratory Certification #13461

\*Refer to NJAC 7:26E - Appendix A, Section IV - Reduced Data Deliverables - Non-USEPA/CLP  
Methods for further guidance.

000021

## Laboratory Authentication Statement

I certify under penalty of law, where applicable, that this laboratory meets the Laboratory Performance Standards and Quality Control requirements specified in N.J.A.C. 7:18 and 40 CFR Part 136 for Water and Wastewater Analyses and SW-846 for Solid Waste Analysis. I have personally examined the information contained in this report and to the best of my knowledge, I believe that the submitted information is true, accurate, complete and meets the above referenced standards where applicable. I am aware that there are significant penalties for purposefully submitting falsified information, including the possibility of a fine and imprisonment.



Daniel K. Wright  
Laboratory Manager

**Attachment K**  
**UST 2030 Closure Report**

**U.S. Army Garrison**  
Fort Monmouth, New Jersey

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

***Charles Wood – Building 2030***

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**NJDEP UST Registration No.: 192486-11**  
**UST No.: 192486-11**

**September 2010**



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

**CHARLES WOOD – BUILDING 2030  
NJDEP UST REGISTRATION NO.: 192486-11**

**SEPTEMBER 2010**

**PROJECT NO.: 10-24949**

**PREPARED FOR:**

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

**PREPARED BY:**

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

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## EXECUTIVE SUMMARY

### UST Closure

On February 28, 2000, a fiberglass wrapped plastic 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. Installed in 1985, the tank was located adjacent to Building 2030 in the Charles Wood area. UST No.: 192486-11 was a 550-gallon, FRP, No. 2 fuel oil tank. The tank with all associated piping was present at the time of removal. 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, of which none were found. No petroleum odors or stained soils were observed in the soils surrounding the tanks.

Closure soil samples were collected after the removal of the UST. Closure samples 2030-A and 2030-B were collected from a total of two (2) locations along the UST bottom of the excavation for the UST No.: 192486-11. Closure sample 2030-C was collected from a location along the UST piping. A duplicate of sample 2030-A was collected. All samples were analyzed for total petroleum hydrocarbons (TPH). Groundwater was not encountered in the bottom of the excavation.

### Findings

The closure soil samples collected from the UST excavation associated UST No.: 192486-11 contained TPH concentrations below the NJDEP health based criterion of 10,000 milligrams per kilogram (mg/kg) for total organic contaminants (N.J.A.C. 7:26E and revisions dated February 3, 1994). All soil samples, including the duplicate, contained a TPH concentration of Not Detected.

### Conclusions and Recommendations

Based on the closure soil sampling results, soils with TPH concentrations exceeding the NJDEP health based criterion of 10,000 mg/kg for total organic contaminants (N.J.A.C. 7:26E and revisions dated February 3, 1994) are not present in the former location of the UST.

**No Further Action** is proposed in regard to the closure and site assessment of UST No.: 192486-11 at Building 2030.

## **1.0 UNDERGROUND STORAGE TANK DECOMMISSIONING ACTIVITIES**

### **1.1 OVERVIEW**

One underground storage tank (UST), New Jersey Department of Environmental Protection (NJDEP) Registration No.: 192486-11 was closed at Building 2030 of the Charles Wood area at U.S. Army Garrison, Fort Monmouth, New Jersey. Refer to site location maps on Figure 1 & 2. This report presents the results of the implementation of the Directorate of the Public Work's UST Management Plan, March 1996. Installed in 1985, the UST was a 550-gallon, FRP, containing No. 2 fuel oil for residential use. It was removed on February 28, 2000.

Decommissioning activities for UST No.: 192486-11 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 Site 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)*.

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 UST decommissioning activities. Section 2 describes the site investigation activities. Conclusions and recommendations are presented in Section 3 of this report.

### **1.2 SITE DESCRIPTION**

Building 2030 (Megill Drive) is located in the Charles Wood area of Fort Monmouth, as shown on Figure 1 & 2. UST No.: 192486-11 and associated piping were located adjacent to the building, as shown on Figure 3.

#### **1.2.1 Geological/Hydrogeological Setting**

The following is a description of the geological/hydrogeological setting of Bldg. 2030. 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 Charles Wood 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 (Zapeczka, 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 encrusted (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 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

Fort Monmouth has been an operational military facility for in excess of ninety (90) years; and in many areas of Charles Wood, human activities have completely transformed the topography. Currently, 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 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 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 Charles Wood 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-ionizer detector: Thermo Instruments Organic Vapor Monitor (OVM) – Model #580-B. The individual ascertained if the area was properly vented to render the area safe, as defined by OSHA. All work areas were properly vented to insure that there were no contaminants present in the breathing zone above permissible exposure limits (PEL's).

### **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 great regard to safety and health and the 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.

- 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.
- 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 UST. The tank was completely empty and contained no liquids prior to removal from the ground.

After the UST was removed from the excavation, it was staged on an impervious surface, labeled and examined for holes. The Subsurface Evaluator observed no holes in the tank during the inspection. Soils surrounding the UST were screened visually and with an OVM for evidence of contamination. Soil staining or petroleum hydrocarbons were not observed.

### **1.5 UNDERGROUND STORAGE TANK DECOMMISSIONING AND DISPOSAL**

Subsequent to disposal, the UST was purged with air to remove vapors prior to cutting. A 4 feet by 3 feet access hole was made in the UST using a pneumatic ripper gun with a non-sparking bit. The UST was cleaned first with rubber squeegees and adsorbent material broomed on the sidewalls and bottom. The adsorbent material was then drummed and subsequently put 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 for disposal in compliance with all applicable regulations and laws. The UST disposal certification, along with backfilling authorization, is included in Appendix B.

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

If available, photographic documentation of the UST is included in Appendix C.

## **2.0 SITE INVESTIGATION ACTIVITIES**

### **2.1 OVERVIEW**

The Site Investigation was managed by U.S. Army DPW personnel. All analyses were performed and reported by Fort Monmouth Environmental Testing Laboratory, a NJDEP-certified testing laboratory. All sampling was performed by a NJDEP Certified Subsurface Evaluator according to the methods described in the NJDEP *Field Sampling Procedures Manual* (1992). Sampling frequency and parameters analyzed complied with the NJDEP document *Technical Requirements for Site Remediation*, 7:26E-3.9 (June 7, 1993) which was the applicable regulation at the date of the closure. All records of the Site Investigation activities are maintained by the Fort Monmouth DPW Environmental Office.

The following Parties participated in Closure and Site Investigation Activities.

- Ft. Monmouth Directorate of Public Works-Environmental Division  
Contact Person: Joseph Fallon  
Phone Number: (732) 532-6223
- Subsurface Evaluator: Frank Accorsi  
Employer: TECOM-Vinnell Services, Inc. (TVS)  
Phone Number: (732) 532-5241  
NJDEP License No.: 0010042  
(TVS)NJDEP License No.: US252302
- Analytical Laboratory: Fort Monmouth Environmental Testing Laboratory  
Contact Person: Dan Wright  
Phone Number: (732) 532-4359  
NJDEP Laboratory Certification No.: 13461

### **2.2 FIELD SCREENING/MONITORING**

Field screening was performed by a NJDEP certified Subsurface Evaluator using an OVM and visual observations to identify potentially contaminated material, of which none were found.

### **2.3 SOIL SAMPLING**

On February 28, 2000, closure soil samples were collected after the removal of the UST. Closure samples 2030-A and 2030-B were collected from a total of two (2) locations along the UST bottom of the excavation for the UST No.: 192486-11. Closure sample 2030-C was collected from a location along the UST piping. A duplicate of sample 2030-A was also collected. Refer

to soil sampling location map in Figure 3. All samples were analyzed for total petroleum hydrocarbons (TPH). Groundwater was not encountered in the excavation.

The site assessment was performed by TVS personnel in accordance with the NJDEP *Technical Requirements for Site Remediation* and the NJDEP *Field Sampling Procedures Manual*. A summary of sampling activities including parameters analyzed is provided on Table 1. The closure soil samples were collected. 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

Closure soil samples were collected from a total of three locations (which included the duplicate) on February 28, 2000 to evaluate soil conditions following removal of the UST and piping. All samples were analyzed for TPH. The closure soil sample results were compared to the NJDEP health based criterion of 10,000 mg/kg for total organic contaminants (*N.J.A.C. 7:26D* and revisions dated February 3, 1994). A summary of the analytical results and comparison to the NJDEP soil cleanup criteria is provided on Table 2. The analytical data package, including associated quality control data, is provided in Appendix D.

Closure soil samples collected on February 28, 2000 from the UST site excavation contained concentrations of TPH below the NJDEP soil cleanup criteria.

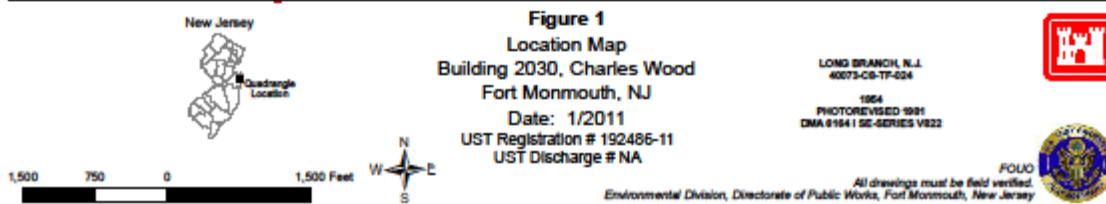
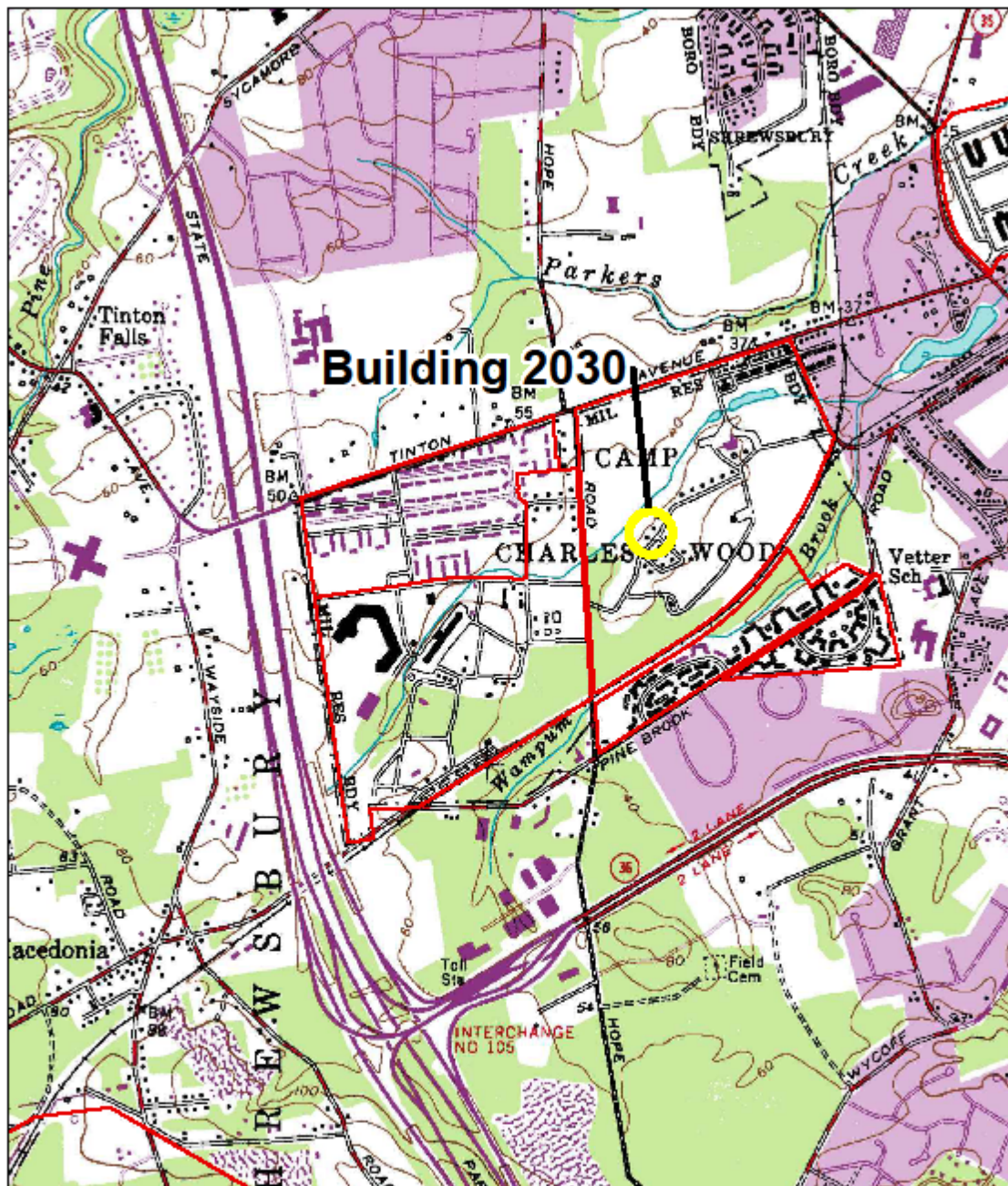
#### 3.2 CONCLUSIONS AND RECOMMENDATIONS

The analytical results for all of closure soil samples collected from the UST closure excavation at UST No.: 192486-11 were Not Detected for total petroleum hydrocarbons.

Based on the closure soil sampling results, soils with TPH concentrations exceeding the NJDEP soil cleanup criterion for total organic contaminants of 10,000 mg/kg are not present in the location of former UST No.: 192486-11.

**No Further Action** is proposed in regard to the closure and site investigation of UST No.: 192486-11 at Building 2030.

# FIGURES

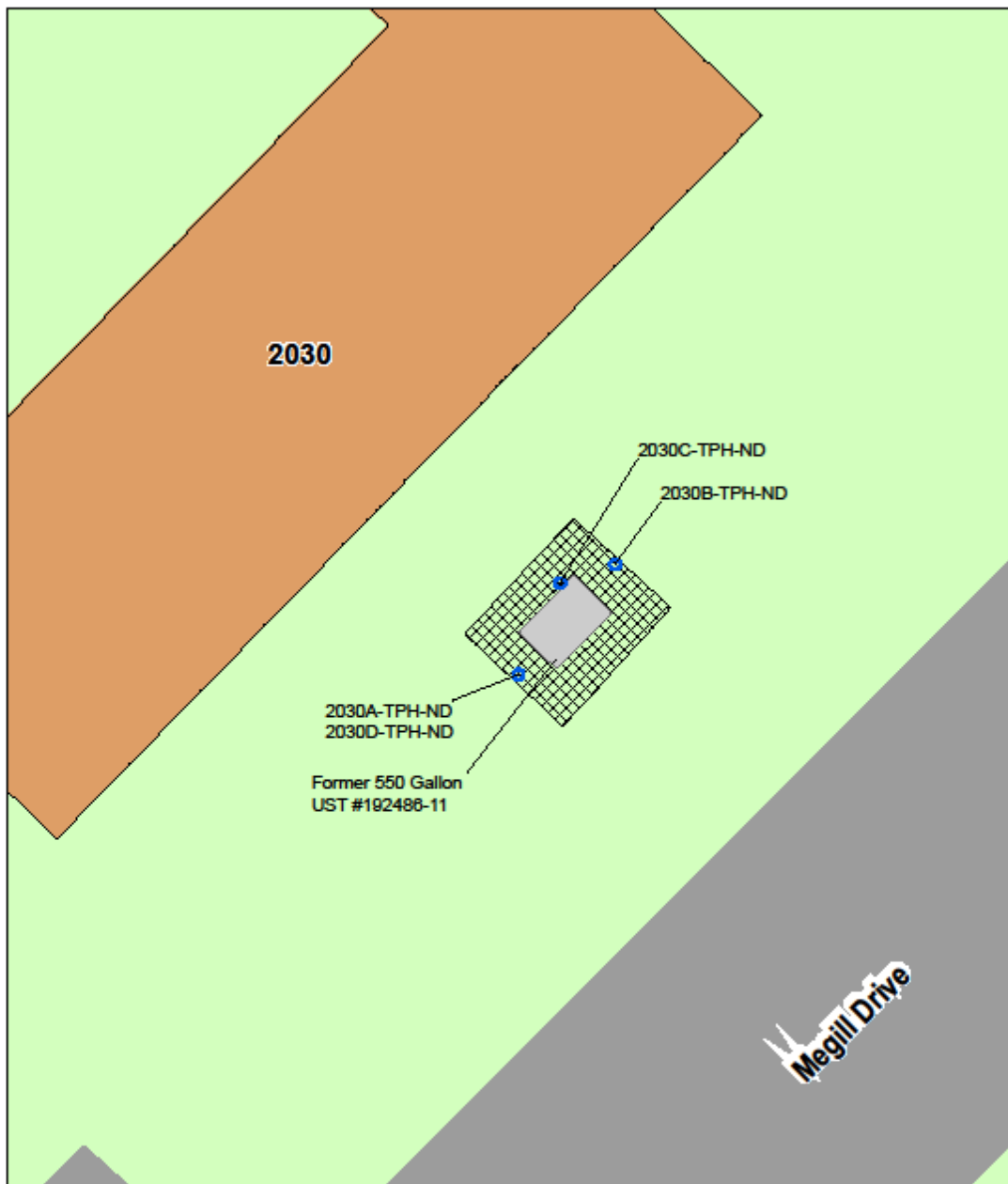




**Figure 2**  
 Location Map  
 Building 2030, Charles Wood Area  
 Fort Monmouth, NJ  
 Date: 1/2011  
 UST Registration # 192486-11  
 UST Discharge # NA



*All drawings must be field verified.*  
 Environmental Division, Directorate of Public Works, Fort Monmouth, New Jersey



**Legend**  
 [Grey Box] UST  
 [Grid Box] UST Excavation Limits  
 [Blue Dot] Soil Sample - 2/28/2000

10 5 0 10 Feet



**Figure 3**  
 Soil Sampling Location Map  
 Building 2030, Charles Wood Area  
 Fort Monmouth, NJ  
 Date: 1/2011  
 UST Registration # 192486-11  
 UST Discharge # NA



*All drawings must be field verified.*  
 Environmental Division, Directorate of Public Works, Fort Monmouth, New Jersey



# TABLES

# **TABLE 1**

## **SUMMARY OF LABORATORY ANALYSIS**

**FT. MONMOUTH, BUILDING 2030, UST No.: 192486-11**

**28 February 2000**

| <b>SAMPLE ID</b>        | <b>LABORATORY SAMPLE ID</b> | <b>SAMPLE DATE</b> | <b>SAMPLE MATRIX</b> | <b>ANALYTICAL PARAMETER</b> | <b>ANALYTICAL METHOD</b> |
|-------------------------|-----------------------------|--------------------|----------------------|-----------------------------|--------------------------|
|                         |                             |                    |                      |                             |                          |
| <b>2030-A</b>           | 5203.01                     | 28-Feb-00          | SOIL                 | TPH                         | OQA-QAM-25               |
| <b>2030-B</b>           | 5203.02                     | 28-Feb-00          | SOIL                 | TPH                         | OQA-QAM-25               |
| <b>2030-C</b>           | 5203.03                     | 28-Feb-00          | SOIL                 | TPH                         | OQA-QAM-25               |
| <b>2030-D Duplicate</b> | 5203.04                     | 28-Feb-00          | SOIL                 | TPH                         | OQA-QAM-25               |

### ABBREVIATIONS:

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

## **TABLE 2**

### **SUMMARY OF LABORATORY ANALYTICAL RESULTS**

FT. MONMOUTH, BUILDING 2030, UST No.: 192486-11

28 February 2000

#### **TOTAL PETROLEUM HYDROCARBONS**

| <b>SAMPLE ID</b>            | <b>LABORATORY<br/>SAMPLE ID</b> | <b>SAMPLE LOCATION</b> | <b>SAMPLE<br/>DEPTH</b> | <b>MATRIX</b> | <b>TPH<br/>RESULT S</b> |
|-----------------------------|---------------------------------|------------------------|-------------------------|---------------|-------------------------|
|                             |                                 |                        | <b>(in feet)</b>        |               | <b>mg/kg</b>            |
| <b>2030-A</b>               | 5203.01                         | WEST END               | 6.5-7.0                 | Soil          | ND                      |
| <b>2030-B</b>               | 5203.02                         | EAST END               | 6.5-7.0                 | Soil          | ND                      |
| <b>2030-C</b>               | 5203.03                         | PIPING                 | 1.0-1.5                 | Soil          | ND                      |
| <b>2030-D<br/>Duplicate</b> | 5203.04                         | DUPLICATE-WEST END     | 6.5-7.0                 | Soil          | ND                      |

**ABBREVIATIONS:**

mg/kg = Milligrams Per Kilogram = parts per million

ND = Compound Not Detected

**Gray shading** indicates exceedance of NJDEP health based criterion of 10,000 ppm total organic contaminants

# **APPENDIX A**

## **CERTIFICATIONS**

**(NOT AVAILABLE)**

## **APPENDIX B**

### **UST DISPOSAL CERTIFICATE**



**DEPARTMENT OF THE ARMY**  
Headquarters, U.S. Army Garrison Fort Monmouth  
Fort Monmouth, New Jersey 07703 - 5101



REPLY TO  
ATTENTION OF  
Directorate of Public Works

31 2000

Marpal Disposal Company, Inc.  
P.O. Box 188  
Lincroft, New Jersey 07738

Re: Non-Hazardous Waste Disposal  
Contract No. DAAB07-96-C-8252  
Location: Bldg. 166  
Roll-off container No. 2065  
Size: 30 cubic yards  
USTs from Bldgs: 2022, 2023, 2024, 2025, 2026, 2027, 2028, 2029,  
2030, 2031, 2032, 2033, 2034, 2035, 2036, and 2037

Dear Sirs:

I certify that the above referenced 30 cubic yard roll-off container provided by Marpal, Inc. contains only crushed fiberglass underground storage tanks removed from residential buildings at Fort Monmouth, NJ. The tanks only held No. 2 heating oil. The tanks were cleaned in accordance with acceptable industry standards and NJDEP protocol and then crushed. No free liquids are present in the container.

If you should require any additional information or help at this time, please contact Mr. Dinker Desai, Environmental Engineer, at (732) 532-1475.

Sincerely,

James Ott,  
Director, Public Works

Attachments: None

## **APPENDIX C**

# **PHOTO DOCUMENTATION**

**(NOT AVAILABLE)**

## **APPENDIX D**

# **SOIL ANALYTICAL DATA PACKAGE**



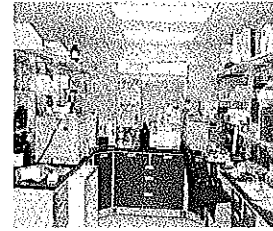
# FORT MONMOUTH ENVIRONMENTAL TESTING LABORATORY

## DIRECTORATE OF PUBLIC WORKS

PHONE: (732) 532-6224 FAX: (732) 532-6263

WET-CHEM - METALS - ORGANICS - FIELD SAMPLING

CERTIFICATIONS: NJDEP #13461, NYSDOH #11699



ANALYTICAL DATA REPORT  
Fort Monmouth Environmental Laboratory  
ENVIRONMENTAL DIVISION  
Fort Monmouth, New Jersey  
PROJECT: IJO# 100004

### Bldg. 2030

| Field Sample Location  | Laboratory Sample ID# | Matrix   | Date and Time of Collection | Date Received |
|------------------------|-----------------------|----------|-----------------------------|---------------|
| 2030-A West End 6.5-7' | 5203.01               | Soil     | 28-Feb-00 10:00             | 02/28/00      |
| 2030-B West End 6.5-7' | 5203.02               | Soil     | 28-Feb-00 10:30             | 02/28/00      |
| 2030-C Piping 1-1.5'   | 5203.03               | Soil     | 28-Feb-00 10:40             | 02/28/00      |
| 2030-D Duplicate       | 5203.04               | Soil     | 28-Feb-00 10:00             | 02/28/00      |
| Trip Blank             | 5203.05               | Methanol | 28-Feb-00                   | 02/28/00      |

ANALYSIS:  
FORT MONMOUTH ENVIRONMENTAL LAB  
TPHC, %SOLIDS

ENCLOSURE:  
CHAIN OF CUSTODY  
RESULTS

Daniel Wright/Date  
Laboratory Director

3-2-00

## **Table of Contents**

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## **Method Summary**

**NJDEP Method OQA-QAM-025-10/97**

### **Gas Chromatographic Determination of Total Petroleum Hydrocarbons in Soil**

Fifteen grams (15g)(wet weight) of a soil sample is added to a 125 mL acid cleaned, solvent rinsed, capped Erlenmeyer flask. 15g anhydrous sodium sulfate is added to dry sample. Surrogate standard spiking solution is then added to the flask.

Twenty five milliliters(25mL) Methylene Chloride is added to the flask and it is secured on a orbital shaker table. The agitation rate is set to 400rpm and the sample is shaken for 30 minutes. The flask is the removed from the table and the particulate matter is allowed to settle. The extract is transferred to a Teflon capped vial. A second 25mL of Methylene Chloride is added to the flask and shaken for an additional 30 minutes. The flask is again removed and allowed to settle. The extracts are combined in the vial then transferred to a 1mL autosampler vial.

The extract is then injected directly into a GC-FID for analysis. The sample is analyzed for petroleum hydrocarbons covering a range of C8-C42 including pristane and phytane. Total Petroleum Hydrocarbon concentration is determined by integrating between 5 minutes and 22 minutes. The baseline is established by starting the integration after the end of the solvent peak and stopping after the last peak.

The final concentration of Total Petroleum Hydrocarbons is calculated using percent solid, sample weight and concentration.

000001

## TPHC Conformance/Non-conformance Summary Report

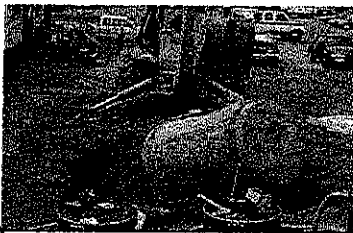
- |                                                                                                                                                                       | Indicate<br>Yes, No, N/A |
|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------|
| 1. Method Detection Limits provided.                                                                                                                                  | <u>Yes</u>               |
| 2. Method Blank Contamination – If yes, list the sample and the corresponding concentrations in each blank.<br>_____<br>_____                                         | <u>No</u>                |
| 3. Matrix Spike Results Summary Meet Criteria<br>(If not met, list the sample and corresponding recovery which falls outside the acceptable range).<br>_____<br>_____ | <u>Yes</u>               |
| 4. Duplicate Results Summary Meet Criteria<br>(If not met, list the sample and corresponding recovery which falls outside the acceptable range).<br>_____<br>_____    | <u>Yes</u>               |
| 5. IR Spectra submitted for standards, blanks and samples.                                                                                                            | <u>NA</u>                |
| 6. Chromatograms submitted for standards, blanks and samples if GC fingerprinting was conducted.                                                                      | <u>Yes</u>               |
| 7. Analysis holding time met.<br>(If not met, list number of days exceeded for each sample).<br>_____<br>_____                                                        | <u>Yes</u>               |

Additional comments: \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

\_\_\_\_\_  
Laboratory Manager

3-2-06  
\_\_\_\_\_  
Date

000002



# Fort Monmouth Environmental Testing Laboratory

Bldg. 173, SELFM-PW-EV, Fort Monmouth, NJ 07703

Tel (732)532-4359 Fax (732)532-6263 EMail:appleby@mail1.monmouth.army.mil

NJDEP Certification #13461

## Chain of Custody Record

|                                             |                         |                |             |                                         |          |                     |          |          |               |             |                               |
|---------------------------------------------|-------------------------|----------------|-------------|-----------------------------------------|----------|---------------------|----------|----------|---------------|-------------|-------------------------------|
| Customer: Dinker Desai                      |                         |                |             | Project No: 100004                      |          | Analysis Parameters |          |          |               | Comments:   |                               |
| Phone #: X21475                             |                         |                |             | Location: <u>Bldg. 2030 (33+35)</u>     |          | TPHC                | % SOLIDS | VOA+10   | VOA ID Number | PID Reading | * = Samples Kept <4 Celsius   |
| ( ) DERA (X) OMA UST Assessment             |                         |                |             | UST# <u>192486-11</u> <u>METALL DR.</u> |          |                     |          |          |               |             |                               |
| Samplers Name / Company : Frank Accorsi/TVS |                         |                |             |                                         |          | Sample #            |          |          |               |             |                               |
| Lab Sample ID.                              | Sample Location         | Date           | Time        | Type                                    | bottles  |                     |          |          |               |             | Remarks / Preservation Method |
| <u>5203. 01</u>                             | <u>2030-A WEST END</u>  | <u>2-28-00</u> | <u>1000</u> | <u>501L</u>                             | <u>2</u> | <u>X</u>            | <u>X</u> | <u>X</u> | <u>607</u>    | <u>0</u>    | <u>ICE</u>                    |
| <u>02</u>                                   | <u>2030-B EAST END</u>  |                | <u>1030</u> |                                         | <u>2</u> | <u>X</u>            | <u>X</u> | <u>X</u> | <u>608</u>    | <u>0</u>    |                               |
| <u>03</u>                                   | <u>2030-C PIPING</u>    |                | <u>1040</u> |                                         | <u>2</u> | <u>X</u>            | <u>X</u> | <u>X</u> | <u>609</u>    | <u>0</u>    |                               |
| <u>04</u>                                   | <u>2030-D DUPLICATE</u> |                | <u>1000</u> |                                         | <u>2</u> | <u>X</u>            | <u>X</u> | <u>X</u> | <u>610</u>    | <u>0</u>    |                               |
| <u>05</u>                                   | <u>TRIP BLANK</u>       |                | <u>-</u>    | <u>AQ.</u>                              | <u>1</u> |                     |          | <u>X</u> | <u>611</u>    | <u>-</u>    |                               |

OVM sn#580U-64455.343 was calibrated with zero air & w/ 245 ppm Isobutylene read 245 ppm. 0930 2-28-00 FA (time/date & initial)

|                                                      |                                   |                                             |                              |            |                          |
|------------------------------------------------------|-----------------------------------|---------------------------------------------|------------------------------|------------|--------------------------|
| Relinquished by (signature):<br><u>Frank Accorsi</u> | Date/Time:<br><u>2-28-00 1000</u> | Received by (signature):<br><u>J. Desai</u> | Relinquished by (signature): | Date/Time: | Received by (signature): |
| Relinquished by (signature):                         | Date/Time:                        | Received by (signature):                    | Relinquished by (signature): | Date/Time: | Received by (signature): |

Report Type: ( ) Full, (X) Reduced, ( ) Standard, ( ) Screen / non-certified

Turnaround time: ( ) Standard 2 wks, (X) Rush 1 Days, ( ) ASAP Verbal      Hrs.

Remarks: VOA+10 on 25 % > 1000 PPM TPH, ON HIGHEST, MIN.  
All sample points have been GPS? (X) YES ( ) NO ( ) NA ONE

**Report of Analysis**  
**U.S.Army, Fort Monmouth Environmental Laboratory**  
**NJDEP Certification # 13461**

**Client :** U.S. Army  
 DPW. SELFM-PW-EV  
 Bldg. 173  
 Ft. Monmouth, NJ 07703

**Project # :** 5203  
**Location :** Bldg.2030  
**UST Reg. # :** 192486-11

**Analysis :** OQA-QAM-025  
**Matrix :** Soil  
**Inst. ID. :** GC TPHC INST. #1  
**Column Type :** RTX-5, 0.32mm ID, 30M  
**Injection Volume :** 1uL

**Date Received :** 28-Feb-00  
**Date Extracted :** 28-Feb-00  
**Extraction Method :** Shake  
**Analysis Complete :** 28-Feb-00  
**Analyst :** D. Costagliola

| Sample       | Field ID | Dilution Factor | Weight (g) | % Solid | MDL (mg/kg) | TPHC Result (mg/kg) |
|--------------|----------|-----------------|------------|---------|-------------|---------------------|
| 5203.01      | 2030-A   | 1.00            | 15.01      | 86.14   | 182         | ND                  |
| 5203.02      | 2030-B   | 1.00            | 15.15      | 90.34   | 172         | ND                  |
| 5203.03      | 2030-C   | 1.00            | 15.16      | 90.12   | 172         | ND                  |
| 5203.04      | 2030-D   | 1.00            | 15.09      | 86.13   | 181         | ND                  |
|              |          |                 |            |         |             |                     |
|              |          |                 |            |         |             |                     |
|              |          |                 |            |         |             |                     |
|              |          |                 |            |         |             |                     |
|              |          |                 |            |         |             |                     |
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|              |          |                 |            |         |             |                     |
|              |          |                 |            |         |             |                     |
|              |          |                 |            |         |             |                     |
|              |          |                 |            |         |             |                     |
|              |          |                 |            |         |             |                     |
|              |          |                 |            |         |             |                     |
|              |          |                 |            |         |             |                     |
| METHOD BLANK | TBLK335  | 1.00            | 15.00      | 100.00  | 157         | ND                  |

ND = Not Detected

MDL = Method Detection Limit

  
 Daniel K. Wright  
 Laboratory Director

**000004**

## LABORATORY DELIVERABLES CHECKLIST AND NON-CONFORMANCE SUMMARY

THIS FORM MUST BE COMPLETED BY THE LABORATORY OR ENVIRONMENTAL CONSULTANT  
AND ACCOMPANY ALL DATA SUBMISSIONS

The following Laboratory Deliverables checklist and Non-Conformance Summary shall be included in the data submission. All deviations from the accepted methodology and procedures, of performance values outside acceptable ranges shall be summarized in the Non-Conformance Summary. The Technical Requirements for Site Remediation, effective June 7, 1993, provides further details. The document shall be bound and paginated, contain a table of contents, and all pages shall be legible. Incomplete packages will be returned or held without review until the data package is completed.

It is recommended that the analytical results summary sheets listing all targeted and non-targeted compounds with the method detection limits, practical quantitation limits, and the laboratory and/or sample numbers be included in one section of the data package and in the main body of the report.

- |                                                                                                              |                                     |
|--------------------------------------------------------------------------------------------------------------|-------------------------------------|
| 1. Cover page, Title Page listing Lab Certification #, facility name and address, & date of report submitted | <input checked="" type="checkbox"/> |
| 2. Table of Contents submitted                                                                               | <input checked="" type="checkbox"/> |
| 3. Summary Sheets listing analytical results for all targeted and non-targeted compounds submitted           | <input checked="" type="checkbox"/> |
| 4. Document paginated and legible                                                                            | <input checked="" type="checkbox"/> |
| 5. Chain of Custody submitted                                                                                | <input checked="" type="checkbox"/> |
| 6. Samples submitted to lab within 48 hours of sample collection                                             | <input checked="" type="checkbox"/> |
| 7. Methodology Summary submitted                                                                             | <input checked="" type="checkbox"/> |
| 8. Laboratory Chronicle and Holding Time Check submitted                                                     | <input checked="" type="checkbox"/> |
| 9. Results submitted on a dry weight basis                                                                   | <input checked="" type="checkbox"/> |
| 10. Method Detection Limits submitted                                                                        | <input checked="" type="checkbox"/> |
| 11. Lab certified by NJDEP for parameters of appropriate category of parameters or a member of the USEPA CLP | <input checked="" type="checkbox"/> |

Laboratory Manager or Environmental Consultant's Signature \_\_\_\_\_  
Date 3/2/00

Laboratory Certification #13461

\*Refer to NJAC 7:26E - Appendix A, Section IV - Reduced Data Deliverables - Non-USEPA/CLP  
Methods for further guidance.

000021

## **Laboratory Authentication Statement**

I certify under penalty of law, where applicable, that this laboratory meets the Laboratory Performance Standards and Quality Control requirements specified in N.J.A.C. 7:18 and 40 CFR Part 136 for Water and Wastewater Analyses and SW-846 for Solid Waste Analysis. I have personally examined the information contained in this report and to the best of my knowledge, I believe that the submitted information is true, accurate, complete and meets the above referenced standards where applicable. I am aware that there are significant penalties for purposefully submitting falsified information, including the possibility of a fine and imprisonment.



Daniel K. Wright  
Laboratory Manager



**Attachment L**  
**UST 2031 Closure Report**

**U.S. Army Garrison**  
Fort Monmouth, New Jersey

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

***Charles Wood – Building 2031***

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**NJDEP UST Registration No.: 192486-12**  
**UST No.: 192486-12**

**September 2010**

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

**CHARLES WOOD – BUILDING 2031  
NJDEP UST REGISTRATION NO.: 192486-12**

**SEPTEMBER 2010**

**PROJECT NO.: 10-24949**

**PREPARED FOR:**

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

**PREPARED BY:**

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

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## EXECUTIVE SUMMARY

### UST Closure

On March 1, 2000, a fiberglass wrapped plastic 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. Installed in 1985, the tank was located adjacent to Building 2031 in the Charles Wood area. UST No.: 192486-12 was a 550-gallon, FRP, No. 2 fuel oil tank. The tank with all associated piping was present at the time of removal. 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, of which none were found. No petroleum odors or stained soils were observed in the soils surrounding the tanks.

Closure soil samples were collected after the removal of the UST. Closure samples 2031-A and 2031-B were collected from a total of two (2) locations along the UST bottom of the excavation for the UST No.: 192486-12. Closure sample 2031-C was collected from a location along the UST piping. A duplicate of sample 2031-A was collected. All samples were analyzed for total petroleum hydrocarbons (TPH). Groundwater was not encountered in the bottom of the excavation.

### Findings

The closure soil samples collected from the UST excavation associated UST No.: 192486-12 contained TPH concentrations below the NJDEP health based criterion of 10,000 milligrams per kilogram (mg/kg) for total organic contaminants (N.J.A.C. 7:26E and revisions dated February 3, 1994). All soil samples, including the duplicate, contained a TPH concentration of Not Detected.

### Conclusions and Recommendations

Based on the closure soil sampling results, soils with TPH concentrations exceeding the NJDEP health based criterion of 10,000 mg/kg for total organic contaminants (N.J.A.C. 7:26E and revisions dated February 3, 1994) are not present in the former location of the UST.

**No Further Action** is proposed in regard to the closure and site assessment of UST No.: 192486-12 at Building 2031.

## **1.0 UNDERGROUND STORAGE TANK DECOMMISSIONING ACTIVITIES**

### **1.1 OVERVIEW**

One underground storage tank (UST), New Jersey Department of Environmental Protection (NJDEP) Registration No.: 192486-12 was closed at Building 2031 of the Charles Wood area at U.S. Army Garrison, Fort Monmouth, New Jersey. Refer to site location maps Figure 1 & 2. This report presents the results of the implementation of the Directorate of the Public Work's UST Management Plan, March 1996. Installed in 1985, the UST was a 550-gallon, FRP, containing No. 2 fuel oil for residential use. It was removed on March 1, 2000.

Decommissioning activities for UST No.: 192486-12 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 Site 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)*.

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 UST decommissioning activities. Section 2 describes the site investigation activities. Conclusions and recommendations are presented in Section 3 of this report.

### **1.2 SITE DESCRIPTION**

Building 2031 (Megill Circle) is located in the eastern portion of the Charles Wood area of Fort Monmouth, as shown on Figure 1 & 2. UST No.: 192486-12 and associated piping were located adjacent to the building, as shown on Figure 3.

#### **1.2.1 Geological/Hydrogeological Setting**

The following is a description of the geological/hydrogeological setting of Bldg. 2031. 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 Charles Wood 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 (Zapeczka, 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 encrusted (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 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*

Fort Monmouth has been an operational military facility for in excess of ninety (90) years; and in many areas of Charles Wood, human activities have completely transformed the topography. Currently, 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 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 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 Charles Wood 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-ionizer detector: Thermo Instruments Organic Vapor Monitor (OVM) – Model #580-B. The individual ascertained if the area was properly vented to render the area safe, as defined by OSHA. All work areas were properly vented to insure that there were no contaminants present in the breathing zone above permissible exposure limits (PEL's).

### **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 great regard to safety and health and the 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.

- 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.
- 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 UST. The tank was completely empty and contained no liquids prior to removal from the ground.

After the UST was removed from the excavation, it was staged on an impervious surface, labeled and examined for holes. The Subsurface Evaluator observed no holes in the tank during the inspection. Soils surrounding the UST were screened visually and with an OVM for evidence of contamination. Soil staining or petroleum hydrocarbons were not observed.

### **1.5 UNDERGROUND STORAGE TANK DECOMMISSIONING AND DISPOSAL**

Subsequent to disposal, the UST was purged with air to remove vapors prior to cutting. A 4 feet by 3 feet access hole was made in the UST using a pneumatic ripper gun with a non-sparking bit. The UST was cleaned first with rubber squeegees and adsorbent material broomed on the sidewalls and bottom. The adsorbent material was then drummed and subsequently put 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 for disposal in compliance with all applicable regulations and laws. The UST disposal certification, along with backfilling authorization, is included in Appendix B.

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

If available, photographic documentation of the UST is included in Appendix C.

## **2.0 SITE INVESTIGATION ACTIVITIES**

### **2.1 OVERVIEW**

The Site Investigation was managed by U.S. Army DPW personnel. All analyses were performed and reported by Fort Monmouth Environmental Testing Laboratory, a NJDEP-certified testing laboratory. All sampling was performed by a NJDEP Certified Subsurface Evaluator according to the methods described in the NJDEP *Field Sampling Procedures Manual* (1992). Sampling frequency and parameters analyzed complied with the NJDEP document *Technical Requirements for Site Remediation*, 7:26E-3.9 (June 7, 1993) which was the applicable regulation at the date of the closure. All records of the Site Investigation activities are maintained by the Fort Monmouth DPW Environmental Office.

The following Parties participated in Closure and Site Investigation Activities.

- Ft. Monmouth Directorate of Public Works-Environmental Division  
Contact Person: Joseph Fallon  
Phone Number: (732) 532-6223
- Subsurface Evaluator: Frank Accorsi  
Employer: TECOM-Vinnell Services, Inc. (TVS)  
Phone Number: (732) 532-5241  
NJDEP License No.: 0010042  
(TVS)NJDEP License No.: US252302
- Analytical Laboratory: Fort Monmouth Environmental Testing Laboratory  
Contact Person: Dan Wright  
Phone Number: (732) 532-4359  
NJDEP Laboratory Certification No.: 13461

### **2.2 FIELD SCREENING/MONITORING**

Field screening was performed by a NJDEP certified Subsurface Evaluator using an OVM and visual observations to identify potentially contaminated material, of which none were found.

### **2.3 SOIL SAMPLING**

On March 1, 2000, closure soil samples were collected after the removal of the UST. Closure samples 2031-A and 2031-B were collected from a total of two (2) locations along the UST

bottom of the excavation for the UST No.: 192486-12. Closure sample 2031-C was collected from a location along the UST piping. A duplicate of sample 2031-A was also collected. Refer to soil sampling location map in Figure 3. All samples were analyzed for total petroleum hydrocarbons (TPH). Groundwater was not encountered in the excavation.

The site assessment was performed by TVS personnel in accordance with the NJDEP *Technical Requirements for Site Remediation* and the NJDEP *Field Sampling Procedures Manual*. A summary of sampling activities including parameters analyzed is provided on Table 1. The closure soil samples were collected. 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

Closure soil samples were collected from a total of three locations (which included the duplicate) on March 1, 2000 to evaluate soil conditions following removal of the UST and piping. All samples were analyzed for TPH. The closure soil sample results were compared to the NJDEP health based criterion of 10,000 mg/kg for total organic contaminants (*N.J.A.C. 7:26D* and revisions dated February 3, 1994). A summary of the analytical results and comparison to the NJDEP soil cleanup criteria is provided on Table 2. The analytical data package, including associated quality control data, is provided in Appendix D.

Closure soil samples collected on March 1, 2000 from the UST site excavation contained concentrations of TPH below the NJDEP soil cleanup criteria.

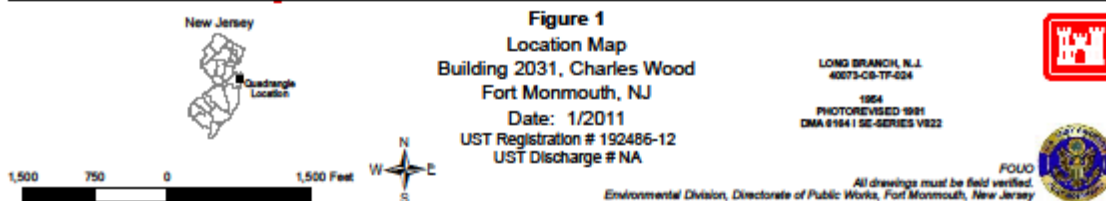
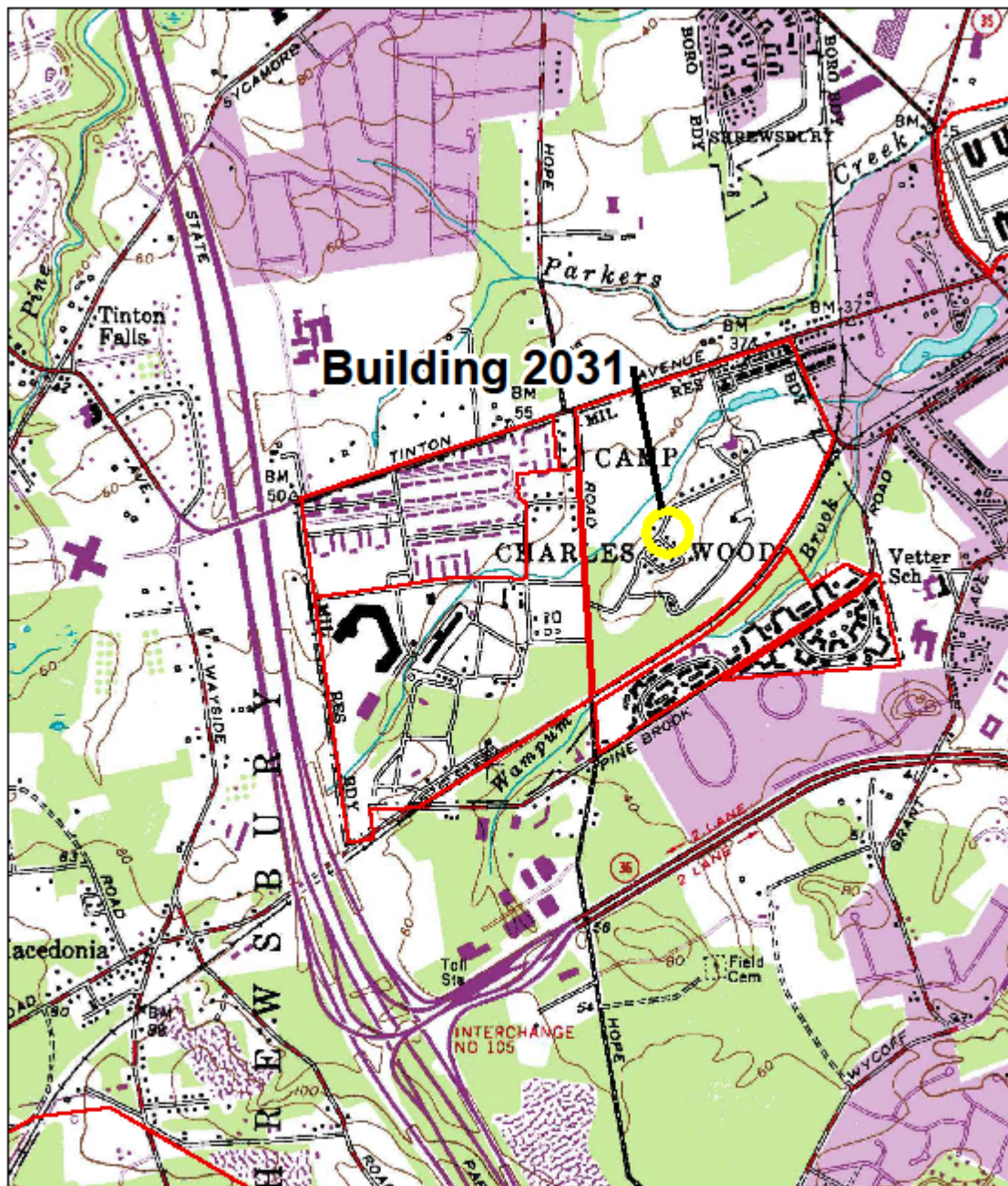
#### 3.2 CONCLUSIONS AND RECOMMENDATIONS

The analytical results for all of closure soil samples collected from the UST closure excavation at UST No.: 192486-12 were Not Detected for total petroleum hydrocarbons.

Based on the closure soil sampling results, soils with TPH concentrations exceeding the NJDEP soil cleanup criterion for total organic contaminants of 10,000 mg/kg are not present in the location of former UST No.: 192486-12.

**No Further Action** is proposed in regard to the closure and site investigation of UST No.: 192486-12 at Building 2031.

# FIGURES

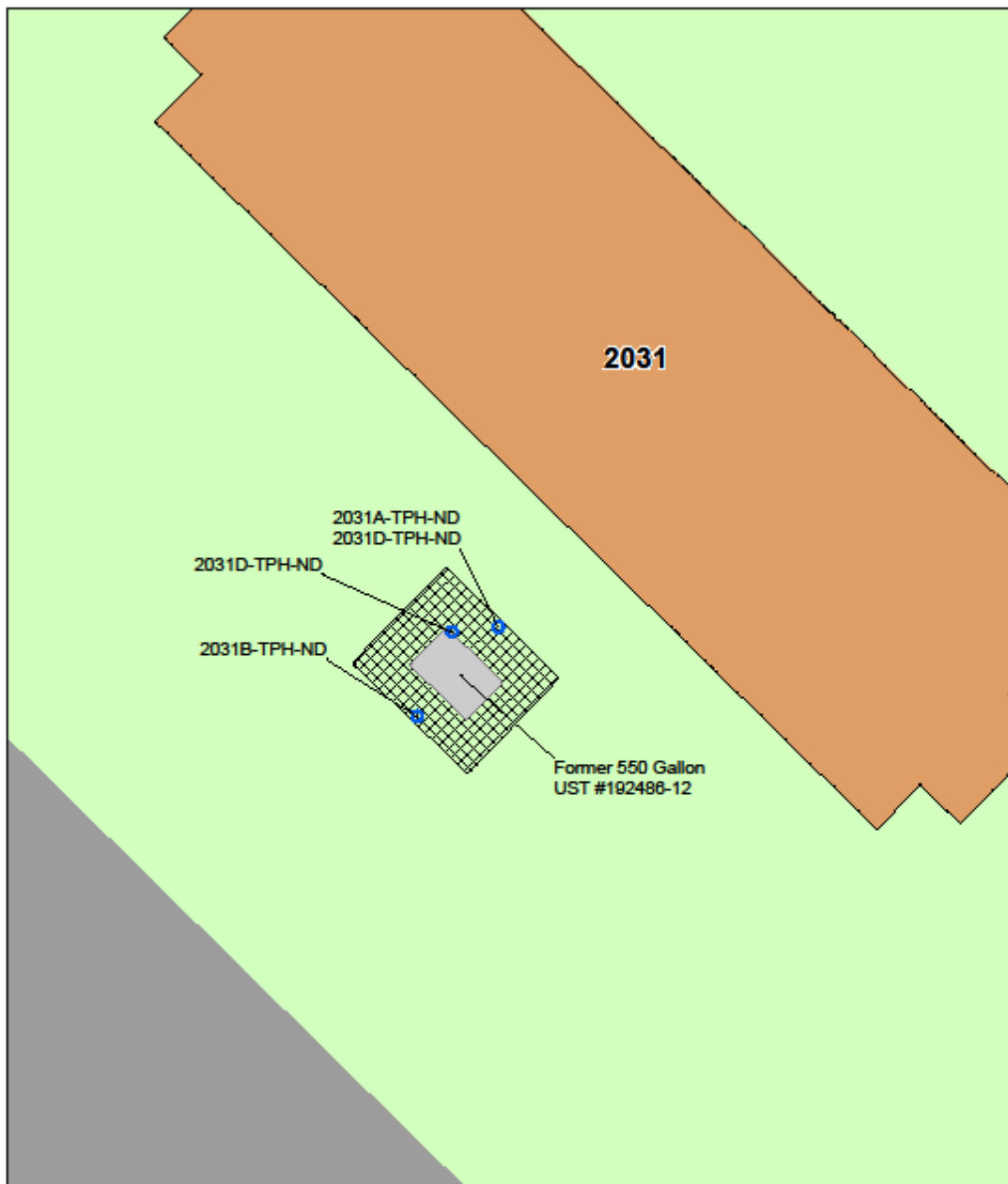






**Figure 2**  
 Location Map  
 Building 2031, Charles Wood Area  
 Fort Monmouth, NJ  
 Date: 1/2011  
 UST Registration # 192486-12  
 UST Discharge # NA





**Legend**  
 UST  
 UST Excavation Limits  
 Soil Sample - 3/1/2000

10 5 0 10 Feet



**Figure 3**  
 Soil Sampling Location Map  
 Building 2031, Charles Wood Area  
 Fort Monmouth, NJ  
 Date: 1/2011  
 UST Registration # 192486-12  
 UST Discharge # NA



All drawings must be field verified.  
 Environmental Division, Directorate of Public Works, Fort Monmouth, New Jersey

# TABLES

# **TABLE 1**

## **SUMMARY OF LABORATORY ANALYSIS** **FT. MONMOUTH, BUILDING 2031, UST No.: 192486-12** **01 March 2000**

| <b>SAMPLE ID</b>        | <b>LABORATORY SAMPLE ID</b> | <b>SAMPLE DATE</b> | <b>SAMPLE MATRIX</b> | <b>ANALYTICAL PARAMETER</b> | <b>ANALYTICAL METHOD</b> |
|-------------------------|-----------------------------|--------------------|----------------------|-----------------------------|--------------------------|
|                         |                             |                    |                      |                             |                          |
| <b>2031-A</b>           | 5215.01                     | 01-Mar-00          | SOIL                 | TPH                         | OQA-QAM-25               |
| <b>2031-B</b>           | 5215.02                     | 01- Mar-00         | SOIL                 | TPH                         | OQA-QAM-25               |
| <b>2031-C</b>           | 5215.03                     | 01-Mar-00          | SOIL                 | TPH                         | OQA-QAM-25               |
| <b>2031-D Duplicate</b> | 5215.04                     | 01-Mar-00          | SOIL                 | TPH                         | OQA-QAM-25               |

### ABBREVIATIONS:

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

## **TABLE 2**

### **SUMMARY OF LABORATORY ANALYTICAL RESULTS**

**FT. MONMOUTH, BUILDING 2031, UST No.: 192486-12**

**01 March 2000**

#### **TOTAL PETROLEUM HYDROCARBONS**

| <b>SAMPLE ID</b>            | <b>LABORATORY<br/>SAMPLE ID</b> | <b>SAMPLE LOCATION</b> | <b>SAMPLE<br/>DEPTH</b> | <b>MATRIX</b> | <b>TPH<br/>RESULT S</b> |
|-----------------------------|---------------------------------|------------------------|-------------------------|---------------|-------------------------|
|                             |                                 |                        | <b>(in feet)</b>        |               | <b>mg/kg</b>            |
| <b>2031-A</b>               | 5215.01                         | NORTH END              | 6.5-7.0                 | Soil          | ND                      |
| <b>2031-B</b>               | 5215.02                         | SOUTH END              | 6.5-7.0                 | Soil          | ND                      |
| <b>2031-C</b>               | 5215.03                         | PIPING                 | 1.5-2.0                 | Soil          | ND                      |
| <b>2031-D<br/>Duplicate</b> | 5215.04                         | DUPLICATE-NORTH END    | 6.5-7.0                 | Soil          | ND                      |

#### ABBREVIATIONS:

mg/kg = Milligrams Per Kilogram = parts per million

ND = Compound Not Detected

**Gray shading** indicates exceedance of NJDEP health based criterion of 10,000 ppm total organic contaminants

# **APPENDIX A**

## **CERTIFICATIONS**

**(NOT AVAILABLE)**

## **APPENDIX B**

### **UST DISPOSAL CERTIFICATE**

DIRECTORATE OF PUBLIC WORKS  
FORT MONMOUTH, NEW JERSEY 07703

Contract Management Division

SUBJECT: PWS-007, Residential UST Removal  
Contractor: TVS Inc.

RE: Backfilling of excavation,

BUILDING #: 2031 (49+51 MERRILL CIR.)

TVS Inc.  
Field Supervisor, PWS-007  
ATTN: Brian Finch  
Building 166  
Fort Monmouth, New Jersey 07703-5000

Dear Mr. Finch:

The above referenced area has been sampled and analyzed as described in the NJDEP Regulations. The results indicate levels of petroleum contamination below the NJDEP allowable limits ~~or that the site requires further investigation outside the scope of this contract.~~ The contractor may proceed with the backfilling of the excavation with stone to groundwater and clean fill to grade as required in the above referenced contract specification.

Regards,



Mr. Dinker Desai  
Environmental Engineer  
Directorate of Public Works

CC: UST file copy





**DEPARTMENT OF THE ARMY**  
Headquarters, U.S. Army Garrison Fort Monmouth  
Fort Monmouth, New Jersey 07703 - 5101



REPLY TO  
ATTENTION OF  
Directorate of Public Works

31 2000

Marpal Disposal Company, Inc.  
P.O. Box 188  
Lincroft, New Jersey 07738

Re: Non-Hazardous Waste Disposal  
Contract No. DAAB07-96-C-8252  
Location: Bldg. 166  
Roll-off container No. 2065  
Size: 30 cubic yards  
USTs from Bldgs: 2022, 2023, 2024, 2025, 2026, 2027, 2028, 2029,  
2030, 2031, 2032, 2033, 2034, 2035, 2036, and 2037

Dear Sirs:

I certify that the above referenced 30 cubic yard roll-off container provided by Marpal, Inc. contains only crushed fiberglass underground storage tanks removed from residential buildings at Fort Monmouth, NJ. The tanks only held No. 2 heating oil. The tanks were cleaned in accordance with acceptable industry standards and NJDEP protocol and then crushed. No free liquids are present in the container.

If you should require any additional information or help at this time, please contact Mr. Dinker Desai, Environmental Engineer, at (732) 532-1475.

Sincerely,

James Ott,  
Director, Public Works

Attachments: None

## **APPENDIX C**

### **PHOTO DOCUMENTATION**

**(NOT AVAILABLE)**

## **APPENDIX D**

# **SOIL ANALYTICAL DATA PACKAGE**

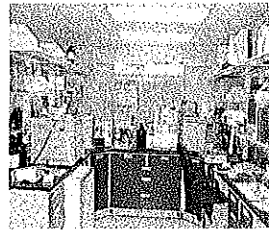
# FORT MONMOUTH ENVIRONMENTAL TESTING LABORATORY

DIRECTORATE OF PUBLIC WORKS

PHONE: (732) 532-6224 FAX: (732) 532-6263

WET-CHEM - METALS - ORGANICS - FIELD SAMPLING

CERTIFICATIONS: NJDEP #13461, NYSDOH #11699



ANALYTICAL DATA REPORT  
Fort Monmouth Environmental Laboratory  
ENVIRONMENTAL DIVISION  
Fort Monmouth, New Jersey  
PROJECT: IJO# 100004

## Bldg. 2031

| Field Sample Location   | Laboratory<br>Sample ID# | Matrix   | Date and Time<br>of Collection | Date Received |
|-------------------------|--------------------------|----------|--------------------------------|---------------|
| 2031-A North End 6.5-7' | 5215.01                  | Soil     | 01-Mar-00 15:00                | 03/01/00      |
| 2031-B South End 6.5-7' | 5215.01                  | Soil     | 01-Mar-00 15:20                | 03/01/00      |
| 2031-C Piping 1.5-2'    | 5215.01                  | Soil     | 01-Mar-00 15:30                | 03/01/00      |
| 2031-D Duplicate        | 5215.01                  | Soil     | 01-Mar-00 15:00                | 03/01/00      |
| Trip Blank              | 5215.01                  | Methanol | 01-Mar-00                      | 03/01/00      |

ANALYSIS:  
FORT MONMOUTH ENVIRONMENTAL LAB  
TPHC, %SOLIDS

ENCLOSURE:  
CHAIN OF CUSTODY  
RESULTS

 3-9-00  
Daniel Wright/Date  
Laboratory Director

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## **Method Summary**

### **NJDEP Method OQA-QAM-025-10/97**

#### **Gas Chromatographic Determination of Total Petroleum Hydrocarbons in Soil**

Fifteen grams (15g)(wet weight) of a soil sample is added to a 125 mL acid cleaned, solvent rinsed, capped Erlenmeyer flask. 15g anhydrous sodium sulfate is added to dry sample. Surrogate standard spiking solution is then added to the flask.

Twenty five milliliters(25mL) Methylene Chloride is added to the flask and it is secured on a orbital shaker table. The agitation rate is set to 400rpm and the sample is shaken for 30 minutes. The flask is the removed from the table and the particulate matter is allowed to settle. The extract is transferred to a Teflon capped vial. A second 25mL of Methylene Chloride is added to the flask and shaken for an additional 30 minutes. The flask is again removed and allowed to settle. The extracts are combined in the vial then transferred to a 1mL autosampler vial.

The extract is then injected directly into a GC-FID for analysis. The sample is analyzed for petroleum hydrocarbons covering a range of C8-C42 including pristane and phytane. Total Petroleum Hydrocarbon concentration is determined by integrating between 5 minutes and 22 minutes. The baseline is established by starting the integration after the end of the solvent peak and stopping after the last peak.

The final concentration of Total Petroleum Hydrocarbons is calculated using percent solid, sample weight and concentration.

000001

## TPHC Conformance/Non-conformance Summary Report

- |                                                                                                                                                                       | Indicate<br>Yes, No, N/A |
|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------|
| 1. Method Detection Limits provided.                                                                                                                                  | <u>Yes</u>               |
| 2. Method Blank Contamination – If yes, list the sample and the corresponding concentrations in each blank.<br>_____<br>_____                                         | <u>NO</u>                |
| 3. Matrix Spike Results Summary Meet Criteria<br>(If not met, list the sample and corresponding recovery which falls outside the acceptable range).<br>_____<br>_____ | <u>Yes</u>               |
| 4. Duplicate Results Summary Meet Criteria<br>(If not met, list the sample and corresponding recovery which falls outside the acceptable range).<br>_____<br>_____    | <u>Yes</u>               |
| 5. IR Spectra submitted for standards, blanks and samples.                                                                                                            | <u>N/A</u>               |
| 6. Chromatograms submitted for standards, blanks and samples if GC fingerprinting was conducted.                                                                      | <u>Yes</u>               |
| 7. Analysis holding time met.<br>(If not met, list number of days exceeded for each sample).<br>_____<br>_____                                                        | <u>Yes</u>               |

Additional comments: \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

  
\_\_\_\_\_  
Laboratory Manager

3/9/00  
\_\_\_\_\_  
Date

000002



Bldg. 173, SELFM-PW-EV, Fort Monmouth, NJ 07703

Tel (732)532-4359 Fax (732)532-6263 EMail:appleby@mail1.monmouth.army.mil

**NJDEP Certification #13461**

## Chain of Custody Record

[illegible]



**Report of Analysis**  
**U.S. Army, Fort Monmouth Environmental Laboratory**  
**NJDEP Certification # 13461**

**Client :** U.S. Army  
 DPW. SELFM-PW-EV  
 Bldg. 173  
 Ft. Monmouth, NJ 07703

**Project # :** 5215  
**Location :** Bldg. 2031  
**UST Reg. # :** 192486-12

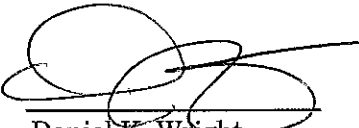
**Analysis :** OQA-QAM-025  
**Matrix :** Soil  
**Inst. ID. :** GC TPHC INST. #1  
**Column Type :** RTX-5, 0.32mm ID, 30M  
**Injection Volume :** 1uL

**Date Received :** 01-Mar-00  
**Date Extracted :** 03-Mar-00  
**Extraction Method :** Shake  
**Analysis Complete :** 06-Mar-00  
**Analyst :** D. Costagliola

| Sample       | Field ID | Dilution Factor | Weight (g) | % Solid | MDL (mg/kg) | TPHC Result (mg/kg) |
|--------------|----------|-----------------|------------|---------|-------------|---------------------|
| 5215.01      | 2031-A   | 1.00            | 15.34      | 87.30   | 175         | ND                  |
| 5215.02      | 2031-B   | 1.00            | 15.40      | 86.25   | 177         | ND                  |
| 5215.03      | 2031-C   | 1.00            | 15.10      | 89.65   | 174         | ND                  |
| 5215.04      | 2031-D   | 1.00            | 15.42      | 87.65   | 174         | ND                  |
|              |          |                 |            |         |             |                     |
|              |          |                 |            |         |             |                     |
|              |          |                 |            |         |             |                     |
|              |          |                 |            |         |             |                     |
|              |          |                 |            |         |             |                     |
|              |          |                 |            |         |             |                     |
|              |          |                 |            |         |             |                     |
|              |          |                 |            |         |             |                     |
|              |          |                 |            |         |             |                     |
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|              |          |                 |            |         |             |                     |
|              |          |                 |            |         |             |                     |
|              |          |                 |            |         |             |                     |
|              |          |                 |            |         |             |                     |
|              |          |                 |            |         |             |                     |
|              |          |                 |            |         |             |                     |
| METHOD BLANK | TBLK336  | 1.00            | 15.00      | 100.00  | 157         | ND                  |

ND = Not Detected

MDL = Method Detection Limit

  
 Daniel K. Wright  
 Laboratory Director

**000004**

## LABORATORY DELIVERABLES CHECKLIST AND NON-CONFORMANCE SUMMARY

THIS FORM MUST BE COMPLETED BY THE LABORATORY OR ENVIRONMENTAL CONSULTANT  
AND ACCOMPANY ALL DATA SUBMISSIONS

The following Laboratory Deliverables checklist and Non-Conformance Summary shall be included in the data submission. All deviations from the accepted methodology and procedures, of performance values outside acceptable ranges shall be summarized in the Non-Conformance Summary. The Technical Requirements for Site Remediation, effective June 7, 1993, provides further details. The document shall be bound and paginated, contain a table of contents, and all pages shall be legible. Incomplete packages will be returned or held without review until the data package is completed.

It is recommended that the analytical results summary sheets listing all targeted and non-targeted compounds with the method detection limits, practical quantitation limits, and the laboratory and/or sample numbers be included in one section of the data package and in the main body of the report.

1. Cover page, Title Page listing Lab Certification #, facility name and address, & date of report submitted ☒
2. Table of Contents submitted ☒
3. Summary Sheets listing analytical results for all targeted and non-targeted compounds submitted ☒
4. Document paginated and legible ☒
5. Chain of Custody submitted ☒
6. Samples submitted to lab within 48 hours of sample collection ☒
7. Methodology Summary submitted ☒
8. Laboratory Chronicle and Holding Time Check submitted ☒
9. Results submitted on a dry weight basis ☒
10. Method Detection Limits submitted ☒
11. Lab certified by NJDEP for parameters of appropriate category of parameters or a member of the USEPA CLP ☒

**PLEASE SIGN  
& DATE**

Laboratory Manager or Environmental Consultant's Signature \_\_\_\_\_  
Date 3/1/00

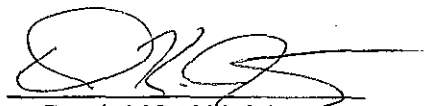
Laboratory Certification #13461

\*Refer to NJAC 7:26E - Appendix A, Section IV - Reduced Data Deliverables - Non-USEPA/CLP  
Methods for further guidance.

000020

## Laboratory Authentication Statement

I certify under penalty of law, where applicable, that this laboratory meets the Laboratory Performance Standards and Quality Control requirements specified in N.J.A.C. 7:18 and 40 CFR Part 136 for Water and Wastewater Analyses and SW-846 for Solid Waste Analysis. I have personally examined the information contained in this report and to the best of my knowledge, I believe that the submitted information is true, accurate, complete and meets the above referenced standards where applicable. I am aware that there are significant penalties for purposefully submitting falsified information, including the possibility of a fine and imprisonment.



Daniel K. Wright  
Laboratory Manager

000021

**Attachment M**  
**UST 2032 Closure Report**

**U.S. Army Garrison**  
Fort Monmouth, New Jersey

---

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

***Charles Wood – Building 2032***

---

**NJDEP UST Registration No.: 192486-13**  
**UST No.: 192486-13**

**September 2010**

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

**CHARLES WOOD – BUILDING 2032  
NJDEP UST REGISTRATION NO.: 192486-13**

**SEPTEMBER 2010**

**PROJECT NO.: 10-24949**

**PREPARED FOR:**

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

**PREPARED BY:**

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

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## EXECUTIVE SUMMARY

### UST Closure

On March 2, 2000, a fiberglass wrapped plastic 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. Installed in 1985, the tank was located adjacent to Building 2032 in the Charles Wood area. UST No.: 192486-13 was a 550-gallon, FRP, No. 2 fuel oil tank. The tank with all associated piping was present at the time of removal. 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, of which none were found. No petroleum odors or stained soils were observed in the soils surrounding the tanks.

Closure soil samples were collected after the removal of the UST. Closure samples 2032-A and 2032-B were collected from a total of two (2) locations along the UST bottom of the excavation for the UST No.: 192486-13. Closure sample 2032-C was collected from a location along the UST piping. A duplicate of sample 2032-A was collected. All samples were analyzed for total petroleum hydrocarbons (TPH). Groundwater was not encountered in the bottom of the excavation.

### Findings

The closure soil samples collected from the UST excavation associated UST No.: 192486-13 contained TPH concentrations below the NJDEP health based criterion of 10,000 milligrams per kilogram (mg/kg) for total organic contaminants (N.J.A.C. 7:26E and revisions dated February 3, 1994). All soil samples, including the duplicate, contained a TPH concentration of Not Detected.

### Conclusions and Recommendations

Based on the closure soil sampling results, soils with TPH concentrations exceeding the NJDEP health based criterion of 10,000 mg/kg for total organic contaminants (N.J.A.C. 7:26E and revisions dated February 3, 1994) are not present in the former location of the UST.

**No Further Action** is proposed in regard to the closure and site assessment of UST No.: 192486-13 at Building 2032.

## **1.0 UNDERGROUND STORAGE TANK DECOMMISSIONING ACTIVITIES**

### **1.1 OVERVIEW**

One underground storage tank (UST), New Jersey Department of Environmental Protection (NJDEP) Registration No.: 192486-13 was closed at Building 2032 of the Charles Wood area at U.S. Army Garrison, Fort Monmouth, New Jersey. Refer to site location maps Figure 1 & 2. This report presents the results of the implementation of the Directorate of the Public Work's UST Management Plan, March 1996. Installed in 1985, the UST was a 550-gallon, FRP, containing No. 2 fuel oil for residential use. It was removed on March 2, 2000.

Decommissioning activities for UST No.: 192486-13 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 Site 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)*.

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 UST decommissioning activities. Section 2 describes the site investigation activities. Conclusions and recommendations are presented in Section 3 of this report.

### **1.2 SITE DESCRIPTION**

Building 2032 (Megill Circle) is located in the Charles Wood area of Fort Monmouth, as shown on Figure 1 & 2. UST No.: 192486-13 and associated piping were located adjacent to the building, as shown on Figure 3.

#### **1.2.1 Geological/Hydrogeological Setting**

The following is a description of the geological/hydrogeological setting of Bldg. 2032. 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 Charles Wood 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 (Zapeczka, 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 encrusted (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 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

Fort Monmouth has been an operational military facility for in excess of ninety (90) years; and in many areas of Charles Wood, human activities have completely transformed the topography. Currently, 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 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 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 Charles Wood 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-ionizer detector: Thermo Instruments Organic Vapor Monitor (OVM) – Model #580-B. The individual ascertained if the area was properly vented to render the area safe, as defined by OSHA. All work areas were properly vented to insure that there were no contaminants present in the breathing zone above permissible exposure limits (PEL’s).

### **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 great regard to safety and health and the 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.

- 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.
- 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 UST. The tank was completely empty and contained no liquids prior to removal from the ground.

After the UST was removed from the excavation, it was staged on an impervious surface, labeled and examined for holes. The Subsurface Evaluator observed no holes in the tank during the inspection. Soils surrounding the UST were screened visually and with an OVM for evidence of contamination. Soil staining or petroleum hydrocarbons were not observed.

### **1.5 UNDERGROUND STORAGE TANK DECOMMISSIONING AND DISPOSAL**

Subsequent to disposal, the UST was purged with air to remove vapors prior to cutting. A 4 feet by 3 feet access hole was made in the UST using a pneumatic ripper gun with a non-sparking bit. The UST was cleaned first with rubber squeegees and adsorbent material broomed on the sidewalls and bottom. The adsorbent material was then drummed and subsequently put 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 for disposal in compliance with all applicable regulations and laws. The UST disposal certification, along with backfilling authorization, is included in Appendix B.

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

If available, photographic documentation of the UST is included in Appendix C.

## **2.0 SITE INVESTIGATION ACTIVITIES**

### **2.1 OVERVIEW**

The Site Investigation was managed by U.S. Army DPW personnel. All analyses were performed and reported by Fort Monmouth Environmental Testing Laboratory, a NJDEP-certified testing laboratory. All sampling was performed by a NJDEP Certified Subsurface Evaluator according to the methods described in the NJDEP *Field Sampling Procedures Manual* (1992). Sampling frequency and parameters analyzed complied with the NJDEP document *Technical Requirements for Site Remediation*, 7:26E-3.9 (June 7, 1993) which was the applicable regulation at the date of the closure. All records of the Site Investigation activities are maintained by the Fort Monmouth DPW Environmental Office.

The following Parties participated in Closure and Site Investigation Activities.

- Ft. Monmouth Directorate of Public Works-Environmental Division  
Contact Person: Joseph Fallon  
Phone Number: (732) 532-6223
- Subsurface Evaluator: Frank Accorsi  
Employer: TECOM-Vinnell Services, Inc. (TVS)  
Phone Number: (732) 532-5241  
NJDEP License No.: 0010042  
(TVS)NJDEP License No.: US252302
- Analytical Laboratory: Fort Monmouth Environmental Testing Laboratory  
Contact Person: Dan Wright  
Phone Number: (732) 532-4359  
NJDEP Laboratory Certification No.: 13461

### **2.2 FIELD SCREENING/MONITORING**

Field screening was performed by a NJDEP certified Subsurface Evaluator using an OVM and visual observations to identify potentially contaminated material, of which none were found.

### **2.3 SOIL SAMPLING**

On March 2, 2000, closure soil samples were collected after the removal of the UST. Closure samples 2032-A and 2032-B were collected from a total of two (2) locations along the UST bottom of the excavation for the UST No.: 192486-13. Closure sample 2032-C was collected from a location along the UST piping. A duplicate of sample 2032-A was also collected.



Refer to soil sampling location map in Figure 3. All samples were analyzed for total petroleum hydrocarbons (TPH). Groundwater was not encountered in the excavation.

The site assessment was performed by TVS personnel in accordance with the NJDEP *Technical Requirements for Site Remediation* and the NJDEP *Field Sampling Procedures Manual*. A summary of sampling activities including parameters analyzed is provided on Table 1. The closure soil samples were collected. 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

Closure soil samples were collected from a total of three locations (which included the duplicate) on March 2, 2000 to evaluate soil conditions following removal of the UST and piping. All samples were analyzed for TPH. The closure soil sample results were compared to the NJDEP health based criterion of 10,000 mg/kg for total organic contaminants (*N.J.A.C. 7:26D* and revisions dated February 3, 1994). A summary of the analytical results and comparison to the NJDEP soil cleanup criteria is provided on Table 2. The analytical data package, including associated quality control data, is provided in Appendix D.

Closure soil samples collected on March 2, 2000 from the UST site excavation contained concentrations of TPH below the NJDEP soil cleanup criteria.

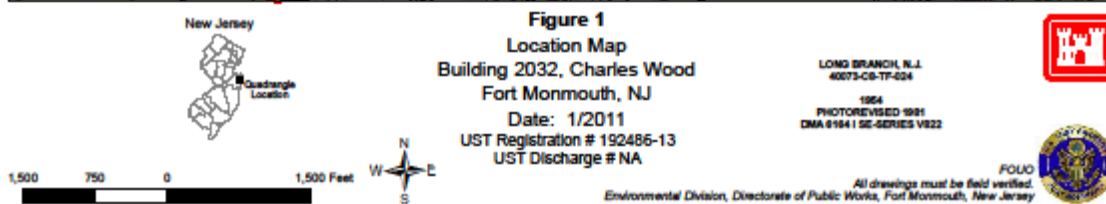
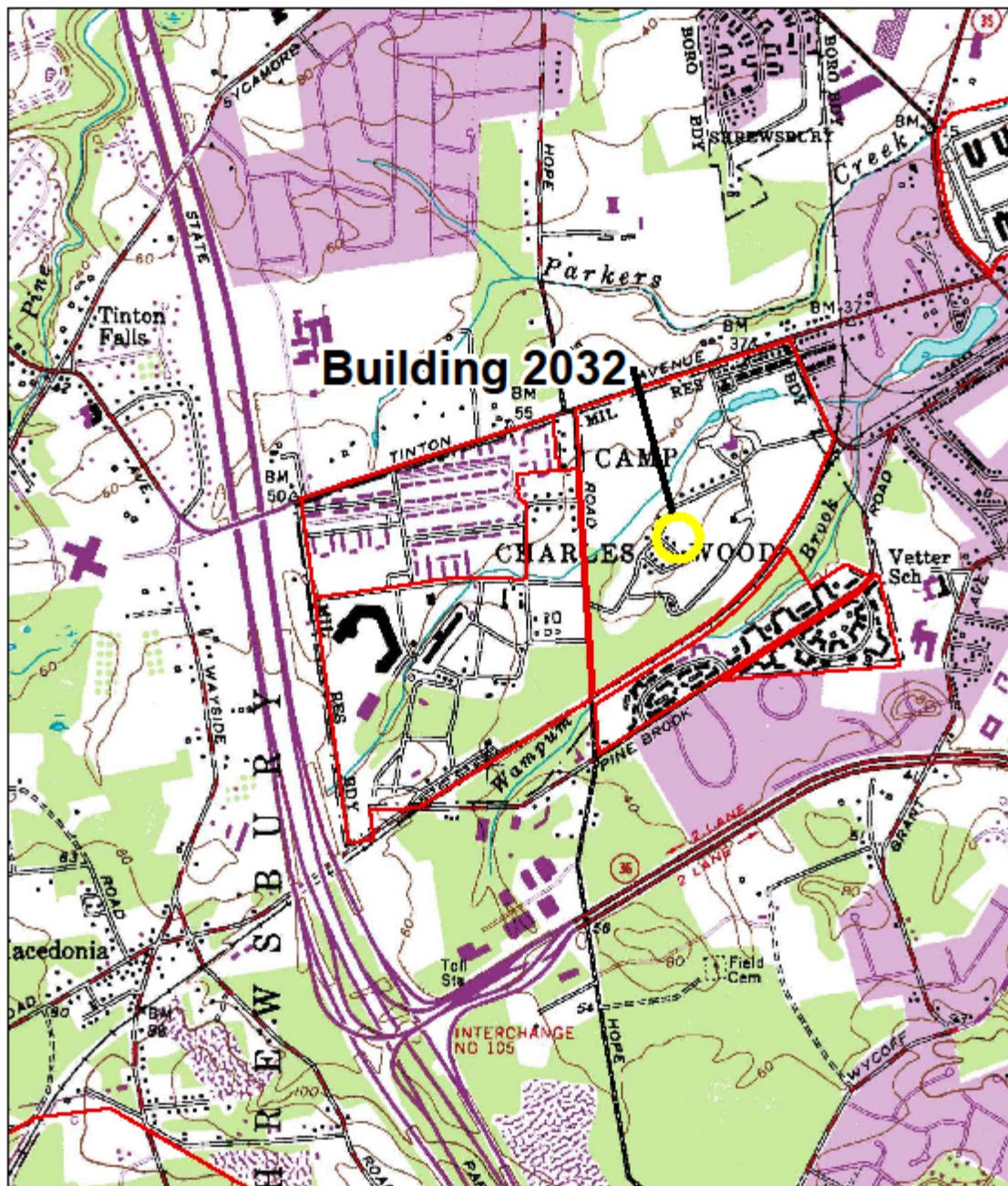
#### 3.2 CONCLUSIONS AND RECOMMENDATIONS

The analytical results for all of closure soil samples collected from the UST closure excavation at UST No.: 192486-13 were Not Detected for total petroleum hydrocarbons.

Based on the closure soil sampling results, soils with TPH concentrations exceeding the NJDEP soil cleanup criterion for total organic contaminants of 10,000 mg/kg are not present in the location of former UST No.: 192486-13.

**No Further Action** is proposed in regard to the closure and site investigation of UST No.: 192486-13 at Building 2032.

# FIGURES





**Figure 2**  
 Location Map  
 Building 2032, Charles Wood Area  
 Fort Monmouth, NJ  
 Date: 1/2011  
 UST Registration # 192486-13  
 UST Discharge # NA



FOUO  
 All drawings must be field verified.  
 Environmental Division, Directorate of Public Works, Fort Monmouth, New Jersey





**Legend**  
 [Grey Box] UST  
 [Cross-hatched Box] UST Excavation Limits  
 [Blue Dot with 'x'] Soil Sample - 3/2/2000

10 5 0 10 Feet



**Figure 3**  
 Soil Sampling Location Map  
 Building 2032, Charles Wood Area  
 Fort Monmouth, NJ  
 Date: 1/2011  
 UST Registration # 192486-13  
 UST Discharge # NA



All drawings must be field verified.  
 FOUO  
 Environmental Division, Directorate of Public Works, Fort Monmouth, New Jersey

# TABLES

# **TABLE 1**

## **SUMMARY OF LABORATORY ANALYSIS** **FT. MONMOUTH, BUILDING 2032, UST No.: 192486-13** **02 March 2000**

| <b>SAMPLE ID</b>        | <b>LABORATORY SAMPLE ID</b> | <b>SAMPLE DATE</b> | <b>SAMPLE MATRIX</b> | <b>ANALYTICAL PARAMETER</b> | <b>ANALYTICAL METHOD</b> |
|-------------------------|-----------------------------|--------------------|----------------------|-----------------------------|--------------------------|
|                         |                             |                    |                      |                             |                          |
| <b>2032-A</b>           | 5216.01                     | 02-Mar-00          | SOIL                 | TPH                         | OQA-QAM-25               |
| <b>2032-B</b>           | 5216.02                     | 02-Mar-00          | SOIL                 | TPH                         | OQA-QAM-25               |
| <b>2032-C</b>           | 5216.03                     | 02-Mar-00          | SOIL                 | TPH                         | OQA-QAM-25               |
| <b>2032-D Duplicate</b> | 5216.04                     | 02-Mar-00          | SOIL                 | TPH                         | OQA-QAM-25               |

### ABBREVIATIONS:

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

## **TABLE 2**

### **SUMMARY OF LABORATORY ANALYTICAL RESULTS**

**FT. MONMOUTH, BUILDING 2032, UST No.: 192486-13**

**02 March 2000**

#### **TOTAL PETROLEUM HYDROCARBONS**

| <b>SAMPLE ID</b>            | <b>LABORATORY<br/>SAMPLE ID</b> | <b>SAMPLE LOCATION</b> | <b>SAMPLE<br/>DEPTH</b> | <b>MATRIX</b> | <b>TPH<br/>RESULT S</b> |
|-----------------------------|---------------------------------|------------------------|-------------------------|---------------|-------------------------|
|                             |                                 |                        | <b>(in feet)</b>        |               | <b>mg/kg</b>            |
| <b>2032-A</b>               | 5216.01                         | EAST END               | 7.0-7.5                 | Soil          | ND                      |
| <b>2032-B</b>               | 5216.02                         | WEST END               | 7.0-7.5                 | Soil          | ND                      |
| <b>2032-C</b>               | 5216.03                         | PIPING                 | 2.0-2.5                 | Soil          | ND                      |
| <b>2032-D<br/>Duplicate</b> | 5216.04                         | DUPLICATE-EAST END     | 7.0-7.5                 | Soil          | ND                      |

#### ABBREVIATIONS:

mg/kg = Milligrams Per Kilogram = parts per million

ND = Compound Not Detected

Gray shading indicates exceedance of NJDEP health based criterion of 10,000 ppm total organic contaminants



**APPENDIX A**

**CERTIFICATIONS**

**(NOT AVAILABLE)**

## **APPENDIX B**

### **UST DISPOSAL CERTIFICATE**

**DIRECTORATE OF PUBLIC WORKS  
FORT MONMOUTH, NEW JERSEY 07703**

Contract Management Division

SUBJECT: PWS-007, Residential UST Removal  
Contractor: TVS Inc.

RE: Backfilling of excavation,

BUILDING #: 2032(45+47 MEILL CIR.)

TVS Inc.  
Field Supervisor, PWS-007  
ATTN: Brian Finch  
Building 166  
Fort Monmouth, New Jersey 07703-5000

Dear Mr. Finch:

The above referenced area has been sampled and analyzed as described in the NJDEP Regulations. The results indicate levels of petroleum contamination below the NJDEP allowable limits ~~or that the site requires further investigation outside the scope of this contract.~~ The contractor may proceed with the backfilling of the excavation with stone to groundwater and clean fill to grade as required in the above referenced contract specification.

Regards,



Mr. Dinker Desai  
Environmental Engineer  
Directorate of Public Works

CC: UST file copy



**DEPARTMENT OF THE ARMY**  
Headquarters, U.S. Army Garrison Fort Monmouth  
Fort Monmouth, New Jersey 07703 - 5101



REPLY TO  
ATTENTION OF  
Directorate of Public Works

MAR 31 2000

Marpal Disposal Company, Inc.  
P.O. Box 188  
Lincroft, New Jersey 07738

Re: Non-Hazardous Waste Disposal  
Contract No. DAAB07-96-C-8252  
Location: Bldg. 166  
Roll-off container No. 2065  
Size: 30 cubic yards  
USTs from Bldgs: 2022, 2023, 2024, 2025, 2026, 2027, 2028, 2029,  
2030, 2031, 2032, 2033, 2034, 2035, 2036, and 2037

Dear Sirs:

I certify that the above referenced 30 cubic yard roll-off container provided by Marpal, Inc. contains only crushed fiberglass underground storage tanks removed from residential buildings at Fort Monmouth, NJ. The tanks only held No. 2 heating oil. The tanks were cleaned in accordance with acceptable industry standards and NJDEP protocol and then crushed. No free liquids are present in the container.

If you should require any additional information or help at this time, please contact Mr. Dinker Desai, Environmental Engineer, at (732) 532-1475.

Sincerely,

James Ott,  
Director, Public Works

Attachments: None

## **APPENDIX C**

# **PHOTO DOCUMENTATION**

**(NOT AVAILABLE)**

## **APPENDIX D**

### **SOIL ANALYTICAL DATA PACKAGE**

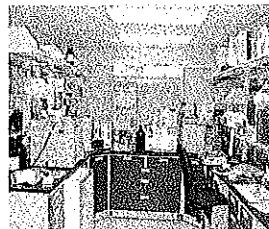
# FORT MONMOUTH ENVIRONMENTAL TESTING LABORATORY

DIRECTORATE OF PUBLIC WORKS

PHONE: (732) 532-6224 FAX: (732) 532-6263

WET-CHEM - METALS - ORGANICS - FIELD SAMPLING

CERTIFICATIONS: NJDEP #13461, NYSDOH #11699



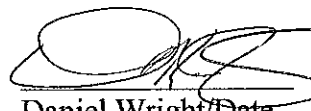
ANALYTICAL DATA REPORT  
Fort Monmouth Environmental Laboratory  
ENVIRONMENTAL DIVISION  
Fort Monmouth, New Jersey  
PROJECT: IJO# 100004

**Bldg. 2032**

| Field Sample Location  | Laboratory Sample ID# | Matrix   | Date and Time of Collection | Date Received |
|------------------------|-----------------------|----------|-----------------------------|---------------|
| 2032-A East End 7-7.5' | 5216.01               | Soil     | 02-Mar-00 09:30             | 03/02/00      |
| 2032-B West End 7-7.5' | 5216.01               | Soil     | 02-Mar-00 09:40             | 03/02/00      |
| 2032-C Piping 2-2.5'   | 5216.01               | Soil     | 02-Mar-00 09:50             | 03/02/00      |
| 2032-D Duplicate       | 5216.01               | Soil     | 02-Mar-00 09:30             | 03/02/00      |
| Trip Blank             | 5216.01               | Methanol | 02-Mar-00                   | 03/02/00      |

ANALYSIS:  
FORT MONMOUTH ENVIRONMENTAL LAB  
TPHC, %SOLIDS

ENCLOSURE:  
CHAIN OF CUSTODY  
RESULTS

 3-9-00  
Daniel Wright/Date  
Laboratory Director

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## **Method Summary**

### **NJDEP Method OQA-QAM-025-10/97**

#### **Gas Chromatographic Determination of Total Petroleum Hydrocarbons in Soil**

Fifteen grams (15g)(wet weight) of a soil sample is added to a 125 mL acid cleaned, solvent rinsed, capped Erlenmeyer flask. 15g anhydrous sodium sulfate is added to dry sample. Surrogate standard spiking solution is then added to the flask.

Twenty five milliliters(25mL) Methylene Chloride is added to the flask and it is secured on a orbital shaker table. The agitation rate is set to 400rpm and the sample is shaken for 30 minutes. The flask is the removed from the table and the particulate matter is allowed to settle. The extract is transferred to a Teflon capped vial. A second 25mL of Methylene Chloride is added to the flask and shaken for an additional 30 minutes. The flask is again removed and allowed to settle. The extracts are combined in the vial then transferred to a 1mL autosampler vial.

The extract is then injected directly into a GC-FID for analysis. The sample is analyzed for petroleum hydrocarbons covering a range of C8-C42 including pristane and phytane. Total Petroleum Hydrocarbon concentration is determined by integrating between 5 minutes and 22 minutes. The baseline is established by starting the integration after the end of the solvent peak and stopping after the last peak.

The final concentration of Total Petroleum Hydrocarbons is calculated using percent solid, sample weight and concentration.

000001

## TPHC Conformance/Non-conformance Summary Report

Indicate  
Yes, No, N/A

1. Method Detection Limits provided. Yes
2. Method Blank Contamination – If yes, list the sample and the corresponding concentrations in each blank. No  
\_\_\_\_\_  
\_\_\_\_\_
3. Matrix Spike Results Summary Meet Criteria Yes  
(If not met, list the sample and corresponding recovery which falls outside the acceptable range).  
\_\_\_\_\_  
\_\_\_\_\_
4. Duplicate Results Summary Meet Criteria yes  
(If not met, list the sample and corresponding recovery which falls outside the acceptable range).  
\_\_\_\_\_  
\_\_\_\_\_
5. IR Spectra submitted for standards, blanks and samples. NA
6. Chromatograms submitted for standards, blanks and samples if GC fingerprinting was conducted. yes
7. Analysis holding time met. yes  
(If not met, list number of days exceeded for each sample).  
\_\_\_\_\_  
\_\_\_\_\_

Additional comments: \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

  
Laboratory Manager

3-9-00  
Date

000002



# Fort Monmouth Environmental Testing Laboratory

Bldg. 173, SELFM-PW-EV, Fort Monmouth, NJ 07703

Tel (732)532-4359 Fax (732)532-6263 EMail:appleby@mail1.monmouth.army.mil

NJDEP Certification #13461

## Chain of Custody Record

[illegible]

**Report of Analysis**  
**U.S. Army, Fort Monmouth Environmental Laboratory**  
**NJDEP Certification # 13461**

**Client :** U.S. Army  
DPW. SELFM-PW-EV  
Bldg. 173  
Ft. Monmouth, NJ 07703

**Project # :** 5216  
**Location :** Bldg. 2032  
**UST Reg. # :** 192486-13

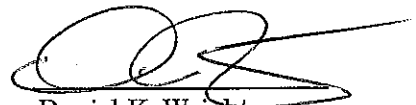
**Analysis :** OQA-QAM-025  
**Matrix :** Soil  
**Inst. ID. :** GC TPHC INST. #1  
**Column Type :** RTX-5, 0.32mm ID, 30M  
**Injection Volume :** 1uL

**Date Received :** 02-Mar-00  
**Date Extracted :** 03-Mar-00  
**Extraction Method :** Shake  
**Analysis Complete :** 06-Mar-00  
**Analyst :** D. Costagliola

| Sample       | Field ID | Dilution Factor | Weight (g) | % Solid | MDL (mg/kg) | TPHC Result (mg/kg) |
|--------------|----------|-----------------|------------|---------|-------------|---------------------|
| 5216.01      | 2032-A   | 1.00            | 15.18      | 91.78   | 169         | ND                  |
| 5216.02      | 2032-B   | 1.00            | 15.04      | 87.27   | 179         | ND                  |
| 5216.03      | 2032-C   | 1.00            | 15.12      | 88.41   | 176         | ND                  |
| 5216.04      | 2032-D   | 1.00            | 15.20      | 91.78   | 168         | ND                  |
|              |          |                 |            |         |             |                     |
|              |          |                 |            |         |             |                     |
|              |          |                 |            |         |             |                     |
|              |          |                 |            |         |             |                     |
|              |          |                 |            |         |             |                     |
|              |          |                 |            |         |             |                     |
|              |          |                 |            |         |             |                     |
|              |          |                 |            |         |             |                     |
|              |          |                 |            |         |             |                     |
|              |          |                 |            |         |             |                     |
|              |          |                 |            |         |             |                     |
|              |          |                 |            |         |             |                     |
|              |          |                 |            |         |             |                     |
|              |          |                 |            |         |             |                     |
| METHOD BLANK | TBLK336  | 1.00            | 15.00      | 100.00  | 157         | ND                  |

ND = Not Detected

MDL = Method Detection Limit

  
Daniel K. Wright  
Laboratory Director

**000004**

## LABORATORY DELIVERABLES CHECKLIST AND NON-CONFORMANCE SUMMARY

THIS FORM MUST BE COMPLETED BY THE LABORATORY OR ENVIRONMENTAL CONSULTANT  
AND ACCOMPANY ALL DATA SUBMISSIONS

The following Laboratory Deliverables checklist and Non-Conformance Summary shall be included in the data submission. All deviations from the accepted methodology and procedures, of performance values outside acceptable ranges shall be summarized in the Non-Conformance Summary. The Technical Requirements for Site Remediation, effective June 7, 1993, provides further details. The document shall be bound and paginated, contain a table of contents, and all pages shall be legible. Incomplete packages will be returned or held without review until the data package is completed.

It is recommended that the analytical results summary sheets listing all targeted and non-targeted compounds with the method detection limits, practical quantitation limits, and the laboratory and/or sample numbers be included in one section of the data package and in the main body of the report.

1. Cover page, Title Page listing Lab Certification #, facility name and address, & date of report submitted ☒
2. Table of Contents submitted ☒
3. Summary Sheets listing analytical results for all targeted and non-targeted compounds submitted ☒
4. Document paginated and legible ☒
5. Chain of Custody submitted ☒
6. Samples submitted to lab within 48 hours of sample collection ☒
7. Methodology Summary submitted ☒
8. Laboratory Chronicle and Holding Time Check submitted ☒
9. Results submitted on a dry weight basis ☒
10. Method Detection Limits submitted ☒
11. Lab certified by NJDEP for parameters of appropriate category of parameters or a member of the USEPA CLP ☒

Laboratory Manager or Environmental Consultant's Signature  
Date 3/9/00

Laboratory Certification #13461

\*Refer to NJAC 7:26E - Appendix A, Section IV - Reduced Data Deliverables - Non-USEPA/CLP  
Methods for further guidance.

000020

## Laboratory Authentication Statement

I certify under penalty of law, where applicable, that this laboratory meets the Laboratory Performance Standards and Quality Control requirements specified in N.J.A.C. 7:18 and 40 CFR Part 136 for Water and Wastewater Analyses and SW-846 for Solid Waste Analysis. I have personally examined the information contained in this report and to the best of my knowledge, I believe that the submitted information is true, accurate, complete and meets the above referenced standards where applicable. I am aware that there are significant penalties for purposefully submitting falsified information, including the possibility of a fine and imprisonment.



---

Daniel K. Wright  
Laboratory Manager

000021

**Attachment N**  
**UST 2033 Closure Report**

**U.S. Army Garrison**  
Fort Monmouth, New Jersey

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

***Charles Wood – Building 2033***

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**NJDEP UST Registration No.: 192486-14**  
**UST No.: 192486-14**

**September 2010**



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

**CHARLES WOOD – BUILDING 2033  
NJDEP UST REGISTRATION NO.: 192486-14**

**SEPTEMBER 2010**

**PROJECT NO.: 10-24949**

**PREPARED FOR:**

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

**PREPARED BY:**

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

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## EXECUTIVE SUMMARY

### UST Closure

On March 17, 2000, a fiberglass wrapped plastic 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. Installed in 1985, the tank was located adjacent to Building 2033 in Charles Wood area. UST No.: 192486-14 was a 550-gallon, FRP, No. 2 fuel oil tank. The tank with all associated piping was present at the time of removal. 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, of which none were found. No petroleum odors or stained soils were observed in the soils surrounding the tanks.

Closure soil samples were collected after the removal of the UST. Closure samples 2033-A and 2033-B were collected from a total of two (2) locations along the UST bottom of the excavation for the UST No.: 192486-14. Closure sample 2033-C was collected from a location along the UST piping. A duplicate of sample 2033-A was collected. All samples were analyzed for total petroleum hydrocarbons (TPH). Groundwater was not encountered in the bottom of the excavation.

### Findings

The closure soil samples collected from the UST excavation associated UST No.: 192486-14 contained TPH concentrations below the NJDEP health based criterion of 10,000 milligrams per kilogram (mg/kg) for total organic contaminants (N.J.A.C. 7:26E and revisions dated February 3, 1994). All soil samples, including the duplicate, contained a TPH concentration of Not Detected.

### Conclusions and Recommendations

Based on the closure soil sampling results, soils with TPH concentrations exceeding the NJDEP health based criterion of 10,000 mg/kg for total organic contaminants (N.J.A.C. 7:26E and revisions dated February 3, 1994) are not present in the former location of the UST.

**No Further Action** is proposed in regard to the closure and site assessment of UST No.: 192486-14 at Building 2033.

## **1.0 UNDERGROUND STORAGE TANK DECOMMISSIONING ACTIVITIES**

### **1.1 OVERVIEW**

One underground storage tank (UST), New Jersey Department of Environmental Protection (NJDEP) Registration No.: 192486-14 was closed at Building 2033 of the Charles Wood area at U.S. Army Garrison, Fort Monmouth, New Jersey. Refer to site location maps Figure 1 & 2. This report presents the results of the implementation of the Directorate of the Public Work's UST Management Plan, March 1996. Installed in 1985, the UST was a 550-gallon, FRP, containing No.2 fuel oil for residential use. It was removed on March 17, 2000.

Decommissioning activities for UST No.: 192486-14 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 Site 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)*.

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 UST decommissioning activities. Section 2 describes the site investigation activities. Conclusions and recommendations are presented in Section 3 of this report.

### **1.2 SITE DESCRIPTION**

Building 2033 (Megill Circle) is located in the Charles Wood area of Fort Monmouth, as shown on Figure 1 & 2. UST No.: 192486-14 and associated piping were located adjacent to the building, as shown on Figure 3.

#### **1.2.1 Geological/Hydrogeological Setting**

The following is a description of the geological/hydrogeological setting of Bldg. 2033. 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 Charles Wood 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 (Zapeczka, 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 encrusted (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 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

Fort Monmouth has been an operational military facility for in excess of ninety (90) years; and in many areas of Charles Wood, human activities have completely transformed the topography. Currently, 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 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 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 Charles Wood 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-ionizer detector: Thermo Instruments Organic Vapor Monitor (OVM) – Model #580-B. The individual ascertained if the area was properly vented to render the area safe, as defined by OSHA. All work areas were properly vented to insure that there were no contaminants present in the breathing zone above permissible exposure limits (PEL's).

### **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 great regard to safety and health and the 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.

- 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.
- 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 UST. The tank was completely empty and contained no liquids prior to removal from the ground.

After the UST was removed from the excavation, it was staged on an impervious surface, labeled and examined for holes. The Subsurface Evaluator observed no holes in the tank during the inspection. Soils surrounding the UST were screened visually and with an OVM for evidence of contamination. Soil staining or petroleum hydrocarbons were not observed.

### **1.5 UNDERGROUND STORAGE TANK DECOMMISSIONING AND DISPOSAL**

Subsequent to disposal, the UST was purged with air to remove vapors prior to cutting. A 4 feet by 3 feet access hole was made in the UST using a pneumatic ripper gun with a non-sparking bit. The UST was cleaned first with rubber squeegees and adsorbent material broomed on the sidewalls and bottom. The adsorbent material was then drummed and subsequently put 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 for disposal in compliance with all applicable regulations and laws. The UST disposal certification, along with backfilling authorization, is included in Appendix B.

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

If available, photographic documentation of the UST is included in Appendix C.

## **2.0 SITE INVESTIGATION ACTIVITIES**

### **2.1 OVERVIEW**

The Site Investigation was managed by U.S. Army DPW personnel. All analyses were performed and reported by Fort Monmouth Environmental Testing Laboratory, a NJDEP-certified testing laboratory. All sampling was performed by a NJDEP Certified Subsurface Evaluator according to the methods described in the NJDEP *Field Sampling Procedures Manual* (1992). Sampling frequency and parameters analyzed complied with the NJDEP document *Technical Requirements for Site Remediation*, 7:26E-3.9 (June 7, 1993) which was the applicable regulation at the date of the closure. All records of the Site Investigation activities are maintained by the Fort Monmouth DPW Environmental Office.

The following Parties participated in Closure and Site Investigation Activities.

- Ft. Monmouth Directorate of Public Works-Environmental Division  
Contact Person: Joseph Fallon  
Phone Number: (732) 532-6223
- Subsurface Evaluator: Frank Accorsi  
Employer: TECOM-Vinnell Services, Inc. (TVS)  
Phone Number: (732) 532-5241  
NJDEP License No.: 0010042  
(TVS)NJDEP License No.: US252302
- Analytical Laboratory: Fort Monmouth Environmental Testing Laboratory  
Contact Person: Dan Wright  
Phone Number: (732) 532-4359  
NJDEP Laboratory Certification No.: 13461

### **2.2 FIELD SCREENING/MONITORING**

Field screening was performed by a NJDEP certified Subsurface Evaluator using an OVM and visual observations to identify potentially contaminated material, of which none were found.

### **2.3 SOIL SAMPLING**

On March 17, 2000, closure soil samples were collected after the removal of the UST. Closure samples 2033-A and 2033-B were collected from a total of two (2) locations along the UST bottom of the excavation for the UST No.: 192486-14. Closure sample 2033-C was collected from a location along the UST piping. A duplicate of sample 2033-A was also collected.

Refer to soil sampling location map in Figure 3. All samples were analyzed for total petroleum hydrocarbons (TPH). Groundwater was not encountered in the excavation.

The site assessment was performed by TVS personnel in accordance with the NJDEP *Technical Requirements for Site Remediation* and the NJDEP *Field Sampling Procedures Manual*. A summary of sampling activities including parameters analyzed is provided on Table 1. The closure soil samples were collected. 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

Closure soil samples were collected from a total of three locations (which included the duplicate) on March 17, 2000 to evaluate soil conditions following removal of the UST and piping. All samples were analyzed for TPH. The closure soil sample results were compared to the NJDEP health based criterion of 10,000 mg/kg for total organic contaminants (*N.J.A.C. 7:26D* and revisions dated February 3, 1994). A summary of the analytical results and comparison to the NJDEP soil cleanup criteria is provided on Table 2. The analytical data package, including associated quality control data, is provided in Appendix D.

Closure soil samples collected on March 17, 2000 from the UST site excavation contained concentrations of TPH below the NJDEP soil cleanup criteria.

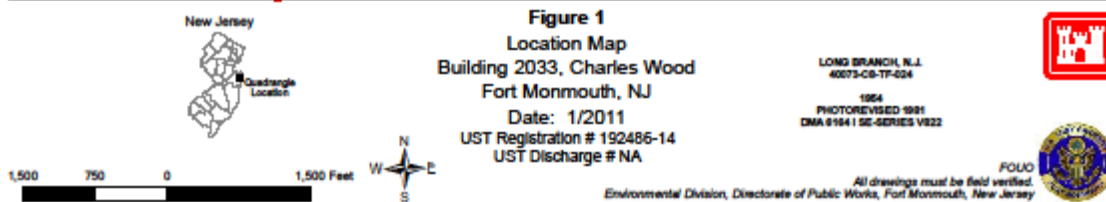
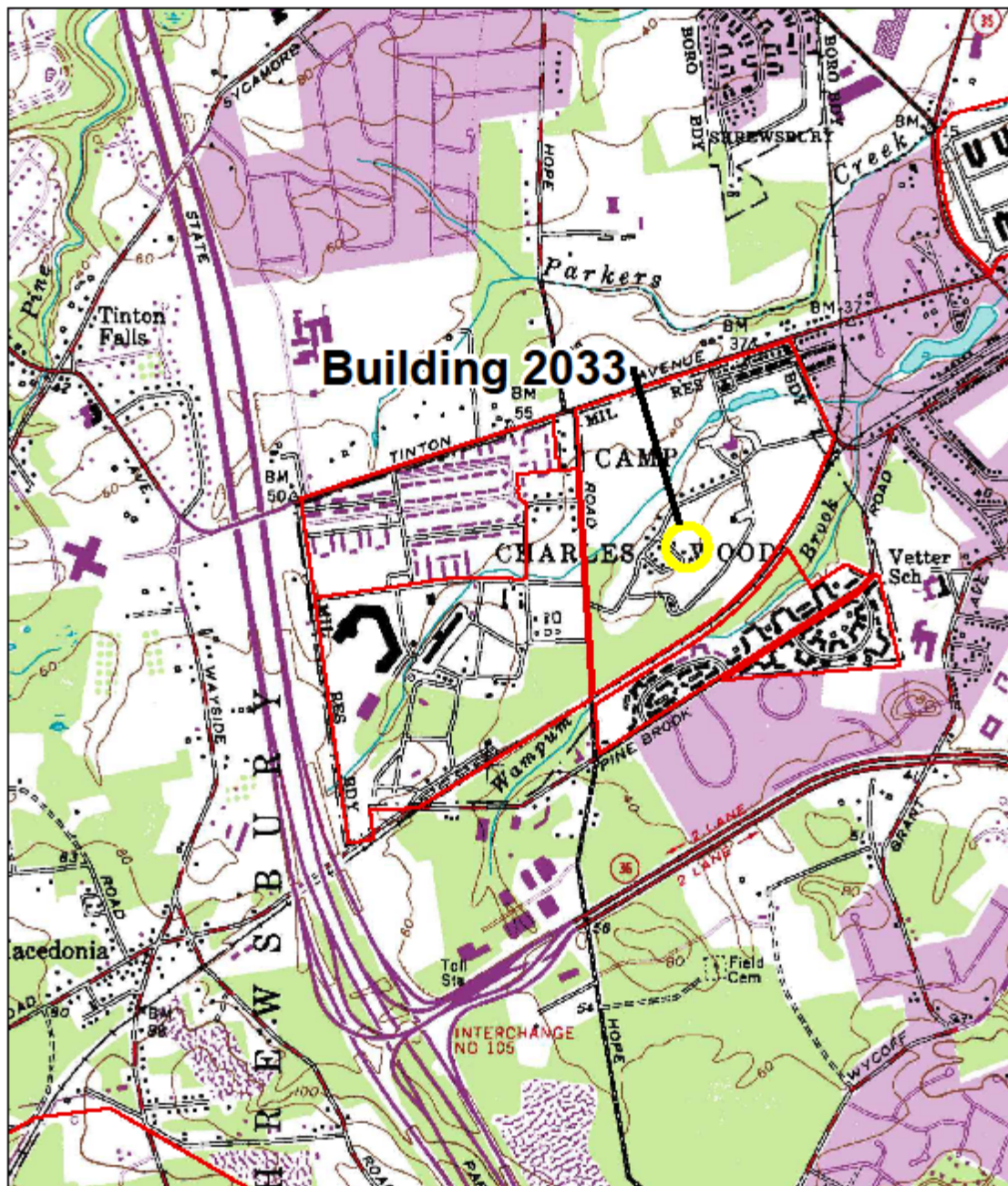
#### 3.2 CONCLUSIONS AND RECOMMENDATIONS

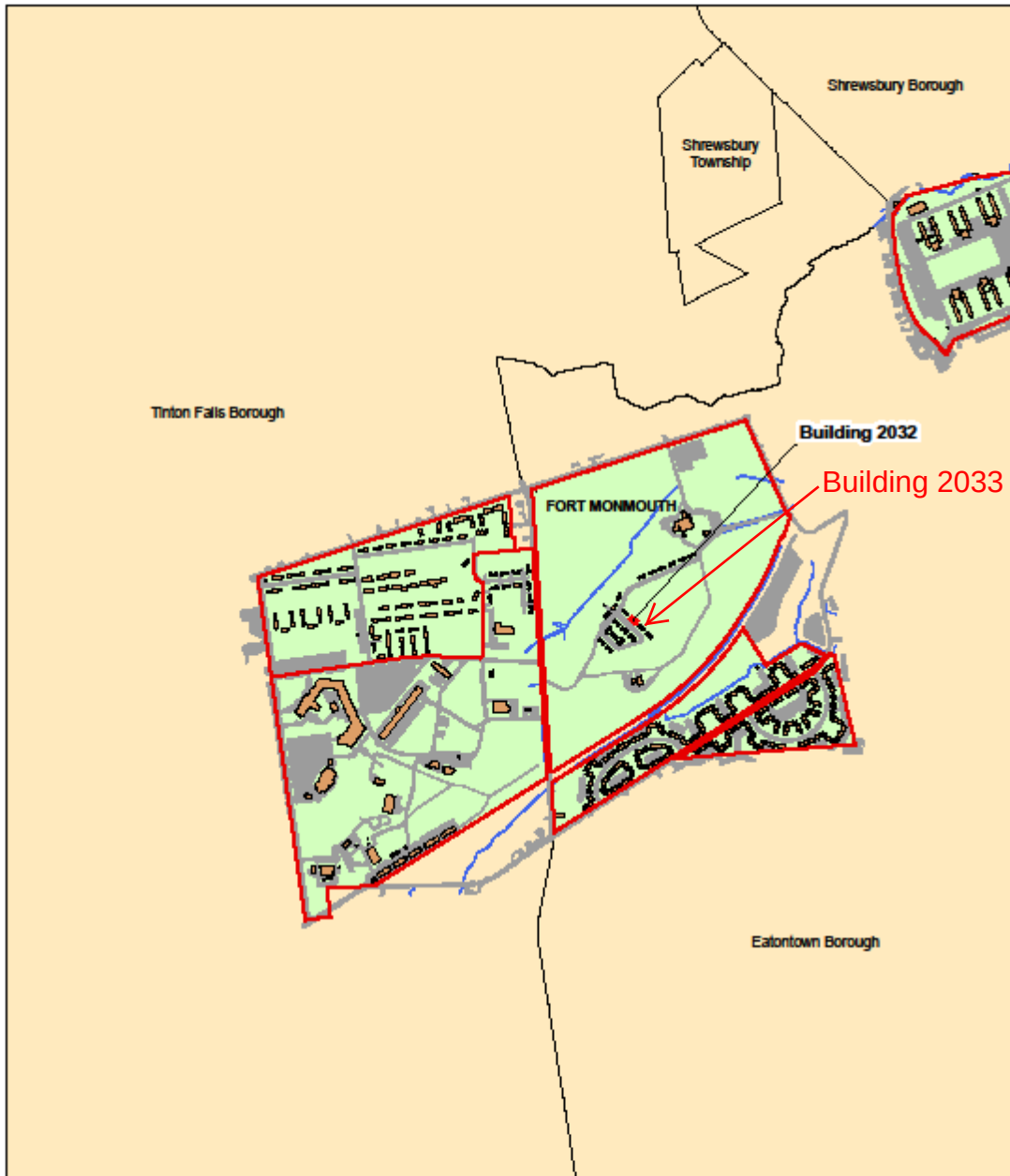
The analytical results for all of closure soil samples collected from the UST closure excavation at UST No.: 192486-14 were Not Detected for total petroleum hydrocarbons.

Based on the closure soil sampling results, soils with TPH concentrations exceeding the NJDEP soil cleanup criterion for total organic contaminants of 10,000 mg/kg are not present in the location of former UST No.: 192486-14.

**No Further Action** is proposed in regard to the closure and site investigation of UST No.: 192486-14 at Building 2033.

# FIGURES





**Figure 2**  
 Location Map  
 Building 2032, Charles Wood Area  
 Fort Monmouth, NJ  
 Date: 1/2011  
 UST Registration # 192486-13  
 UST Discharge # NA



FODD  
 All drawings must be field verified.  
 Environmental Division, Directorate of Public Works, Fort Monmouth, New Jersey



A figure for Building 2033 was not found; however the tank and sample locations were likely similar to Building 2032, shown below.





# TABLES

# **TABLE 1**

## **SUMMARY OF LABORATORY ANALYSIS** **FT. MONMOUTH, BUILDING 2033, UST No.: 192486-14** **17 March 2000**

| <b>SAMPLE ID</b> | <b>LABORATORY SAMPLE ID</b> | <b>SAMPLE DATE</b> | <b>SAMPLE MATRIX</b> | <b>ANALYTICAL PARAMETER</b> | <b>ANALYTICAL METHOD</b> |
|------------------|-----------------------------|--------------------|----------------------|-----------------------------|--------------------------|
|                  |                             |                    |                      |                             |                          |
| <b>2033-A</b>    | 5258.01                     | 17-Mar-00          | SOIL                 | TPH                         | OQA-QAM-25               |
| <b>2033-B</b>    | 5258.02                     | 17-Mar-00          | SOIL                 | TPH                         | OQA-QAM-25               |
| <b>2033-C</b>    | 5258.03                     | 17-Mar-00          | SOIL                 | TPH                         | OQA-QAM-25               |
| <b>2033-D</b>    | 5258.04                     | 17-Mar-00          | SOIL                 | TPH                         | OQA-QAM-25               |

### ABBREVIATIONS:

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

## **TABLE 2**

### **SUMMARY OF LABORATORY ANALYTICAL RESULTS**

**FT. MONMOUTH, BUILDING 2033, UST No.: 192486-14**

**17March 2000**

#### **TOTAL PETROLEUM HYDROCARBONS**

| <b>SAMPLE ID</b>            | <b>LABORATORY<br/>SAMPLE ID</b> | <b>SAMPLE LOCATION</b> | <b>SAMPLE<br/>DEPTH</b> | <b>MATRIX</b> | <b>TPH<br/>RESULT S</b> |
|-----------------------------|---------------------------------|------------------------|-------------------------|---------------|-------------------------|
|                             |                                 |                        | <b>(in feet)</b>        |               | <b>mg/kg</b>            |
| <b>2033-A</b>               | 5258.01                         | EAST END               | 6.5-7.0                 | Soil          | ND                      |
| <b>2033-B</b>               | 5258.02                         | WEST END               | 6.5-7.0                 | Soil          | ND                      |
| <b>2033-C</b>               | 5258.03                         | PIPING                 | 2.0-2.5                 | Soil          | ND                      |
| <b>2033-D<br/>Duplicate</b> | 5258.04                         | DUPLICATE-EAST END     | 6.5-7.0                 | SOIL          | ND                      |

#### ABBREVIATIONS:

mg/kg = Milligrams Per Kilogram = parts per million

ND = Compound Not Detected

Gray shading indicates exceedance of NJDEP health based criterion of 10,000 ppm total organic contaminants

# **APPENDIX A**

## **CERTIFICATIONS**

**(NOT AVAILABLE)**

## **APPENDIX B**

### **UST DISPOSAL CERTIFICATE**

DIRECTORATE OF PUBLIC WORKS  
FORT MONMOUTH, NEW JERSEY 07703

Contract Management Division

SUBJECT: PWS-007, Residential UST Removal  
Contractor: TVS Inc.

RE: Backfilling of excavation,

BUILDING #: 2033 (41+43 METILL CIRCLE)

TVS Inc.  
Field Supervisor, PWS-007  
ATTN: Brian Finch  
Building 166  
Fort Monmouth, New Jersey 07703-5000

Dear Mr. Finch:

The above referenced area has been sampled and analyzed as described in the NJDEP Regulations. The results indicate levels of petroleum contamination below the NJDEP allowable limits ~~or that the site requires further investigation outside the scope of this contract.~~ The contractor may proceed with the backfilling of the excavation with stone to groundwater and clean fill to grade as required in the above referenced contract specification.

Regards,



Mr. Dinker Desai  
Environmental Engineer  
Directorate of Public Works

CC: UST file copy



**DEPARTMENT OF THE ARMY**  
Headquarters, U.S. Army Garrison Fort Monmouth  
Fort Monmouth, New Jersey 07703 - 5101



REPLY TO  
ATTENTION OF  
Directorate of Public Works

MAR 31 2000

Marpal Disposal Company, Inc.  
P.O. Box 188  
Lincroft, New Jersey 07738

Re: Non-Hazardous Waste Disposal  
Contract No. DAAB07-96-C-8252  
Location: Bldg. 166  
Roll-off container No. 2065  
Size: 30 cubic yards  
USTs from Bldgs: 2022, 2023, 2024, 2025, 2026, 2027, 2028, 2029,  
2030, 2031, 2032, 2033, 2034, 2035, 2036, and 2037

Dear Sirs:

I certify that the above referenced 30 cubic yard roll-off container provided by Marpal, Inc. contains only crushed fiberglass underground storage tanks removed from residential buildings at Fort Monmouth, NJ. The tanks only held No. 2 heating oil. The tanks were cleaned in accordance with acceptable industry standards and NJDEP protocol and then crushed. No free liquids are present in the container.

If you should require any additional information or help at this time, please contact Mr. Dinker Desai, Environmental Engineer, at (732) 532-1475.

Sincerely,

James Ott,  
Director, Public Works

Attachments: None

## **APPENDIX C**

# **PHOTO DOCUMENTATION**

**(NOT AVAILABLE)**



## **APPENDIX D**

### **SOIL ANALYTICAL DATA PACKAGE**

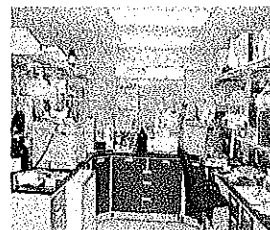
# FORT MONMOUTH ENVIRONMENTAL TESTING LABORATORY

DIRECTORATE OF PUBLIC WORKS

PHONE: (732) 532-6224 FAX: (732) 532-6263

WET-CHEM - METALS - ORGANICS - FIELD SAMPLING

CERTIFICATIONS: NJDEP #13461, NYSDOH #11699



ANALYTICAL DATA REPORT  
Fort Monmouth Environmental Laboratory  
ENVIRONMENTAL DIVISION  
Fort Monmouth, New Jersey  
PROJECT: IJO#100004

**Bldg. 2033**

| Field Sample Location  | Laboratory Sample ID# | Matrix   | Date and Time of Collection | Date Received |
|------------------------|-----------------------|----------|-----------------------------|---------------|
| 2033-A East End 6.5-7' | 5258.01               | Soil     | 17-Mar-00 10:20             | 03/17/00      |
| 2033-B West End 6.5-7' | 5258.02               | Soil     | 17-Mar-00 10:40             | 03/17/00      |
| 2033-C Piping 2-2.5''  | 5258.03               | Soil     | 17-Mar-00 10:50             | 03/17/00      |
| 2033-D Duplicate       | 5258.04               | Soil     | 17-Mar-00 10:20             | 03/17/00      |
| Trip Blank             | 5258.05               | Methanol | 17-Mar-00                   | 03/17/00      |

ANALYSIS:  
FORT MONMOUTH ENVIRONMENTAL LAB  
TPHC, %SOLIDS

ENCLOSURE:  
CHAIN OF CUSTODY  
RESULTS

  
3-24-00  
Daniel Wright/Date  
Laboratory Director

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## **Method Summary**

### **NJDEP Method OQA-QAM-025-10/97**

#### **Gas Chromatographic Determination of Total Petroleum Hydrocarbons in Soil**

Fifteen grams (15g)(wet weight) of a soil sample is added to a 125 mL acid cleaned, solvent rinsed, capped Erlenmeyer flask. 15g anhydrous sodium sulfate is added to dry sample. Surrogate standard spiking solution is then added to the flask.

Twenty five milliliters(25mL) Methylene Chloride is added to the flask and it is secured on a orbital shaker table. The agitation rate is set to 400rpm and the sample is shaken for 30 minutes. The flask is the removed from the table and the particulate matter is allowed to settle. The extract is transferred to a Teflon capped vial. A second 25mL of Methylene Chloride is added to the flask and shaken for an additional 30 minutes. The flask is again removed and allowed to settle. The extracts are combined in the vial then transferred to a 1mL autosampler vial.

The extract is then injected directly into a GC-FID for analysis. The sample is analyzed for petroleum hydrocarbons covering a range of C8-C42 including pristane and phytane. Total Petroleum Hydrocarbon concentration is determined by integrating between 5 minutes and 22 minutes. The baseline is established by starting the integration after the end of the solvent peak and stopping after the last peak.

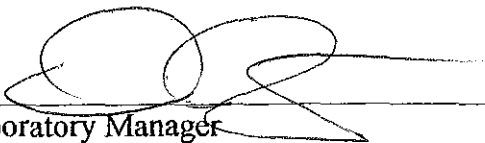
The final concentration of Total Petroleum Hydrocarbons is calculated using percent solid, sample weight and concentration.

## TPHC Conformance/Non-conformance Summary Report

Indicate  
Yes, No, N/A

1. Method Detection Limits provided. Yes
2. Method Blank Contamination – If yes, list the sample and the corresponding concentrations in each blank. No  
\_\_\_\_\_  
\_\_\_\_\_
3. Matrix Spike Results Summary Meet Criteria  
(If not met, list the sample and corresponding recovery which falls outside the acceptable range). Yes  
\_\_\_\_\_  
\_\_\_\_\_
4. Duplicate Results Summary Meet Criteria  
(If not met, list the sample and corresponding recovery which falls outside the acceptable range). Yes  
\_\_\_\_\_  
\_\_\_\_\_
5. IR Spectra submitted for standards, blanks and samples. No
6. Chromatograms submitted for standards, blanks and samples if GC fingerprinting was conducted. Yes
7. Analysis holding time met.  
(If not met, list number of days exceeded for each sample). Yes  
\_\_\_\_\_  
\_\_\_\_\_

Additional comments: \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

  
Laboratory Manager

3-24-06  
Date

000002



**Bldg. 173, SELFM-PW-EV, Fort Monmouth, NJ 07703**

Tel (732)532-4359 Fax (732)532-6263 EMail:appleby@mail1.monmouth.army.mil

**NJDEP Certification #13461**

## Chain of Custody Record

[illegible]

**Report of Analysis**  
**U.S.Army, Fort Monmouth Environmental Laboratory**  
**NJDEP Certification # 13461**

**Client :** U.S. Army  
 DPW. SELFM-PW-EV  
 Bldg. 173  
 Ft. Monmouth, NJ 07703

**Project # :** 5258  
**Location :** Bldg.2033  
**UST Reg. # :** 192486-14

**Analysis :** OQA-QAM-025  
**Matrix :** Soil  
**Inst. ID. :** GC TPHC INST. #1  
**Column Type :** RTX-5, 0.32mm ID, 30M  
**Injection Volume :** 1uL

**Date Received :** 17-Mar-00  
**Date Extracted :** 21-Mar-00  
**Extraction Method :** Shake  
**Analysis Complete :** 21-Mar-00  
**Analyst :** B.Patel

| Sample       | Field ID | Dilution Factor | Weight (g) | % Solid | MDL (mg/kg) | TPHC Result (mg/kg) |
|--------------|----------|-----------------|------------|---------|-------------|---------------------|
| 5258.01      | 2033-A   | 1.00            | 15.25      | 91.62   | 168         | ND                  |
| 5258.02      | 2033-B   | 1.00            | 15.31      | 91.59   | 168         | ND                  |
| 5258.03      | 2033-C   | 1.00            | 15.35      | 87.84   | 174         | ND                  |
| 5258.04      | 2033-D   | 1.00            | 15.10      | 90.70   | 172         | ND                  |
|              |          |                 |            |         |             |                     |
|              |          |                 |            |         |             |                     |
|              |          |                 |            |         |             |                     |
|              |          |                 |            |         |             |                     |
|              |          |                 |            |         |             |                     |
|              |          |                 |            |         |             |                     |
|              |          |                 |            |         |             |                     |
|              |          |                 |            |         |             |                     |
|              |          |                 |            |         |             |                     |
|              |          |                 |            |         |             |                     |
|              |          |                 |            |         |             |                     |
|              |          |                 |            |         |             |                     |
|              |          |                 |            |         |             |                     |
|              |          |                 |            |         |             |                     |
| METHOD BLANK | TBLK351  | 1.00            | 15.00      | 100.00  | 157         | ND                  |

ND = Not Detected

MDL = Method Detection Limit

000004

## LABORATORY DELIVERABLES CHECKLIST AND NON-CONFORMANCE SUMMARY

THIS FORM MUST BE COMPLETED BY THE LABORATORY OR ENVIRONMENTAL CONSULTANT  
AND ACCOMPANY ALL DATA SUBMISSIONS

The following Laboratory Deliverables checklist and Non-Conformance Summary shall be included in the data submission. All deviations from the accepted methodology and procedures, of performance values outside acceptable ranges shall be summarized in the Non-Conformance Summary. The Technical Requirements for Site Remediation, effective June 7, 1993, provides further details. The document shall be bound and paginated, contain a table of contents, and all pages shall be legible. Incomplete packages will be returned or held without review until the data package is completed.

It is recommended that the analytical results summary sheets listing all targeted and non-targeted compounds with the method detection limits, practical quantitation limits, and the laboratory and/or sample numbers be included in one section of the data package and in the main body of the report.

- |                                                                                                              |                                     |
|--------------------------------------------------------------------------------------------------------------|-------------------------------------|
| 1. Cover page, Title Page listing Lab Certification #, facility name and address, & date of report submitted | <input checked="" type="checkbox"/> |
| 2. Table of Contents submitted                                                                               | <input checked="" type="checkbox"/> |
| 3. Summary Sheets listing analytical results for all targeted and non-targeted compounds submitted           | <input checked="" type="checkbox"/> |
| 4. Document paginated and legible                                                                            | <input checked="" type="checkbox"/> |
| 5. Chain of Custody submitted                                                                                | <input checked="" type="checkbox"/> |
| 6. Samples submitted to lab within 48 hours of sample collection                                             | <input checked="" type="checkbox"/> |
| 7. Methodology Summary submitted                                                                             | <input checked="" type="checkbox"/> |
| 8. Laboratory Chronicle and Holding Time Check submitted                                                     | <input checked="" type="checkbox"/> |
| 9. Results submitted on a dry weight basis                                                                   | <input checked="" type="checkbox"/> |
| 10. Method Detection Limits submitted                                                                        | <input checked="" type="checkbox"/> |
| 11. Lab certified by NJDEP for parameters of appropriate category of parameters or a member of the USEPA CLP | <input checked="" type="checkbox"/> |

Laboratory Manager or Environmental Consultant's Signature \_\_\_\_\_  
Date 3/24/00

Laboratory Certification #13461

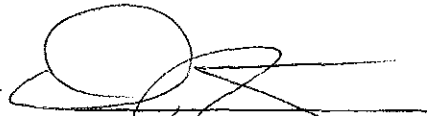
\*Refer to NJAC 7:26E - Appendix A, Section IV - Reduced Data Deliverables - Non-USEPA/CLP  
Methods for further guidance.

000021



## Laboratory Authentication Statement

I certify under penalty of law, where applicable, that this laboratory meets the Laboratory Performance Standards and Quality Control requirements specified in N.J.A.C. 7:18 and 40 CFR Part 136 for Water and Wastewater Analyses and SW-846 for Solid Waste Analysis. I have personally examined the information contained in this report and to the best of my knowledge, I believe that the submitted information is true, accurate, complete and meets the above referenced standards where applicable. I am aware that there are significant penalties for purposefully submitting falsified information, including the possibility of a fine and imprisonment.

A handwritten signature in black ink, appearing to read 'Daniel K. Wright', is written over a horizontal line.

Daniel K. Wright  
Laboratory Manager

**Attachment O**  
**UST 2034 Closure Report**

**U.S. Army Garrison**  
Fort Monmouth, New Jersey

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

***Charles Wood – Building 2034***

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**NJDEP UST Registration No.: 192486-15**  
**UST No.: 192486-15**

**September 2010**

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

**CHARLES WOOD – BUILDING 2034  
NJDEP UST REGISTRATION NO.: 192486-15**

**SEPTEMBER 2010**

**PROJECT NO.: 10-24949**

**PREPARED FOR:**

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

**PREPARED BY:**

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

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## EXECUTIVE SUMMARY

### UST Closure

On March 20, 2000, a fiberglass wrapped plastic 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. Installed in 1985, the tank was located adjacent to Building 2034 in Charles Wood area. UST No.: 192486-15 was a 550-gallon, FRP, No. 2 fuel oil tank. The tank with all associated piping was present at the time of removal. 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, of which none were found. No petroleum odors or stained soils were observed in the soils surrounding the tanks.

Closure soil samples were collected after the removal of the UST. Closure samples 2034-A and 2034-B were collected from a total of two (2) locations along the UST bottom of the excavation for the UST No.: 192486-15. Closure sample 2034-C was collected from a location along the UST piping. A duplicate of sample 2034-A was also collected. All samples were analyzed for total petroleum hydrocarbons (TPH). Groundwater was not encountered in the bottom of the excavation.

### Findings

The closure soil samples collected from the UST excavation associated UST No.: 192486-15 contained TPH concentrations below the NJDEP health based criterion of 10,000 milligrams per kilogram (mg/kg) for total organic contaminants (N.J.A.C. 7:26E and revisions dated February 3, 1994). All soil samples, including duplicate, contained a TPH concentration of Not Detected.

### Conclusions and Recommendations

Based on the closure soil sampling results, soils with TPH concentrations exceeding the NJDEP health based criterion of 10,000 mg/kg for total organic contaminants (N.J.A.C. 7:26E and revisions dated February 3, 1994) are not present in the former location of the UST.

**No Further Action** is proposed in regard to the closure and site assessment of UST No.: 192486-15 at Building 2034.

## **1.0 UNDERGROUND STORAGE TANK DECOMMISSIONING ACTIVITIES**

### **1.1 OVERVIEW**

One underground storage tank (UST), New Jersey Department of Environmental Protection (NJDEP) Registration No.: 192486-15 was closed at Building 2034 of the Charles Wood area at U.S. Army Garrison, Fort Monmouth, New Jersey. Refer to site location maps Figure 1 & 2. This report presents the results of the implementation of the Directorate of the Public Work's UST Management Plan, March 1996. Installed in 1985, the UST was a 550-gallon, FRP, containing No. 2 fuel oil for residential use. It was removed on March 20, 2000.

Decommissioning activities for UST No.: 192486-15 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 Site 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)*.

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 UST decommissioning activities. Section 2 describes the site investigation activities. Conclusions and recommendations are presented in Section 3 of this report.

### **1.2 SITE DESCRIPTION**

Building 2034 (Megill Circle) is located in the Charles Wood area of Fort Monmouth, as shown on Figure 1 & 2. UST No.: 192486-15 and associated piping were located adjacent to the building, as shown on Figure 3.

#### **1.2.1 Geological/Hydrogeological Setting**

The following is a description of the geological/hydrogeological setting of Bldg. 2034. 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 Charles Wood 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 (Zapeczka, 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 encrusted (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 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

Fort Monmouth has been an operational military facility for in excess of ninety (90) years; and in many areas of Charles Wood, human activities have completely transformed the topography. Currently, 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 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 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 Charles Wood 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-ionizer detector: Thermo Instruments Organic Vapor Monitor (OVM) – Model #580-B. The individual ascertained if the area was properly vented to render the area safe, as defined by OSHA. All work areas were properly vented to insure that there were no contaminants present in the breathing zone above permissible exposure limits (PEL’s).

### **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 great regard to safety and health and the 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.

- 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.
- 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 UST. The tank was completely empty and contained no liquids prior to removal from the ground.

After the UST was removed from the excavation, it was staged on an impervious surface, labeled and examined for holes. The Subsurface Evaluator observed no holes in the tank during the inspection. Soils surrounding the UST were screened visually and with an OVM for evidence of contamination. Soil staining or petroleum hydrocarbons were not observed.

### **1.5 UNDERGROUND STORAGE TANK DECOMMISSIONING AND DISPOSAL**

Subsequent to disposal, the UST was purged with air to remove vapors prior to cutting. A 4 feet by 3 feet access hole was made in the UST using a pneumatic ripper gun with a non-sparking bit. The UST was cleaned first with rubber squeegees and adsorbent material broomed on the sidewalls and bottom. The adsorbent material was then drummed and subsequently put 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 for disposal in compliance with all applicable regulations and laws. The UST disposal certification, along with backfilling authorization, is included in Appendix B.

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

If available, photographic documentation of the UST is included in Appendix C.

## **2.0 SITE INVESTIGATION ACTIVITIES**

### **2.1 OVERVIEW**

The Site Investigation was managed by U.S. Army DPW personnel. All analyses were performed and reported by Fort Monmouth Environmental Testing Laboratory, a NJDEP-certified testing laboratory. All sampling was performed by a NJDEP Certified Subsurface Evaluator according to the methods described in the NJDEP *Field Sampling Procedures Manual* (1992). Sampling frequency and parameters analyzed complied with the NJDEP document *Technical Requirements for Site Remediation*, 7:26E-3.9 (June 7, 1993) which was the applicable regulation at the date of the closure. All records of the Site Investigation activities are maintained by the Fort Monmouth DPW Environmental Office.

The following Parties participated in Closure and Site Investigation Activities.

- Ft. Monmouth Directorate of Public Works-Environmental Division  
Contact Person: Joseph Fallon  
Phone Number: (732) 532-6223
- Subsurface Evaluator: Frank Accorsi  
Employer: TECOM-Vinnell Services, Inc. (TVS)  
Phone Number: (732) 532-5241  
NJDEP License No.: 0010042  
(TVS)NJDEP License No.: US252302
- Analytical Laboratory: Fort Monmouth Environmental Testing Laboratory  
Contact Person: Dan Wright  
Phone Number: (732) 532-4359  
NJDEP Laboratory Certification No.: 13461

### **2.2 FIELD SCREENING/MONITORING**

Field screening was performed by a NJDEP certified Subsurface Evaluator using an OVM and visual observations to identify potentially contaminated material, of which none were found.

### **2.3 SOIL SAMPLING**

On March 20, 2000, closure soil samples were collected after the removal of the UST. Closure samples 2034-A and 2034-B were collected from a total of two (2) locations along the UST bottom of the excavation for the UST No.: 192486-15. Closure sample 2034-C was collected from a location along the UST piping. A duplicate of sample 2034-A was also collected.

Refer to soil sampling location map in Figure 3. All samples were analyzed for total petroleum hydrocarbons (TPH). Groundwater was not encountered in the excavation.

The site assessment was performed by TVS personnel in accordance with the NJDEP *Technical Requirements for Site Remediation* and the NJDEP *Field Sampling Procedures Manual*. A summary of sampling activities including parameters analyzed is provided on Table 1. The closure soil samples were collected. 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

Closure soil samples were collected from a total of three locations (which included the duplicate) on March 20, 2000 to evaluate soil conditions following removal of the UST and piping. All samples were analyzed for TPH. The closure soil sample results were compared to the NJDEP health based criterion of 10,000 mg/kg for total organic contaminants (*N.J.A.C. 7:26D* and revisions dated February 3, 1994). A summary of the analytical results and comparison to the NJDEP soil cleanup criteria is provided on Table 2. The analytical data package, including associated quality control data, is provided in Appendix D.

Closure soil samples collected on March 20, 2000 from the UST site excavation contained concentrations of TPH below the NJDEP soil cleanup criteria.

#### 3.2 CONCLUSIONS AND RECOMMENDATIONS

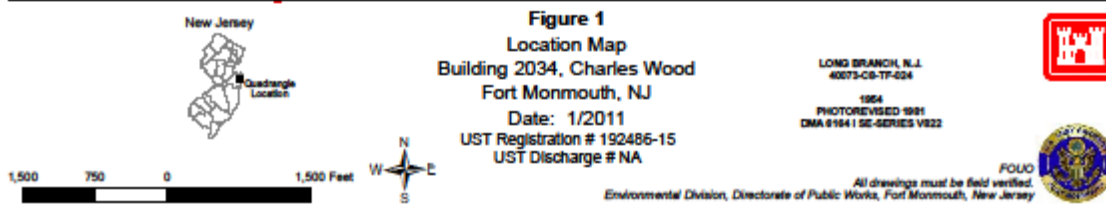
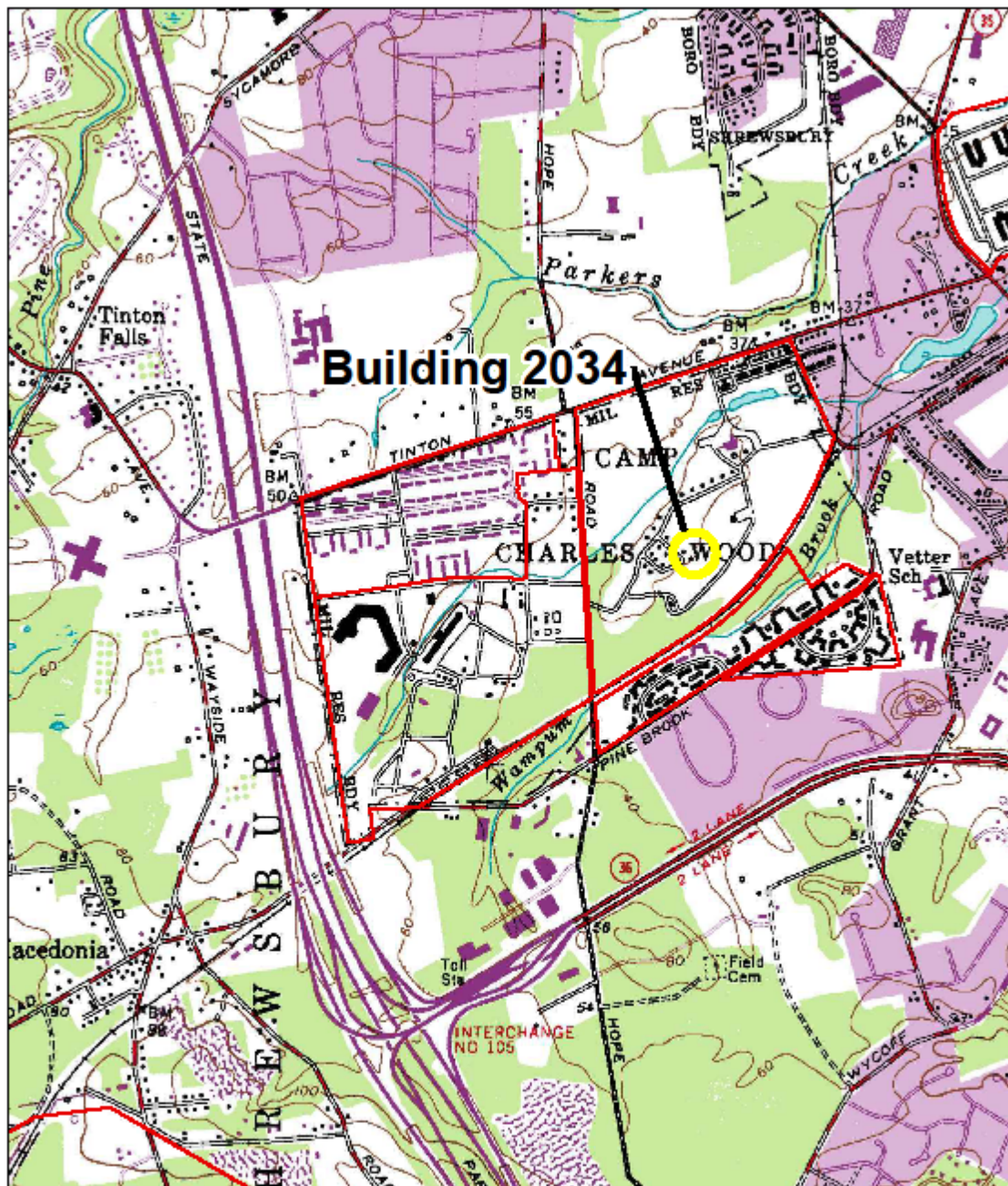
The analytical results for all of closure soil samples collected from the UST closure excavation of UST No.: 192486-15 were Not Detected for total petroleum hydrocarbons.

Based on the closure soil sampling results, soils with TPH concentrations exceeding the NJDEP soil cleanup criterion for total organic contaminants of 10,000 mg/kg are not present in the location of former UST No.: 192486-15.

**No Further Action** is proposed in regard to the closure and site investigation of UST No.: 192486-15 at Building 2034.

# FIGURES





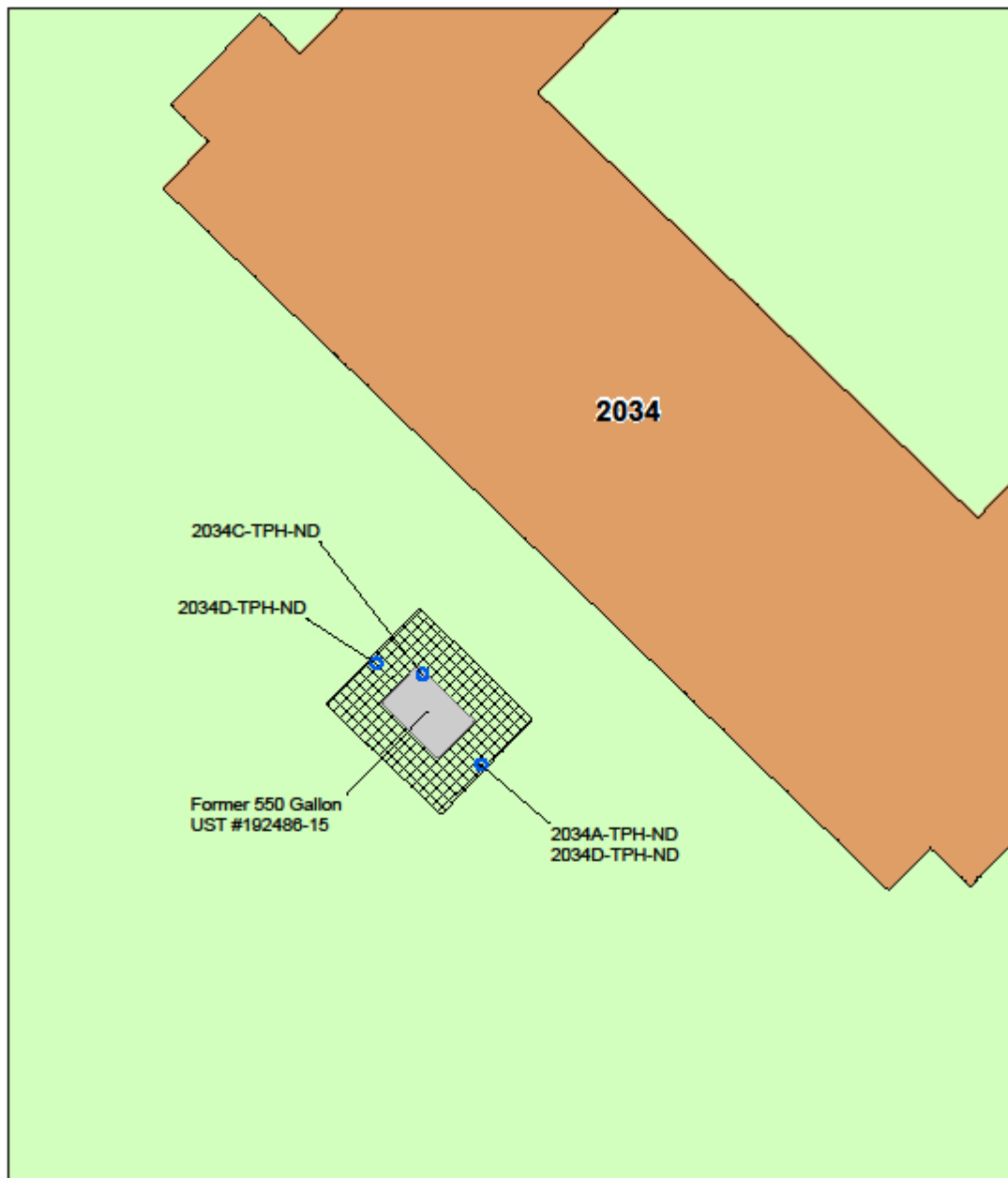


**Figure 2**  
 Location Map  
 Building 2034, Charles Wood Area  
 Fort Monmouth, NJ  
 Date: 1/2011  
 UST Registration # 192486-15  
 UST Discharge # NA



*All drawings must be field verified.*  
 Environmental Division, Directorate of Public Works, Fort Monmouth, New Jersey





**Legend**

-  UST
-  UST Excavation Limits
-  Soil Sample - 3/20/2000

10 5 0 10 Feet



**Figure 3**  
 Soil Sampling Location Map  
 Building 2034, Charles Wood Area  
 Fort Monmouth, NJ  
 Date: 1/2011  
 UST Registration # 192486-15  
 UST Discharge # NA



*All drawings must be field verified.*  
 Environmental Division, Directorate of Public Works, Fort Monmouth, New Jersey

# TABLES

# **TABLE 1**

## **SUMMARY OF LABORATORY ANALYSIS** **FT. MONMOUTH, BUILDING 2034, UST No.: 192486-15** **20 March 2000**

| <b>SAMPLE ID</b> | <b>LABORATORY SAMPLE ID</b> | <b>SAMPLE DATE</b> | <b>SAMPLE MATRIX</b> | <b>ANALYTICAL PARAMETER</b> | <b>ANALYTICAL METHOD</b> |
|------------------|-----------------------------|--------------------|----------------------|-----------------------------|--------------------------|
|                  |                             |                    |                      |                             |                          |
| <b>2034-A</b>    | 5266.01                     | 20-Mar-00          | SOIL                 | TPH                         | OQA-QAM-25               |
| <b>2034-B</b>    | 5266.02                     | 20-Mar-00          | SOIL                 | TPH                         | OQA-QAM-25               |
| <b>2034-C</b>    | 5266.03                     | 20-Mar-00          | SOIL                 | TPH                         | OQA-QAM-25               |
| <b>2034-D</b>    | 5266.04                     | 20-Mar-00          | SOIL                 | TPH                         | OQA-QAM-25               |

### ABBREVIATIONS:

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

## **TABLE 2**

### **SUMMARY OF LABORATORY ANALYTICAL RESULTS**

**FT. MONMOUTH, BUILDING 2034, UST No.: 192486-15**

**20 March 2000**

#### **TOTAL PETROLEUM HYDROCARBONS**

| <b>SAMPLE ID</b>            | <b>LABORATORY<br/>SAMPLE ID</b> | <b>SAMPLE LOCATION</b> | <b>SAMPLE<br/>DEPTH</b> | <b>MATRIX</b> | <b>TPH<br/>RESULT S</b> |
|-----------------------------|---------------------------------|------------------------|-------------------------|---------------|-------------------------|
|                             |                                 |                        | <b>(in feet)</b>        |               | <b>mg/kg</b>            |
| <b>2034-A</b>               | 5266.01                         | SOUTH END              | 6.5-7.0                 | Soil          | ND                      |
| <b>2034-B</b>               | 5266.02                         | NORTH END              | 6.5-7.0                 | Soil          | ND                      |
| <b>2034-C</b>               | 5266.03                         | PIPING                 | 2.0-2.5                 | Soil          | ND                      |
| <b>2034-D<br/>Duplicate</b> | 5266.04                         | DUPLICATE-SOUTH<br>END | 6.5-7.0                 | SOIL          | ND                      |

#### ABBREVIATIONS:

mg/kg = Milligrams Per Kilogram = parts per million

ND = Compound Not Detected

Gray shading indicates exceedance of NJDEP health based criterion of 10,000 ppm total organic contaminants

# **APPENDIX A**

## **CERTIFICATIONS**

**(NOT AVAILABLE)**

## **APPENDIX B**

### **UST DISPOSAL CERTIFICATE**



DIRECTORATE OF PUBLIC WORKS  
FORT MONMOUTH, NEW JERSEY 07703

Contract Management Division

SUBJECT: PWS-007, Residential UST Removal  
Contractor: TVS Inc.

RE: Backfilling of excavation,

BUILDING #: 2033 (41+43 METILL CIRCLE)

TVS Inc.  
Field Supervisor, PWS-007  
ATTN: Brian Finch  
Building 166  
Fort Monmouth, New Jersey 07703-5000

Dear Mr. Finch:

The above referenced area has been sampled and analyzed as described in the NJDEP Regulations. The results indicate levels of petroleum contamination below the NJDEP allowable limits ~~or that the site requires further investigation outside the scope of this contract.~~ The contractor may proceed with the backfilling of the excavation with stone to groundwater and clean fill to grade as required in the above referenced contract specification.

Regards,



Mr. Dinker Desai  
Environmental Engineer  
Directorate of Public Works

CC: UST file copy



**DEPARTMENT OF THE ARMY**  
Headquarters, U.S. Army Garrison Fort Monmouth  
Fort Monmouth, New Jersey 07703 - 5101



REPLY TO  
ATTENTION OF  
Directorate of Public Works

MAR 31 2000

Marpal Disposal Company, Inc.  
P.O. Box 188  
Lincroft, New Jersey 07738

Re: Non-Hazardous Waste Disposal  
Contract No. DAAB07-96-C-8252  
Location: Bldg. 166  
Roll-off container No. 2065  
Size: 30 cubic yards  
USTs from Bldgs: 2022, 2023, 2024, 2025, 2026, 2027, 2028, 2029,  
2030, 2031, 2032, 2033, 2034, 2035, 2036, and 2037

Dear Sirs:

I certify that the above referenced 30 cubic yard roll-off container provided by Marpal, Inc. contains only crushed fiberglass underground storage tanks removed from residential buildings at Fort Monmouth, NJ. The tanks only held No. 2 heating oil. The tanks were cleaned in accordance with acceptable industry standards and NJDEP protocol and then crushed. No free liquids are present in the container.

If you should require any additional information or help at this time, please contact Mr. Dinker Desai, Environmental Engineer, at (732) 532-1475.

Sincerely,

James Ott,  
Director, Public Works

Attachments: None

## **APPENDIX C**

# **PHOTO DOCUMENTATION**

**(NOT AVAILABLE)**

## **APPENDIX D**

# **SOIL ANALYTICAL DATA PACKAGE**

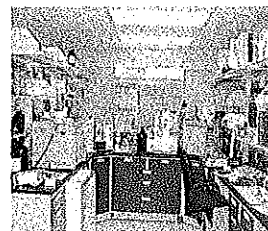
# FORT MONMOUTH ENVIRONMENTAL TESTING LABORATORY

DIRECTORATE OF PUBLIC WORKS

PHONE: (732) 532-6224 FAX: (732) 532-6263

WET-CHEM - METALS - ORGANICS - FIELD SAMPLING

CERTIFICATIONS: NJDEP #13461, NYSDOH #11699



ANALYTICAL DATA REPORT  
Fort Monmouth Environmental Laboratory  
ENVIRONMENTAL DIVISION  
Fort Monmouth, New Jersey  
PROJECT: IJO#100004

**Bldg. 2034**

| Field Sample Location   | Laboratory Sample ID# | Matrix   | Date and Time of Collection | Date Received |
|-------------------------|-----------------------|----------|-----------------------------|---------------|
| 2034-A South End 6.5-7' | 5266.01               | Soil     | 20-Mar-00 13:40             | 03/20/00      |
| 2034-B North End 6.5-7' | 5266.02               | Soil     | 20-Mar-00 13:50             | 03/20/00      |
| 2034-C Piping 2-2.5'    | 5266.03               | Soil     | 20-Mar-00 14:10             | 03/20/00      |
| 2034-D Duplicate        | 5266.04               | Soil     | 20-Mar-00 13:40             | 03/20/00      |
| Trip Blank              | 5266.05               | Methanol | 20-Mar-00                   | 03/20/00      |

ANALYSIS:  
FORT MONMOUTH ENVIRONMENTAL LAB  
TPHC, %SOLIDS

ENCLOSURE:  
CHAIN OF CUSTODY  
RESULTS

  
Daniel Wright/Date  
Laboratory Director

## **Table of Contents**

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## **Method Summary**

**NJDEP Method OQA-QAM-025-10/97**

### **Gas Chromatographic Determination of Total Petroleum Hydrocarbons in Soil**

Fifteen grams (15g)(wet weight) of a soil sample is added to a 125 mL acid cleaned, solvent rinsed, capped Erlenmeyer flask. 15g anhydrous sodium sulfate is added to dry sample. Surrogate standard spiking solution is then added to the flask.

Twenty five milliliters(25mL) Methylene Chloride is added to the flask and it is secured on a orbital shaker table. The agitation rate is set to 400rpm and the sample is shaken for 30 minutes. The flask is the removed from the table and the particulate matter is allowed to settle. The extract is transferred to a Teflon capped vial. A second 25mL of Methylene Chloride is added to the flask and shaken for an additional 30 minutes. The flask is again removed and allowed to settle. The extracts are combined in the vial then transferred to a 1mL autosampler vial.

The extract is then injected directly into a GC-FID for analysis. The sample is analyzed for petroleum hydrocarbons covering a range of C8-C42 including pristane and phytane. Total Petroleum Hydrocarbon concentration is determined by integrating between 5 minutes and 22 minutes. The baseline is established by starting the integration after the end of the solvent peak and stopping after the last peak.

The final concentration of Total Petroleum Hydrocarbons is calculated using percent solid, sample weight and concentration.

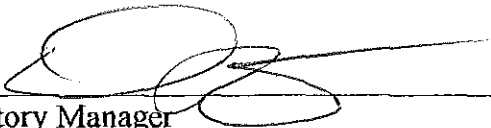
000001

## TPHC Conformance/Non-conformance Summary Report

Indicate  
Yes, No, N/A

1. Method Detection Limits provided. Y
2. Method Blank Contamination – If yes, list the sample and the corresponding concentrations in each blank. N  
\_\_\_\_\_  
\_\_\_\_\_
3. Matrix Spike Results Summary Meet Criteria Y  
(If not met, list the sample and corresponding recovery which falls outside the acceptable range).  
\_\_\_\_\_  
\_\_\_\_\_
4. Duplicate Results Summary Meet Criteria Y  
(If not met, list the sample and corresponding recovery which falls outside the acceptable range).  
\_\_\_\_\_  
\_\_\_\_\_
5. IR Spectra submitted for standards, blanks and samples. N/A
6. Chromatograms submitted for standards, blanks and samples if GC fingerprinting was conducted. Y
7. Analysis holding time met. Y  
(If not met, list number of days exceeded for each sample).  
\_\_\_\_\_  
\_\_\_\_\_

Additional comments: \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

  
\_\_\_\_\_  
Laboratory Manager

3-28-00  
Date

000002





# Fort Monmouth Environmental Testing Laboratory

Bldg. 173, SELFM-PW-EV, Fort Monmouth, NJ 07703

Tel (732)532-4359 Fax (732)532-6263 EMail:appleby@mail1.monmouth.army.mil

NJDEP Certification #13461

## Chain of Custody Record

|                                                                                                                              |                             |                            |             |                                                      |                |                                                                                                                            |            |            |               |                          |                                                              |  |
|------------------------------------------------------------------------------------------------------------------------------|-----------------------------|----------------------------|-------------|------------------------------------------------------|----------------|----------------------------------------------------------------------------------------------------------------------------|------------|------------|---------------|--------------------------|--------------------------------------------------------------|--|
| <b>Customer: Dinker Desai</b>                                                                                                |                             |                            |             | <b>Project No: 100004</b>                            |                | <b>Analysis Parameters</b>                                                                                                 |            |            |               |                          | <b>Comments:</b>                                             |  |
| <b>Phone #: X21475</b>                                                                                                       |                             |                            |             | <b>Location: BL06.2034</b>                           |                | TPHC                                                                                                                       | % SOLIDS * | VOA+10 *   | VOA ID Number | PID Reading              | * = Samples Kept <4 Celsius<br>Remarks / Preservation Method |  |
| <b>( ) DERA (X) OMA UST Assessment</b>                                                                                       |                             |                            |             | <b>UST# 192486-15</b>                                |                |                                                                                                                            |            |            |               |                          |                                                              |  |
| <b>Samplers Name / Company : Frank Accorsi/TVS</b>                                                                           |                             |                            |             | <b>Sample #</b>                                      |                |                                                                                                                            |            |            |               |                          |                                                              |  |
| <b>Lab Sample I.D.</b>                                                                                                       | <b>Sample Location</b>      | <b>Date</b>                | <b>Time</b> | <b>Type</b>                                          | <b>bottles</b> |                                                                                                                            |            |            |               |                          |                                                              |  |
| 5206. 61                                                                                                                     | 2034-A, SOUTH END, 6.5-7 FT | 3-20-00                    | 1340        | SOIL                                                 | 2              | X                                                                                                                          | X          | X          | 1065          | 0                        | ICE                                                          |  |
| 02                                                                                                                           | 2034-B, NORTH END, 6.5-7 FT |                            | 1350        |                                                      | 2              | X                                                                                                                          | X          | X          | 1066          | 0                        |                                                              |  |
| 03                                                                                                                           | 2034-C, PIPELINE, 2-2.5 FT  |                            | 1410        |                                                      | 2              | X                                                                                                                          | X          | X          | 1067          | 0                        |                                                              |  |
| 04                                                                                                                           | 2034-D, DUPLICATE           |                            | 1340        |                                                      | 2              | X                                                                                                                          | X          | X          | 1068          | 0                        |                                                              |  |
| 05                                                                                                                           | TRIP BLANK                  |                            | -           | AQ.                                                  | 1              |                                                                                                                            |            | X          | 1069          | -                        |                                                              |  |
| OVM sn#580U-64455.343 was calibrated with zero air & w/ 245 ppm Isobutylene read 245 ppm. 1230 3-20-00 (time/date & initial) |                             |                            |             |                                                      |                |                                                                                                                            |            |            |               |                          |                                                              |  |
| Relinquished by (signature):<br><i>Frank Accorsi</i>                                                                         |                             | Date/Time:<br>3-20-00 1350 |             | Received by (signature):<br><i>J. V. [Signature]</i> |                | Relinquished by (signature):                                                                                               |            | Date/Time: |               | Received by (signature): |                                                              |  |
| Relinquished by (signature):                                                                                                 |                             | Date/Time:                 |             | Received by (signature):                             |                | Relinquished by (signature):                                                                                               |            | Date/Time: |               | Received by (signature): |                                                              |  |
| Report Type: ( ) Full, (X) Reduced, (X) Standard, ( ) Screen / non-certified                                                 |                             |                            |             |                                                      |                | Remarks: *<br>VOA+10 0N25% > 1,000 PPM TPH, ON HIGHEST, MIN. ONE<br>All sample points have been GPS? (X) YES ( ) NO ( ) NA |            |            |               |                          |                                                              |  |
| Turnaround time: ( ) Standard 2 wks, (X) Rush 2 Days, ( ) ASAP Verbal Hrs.                                                   |                             |                            |             |                                                      |                | Dedicated Sampling Tools Used                                                                                              |            |            |               |                          |                                                              |  |

**Report of Analysis**  
**U.S. Army, Fort Monmouth Environmental Laboratory**  
**NJDEP Certification # 13461**

**Client :** U.S. Army  
 DPW. SELFM-PW-EV  
 Bldg. 173  
 Ft. Monmouth, NJ 07703

**Project # :** 5266  
**Location :** Bldg.2034  
**UST Reg. # :**

**Analysis :** OQA-QAM-025  
**Matrix :** Soil  
**Inst. ID. :** GC TPHC INST. #1  
**Column Type :** RTX-5, 0.32mm ID, 30M  
**Injection Volume :** 1uL

**Date Received :** 20-Mar-00  
**Date Extracted :** 21-Mar-00  
**Extraction Method :** Shake  
**Analysis Complete :** 23-Mar-00  
**Analyst :** B.Patel

| Sample       | Field ID | Dilution Factor | Weight (g) | % Solid | MDL (mg/kg) | TPHC Result (mg/kg) |
|--------------|----------|-----------------|------------|---------|-------------|---------------------|
| 5266.01      | 2034-A   | 1.00            | 15.26      | 90.76   | 170         | ND                  |
| 5266.02      | 2034-B   | 1.00            | 15.46      | 87.22   | 174         | ND                  |
| 5266.03      | 2034-C   | 1.00            | 15.43      | 82.04   | 186         | ND                  |
| 5266.04      | 2034-D   | 1.00            | 15.20      | 88.60   | 175         | ND                  |
|              |          |                 |            |         |             |                     |
|              |          |                 |            |         |             |                     |
|              |          |                 |            |         |             |                     |
|              |          |                 |            |         |             |                     |
|              |          |                 |            |         |             |                     |
|              |          |                 |            |         |             |                     |
|              |          |                 |            |         |             |                     |
|              |          |                 |            |         |             |                     |
|              |          |                 |            |         |             |                     |
|              |          |                 |            |         |             |                     |
|              |          |                 |            |         |             |                     |
|              |          |                 |            |         |             |                     |
|              |          |                 |            |         |             |                     |
|              |          |                 |            |         |             |                     |
|              |          |                 |            |         |             |                     |
|              |          |                 |            |         |             |                     |
| METHOD BLANK | TBLK352  | 1.00            | 15.00      | 100.00  | 157         | ND                  |

ND = Not Detected  
 MDL = Method Detection Limit

## LABORATORY DELIVERABLES CHECKLIST AND NON-CONFORMANCE SUMMARY

THIS FORM MUST BE COMPLETED BY THE LABORATORY OR ENVIRONMENTAL CONSULTANT  
AND ACCOMPANY ALL DATA SUBMISSIONS

The following Laboratory Deliverables checklist and Non-Conformance Summary shall be included in the data submission. All deviations from the accepted methodology and procedures, of performance values outside acceptable ranges shall be summarized in the Non-Conformance Summary. The Technical Requirements for Site Remediation, effective June 7, 1993, provides further details. The document shall be bound and paginated, contain a table of contents, and all pages shall be legible. Incomplete packages will be returned or held without review until the data package is completed.

It is recommended that the analytical results summary sheets listing all targeted and non-targeted compounds with the method detection limits, practical quantitation limits, and the laboratory and/or sample numbers be included in one section of the data package and in the main body of the report.

- |                                                                                                              |          |
|--------------------------------------------------------------------------------------------------------------|----------|
| 1. Cover page, Title Page listing Lab Certification #, facility name and address, & date of report submitted | <u>✓</u> |
| 2. Table of Contents submitted                                                                               | <u>✓</u> |
| 3. Summary Sheets listing analytical results for all targeted and non-targeted compounds submitted           | <u>✓</u> |
| 4. Document paginated and legible                                                                            | <u>✓</u> |
| 5. Chain of Custody submitted                                                                                | <u>✓</u> |
| 6. Samples submitted to lab within 48 hours of sample collection                                             | <u>✓</u> |
| 7. Methodology Summary submitted                                                                             | <u>✓</u> |
| 8. Laboratory Chronicle and Holding Time Check submitted                                                     | <u>✓</u> |
| 9. Results submitted on a dry weight basis                                                                   | <u>✓</u> |
| 10. Method Detection Limits submitted                                                                        | <u>✓</u> |
| 11. Lab certified by NJDEP for parameters of appropriate category of parameters or a member of the USEPA CLP | <u>✓</u> |

Laboratory Manager or Environmental Consultant's Signature \_\_\_\_\_  
Date 3/24/00

Laboratory Certification #13461

\*Refer to NJAC 7:26E - Appendix A, Section IV - Reduced Data Deliverables - Non-USEPA/CLP  
Methods for further guidance.

000023

## **Laboratory Authentication Statement**

I certify under penalty of law, where applicable, that this laboratory meets the Laboratory Performance Standards and Quality Control requirements specified in N.J.A.C. 7:18 and 40 CFR Part 136 for Water and Wastewater Analyses and SW-846 for Solid Waste Analysis. I have personally examined the information contained in this report and to the best of my knowledge, I believe that the submitted information is true, accurate, complete and meets the above referenced standards where applicable. I am aware that there are significant penalties for purposefully submitting falsified information, including the possibility of a fine and imprisonment.



Daniel K. Wright  
Laboratory Manager

000024

**Attachment P**  
**UST 2035 Closure Report**

**U.S. Army Garrison**  
Fort Monmouth, New Jersey

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

***Charles Wood – Building 2035***

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**NJDEP UST Registration No.: 192486-16**  
**UST No.: 192486-16**

**September 2010**

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

**CHARLES WOOD – BUILDING 2035  
NJDEP UST REGISTRATION NO.: 192486-16**

**SEPTEMBER 2010**

**PROJECT NO.: 10-24949**

**PREPARED FOR:**

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

**PREPARED BY:**

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

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## EXECUTIVE SUMMARY

### UST Closure

On March 21, 2000, a fiberglass wrapped plastic 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. Installed in 1985, the tank was located adjacent to Building 2035 in Charles Wood area. UST No.: 192486-16 was a 550-gallon, FRP, No. 2 fuel oil tank. The tank with all associated piping was present at the time of removal. 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, of which none were found. No petroleum odors or stained soils were observed in the soils surrounding the tanks.

Closure soil samples were collected after the removal of the UST. Closure samples 2035-A and 2035-B were collected from a total of two (2) locations along the UST bottom of the excavation for the UST No.: 192486-16. Closure sample 2035-C was collected from a location along the UST piping. A duplicate of sample 2035-A was collected. All samples were analyzed for total petroleum hydrocarbons (TPH). Groundwater was not encountered in the bottom of the excavation.

### Findings

The closure soil samples collected from the UST excavation associated UST No.: 192486-16 contained TPH concentrations below the NJDEP health based criterion of 10,000 milligrams per kilogram (mg/kg) for total organic contaminants (N.J.A.C. 7:26E and revisions dated February 3, 1994). All soil samples, including the duplicate, contained a TPH concentration of Not Detected.

### Conclusions and Recommendations

Based on the closure soil sampling results, soils with TPH concentrations exceeding the NJDEP health based criterion of 10,000 mg/kg for total organic contaminants (N.J.A.C. 7:26E and revisions dated February 3, 1994) are not present in the former location of the UST.

**No Further Action** is proposed in regard to the closure and site assessment of UST No.: 192486-16 at Building 2035.

## **1.0 UNDERGROUND STORAGE TANK DECOMMISSIONING ACTIVITIES**

### **1.1 OVERVIEW**

One underground storage tank (UST), New Jersey Department of Environmental Protection (NJDEP) Registration No.: 192486-16 was closed at Building 2035 of the Charles Wood area at U.S. Army Garrison, Fort Monmouth, New Jersey. Refer to site location maps Figure 1 & 2. This report presents the results of the implementation of the Directorate of the Public Work's UST Management Plan, March 1996. Installed in 1985, the UST was a 550-gallon, FRP, containing No. 2 fuel oil for residential use. It was removed on March 21, 2000.

Decommissioning activities for UST No.: 192486-16 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 Site 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)*.

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 UST decommissioning activities. Section 2 describes the site investigation activities. Conclusions and recommendations are presented in Section 3 of this report.

### **1.2 SITE DESCRIPTION**

Building 2035 (40 & 42 Megill Circle) is located in the Charles Wood area of Fort Monmouth, as shown on Figure 1 & 2. UST No.: 192486-16 and associated piping were located adjacent to the building, as shown on Figure 3.

#### **1.2.1 Geological/Hydrogeological Setting**

The following is a description of the geological/hydrogeological setting of Bldg. 2035. 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 Charles Wood 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 (Zapeczka, 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 encrusted (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 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

Fort Monmouth has been an operational military facility for in excess of ninety (90) years; and in many areas of Charles Wood, human activities have completely transformed the topography. Currently, 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 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 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 Charles Wood 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-ionizer detector: Thermo Instruments Organic Vapor Monitor (OVM) – Model #580-B. The individual ascertained if the area was properly vented to render the area safe, as defined by OSHA. All work areas were properly vented to insure that there were no contaminants present in the breathing zone above permissible exposure limits (PEL’s).

### **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 great regard to safety and health and the 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.

- 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.
- 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 UST. The tank was completely empty and contained no liquids prior to removal from the ground.

After the UST was removed from the excavation, it was staged on an impervious surface, labeled and examined for holes. The Subsurface Evaluator observed no holes in the tank during the inspection. Soils surrounding the UST were screened visually and with an OVM for evidence of contamination. Soil staining or petroleum hydrocarbons were not observed.

### **1.5 UNDERGROUND STORAGE TANK DECOMMISSIONING AND DISPOSAL**

Subsequent to disposal, the UST was purged with air to remove vapors prior to cutting. A 4 feet by 3 feet access hole was made in the UST using a pneumatic ripper gun with a non-sparking bit. The UST was cleaned first with rubber squeegees and adsorbent material broomed on the sidewalls and bottom. The adsorbent material was then drummed and subsequently put 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 for disposal in compliance with all applicable regulations and laws. The UST disposal certification, along with backfilling authorization, is included in Appendix B.

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

If available, photographic documentation of the UST is included in Appendix C.



## **2.0 SITE INVESTIGATION ACTIVITIES**

### **2.1 OVERVIEW**

The Site Investigation was managed by U.S. Army DPW personnel. All analyses were performed and reported by Fort Monmouth Environmental Testing Laboratory, a NJDEP-certified testing laboratory. All sampling was performed by a NJDEP Certified Subsurface Evaluator according to the methods described in the NJDEP *Field Sampling Procedures Manual* (1992). Sampling frequency and parameters analyzed complied with the NJDEP document *Technical Requirements for Site Remediation*, 7:26E-3.9 (June 7, 1993) which was the applicable regulation at the date of the closure. All records of the Site Investigation activities are maintained by the Fort Monmouth DPW Environmental Office.

The following Parties participated in Closure and Site Investigation Activities.

- Ft. Monmouth Directorate of Public Works-Environmental Division  
Contact Person: Joseph Fallon  
Phone Number: (732) 532-6223
- Subsurface Evaluator: Frank Accorsi  
Employer: TECOM-Vinnell Services, Inc. (TVS)  
Phone Number: (732) 532-5241  
NJDEP License No.: 0010042  
(TVS)NJDEP License No.: US252302
- Analytical Laboratory: Fort Monmouth Environmental Testing Laboratory  
Contact Person: Dan Wright  
Phone Number: (732) 532-4359  
NJDEP Laboratory Certification No.: 13461

### **2.2 FIELD SCREENING/MONITORING**

Field screening was performed by a NJDEP certified Subsurface Evaluator using an OVM and visual observations to identify potentially contaminated material, of which none were found.

### **2.3 SOIL SAMPLING**

On March 21, 2000, closure soil samples were collected after the removal of the UST. Closure samples 2035-A and 2035-B were collected from a total of two (2) locations along the UST bottom of the excavation for the UST No.: 192486-16. Closure sample 2035-C was collected from a location along the UST piping. A duplicate of sample 2035-A was collected.

Refer to soil sampling location map in Figure 3. All samples were analyzed for total petroleum hydrocarbons (TPH). Groundwater was not encountered in the excavation.

The site assessment was performed by TVS personnel in accordance with the NJDEP *Technical Requirements for Site Remediation* and the NJDEP *Field Sampling Procedures Manual*. A summary of sampling activities including parameters analyzed is provided on Table 1. The closure soil samples were collected. 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

Closure soil samples were collected from a total of three locations (which included the duplicate) on March 21, 2000 to evaluate soil conditions following removal of the UST and piping. All samples were analyzed for TPH. The closure soil sample results were compared to the NJDEP health based criterion of 10,000 mg/kg for total organic contaminants (*N.J.A.C.* 7:26D and revisions dated February 3, 1994). A summary of the analytical results and comparison to the NJDEP soil cleanup criteria is provided on Table 2. The analytical data package, including associated quality control data, is provided in Appendix D.

Closure soil samples collected on March 21, 2000 from the UST site excavation contained concentrations of TPH below the NJDEP soil cleanup criteria.

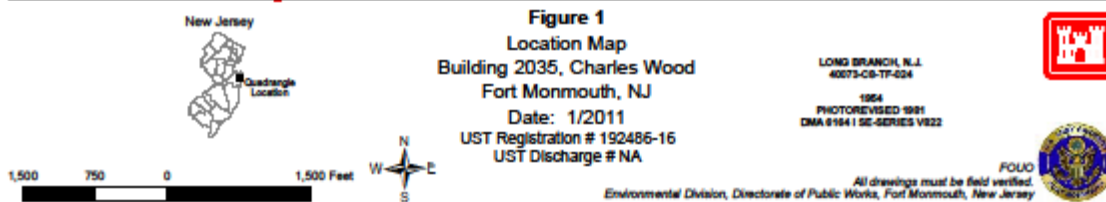
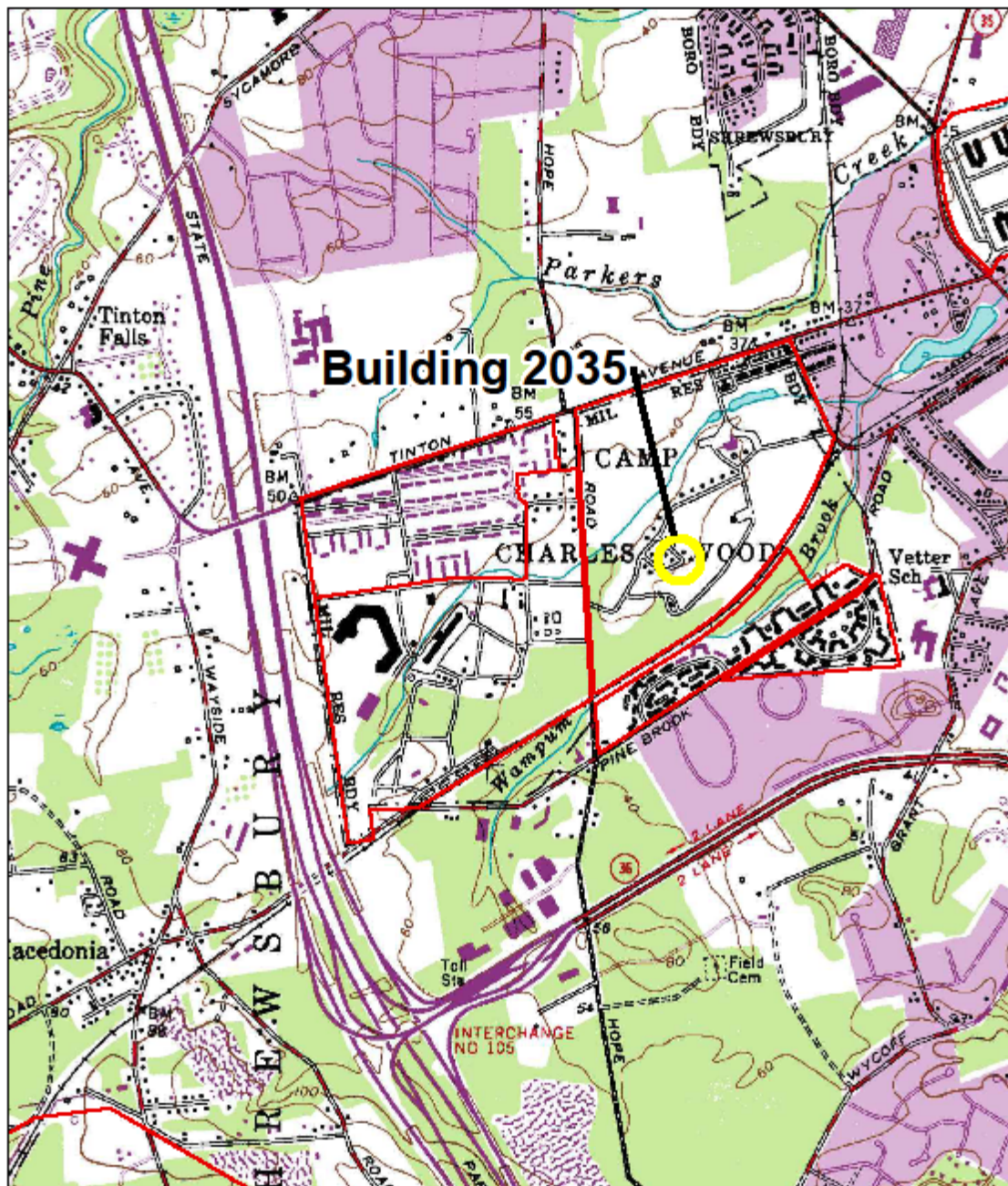
#### 3.2 CONCLUSIONS AND RECOMMENDATIONS

The analytical results for all of closure soil samples collected from the UST closure excavation at UST No.: 192486-16 were Not Detected for total petroleum hydrocarbons.

Based on the closure soil sampling results, soils with TPH concentrations exceeding the NJDEP soil cleanup criterion for total organic contaminants of 10,000 mg/kg are not present in the location of former UST No.: 192486-16.

**No Further Action** is proposed in regard to the closure and site investigation of UST No.: 192486-16 at Building 2035.

# FIGURES

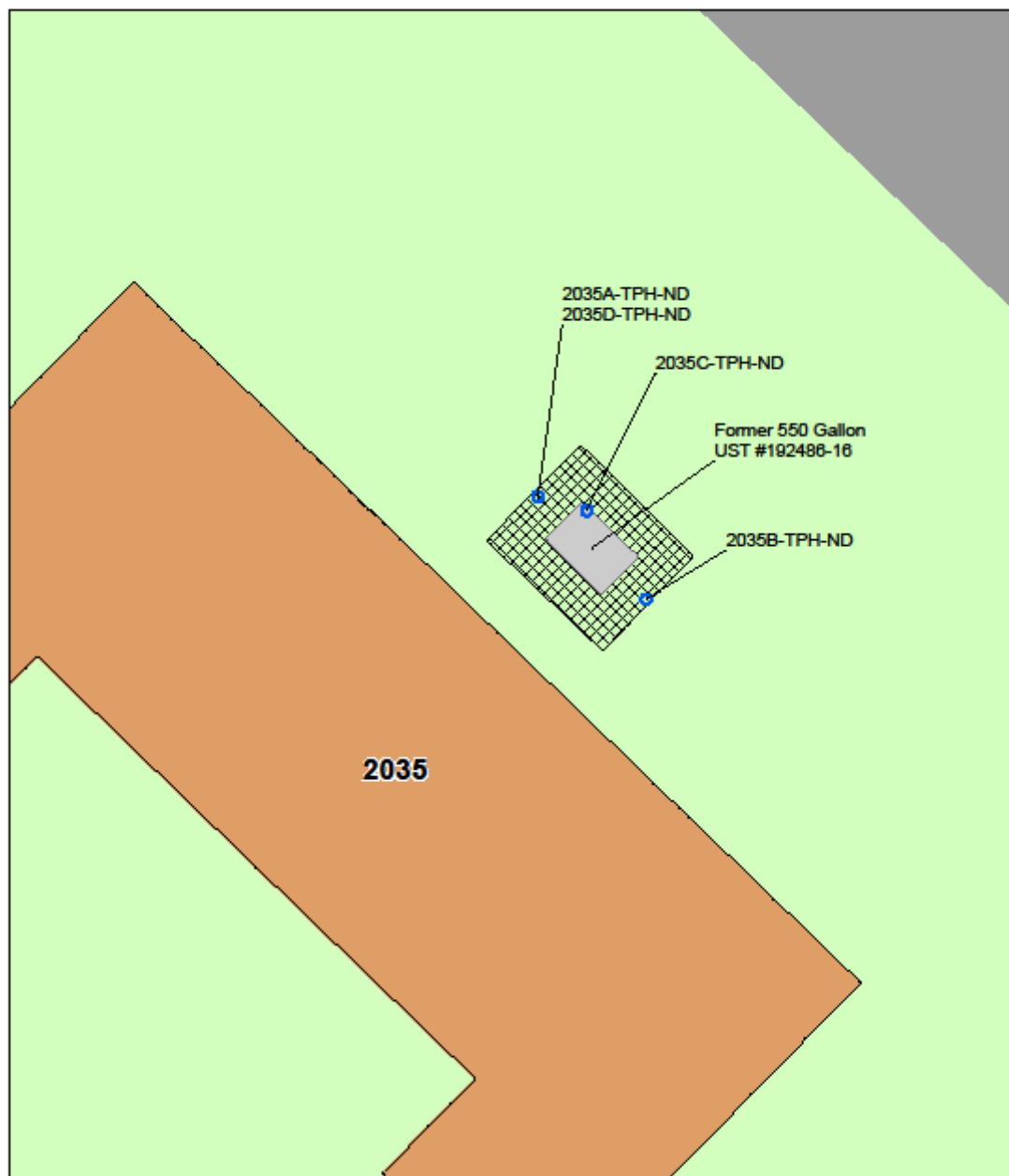




**Figure 2**  
**Location Map**  
 Building 2035, Charles Wood Area  
 Fort Monmouth, NJ  
 Date: 1/2011  
 UST Registration # 192486-16  
 UST Discharge # NA



*All drawings must be field verified.*  
 Environmental Division, Directorate of Public Works, Fort Monmouth, New Jersey



**Legend**  
 [Grey Box] UST  
 [Cross-hatched Box] UST Excavation Limits  
 [Blue Circle with 'S'] Soil Sample - 3/21/2000

10 5 0 10 Feet



**Figure 3**  
 Soil Sampling Location Map  
 Building 2035, Charles Wood Area  
 Fort Monmouth, NJ  
 Date: 1/2011  
 UST Registration # 192486-16  
 UST Discharge # NA



*All drawings must be field verified.*  
 Environmental Division, Directorate of Public Works, Fort Monmouth, New Jersey

# TABLES

# **TABLE 1**

## **SUMMARY OF LABORATORY ANALYSIS**

**FT. MONMOUTH, BUILDING 2035, UST No.: 192486-16**

**21 March 2000**

| <b>SAMPLE<br/>ID</b>        | <b>LABORATORY<br/>SAMPLE ID</b> | <b>SAMPLE<br/>DATE</b> | <b>SAMPLE<br/>MATRIX</b> | <b>ANALYTICAL<br/>PARAMETER</b> | <b>ANALYTICAL<br/>METHOD</b> |
|-----------------------------|---------------------------------|------------------------|--------------------------|---------------------------------|------------------------------|
|                             |                                 |                        |                          |                                 |                              |
| <b>2035-A</b>               | 5267.01                         | 21-Mar-00              | SOIL                     | TPH                             | OQA-QAM-25                   |
| <b>2035-B</b>               | 5267.02                         | 21-Mar-00              | SOIL                     | TPH                             | OQA-QAM-25                   |
| <b>2035-C</b>               | 5267.03                         | 21-Mar-00              | SOIL                     | TPH                             | OQA-QAM-25                   |
| <b>2035-D<br/>Duplicate</b> | 5267.04                         | 21-Mar-00              | SOIL                     | TPH                             | OQA-QAM-25                   |

### ABBREVIATIONS:

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



## **TABLE 2**

### **SUMMARY OF LABORATORY ANALYTICAL RESULTS**

FT. MONMOUTH, BUILDING 2035, UST No.: 192486-16

21 March 2000

#### **TOTAL PETROLEUM HYDROCARBONS**

| <b>SAMPLE ID</b>            | <b>LABORATORY<br/>SAMPLE ID</b> | <b>SAMPLE LOCATION</b> | <b>SAMPLE<br/>DEPTH</b> | <b>MATRIX</b> | <b>TPH<br/>RESULT S</b> |
|-----------------------------|---------------------------------|------------------------|-------------------------|---------------|-------------------------|
|                             |                                 |                        | <b>(in feet)</b>        |               | <b>mg/kg</b>            |
| <b>2035-A</b>               | 5267.01                         | WEST END               | 6.5-7.0                 | Soil          | ND                      |
| <b>2035-B</b>               | 5267.02                         | EAST END               | 6.5-7.0                 | Soil          | ND                      |
| <b>2035-C</b>               | 5267.03                         | PIPING                 | 2.0-2.5                 | Soil          | ND                      |
| <b>2035-D<br/>Duplicate</b> | 5267.04                         | DUPLICATE-WEST END     | 6.5-7.0                 | Soil          | ND                      |

**ABBREVIATIONS:**

mg/kg = Milligrams Per Kilogram = parts per million

ND = Compound Not Detected

**Gray shading** indicates exceedance of NJDEP health based criterion of 10,000 ppm total organic contaminants

# **APPENDIX A**

## **CERTIFICATIONS**

**(NOT AVAILABLE)**

## **APPENDIX B**

### **UST DISPOSAL CERTIFICATE**

DIRECTORATE OF PUBLIC WORKS  
FORT MONMOUTH, NEW JERSEY 07703

Contract Management Division

SUBJECT: PWS-007, Residential UST Removal  
Contractor: TVS Inc.

RE: Backfilling of excavation,

BUILDING #: 2033 (41+43 METILL CIRCLE)

TVS Inc.  
Field Supervisor, PWS-007  
ATTN: Brian Finch  
Building 166  
Fort Monmouth, New Jersey 07703-5000

Dear Mr. Finch:

The above referenced area has been sampled and analyzed as described in the NJDEP Regulations. The results indicate levels of petroleum contamination below the NJDEP allowable limits ~~or that the site requires further investigation outside the scope of this contract.~~ The contractor may proceed with the backfilling of the excavation with stone to groundwater and clean fill to grade as required in the above referenced contract specification.

Regards,



Mr. Dinker Desai  
Environmental Engineer  
Directorate of Public Works

CC: UST file copy



**DEPARTMENT OF THE ARMY**  
Headquarters, U.S. Army Garrison Fort Monmouth  
Fort Monmouth, New Jersey 07703 - 5101



REPLY TO  
ATTENTION OF  
Directorate of Public Works

MAR 31 2000

Marpal Disposal Company, Inc.  
P.O. Box 188  
Lincroft, New Jersey 07738

Re: Non-Hazardous Waste Disposal  
Contract No. DAAB07-96-C-8252  
Location: Bldg. 166  
Roll-off container No. 2065  
Size: 30 cubic yards  
USTs from Bldgs: 2022, 2023, 2024, 2025, 2026, 2027, 2028, 2029,  
2030, 2031, 2032, 2033, 2034, 2035, 2036, and 2037

Dear Sirs:

I certify that the above referenced 30 cubic yard roll-off container provided by Marpal, Inc. contains only crushed fiberglass underground storage tanks removed from residential buildings at Fort Monmouth, NJ. The tanks only held No. 2 heating oil. The tanks were cleaned in accordance with acceptable industry standards and NJDEP protocol and then crushed. No free liquids are present in the container.

If you should require any additional information or help at this time, please contact Mr. Dinker Desai, Environmental Engineer, at (732) 532-1475.

Sincerely,

James Ott,  
Director, Public Works

Attachments: None

## **APPENDIX C**

# **PHOTO DOCUMENTATION**

**(NOT AVAILABLE)**

## **APPENDIX D**

# **SOIL ANALYTICAL DATA PACKAGE**

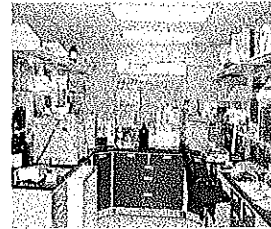
# FORT MONMOUTH ENVIRONMENTAL TESTING LABORATORY

DIRECTORATE OF PUBLIC WORKS

PHONE: (732) 532-6224 FAX: (732) 532-6263

WET-CHEM - METALS - ORGANICS - FIELD SAMPLING

CERTIFICATIONS: NJDEP #13461, NYSDOH #11699



ANALYTICAL DATA REPORT  
Fort Monmouth Environmental Laboratory  
ENVIRONMENTAL DIVISION  
Fort Monmouth, New Jersey  
PROJECT: IJO#100004

**Bldg. 2035**

| Field Sample Location  | Laboratory Sample ID# | Matrix   | Date and Time of Collection | Date Received |
|------------------------|-----------------------|----------|-----------------------------|---------------|
| 2035-A West End 6.5-7' | 5267.01               | Soil     | 21-Mar-00 11:00             | 03/21/00      |
| 2035-B East End 6.5-7' | 5267.02               | Soil     | 21-Mar-00 11:40             | 03/21/00      |
| 2035-C Piping 2-2.5'   | 5267.03               | Soil     | 21-Mar-00 11:20             | 03/21/00      |
| 2035-D Duplicate       | 5267.04               | Soil     | 21-Mar-00 11:00             | 03/21/00      |
| Trip Blank             | 5267.05               | Methanol | 21-Mar-00                   | 03/21/00      |

ANALYSIS:  
FORT MONMOUTH ENVIRONMENTAL LAB  
TPHC, %SOLIDS

ENCLOSURE:  
CHAIN OF CUSTODY  
RESULTS

 3-28-00  
Daniel Wright/Date  
Laboratory Director



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## **Method Summary**

**NJDEP Method OQA-QAM-025-10/97**

### **Gas Chromatographic Determination of Total Petroleum Hydrocarbons in Soil**

Fifteen grams (15g)(wet weight) of a soil sample is added to a 125 mL acid cleaned, solvent rinsed, capped Erlenmeyer flask. 15g anhydrous sodium sulfate is added to dry sample. Surrogate standard spiking solution is then added to the flask.

Twenty five milliliters(25mL) Methylene Chloride is added to the flask and it is secured on a orbital shaker table. The agitation rate is set to 400rpm and the sample is shaken for 30 minutes. The flask is the removed from the table and the particulate matter is allowed to settle. The extract is transferred to a Teflon capped vial. A second 25mL of Methylene Chloride is added to the flask and shaken for an additional 30 minutes. The flask is again removed and allowed to settle. The extracts are combined in the vial then transferred to a 1mL autosampler vial.

The extract is then injected directly into a GC-FID for analysis. The sample is analyzed for petroleum hydrocarbons covering a range of C8-C42 including pristane and phytane. Total Petroleum Hydrocarbon concentration is determined by integrating between 5 minutes and 22 minutes. The baseline is established by starting the integration after the end of the solvent peak and stopping after the last peak.

The final concentration of Total Petroleum Hydrocarbons is calculated using percent solid, sample weight and concentration.

000001

## TPHC Conformance/Non-conformance Summary Report

Indicate  
Yes, No, N/A

1. Method Detection Limits provided. yes
2. Method Blank Contamination – If yes, list the sample and the corresponding concentrations in each blank.  
\_\_\_\_\_  
\_\_\_\_\_ no
3. Matrix Spike Results Summary Meet Criteria  
(If not met, list the sample and corresponding recovery which falls outside the acceptable range).  
\_\_\_\_\_  
\_\_\_\_\_ yes
4. Duplicate Results Summary Meet Criteria  
(If not met, list the sample and corresponding recovery which falls outside the acceptable range).  
\_\_\_\_\_  
\_\_\_\_\_ yes
5. IR Spectra submitted for standards, blanks and samples. NA
6. Chromatograms submitted for standards, blanks and samples if GC fingerprinting was conducted. yes
7. Analysis holding time met.  
(If not met, list number of days exceeded for each sample).  
\_\_\_\_\_  
\_\_\_\_\_ yes

Additional comments: \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

  
Laboratory Manager

3-24-00  
Date

000002



# Fort Monmouth Environmental Testing Laboratory

Bldg. 173, SELFM-PW-EV, Fort Monmouth, NJ 07703

Tel (732)532-4359 Fax (732)532-6263 EMail:appleby@mail1.monmouth.army.mil

NJDEP Certification #13461

## Chain of Custody Record

|                                             |                           |         |      |                           |         |                     |      |          |        |                             |             |                               |
|---------------------------------------------|---------------------------|---------|------|---------------------------|---------|---------------------|------|----------|--------|-----------------------------|-------------|-------------------------------|
| Customer: Charles Appleby                   |                           |         |      | Project No: 10000499-0008 |         | Analysis Parameters |      |          |        | Comments:                   |             |                               |
| Phone #: X26224                             |                           |         |      | Location: BLDG 2035       |         |                     |      |          |        | * = Samples Kept <4 Celsius |             |                               |
| ( ) DERA (X) OMA UST Assessment             |                           |         |      | UST# 192486-16            |         |                     |      |          |        |                             |             |                               |
| Samplers Name / Company : Frank Accorsi/TVS |                           |         |      |                           |         | Sample #            | TPHC | % SOLIDS | VOA+10 | VOA ID Number               | PID Reading | Remarks / Preservation Method |
| Lab Sample ID.                              | Sample Location           | Date    | Time | Type                      | bottles |                     |      |          |        |                             |             |                               |
| 5207, 01                                    | 2035-A, WEST END 6.5-7 FT | 3-21-00 | 1100 | SOIL                      | 3       | X                   | X    | X        | 1070   | 0                           | ICE         |                               |
| 02                                          | 2035-B, EAST END 6.5-7 FT |         | 1140 |                           | 3       | X                   | X    | X        | 1071   | 0                           |             |                               |
| 03                                          | 2035-C, PIPING 2-2.5 FT   |         | 1120 |                           | 3       | X                   | X    | X        | 1072   | 0                           |             |                               |
| 04                                          | 2035-D, DUPLICATE         |         | 1100 |                           | 3       | X                   | X    | X        | 1073   | 0                           |             |                               |
| 05                                          | TRIP BLANK                |         | -    | AQ.                       | 1       |                     |      | X        | 1074   | -                           |             |                               |

OVM sn#580U-64455.343 was calibrated with zero air & w/ 245 ppm Isobutylene read 245 ppm. 1270 3-20-00 (time/date & initial)

|                                                      |                            |                                                |                              |            |                          |
|------------------------------------------------------|----------------------------|------------------------------------------------|------------------------------|------------|--------------------------|
| Relinquished by (signature):<br><i>Frank Accorsi</i> | Date/Time:<br>3-21-00 1300 | Received by (signature):<br><i>[Signature]</i> | Relinquished by (signature): | Date/Time: | Received by (signature): |
| Relinquished by (signature):                         | Date/Time:                 | Received by (signature):                       | Relinquished by (signature): | Date/Time: | Received by (signature): |

Report Type: ( ) Full, ( ) Reduced, (X) Standard, ( ) Screen / non-certified

Turnaround time: ( ) Standard 4 wks, (X) Rush 2 Days, ( ) ASAP Verbal Hrs.

Remarks: \*  
VO+10 ON 25% > 1,000 PPM TPH, ON H26HETT, MIN. ONE  
All sample points have been GPS? YES ( ) NO ( ) NA

Dedicated Sampling Tools Used

**Report of Analysis**  
**U.S. Army, Fort Monmouth Environmental Laboratory**  
**NJDEP Certification # 13461**

**Client :** U.S. Army  
 DPW. SELFM-PW-EV  
 Bldg. 173  
 Ft. Monmouth, NJ 07703

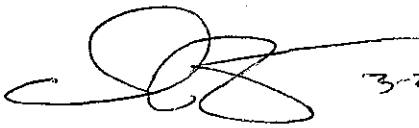
**Project # :** 5267  
**Location :** Bldg. 2035  
**UST Reg. # :** 192486-16

**Analysis :** OQA-QAM-025  
**Matrix :** Soil  
**Inst. ID. :** GC TPHC INST. #1  
**Column Type :** RTX-5, 0.32mm ID, 30M  
**Injection Volume :** 1uL

**Date Received :** 21-Mar-00  
**Date Extracted :** 22-Mar-00  
**Extraction Method :** Shake  
**Analysis Complete :** 23-Mar-00  
**Analyst :** B. Patel

| Sample       | Field ID | Dilution Factor | Weight (g) | % Solid | MDL (mg/kg) | TPHC Result (mg/kg) |
|--------------|----------|-----------------|------------|---------|-------------|---------------------|
| 5267.01      | 2035-A   | 1.00            | 15.01      | 90.01   | 174         | ND                  |
| 5267.02      | 2035-B   | 1.00            | 15.07      | 90.12   | 173         | ND                  |
| 5267.03      | 2035-C   | 1.00            | 15.00      | 87.65   | 179         | ND                  |
| 5267.04      | 2035-D   | 1.00            | 15.27      | 90.57   | 170         | ND                  |
|              |          |                 |            |         |             |                     |
|              |          |                 |            |         |             |                     |
|              |          |                 |            |         |             |                     |
|              |          |                 |            |         |             |                     |
|              |          |                 |            |         |             |                     |
|              |          |                 |            |         |             |                     |
|              |          |                 |            |         |             |                     |
|              |          |                 |            |         |             |                     |
|              |          |                 |            |         |             |                     |
|              |          |                 |            |         |             |                     |
|              |          |                 |            |         |             |                     |
|              |          |                 |            |         |             |                     |
|              |          |                 |            |         |             |                     |
|              |          |                 |            |         |             |                     |
|              |          |                 |            |         |             |                     |
|              |          |                 |            |         |             |                     |
|              |          |                 |            |         |             |                     |
|              |          |                 |            |         |             |                     |
| METHOD BLANK | TBLK353  | 1.00            | 15.00      | 100.00  | 157         | ND                  |

ND = Not Detected  
 MDL = Method Detection Limit

 3-28-00

## LABORATORY DELIVERABLES CHECKLIST AND NON-CONFORMANCE SUMMARY

THIS FORM MUST BE COMPLETED BY THE LABORATORY OR ENVIRONMENTAL CONSULTANT  
AND ACCOMPANY ALL DATA SUBMISSIONS

The following Laboratory Deliverables checklist and Non-Conformance Summary shall be included in the data submission. All deviations from the accepted methodology and procedures, of performance values outside acceptable ranges shall be summarized in the Non-Conformance Summary. The Technical Requirements for Site Remediation, effective June 7, 1993, provides further details. The document shall be bound and paginated, contain a table of contents, and all pages shall be legible. Incomplete packages will be returned or held without review until the data package is completed.

It is recommended that the analytical results summary sheets listing all targeted and non-targeted compounds with the method detection limits, practical quantitation limits, and the laboratory and/or sample numbers be included in one section of the data package and in the main body of the report.

- |                                                                                                              |                                     |
|--------------------------------------------------------------------------------------------------------------|-------------------------------------|
| 1. Cover page, Title Page listing Lab Certification #, facility name and address, & date of report submitted | <input checked="" type="checkbox"/> |
| 2. Table of Contents submitted                                                                               | <input checked="" type="checkbox"/> |
| 3. Summary Sheets listing analytical results for all targeted and non-targeted compounds submitted           | <input checked="" type="checkbox"/> |
| 4. Document paginated and legible                                                                            | <input checked="" type="checkbox"/> |
| 5. Chain of Custody submitted                                                                                | <input checked="" type="checkbox"/> |
| 6. Samples submitted to lab within 48 hours of sample collection                                             | <input checked="" type="checkbox"/> |
| 7. Methodology Summary submitted                                                                             | <input checked="" type="checkbox"/> |
| 8. Laboratory Chronicle and Holding Time Check submitted                                                     | <input checked="" type="checkbox"/> |
| 9. Results submitted on a dry weight basis                                                                   | <input checked="" type="checkbox"/> |
| 10. Method Detection Limits submitted                                                                        | <input checked="" type="checkbox"/> |
| 11. Lab certified by NJDEP for parameters of appropriate category of parameters or a member of the USEPA CLP | <input checked="" type="checkbox"/> |

Laboratory Manager or Environmental Consultant's Signature

Date 3/24/00

Laboratory Certification #13461

\*Refer to NJAC 7:26E - Appendix A, Section IV - Reduced Data Deliverables - Non-USEPA/CLP  
Methods for further guidance.

000023

## **Laboratory Authentication Statement**

I certify under penalty of law, where applicable, that this laboratory meets the Laboratory Performance Standards and Quality Control requirements specified in N.J.A.C. 7:18 and 40 CFR Part 136 for Water and Wastewater Analyses and SW-846 for Solid Waste Analysis. I have personally examined the information contained in this report and to the best of my knowledge, I believe that the submitted information is true, accurate, complete and meets the above referenced standards where applicable. I am aware that there are significant penalties for purposefully submitting falsified information, including the possibility of a fine and imprisonment.



Daniel K. Wright  
Laboratory Manager

000024

**Attachment Q**  
**UST 2036 Closure Report**



**U.S. Army Garrison**  
Fort Monmouth, New Jersey

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

***Charles Wood – Building 2036***

---

**NJDEP UST Registration No.: 192486-17**  
**UST No.: 192486-17**

**September 2010**

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

**CHARLES WOOD – BUILDING 2036  
NJDEP UST REGISTRATION NO.: 192486-17**

**SEPTEMBER 2010**

**PROJECT NO.: 10-24949**

**PREPARED FOR:**

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

**PREPARED BY:**

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

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## EXECUTIVE SUMMARY

### UST Closure

On March 22, 2000, a fiberglass wrapped plastic 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. Installed in 1985, the tank was located adjacent to Building 2036 in Charles Wood area. UST No.: 192486-17 was a 550-gallon, FRP, No. 2 fuel oil tank. The tank with all associated piping was present at the time of removal. 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, of which none were found. No petroleum odors or stained soils were observed in the soils surrounding the tanks.

Closure soil samples were collected after the removal of the UST. Closure samples 2036-A and 2036-B were collected from a total of two (2) locations along the UST bottom of the excavation for the UST No.: 192486-17. Closure sample 2036-C was collected from a location along the UST piping. A duplicate of sample 2036-A was also collected. All samples were analyzed for total petroleum hydrocarbons (TPH). Groundwater was not encountered in the bottom of the excavation.

### Findings

The closure soil samples collected from the UST excavation associated UST No.: 192486-17 contained TPH concentrations below the NJDEP health based criterion of 10,000 milligrams per kilogram (mg/kg) for total organic contaminants (N.J.A.C. 7:26E and revisions dated February 3, 1994). All soil samples, including the duplicate, contained a TPH concentration of Not Detected.

### Conclusions and Recommendations

Based on the closure soil sampling results, soils with TPH concentrations exceeding the NJDEP health based criterion of 10,000 mg/kg for total organic contaminants (N.J.A.C. 7:26E and revisions dated February 3, 1994) are not present in the former location of the UST.

**No Further Action** is proposed in regard to the closure and site assessment of UST No.: 192486-17 at Building 2036.

## **1.0 UNDERGROUND STORAGE TANK DECOMMISSIONING ACTIVITIES**

### **1.1 OVERVIEW**

One underground storage tank (UST), New Jersey Department of Environmental Protection (NJDEP) Registration No.: 192486-17 was closed at Building 2036 of the Charles Wood area at U.S. Army Garrison, Fort Monmouth, New Jersey. Refer to site location maps Figure 1 & 2. This report presents the results of the implementation of the Directorate of the Public Work's UST Management Plan, March 1996. Installed in 1985, the UST was a 550-gallon, FRP, containing No. 2 fuel oil for residential use. It was removed on March 22, 2000.

Decommissioning activities for UST No.: 192486-17 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 Site 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)*.

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 UST decommissioning activities. Section 2 describes the site investigation activities. Conclusions and recommendations are presented in Section 3 of this report.

### **1.2 SITE DESCRIPTION**

Building 2036 (44 & 46 Megill Circle) is located in the Charles Wood area of Fort Monmouth, as shown on Figure 1 & 2. UST No.: 192486-17 and associated piping were located adjacent to the building, as shown on Figure 3.

#### **1.2.1 Geological/Hydrogeological Setting**

The following is a description of the geological/hydrogeological setting of Bldg. 2036. 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 Charles Wood 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 (Zapeczka, 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 encrusted (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 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

Fort Monmouth has been an operational military facility for in excess of ninety (90) years; and in many areas of Charles Wood, human activities have completely transformed the topography. Currently, 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 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 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 Charles Wood 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-ionizer detector: Thermo Instruments Organic Vapor Monitor (OVM) – Model #580-B. The individual ascertained if the area was properly vented to render the area safe, as defined by OSHA. All work areas were properly vented to insure that there were no contaminants present in the breathing zone above permissible exposure limits (PEL's).

### **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 great regard to safety and health and the 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.

- 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.
- 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 UST. The tank was completely empty and contained no liquids prior to removal from the ground.

After the UST was removed from the excavation, it was staged on an impervious surface, labeled and examined for holes. The Subsurface Evaluator observed no holes in the tank during the inspection. Soils surrounding the UST were screened visually and with an OVM for evidence of contamination. Soil staining or petroleum hydrocarbons were not observed.

### **1.5 UNDERGROUND STORAGE TANK DECOMMISSIONING AND DISPOSAL**

Subsequent to disposal, the UST was purged with air to remove vapors prior to cutting. A 4 feet by 3 feet access hole was made in the UST using a pneumatic ripper gun with a non-sparking bit. The UST was cleaned first with rubber squeegees and adsorbent material broomed on the sidewalls and bottom. The adsorbent material was then drummed and subsequently put 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 for disposal in compliance with all applicable regulations and laws. The UST disposal certification, along with backfilling authorization, is included in Appendix B.

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

If available, photographic documentation of the UST is included in Appendix C.

## **2.0 SITE INVESTIGATION ACTIVITIES**

### **2.1 OVERVIEW**

The Site Investigation was managed by U.S. Army DPW personnel. All analyses were performed and reported by Fort Monmouth Environmental Testing Laboratory, a NJDEP-certified testing laboratory. All sampling was performed by a NJDEP Certified Subsurface Evaluator according to the methods described in the NJDEP *Field Sampling Procedures Manual* (1992). Sampling frequency and parameters analyzed complied with the NJDEP document *Technical Requirements for Site Remediation*, 7:26E-3.9 (June 7, 1993) which was the applicable regulation at the date of the closure. All records of the Site Investigation activities are maintained by the Fort Monmouth DPW Environmental Office.

The following Parties participated in Closure and Site Investigation Activities.

- Ft. Monmouth Directorate of Public Works-Environmental Division  
Contact Person: Joseph Fallon  
Phone Number: (732) 532-6223
- Subsurface Evaluator: Frank Accorsi  
Employer: TECOM-Vinnell Services, Inc. (TVS)  
Phone Number: (732) 532-5241  
NJDEP License No.: 0010042  
(TVS)NJDEP License No.: US252302
- Analytical Laboratory: Fort Monmouth Environmental Testing Laboratory  
Contact Person: Dan Wright  
Phone Number: (732) 532-4359  
NJDEP Laboratory Certification No.: 13461

### **2.2 FIELD SCREENING/MONITORING**

Field screening was performed by a NJDEP certified Subsurface Evaluator using an OVM and visual observations to identify potentially contaminated material, of which none were found.

### **2.3 SOIL SAMPLING**

On March 22, 2000, closure soil samples were collected after the removal of the UST. Closure samples 2036-A and 2036-B were collected from a total of two (2) locations along the UST bottom of the excavation for the UST No.: 192486-17. Closure sample 2036-C was collected from a location along the UST piping. A duplicate of sample 2036-A was collected.

Refer to soil sampling location map in Figure 3. All samples were analyzed for total petroleum hydrocarbons (TPH). Groundwater was not encountered in the excavation.

The site assessment was performed by TVS personnel in accordance with the NJDEP *Technical Requirements for Site Remediation* and the NJDEP *Field Sampling Procedures Manual*. A summary of sampling activities including parameters analyzed is provided on Table 1. The closure soil samples were collected. 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

Closure soil samples were collected from a total of three locations (which included the duplicate) on March 22, 2000 to evaluate soil conditions following removal of the UST and piping. All samples were analyzed for TPH. The closure soil sample results were compared to the NJDEP health based criterion of 10,000 mg/kg for total organic contaminants (*N.J.A.C. 7:26D* and revisions dated February 3, 1994). A summary of the analytical results and comparison to the NJDEP soil cleanup criteria is provided on Table 2. The analytical data package, including associated quality control data, is provided in Appendix D.

Closure soil samples collected on March 22, 2000 from the UST site excavation contained concentrations of TPH below the NJDEP soil cleanup criteria.

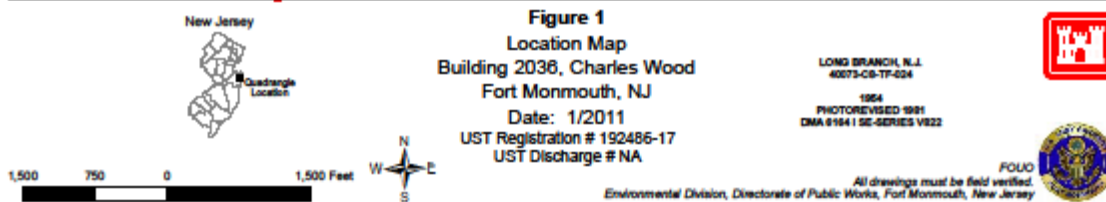
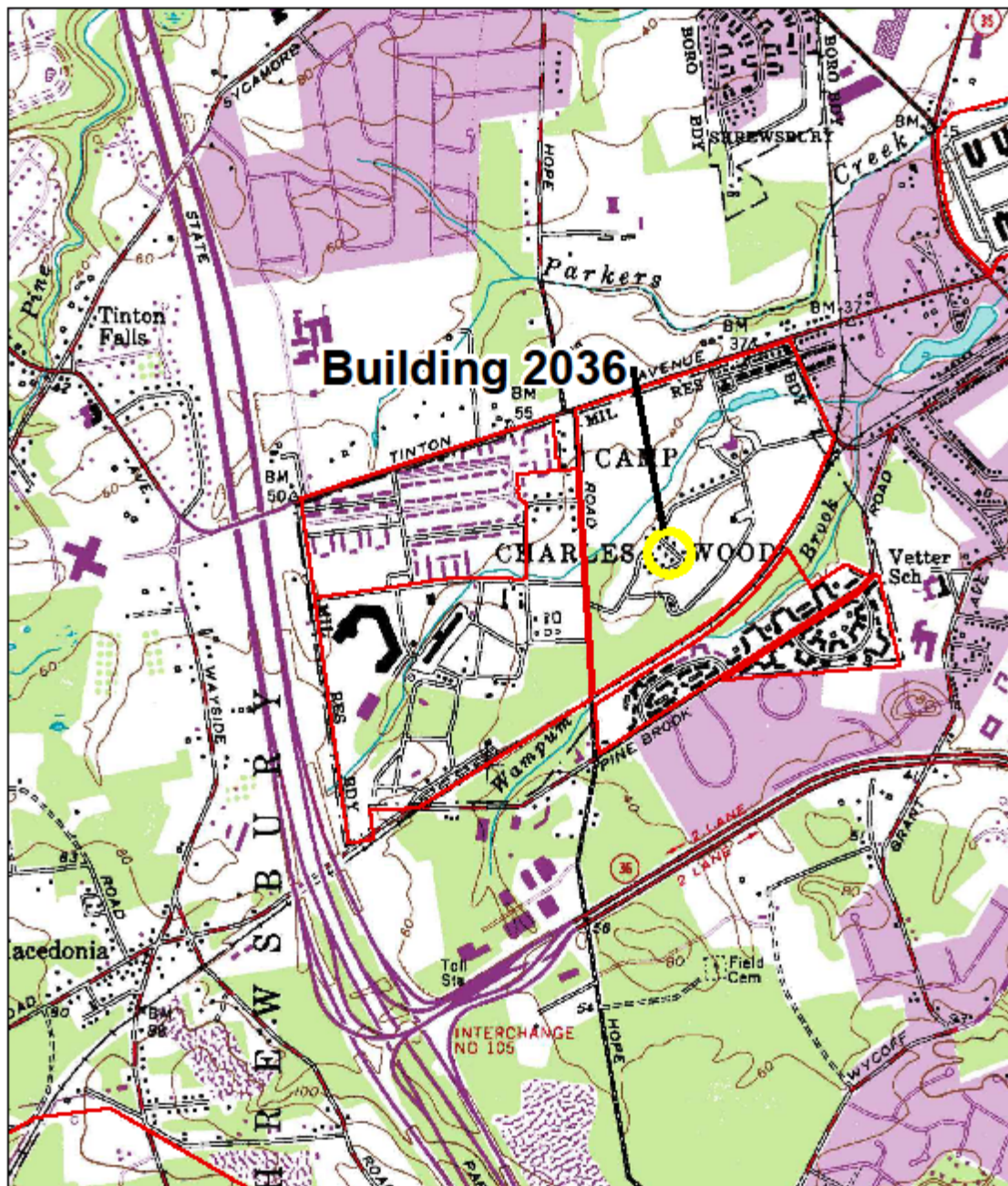
#### 3.2 CONCLUSIONS AND RECOMMENDATIONS

The analytical results for all of closure soil samples collected from the UST closure excavation at UST No.: 192486-17 were Not Detected for total petroleum hydrocarbons.

Based on the closure soil sampling results, soils with TPH concentrations exceeding the NJDEP soil cleanup criterion for total organic contaminants of 10,000 mg/kg are not present in the location of former UST No.: 192486-17.

**No Further Action** is proposed in regard to the closure and site investigation of UST No.: 192486-17 at Building 2036.

# FIGURES





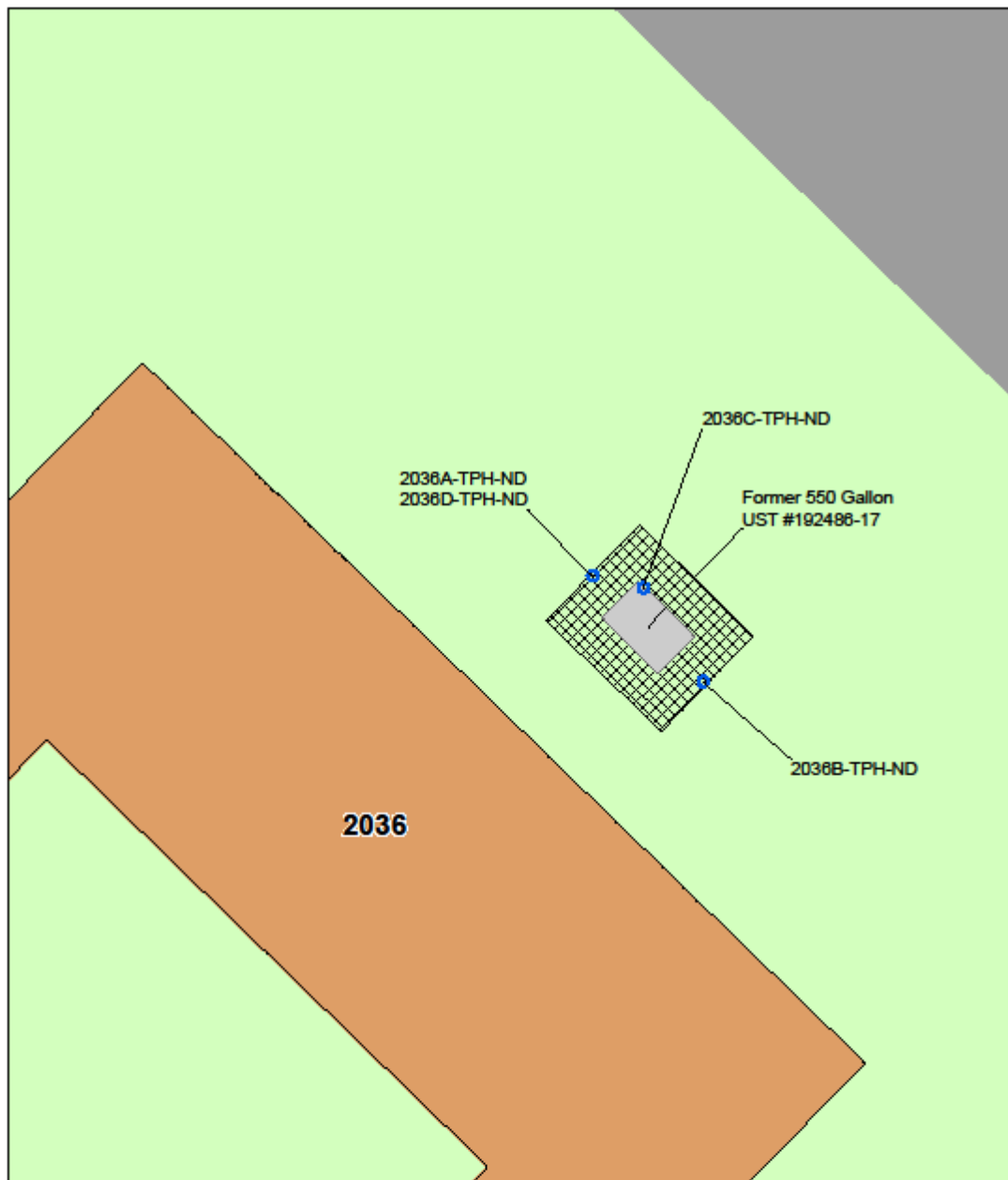
**Figure 2**  
 Location Map  
 Building 2036, Charles Wood Area  
 Fort Monmouth, NJ  
 Date: 1/2011  
 UST Registration # 192486-17  
 UST Discharge # NA



*All drawings must be field verified.*  
 Environmental Division, Directorate of Public Works, Fort Monmouth, New Jersey







**Legend**  
 [Grey Box] UST  
 [Grid Box] UST Excavation Limits  
 [Blue Dot] Soil Sample - 3/22/2000

10 5 0 10 Feet



**Figure 3**  
 Soil Sampling Location Map  
 Building 2036, Charles Wood Area  
 Fort Monmouth, NJ  
 Date: 1/2011  
 UST Registration # 192486-17  
 UST Discharge # NA



*All drawings must be field verified.*  
 Environmental Division, Directorate of Public Works, Fort Monmouth, New Jersey

# TABLES

# **TABLE 1**

## **SUMMARY OF LABORATORY ANALYSIS** **FT. MONMOUTH, BUILDING 2036, UST No.: 192486-17** **22 March 2000**

| <b>SAMPLE<br/>ID</b> | <b>LABORATORY<br/>SAMPLE ID</b> | <b>SAMPLE<br/>DATE</b> | <b>SAMPLE<br/>MATRIX</b> | <b>ANALYTICAL<br/>PARAMETER</b> | <b>ANALYTICAL<br/>METHOD</b> |
|----------------------|---------------------------------|------------------------|--------------------------|---------------------------------|------------------------------|
| <b>2036-A</b>        | 5271.01                         | 22-Mar-00              | SOIL                     | TPH                             | OQA-QAM-25                   |
| <b>2036-B</b>        | 5271.02                         | 22-Mar-00              | SOIL                     | TPH                             | OQA-QAM-25                   |
| <b>2036-C</b>        | 5271.03                         | 22-Mar-00              | SOIL                     | TPH                             | OQA-QAM-25                   |
| <b>2036-D</b>        | 5217.04                         | 22-Mar-00              | SOIL                     | TPH                             | OQA-QAM-25                   |

### ABBREVIATIONS:

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

## **TABLE 2**

### **SUMMARY OF LABORATORY ANALYTICAL RESULTS**

**FT. MONMOUTH, BUILDING 2036, UST No.: 192486-17**

**22 March 2000**

#### **TOTAL PETROLEUM HYDROCARBONS**

| <b>SAMPLE ID</b> | <b>LABORATORY<br/>SAMPLE ID</b> | <b>SAMPLE LOCATION</b> | <b>SAMPLE<br/>DEPTH</b> | <b>MATRIX</b> | <b>TPH<br/>RESULT S</b> |
|------------------|---------------------------------|------------------------|-------------------------|---------------|-------------------------|
|                  |                                 |                        | <b>(in feet)</b>        |               | <b>mg/kg</b>            |
| <b>2036-A</b>    | 5271.01                         | WEST END               | 6.5-7.0                 | Soil          | ND                      |
| <b>2036-B</b>    | 5271.02                         | EAST END               | 6.5-7.0                 | Soil          | ND                      |
| <b>2036-C</b>    | 5271.03                         | PIPING                 | 1.5-2.0                 | Soil          | ND                      |
| <b>2036-D</b>    | 5271.04                         | DUPLICATE-WEST END     | 6.5-7.0                 | Soil          | ND                      |

#### ABBREVIATIONS:

mg/kg = Milligrams Per Kilogram = parts per million

ND = Compound Not Detected

Gray shading indicates exceedance of NJDEP health based criterion of 10,000 ppm total organic contaminants

# **APPENDIX A**

## **CERTIFICATIONS**

**(NOT AVAILABLE)**

## **APPENDIX B**

### **UST DISPOSAL CERTIFICATE**

DIRECTORATE OF PUBLIC WORKS  
FORT MONMOUTH, NEW JERSEY 07703

Contract Management Division

SUBJECT: PWS-007, Residential UST Removal  
Contractor: TVS Inc.

RE: Backfilling of excavation,

BUILDING #: 2033 (41+43 METILL CIRCLE)

TVS Inc.  
Field Supervisor, PWS-007  
ATTN: Brian Finch  
Building 166  
Fort Monmouth, New Jersey 07703-5000

Dear Mr. Finch:

The above referenced area has been sampled and analyzed as described in the NJDEP Regulations. The results indicate levels of petroleum contamination below the NJDEP allowable limits ~~or that the site requires further investigation outside the scope of this contract.~~ The contractor may proceed with the backfilling of the excavation with stone to groundwater and clean fill to grade as required in the above referenced contract specification.

Regards,



Mr. Dinker Desai  
Environmental Engineer  
Directorate of Public Works

CC: UST file copy



**DEPARTMENT OF THE ARMY**  
Headquarters, U.S. Army Garrison Fort Monmouth  
Fort Monmouth, New Jersey 07703 - 5101



REPLY TO  
ATTENTION OF  
Directorate of Public Works

MAR 31 2000

Marpal Disposal Company, Inc.  
P.O. Box 188  
Lincroft, New Jersey 07738

Re: Non-Hazardous Waste Disposal  
Contract No. DAAB07-96-C-8252  
Location: Bldg. 166  
Roll-off container No. 2065  
Size: 30 cubic yards  
USTs from Bldgs: 2022, 2023, 2024, 2025, 2026, 2027, 2028, 2029,  
2030, 2031, 2032, 2033, 2034, 2035, 2036, and 2037

Dear Sirs:

I certify that the above referenced 30 cubic yard roll-off container provided by Marpal, Inc. contains only crushed fiberglass underground storage tanks removed from residential buildings at Fort Monmouth, NJ. The tanks only held No. 2 heating oil. The tanks were cleaned in accordance with acceptable industry standards and NJDEP protocol and then crushed. No free liquids are present in the container.

If you should require any additional information or help at this time, please contact Mr. Dinker Desai, Environmental Engineer, at (732) 532-1475.

Sincerely,

James Ott,  
Director, Public Works

Attachments: None



## **APPENDIX C**

# **PHOTO DOCUMENTATION**

**(NOT AVAILABLE)**

## **APPENDIX D**

### **SOIL ANALYTICAL DATA PACKAGE**

# FORT MONMOUTH ENVIRONMENTAL TESTING LABORATORY

DIRECTORATE OF PUBLIC WORKS

PHONE: (732) 532-6224 FAX: (732) 532-6263

WET-CHEM - METALS - ORGANICS - FIELD SAMPLING

CERTIFICATIONS: NJDEP #13461, NYSDOH #11699



ANALYTICAL DATA REPORT  
Fort Monmouth Environmental Laboratory  
ENVIRONMENTAL DIVISION  
Fort Monmouth, New Jersey  
PROJECT: IJO#100004

**Bldg. 2036**

| Field Sample Location   | Laboratory Sample ID# | Matrix   | Date and Time of Collection | Date Received |
|-------------------------|-----------------------|----------|-----------------------------|---------------|
| 2036-A West End 6.5-7'  | 5271.01               | Soil     | 22-Mar-00 11:00             | 03/22/00      |
| 2036-B East End 6.5-7'  | 5271.02               | Soil     | 22-Mar-00 11:15             | 03/22/00      |
| 2036-C Piping 1.5-2'    | 5271.03               | Soil     | 22-Mar-00 11:30             | 03/22/00      |
| 2036-D Duplicate 6.5-7' | 5271.04               | Soil     | 22-Mar-00 11:00             | 03/22/00      |
| Trip Blank              | 5271.05               | Methanol | 22-Mar-00                   | 03/22/00      |

ANALYSIS:  
FORT MONMOUTH ENVIRONMENTAL LAB  
TPHC, %SOLIDS

ENCLOSURE:  
CHAIN OF CUSTODY  
RESULTS

  
3-27-00  
Daniel Wright/Date  
Laboratory Director

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## **Method Summary**

**NJDEP Method OQA-QAM-025-10/97**

### **Gas Chromatographic Determination of Total Petroleum Hydrocarbons in Soil**

Fifteen grams (15g)(wet weight) of a soil sample is added to a 125 mL acid cleaned, solvent rinsed, capped Erlenmeyer flask. 15g anhydrous sodium sulfate is added to dry sample. Surrogate standard spiking solution is then added to the flask.

Twenty five milliliters(25mL) Methylene Chloride is added to the flask and it is secured on a orbital shaker table. The agitation rate is set to 400rpm and the sample is shaken for 30 minutes. The flask is the removed from the table and the particulate matter is allowed to settle. The extract is transferred to a Teflon capped vial. A second 25mL of Methylene Chloride is added to the flask and shaken for an additional 30 minutes. The flask is again removed and allowed to settle. The extracts are combined in the vial then transferred to a 1mL autosampler vial.

The extract is then injected directly into a GC-FID for analysis. The sample is analyzed for petroleum hydrocarbons covering a range of C8-C42 including pristane and phytane. Total Petroleum Hydrocarbon concentration is determined by integrating between 5 minutes and 22 minutes. The baseline is established by starting the integration after the end of the solvent peak and stopping after the last peak.

The final concentration of Total Petroleum Hydrocarbons is calculated using percent solid, sample weight and concentration.

000001

## TPHC Conformance/Non-conformance Summary Report

- |                                                                                                                                                                       | Indicate<br>Yes, No, N/A |
|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------|
| 1. Method Detection Limits provided.                                                                                                                                  | <u>Yes</u>               |
| 2. Method Blank Contamination -- If yes, list the sample and the corresponding concentrations in each blank.<br>_____<br>_____                                        | <u>No</u>                |
| 3. Matrix Spike Results Summary Meet Criteria<br>(If not met, list the sample and corresponding recovery which falls outside the acceptable range).<br>_____<br>_____ | <u>Yes</u>               |
| 4. Duplicate Results Summary Meet Criteria<br>(If not met, list the sample and corresponding recovery which falls outside the acceptable range).<br>_____<br>_____    | <u>Yes</u>               |
| 5. IR Spectra submitted for standards, blanks and samples.                                                                                                            | <u>NA</u>                |
| 6. Chromatograms submitted for standards, blanks and samples if GC fingerprinting was conducted.                                                                      | <u>Yes</u>               |
| 7. Analysis holding time met.<br>(If not met, list number of days exceeded for each sample).<br>_____<br>_____                                                        | <u>Yes</u>               |

Additional comments: \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

  
\_\_\_\_\_  
Laboratory Manager

3-27-08  
\_\_\_\_\_  
Date

000002



# Fort Monmouth Environmental Testing Laboratory

Bldg. 173, SELFM-PW-EV, Fort Monmouth, NJ 07703

Tel (732)532-4359 Fax (732)532-6263 EMail:wrightd@mail1.monmouth.army.mil

NJDEP Certification #13461 / NYDOH Certification #11699

## Chain of Custody Record

|                                                                                                                                                             |                          |                                   |                |                                                |                                                   |                                                                           |                     |          |          |             |             |                               |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------|-----------------------------------|----------------|------------------------------------------------|---------------------------------------------------|---------------------------------------------------------------------------|---------------------|----------|----------|-------------|-------------|-------------------------------|
| <b>Customer: Dinker Desai</b>                                                                                                                               |                          |                                   |                |                                                | Project No: 100004                                |                                                                           | Analysis Parameters |          |          |             |             | * = Samples Kept <4°C         |
| Phone #: X21475                                                                                                                                             |                          |                                   |                |                                                | Location: <i>BLDG. 2036 (44+46 MERILL CIRCLE)</i> |                                                                           | TPHC                | % SOLIDS | VOA+10   | VOA ID #    | PID Reading |                               |
| ( ) DERA (X) OMA UST Assessment                                                                                                                             |                          |                                   |                |                                                | UST# <i>192486-17</i>                             |                                                                           |                     |          |          |             |             |                               |
| Samplers Name / Company : Frank Accorsi/TVS                                                                                                                 |                          |                                   |                |                                                | Sample                                            | #                                                                         |                     |          |          |             |             | Remarks / Preservation Method |
| Lab Sample I.D.                                                                                                                                             | Sample Location          | Depth                             | Date           | Time                                           | Type                                              | Bottles                                                                   |                     |          |          |             |             |                               |
| <i>5271.01</i>                                                                                                                                              | <i>2036-A, WEST END</i>  | <i>6.5-7 FT</i>                   | <i>3-22-00</i> | <i>1100</i>                                    | <i>SOIL</i>                                       | <i>3</i>                                                                  | <i>X</i>            | <i>X</i> | <i>X</i> | <i>1075</i> | <i>1</i>    | <i>ICE</i>                    |
| <i>02</i>                                                                                                                                                   | <i>2036-B, EAST END</i>  | <i>6.5-7 FT</i>                   |                | <i>1115</i>                                    |                                                   | <i>3</i>                                                                  | <i>X</i>            | <i>X</i> | <i>X</i> | <i>1076</i> | <i>0</i>    |                               |
| <i>03</i>                                                                                                                                                   | <i>2036-C, PIPING</i>    | <i>1.5-2 FT</i>                   |                | <i>1130</i>                                    |                                                   | <i>3</i>                                                                  | <i>X</i>            | <i>X</i> | <i>X</i> | <i>1077</i> | <i>0</i>    |                               |
| <i>04</i>                                                                                                                                                   | <i>2036-D, DUPLICATE</i> | <i>6.5-7 FT</i>                   |                | <i>1100</i>                                    |                                                   | <i>3</i>                                                                  | <i>X</i>            | <i>X</i> | <i>X</i> | <i>1078</i> | <i>1</i>    |                               |
| <i>05</i>                                                                                                                                                   | <i>TRIP BLANK</i>        | <i>—</i>                          |                | <i>—</i>                                       | <i>AQ.</i>                                        | <i>1</i>                                                                  |                     |          | <i>X</i> | <i>1079</i> | <i>—</i>    |                               |
| OVM sn#580U-64455.343 was calibrated with zero air & w/ <i>245</i> ppm Isobutylene read <i>246</i> ppm. <i>1000</i> <i>3-22-00 PM</i> (time/date & initial) |                          |                                   |                |                                                |                                                   |                                                                           |                     |          |          |             |             |                               |
| Relinquished by (signature):<br><i>Frank Accorsi</i>                                                                                                        |                          | Date/Time:<br><i>3-22-00 1150</i> |                | Received by (signature):<br><i>J. DiPietro</i> |                                                   | Comments: <i>* VOA+10 ON 25% &gt; 1,000 PPM TPH, ON HIGHEST, MIN. ONE</i> |                     |          |          |             |             |                               |
| Relinquished by (signature):                                                                                                                                |                          | Date/Time:                        |                | Received by (signature):                       |                                                   |                                                                           |                     |          |          |             |             |                               |
| Report Type: ( ) Full, ( ) Reduced, (X) Standard, ( ) Screen / non-certified, ( ) EDD                                                                       |                          |                                   |                |                                                |                                                   | Remarks: Dedicated Sampling Tools Used                                    |                     |          |          |             |             |                               |
| Turnaround time: ( ) Standard 2 wks, (X) Rush <i>2</i> Days, ( ) ASAP Verbal <i>2</i> Hrs.                                                                  |                          |                                   |                |                                                |                                                   | All sample points have been GPS? ( ) YES ( ) NO ( ) NA                    |                     |          |          |             |             |                               |

000003

**Report of Analysis**  
**U.S.Army, Fort Monmouth Environmental Laboratory**  
**NJDEP Certification # 13461**

**Client :** U.S. Army  
 DPW. SELFM-PW-EV  
 Bldg. 173  
 Ft. Monmouth, NJ 07703

**Project # :** 5271  
**Location :** Bldg.2036  
**UST Reg. # :** 192486-17

**Analysis :** OQA-QAM-025  
**Matrix :** Soil  
**Inst. ID. :** GC TPHC INST. #1  
**Column Type :** RTX-5, 0.32mm ID, 30M  
**Injection Volume :** 1uL

**Date Received :** 22-Mar-00  
**Date Extracted :** 23-Mar-00  
**Extraction Method :** Shake  
**Analysis Complete :** 25-Mar-00  
**Analyst :** B.Patel

| Sample       | Field ID | Dilution Factor | Weight (g) | % Solid | MDL (mg/kg) | TPHC Result (mg/kg) |
|--------------|----------|-----------------|------------|---------|-------------|---------------------|
| 5271.01      | 2036-A   | 1.00            | 15.05      | 89.65   | 174         | ND                  |
| 5271.02      | 2036-B   | 1.00            | 15.06      | 89.67   | 174         | ND                  |
| 5271.03      | 2036-C   | 1.00            | 15.40      | 83.91   | 182         | ND                  |
| 5271.04      | 2036-D   | 1.00            | 15.05      | 89.71   | 174         | ND                  |
|              |          |                 |            |         |             |                     |
|              |          |                 |            |         |             |                     |
|              |          |                 |            |         |             |                     |
|              |          |                 |            |         |             |                     |
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|              |          |                 |            |         |             |                     |
|              |          |                 |            |         |             |                     |
|              |          |                 |            |         |             |                     |
|              |          |                 |            |         |             |                     |
| METHOD BLANK | TBLK356  | 1.00            | 15.00      | 100.00  | 157         | ND                  |

ND = Not Detected

MDL = Method Detection Limit

000004



## LABORATORY DELIVERABLES CHECKLIST AND NON-CONFORMANCE SUMMARY

THIS FORM MUST BE COMPLETED BY THE LABORATORY OR ENVIRONMENTAL CONSULTANT  
AND ACCOMPANY ALL DATA SUBMISSIONS

The following Laboratory Deliverables checklist and Non-Conformance Summary shall be included in the data submission. All deviations from the accepted methodology and procedures, of performance values outside acceptable ranges shall be summarized in the Non-Conformance Summary. The Technical Requirements for Site Remediation, effective June 7, 1993, provides further details. The document shall be bound and paginated, contain a table of contents, and all pages shall be legible. Incomplete packages will be returned or held without review until the data package is completed.

It is recommended that the analytical results summary sheets listing all targeted and non-targeted compounds with the method detection limits, practical quantitation limits, and the laboratory and/or sample numbers be included in one section of the data package and in the main body of the report.

- |                                                                                                              |                                     |
|--------------------------------------------------------------------------------------------------------------|-------------------------------------|
| 1. Cover page, Title Page listing Lab Certification #, facility name and address, & date of report submitted | <input checked="" type="checkbox"/> |
| 2. Table of Contents submitted                                                                               | <input checked="" type="checkbox"/> |
| 3. Summary Sheets listing analytical results for all targeted and non-targeted compounds submitted           | <input checked="" type="checkbox"/> |
| 4. Document paginated and legible                                                                            | <input checked="" type="checkbox"/> |
| 5. Chain of Custody submitted                                                                                | <input checked="" type="checkbox"/> |
| 6. Samples submitted to lab within 48 hours of sample collection                                             | <input checked="" type="checkbox"/> |
| 7. Methodology Summary submitted                                                                             | <input checked="" type="checkbox"/> |
| 8. Laboratory Chronicle and Holding Time Check submitted                                                     | <input checked="" type="checkbox"/> |
| 9. Results submitted on a dry weight basis                                                                   | <input checked="" type="checkbox"/> |
| 10. Method Detection Limits submitted                                                                        | <input checked="" type="checkbox"/> |
| 11. Lab certified by NJDEP for parameters of appropriate category of parameters or a member of the USEPA CLP | <input checked="" type="checkbox"/> |

Laboratory Manager or Environmental Consultant's Signature  
Date 3/27/00

Laboratory Certification #13461

\*Refer to NJAC 7:26E - Appendix A, Section IV - Reduced Data Deliverables - Non-USEPA/CLP  
Methods for further guidance.

000023

## Laboratory Authentication Statement

I certify under penalty of law, where applicable, that this laboratory meets the Laboratory Performance Standards and Quality Control requirements specified in N.J.A.C. 7:18 and 40 CFR Part 136 for Water and Wastewater Analyses and SW-846 for Solid Waste Analysis. I have personally examined the information contained in this report and to the best of my knowledge, I believe that the submitted information is true, accurate, complete and meets the above referenced standards where applicable. I am aware that there are significant penalties for purposefully submitting falsified information, including the possibility of a fine and imprisonment.



3-27-06  
Daniel K. Wright  
Laboratory Manager

000004

**Attachment R**  
**UST 2037 Closure Report**

**U.S. Army Garrison**  
Fort Monmouth, New Jersey

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

***Charles Wood – Building 2037***

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**NJDEP UST Registration No.: 192486-18**  
**UST No.: 192486-18**

**September 2010**

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

**CHARLES WOOD – BUILDING 2037  
NJDEP UST REGISTRATION NO.: 192486-18**

**SEPTEMBER 2010**

**PROJECT NO.: 10-24949**

**PREPARED FOR:**

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

**PREPARED BY:**

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

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## EXECUTIVE SUMMARY

### UST Closure

On March 23, 2000, a fiberglass wrapped plastic 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. Installed in 1985, the tank was located adjacent to Building 2037 in Charles Wood area. UST No.: 192486-18 was a 550-gallon FRP No. 2 fuel oil tank. The tank with all associated piping was present at the time of removal. 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, of which none were found. No petroleum odors or stained soils were observed in the soils surrounding the tanks.

Closure soil samples were collected after the removal of the UST. Closure samples 2037-A and 2037-B were collected from a total of two (2) locations along the UST bottom of the excavation for the UST No.: 192486-18. Closure sample 2037-C was collected from a location along the UST piping. A duplicate of sample 2037-A was collected. All samples were analyzed for total petroleum hydrocarbons (TPH). Groundwater was not encountered in the bottom of the excavation.

### Findings

The closure soil samples collected from the UST excavation associated UST No.: 192486-18 contained TPH concentrations below the NJDEP health based criterion of 10,000 milligrams per kilogram (mg/kg) for total organic contaminants (N.J.A.C. 7:26E and revisions dated February 3, 1994). All soil samples, including the duplicate, contained a TPH concentration of Not Detected.

### Conclusions and Recommendations

Based on the closure soil sampling results, soils with TPH concentrations exceeding the NJDEP health based criterion of 10,000 mg/kg for total organic contaminants (N.J.A.C. 7:26E and revisions dated February 3, 1994) are not present in the former location of the UST.

**No Further Action** is proposed in regard to the closure and site assessment of UST No.: 192486-18 at Building 2037.



## **1.0 UNDERGROUND STORAGE TANK DECOMMISSIONING ACTIVITIES**

### **1.1 OVERVIEW**

One underground storage tank (UST), New Jersey Department of Environmental Protection (NJDEP) Registration No.: 192486-18 was closed at Building 2037 of the Charles Wood area at U.S. Army Garrison, Fort Monmouth, New Jersey. Refer to site location maps Figure 1 & 2. This report presents the results of the implementation of the Directorate of the Public Work's UST Management Plan, March 1996. Installed in 1985, the UST was a 550-gallon, FRP, containing No. 2 fuel oil for residential use. It was removed on March 23, 2000.

Decommissioning activities for UST No.: 192486-18 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 Site 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)*.

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 UST decommissioning activities. Section 2 describes the site investigation activities. Conclusions and recommendations are presented in Section 3 of this report.

### **1.2 SITE DESCRIPTION**

Building 2037 (48 & 50 Megill Circle) is located in the Charles Wood area of Fort Monmouth, as shown on Figure 1 & 2. UST No.: 192486-18 and associated piping were located adjacent to the building, as shown on Figure 3.

#### **1.2.1 Geological/Hydrogeological Setting**

The following is a description of the geological/hydrogeological setting of Bldg. 2037. 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 Charles Wood 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 (Zapeczka, 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 encrusted (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 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

Fort Monmouth has been an operational military facility for in excess of ninety (90) years; and in many areas of Charles Wood, human activities have completely transformed the topography. Currently, 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 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 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 Charles Wood 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-ionizer detector: Thermo Instruments Organic Vapor Monitor (OVM) – Model #580-B. The individual ascertained if the area was properly vented to render the area safe, as defined by OSHA. All work areas were properly vented to insure that there were no contaminants present in the breathing zone above permissible exposure limits (PEL's).

### **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 great regard to safety and health and the 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.

- 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.
- 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 UST. The tank was completely empty and contained no liquids prior to removal from the ground.

After the UST was removed from the excavation, it was staged on an impervious surface, labeled and examined for holes. The Subsurface Evaluator observed no holes in the tank during the inspection. Soils surrounding the UST were screened visually and with an OVM for evidence of contamination. Soil staining or petroleum hydrocarbons were not observed.

### **1.5 UNDERGROUND STORAGE TANK DECOMMISSIONING AND DISPOSAL**

Subsequent to disposal, the UST was purged with air to remove vapors prior to cutting. A 4 feet by 3 feet access hole was made in the UST using a pneumatic ripper gun with a non-sparking bit. The UST was cleaned first with rubber squeegees and adsorbent material broomed on the sidewalls and bottom. The adsorbent material was then drummed and subsequently put 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 for disposal in compliance with all applicable regulations and laws. The UST disposal certification, along with backfilling authorization, is included in Appendix B.

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

If available, photographic documentation of the UST is included in Appendix C.

## **2.0 SITE INVESTIGATION ACTIVITIES**

### **2.1 OVERVIEW**

The Site Investigation was managed by U.S. Army DPW personnel. All analyses were performed and reported by Fort Monmouth Environmental Testing Laboratory, a NJDEP-certified testing laboratory. All sampling was performed by a NJDEP Certified Subsurface Evaluator according to the methods described in the NJDEP *Field Sampling Procedures Manual* (1992). Sampling frequency and parameters analyzed complied with the NJDEP document *Technical Requirements for Site Remediation*, 7:26E-3.9 (June 7, 1993) which was the applicable regulation at the date of the closure. All records of the Site Investigation activities are maintained by the Fort Monmouth DPW Environmental Office.

The following Parties participated in Closure and Site Investigation Activities.

- Ft. Monmouth Directorate of Public Works-Environmental Division  
Contact Person: Joseph Fallon  
Phone Number: (732) 532-6223
- Subsurface Evaluator: Frank Accorsi  
Employer: TECOM-Vinnell Services, Inc. (TVS)  
Phone Number: (732) 532-5241  
NJDEP License No.: 0010042  
(TVS)NJDEP License No.: US252302
- Analytical Laboratory: Fort Monmouth Environmental Testing Laboratory  
Contact Person: Dan Wright  
Phone Number: (732) 532-4359  
NJDEP Laboratory Certification No.: 13461

### **2.2 FIELD SCREENING/MONITORING**

Field screening was performed by a NJDEP certified Subsurface Evaluator using an OVM and visual observations to identify potentially contaminated material, of which none were found.

### **2.3 SOIL SAMPLING**

On March 23, 2000, closure soil samples were collected after the removal of the UST. Closure samples 2037-A and 2037-B were collected from a total of two (2) locations along the UST bottom of the excavation for the UST No.: 192486-18. Closure sample 2037-C was collected from a location along the UST piping. A duplicate of sample 2037-A was also collected.

Refer to soil sampling location map in Figure 3. All samples were analyzed for total petroleum hydrocarbons (TPH). Groundwater was not encountered in the excavation.

The site assessment was performed by TVS personnel in accordance with the NJDEP *Technical Requirements for Site Remediation* and the NJDEP *Field Sampling Procedures Manual*. A summary of sampling activities including parameters analyzed is provided on Table 1. The closure soil samples were collected. 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**

Closure soil samples were collected from a total of three locations (which included the duplicate) on March 23, 2000 to evaluate soil conditions following removal of the UST and piping. All samples were analyzed for TPH. The closure soil sample results were compared to the NJDEP health based criterion of 10,000 mg/kg for total organic contaminants (*N.J.A.C. 7:26D* and revisions dated February 3, 1994). A summary of the analytical results and comparison to the NJDEP soil cleanup criteria is provided on Table 2. The analytical data package, including associated quality control data, is provided in Appendix D.

Closure soil samples collected on March 23, 2000 from the UST site excavation contained concentrations of TPH below the NJDEP soil cleanup criteria.

#### **3.2 CONCLUSIONS AND RECOMMENDATIONS**

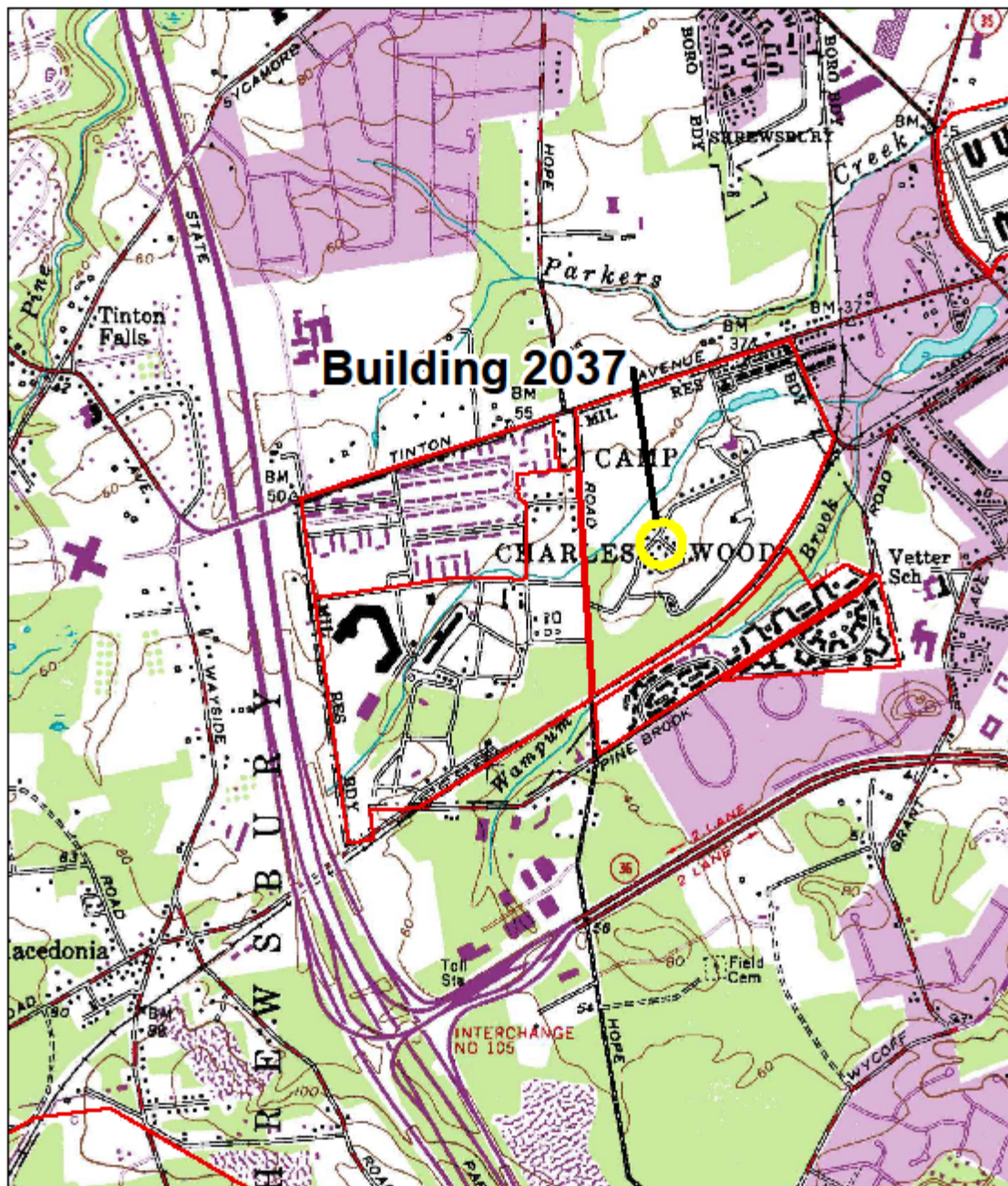
The analytical results for all of closure soil samples collected from the UST closure excavation at UST No.: 192486-18 were Not Detected for total petroleum hydrocarbons.

Based on the closure soil sampling results, soils with TPH concentrations exceeding the NJDEP soil cleanup criterion for total organic contaminants of 10,000 mg/kg are not present in the location of former UST No.: 192486-18.

**No Further Action** is proposed in regard to the closure and site investigation of UST No.: 192486-18 at Building 2037.



# FIGURES



**Figure 1**

Location Map  
 Building 2037, Charles Wood  
 Fort Monmouth, NJ

Date: 1/2011  
 UST Registration # 192486-18  
 UST Discharge # NA

LONG BRANCH, N.J.  
 40073-CS-TF-024  
 1984  
 PHOTO REVISIT 1991  
 DMA 51641 SE-SERIES V822



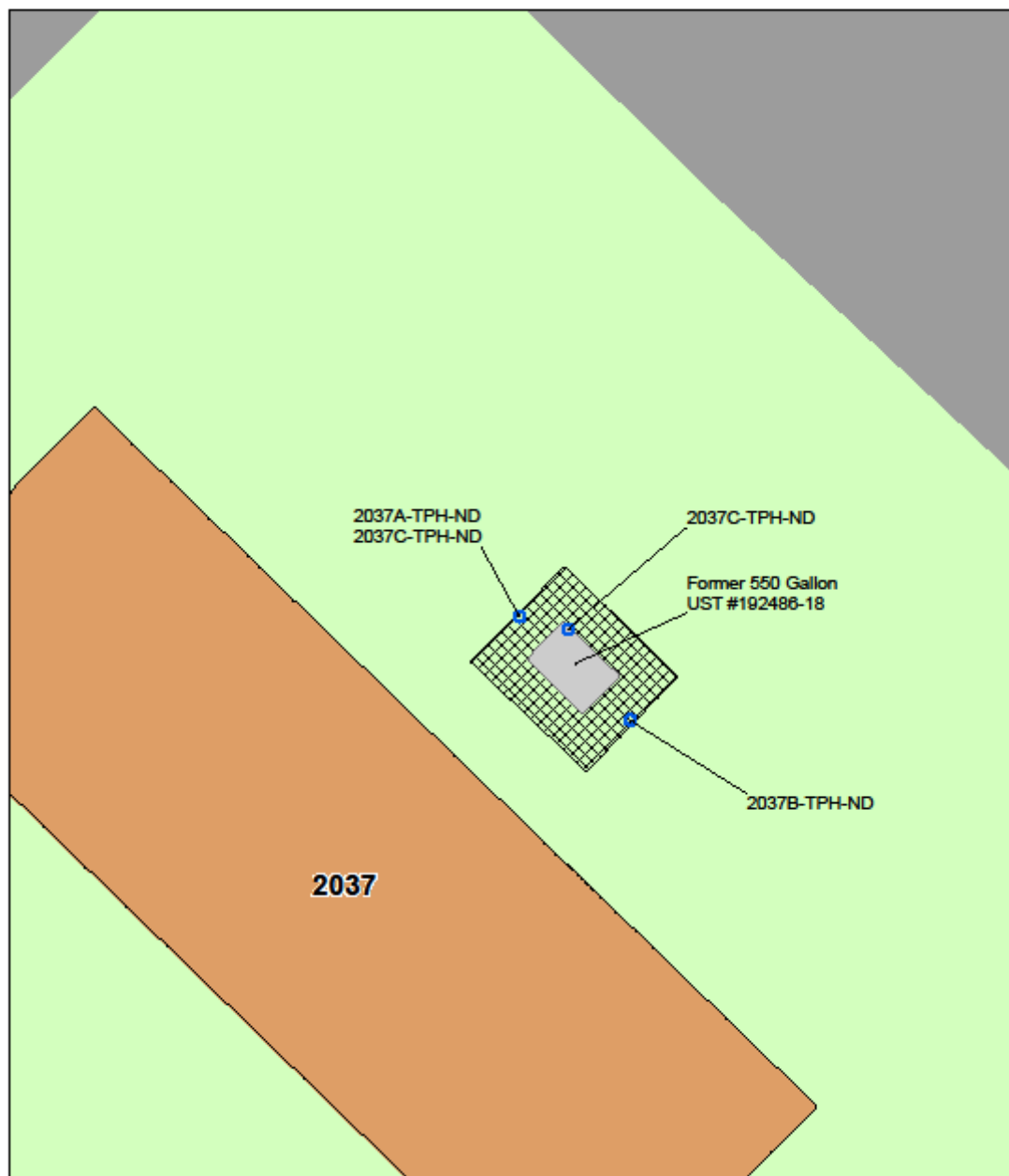
FOUO  
 All drawings must be field verified.  
 Environmental Division, Directorate of Public Works, Fort Monmouth, New Jersey



**Figure 2**  
**Location Map**  
**Building 2037, Charles Wood Area**  
**Fort Monmouth, NJ**  
**Date: 1/2011**  
**UST Registration # 192486-18**  
**UST Discharge # NA**



*All drawings must be field verified.*  
 Environmental Division, Directorate of Public Works, Fort Monmouth, New Jersey



**Legend**  
 [Grey Box] UST  
 [Cross-hatched Box] UST Excavation Limits  
 [Blue Dot] Soil Sample - 3/23/2000

10 5 0 10 Feet



**Figure 3**  
 Soil Sampling Location Map  
 Building 2037, Charles Wood Area  
 Fort Monmouth, NJ  
 Date: 1/2011  
 UST Registration # 192486-18  
 UST Discharge # NA



*All drawings must be field verified.*  
 Environmental Division, Directorate of Public Works, Fort Monmouth, New Jersey

# TABLES

# **TABLE 1**

## **SUMMARY OF LABORATORY ANALYSIS**

**FT. MONMOUTH, BUILDING 2037, UST No.: 192486-18  
23 March 2000**

| <b>SAMPLE<br/>ID</b>        | <b>LABORATORY<br/>SAMPLE ID</b> | <b>SAMPLE<br/>DATE</b> | <b>SAMPLE<br/>MATRIX</b> | <b>ANALYTICAL<br/>PARAMETER</b> | <b>ANALYTICAL<br/>METHOD</b> |
|-----------------------------|---------------------------------|------------------------|--------------------------|---------------------------------|------------------------------|
|                             |                                 |                        |                          |                                 |                              |
| <b>2037-A</b>               | 5276.01                         | 23-Mar-00              | SOIL                     | TPH                             | OQA-QAM-25                   |
| <b>2037-B</b>               | 5276.02                         | 23-Mar-00              | SOIL                     | TPH                             | OQA-QAM-25                   |
| <b>2037-C</b>               | 5276.03                         | 23-Mar-00              | SOIL                     | TPH                             | OQA-QAM-25                   |
| <b>2037-D<br/>Duplicate</b> | 5276.04                         | 23-Mar-00              | SOIL                     | TPH                             | OQA-QAM-25                   |

### ABBREVIATIONS:

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

## **TABLE 2**

### **SUMMARY OF LABORATORY ANALYTICAL RESULTS**

**FT. MONMOUTH, BUILDING 2037, UST No.: 192486-18**

**23 March 2000**

#### **TOTAL PETROLEUM HYDROCARBONS**

| <b>SAMPLE ID</b>            | <b>LABORATORY<br/>SAMPLE ID</b> | <b>SAMPLE LOCATION</b> | <b>SAMPLE<br/>DEPTH</b> | <b>MATRIX</b> | <b>TPH<br/>RESULT S</b> |
|-----------------------------|---------------------------------|------------------------|-------------------------|---------------|-------------------------|
|                             |                                 |                        | <b>(in feet)</b>        |               | <b>mg/kg</b>            |
| <b>2037-A</b>               | 5276.01                         | WEST END               | 6.5-7.0                 | Soil          | ND                      |
| <b>2037-B</b>               | 5276.02                         | EAST END               | 6.5-7.0                 | Soil          | ND                      |
| <b>2037-C</b>               | 5276.03                         | PIPING                 | 2.0-2.5                 | Soil          | ND                      |
| <b>2037-D<br/>Duplicate</b> | 5276.04                         | DUPLICATE-WEST END     | 6.5-7.0                 | Soil          | ND                      |

#### ABBREVIATIONS:

mg/kg = Milligrams Per Kilogram = parts per million

ND = Compound Not Detected

Gray shading indicates exceedance of NJDEP health based criterion of 10,000 ppm total organic contaminants

# **APPENDIX A**

## **CERTIFICATIONS**

**(NOT AVAILABLE)**



## **APPENDIX B**

### **UST DISPOSAL CERTIFICATE**

DIRECTORATE OF PUBLIC WORKS  
FORT MONMOUTH, NEW JERSEY 07703

Contract Management Division

SUBJECT: PWS-007, Residential UST Removal  
Contractor: TVS Inc.

RE: Backfilling of excavation,

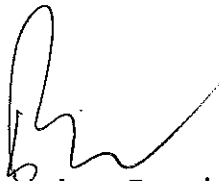
BUILDING #: 2037(48+50 MELL CIRCLE)

TVS Inc.  
Field Supervisor, PWS-007  
ATTN: Brian Finch  
Building 166  
Fort Monmouth, New Jersey 07703-5000

Dear Mr. Finch:

The above referenced area has been sampled and analyzed as described in the NJDEP Regulations. The results indicate levels of petroleum contamination below the NJDEP allowable limits ~~or that the site requires further investigation outside the scope of this contract.~~ The contractor may proceed with the backfilling of the excavation with stone to groundwater and clean fill to grade as required in the above referenced contract specification.

Regards,



Mr. Dinker Desai  
Environmental Engineer  
Directorate of Public Works

CC: UST file copy



**DEPARTMENT OF THE ARMY**  
Headquarters, U.S. Army Garrison Fort Monmouth  
Fort Monmouth, New Jersey 07703 - 5101



REPLY TO  
ATTENTION OF  
Directorate of Public Works

MAR 31 2000

Marpal Disposal Company, Inc.  
P.O. Box 188  
Lincroft, New Jersey 07738

Re: Non-Hazardous Waste Disposal  
Contract No. DAAB07-96-C-8252  
Location: Bldg. 166  
Roll-off container No. 2065  
Size: 30 cubic yards  
USTs from Bldgs: 2022, 2023, 2024, 2025, 2026, 2027, 2028, 2029,  
2030, 2031, 2032, 2033, 2034, 2035, 2036, and 2037

Dear Sirs:

I certify that the above referenced 30 cubic yard roll-off container provided by Marpal, Inc. contains only crushed fiberglass underground storage tanks removed from residential buildings at Fort Monmouth, NJ. The tanks only held No. 2 heating oil. The tanks were cleaned in accordance with acceptable industry standards and NJDEP protocol and then crushed. No free liquids are present in the container.

If you should require any additional information or help at this time, please contact Mr. Dinker Desai, Environmental Engineer, at (732) 532-1475.

Sincerely,

James Ott,  
Director, Public Works

Attachments: None

## **APPENDIX C**

# **PHOTO DOCUMENTATION**

**(NOT AVAILABLE)**

## **APPENDIX D**

### **SOIL ANALYTICAL DATA PACKAGE**

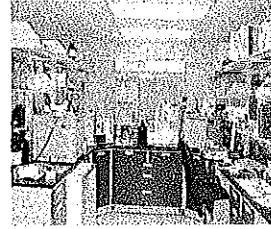
# FORT MONMOUTH ENVIRONMENTAL TESTING LABORATORY

DIRECTORATE OF PUBLIC WORKS

PHONE: (732) 532-6224 FAX: (732) 532-6263

WET-CHEM - METALS - ORGANICS - FIELD SAMPLING

CERTIFICATIONS: NJDEP #13461, NYSDOH #11699



ANALYTICAL DATA REPORT  
Fort Monmouth Environmental Laboratory  
ENVIRONMENTAL DIVISION  
Fort Monmouth, New Jersey  
PROJECT: IJO# 100004

**Bldg. 2037**

| Field Sample Location     | Laboratory<br>Sample ID# | Matrix   | Date and Time<br>of Collection | Date Received |
|---------------------------|--------------------------|----------|--------------------------------|---------------|
| 2037-A West End 6.5-7.0'  | 5276.01                  | Soil     | 23-Mar-00 10:40                | 03/23/00      |
| 2037-B East End 6.5-7.0'  | 5276.02                  | Soil     | 23-Mar-00 11:00                | 03/23/00      |
| 2037-C Piping 2-2.5'      | 5276.03                  | Soil     | 23-Mar-00 10:50                | 03/23/00      |
| 2037-D Duplicate 6.5-7.0' | 5276.04                  | Soil     | 23-Mar-00 10:40                | 03/23/00      |
| Trip Blank                | 5276.05                  | Methanol | 23-Mar-00                      | 03/23/00      |

ANALYSIS:  
FORT MONMOUTH ENVIRONMENTAL LAB  
TPHC, %SOLIDS

ENCLOSURE:  
CHAIN OF CUSTODY  
RESULTS

Daniel Wright/Date  
Laboratory Director

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## **Method Summary**

### **NJDEP Method OQA-QAM-025-10/97**

#### **Gas Chromatographic Determination of Total Petroleum Hydrocarbons in Soil**

Fifteen grams (15g)(wet weight) of a soil sample is added to a 125 mL acid cleaned, solvent rinsed, capped Erlenmeyer flask. 15g anhydrous sodium sulfate is added to dry sample. Surrogate standard spiking solution is then added to the flask.

Twenty five milliliters(25mL) Methylene Chloride is added to the flask and it is secured on a orbital shaker table. The agitation rate is set to 400rpm and the sample is shaken for 30 minutes. The flask is the removed from the table and the particulate matter is allowed to settle. The extract is transferred to a Teflon capped vial. A second 25mL of Methylene Chloride is added to the flask and shaken for an additional 30 minutes. The flask is again removed and allowed to settle. The extracts are combined in the vial then transferred to a 1mL autosampler vial.

The extract is then injected directly into a GC-FID for analysis. The sample is analyzed for petroleum hydrocarbons covering a range of C8-C42 including pristane and phytane. Total Petroleum Hydrocarbon concentration is determined by integrating between 5 minutes and 22 minutes. The baseline is established by starting the integration after the end of the solvent peak and stopping after the last peak.

The final concentration of Total Petroleum Hydrocarbons is calculated using percent solid, sample weight and concentration.

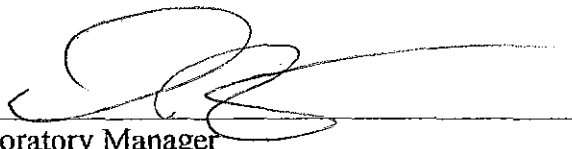


## TPHC Conformance/Non-conformance Summary Report

Indicate  
Yes, No, N/A

1. Method Detection Limits provided. Yes
2. Method Blank Contamination -- If yes, list the sample and the corresponding concentrations in each blank. No  
\_\_\_\_\_  
\_\_\_\_\_
3. Matrix Spike Results Summary Meet Criteria  
(If not met, list the sample and corresponding recovery which falls outside the acceptable range). Yes  
\_\_\_\_\_  
\_\_\_\_\_
4. Duplicate Results Summary Meet Criteria  
(If not met, list the sample and corresponding recovery which falls outside the acceptable range). Yes  
\_\_\_\_\_  
\_\_\_\_\_
5. IR Spectra submitted for standards, blanks and samples. NA
6. Chromatograms submitted for standards, blanks and samples if GC fingerprinting was conducted. Yes
7. Analysis holding time met.  
(If not met, list number of days exceeded for each sample). Yes  
\_\_\_\_\_  
\_\_\_\_\_

Additional comments: \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

  
Laboratory Manager

4-6-00  
Date

000002



# Fort Monmouth Environmental Testing Laboratory

Bldg. 173, SELFM-PW-EV, Fort Monmouth, NJ 07703

Tel (732)532-4359 Fax (732)532-6263 EMail:wrightd@mail1.monmouth.army.mil

NJDEP Certification #13461 / NYDOH Certification #11699

## Chain of Custody Record

|                                                                                                                                |                        |                            |             |                                              |                                                   |                                                                           |                            |                 |               |                 |                    |                                      |
|--------------------------------------------------------------------------------------------------------------------------------|------------------------|----------------------------|-------------|----------------------------------------------|---------------------------------------------------|---------------------------------------------------------------------------|----------------------------|-----------------|---------------|-----------------|--------------------|--------------------------------------|
| <b>Customer: Dinker Desai</b>                                                                                                  |                        |                            |             |                                              | <b>Project No: 100004</b>                         |                                                                           | <b>Analysis Parameters</b> |                 |               |                 |                    | <b>* = Samples Kept &lt;4°C</b>      |
| <b>Phone #: X21475</b>                                                                                                         |                        |                            |             |                                              | <b>Location: BLDG. 2037 (48+50 MERILL CIRCLE)</b> |                                                                           | <b>TPHC</b>                | <b>% SOLIDS</b> | <b>VOA+10</b> | <b>VOA ID #</b> | <b>PID Reading</b> |                                      |
| <b>( ) DERA (X) OMA UST Assessment</b>                                                                                         |                        |                            |             |                                              | <b>UST# 192886-18</b>                             |                                                                           |                            |                 |               |                 |                    |                                      |
| <b>Samplers Name / Company : Frank Accorsi/TVS</b>                                                                             |                        |                            |             |                                              | <b>Sample</b>                                     | <b>#</b>                                                                  |                            |                 |               |                 |                    | <b>Remarks / Preservation Method</b> |
| <b>Lab Sample I.D.</b>                                                                                                         | <b>Sample Location</b> | <b>Depth (ft)</b>          | <b>Date</b> | <b>Time</b>                                  | <b>Type</b>                                       | <b>Bottles</b>                                                            |                            |                 |               |                 |                    |                                      |
| 52 No. 01                                                                                                                      | 2037-A, WEST END       | 6.5-7.0                    | 3-23-00     | 1040                                         | SOIL                                              | 2                                                                         | X                          | X               | X             | 1080            | 0                  | ICE                                  |
| 02                                                                                                                             | 2037-B, EAST END       |                            |             | 1100                                         |                                                   | 2                                                                         | X                          | X               | X             | 1081            | 0                  |                                      |
| 03                                                                                                                             | 2037-C, PIPING         | 2-2.5                      |             | 1050                                         |                                                   | 2                                                                         | X                          | X               | X             | 1082            | 0                  |                                      |
| 04                                                                                                                             | 2038-D, DUPLICATE      | 6.5-7.0                    |             | 1040                                         |                                                   | 2                                                                         | X                          | X               | X             | 1020            | 0                  |                                      |
| 05                                                                                                                             | TRIP BLANK             | -                          |             | -                                            | AQ.                                               | 1                                                                         |                            |                 | X             | 1027            | -                  |                                      |
| OVM sn#580U-64455.343 was calibrated with zero air & w/245 ppm Isobutylene read 246 ppm. 1000 3-22-00 FA (time/date & initial) |                        |                            |             |                                              |                                                   |                                                                           |                            |                 |               |                 |                    |                                      |
| Relinquished by (signature):<br><i>Frank Accorsi</i>                                                                           |                        | Date/Time:<br>3-23-00 1110 |             | Received by (signature):<br><i>J. Wright</i> |                                                   | <b>Comments: * VOA+10 ON 25% &gt; 1,000 PPM TPH, ON HIGHEST, MIN. ONE</b> |                            |                 |               |                 |                    |                                      |
| Relinquished by (signature):                                                                                                   |                        | Date/Time:                 |             | Received by (signature):                     |                                                   |                                                                           |                            |                 |               |                 |                    |                                      |
| Report Type: ( ) Full, (X) Reduced, ( ) Standard, ( ) Screen / non-certified, ( ) EDD                                          |                        |                            |             |                                              |                                                   | Remarks: Dedicated Sampling Tools Used                                    |                            |                 |               |                 |                    |                                      |
| Turnaround time: ( ) Standard 2 wks, (X) Rush 2 Days, ( ) ASAP Verbal Hrs.                                                     |                        |                            |             |                                              |                                                   | All sample points have been GPS? (X) YES ( ) NO ( ) NA                    |                            |                 |               |                 |                    |                                      |

**Report of Analysis**  
**U.S.Army, Fort Monmouth Environmental Laboratory**  
**NJDEP Certification # 13461**

**Client :** U.S. Army  
 DPW. SELFM-PW-EV  
 Bldg. 173  
 Ft. Monmouth, NJ 07703

**Project # :** 5276  
**Location :** Bldg.2037  
**UST Reg. # :** 192486-18

**Analysis :** OQA-QAM-025  
**Matrix :** Soil  
**Inst. ID. :** GC TPHC INST. #1  
**Column Type :** RTX-5, 0.32mm ID, 30M  
**Injection Volume :** 1uL

**Date Received :** 23-Mar-00  
**Date Extracted :** 27-Mar-00  
**Extraction Method :** Shake  
**Analysis Complete :** 28-Mar-00  
**Analyst :** B.Patel

| Sample       | Field ID | Dilution Factor | Weight (g) | % Solid | MDL (mg/kg) | TPHC Result (mg/kg) |
|--------------|----------|-----------------|------------|---------|-------------|---------------------|
| 5276.01      | 2037-A   | 1.00            | 15.00      | 87.75   | 179         | ND                  |
| 5276.02      | 2037-B   | 1.00            | 15.03      | 89.31   | 175         | ND                  |
| 5276.03      | 2037-C   | 1.00            | 15.01      | 89.81   | 174         | ND                  |
| 5276.04      | 2037-D   | 1.00            | 15.03      | 87.60   | 178         | ND                  |
|              |          |                 |            |         |             |                     |
|              |          |                 |            |         |             |                     |
|              |          |                 |            |         |             |                     |
|              |          |                 |            |         |             |                     |
|              |          |                 |            |         |             |                     |
|              |          |                 |            |         |             |                     |
|              |          |                 |            |         |             |                     |
|              |          |                 |            |         |             |                     |
|              |          |                 |            |         |             |                     |
|              |          |                 |            |         |             |                     |
|              |          |                 |            |         |             |                     |
|              |          |                 |            |         |             |                     |
|              |          |                 |            |         |             |                     |
|              |          |                 |            |         |             |                     |
| METHOD BLANK | TBLK358  | 1.00            | 15.00      | 100.00  | 157         | ND                  |

ND = Not Detected

MDL = Method Detection Limit

000004

## LABORATORY DELIVERABLES CHECKLIST AND NON-CONFORMANCE SUMMARY

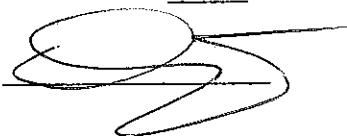
THIS FORM MUST BE COMPLETED BY THE LABORATORY OR ENVIRONMENTAL CONSULTANT  
AND ACCOMPANY ALL DATA SUBMISSIONS

The following Laboratory Deliverables checklist and Non-Conformance Summary shall be included in the data submission. All deviations from the accepted methodology and procedures, of performance values outside acceptable ranges shall be summarized in the Non-Conformance Summary. The Technical Requirements for Site Remediation, effective June 7, 1993, provides further details. The document shall be bound and paginated, contain a table of contents, and all pages shall be legible. Incomplete packages will be returned or held without review until the data package is completed.

It is recommended that the analytical results summary sheets listing all targeted and non-targeted compounds with the method detection limits, practical quantitation limits, and the laboratory and/or sample numbers be included in one section of the data package and in the main body of the report.

- |                                                                                                              |                                     |
|--------------------------------------------------------------------------------------------------------------|-------------------------------------|
| 1. Cover page, Title Page listing Lab Certification #, facility name and address, & date of report submitted | <input checked="" type="checkbox"/> |
| 2. Table of Contents submitted                                                                               | <input checked="" type="checkbox"/> |
| 3. Summary Sheets listing analytical results for all targeted and non-targeted compounds submitted           | <input checked="" type="checkbox"/> |
| 4. Document paginated and legible                                                                            | <input checked="" type="checkbox"/> |
| 5. Chain of Custody submitted                                                                                | <input checked="" type="checkbox"/> |
| 6. Samples submitted to lab within 48 hours of sample collection                                             | <input checked="" type="checkbox"/> |
| 7. Methodology Summary submitted                                                                             | <input checked="" type="checkbox"/> |
| 8. Laboratory Chronicle and Holding Time Check submitted                                                     | <input checked="" type="checkbox"/> |
| 9. Results submitted on a dry weight basis                                                                   | <input checked="" type="checkbox"/> |
| 10. Method Detection Limits submitted                                                                        | <input checked="" type="checkbox"/> |
| 11. Lab certified by NJDEP for parameters of appropriate category of parameters or a member of the USEPA CLP | <input checked="" type="checkbox"/> |

Laboratory Manager or Environmental Consultant's Signature  
Date 4/6/00



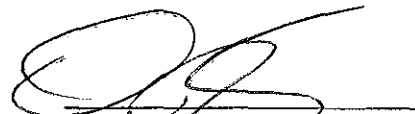
Laboratory Certification #13461

\*Refer to NJAC 7:26E - Appendix A, Section IV - Reduced Data Deliverables - Non-USEPA/CLP  
Methods for further guidance.

000025

## **Laboratory Authentication Statement**

I certify under penalty of law, where applicable, that this laboratory meets the Laboratory Performance Standards and Quality Control requirements specified in N.J.A.C. 7:18 and 40 CFR Part 136 for Water and Wastewater Analyses and SW-846 for Solid Waste Analysis. I have personally examined the information contained in this report and to the best of my knowledge, I believe that the submitted information is true, accurate, complete and meets the above referenced standards where applicable. I am aware that there are significant penalties for purposefully submitting falsified information, including the possibility of a fine and imprisonment.



Daniel K. Wright  
Laboratory Manager

000026

**Attachment S**  
**UST 2038 Closure Report**

**U.S. Army Garrison**  
Fort Monmouth, New Jersey

---

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

***Charles Wood – Building 2038***

---

**NJDEP UST Registration No.: 192486-19**  
**UST No.: 192486-19**

**September 2010**

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

**CHARLES WOOD – BUILDING 2038  
NJDEP UST REGISTRATION NO.: 192486-19**

**SEPTEMBER 2010**

**PROJECT NO.: 10-24949**

**PREPARED FOR:**

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

**PREPARED BY:**

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



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## EXECUTIVE SUMMARY

### UST Closure

On April 11, 2000, a fiberglass wrapped plastic 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. Installed in 1985, the tank was located adjacent to Building 2038 in Charles Wood area. UST No.: 192486-19 was a 550-gallon, FRP, No. 2 fuel oil tank. The tank with all associated piping was present at the time of removal. 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, of which none were found. No petroleum odors or stained soils were observed in the soils surrounding the tanks.

Closure soil samples were collected after the removal of the UST. Closure samples 2038-A and 2038-B were collected from a total of two (2) locations along the UST bottom of the excavation for the UST No.: 192486-19. Closure sample 2038-C was collected from a location along the UST piping. A duplicate of sample 2038-A was collected. All samples were analyzed for total petroleum hydrocarbons (TPH). Groundwater was not encountered in the bottom of the excavation.

### Findings

The closure soil samples collected from the UST excavation associated UST No.: 192486-19 contained TPH concentrations below the NJDEP health based criterion of 10,000 milligrams per kilogram (mg/kg) for total organic contaminants (N.J.A.C. 7:26E and revisions dated February 3, 1994). All soil samples, including the duplicate, contained a TPH concentration of Not Detected.

### Conclusions and Recommendations

Based on the closure soil sampling results, soils with TPH concentrations exceeding the NJDEP health based criterion of 10,000 mg/kg for total organic contaminants (N.J.A.C. 7:26E and revisions dated February 3, 1994) are not present in the former location of the UST.

**No Further Action** is proposed in regard to the closure and site assessment of UST No.: 192486-19 at Building 2038.

## **1.0 UNDERGROUND STORAGE TANK DECOMMISSIONING ACTIVITIES**

### **1.1 OVERVIEW**

One underground storage tank (UST), New Jersey Department of Environmental Protection (NJDEP) Registration No.: 192486-19 was closed at Building 2038 of the Charles Wood area at U.S. Army Garrison, Fort Monmouth, New Jersey. Refer to site location maps Figure 1 & 2. This report presents the results of the implementation of the Directorate of the Public Work's UST Management Plan, March 1996. Installed in 1985, the UST was a 550-gallon, FRP, containing No. 2 fuel oil for residential use. It was removed on April 11, 2000.

Decommissioning activities for UST No.: 192486-19 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 Site 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)*.

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 UST decommissioning activities. Section 2 describes the site investigation activities. Conclusions and recommendations are presented in Section 3 of this report.

### **1.2 SITE DESCRIPTION**

Building 2038 (36 & 38 Megill Circle) is located in the Charles Wood area of Fort Monmouth, as shown on Figure 1 & 2. UST No.: 192486-19 and associated piping were located adjacent to the building, as shown on Figure 3.

#### **1.2.1 Geological/Hydrogeological Setting**

The following is a description of the geological/hydrogeological setting of Bldg. 2038. 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 Charles Wood 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 (Zapeczka, 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 encrusted (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 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

Fort Monmouth has been an operational military facility for in excess of ninety (90) years; and in many areas of Charles Wood, human activities have completely transformed the topography. Currently, 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 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 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 Charles Wood 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-ionizer detector: Thermo Instruments Organic Vapor Monitor (OVM) – Model #580-B. The individual ascertained if the area was properly vented to render the area safe, as defined by OSHA. All work areas were properly vented to insure that there were no contaminants present in the breathing zone above permissible exposure limits (PEL’s).

### **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 great regard to safety and health and the 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.



- 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.
- 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 UST. The tank was completely empty and contained no liquids prior to removal from the ground.

After the UST was removed from the excavation, it was staged on an impervious surface, labeled and examined for holes. The Subsurface Evaluator observed no holes in the tank during the inspection. Soils surrounding the UST were screened visually and with an OVM for evidence of contamination. Soil staining or petroleum hydrocarbons were not observed.

### **1.5 UNDERGROUND STORAGE TANK DECOMMISSIONING AND DISPOSAL**

Subsequent to disposal, the UST was purged with air to remove vapors prior to cutting. A 4 feet by 3 feet access hole was made in the UST using a pneumatic ripper gun with a non-sparking bit. The UST was cleaned first with rubber squeegees and adsorbent material broomed on the sidewalls and bottom. The adsorbent material was then drummed and subsequently put 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 for disposal in compliance with all applicable regulations and laws. The UST disposal certification, along with backfilling authorization, is included in Appendix B.

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

If available, photographic documentation of the UST is included in Appendix C.

## **2.0 SITE INVESTIGATION ACTIVITIES**

### **2.1 OVERVIEW**

The Site Investigation was managed by U.S. Army DPW personnel. All analyses were performed and reported by Fort Monmouth Environmental Testing Laboratory, a NJDEP-certified testing laboratory. All sampling was performed by a NJDEP Certified Subsurface Evaluator according to the methods described in the NJDEP *Field Sampling Procedures Manual* (1992). Sampling frequency and parameters analyzed complied with the NJDEP document *Technical Requirements for Site Remediation*, 7:26E-3.9 (June 7, 1993) which was the applicable regulation at the date of the closure. All records of the Site Investigation activities are maintained by the Fort Monmouth DPW Environmental Office.

The following Parties participated in Closure and Site Investigation Activities.

- Ft. Monmouth Directorate of Public Works-Environmental Division  
Contact Person: Joseph Fallon  
Phone Number: (732) 532-6223
- Subsurface Evaluator: Frank Accorsi  
Employer: TECOM-Vinnell Services, Inc. (TVS)  
Phone Number: (732) 532-5241  
NJDEP License No.: 0010042  
(TVS)NJDEP License No.: US252302
- Analytical Laboratory: Fort Monmouth Environmental Testing Laboratory  
Contact Person: Dan Wright  
Phone Number: (732) 532-4359  
NJDEP Laboratory Certification No.: 13461

### **2.2 FIELD SCREENING/MONITORING**

Field screening was performed by a NJDEP certified Subsurface Evaluator using an OVM and visual observations to identify potentially contaminated material, of which none were found.

### **2.3 SOIL SAMPLING**

On April 11, 2000, closure soil samples were collected after the removal of the UST. Closure samples 2038-A and 2038-B were collected from a total of two (2) locations along the UST bottom of the excavation for the UST No.: 192486-19. Closure sample 2038-C was collected from a location along the UST piping. A duplicate of sample 2038-A was also collected.

Refer to soil sampling location map in Figure 3. All samples were analyzed for total petroleum hydrocarbons (TPH). Groundwater was not encountered in the excavation.

The site assessment was performed by TVS personnel in accordance with the NJDEP *Technical Requirements for Site Remediation* and the NJDEP *Field Sampling Procedures Manual*. A summary of sampling activities including parameters analyzed is provided on Table 1. The closure soil samples were collected. 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

Closure soil samples were collected from a total of three locations (which included the duplicate) on April 11, 2000 to evaluate soil conditions following removal of the UST and piping. All samples were analyzed for TPH. The closure soil sample results were compared to the NJDEP health based criterion of 10,000 mg/kg for total organic contaminants (*N.J.A.C. 7:26D* and revisions dated February 3, 1994). A summary of the analytical results and comparison to the NJDEP soil cleanup criteria is provided on Table 2. The analytical data package, including associated quality control data, is provided in Appendix D.

Closure soil samples collected on April 11, 2000 from the UST site excavation contained concentrations of TPH below the NJDEP soil cleanup criteria.

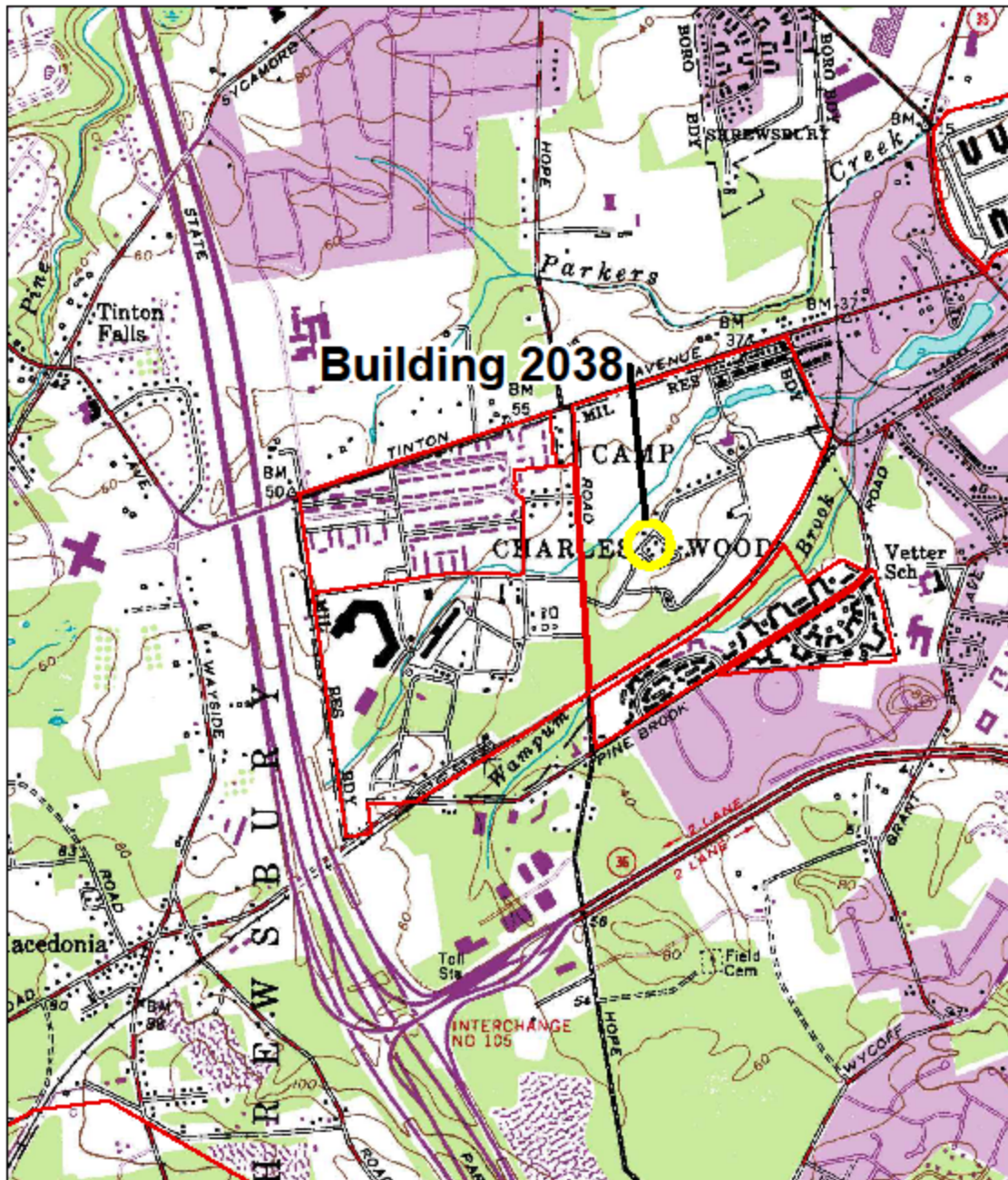
#### 3.2 CONCLUSIONS AND RECOMMENDATIONS

The analytical results for all of closure soil samples collected from the UST closure excavation at UST No.: 192486-19 were Not Detected for total petroleum hydrocarbons.

Based on the closure soil sampling results, soils with TPH concentrations exceeding the NJDEP soil cleanup criterion for total organic contaminants of 10,000 mg/kg are not present in the location of former UST No.: 192486-19.

**No Further Action** is proposed in regard to the closure and site investigation of UST No.: 192486-19 at Building 2038.

# FIGURES



**Figure 1**

Location Map  
 Building 2038, Charles Wood  
 Fort Monmouth, NJ

Date: 1/2011  
 UST Registration # 192486-19  
 UST Discharge # NA

LONG BRANCH, N.J.  
 40073-CB-TF-024

1984  
 PHOTO REVISSED 1991  
 DMA 51641 SE-SERIES V822



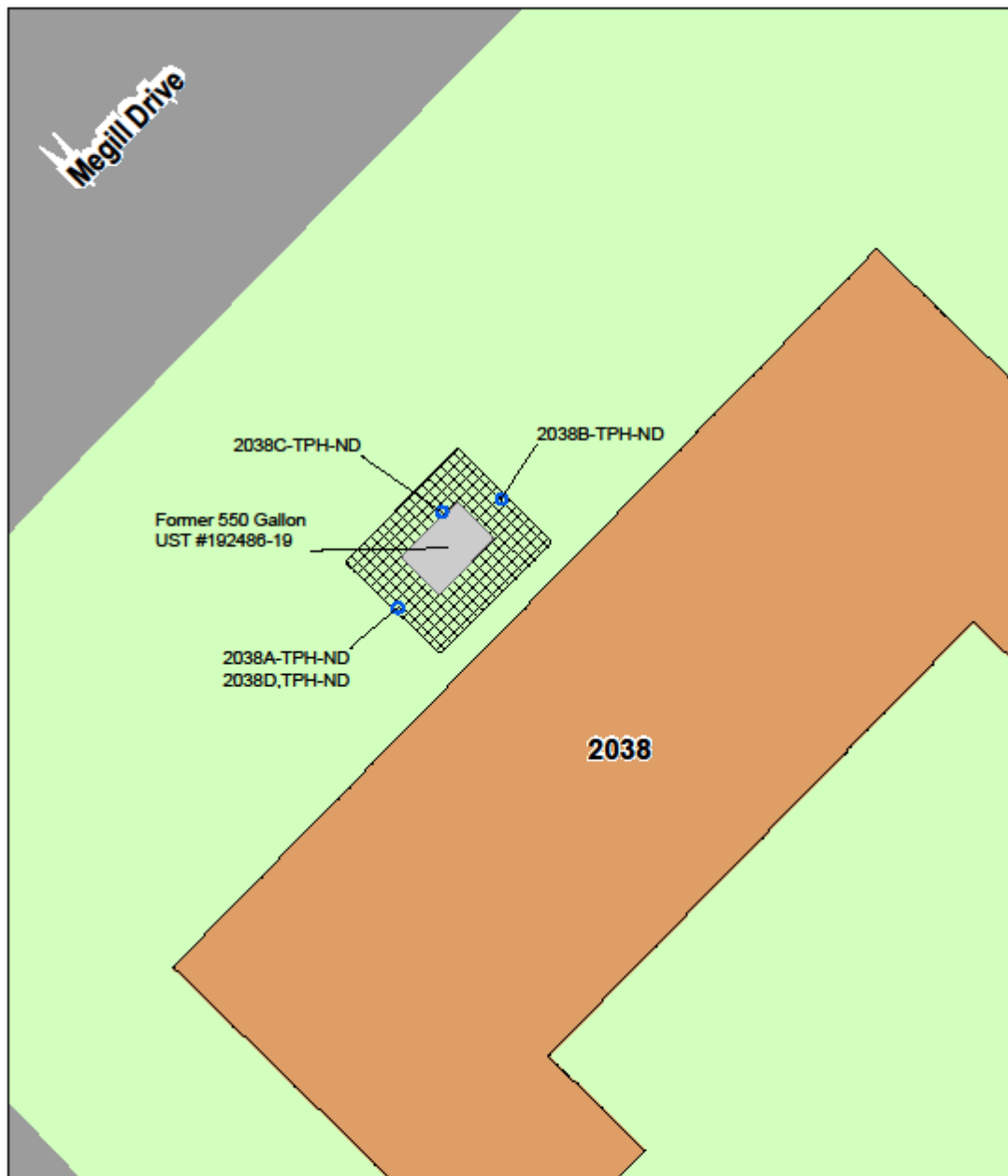
FOUO  
 All drawings must be field verified.  
 Environmental Division, Directorate of Public Works, Fort Monmouth, New Jersey



**Figure 2**  
 Location Map  
 Building 2038, Charles Wood Area  
 Fort Monmouth, NJ  
 Date: 1/2011  
 UST Registration # 192486-19  
 UST Discharge # NA



All drawings must be field verified.  
 Environmental Division, Directorate of Public Works, Fort Monmouth, New Jersey



**Figure 3**

Soil Sampling Location Map  
 Building 2038, Charles Wood Area  
 Fort Monmouth, NJ  
 Date: 1/2011  
 UST Registration # 192486-19  
 UST Discharge # NA



*All drawings must be field verified.*  
 Environmental Division, Directorate of Public Works, Fort Monmouth, New Jersey

# TABLES



# **TABLE 1**

## **SUMMARY OF LABORATORY ANALYSIS**

**FT. MONMOUTH, BUILDING 2038, UST No.: 192486-19**

**11 April 2000**

| <b>SAMPLE ID</b>        | <b>LABORATORY SAMPLE ID</b> | <b>SAMPLE DATE</b> | <b>SAMPLE MATRIX</b> | <b>ANALYTICAL PARAMETER</b> | <b>ANALYTICAL METHOD</b> |
|-------------------------|-----------------------------|--------------------|----------------------|-----------------------------|--------------------------|
|                         |                             |                    |                      |                             |                          |
| <b>2038-A</b>           | 5332.01                     | 11-Apr-00          | SOIL                 | TPH                         | OQA-QAM-25               |
| <b>2038-B</b>           | 5332.02                     | 11-Apr-00          | SOIL                 | TPH                         | OQA-QAM-25               |
| <b>2038-C</b>           | 5332.03                     | 11-Apr-00          | SOIL                 | TPH                         | OQA-QAM-25               |
| <b>2038-D Duplicate</b> | 5332.04                     | 11-Apr-00          | SOIL                 | TPH                         | OQA-QAM-25               |

### ABBREVIATIONS:

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

## **TABLE 2**

### **SUMMARY OF LABORATORY ANALYTICAL RESULTS**

FT. MONMOUTH, BUILDING 2038, UST No.: 192486-19

11 April 2000

#### **TOTAL PETROLEUM HYDROCARBONS**

| SAMPLE ID           | LABORATORY<br>SAMPLE ID | SAMPLE LOCATION    | SAMPLE<br>DEPTH | MATRIX | TPH<br>RESULTS |
|---------------------|-------------------------|--------------------|-----------------|--------|----------------|
|                     |                         |                    | (in feet)       |        | mg/kg          |
| 2038-A              | 5332.01                 | WEST END           | 6.5-7.0         | Soil   | ND             |
| 2038-B              | 5332.02                 | EAST END           | 6.5-7.0         | Soil   | ND             |
| 2038-C              | 5332.03                 | PIPING             | 1.5-2.0         | Soil   | ND             |
| 2038-D<br>Duplicate | 5332.04                 | DUPLICATE-WEST END | 6.5-7.0         | Soil   | ND             |

**ABBREVIATIONS:**

mg/kg = Milligrams Per Kilogram = parts per million

ND = Compound Not Detected

Gray shading indicates exceedance of NJDEP health based criterion of 10,000 ppm total organic contaminants

# **APPENDIX A**

## **CERTIFICATIONS**

**(NOT AVAILABLE)**

## **APPENDIX B**

### **UST DISPOSAL CERTIFICATE**

**DIRECTORATE OF PUBLIC WORKS  
FORT MONMOUTH, NEW JERSEY 07703**

Contract Management Division

SUBJECT: PWS-007, Residential UST Removal  
Contractor: TVS Inc.

RE: Backfilling of excavation,

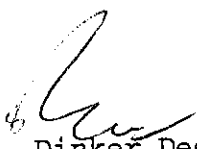
BUILDING #: 2038 (36+38 MEGILL CIRCLE)

TVS Inc.  
Field Supervisor, PWS-007  
ATTN: Brian Finch  
Building 166  
Fort Monmouth, New Jersey 07703-5000

Dear Mr. Finch:

The above referenced area has been sampled and analyzed as described in the NJDEP Regulations. The results indicate levels of petroleum contamination below the NJDEP allowable limits ~~or that the site requires further investigation outside the scope of this contract.~~ The contractor may proceed with the backfilling of the excavation with stone to groundwater and clean fill to grade as required in the above referenced contract specification.

Regards,

  
Mr. Dinker Desai  
Environmental Engineer  
Directorate of Public Works

CC: UST file copy



**DEPARTMENT OF THE ARMY**

Headquarters, U.S. Army Garrison Fort Monmouth  
Fort Monmouth, New Jersey 07703 - 5101



REPLY TO  
ATTENTION OF

Directorate of Public Works

Date: 30 January, 2001

Marpal Disposal Company, Inc.  
P.O. Box 188  
Lincroft, New Jersey 07738

Re: Non-Hazardous Waste Disposal  
Contract No. DAAB07-96-C-8252  
Location: Bldg. 166, rear  
Roll-off container No. 2798  
Size: 30 cubic yards  
USTs from Bldgs: 226(2K), 227(2K), 228(2K), 2038(.5K), 2039(.5K), 2040(.5K),  
2041(.5K), 2042(.5K), McGuire AFB 1507(2.5K)

Dear Sirs:

I certify that the above referenced 30 cubic yard roll-off container provided by Marpal, Inc. contains only crushed fiberglass underground storage tanks removed from residential buildings at Fort Monmouth, NJ, and one from McGuire Air Force Base. The tanks held only No. 2 heating oil. The tanks were cleaned in accordance with acceptable industry standards and NJDEP protocol and then crushed. No free liquids are present in the container.

If you should require any additional information or help at this time, please contact Mr. Dinker Desai, Environmental Protection Specialist. He can be reached at the following telephone number: (732) 532-1475.

Sincerely,

Dinker Desai  
Environmental Protection Specialist

Attachments: None

## **APPENDIX C**

# **PHOTO DOCUMENTATION**

**(NOT AVAILABLE)**

## **APPENDIX D**

### **SOIL ANALYTICAL DATA PACKAGE**



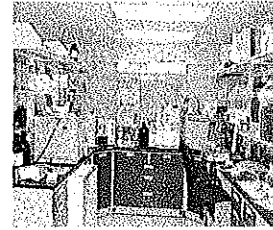
# FORT MONMOUTH ENVIRONMENTAL TESTING LABORATORY

DIRECTORATE OF PUBLIC WORKS

PHONE: (732) 532-6224 FAX: (732) 532-6263

WET-CHEM - METALS - ORGANICS - FIELD SAMPLING

CERTIFICATIONS: NJDEP #13461, NYSDOH #11699



ANALYTICAL DATA REPORT  
Fort Monmouth Environmental Laboratory  
ENVIRONMENTAL DIVISION  
Fort Monmouth, New Jersey  
PROJECT: IJO# 100004

**Bldg. 2038**

| Field Sample Location     | Laboratory Sample ID# | Matrix   | Date and Time of Collection | Date Received |
|---------------------------|-----------------------|----------|-----------------------------|---------------|
| 2038-A West End 6.5-7.0'  | 5332.01               | Soil     | 11-Apr-00 09:30             | 04/11/00      |
| 2038-B East End 6.5-7.0'  | 5332.02               | Soil     | 11-Apr-00 10:00             | 04/11/00      |
| 2038-C Piping 1.5-2.0'    | 5332.03               | Soil     | 11-Apr-00 09:45             | 04/11/00      |
| 2038-D Duplicate 6.5-7.0' | 5332.04               | Soil     | 11-Apr-00 09:30             | 04/11/00      |
| Trip Blank                | 5332.05               | Methanol | 11-Apr-00                   | 04/11/00      |

ANALYSIS:  
FORT MONMOUTH ENVIRONMENTAL LAB  
TPHC, %SOLIDS

ENCLOSURE:  
CHAIN OF CUSTODY  
RESULTS

  
4-20-00  
Daniel Wright/Date  
Laboratory Director

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## **Method Summary**

### **NJDEP Method OQA-QAM-025-10/97**

#### **Gas Chromatographic Determination of Total Petroleum Hydrocarbons in Soil**

Fifteen grams (15g)(wet weight) of a soil sample is added to a 125 mL acid cleaned, solvent rinsed, capped Erlenmeyer flask. 15g anhydrous sodium sulfate is added to dry sample. Surrogate standard spiking solution is then added to the flask.

Twenty five milliliters(25mL) Methylene Chloride is added to the flask and it is secured on a orbital shaker table. The agitation rate is set to 400rpm and the sample is shaken for 30 minutes. The flask is the removed from the table and the particulate matter is allowed to settle. The extract is transferred to a Teflon capped vial. A second 25mL of Methylene Chloride is added to the flask and shaken for an additional 30 minutes. The flask is again removed and allowed to settle. The extracts are combined in the vial then transferred to a 1mL autosampler vial.

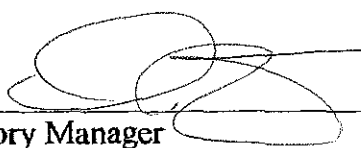
The extract is then injected directly into a GC-FID for analysis. The sample is analyzed for petroleum hydrocarbons covering a range of C8-C42 including pristane and phytane. Total Petroleum Hydrocarbon concentration is determined by integrating between 5 minutes and 22 minutes. The baseline is established by starting the integration after the end of the solvent peak and stopping after the last peak.

The final concentration of Total Petroleum Hydrocarbons is calculated using percent solid, sample weight and concentration.

## TPHC Conformance/Non-conformance Summary Report

- |                                                                                                                                                                       | Indicate<br>Yes, No, N/A |
|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------|
| 1. Method Detection Limits provided.                                                                                                                                  | <u>yes</u>               |
| 2. Method Blank Contamination -- If yes, list the sample and the corresponding concentrations in each blank.<br>_____<br>_____                                        | <u>no</u>                |
| 3. Matrix Spike Results Summary Meet Criteria<br>(If not met, list the sample and corresponding recovery which falls outside the acceptable range).<br>_____<br>_____ | <u>yes</u>               |
| 4. Duplicate Results Summary Meet Criteria<br>(If not met, list the sample and corresponding recovery which falls outside the acceptable range).<br>_____<br>_____    | <u>yes</u>               |
| 5. IR Spectra submitted for standards, blanks and samples.                                                                                                            | <u>NA</u>                |
| 6. Chromatograms submitted for standards, blanks and samples if GC fingerprinting was conducted.                                                                      | <u>yes</u>               |
| 7. Analysis holding time met.<br>(If not met, list number of days exceeded for each sample).<br>_____<br>_____                                                        | <u>yes</u>               |

Additional comments: \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

  
\_\_\_\_\_  
Laboratory Manager

4-20-00  
Date

000002



Bldg. 173, SELFM-PW-EV, Fort Monmouth, NJ 07703

Tel (732)532-4359 Fax (732)532-6263 EMail:wrightd@mail1.monmouth.army.mil

NJDEP Certification #13461 / NYDOH Certification #11699

## Chain of Custody Record

[illegible]

**Report of Analysis**  
**U.S.Army, Fort Monmouth Environmental Laboratory**  
**NJDEP Certification # 13461**

**Client :** U.S. Army  
DPW. SELFM-PW-EV  
Bldg. 173  
Ft. Monmouth, NJ 07703

**Project # :** 5332  
**Location :** Bldg.2038  
**UST Reg. # :** 192486-19

**Analysis :** OQA-QAM-025  
**Matrix :** Soil  
**Inst. ID. :** GC TPHC INST. #1  
**Column Type :** RTX-5, 0.32mm ID, 30M  
**Injection Volume :** 1uL

**Date Received :** 11-Apr-00  
**Date Extracted :** 12-Apr-00  
**Extraction Method :** Shake  
**Analysis Complete :** 13-Apr-00  
**Analyst :** B.Patel

| Sample       | Field ID | Dilution Factor | Weight (g) | % Solid | MDL (mg/kg) | TPHC Result (mg/kg) |
|--------------|----------|-----------------|------------|---------|-------------|---------------------|
| 5332.01      | 2038-A   | 1.00            | 15.05      | 89.37   | 175         | ND                  |
| 5332.02      | 2038-B   | 1.00            | 15.18      | 89.96   | 172         | ND                  |
| 5332.03      | 2038-C   | 1.00            | 15.40      | 86.97   | 175         | ND                  |
| 5332.04      | 2038-D   | 1.00            | 15.38      | 89.01   | 172         | ND                  |
|              |          |                 |            |         |             |                     |
|              |          |                 |            |         |             |                     |
|              |          |                 |            |         |             |                     |
|              |          |                 |            |         |             |                     |
|              |          |                 |            |         |             |                     |
|              |          |                 |            |         |             |                     |
|              |          |                 |            |         |             |                     |
|              |          |                 |            |         |             |                     |
|              |          |                 |            |         |             |                     |
|              |          |                 |            |         |             |                     |
|              |          |                 |            |         |             |                     |
|              |          |                 |            |         |             |                     |
|              |          |                 |            |         |             |                     |
|              |          |                 |            |         |             |                     |
| METHOD BLANK | TBLK378  | 1.00            | 15.00      | 100.00  | 157         | ND                  |

ND = Not Detected  
MDL = Method Detection Limit

## LABORATORY DELIVERABLES CHECKLIST AND NON-CONFORMANCE SUMMARY

THIS FORM MUST BE COMPLETED BY THE LABORATORY OR ENVIRONMENTAL CONSULTANT  
AND ACCOMPANY ALL DATA SUBMISSIONS

The following Laboratory Deliverables checklist and Non-Conformance Summary shall be included in the data submission. All deviations from the accepted methodology and procedures, of performance values outside acceptable ranges shall be summarized in the Non-Conformance Summary. The Technical Requirements for Site Remediation, effective June 7, 1993, provides further details. The document shall be bound and paginated, contain a table of contents, and all pages shall be legible. Incomplete packages will be returned or held without review until the data package is completed.

It is recommended that the analytical results summary sheets listing all targeted and non-targeted compounds with the method detection limits, practical quantitation limits, and the laboratory and/or sample numbers be included in one section of the data package and in the main body of the report.

1. Cover page, Title Page listing Lab Certification #, facility name and address, & date of report submitted ☒
2. Table of Contents submitted ☒
3. Summary Sheets listing analytical results for all targeted and non-targeted compounds submitted ☒
4. Document paginated and legible ☒
5. Chain of Custody submitted ☒
6. Samples submitted to lab within 48 hours of sample collection ☒
7. Methodology Summary submitted ☒
8. Laboratory Chronicle and Holding Time Check submitted ☒
9. Results submitted on a dry weight basis ☒
10. Method Detection Limits submitted ☒
11. Lab certified by NJDEP for parameters of appropriate category of parameters or a member of the USEPA CLP ☒

Laboratory Manager or Environmental Consultant's Signature

Date 4/12/00

Laboratory Certification #13461

\*Refer to NJAC 7:26E - Appendix A, Section IV - Reduced Data Deliverables - Non-USEPA/CLP  
Methods for further guidance.

000023

## **Laboratory Authentication Statement**

I certify under penalty of law, where applicable, that this laboratory meets the Laboratory Performance Standards and Quality Control requirements specified in N.J.A.C. 7:18 and 40 CFR Part 136 for Water and Wastewater Analyses and SW-846 for Solid Waste Analysis. I have personally examined the information contained in this report and to the best of my knowledge, I believe that the submitted information is true, accurate, complete and meets the above referenced standards where applicable. I am aware that there are significant penalties for purposefully submitting falsified information, including the possibility of a fine and imprisonment.



Daniel K. Wright  
Laboratory Manager



**Attachment T**  
**UST 2039 Closure Report**

**U.S. Army Garrison**  
Fort Monmouth, New Jersey

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

***Charles Wood – Building 2039***

---

**NJDEP UST Registration No.: 192486-20**  
**UST No.: 192486-20**

**September 2010**

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

**CHARLES WOOD – BUILDING 2039  
NJDEP UST REGISTRATION NO.: 192486-20**

**SEPTEMBER 2010**

**PROJECT NO.: 10-24949**

**PREPARED FOR:**

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

**PREPARED BY:**

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

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## EXECUTIVE SUMMARY

### UST Closure

On April 12, 2000, a fiberglass wrapped plastic 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. Installed in 1985, the tank was located adjacent to Building 2039 in Charles Wood area. UST No.: 192486-20 was a 550-gallon, FRP, No. 2 fuel oil tank. The tank with all associated piping was present at the time of removal. 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, of which none were found. No petroleum odors or stained soils were observed in the soils surrounding the tanks.

Closure soil samples were collected after the removal of the UST. Closure samples 2039-A and 2039-B were collected from a total of two (2) locations along the UST bottom of the excavation for the UST No.: 192486-20. Closure sample 2039-C was collected from a location along the UST piping. A duplicate of sample 2039-A was collected. All samples were analyzed for total petroleum hydrocarbons (TPH). Groundwater was not encountered in the bottom of the excavation.

### Findings

The closure soil samples collected from the UST excavation associated UST No.: 192486-20 contained TPH concentrations below the NJDEP health based criterion of 10,000 milligrams per kilogram (mg/kg) for total organic contaminants (N.J.A.C. 7:26E and revisions dated February 3, 1994). All soil samples, including the duplicate, contained a TPH concentration of Not Detected.

### Conclusions and Recommendations

Based on the closure soil sampling results, soils with TPH concentrations exceeding the NJDEP health based criterion of 10,000 mg/kg for total organic contaminants (N.J.A.C. 7:26E and revisions dated February 3, 1994) are not present in the former location of the UST.

**No Further Action** is proposed in regard to the closure and site assessment of UST No.: 192486-20 at Building 2039.

## **1.0 UNDERGROUND STORAGE TANK DECOMMISSIONING ACTIVITIES**

### **1.1 OVERVIEW**

One underground storage tank (UST), New Jersey Department of Environmental Protection (NJDEP) Registration No.: 192486-20 was closed at Building 2039 of the Charles Wood area at U.S. Army Garrison, Fort Monmouth, New Jersey. Refer to site location maps Figure 1 & 2. This report presents the results of the implementation of the Directorate of the Public Work's UST Management Plan, March 1996. Installed in 1985, the UST was a 550-gallon, FRP, containing No. 2 fuel oil for residential use. It was removed on April 12, 2000.

Decommissioning activities for UST No.: 192486-20 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 Site 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)*.

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 UST decommissioning activities. Section 2 describes the site investigation activities. Conclusions and recommendations are presented in Section 3 of this report.

### **1.2 SITE DESCRIPTION**

Building 2039 (56 & 58 Megill Circle) is located in the Charles Wood area of Fort Monmouth, as shown on Figure 1 & 2. UST No.: 192486-20 and associated piping were located adjacent to the building, as shown on Figure 3.

#### **1.2.1 Geological/Hydrogeological Setting**

The following is a description of the geological/hydrogeological setting of Bldg. 2039. 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 Charles Wood 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 (Zapczynski, 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 encrusted (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 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

Fort Monmouth has been an operational military facility for in excess of ninety (90) years; and in many areas of Charles Wood, human activities have completely transformed the topography. Currently, 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 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 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 Charles Wood 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-ionizer detector: Thermo Instruments Organic Vapor Monitor (OVM) – Model #580-B. The individual ascertained if the area was properly vented to render the area safe, as defined by OSHA. All work areas were properly vented to insure that there were no contaminants present in the breathing zone above permissible exposure limits (PEL’s).

### **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 great regard to safety and health and the 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.

- 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.
- 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 UST. The tank was completely empty and contained no liquids prior to removal from the ground.

After the UST was removed from the excavation, it was staged on an impervious surface, labeled and examined for holes. The Subsurface Evaluator observed no holes in the tank during the inspection. Soils surrounding the UST were screened visually and with an OVM for evidence of contamination. Soil staining or petroleum hydrocarbons were not observed.

### **1.5 UNDERGROUND STORAGE TANK DECOMMISSIONING AND DISPOSAL**

Subsequent to disposal, the UST was purged with air to remove vapors prior to cutting. A 4 feet by 3 feet access hole was made in the UST using a pneumatic ripper gun with a non-sparking bit. The UST was cleaned first with rubber squeegees and adsorbent material broomed on the sidewalls and bottom. The adsorbent material was then drummed and subsequently put 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 for disposal in compliance with all applicable regulations and laws. The UST disposal certification, along with backfilling authorization, is included in Appendix B.

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

If available, photographic documentation of the UST is included in Appendix C.

## **2.0 SITE INVESTIGATION ACTIVITIES**

### **2.1 OVERVIEW**

The Site Investigation was managed by U.S. Army DPW personnel. All analyses were performed and reported by Fort Monmouth Environmental Testing Laboratory, a NJDEP-certified testing laboratory. All sampling was performed by a NJDEP Certified Subsurface Evaluator according to the methods described in the NJDEP *Field Sampling Procedures Manual* (1992). Sampling frequency and parameters analyzed complied with the NJDEP document *Technical Requirements for Site Remediation*, 7:26E-3.9 (June 7, 1993) which was the applicable regulation at the date of the closure. All records of the Site Investigation activities are maintained by the Fort Monmouth DPW Environmental Office.

The following Parties participated in Closure and Site Investigation Activities.

- Ft. Monmouth Directorate of Public Works-Environmental Division  
Contact Person: Joseph Fallon  
Phone Number: (732) 532-6223
- Subsurface Evaluator: Frank Accorsi  
Employer: TECOM-Vinnell Services, Inc. (TVS)  
Phone Number: (732) 532-5241  
NJDEP License No.: 0010042  
(TVS)NJDEP License No.: US252302
- Analytical Laboratory: Fort Monmouth Environmental Testing Laboratory  
Contact Person: Dan Wright  
Phone Number: (732) 532-4359  
NJDEP Laboratory Certification No.: 13461

### **2.2 FIELD SCREENING/MONITORING**

Field screening was performed by a NJDEP certified Subsurface Evaluator using an OVM and visual observations to identify potentially contaminated material, of which none were found.

### **2.3 SOIL SAMPLING**

On April 12, 2000, closure soil samples were collected after the removal of the UST. Closure samples 2039-A and 2039-B were collected from a total of two (2) locations along the UST bottom of the excavation for the UST No.: 192486-20. Closure sample 2039-C was collected from a location along the UST piping. A duplicate of sample 2039-A was also collected.

Refer to soil sampling location map in Figure 3. All samples were analyzed for total petroleum hydrocarbons (TPH). Groundwater was not encountered in the excavation.

The site assessment was performed by TVS personnel in accordance with the NJDEP *Technical Requirements for Site Remediation* and the NJDEP *Field Sampling Procedures Manual*. A summary of sampling activities including parameters analyzed is provided on Table 1. The closure soil samples were collected. 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

Closure soil samples were collected from a total of three locations (which included the duplicate) on April 12, 2000 to evaluate soil conditions following removal of the UST and piping. All samples were analyzed for TPH. The closure soil sample results were compared to the NJDEP health based criterion of 10,000 mg/kg for total organic contaminants (*N.J.A.C.* 7:26D and revisions dated February 3, 1994). A summary of the analytical results and comparison to the NJDEP soil cleanup criteria is provided on Table 2. The analytical data package, including associated quality control data, is provided in Appendix D.

Closure soil samples collected on April 12, 2000 from the UST site excavation contained concentrations of TPH below the NJDEP soil cleanup criteria.

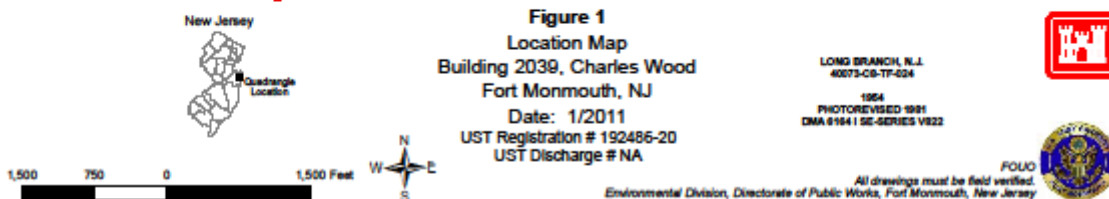
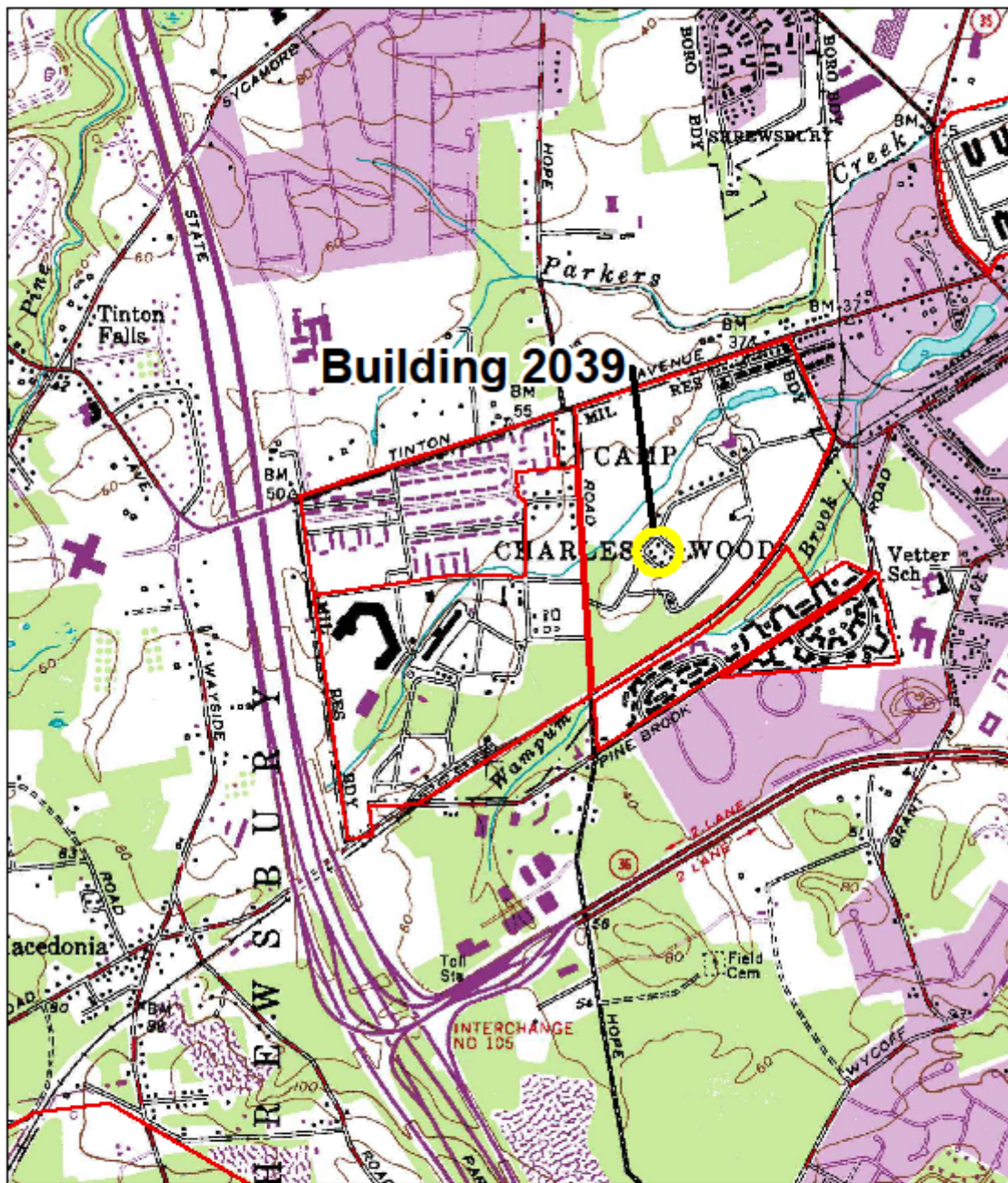
#### 3.2 CONCLUSIONS AND RECOMMENDATIONS

The analytical results for all of closure soil samples collected from the UST closure excavation at UST No.: 192486-20 were Not Detected for total petroleum hydrocarbons.

Based on the closure soil sampling results, soils with TPH concentrations exceeding the NJDEP soil cleanup criterion for total organic contaminants of 10,000 mg/kg are not present in the location of former UST No.: 192486-20.

**No Further Action** is proposed in regard to the closure and site investigation of UST No.: 192486-20 at Building 2039.

# FIGURES



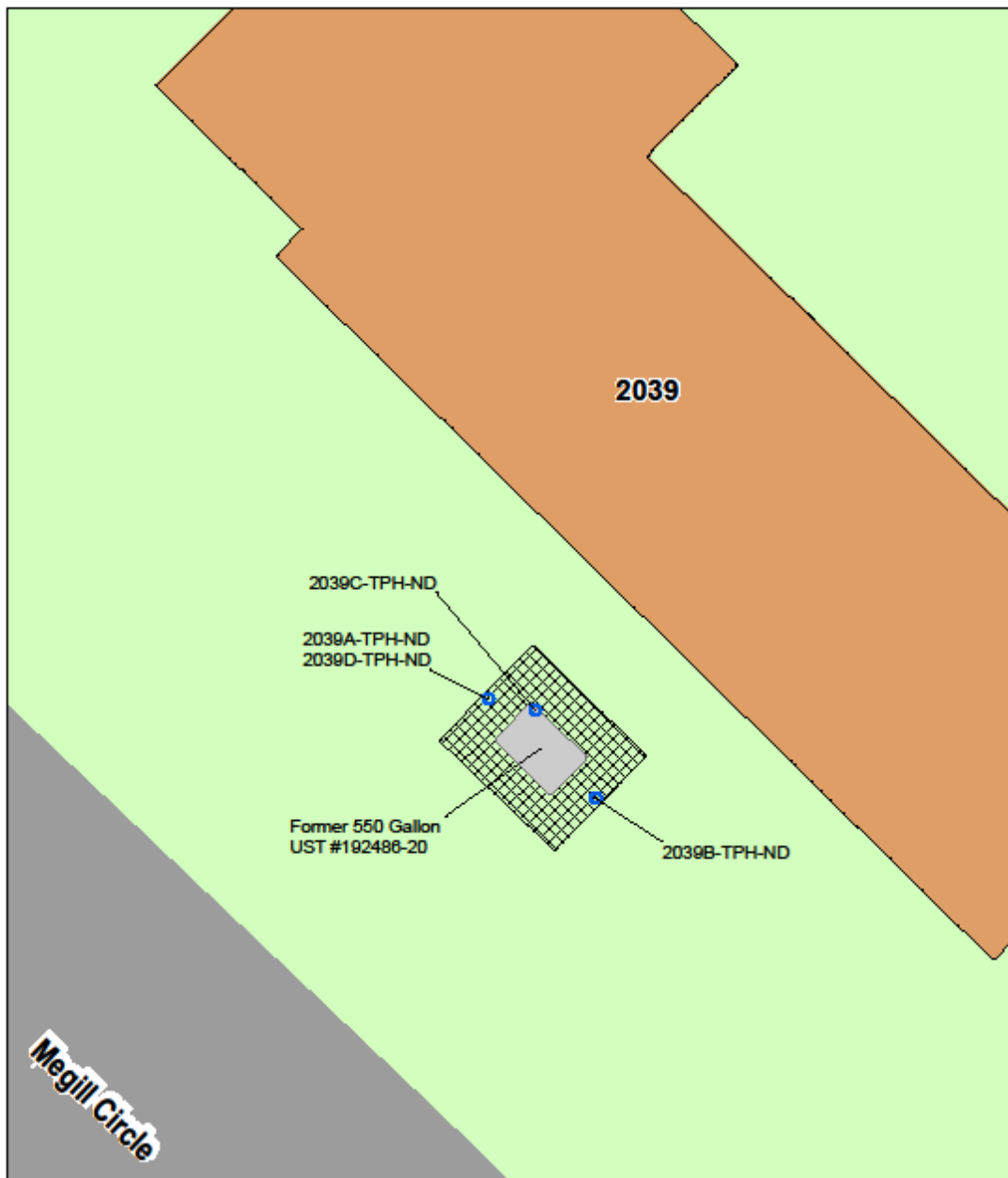




**Figure 2**  
**Location Map**  
 Building 2039, Charles Wood Area  
 Fort Monmouth, NJ  
 Date: 1/2011  
 UST Registration # 192486-20  
 UST Discharge # NA



*All drawings must be field verified.*  
 Environmental Division, Directorate of Public Works, Fort Monmouth, New Jersey



**Legend**  
 [Grey Box] UST  
 [Grid Box] UST Excavation Limits  
 [Blue Dot] Soil Sample - 4/13/2000

10 5 0 10 Feet



**Figure 3**  
 Soil Sampling Location Map  
 Building 2039, Charles Wood Area  
 Fort Monmouth, NJ  
 Date: 1/2011  
 UST Registration # 192486-20  
 UST Discharge # NA



All drawings must be field verified.  
 Environmental Division, Directorate of Public Works, Fort Monmouth, New Jersey

# TABLES

# **TABLE 1**

## **SUMMARY OF LABORATORY ANALYSIS**

**FT. MONMOUTH, BUILDING 2039, UST No.: 192486-20**

**12 April 2000**

| <b>SAMPLE ID</b>        | <b>LABORATORY SAMPLE ID</b> | <b>SAMPLE DATE</b> | <b>SAMPLE MATRIX</b> | <b>ANALYTICAL PARAMETER</b> | <b>ANALYTICAL METHOD</b> |
|-------------------------|-----------------------------|--------------------|----------------------|-----------------------------|--------------------------|
|                         |                             |                    |                      |                             |                          |
| <b>2039-A</b>           | 5335.01                     | 12-Apr-00          | SOIL                 | TPH                         | OQA-QAM-25               |
| <b>2039-B</b>           | 5335.02                     | 12-Apr-00          | SOIL                 | TPH                         | OQA-QAM-25               |
| <b>2039-C</b>           | 5335.03                     | 12-Apr-00          | SOIL                 | TPH                         | OQA-QAM-25               |
| <b>2039-D Duplicate</b> | 5335.04                     | 12-Apr-00          | SOIL                 | TPH                         | OQA-QAM-25               |

### ABBREVIATIONS:

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

## **TABLE 2**

### **SUMMARY OF LABORATORY ANALYTICAL RESULTS**

FT. MONMOUTH, BUILDING 2039, UST No.: 192486-20

13 April 2000

#### **TOTAL PETROLEUM HYDROCARBONS**

| <b>SAMPLE ID</b>            | <b>LABORATORY<br/>SAMPLE ID</b> | <b>SAMPLE LOCATION</b> | <b>SAMPLE<br/>DEPTH</b> | <b>MATRIX</b> | <b>TPH<br/>RESULT S</b> |
|-----------------------------|---------------------------------|------------------------|-------------------------|---------------|-------------------------|
|                             |                                 |                        | <b>(in feet)</b>        |               | <b>mg/kg</b>            |
| <b>2039-A</b>               | 5335.01                         | NORTH END              | 6.5-7.0                 | Soil          | ND                      |
| <b>2039-B</b>               | 5335.02                         | SOUTH END              | 6.5-7.0                 | Soil          | ND                      |
| <b>2039-C</b>               | 5335.03                         | PIPING                 | 1.5-2.0                 | Soil          | ND                      |
| <b>2039-D<br/>Duplicate</b> | 5335.04                         | DUPLICATE-NORTH END    | 6.5-7.0                 | Soil          | ND                      |

**ABBREVIATIONS:**

mg/kg = Milligrams Per Kilogram = parts per million

ND = Compound Not Detected

Gray shading indicates exceedance of NJDEP health based criterion of 10,000 ppm total organic contaminants

## **APPENDIX A**

### **CERTIFICATIONS**

**(NOT AVAILABLE)**

## **APPENDIX B**

### **UST DISPOSAL CERTIFICATE**

DIRECTORATE OF PUBLIC WORKS  
FORT MONMOUTH, NEW JERSEY 07703

Contract Management Division

SUBJECT: PWS-007, Residential UST Removal  
Contractor: TVS Inc.

RE: Backfilling of excavation,

BUILDING #: 2039(56+58 MERRILL CIRCLE)

TVS Inc.  
Field Supervisor, PWS-007  
ATTN: Brian Finch  
Building 166  
Fort Monmouth, New Jersey 07703-5000

Dear Mr. Finch:

The above referenced area has been sampled and analyzed as described in the NJDEP Regulations. The results indicate levels of petroleum contamination below the NJDEP allowable limits ~~or that the site requires further investigation outside the scope of this contract.~~ The contractor may proceed with the backfilling of the excavation with stone to groundwater and clean fill to grade as required in the above referenced contract specification.

Regards,

  
Mr. Dinker Desai  
Environmental Engineer  
Directorate of Public Works

CC: UST file copy





**DEPARTMENT OF THE ARMY**  
Headquarters, U.S. Army Garrison Fort Monmouth  
Fort Monmouth, New Jersey 07703 - 5101



REPLY TO  
ATTENTION OF

Directorate of Public Works

Date: 30 January, 2001

Marpal Disposal Company, Inc.  
P.O. Box 188  
Lincroft, New Jersey 07738

Re: Non-Hazardous Waste Disposal  
Contract No. DAAB07-96-C-8252  
Location: Bldg. 166, rear  
Roll-off container No. 2798  
Size: 30 cubic yards  
USTs from Bldgs: 226(2K), 227(2K), 228(2K), 2038(.5K), 2039(.5K), 2040(.5K),  
2041(.5K), 2042(.5K), McGuire AFB 1507(2.5K)

Dear Sirs:

I certify that the above referenced 30 cubic yard roll-off container provided by Marpal, Inc. contains only crushed fiberglass underground storage tanks removed from residential buildings at Fort Monmouth, NJ, and one from McGuire Air Force Base. The tanks held only No. 2 heating oil. The tanks were cleaned in accordance with acceptable industry standards and NJDEP protocol and then crushed. No free liquids are present in the container.

If you should require any additional information or help at this time, please contact Mr. Dinker Desai, Environmental Protection Specialist. He can be reached at the following telephone number: (732) 532-1475.

Sincerely,

Dinker Desai  
Environmental Protection Specialist

Attachments: None

## **APPENDIX C**

# **PHOTO DOCUMENTATION**

**(NOT AVAILABLE)**

## **APPENDIX D**

# **SOIL ANALYTICAL DATA PACKAGE**

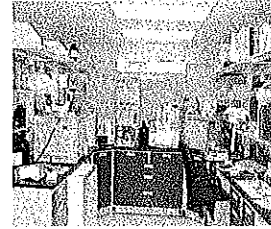
# FORT MONMOUTH ENVIRONMENTAL TESTING LABORATORY

DIRECTORATE OF PUBLIC WORKS

PHONE: (732) 532-6224 FAX: (732) 532-6263

WET-CHEM - METALS - ORGANICS - FIELD SAMPLING

CERTIFICATIONS: NJDEP #13461, NYSDOH #11699



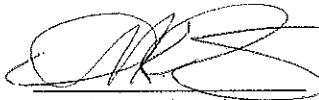
ANALYTICAL DATA REPORT  
Fort Monmouth Environmental Laboratory  
ENVIRONMENTAL DIVISION  
Fort Monmouth, New Jersey  
PROJECT: IJO# 100004

## Bldg. 2039

| Field Sample Location     | Laboratory<br>Sample ID# | Matrix   | Date and Time<br>of Collection | Date Received |
|---------------------------|--------------------------|----------|--------------------------------|---------------|
| 2039-A North End 6.5-7.0' | 5335.01                  | Soil     | 12-Apr-00 11:30                | 04/12/00      |
| 2039-B South End 6.5-7.0' | 5335.02                  | Soil     | 12-Apr-00 11:50                | 04/12/00      |
| 2039-C Piping 1.5-2.0'    | 5335.03                  | Soil     | 12-Apr-00 12:00                | 04/12/00      |
| 2039-D Duplicate 6.5-7.0' | 5335.04                  | Soil     | 12-Apr-00 11:30                | 04/12/00      |
| Trip Blank                | 5335.05                  | Methanol | 12-Apr-00                      | 04/12/00      |

ANALYSIS:  
FORT MONMOUTH ENVIRONMENTAL LAB  
TPHC, %SOLIDS

ENCLOSURE:  
CHAIN OF CUSTODY  
RESULTS

 4-20-00  
Daniel Wright/Date  
Laboratory Director

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## Method Summary

### NJDEP Method OQA-QAM-025-10/97

#### Gas Chromatographic Determination of Total Petroleum Hydrocarbons in Soil

Fifteen grams (15g)(wet weight) of a soil sample is added to a 125 mL acid cleaned, solvent rinsed, capped Erlenmeyer flask. 15g anhydrous sodium sulfate is added to dry sample. Surrogate standard spiking solution is then added to the flask.

Twenty five milliliters(25mL) Methylene Chloride is added to the flask and it is secured on a orbital shaker table. The agitation rate is set to 400rpm and the sample is shaken for 30 minutes. The flask is the removed from the table and the particulate matter is allowed to settle. The extract is transferred to a Teflon capped vial. A second 25mL of Methylene Chloride is added to the flask and shaken for an additional 30 minutes. The flask is again removed and allowed to settle. The extracts are combined in the vial then transferred to a 1mL autosampler vial.

The extract is then injected directly into a GC-FID for analysis. The sample is analyzed for petroleum hydrocarbons covering a range of C8-C42 including pristane and phytane. Total Petroleum Hydrocarbon concentration is determined by integrating between 5 minutes and 22 minutes. The baseline is established by starting the integration after the end of the solvent peak and stopping after the last peak.

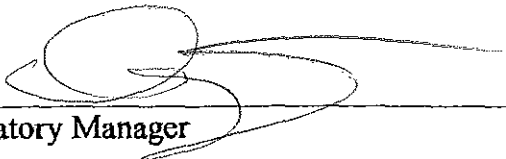
The final concentration of Total Petroleum Hydrocarbons is calculated using percent solid, sample weight and concentration.

## TPHC Conformance/Non-conformance Summary Report

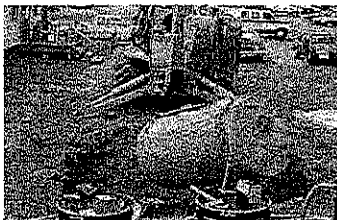
Indicate  
Yes, No, N/A

1. Method Detection Limits provided. YES
2. Method Blank Contamination – If yes, list the sample and the corresponding concentrations in each blank. NO  
\_\_\_\_\_  
\_\_\_\_\_
3. Matrix Spike Results Summary Meet Criteria  
(If not met, list the sample and corresponding recovery which falls outside the acceptable range). YES  
\_\_\_\_\_  
\_\_\_\_\_
4. Duplicate Results Summary Meet Criteria  
(If not met, list the sample and corresponding recovery which falls outside the acceptable range). YES  
\_\_\_\_\_  
\_\_\_\_\_
5. IR Spectra submitted for standards, blanks and samples. NA
6. Chromatograms submitted for standards, blanks and samples if GC fingerprinting was conducted. yes
7. Analysis holding time met. yes  
(If not met, list number of days exceeded for each sample).  
\_\_\_\_\_  
\_\_\_\_\_

Additional comments: \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

  
\_\_\_\_\_  
Laboratory Manager

4-20-00  
\_\_\_\_\_  
Date



# Fort Monmouth Environmental Testing Laboratory

Bldg. 173, SELFM-PW-EV, Fort Monmouth, NJ 07703

Tel (732)532-4359 Fax (732)532-6263 EMail:wrightd@mail1.monmouth.army.mil

NJDEP Certification #13461 / NYDOH Certification #11699

## Chain of Custody Record

|                                                                                                                                                             |                          |                                   |                |                                              |                                                  |                                                                          |                                                        |          |             |             |             |                               |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------|-----------------------------------|----------------|----------------------------------------------|--------------------------------------------------|--------------------------------------------------------------------------|--------------------------------------------------------|----------|-------------|-------------|-------------|-------------------------------|
| <b>Customer: Dinker Desai</b>                                                                                                                               |                          |                                   |                |                                              | Project No: 100004                               |                                                                          | Analysis Parameters                                    |          |             |             |             | * = Samples Kept <4°C         |
| Phone #: X21475                                                                                                                                             |                          |                                   |                |                                              | Location: <i>BLDG. 2039 (90+42 METAL CIRCLE)</i> |                                                                          | TPHC                                                   | % SOLIDS | *<br>VOA+10 | VOA ID #    | PID Reading |                               |
| ( ) DERA (X) OMA UST Assessment                                                                                                                             |                          |                                   |                |                                              | UST# <i>192486-20</i>                            |                                                                          |                                                        |          |             |             |             |                               |
| Samplers Name / Company: Frank Accorsi/TVS                                                                                                                  |                          |                                   |                |                                              | Sample #                                         |                                                                          |                                                        |          |             |             |             | Remarks / Preservation Method |
| Lab Sample I.D.                                                                                                                                             | Sample Location          | Depth (ft)                        | Date           | Time                                         | Type                                             | Bottles                                                                  |                                                        |          |             |             |             |                               |
| <i>5335-01</i>                                                                                                                                              | <i>2039-A, NORTH END</i> | <i>6.5-7.0</i>                    | <i>4-12-00</i> | <i>1130</i>                                  | <i>SOIL</i>                                      | <i>2</i>                                                                 | <i>X</i>                                               | <i>X</i> | <i>X</i>    | <i>1462</i> | <i>0</i>    | <i>ICE</i>                    |
| <i>02</i>                                                                                                                                                   | <i>2039-B, SOUTH END</i> | <i>6.5-7.0</i>                    |                | <i>1150</i>                                  |                                                  | <i>2</i>                                                                 | <i>X</i>                                               | <i>X</i> | <i>X</i>    | <i>1463</i> | <i>0</i>    |                               |
| <i>03</i>                                                                                                                                                   | <i>2039-C, PIPING</i>    | <i>1.5-2.0</i>                    |                | <i>1200</i>                                  |                                                  | <i>2</i>                                                                 | <i>X</i>                                               | <i>X</i> | <i>X</i>    | <i>1464</i> | <i>0</i>    |                               |
| <i>04</i>                                                                                                                                                   | <i>2039-D, DUPLICATE</i> | <i>6.5-7.0</i>                    |                | <i>1130</i>                                  |                                                  | <i>2</i>                                                                 | <i>X</i>                                               | <i>X</i> | <i>X</i>    | <i>1465</i> | <i>0</i>    |                               |
| <i>05</i>                                                                                                                                                   | <i>TRIP BLANK</i>        | <i>-</i>                          |                | <i>-</i>                                     | <i>AQ</i>                                        | <i>1</i>                                                                 |                                                        |          | <i>X</i>    | <i>1466</i> | <i>-</i>    |                               |
| OVM sn#580U-64455.343 was calibrated with zero air & w/ <i>245</i> ppm Isobutylene read <i>297</i> ppm. <i>1010</i> <i>9-12-00 FA</i> (time/date & initial) |                          |                                   |                |                                              |                                                  |                                                                          |                                                        |          |             |             |             |                               |
| Relinquished by (signature):<br><i>Frank Accorsi</i>                                                                                                        |                          | Date/Time:<br><i>4-12-00 1500</i> |                | Received by (signature):<br><i>J. Wright</i> |                                                  | Comments: <i>* VO+10 ON 25% &gt; 1,000 PPM TRIP ON HIGHEST, MIN. ONE</i> |                                                        |          |             |             |             |                               |
| Relinquished by (signature):                                                                                                                                |                          | Date/Time:                        |                | Received by (signature):                     |                                                  |                                                                          |                                                        |          |             |             |             |                               |
| Report Type: ( ) Full, ( ) Reduced, (X) Standard, ( ) Screen / non-certified, ( ) EDD                                                                       |                          |                                   |                |                                              |                                                  |                                                                          | Remarks: Dedicated Sampling Tools Used                 |          |             |             |             |                               |
| Turnaround time: ( ) Standard 2 wks, (X) Rush <i>2</i> Days, ( ) ASAP Verbal <i>2</i> Hrs.                                                                  |                          |                                   |                |                                              |                                                  |                                                                          | All sample points have been GPS? (X) YES ( ) NO ( ) NA |          |             |             |             |                               |



**Report of Analysis**  
**U.S.Army, Fort Monmouth Environmental Laboratory**  
**NJDEP Certification # 13461**

**Client :** U.S. Army  
 DPW. SELFM-PW-EV  
 Bldg. 173  
 Ft. Monmouth, NJ 07703

**Project # :** 5335  
**Location :** Bldg.2039  
**UST Reg. # :** 192486-20

**Analysis :** OQA-QAM-025  
**Matrix :** Soil  
**Inst. ID. :** GC TPHC INST. #1  
**Column Type :** RTX-5, 0.32mm ID, 30M  
**Injection Volume :** 1uL

**Date Received :** 12-Apr-00  
**Date Extracted :** 14-Apr-00  
**Extraction Method :** Shake  
**Analysis Complete :** 15-Apr-00  
**Analyst :** B.Patel

| Sample       | Field ID | Dilution Factor | Weight (g) | % Solid | MDL (mg/kg) | TPHC Result (mg/kg) |
|--------------|----------|-----------------|------------|---------|-------------|---------------------|
| 5335.01      | 2039-A   | 1.00            | 15.11      | 92.87   | 167         | ND                  |
| 5335.02      | 2039-B   | 1.00            | 15.05      | 87.12   | 179         | ND                  |
| 5335.03      | 2039-C   | 1.00            | 15.08      | 83.71   | 186         | ND                  |
| 5335.04      | 2039-D   | 1.00            | 15.08      | 91.31   | 171         | ND                  |
|              |          |                 |            |         |             |                     |
|              |          |                 |            |         |             |                     |
|              |          |                 |            |         |             |                     |
|              |          |                 |            |         |             |                     |
|              |          |                 |            |         |             |                     |
|              |          |                 |            |         |             |                     |
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|              |          |                 |            |         |             |                     |
|              |          |                 |            |         |             |                     |
|              |          |                 |            |         |             |                     |
|              |          |                 |            |         |             |                     |
| METHOD BLANK | TBLK379  | 1.00            | 15.00      | 100.00  | 157         | ND                  |

ND = Not Detected

MDL = Method Detection Limit

000004

## LABORATORY DELIVERABLES CHECKLIST AND NON-CONFORMANCE SUMMARY

THIS FORM MUST BE COMPLETED BY THE LABORATORY OR ENVIRONMENTAL CONSULTANT  
AND ACCOMPANY ALL DATA SUBMISSIONS

The following Laboratory Deliverables checklist and Non-Conformance Summary shall be included in the data submission. All deviations from the accepted methodology and procedures, of performance values outside acceptable ranges shall be summarized in the Non-Conformance Summary. The Technical Requirements for Site Remediation, effective June 7, 1993, provides further details. The document shall be bound and paginated, contain a table of contents, and all pages shall be legible. Incomplete packages will be returned or held without review until the data package is completed.

It is recommended that the analytical results summary sheets listing all targeted and non-targeted compounds with the method detection limits, practical quantitation limits, and the laboratory and/or sample numbers be included in one section of the data package and in the main body of the report.

1. Cover page, Title Page listing Lab Certification #, facility name and address, & date of report submitted ☒
2. Table of Contents submitted ☒
3. Summary Sheets listing analytical results for all targeted and non-targeted compounds submitted ☒
4. Document paginated and legible ☒
5. Chain of Custody submitted ☒
6. Samples submitted to lab within 48 hours of sample collection ☒
7. Methodology Summary submitted ☒
8. Laboratory Chronicle and Holding Time Check submitted ☒
9. Results submitted on a dry weight basis ☒
10. Method Detection Limits submitted ☒
11. Lab certified by NJDEP for parameters of appropriate category of parameters or a member of the USEPA CLP ☒

Laboratory Manager or Environmental Consultant's Signature \_\_\_\_\_  
Date 4/20/00

Laboratory Certification #13461

\*Refer to NJAC 7:26E - Appendix A, Section IV - Reduced Data Deliverables - Non-USEPA/CLP  
Methods for further guidance.

000027

## **Laboratory Authentication Statement**

I certify under penalty of law, where applicable, that this laboratory meets the Laboratory Performance Standards and Quality Control requirements specified in N.J.A.C. 7:18 and 40 CFR Part 136 for Water and Wastewater Analyses and SW-846 for Solid Waste Analysis. I have personally examined the information contained in this report and to the best of my knowledge, I believe that the submitted information is true, accurate, complete and meets the above referenced standards where applicable. I am aware that there are significant penalties for purposefully submitting falsified information, including the possibility of a fine and imprisonment.



**Daniel K. Wright**  
**Laboratory Manager**

**000028**

**Attachment U**  
**UST 2040 Closure Report**

**U.S. Army Garrison**  
Fort Monmouth, New Jersey

---

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

***Charles Wood – Building 2040***

---

**NJDEP UST Registration No.: 192486-21**  
**UST No.: 192486-21**

**September 2010**

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

**CHARLES WOOD – BUILDING 2040  
NJDEP UST REGISTRATION NO.: 192486-21**

**SEPTEMBER 2010**

**PROJECT NO.: 10-24949**

**PREPARED FOR:**

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

**PREPARED BY:**

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

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## EXECUTIVE SUMMARY

### UST Closure

On April 13, 2000, a fiberglass wrapped plastic 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. Installed in 1985, the tank was located adjacent to Building 2040 in Charles Wood area. UST No.: 192486-21 was a 550-gallon FRP No. 2 fuel oil tank. The tank with all associated piping was present at the time of removal. 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, of which none were found. No petroleum odors or stained soils were observed in the soils surrounding the tanks.

Closure soil samples were collected after the removal of the UST. Closure samples 2040-A and 2040-B were collected from a total of two (2) locations along the UST bottom of the excavation for the UST No.: 192486-21. Closure sample 2040-C was collected from a location along the UST piping. A duplicate of sample 2040-A was collected. All samples were analyzed for total petroleum hydrocarbons (TPH). Groundwater was not encountered in the bottom of the excavation.

### Findings

The closure soil samples collected from the UST excavation associated UST No.: 192486-21 contained TPH concentrations below the NJDEP health based criterion of 10,000 milligrams per kilogram (mg/kg) for total organic contaminants (N.J.A.C. 7:26E and revisions dated February 3, 1994). All soil samples, including the duplicate, contained a TPH concentration of Not Detected.

### Conclusions and Recommendations

Based on the closure soil sampling results, soils with TPH concentrations exceeding the NJDEP health based criterion of 10,000 mg/kg for total organic contaminants (N.J.A.C. 7:26E and revisions dated February 3, 1994) are not present in the former location of the UST.

**No Further Action** is proposed in regard to the closure and site assessment of UST No.: 192486-21 at Building 2040.

## **1.0 UNDERGROUND STORAGE TANK DECOMMISSIONING ACTIVITIES**

### **1.1 OVERVIEW**

One underground storage tank (UST), New Jersey Department of Environmental Protection (NJDEP) Registration No.: 192486-21 was closed at Building 2040 of the Charles Wood area at U.S. Army Garrison, Fort Monmouth, New Jersey. Refer to site location maps Figure 1 & 2. This report presents the results of the implementation of the Directorate of the Public Work's UST Management Plan, March 1996. Installed in 1985, the UST was a 550-gallon, FRP, containing No. 2 fuel oil for residential use. It was removed on April 13, 2000.

Decommissioning activities for UST No.: 192486-21 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 Site 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)*.

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 UST decommissioning activities. Section 2 describes the site investigation activities. Conclusions and recommendations are presented in Section 3 of this report.

### **1.2 SITE DESCRIPTION**

Building 2040 (52 & 54 Megill Circle) is located in the Charles Wood area of Fort Monmouth, as shown on Figure 1 & 2. UST No.: 192486-21 and associated piping were located adjacent to the building, as shown on Figure 3.

#### **1.2.1 Geological/Hydrogeological Setting**

The following is a description of the geological/hydrogeological setting of Bldg. 2040. 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 Charles Wood 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 (Zapeczka, 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 encrusted (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 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

Fort Monmouth has been an operational military facility for in excess of ninety (90) years; and in many areas of Charles Wood, human activities have completely transformed the topography. Currently, 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 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 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 Charles Wood 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-ionizer detector: Thermo Instruments Organic Vapor Monitor (OVM) – Model #580-B. The individual ascertained if the area was properly vented to render the area safe, as defined by OSHA. All work areas were properly vented to insure that there were no contaminants present in the breathing zone above permissible exposure limits (PEL’s).

### **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 great regard to safety and health and the 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.

- 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.
- 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 UST. The tank was completely empty and contained no liquids prior to removal from the ground.

After the UST was removed from the excavation, it was staged on an impervious surface, labeled and examined for holes. The Subsurface Evaluator observed no holes in the tank during the inspection. Soils surrounding the UST were screened visually and with an OVM for evidence of contamination. Soil staining or petroleum hydrocarbons were not observed.

### **1.5 UNDERGROUND STORAGE TANK DECOMMISSIONING AND DISPOSAL**

Subsequent to disposal, the UST was purged with air to remove vapors prior to cutting. A 4 feet by 3 feet access hole was made in the UST using a pneumatic ripper gun with a non-sparking bit. The UST was cleaned first with rubber squeegees and adsorbent material broomed on the sidewalls and bottom. The adsorbent material was then drummed and subsequently put 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 for disposal in compliance with all applicable regulations and laws. The UST disposal certification, along with backfilling authorization, is included in Appendix B.

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

If available, photographic documentation of the UST is included in Appendix C.

## **2.0 SITE INVESTIGATION ACTIVITIES**

### **2.1 OVERVIEW**

The Site Investigation was managed by U.S. Army DPW personnel. All analyses were performed and reported by Fort Monmouth Environmental Testing Laboratory, a NJDEP-certified testing laboratory. All sampling was performed by a NJDEP Certified Subsurface Evaluator according to the methods described in the NJDEP *Field Sampling Procedures Manual* (1992). Sampling frequency and parameters analyzed complied with the NJDEP document *Technical Requirements for Site Remediation*, 7:26E-3.9 (June 7, 1993) which was the applicable regulation at the date of the closure. All records of the Site Investigation activities are maintained by the Fort Monmouth DPW Environmental Office.

The following Parties participated in Closure and Site Investigation Activities.

- Ft. Monmouth Directorate of Public Works-Environmental Division  
Contact Person: Joseph Fallon  
Phone Number: (732) 532-6223
- Subsurface Evaluator: Frank Accorsi  
Employer: TECOM-Vinnell Services, Inc. (TVS)  
Phone Number: (732) 532-5241  
NJDEP License No.: 0010042  
(TVS)NJDEP License No.: US252302
- Analytical Laboratory: Fort Monmouth Environmental Testing Laboratory  
Contact Person: Dan Wright  
Phone Number: (732) 532-4359  
NJDEP Laboratory Certification No.: 13461

### **2.2 FIELD SCREENING/MONITORING**

Field screening was performed by a NJDEP certified Subsurface Evaluator using an OVM and visual observations to identify potentially contaminated material, of which none were found.

### **2.3 SOIL SAMPLING**

On April 13, 2000, closure soil samples were collected after the removal of the UST. Closure samples 2040-A and 2040-B were collected from a total of two (2) locations along the UST bottom of the excavation for the UST No.: 192486-21. Closure sample 2040-C was collected from a location along the UST piping. A duplicate of sample 2040-A was also collected.



Refer to soil sampling location map in Figure 3. All samples were analyzed for total petroleum hydrocarbons (TPH). Groundwater was not encountered in the excavation.

The site assessment was performed by TVS personnel in accordance with the NJDEP *Technical Requirements for Site Remediation* and the NJDEP *Field Sampling Procedures Manual*. A summary of sampling activities including parameters analyzed is provided on Table 1. The closure soil samples were collected. 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

Closure soil samples were collected from a total of three locations (which included the duplicate) on April 13, 2000 to evaluate soil conditions following removal of the UST and piping. All samples were analyzed for TPH. The closure soil sample results were compared to the NJDEP health based criterion of 10,000 mg/kg for total organic contaminants (*N.J.A.C. 7:26D* and revisions dated February 3, 1994). A summary of the analytical results and comparison to the NJDEP soil cleanup criteria is provided on Table 2. The analytical data package, including associated quality control data, is provided in Appendix D.

Closure soil samples collected on April 13, 2000 from the UST site excavation contained concentrations of TPH below the NJDEP soil cleanup criteria.

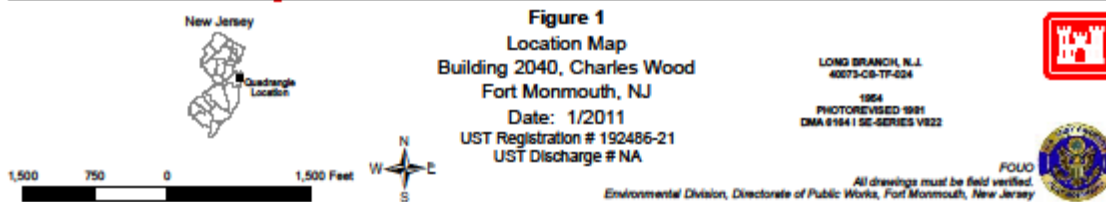
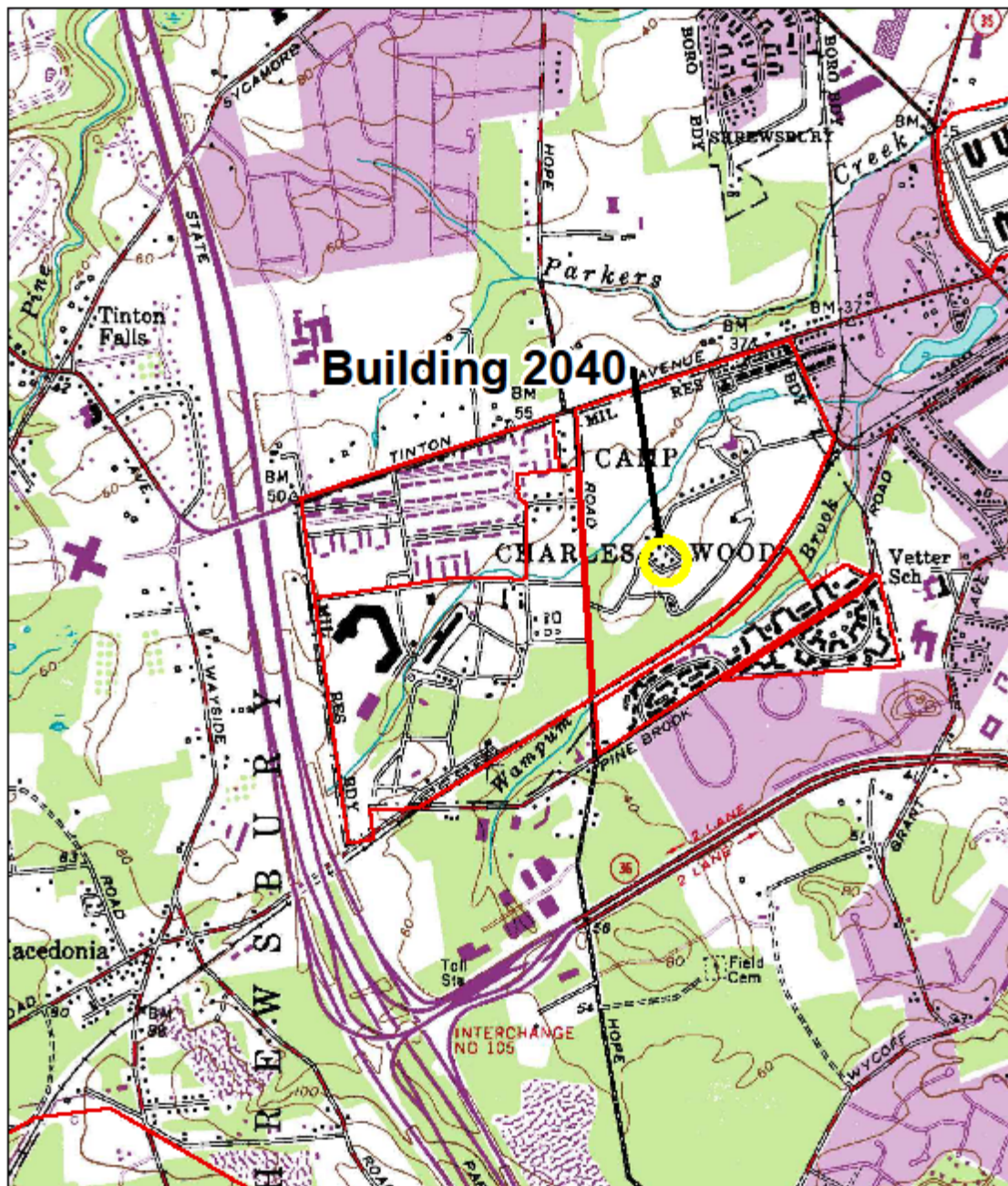
#### 3.2 CONCLUSIONS AND RECOMMENDATIONS

The analytical results for all of closure soil samples collected from the UST closure excavation at UST No.: 192486-21 were Not Detected for total petroleum hydrocarbons.

Based on the closure soil sampling results, soils with TPH concentrations exceeding the NJDEP soil cleanup criterion for total organic contaminants of 10,000 mg/kg are not present in the location of former UST No.: 192486-21.

**No Further Action** is proposed in regard to the closure and site investigation of UST No.: 192486-21 at Building 2040.

# FIGURES

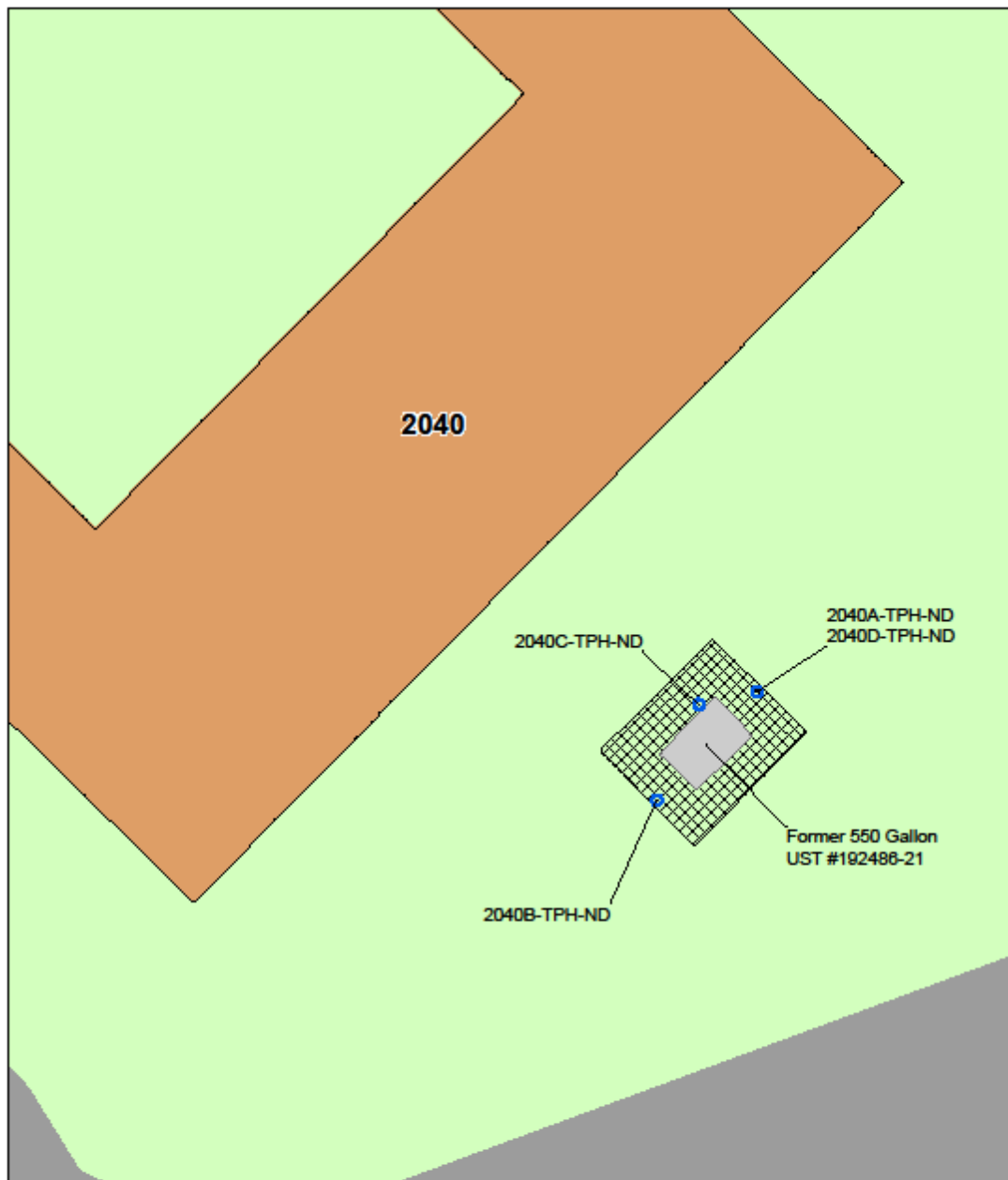




**Figure 2**  
 Location Map  
 Building 2040, Charles Wood Area  
 Fort Monmouth, NJ  
 Date: 1/2011  
 UST Registration # 192486-21  
 UST Discharge # NA



*All drawings must be field verified.*  
 Environmental Division, Directorate of Public Works, Fort Monmouth, New Jersey



**Legend**  
 [Grey Box] UST  
 [Cross-hatched Box] UST Excavation Limits  
 [Blue Circle with 'S'] Soil Sample - 4/13/2000

10 5 0 10 Feet



**Figure 3**  
 Soil Sampling Location Map  
 Building 2040, Charles Wood Area  
 Fort Monmouth, NJ  
 Date: 1/2011  
 UST Registration # 192486-21  
 UST Discharge # NA



*All drawings must be field verified.*  
 Environmental Division, Directorate of Public Works, Fort Monmouth, New Jersey

# TABLES

# **TABLE 1**

## **SUMMARY OF LABORATORY ANALYSIS**

**FT. MONMOUTH, BUILDING 2040, UST No.: 192486-21**

**13 April 2000**

| <b>SAMPLE ID</b> | <b>LABORATORY SAMPLE ID</b> | <b>SAMPLE DATE</b> | <b>SAMPLE MATRIX</b> | <b>ANALYTICAL PARAMETER</b> | <b>ANALYTICAL METHOD</b> |
|------------------|-----------------------------|--------------------|----------------------|-----------------------------|--------------------------|
|                  |                             |                    |                      |                             |                          |
| <b>2040-A</b>    | 5341.01                     | 13-Apr-00          | SOIL                 | TPH                         | OQA-QAM-25               |
| <b>2040-B</b>    | 5341.02                     | 13-Apr-00          | SOIL                 | TPH                         | OQA-QAM-25               |
| <b>2040-C</b>    | 5341.03                     | 13-Apr-00          | SOIL                 | TPH                         | OQA-QAM-25               |
| <b>2040-D</b>    | 5341.04                     | 13-Apr-00          | SOIL                 | TPH                         | OQA-QAM-25               |

### ABBREVIATIONS:

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

## **TABLE 2**

### **SUMMARY OF LABORATORY ANALYTICAL RESULTS**

FT. MONMOUTH, BUILDING 2040, UST No.: 192486-21

13 April 2000

#### **TOTAL PETROLEUM HYDROCARBONS**

| <b>SAMPLE ID</b> | <b>LABORATORY<br/>SAMPLE ID</b> | <b>SAMPLE LOCATION</b> | <b>SAMPLE<br/>DEPTH</b> | <b>MATRIX</b> | <b>TPH<br/>RESULT S</b> |
|------------------|---------------------------------|------------------------|-------------------------|---------------|-------------------------|
|                  |                                 |                        | <b>(in feet)</b>        |               | <b>mg/kg</b>            |
| <b>2040-A</b>    | 5341.01                         | NORTH END              | 7.0-7.5                 | Soil          | ND                      |
| <b>2040-B</b>    | 5341.02                         | SOUTH END              | 7.0-7.5                 | Soil          | ND                      |
| <b>2040-C</b>    | 5341.03                         | PIPING                 | 2.0-2.5                 | Soil          | ND                      |
| <b>2040-D</b>    | 5341.04                         | DUPLICATE-NORTH END    | 7.0-7.5                 | Soil          | ND                      |

**ABBREVIATIONS:**

mg/kg = Milligrams Per Kilogram = parts per million

ND = Compound Not Detected

**Gray shading** indicates exceedance of NJDEP health based criterion of 10,000 ppm total organic contaminants



# **APPENDIX A**

## **CERTIFICATIONS**

**(NOT AVAILABLE)**

## **APPENDIX B**

### **UST DISPOSAL CERTIFICATE**

**DIRECTORATE OF PUBLIC WORKS  
FORT MONMOUTH, NEW JERSEY 07703**

Contract Management Division

SUBJECT: PWS-007, Residential UST Removal  
Contractor: TVS Inc.

RE: Backfilling of excavation,

BUILDING #: 2040(52x54 METALL CIRCLE)

TVS Inc.  
Field Supervisor, PWS-007  
ATTN: Brian Finch  
Building 166  
Fort Monmouth, New Jersey 07703-5000

Dear Mr. Finch:

The above referenced area has been sampled and analyzed as described in the NJDEP Regulations. The results indicate levels of petroleum contamination below the NJDEP allowable limits ~~or that the site requires further investigation outside the scope of this contract.~~ The contractor may proceed with the backfilling of the excavation with stone to groundwater and clean fill to grade as required in the above referenced contract specification.

Regards,

  
Mr. Dinker Desai  
Environmental Engineer  
Directorate of Public Works

CC: UST file copy



**DEPARTMENT OF THE ARMY**  
Headquarters, U.S. Army Garrison Fort Monmouth  
Fort Monmouth, New Jersey 07703 - 5101



REPLY TO  
ATTENTION OF

Directorate of Public Works

Date: 30 January, 2001

Marpal Disposal Company, Inc.  
P.O. Box 188  
Lincroft, New Jersey 07738

Re: Non-Hazardous Waste Disposal  
Contract No. DAAB07-96-C-8252  
Location: Bldg. 166, rear  
Roll-off container No. 2798  
Size: 30 cubic yards  
USTs from Bldgs: 226(2K), 227(2K), 228(2K), 2038(.5K), 2039(.5K), 2040(.5K),  
2041(.5K), 2042(.5K), McGuire AFB 1507(2.5K)

Dear Sirs:

I certify that the above referenced 30 cubic yard roll-off container provided by Marpal, Inc. contains only crushed fiberglass underground storage tanks removed from residential buildings at Fort Monmouth, NJ, and one from McGuire Air Force Base. The tanks held only No. 2 heating oil. The tanks were cleaned in accordance with acceptable industry standards and NJDEP protocol and then crushed. No free liquids are present in the container.

If you should require any additional information or help at this time, please contact Mr. Dinker Desai, Environmental Protection Specialist. He can be reached at the following telephone number: (732) 532-1475.

Sincerely,

Dinker Desai  
Environmental Protection Specialist

Attachments: None

## **APPENDIX C**

# **PHOTO DOCUMENTATION**

**(NOT AVAILABLE)**

## **APPENDIX D**

### **SOIL ANALYTICAL DATA PACKAGE**

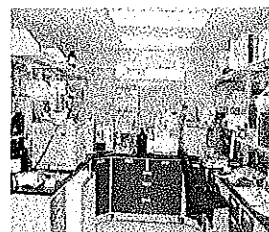
# FORT MONMOUTH ENVIRONMENTAL TESTING LABORATORY

DIRECTORATE OF PUBLIC WORKS

PHONE: (732) 532-6224 FAX: (732) 532-6263

WET-CHEM - METALS - ORGANICS - FIELD SAMPLING

CERTIFICATIONS: NJDEP #13461, NYSDOH #11699



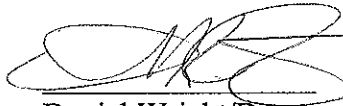
ANALYTICAL DATA REPORT  
Fort Monmouth Environmental Laboratory  
ENVIRONMENTAL DIVISION  
Fort Monmouth, New Jersey  
PROJECT: IJO# 100004

## Bldg. 2040

| Field Sample Location     | Laboratory<br>Sample ID# | Matrix   | Date and Time<br>of Collection | Date Received |
|---------------------------|--------------------------|----------|--------------------------------|---------------|
| 2040-A North End 7.0-7.5' | 5341.01                  | Soil     | 13-Apr-00 14:40                | 04/13/00      |
| 2040-B South End 7.0-7.5' | 5341.02                  | Soil     | 13-Apr-00 15:00                | 04/13/00      |
| 2040-C Piping 2.0-2.5'    | 5341.03                  | Soil     | 13-Apr-00 14:50                | 04/13/00      |
| 2040-D Duplicate 7.0-7.5' | 5341.04                  | Soil     | 13-Apr-00 14:40                | 04/13/00      |
| Trip Blank                | 5341.05                  | Methanol | 13-Apr-00                      | 04/13/00      |

ANALYSIS:  
FORT MONMOUTH ENVIRONMENTAL LAB  
TPHC, %SOLIDS

ENCLOSURE:  
CHAIN OF CUSTODY  
RESULTS

 4-20-00  
Daniel Wright/Date  
Laboratory Director

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## **Method Summary**

### **NJDEP Method OQA-QAM-025-10/97**

#### **Gas Chromatographic Determination of Total Petroleum Hydrocarbons in Soil**

Fifteen grams (15g)(wet weight) of a soil sample is added to a 125 mL acid cleaned, solvent rinsed, capped Erlenmeyer flask. 15g anhydrous sodium sulfate is added to dry sample. Surrogate standard spiking solution is then added to the flask.

Twenty five milliliters(25mL) Methylene Chloride is added to the flask and it is secured on a orbital shaker table. The agitation rate is set to 400rpm and the sample is shaken for 30 minutes. The flask is the removed from the table and the particulate matter is allowed to settle. The extract is transferred to a Teflon capped vial. A second 25mL of Methylene Chloride is added to the flask and shaken for an additional 30 minutes. The flask is again removed and allowed to settle. The extracts are combined in the vial then transferred to a 1mL autosampler vial.

The extract is then injected directly into a GC-FID for analysis. The sample is analyzed for petroleum hydrocarbons covering a range of C8-C42 including pristane and phytane. Total Petroleum Hydrocarbon concentration is determined by integrating between 5 minutes and 22 minutes. The baseline is established by starting the integration after the end of the solvent peak and stopping after the last peak.

The final concentration of Total Petroleum Hydrocarbons is calculated using percent solid, sample weight and concentration.

## TPHC Conformance/Non-conformance Summary Report

Indicate  
Yes, No, N/A

1. Method Detection Limits provided.
2. Method Blank Contamination – If yes, list the sample and the corresponding concentrations in each blank.  
\_\_\_\_\_  
\_\_\_\_\_
3. Matrix Spike Results Summary Meet Criteria  
(If not met, list the sample and corresponding recovery which falls outside the acceptable range).  
\_\_\_\_\_  
\_\_\_\_\_
4. Duplicate Results Summary Meet Criteria  
(If not met, list the sample and corresponding recovery which falls outside the acceptable range).  
\_\_\_\_\_  
\_\_\_\_\_
5. IR Spectra submitted for standards, blanks and samples.
6. Chromatograms submitted for standards, blanks and samples if GC fingerprinting was conducted.
7. Analysis holding time met.  
(If not met, list number of days exceeded for each sample).  
\_\_\_\_\_  
\_\_\_\_\_

Yes

NO

Yes

Yes

NA

Yes

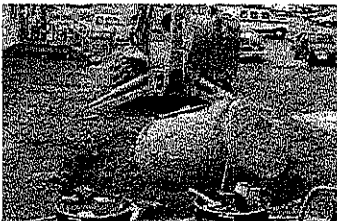
Yes

Additional comments: \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

  
\_\_\_\_\_  
Laboratory Manager

4-20-00  
\_\_\_\_\_  
Date

000002



# Fort Monmouth Environmental Testing Laboratory

Bldg. 173, SELFM-PW-EV, Fort Monmouth, NJ 07703

Tel (732)532-4359 Fax (732)532-6263 EMail:wrightd@mail1.monmouth.army.mil

NJDEP Certification #13461 / NYDOH Certification #11699

## Chain of Custody Record

|                                                                                                                                |                        |              |             |                          |                                                        |                                                                 |   |                            |          |        |          |                                      |
|--------------------------------------------------------------------------------------------------------------------------------|------------------------|--------------|-------------|--------------------------|--------------------------------------------------------|-----------------------------------------------------------------|---|----------------------------|----------|--------|----------|--------------------------------------|
| <b>Customer: Dinker Desai</b>                                                                                                  |                        |              |             |                          | <b>Project No: 100004</b>                              |                                                                 |   | <b>Analysis Parameters</b> |          |        |          | * = Samples Kept <4°C                |
| <b>Phone #: X21475</b>                                                                                                         |                        |              |             |                          | <b>Location: BLDG. 2040 (52+54)</b>                    |                                                                 |   | TPHC                       | % SOLIDS | VOA+10 | VOA ID # |                                      |
| <b>( ) DERA (X) OMA UST Assessment</b>                                                                                         |                        |              |             |                          | <b>UST# 192486-21</b>                                  |                                                                 |   |                            |          |        |          |                                      |
| <b>Samplers Name / Company : Frank Accorsi/TVS</b>                                                                             |                        |              |             |                          | <b>Sample</b>                                          | <b>#</b>                                                        |   |                            |          |        |          | <b>Remarks / Preservation Method</b> |
| <b>Lab Sample I.D.</b>                                                                                                         | <b>Sample Location</b> | <b>Depth</b> | <b>Date</b> | <b>Time</b>              | <b>Type</b>                                            | <b>Bottles</b>                                                  |   |                            |          |        |          |                                      |
| 5341.01                                                                                                                        | 2040-A, NORTH END      | 7.0-7.5      | 4-13-00     | 1440                     | SOIL                                                   | 2                                                               | X | X                          | X        | 1516   |          | ICE                                  |
| 02                                                                                                                             | 2040-B, SOUTH END      | 7.0-7.5      |             | 1500                     |                                                        | 2                                                               | X | X                          | X        | 1517   |          |                                      |
| 03                                                                                                                             | 2040-C, PIPELINE       | 2.0-2.5      |             | 1450                     |                                                        | 2                                                               | X | X                          | X        | 1518   |          |                                      |
| 04                                                                                                                             | 2040-D, DUPLICATE      | 7.0-7.5      |             | 1440                     |                                                        | 2                                                               | X | X                          | X        | 1519   |          |                                      |
| 05                                                                                                                             | TRIP BLANK             | -            |             | -                        | AQ                                                     | 1                                                               |   |                            | X        | 1520   |          |                                      |
| OVM sn#580U-64455.343 was calibrated with zero air & w/245 ppm Isobutylene read 247 ppm. 1010 4-12-00 PA (time/date & initial) |                        |              |             |                          |                                                        |                                                                 |   |                            |          |        |          |                                      |
| Relinquished by (signature):                                                                                                   |                        | Date/Time:   |             | Received by (signature): |                                                        | Comments: * VOA+10 ON 25% > 1000 PPM TPA, ON HIGHEST, MIN. ONE. |   |                            |          |        |          |                                      |
| Relinquished by (signature):                                                                                                   |                        | Date/Time:   |             | Received by (signature): |                                                        |                                                                 |   |                            |          |        |          |                                      |
| Report Type: ( ) Full, (X) Reduced, ( ) Standard, ( ) Screen / non-certified, ( ) EDD                                          |                        |              |             |                          | Remarks: Dedicated Sampling Tools Used                 |                                                                 |   |                            |          |        |          |                                      |
| Turnaround time: ( ) Standard 2 wks, (X) Rush 2 Days, ( ) ASAP Verbal ____ Hrs.                                                |                        |              |             |                          | All sample points have been GPS? (X) YES ( ) NO ( ) NA |                                                                 |   |                            |          |        |          |                                      |

**Report of Analysis**  
**U.S.Army, Fort Monmouth Environmental Laboratory**  
**NJDEP Certification # 13461**

**Client :** U.S. Army  
 DPW. SELFM-PW-EV  
 Bldg. 173  
 Ft. Monmouth, NJ 07703

**Project # :** 5341  
**Location :** Bldg.2040  
**UST Reg. # :** 192486-21

**Analysis :** OQA-QAM-025  
**Matrix :** Soil  
**Inst. ID. :** GC TPHC INST. #1  
**Column Type :** RTX-5, 0.32mm ID, 30M  
**Injection Volume :** 1uL

**Date Received :** 13-Apr-00  
**Date Extracted :** 14-Apr-00  
**Extraction Method :** Shake  
**Analysis Complete :** 15-Apr-00  
**Analyst :** B.Patel

| Sample       | Field ID | Dilution Factor | Weight (g) | % Solid | MDL (mg/kg) | TPHC Result (mg/kg) |
|--------------|----------|-----------------|------------|---------|-------------|---------------------|
| 5341.01      | 2041-A   | 1.00            | 15.07      | 81.91   | 190         | ND                  |
| 5341.02      | 2041-B   | 1.00            | 15.04      | 84.90   | 184         | ND                  |
| 5341.03      | 2041-C   | 1.00            | 15.12      | 86.64   | 179         | ND                  |
| 5341.04      | 2041-D   | 1.00            | 15.42      | 80.69   | 189         | ND                  |
|              |          |                 |            |         |             |                     |
|              |          |                 |            |         |             |                     |
|              |          |                 |            |         |             |                     |
|              |          |                 |            |         |             |                     |
|              |          |                 |            |         |             |                     |
|              |          |                 |            |         |             |                     |
|              |          |                 |            |         |             |                     |
|              |          |                 |            |         |             |                     |
|              |          |                 |            |         |             |                     |
|              |          |                 |            |         |             |                     |
|              |          |                 |            |         |             |                     |
|              |          |                 |            |         |             |                     |
|              |          |                 |            |         |             |                     |
|              |          |                 |            |         |             |                     |
|              |          |                 |            |         |             |                     |
| METHOD BLANK | TBLK379  | 1.00            | 15.00      | 100.00  | 157         | ND                  |

ND = Not Detected

MDL = Method Detection Limit

000004

## LABORATORY DELIVERABLES CHECKLIST AND NON-CONFORMANCE SUMMARY

THIS FORM MUST BE COMPLETED BY THE LABORATORY OR ENVIRONMENTAL CONSULTANT  
AND ACCOMPANY ALL DATA SUBMISSIONS

The following Laboratory Deliverables checklist and Non-Conformance Summary shall be included in the data submission. All deviations from the accepted methodology and procedures, of performance values outside acceptable ranges shall be summarized in the Non-Conformance Summary. The Technical Requirements for Site Remediation, effective June 7, 1993, provides further details. The document shall be bound and paginated, contain a table of contents, and all pages shall be legible. Incomplete packages will be returned or held without review until the data package is completed.

It is recommended that the analytical results summary sheets listing all targeted and non-targeted compounds with the method detection limits, practical quantitation limits, and the laboratory and/or sample numbers be included in one section of the data package and in the main body of the report.

1. Cover page, Title Page listing Lab Certification #, facility name and address, & date of report submitted ☒
2. Table of Contents submitted ☒
3. Summary Sheets listing analytical results for all targeted and non-targeted compounds submitted ☒
4. Document paginated and legible ☒
5. Chain of Custody submitted ☒
6. Samples submitted to lab within 48 hours of sample collection ☒
7. Methodology Summary submitted ☒
8. Laboratory Chronicle and Holding Time Check submitted ☒
9. Results submitted on a dry weight basis ☒
10. Method Detection Limits submitted ☒
11. Lab certified by NJDEP for parameters of appropriate category of parameters or a member of the USEPA CLP ☒

Laboratory Manager or Environmental Consultant's Signature  
Date 4/12/00

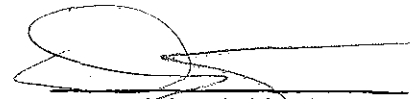
Laboratory Certification #13461

\*Refer to NJAC 7:26E - Appendix A, Section IV - Reduced Data Deliverables - Non-USEPA/CLP  
Methods for further guidance.

000027

## **Laboratory Authentication Statement**

I certify under penalty of law, where applicable, that this laboratory meets the Laboratory Performance Standards and Quality Control requirements specified in N.J.A.C. 7:18 and 40 CFR Part 136 for Water and Wastewater Analyses and SW-846 for Solid Waste Analysis. I have personally examined the information contained in this report and to the best of my knowledge, I believe that the submitted information is true, accurate, complete and meets the above referenced standards where applicable. I am aware that there are significant penalties for purposefully submitting falsified information, including the possibility of a fine and imprisonment.



Daniel K. Wright  
Laboratory Manager

**Attachment V**  
**UST 2041 Closure Report**

**U.S. Army Garrison**  
Fort Monmouth, New Jersey

---

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

***Charles Wood – Building 2041***

---

**NJDEP UST Registration No.: 192486-22**  
**UST No.: 192486-22**

**September 2010**



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

**CHARLES WOOD – BUILDING 2041  
NJDEP UST REGISTRATION NO.: 192486-22**

**SEPTEMBER 2010**

**PROJECT NO.: 10-24949**

**PREPARED FOR:**

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

**PREPARED BY:**

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

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## EXECUTIVE SUMMARY

### UST Closure

On April 6, 2000, a single wall, fiberglass wrapped plastic 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. Installed in 1985, the tank was located adjacent to Building 2041 in Charles Wood area. UST No.: 192486-22 was a 550-gallon, FRP, No. 2 fuel oil tank. The tank with all associated piping was present at the time of removal. 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, of which none were found. No petroleum odors or stained soils were observed in the soils surrounding the tanks.

Closure soil samples were collected after the removal of the UST. Closure samples 2041-A and 2041-B were collected from a total of two (2) locations along the UST bottom of the excavation for the UST No.: 192486-22. Closure sample 2041-C was collected from a location along the UST piping. A duplicate of sample 2041-A was collected. All samples were analyzed for total petroleum hydrocarbons (TPH). Groundwater was not encountered in the bottom of the excavation.

### Findings

The closure soil samples collected from the UST excavation associated UST No.: 192486-22 contained TPH concentrations below the NJDEP health based criterion of 10,000 milligrams per kilogram (mg/kg) for total organic contaminants (N.J.A.C. 7:26E and revisions dated February 3, 1994). All soil samples, including the duplicate, contained a TPH concentration of Not Detected.

### Conclusions and Recommendations

Based on the closure soil sampling results, soils with TPH concentrations exceeding the NJDEP health based criterion of 10,000 mg/kg for total organic contaminants (N.J.A.C. 7:26E and revisions dated February 3, 1994) are not present in the former location of the UST.

**No Further Action** is proposed in regard to the closure and site assessment of UST No.: 192486-22 at Building 2041.

## **1.0 UNDERGROUND STORAGE TANK DECOMMISSIONING ACTIVITIES**

### **1.1 OVERVIEW**

One underground storage tank (UST), New Jersey Department of Environmental Protection (NJDEP) Registration No.: 192486-22 was closed at Building 2041 of the Charles Wood area at U.S. Army Garrison, Fort Monmouth, New Jersey. Refer to site location maps Figure 1 & 2. This report presents the results of the implementation of the Directorate of the Public Work's UST Management Plan, March 1996. Installed in 1985, the UST was a 550-gallon, FRP, containing No. 2 fuel oil for residential use. It was removed on April 6, 2000.

Decommissioning activities for UST No.: 192486-22 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 Site 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)*.

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 UST decommissioning activities. Section 2 describes the site investigation activities. Conclusions and recommendations are presented in Section 3 of this report.

### **1.2 SITE DESCRIPTION**

Building 2041, (63 & 65 Megill Circle) is located in the Charles Wood area of Fort Monmouth, as shown on Figure 1 & 2. UST No.: 192486-22 and associated piping were located adjacent to the building, as shown on Figure 3.

#### **1.2.1 Geological/Hydrogeological Setting**

The following is a description of the geological/hydrogeological setting of Bldg. 2041. 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 Charles Wood 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 (Zapeczka, 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 encrusted (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 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

Fort Monmouth has been an operational military facility for in excess of ninety (90) years; and in many areas of Charles Wood, human activities have completely transformed the topography. Currently, 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 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 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 Charles Wood 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-ionizer detector: Thermo Instruments Organic Vapor Monitor (OVM) – Model #580-B. The individual ascertained if the area was properly vented to render the area safe, as defined by OSHA. All work areas were properly vented to insure that there were no contaminants present in the breathing zone above permissible exposure limits (PEL's).

### **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 great regard to safety and health and the 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.

- 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.
- 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 UST. The tank was completely empty and contained no liquids prior to removal from the ground.

After the UST was removed from the excavation, it was staged on an impervious surface, labeled and examined for holes. The Subsurface Evaluator observed no holes in the tank during the inspection. Soils surrounding the UST were screened visually and with an OVM for evidence of contamination. Soil staining or petroleum hydrocarbons were not observed.

### **1.5 UNDERGROUND STORAGE TANK DECOMMISSIONING AND DISPOSAL**

Subsequent to disposal, the UST was purged with air to remove vapors prior to cutting. A 4 feet by 3 feet access hole was made in the UST using a pneumatic ripper gun with a non-sparking bit. The UST was cleaned first with rubber squeegees and adsorbent material broomed on the sidewalls and bottom. The adsorbent material was then drummed and subsequently put 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 for disposal in compliance with all applicable regulations and laws. The UST disposal certification, along with backfilling authorization, is included in Appendix B.

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

If available, photographic documentation of the UST is included in Appendix C.

## **2.0 SITE INVESTIGATION ACTIVITIES**

### **2.1 OVERVIEW**

The Site Investigation was managed by U.S. Army DPW personnel. All analyses were performed and reported by Fort Monmouth Environmental Testing Laboratory, a NJDEP-certified testing laboratory. All sampling was performed by a NJDEP Certified Subsurface Evaluator according to the methods described in the NJDEP *Field Sampling Procedures Manual* (1992). Sampling frequency and parameters analyzed complied with the NJDEP document *Technical Requirements for Site Remediation*, 7:26E-3.9 (June 7, 1993) which was the applicable regulation at the date of the closure. All records of the Site Investigation activities are maintained by the Fort Monmouth DPW Environmental Office.

The following Parties participated in Closure and Site Investigation Activities.

- Ft. Monmouth Directorate of Public Works-Environmental Division  
Contact Person: Joseph Fallon  
Phone Number: (732) 532-6223
- Subsurface Evaluator: Frank Accorsi  
Employer: TECOM-Vinnell Services, Inc. (TVS)  
Phone Number: (732) 532-5241  
NJDEP License No.: 0010042  
(TVS)NJDEP License No.: US252302
- Analytical Laboratory: Fort Monmouth Environmental Testing Laboratory  
Contact Person: Dan Wright  
Phone Number: (732) 532-4359  
NJDEP Laboratory Certification No.: 13461

### **2.2 FIELD SCREENING/MONITORING**

Field screening was performed by a NJDEP certified Subsurface Evaluator using an OVM and visual observations to identify potentially contaminated material, of which none were found.

### **2.3 SOIL SAMPLING**

On April 6, 2000, closure soil samples were collected after the removal of the UST. Closure samples 2041-A and 2041-B were collected from a total of two (2) locations along the UST bottom of the excavation for the UST No.: 192486-22. Closure sample 2041-C was collected from a location along the UST piping. A duplicate of sample 2041-A was also collected.

Refer to soil sampling location map in Figure 3. All samples were analyzed for total petroleum hydrocarbons (TPH). Groundwater was not encountered in the excavation.

The site assessment was performed by TVS personnel in accordance with the NJDEP *Technical Requirements for Site Remediation* and the NJDEP *Field Sampling Procedures Manual*. A summary of sampling activities including parameters analyzed is provided on Table 1. The closure soil samples were collected. 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

Closure soil samples were collected from a total of three locations (which included the duplicate) on April 6, 2000 to evaluate soil conditions following removal of the UST and piping. All samples were analyzed for TPH. The closure soil sample results were compared to the NJDEP health based criterion of 10,000 mg/kg for total organic contaminants (*N.J.A.C. 7:26D* and revisions dated February 3, 1994). A summary of the analytical results and comparison to the NJDEP soil cleanup criteria is provided on Table 2. The analytical data package, including associated quality control data, is provided in Appendix D.

Closure soil samples collected on April 6, 2000 from the UST site excavation contained concentrations of TPH below the NJDEP soil cleanup criteria.

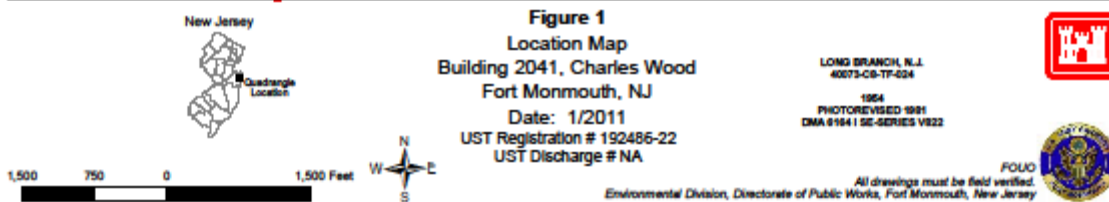
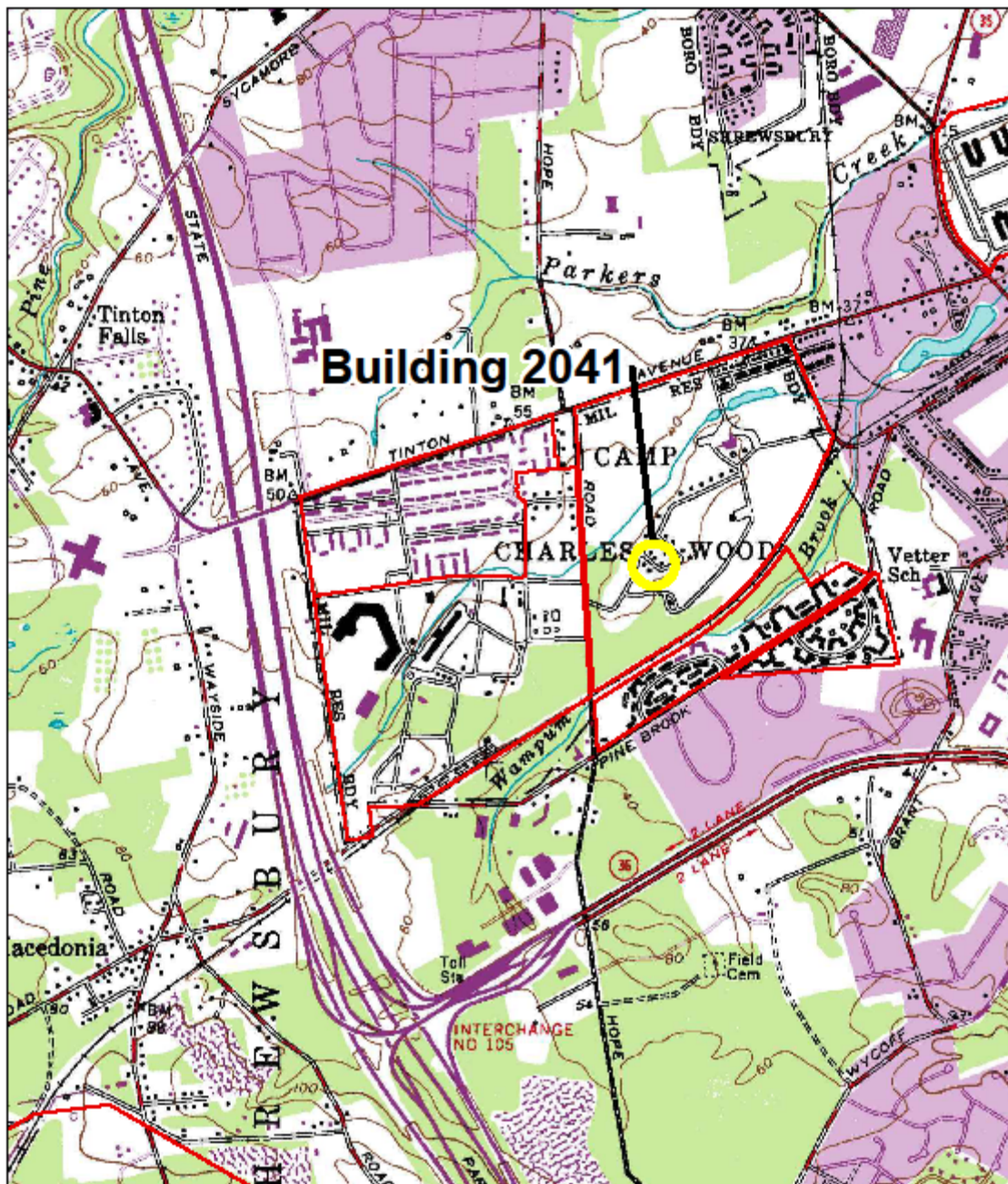
#### 3.2 CONCLUSIONS AND RECOMMENDATIONS

The analytical results for all of closure soil samples collected from the UST closure excavation at UST No.: 192486-22 were Not Detected for total petroleum hydrocarbons.

Based on the closure soil sampling results, soils with TPH concentrations exceeding the NJDEP soil cleanup criterion for total organic contaminants of 10,000 mg/kg are not present in the location of former UST No.: 192486-22.

**No Further Action** is proposed in regard to the closure and site investigation of UST No.: 192486-22 at Building 2041.

# FIGURES

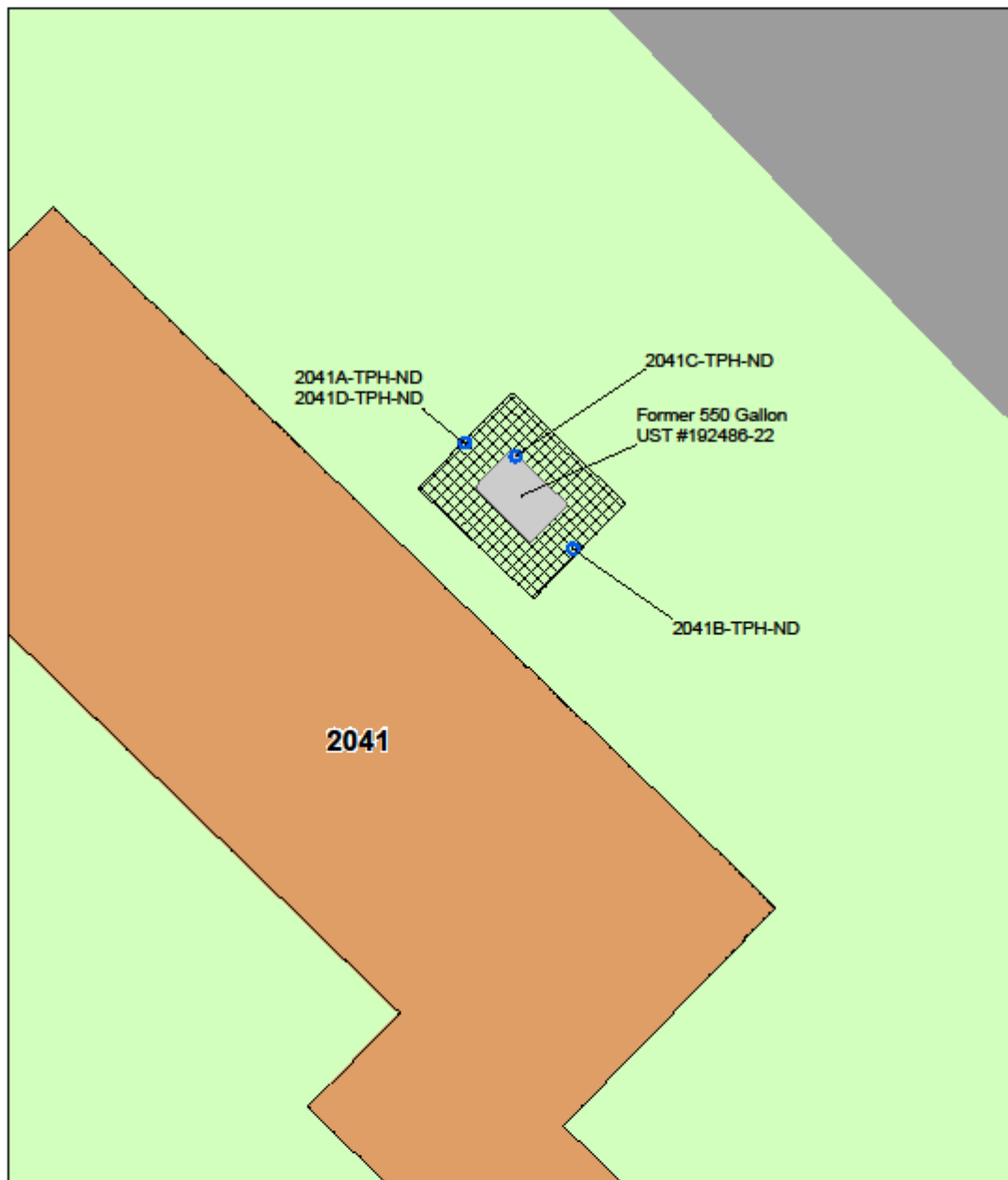




**Figure 2**  
 Location Map  
 Building 2041, Charles Wood Area  
 Fort Monmouth, NJ  
 Date: 1/2011  
 UST Registration # 192486-22  
 UST Discharge # NA



*All drawings must be field verified.*  
 Environmental Division, Directorate of Public Works, Fort Monmouth, New Jersey



**Legend**

-  UST
-  UST Excavation Limits
-  Soil Sample - 4/5/2000

10 5 0 10 Feet



**Figure 3**  
 Soil Sampling Location Map  
 Building 2041, Charles Wood Area  
 Fort Monmouth, NJ  
 Date: 1/2011  
 UST Registration # 192486-22  
 UST Discharge # NA



*All drawings must be field verified.*  
 Environmental Division, Directorate of Public Works, Fort Monmouth, New Jersey



# TABLES

# **TABLE 1**

## **SUMMARY OF LABORATORY ANALYSIS**

**FT. MONMOUTH, BUILDING 2041, UST No.: 192486-22**

**06 April 2000**

| <b>SAMPLE<br/>ID</b>        | <b>LABORATORY<br/>SAMPLE ID</b> | <b>SAMPLE<br/>DATE</b> | <b>SAMPLE<br/>MATRIX</b> | <b>ANALYTICAL<br/>PARAMETER</b> | <b>ANALYTICAL<br/>METHOD</b> |
|-----------------------------|---------------------------------|------------------------|--------------------------|---------------------------------|------------------------------|
|                             |                                 |                        |                          |                                 |                              |
| <b>2041-A</b>               | 5319.01                         | 06-Apr-00              | SOIL                     | TPH                             | OQA-QAM-25                   |
| <b>2041-B</b>               | 5319.02                         | 06-Apr-00              | SOIL                     | TPH                             | OQA-QAM-25                   |
| <b>2041-C</b>               | 5319.03                         | 06-Apr-00              | SOIL                     | TPH                             | OQA-QAM-25                   |
| <b>2041-D<br/>Duplicate</b> | 5319.04                         | 06-Apr-00              | SOIL                     | TPH                             | OQA-QAM-25                   |

### ABBREVIATIONS:

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

## **TABLE 2**

### **SUMMARY OF LABORATORY ANALYTICAL RESULTS**

FT. MONMOUTH, BUILDING 2041, UST No.: 192486-22

06 April 2000

#### **TOTAL PETROLEUM HYDROCARBONS**

| <b>SAMPLE ID</b>            | <b>LABORATORY<br/>SAMPLE ID</b> | <b>SAMPLE LOCATION</b> | <b>SAMPLE<br/>DEPTH</b> | <b>MATRIX</b> | <b>TPH<br/>RESULT S</b> |
|-----------------------------|---------------------------------|------------------------|-------------------------|---------------|-------------------------|
|                             |                                 |                        | <b>(in feet)</b>        |               | <b>mg/kg</b>            |
| <b>2041-A</b>               | 5319.01                         | WEST END               | 6.5-7.0                 | Soil          | ND                      |
| <b>2041-B</b>               | 5319.02                         | EAST END               | 6.5-7.0                 | Soil          | ND                      |
| <b>2041-C</b>               | 5319.03                         | PIPING                 | 1.5-2.0                 | Soil          | ND                      |
| <b>2041-D<br/>Duplicate</b> | 5319.04                         | DUPLICATE-WEST END     | 6.5-7.0                 | Soil          | ND                      |

**ABBREVIATIONS:**

mg/kg = Milligrams Per Kilogram = parts per million

ND = Compound Not Detected

**Gray shading** indicates exceedance of NJDEP health based criterion of 10,000 ppm total organic contaminants

# **APPENDIX A**

## **CERTIFICATIONS**

**(NOT AVAILABLE)**

## **APPENDIX B**

### **UST DISPOSAL CERTIFICATE**

## **APPENDIX C**

# **PHOTO DOCUMENTATION**

**(NOT AVAILABLE)**

## **APPENDIX D**

### **SOIL ANALYTICAL DATA PACKAGE**

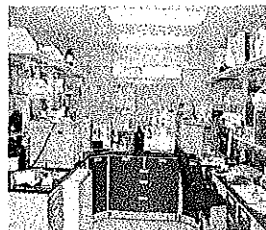
# FORT MONMOUTH ENVIRONMENTAL TESTING LABORATORY

DIRECTORATE OF PUBLIC WORKS

PHONE: (732) 532-6224 FAX: (732) 532-6263

WET-CHEM - METALS - ORGANICS - FIELD SAMPLING

CERTIFICATIONS: NJDEP #13461, NYSDOH #11699



ANALYTICAL DATA REPORT  
Fort Monmouth Environmental Laboratory  
ENVIRONMENTAL DIVISION  
Fort Monmouth, New Jersey  
PROJECT: IJO# 100004

**Bldg. 2041**

| Field Sample Location     | Laboratory Sample ID# | Matrix  | Date and Time of Collection | Date Received |
|---------------------------|-----------------------|---------|-----------------------------|---------------|
| 2041-A West End 6.5-7.0'  | 5319.01               | Aqueous | 06-Apr-00 11:00             | 04/06/00      |
| 2041-B East End 6.5-7.0'  | 5319.02               | Aqueous | 06-Apr-00 11:30             | 04/06/00      |
| 2041-C Piping 1.5-2.0'    | 5319.03               | Aqueous | 06-Apr-00 11:10             | 04/06/00      |
| 2041-D Duplicate 6.5-7.0' | 5319.04               | Aqueous | 06-Apr-00 11:00             | 04/06/00      |
| Trip Blank                | 5319.05               | Aqueous | 06-Apr-00                   | 04/06/00      |

ANALYSIS:  
FORT MONMOUTH ENVIRONMENTAL LAB  
TPHC, %SOLIDS

ENCLOSURE:  
CHAIN OF CUSTODY  
RESULTS

 4-20-00  
Daniel Wright/Date  
Laboratory Director



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## **Method Summary**

### **NJDEP Method OQA-QAM-025-10/97**

#### **Gas Chromatographic Determination of Total Petroleum Hydrocarbons in Soil**

Fifteen grams (15g)(wet weight) of a soil sample is added to a 125 mL acid cleaned, solvent rinsed, capped Erlenmeyer flask. 15g anhydrous sodium sulfate is added to dry sample. Surrogate standard spiking solution is then added to the flask.

Twenty five milliliters(25mL) Methylene Chloride is added to the flask and it is secured on a orbital shaker table. The agitation rate is set to 400rpm and the sample is shaken for 30 minutes. The flask is the removed from the table and the particulate matter is allowed to settle. The extract is transferred to a Teflon capped vial. A second 25mL of Methylene Chloride is added to the flask and shaken for an additional 30 minutes. The flask is again removed and allowed to settle. The extracts are combined in the vial then transferred to a 1mL autosampler vial.

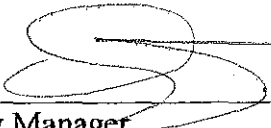
The extract is then injected directly into a GC-FID for analysis. The sample is analyzed for petroleum hydrocarbons covering a range of C8-C42 including pristane and phytane. Total Petroleum Hydrocarbon concentration is determined by integrating between 5 minutes and 22 minutes. The baseline is established by starting the integration after the end of the solvent peak and stopping after the last peak.

The final concentration of Total Petroleum Hydrocarbons is calculated using percent solid, sample weight and concentration.

## TPHC Conformance/Non-conformance Summary Report

- |                                                                                                                                                                       | Indicate<br>Yes, No, N/A |
|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------|
| 1. Method Detection Limits provided.                                                                                                                                  | <u>Yes</u>               |
| 2. Method Blank Contamination – If yes, list the sample and the corresponding concentrations in each blank.<br>_____<br>_____                                         | <u>NO</u>                |
| 3. Matrix Spike Results Summary Meet Criteria<br>(If not met, list the sample and corresponding recovery which falls outside the acceptable range).<br>_____<br>_____ | <u>Yes</u>               |
| 4. Duplicate Results Summary Meet Criteria<br>(If not met, list the sample and corresponding recovery which falls outside the acceptable range).<br>_____<br>_____    | <u>Yes</u>               |
| 5. IR Spectra submitted for standards, blanks and samples.                                                                                                            | <u>NA</u>                |
| 6. Chromatograms submitted for standards, blanks and samples if GC fingerprinting was conducted.                                                                      | <u>Yes</u>               |
| 7. Analysis holding time met.<br>(If not met, list number of days exceeded for each sample).<br>_____<br>_____                                                        | <u>Yes</u>               |

Additional comments: \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

  
\_\_\_\_\_  
Laboratory Manager

4-20-00  
\_\_\_\_\_  
Date

000002



**Report of Analysis**  
**U.S. Army, Fort Monmouth Environmental Laboratory**  
**NJDEP Certification # 13461**

**Client :** U.S. Army  
 DPW. SELFM-PW-EV  
 Bldg. 173  
 Ft. Monmouth, NJ 07703

**Project # :** 5319  
**Location :** 2041  
**UST Reg. # :** 192486-22

**Analysis :** OQA-QAM-025  
**Matrix :** Soil  
**Inst. ID. :** GC TPHC INST. #1  
**Column Type :** RTX-5, 0.32mm ID, 30M  
**Injection Volume :** 1uL

**Date Received :** 06-Apr-00  
**Date Extracted :** 07-Apr-00  
**Extraction Method :** Shake  
**Analysis Complete :** 10-Apr-00  
**Analyst :** D. Costagliola

| Sample       | Field ID          | Dilution Factor | Weight (g) | % Solid | MDL (mg/kg) | TPHC Result (mg/kg) |
|--------------|-------------------|-----------------|------------|---------|-------------|---------------------|
| 5319.01      | 2041-A, West End  | 1.00            | 15.18      | 91.11   | 170         | ND                  |
| 5319.02      | 2041-B, East End  | 1.00            | 15.06      | 88.96   | 175         | ND                  |
| 5319.03      | 2041-C, Piping    | 1.00            | 15.32      | 88.16   | 174         | ND                  |
| 5319.04      | 2041-D, Duplicate | 1.00            | 15.06      | 91.23   | 171         | ND                  |
|              |                   |                 |            |         |             |                     |
|              |                   |                 |            |         |             |                     |
|              |                   |                 |            |         |             |                     |
|              |                   |                 |            |         |             |                     |
|              |                   |                 |            |         |             |                     |
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|              |                   |                 |            |         |             |                     |
|              |                   |                 |            |         |             |                     |
|              |                   |                 |            |         |             |                     |
|              |                   |                 |            |         |             |                     |
| METHOD BLANK | TBLK373           | 1.00            | 15.00      | 100.00  | 157         | ND                  |

ND = Not Detected

MDL = Method Detection Limit

000004

## LABORATORY DELIVERABLES CHECKLIST AND NON-CONFORMANCE SUMMARY

THIS FORM MUST BE COMPLETED BY THE LABORATORY OR ENVIRONMENTAL CONSULTANT  
AND ACCOMPANY ALL DATA SUBMISSIONS

The following Laboratory Deliverables checklist and Non-Conformance Summary shall be included in the data submission. All deviations from the accepted methodology and procedures, of performance values outside acceptable ranges shall be summarized in the Non-Conformance Summary. The Technical Requirements for Site Remediation, effective June 7, 1993, provides further details. The document shall be bound and paginated, contain a table of contents, and all pages shall be legible. Incomplete packages will be returned or held without review until the data package is completed.

It is recommended that the analytical results summary sheets listing all targeted and non-targeted compounds with the method detection limits, practical quantitation limits, and the laboratory and/or sample numbers be included in one section of the data package and in the main body of the report.

- |                                                                                                              |                                     |
|--------------------------------------------------------------------------------------------------------------|-------------------------------------|
| 1. Cover page, Title Page listing Lab Certification #, facility name and address, & date of report submitted | <input checked="" type="checkbox"/> |
| 2. Table of Contents submitted                                                                               | <input checked="" type="checkbox"/> |
| 3. Summary Sheets listing analytical results for all targeted and non-targeted compounds submitted           | <input checked="" type="checkbox"/> |
| 4. Document paginated and legible                                                                            | <input checked="" type="checkbox"/> |
| 5. Chain of Custody submitted                                                                                | <input checked="" type="checkbox"/> |
| 6. Samples submitted to lab within 48 hours of sample collection                                             | <input checked="" type="checkbox"/> |
| 7. Methodology Summary submitted                                                                             | <input checked="" type="checkbox"/> |
| 8. Laboratory Chronicle and Holding Time Check submitted                                                     | <input checked="" type="checkbox"/> |
| 9. Results submitted on a dry weight basis                                                                   | <input checked="" type="checkbox"/> |
| 10. Method Detection Limits submitted                                                                        | <input checked="" type="checkbox"/> |
| 11. Lab certified by NJDEP for parameters of appropriate category of parameters or a member of the USEPA CLP | <input checked="" type="checkbox"/> |

Laboratory Manager or Environmental Consultant's Signature \_\_\_\_\_  
Date 4/20/00

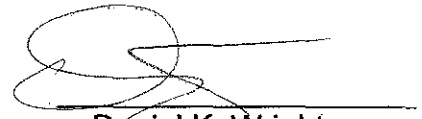
Laboratory Certification #13461

\*Refer to NJAC 7:26E - Appendix A, Section IV - Reduced Data Deliverables - Non-USEPA/CLP  
Methods for further guidance.

000020

## **Laboratory Authentication Statement**

I certify under penalty of law, where applicable, that this laboratory meets the Laboratory Performance Standards and Quality Control requirements specified in N.J.A.C. 7:18 and 40 CFR Part 136 for Water and Wastewater Analyses and SW-846 for Solid Waste Analysis. I have personally examined the information contained in this report and to the best of my knowledge, I believe that the submitted information is true, accurate, complete and meets the above referenced standards where applicable. I am aware that there are significant penalties for purposefully submitting falsified information, including the possibility of a fine and imprisonment.



Daniel K. Wright  
Laboratory Manager

**Attachment W**  
**UST 2042 Closure Report**



**U.S. Army Garrison**  
Fort Monmouth, New Jersey

---

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

***Charles Wood – Building 2042***

---

**NJDEP UST Registration No.: 192486-23**  
**UST No.: 192486-23**

**September 2010**

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

**CHARLES WOOD – BUILDING 2042  
NJDEP UST REGISTRATION NO.: 192486-23**

**SEPTEMBER 2010**

**PROJECT NO.: 10-24949**

**PREPARED FOR:**

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

**PREPARED BY:**

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

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- Appendix C     Photo Documentation**
- Appendix D     Soil Analytical Data Package**

## EXECUTIVE SUMMARY

### UST Closure

On April 7, 2000, a fiberglass wrapped plastic 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. Installed in 1985, the tank was located adjacent to Building 2042 in Charles Wood area. UST No.: 192486-23 was a 550-gallon, FRP, No. 2 fuel oil tank. The tank with all associated piping was present at the time of removal. 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, of which none were found. No petroleum odors or stained soils were observed in the soils surrounding the tanks.

Closure soil samples were collected after the removal of the UST. Closure samples 2042-A and 2042-B were collected from a total of two (2) locations along the UST bottom of the excavation for the UST No.: 192486-23. Closure sample 2042-C was collected from a location along the UST piping. A duplicate sample of 2042-A was collected. All samples were analyzed for total petroleum hydrocarbons (TPH). Groundwater was not encountered in the bottom of the excavation.

### Findings

The closure soil samples collected from the UST excavation associated UST No.: 192486-23 contained TPH concentrations below the NJDEP health based criterion of 10,000 milligrams per kilogram (mg/kg) for total organic contaminants (N.J.A.C. 7:26E and revisions dated February 3, 1994). All soil samples, including the duplicate, contained a TPH concentration of Not Detected.

### Conclusions and Recommendations

Based on the closure soil sampling results, soils with TPH concentrations exceeding the NJDEP health based criterion of 10,000 mg/kg for total organic contaminants (N.J.A.C. 7:26E and revisions dated February 3, 1994) are not present in the former location of the UST.

**No Further Action** is proposed in regard to the closure and site assessment of UST No.: 192486-23 at Building 2042.

## **1.0 UNDERGROUND STORAGE TANK DECOMMISSIONING ACTIVITIES**

### **1.1 OVERVIEW**

One underground storage tank (UST), New Jersey Department of Environmental Protection (NJDEP) Registration No.: 192486-23 was closed at Building 2042 of the Charles Wood area at U.S. Army Garrison, Fort Monmouth, New Jersey. Refer to site location maps Figure 1 & 2. This report presents the results of the implementation of the Directorate of the Public Work's UST Management Plan, March 1996. Installed in 1985, the UST was a 550-gallon, FRP, containing No. 2 fuel oil for residential use. It was removed on April 7, 2000.

Decommissioning activities for UST No.: 192486-23 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 Site 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)*.

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 UST decommissioning activities. Section 2 describes the site investigation activities. Conclusions and recommendations are presented in Section 3 of this report.

### **1.2 SITE DESCRIPTION**

Building 2042, (59 & 61 Megill Circle) is located in the Charles Wood area of Fort Monmouth, as shown on Figure 1 & 2. UST No.: 192486-23 and associated piping were located adjacent to the building, as shown on Figure 3.

#### **1.2.1 Geological/Hydrogeological Setting**

The following is a description of the geological/hydrogeological setting of Bldg. 2042. 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 Charles Wood 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 (Zapeczka, 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 encrusted (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 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

Fort Monmouth has been an operational military facility for in excess of ninety (90) years; and in many areas of Charles Wood, human activities have completely transformed the topography. Currently, 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 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 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 Charles Wood 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-ionizer detector: Thermo Instruments Organic Vapor Monitor (OVM) – Model #580-B. The individual ascertained if the area was properly vented to render the area safe, as defined by OSHA. All work areas were properly vented to insure that there were no contaminants present in the breathing zone above permissible exposure limits (PEL's).

### **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 great regard to safety and health and the 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.

- 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.
- 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 UST. The tank was completely empty and contained no liquids prior to removal from the ground.

After the UST was removed from the excavation, it was staged on an impervious surface, labeled and examined for holes. The Subsurface Evaluator observed no holes in the tank during the inspection. Soils surrounding the UST were screened visually and with an OVM for evidence of contamination. Soil staining or petroleum hydrocarbons were not observed.

### **1.5 UNDERGROUND STORAGE TANK DECOMMISSIONING AND DISPOSAL**

Subsequent to disposal, the UST was purged with air to remove vapors prior to cutting. A 4 feet by 3 feet access hole was made in the UST using a pneumatic ripper gun with a non-sparking bit. The UST was cleaned first with rubber squeegees and adsorbent material broomed on the sidewalls and bottom. The adsorbent material was then drummed and subsequently put 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 for disposal in compliance with all applicable regulations and laws. The UST disposal certification, along with backfilling authorization, is included in Appendix B.

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

If available, photographic documentation of the UST is included in Appendix C.

## **2.0 SITE INVESTIGATION ACTIVITIES**

### **2.1 OVERVIEW**

The Site Investigation was managed by U.S. Army DPW personnel. All analyses were performed and reported by Fort Monmouth Environmental Testing Laboratory, a NJDEP-certified testing laboratory. All sampling was performed by a NJDEP Certified Subsurface Evaluator according to the methods described in the NJDEP *Field Sampling Procedures Manual* (1992). Sampling frequency and parameters analyzed complied with the NJDEP document *Technical Requirements for Site Remediation*, 7:26E-3.9 (June 7, 1993) which was the applicable regulation at the date of the closure. All records of the Site Investigation activities are maintained by the Fort Monmouth DPW Environmental Office.

The following Parties participated in Closure and Site Investigation Activities.

- Ft. Monmouth Directorate of Public Works-Environmental Division  
Contact Person: Joseph Fallon  
Phone Number: (732) 532-6223
- Subsurface Evaluator: Frank Accorsi  
Employer: TECOM-Vinnell Services, Inc. (TVS)  
Phone Number: (732) 532-5241  
NJDEP License No.: 0010042  
(TVS)NJDEP License No.: US252302
- Analytical Laboratory: Fort Monmouth Environmental Testing Laboratory  
Contact Person: Dan Wright  
Phone Number: (732) 532-4359  
NJDEP Laboratory Certification No.: 13461

### **2.2 FIELD SCREENING/MONITORING**

Field screening was performed by a NJDEP certified Subsurface Evaluator using an OVM and visual observations to identify potentially contaminated material, of which none were found.

### **2.3 SOIL SAMPLING**

On April 7, 2000, closure soil samples were collected after the removal of the UST. Closure samples 2042-A and 2042-B were collected from a total of two (2) locations along the UST bottom of the excavation for the UST No.: 192486-23. Closure sample 2042-C was collected from a location along the UST piping. A duplicate of sample 2042-A was also collected.

Refer to soil sampling location map in Figure 3. All samples were analyzed for total petroleum hydrocarbons (TPH). Groundwater was not encountered in the excavation.

The site assessment was performed by TVS personnel in accordance with the NJDEP *Technical Requirements for Site Remediation* and the NJDEP *Field Sampling Procedures Manual*. A summary of sampling activities including parameters analyzed is provided on Table 1. The closure soil samples were collected. 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

Closure soil samples were collected from a total of three locations (which included the duplicate) on April 7, 2000 to evaluate soil conditions following removal of the UST and piping. All samples were analyzed for TPH. The closure soil sample results were compared to the NJDEP health based criterion of 10,000 mg/kg for total organic contaminants (*N.J.A.C. 7:26D* and revisions dated February 3, 1994). A summary of the analytical results and comparison to the NJDEP soil cleanup criteria is provided on Table 2. The analytical data package, including associated quality control data, is provided in Appendix D.

Closure soil samples collected on April 7, 2000 from the UST site excavation contained concentrations of TPH below the NJDEP soil cleanup criteria.

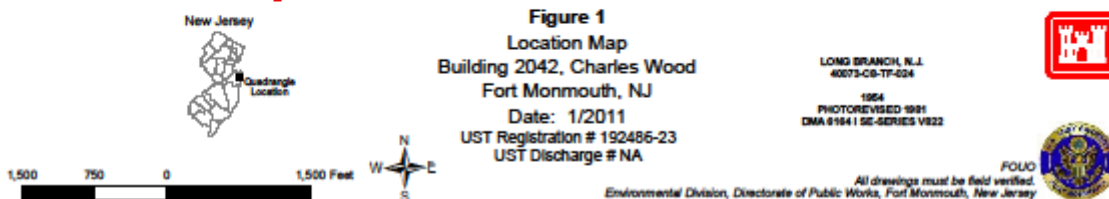
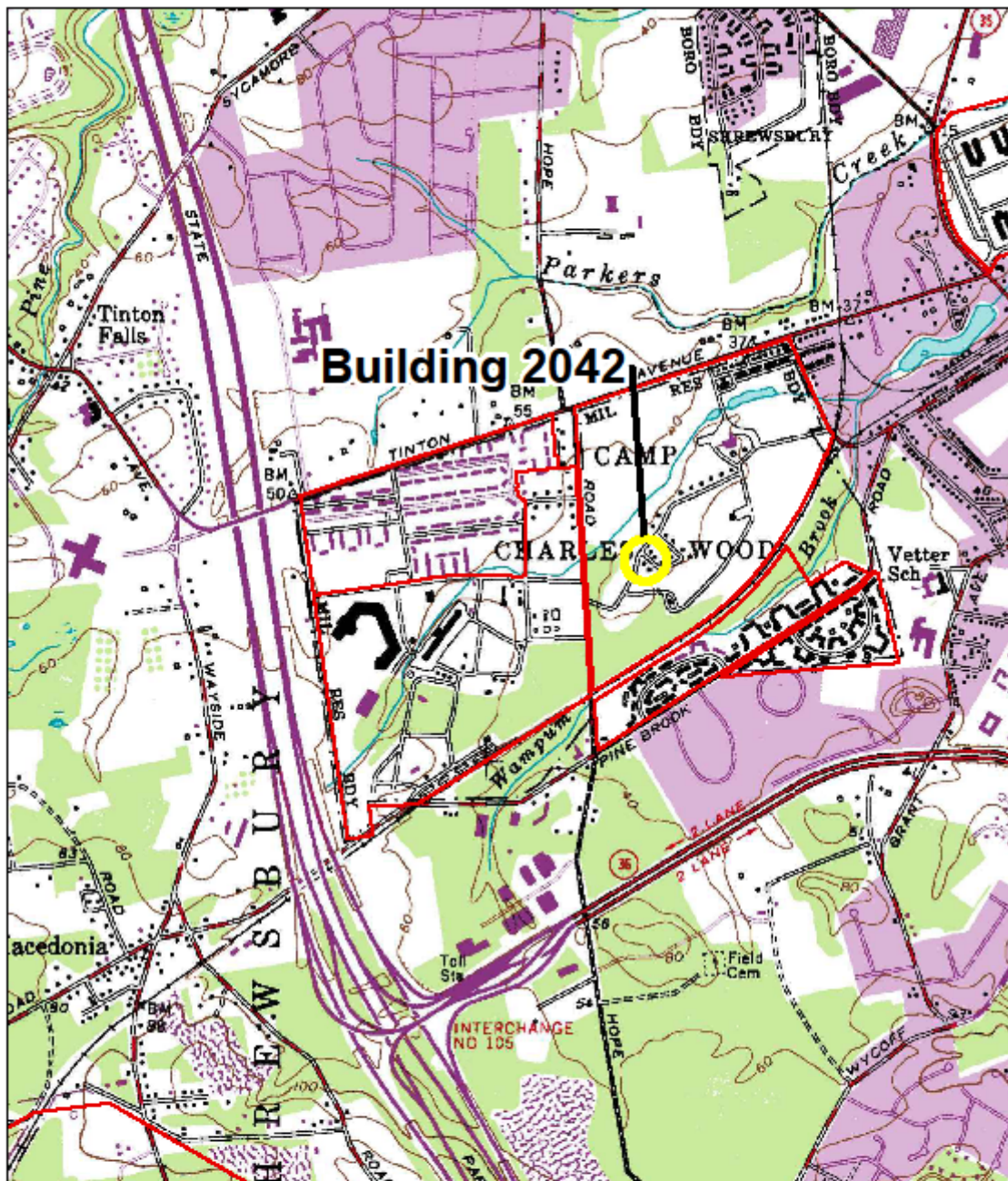
#### 3.2 CONCLUSIONS AND RECOMMENDATIONS

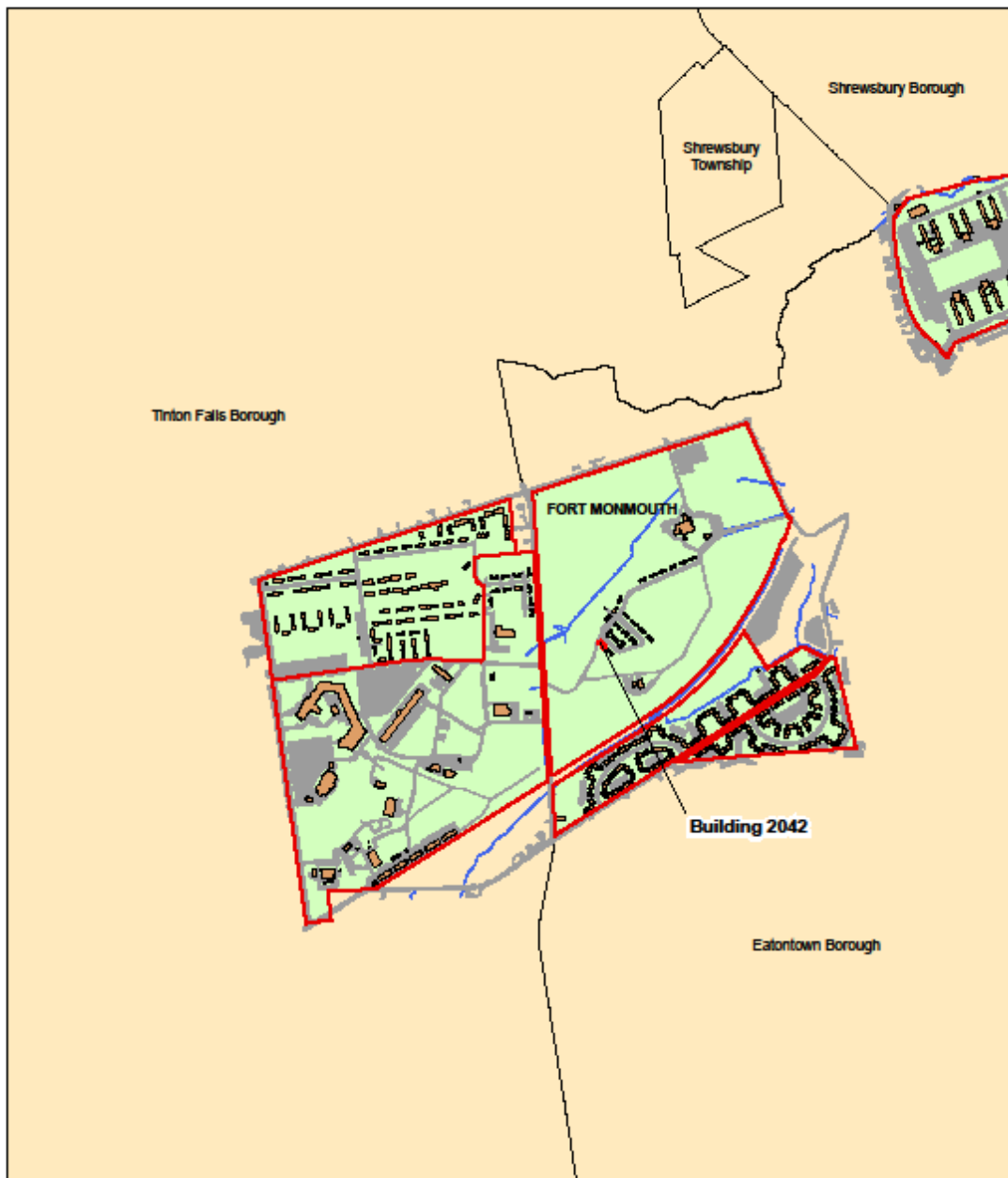
The analytical results for all of closure soil samples collected from the UST closure excavation at UST No.: 192486-23 were Not Detected for total petroleum hydrocarbons.

Based on the closure soil sampling results, soils with TPH concentrations exceeding the NJDEP soil cleanup criterion for total organic contaminants of 10,000 mg/kg are not present in the location of former UST No.: 192486-23.

**No Further Action** is proposed in regard to the closure and site investigation of UST No.: 192486-23 at Building 2042.

# FIGURES



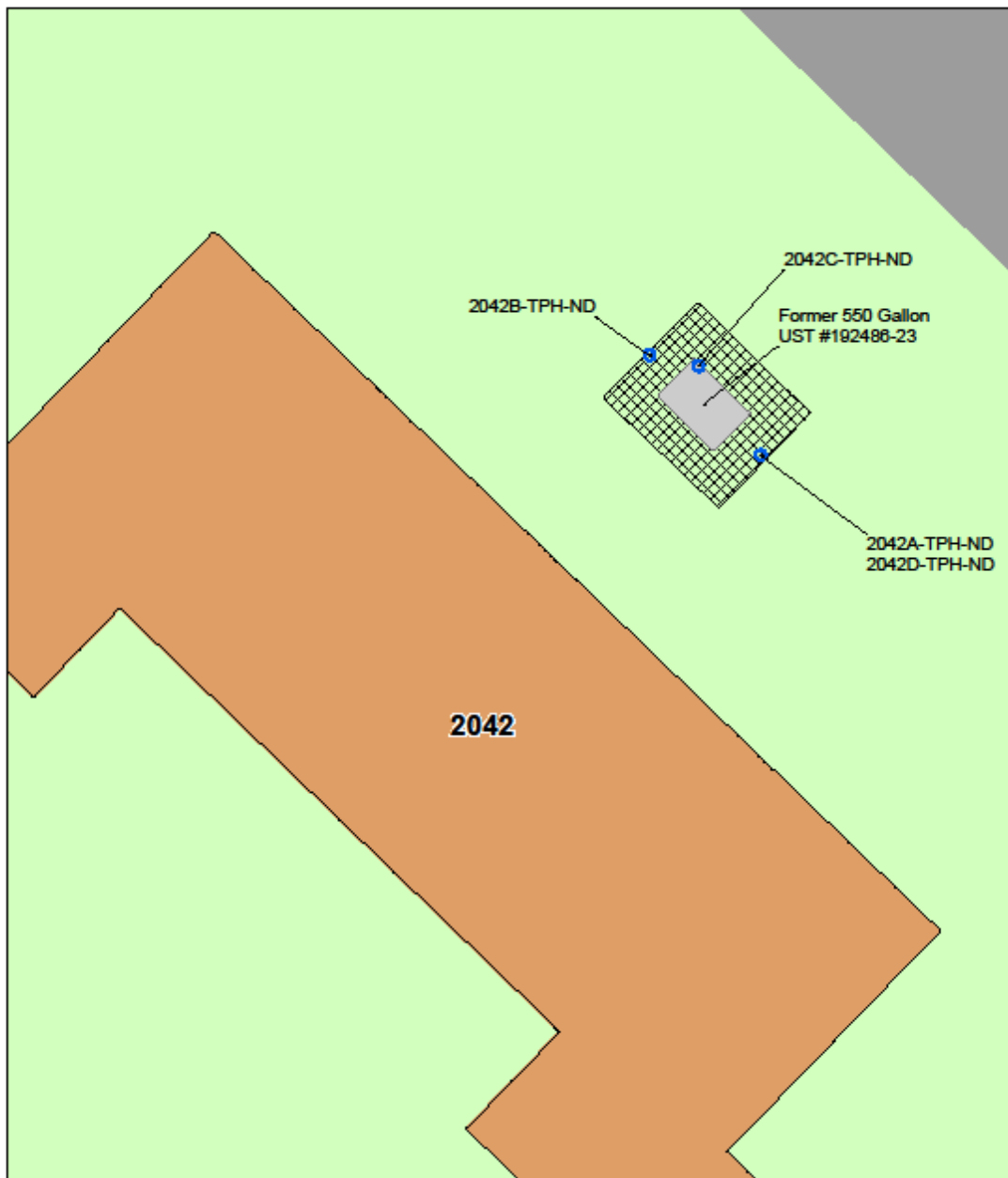


**Figure 2**  
 Location Map  
 Building 2042, Charles Wood Area  
 Fort Monmouth, NJ  
 Date: 1/2011  
 UST Registration # 192486-23  
 UST Discharge # NA



FODD  
 All drawings must be field verified.  
 Environmental Division, Directorate of Public Works, Fort Monmouth, New Jersey





**Legend**  
 [Grey Box] UST  
 [Grid Box] UST Excavation Limits  
 [Blue Dot] Soil Sample - 4/7/2000

10 5 0 10 Feet



**Figure 3**  
 Soil Sampling Location Map  
 Building 2042, Charles Wood Area  
 Fort Monmouth, NJ  
 Date: 1/2011  
 UST Registration # 192486-23  
 UST Discharge # NA



*All drawings must be field verified.*  
 Environmental Division, Directorate of Public Works, Fort Monmouth, New Jersey

# TABLES

# **TABLE 1**

## **SUMMARY OF LABORATORY ANALYSIS** **FT. MONMOUTH, BUILDING 2042, UST No.: 192486-23** **07 April 2000**

| <b>SAMPLE<br/>ID</b>        | <b>LABORATORY<br/>SAMPLE ID</b> | <b>SAMPLE<br/>DATE</b> | <b>SAMPLE<br/>MATRIX</b> | <b>ANALYTICAL<br/>PARAMETER</b> | <b>ANALYTICAL<br/>METHOD</b> |
|-----------------------------|---------------------------------|------------------------|--------------------------|---------------------------------|------------------------------|
| <b>2042-A</b>               | 5322.01                         | 07-Apr-00              | SOIL                     | TPH                             | OQA-QAM-25                   |
| <b>2042-B</b>               | 5322.02                         | 07-Apr-00              | SOIL                     | TPH                             | OQA-QAM-25                   |
| <b>2042-C</b>               | 5322.03                         | 07-Apr-00              | SOIL                     | TPH                             | OQA-QAM-25                   |
| <b>2042-D<br/>Duplicate</b> | 5322.04                         | 07-Apr-00              | SOIL                     | TPH                             | OQA-QAM-25                   |

### ABBREVIATIONS:

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

## **TABLE 2**

### **SUMMARY OF LABORATORY ANALYTICAL RESULTS**

FT. MONMOUTH, BUILDING 2042, UST No.: 192486-23

07 April 2000

#### **TOTAL PETROLEUM HYDROCARBONS**

| <b>SAMPLE ID</b>            | <b>LABORATORY<br/>SAMPLE ID</b> | <b>SAMPLE LOCATION</b> | <b>SAMPLE<br/>DEPTH</b> | <b>MATRIX</b> | <b>TPH<br/>RESULT S</b> |
|-----------------------------|---------------------------------|------------------------|-------------------------|---------------|-------------------------|
|                             |                                 |                        | <b>(in feet)</b>        |               | <b>mg/kg</b>            |
| <b>2042-A</b>               | 5322.01                         | SOUTH END              | 7.0-7.5                 | Soil          | ND                      |
| <b>2042-B</b>               | 5322.02                         | NORTH END              | 7.0-7.5                 | Soil          | ND                      |
| <b>2042-C</b>               | 5322.03                         | PIPING                 | 2.0-2.5                 | Soil          | ND                      |
| <b>2042-D<br/>Duplicate</b> | 5322.04                         | DUPLICATE-SOUTH END    | 7.0-7.5                 | Soil          | ND                      |

**ABBREVIATIONS:**

mg/kg = Milligrams Per Kilogram = parts per million

ND = Compound Not Detected

**Gray shading** indicates exceedance of NJDEP health based criterion of 10,000 ppm total organic contaminants

# **APPENDIX A**

## **CERTIFICATIONS**

**(NOT AVAILABLE)**

## **APPENDIX B**

### **UST DISPOSAL CERTIFICATE**

**DIRECTORATE OF PUBLIC WORKS  
FORT MONMOUTH, NEW JERSEY 07703**

Contract Management Division

SUBJECT: PWS-007, Residential UST Removal  
Contractor: TVS Inc.

RE: Backfilling of excavation,

BUILDING #: 2042(59+61 MEHILL CIRCLE)

TVS Inc.  
Field Supervisor, PWS-007  
ATTN: Brian Finch  
Building 166  
Fort Monmouth, New Jersey 07703-5000

Dear Mr. Finch:

The above referenced area has been sampled and analyzed as described in the NJDEP Regulations. The results indicate levels of petroleum contamination below the NJDEP allowable limits ~~or that the site requires further investigation outside the scope of this contract.~~ The contractor may proceed with the backfilling of the excavation with stone to groundwater and clean fill to grade as required in the above referenced contract specification.

Regards,



Mr. Dinker Desai  
Environmental Engineer  
Directorate of Public Works

CC: UST file copy

Directorate of Public Works

Date: 30 January, 2001

Marpal Disposal Company, Inc.  
P.O. Box 188  
Lincroft, New Jersey 07738

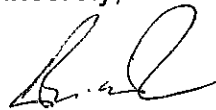
Re: Non-Hazardous Waste Disposal  
Contract No. DAAB07-96-C-8252  
Location: Bldg. 166, rear  
Roll-off container No. 2798  
Size: 30 cubic yards  
USTs from Bldgs: 226(2K), 227(2K), 228(2K), 2038(.5K), 2039(.5K), 2040(.5K),  
2041(.5K), 2042(.5K), McGuire AFB 1507(2.5K)

Dear Sirs:

I certify that the above referenced 30 cubic yard roll-off container provided by Marpal, Inc. contains only crushed fiberglass underground storage tanks removed from residential buildings at Fort Monmouth, NJ, and one from McGuire Air Force Base. The tanks held only No. 2 heating oil. The tanks were cleaned in accordance with acceptable industry standards and NJDEP protocol and then crushed. No free liquids are present in the container.

If you should require any additional information or help at this time, please contact Mr. Dinker Desai, Environmental Protection Specialist. He can be reached at the following telephone number: (732) 532-1475.

Sincerely,



Dinker Desai  
Environmental Protection Specialist

Attachments: None



## **APPENDIX C**

# **PHOTO DOCUMENTATION**

**(NOT AVAILABLE)**

## **APPENDIX D**

# **SOIL ANALYTICAL DATA PACKAGE**

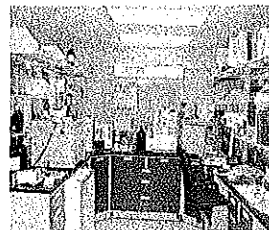
# FORT MONMOUTH ENVIRONMENTAL TESTING LABORATORY

DIRECTORATE OF PUBLIC WORKS

PHONE: (732) 532-6224 FAX: (732) 532-6263

WET-CHEM - METALS - ORGANICS - FIELD SAMPLING

CERTIFICATIONS: NJDEP #13461, NYSDOH #11699



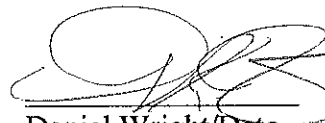
ANALYTICAL DATA REPORT  
Fort Monmouth Environmental Laboratory  
ENVIRONMENTAL DIVISION  
Fort Monmouth, New Jersey  
PROJECT: IJO# 100004

## Bldg. 2042

| Field Sample Location     | Laboratory<br>Sample ID# | Matrix   | Date and Time<br>of Collection | Date Received |
|---------------------------|--------------------------|----------|--------------------------------|---------------|
| 2042-A South End 7.0-7.5' | 5322.01                  | Soil     | 07-Apr-00 13:40                | 04/07/00      |
| 2042-B North End 7.0-7.5' | 5322.02                  | Soil     | 07-Apr-00 14:10                | 04/07/00      |
| 2042-C Piping 2-2.5'      | 5322.03                  | Soil     | 07-Apr-00 13:55                | 04/07/00      |
| 2042-D Duplicate 7.0-7.5' | 5322.04                  | Soil     | 07-Apr-00 13:40                | 04/07/00      |
| Trip Blank                | 5322.05                  | Methanol | 07-Apr-00                      | 04/07/00      |

ANALYSIS:  
FORT MONMOUTH ENVIRONMENTAL LAB  
TPHC, %SOLIDS

ENCLOSURE:  
CHAIN OF CUSTODY  
RESULTS

  
Daniel Wright/Date  
Laboratory Director

4-20-00

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## Method Summary

### NJDEP Method OQA-QAM-025-10/97

#### Gas Chromatographic Determination of Total Petroleum Hydrocarbons in Soil

Fifteen grams (15g)(wet weight) of a soil sample is added to a 125 mL acid cleaned, solvent rinsed, capped Erlenmeyer flask. 15g anhydrous sodium sulfate is added to dry sample. Surrogate standard spiking solution is then added to the flask.

Twenty five milliliters(25mL) Methylene Chloride is added to the flask and it is secured on a orbital shaker table. The agitation rate is set to 400rpm and the sample is shaken for 30 minutes. The flask is the removed from the table and the particulate matter is allowed to settle. The extract is transferred to a Teflon capped vial. A second 25mL of Methylene Chloride is added to the flask and shaken for an additional 30 minutes. The flask is again removed and allowed to settle. The extracts are combined in the vial then transferred to a 1mL autosampler vial.

The extract is then injected directly into a GC-FID for analysis. The sample is analyzed for petroleum hydrocarbons covering a range of C8-C42 including pristane and phytane. Total Petroleum Hydrocarbon concentration is determined by integrating between 5 minutes and 22 minutes. The baseline is established by starting the integration after the end of the solvent peak and stopping after the last peak.

The final concentration of Total Petroleum Hydrocarbons is calculated using percent solid, sample weight and concentration.

## TPHC Conformance/Non-conformance Summary Report

Indicate  
Yes, No, N/A

1. Method Detection Limits provided.
2. Method Blank Contamination – If yes, list the sample and the corresponding concentrations in each blank.  
\_\_\_\_\_  
\_\_\_\_\_
3. Matrix Spike Results Summary Meet Criteria  
(If not met, list the sample and corresponding recovery which falls outside the acceptable range).  
\_\_\_\_\_  
\_\_\_\_\_
4. Duplicate Results Summary Meet Criteria  
(If not met, list the sample and corresponding recovery which falls outside the acceptable range).  
\_\_\_\_\_  
\_\_\_\_\_
5. IR Spectra submitted for standards, blanks and samples.
6. Chromatograms submitted for standards, blanks and samples if GC fingerprinting was conducted.
7. Analysis holding time met.  
(If not met, list number of days exceeded for each sample).  
\_\_\_\_\_  
\_\_\_\_\_

Yes

No

Yes

Yes

NA

Yes

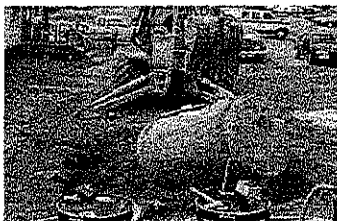
Yes

Additional comments: \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

  
\_\_\_\_\_  
Laboratory Manager

4-20-00  
\_\_\_\_\_  
Date

000002



# Fort Monmouth Environmental Testing Laboratory

Bldg. 173, SELFM-PW-EV, Fort Monmouth, NJ 07703

Tel (732)532-4359 Fax (732)532-6263 EMail:wrightd@mail1.monmouth.army.mil

NJDEP Certification #13461 / NYDOH Certification #11699

## Chain of Custody Record

|                                                                                                                                                  |                   |                               |        |                                             |                                     |                                                                 |                                                        |                     |          |             |          |                       |                               |
|--------------------------------------------------------------------------------------------------------------------------------------------------|-------------------|-------------------------------|--------|---------------------------------------------|-------------------------------------|-----------------------------------------------------------------|--------------------------------------------------------|---------------------|----------|-------------|----------|-----------------------|-------------------------------|
| Customer: Dinker Desai                                                                                                                           |                   |                               |        |                                             | Project No: 100004                  |                                                                 |                                                        | Analysis Parameters |          |             |          | * = Samples Kept <4°C |                               |
| Phone #: X21475                                                                                                                                  |                   |                               |        |                                             | Location: <u>BLDG. 2042 (59+61)</u> |                                                                 |                                                        | TPHC                | % SOLIDS | *<br>VOA+10 | VOA ID # |                       | PID Reading                   |
| ( ) DERA (X) OMA UST Assessment                                                                                                                  |                   |                               |        |                                             | UST# <u>192486-23 METILL CR</u>     |                                                                 |                                                        |                     |          |             |          |                       |                               |
| Samplers Name / Company : Frank Accorsi/TVS                                                                                                      |                   |                               |        |                                             | Sample                              | #                                                               |                                                        |                     |          |             |          |                       | Remarks / Preservation Method |
| Lab Sample I.D.                                                                                                                                  | Sample Location   | Depth (ft)                    | Date   | Time                                        | Type                                | Bottles                                                         |                                                        |                     |          |             |          |                       |                               |
| 5322 01                                                                                                                                          | 2042-A SOUTH END  | 7.0-7.5                       | 4-7-00 | 1340                                        | SOIL                                | 2                                                               | X                                                      | X                   | X        | 1452        | 0        | ICE                   |                               |
| 02                                                                                                                                               | 2042-B NORTH END  | 7.0-7.5                       |        | 1410                                        |                                     | 2                                                               | X                                                      | X                   | X        | 1453        | 0        |                       |                               |
| 03                                                                                                                                               | 2042-C, PIPING    | 2-2.5                         |        | 1355                                        |                                     | 2                                                               | X                                                      | X                   | X        | 1454        | 0        |                       |                               |
| 04                                                                                                                                               | 2042-D, DUPLICATE | 7.0-7.5                       |        | 1340                                        |                                     | 2                                                               | X                                                      | X                   | X        | 1455        | 0        |                       |                               |
| 05                                                                                                                                               | TRIP BLANK        | —                             |        | —                                           | AQ                                  | 1                                                               |                                                        |                     | X        | 1456        | —        |                       |                               |
| OVM sn#580U-64455.343 was calibrated with zero air & w/ <u>245</u> ppm Isobutylene read <u>245</u> ppm. <u>1010 9-6-00</u> (time/date & initial) |                   |                               |        |                                             |                                     |                                                                 |                                                        |                     |          |             |          |                       |                               |
| Relinquished by (signature): <u>Frank Accorsi</u>                                                                                                |                   | Date/Time: <u>4-7-00 1500</u> |        | Received by (signature): <u>[Signature]</u> |                                     | Comments: * VOA+10 ON 25% > 1,000 PPM TPH, ON HIGHEST, MIN. ONE |                                                        |                     |          |             |          |                       |                               |
| Relinquished by (signature):                                                                                                                     |                   | Date/Time:                    |        | Received by (signature):                    |                                     |                                                                 |                                                        |                     |          |             |          |                       |                               |
| Report Type: ( ) Full, (X) Reduced, ( ) Standard, ( ) Screen / non-certified, ( ) EDD                                                            |                   |                               |        |                                             |                                     |                                                                 | Remarks: Dedicated Sampling Tools Used                 |                     |          |             |          |                       |                               |
| Turnaround time: ( ) Standard 2 wks, (X) Rush <u>2</u> Days, ( ) ASAP Verbal _____ Hrs.                                                          |                   |                               |        |                                             |                                     |                                                                 | All sample points have been GPS? (X) YES ( ) NO ( ) NA |                     |          |             |          |                       |                               |

Dante Castrogiate 4.10.2000  
Extracted

**Report of Analysis**  
**U.S.Army, Fort Monmouth Environmental Laboratory**  
**NJDEP Certification # 13461**

**Client :** U.S. Army  
 DPW. SELFM-PW-EV  
 Bldg. 173  
 Ft. Monmouth, NJ 07703

**Project # :** 5322  
**Location :** Bldg.2042  
**UST Reg. # :** 192486-23

**Analysis :** OQA-QAM-025  
**Matrix :** Soil  
**Inst. ID. :** GC TPHC INST. #1  
**Column Type :** RTX-5, 0.32mm ID, 30M  
**Injection Volume :** 1uL

**Date Received :** 07-Apr-00  
**Date Extracted :** 10-Apr-00  
**Extraction Method :** Shake  
**Analysis Complete :** 12-Apr-00  
**Analyst :** B.Patel

| Sample       | Field ID | Dilution Factor | Weight (g) | % Solid | MDL (mg/kg) | TPHC Result (mg/kg) |
|--------------|----------|-----------------|------------|---------|-------------|---------------------|
| 5322.01      | 2042-A   | 1.00            | 15.07      | 90.39   | 173         | ND                  |
| 5322.02      | 2042-B   | 1.00            | 15.08      | 91.14   | 171         | ND                  |
| 5322.03      | 2042-C   | 1.00            | 15.24      | 85.70   | 180         | ND                  |
| 5322.04      | 2042-D   | 1.00            | 15.04      | 90.71   | 172         | ND                  |
|              |          |                 |            |         |             |                     |
|              |          |                 |            |         |             |                     |
|              |          |                 |            |         |             |                     |
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|              |          |                 |            |         |             |                     |
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|              |          |                 |            |         |             |                     |
|              |          |                 |            |         |             |                     |
|              |          |                 |            |         |             |                     |
|              |          |                 |            |         |             |                     |
| METHOD BLANK | TBLK375  | 1.00            | 15.00      | 100.00  | 157         | ND                  |

ND = Not Detected  
 MDL = Method Detection Limit



## LABORATORY DELIVERABLES CHECKLIST AND NON-CONFORMANCE SUMMARY

THIS FORM MUST BE COMPLETED BY THE LABORATORY OR ENVIRONMENTAL CONSULTANT  
AND ACCOMPANY ALL DATA SUBMISSIONS

The following Laboratory Deliverables checklist and Non-Conformance Summary shall be included in the data submission. All deviations from the accepted methodology and procedures, of performance values outside acceptable ranges shall be summarized in the Non-Conformance Summary. The Technical Requirements for Site Remediation, effective June 7, 1993, provides further details. The document shall be bound and paginated, contain a table of contents, and all pages shall be legible. Incomplete packages will be returned or held without review until the data package is completed.

It is recommended that the analytical results summary sheets listing all targeted and non-targeted compounds with the method detection limits, practical quantitation limits, and the laboratory and/or sample numbers be included in one section of the data package and in the main body of the report.

- |                                                                                                              |                                     |
|--------------------------------------------------------------------------------------------------------------|-------------------------------------|
| 1. Cover page, Title Page listing Lab Certification #, facility name and address, & date of report submitted | <input checked="" type="checkbox"/> |
| 2. Table of Contents submitted                                                                               | <input checked="" type="checkbox"/> |
| 3. Summary Sheets listing analytical results for all targeted and non-targeted compounds submitted           | <input checked="" type="checkbox"/> |
| 4. Document paginated and legible                                                                            | <input checked="" type="checkbox"/> |
| 5. Chain of Custody submitted                                                                                | <input checked="" type="checkbox"/> |
| 6. Samples submitted to lab within 48 hours of sample collection                                             | <input checked="" type="checkbox"/> |
| 7. Methodology Summary submitted                                                                             | <input checked="" type="checkbox"/> |
| 8. Laboratory Chronicle and Holding Time Check submitted                                                     | <input checked="" type="checkbox"/> |
| 9. Results submitted on a dry weight basis                                                                   | <input checked="" type="checkbox"/> |
| 10. Method Detection Limits submitted                                                                        | <input checked="" type="checkbox"/> |
| 11. Lab certified by NJDEP for parameters of appropriate category of parameters or a member of the USEPA CLP | <input checked="" type="checkbox"/> |

Laboratory Manager or Environmental Consultant's Signature \_\_\_\_\_  
Date 4/20/00

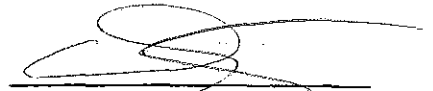
Laboratory Certification #13461

\*Refer to NJAC 7:26E - Appendix A, Section IV - Reduced Data Deliverables - Non-USEPA/CLP  
Methods for further guidance.

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## **Laboratory Authentication Statement**

I certify under penalty of law, where applicable, that this laboratory meets the Laboratory Performance Standards and Quality Control requirements specified in N.J.A.C. 7:18 and 40 CFR Part 136 for Water and Wastewater Analyses and SW-846 for Solid Waste Analysis. I have personally examined the information contained in this report and to the best of my knowledge, I believe that the submitted information is true, accurate, complete and meets the above referenced standards where applicable. I am aware that there are significant penalties for purposefully submitting falsified information, including the possibility of a fine and imprisonment.



Daniel K. Wright  
Laboratory Manager