United States Army
Fort Monmouth, New Jersey

M-8 Landfill (FTMM-08)
Remedial Investigation of Landfill Cover Requirements

U.S. Army Garrison Fort Monmouth, Main Post
Fort Monmouth, New Jersey

Prepared by

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M-8 LANDFILL (FTMM-08)
REMEDIAL INVESTIGATION OF LANDFILL COVER REQUIREMENTS

U.S. ARMY GARRISON FORT MONMOUTH, MAIN POST
FORT MONMOUTH, NEW JERSEY

1.0 PURPOSE

This study was prepared in order to propose meaningful action needed to achieve closure of the historic M-8 Landfill. This study incorporates data concerning the redefined landfill area, depth of landfill cover, and the type and degree of contamination present as it relates to current applicable New Jersey Department of Environmental Protection (NJDEP) Soil Remediation Standards (SRS). The study concludes with a proposal for final remedial action.

The majority of information summarized in this report was obtained from the *Remedial Investigation Report (RIR) for Near Surface Soils – M-8 Landfill Site, Fort Monmouth, New Jersey*, prepared by Versar, Inc. (Versar), dated March 16, 2004. The RIR summarizes a Remedial Investigation (RI) performed from November 1998 to June 1999 at the landfill. The Versar RIR is provided in Exhibit I. Additional information in this report was provided by representatives of Fort Monmouth (Fort).

Data from the 1998/1999 RI presented in Versar's RIR were compared to the NJDEP's Residential Direct Contact Soil Cleanup Criteria (RDCSCC) in effect at that time. These data are summarized in this report as compared to the Nonresidential Direct Contact Soil Remediation Standards (NRDCSRS) due to the 2008 adoption of the SRS and the acknowledgement of the Fort that the landfill will be deed-restricted for nonresidential uses.

2.0 SITE LOCATION AND DESCRIPTION

The M-8 Landfill was a former historic fill site located north of Buildings T-692 and S-697 and south of and adjacent to Parkers Creek on the Main Post. The historic fill reportedly contained domestic and industrial wastes. The approximate size of the M-8 Landfill Site area is 315,000 square feet (7.2 acres). It is estimated that the landfill was in use from approximately 1962 to 1981.

The landfill is located on the south side and adjacent to Parkers Creek, an eastward flowing tributary of the Shrewsbury River. The USGS topographic map (Figure 1) shows that the land surface of the site is nearly horizontal at an elevation of less than 20 feet above mean sea level (amsl). Surface water runoff from the landfill likely flows northward into Parkers Creek. In 2010, a stream bank stabilization program was completed. Figures 2, 3, 4 and 5 show the areas of work completed.

The landfill boundaries were determined through the 1998/1999 RI, a prior review of aerial photographs of the Main Post from 1940 to 1974, and a study conducted in 2009 which consisted of performing trenches and soil borings. (See Section 7.0.) The 2009 investigation was undertaken in order to precisely delineate the perimeter of the landfill. That effort involved performing trenches and/or soil borings at or near the southern and eastern boundaries of the triangular-shaped known landfill. The trenches performed in the southwestern portion/corner of the landfill identified debris and, therefore, did not define the boundary limits in that location. It should be noted, however, that this portion of the landfill is adjacent to the northern boundary of landfill. The northwestern and northeastern boundaries of the M-8 Landfill are Parkers Creek; therefore, delineation trenches were not needed along these boundaries.

3.0 AERIAL PHOTOGRAPH REVIEW – FORT MONMOUTH (1940-1974)

In order to define the limits of the Fort landfills and obtain a better understanding of landfill dates of operation, a review of aerial photographs was performed by Fort representatives. Photographs dated 1940, 1947, 1957, 1963, 1969 and 1974 were reviewed and are summarized below. Copies of these aerial photographs are provided in Exhibit II.

Location Map - Long Branch, New Jersey Quadrangle
A Location Map depicting the boundary of the Post at the Fort shows that the Main Post is divided by Oceanport Avenue, which runs through the eastern side of the Main Post. The adjacent municipalities include the Borough of Shrewsbury to the north, the Borough of Eatontown to the south, the City of Long Branch to the southeast, the Borough of Oceanport to the east, and the Borough of Tinton Falls to the west. Both Parkers Creek and Oceanport Creek surround the northeastern boundary of the Post. No aerial photographs were available prior to 1940.

May 10, 1940 Aerial Photograph
The land uses for the subject property in 1940 consist of numerous buildings, baseball fields, a golf course, a debris/rubble fill area, and an extraction area. All of the buildings are concentrated on the eastern side of the Main Post toward Oceanport Avenue. Two railroads are present. The first railroad is adjacent to the Oceanport Avenue section of the Main Post. The second railroad enters the Main Post boundary through the southeast from Oceanport Avenue and ends to the south of the Building 114 Field House. Discernible buildings include the Gosselin Avenue and 200 area residential housing quarters, Administrative Building 286, and the soldiers' barracks at Barker Circle. The adjacent area to the Post boundary shows a mix of open space and residential neighborhoods.

September 19, 1947 Aerial Photograph
The land use for the subject property in 1947 reveals the construction of numerous new buildings. Development of the area now spans west from the Oceanport Avenue section ending at the golf course area off of Sherrill Avenue. Both original baseball fields are no longer visible; however, there is a new field in the open space in front of Building 286. A fill area is pictured off of Sherrill Avenue, which appears to be the M-8 Landfill, and an additional fill area/open storage is pictured neighboring the railroad tracks adjacent to the Oceanport Avenue section. A supplementary open storage area is pictured off of Riverside Avenue where Buildings 173 and 174 exist today. A fill area is pictured stretching from the southeastern tip of the Main Post boundary, across the railroad, and ends in the 900 area.

May 2, 1957 Aerial Photograph
The land uses for the subject property in 1957 reveal additional buildings constructed on the eastern side of the Main Post near the Main Gate as well as an oval running track toward the center of the southern portion of the Main Post. An incinerator is depicted in the southeastern corner of the Main Post boundary off of Main Street in the Borough of Oceanport.

The M-3, M-4, M-8, and M-8 Landfills are clearly visible on the northeastern portion of the Main Post. In addition, the M-12 and M-14 Landfills are clearly visible toward the center of the Main Post. A small probable magazine area is noted and located slightly to the north of the current M-2 Landfill on the southwestern section of the Main Post. The surrounding area appears to be more developed, with less open space and additional residential housing.

May 13, 1963 Aerial Photograph
The land use for the subject property in 1963 shows minor changes from the 1957 aerial photograph. The M-2 Landfill is now clearly discernible and marked as a possible landfill. The baseball field in the open area to the west of Building 286 was removed and replaced by Building 500. The small buildings on the northeastern side of the Main Post adjacent to Oceanport Avenue have been removed and have not been replaced.

May 13, 1963 Aerial Photograph (M-3, M-8 and M-8 Landfills)
Changes in this aerial photograph are primarily in the M-3, M-4, M-8 and M-8 Landfills which consolidate all of the landfills into one area labeled "Site 1." There is an L-shaped dividing wall on what appears to be the border of the M-5 and M-8 Landfills. Possible debris/rubble and a light-toned surface are both noted in the northwestern portion of the M-8 Landfill. The M-2 Landfill is labeled as "Site 2 Poss Landfill" and appears to be fully delineated. A small fill area is depicted behind the Gosselin Avenue housing area within the vicinity of the current M-14 Landfill.

December 6, 1969 Aerial Photograph
The land uses for the subject property in 1969 show several new buildings which still remain today (the theater [Building 1215], bowling alley [Building 689], and Buildings 361, 362, and 363). The "Site 1" area comprising the M-3, M-4, M-8, and M-8 Landfills shows a defined boundary for the M-8 Landfill and is now labeled as a landfill. Numerous new fill areas have been noted; the first is located within a small area of the current M-18 landfill, an additional fill area in the western portion of the M-12 Landfill, and a small fill area located to the south of the 750 area. A tank cluster is identified behind the Building 116 warehouse on the Oceanport Avenue section of the Main Post.

March 13, 1974 Aerial Photograph
The land use for the subject property in 1974 reveals minor changes. The 1974 aerial photograph depicts the Post from the M-2 and M-3 Landfills to the Oceanport Avenue area. The M-2, M-3, M-8, M-18, and M-12 Landfills appear to be undisturbed and vegetated. The M-8 Landfill appears to still be active.

March 13, 1974 – M-8 Landfill Aerial Photograph
The land use for the subject property in 1974 focuses primarily on the M-8 Landfill. The landfill appears to be active. Both a crane and bulldozer are located on site. In addition, rubble, debris areas, and two burning stalls are visible.

4.0 PROJECT HISTORY CHRONOLOGY

- ✓ **December 1995** – The Fort Monmouth Directorate of Public Works (DPW) submitted the Roy F. Weston, Inc. (Weston) report entitled *Site Investigation* (SI), *Fort Monmouth, New Jersey, Main Post and Charles Wood Areas, Site Investigation Report* (SIR), December 1995 to the NJDEP, a copy of which is included in the Versar RIR (Exhibit I).

- ✓ **April 1996** – The NJDEP returned comments regarding the Weston SIR which stated the following regarding the landfills: "All Base landfills must comply with the New Jersey Solid Waste Management Act, N.J.A.C. 7:26-2A, et seq. If the Fort is able to document that appropriate solid waste closure procedures were followed, no additional action is required other than the NJDEP-approved long-term monitoring. However, if approved closure was not performed at the landfills, it is recommended that a minimum cover of one foot be extended over all areas of documented disposal activities. Also, approximate boundaries must be established and annotated in the Declaration of Environmental Restriction." A copy of the NJDEP correspondence is provided in Exhibit III.

- ✓ **February 24, 1997** – The Fort DPW issued correspondence stating that the "DPW is unable to document that the former landfill sites located on the Main Post of Fort Monmouth have been closed in accordance with N.J.A.C. 7:26-2A, et seq. Each of the referenced areas was covered with suitable fill material at the time of closure. All seven sites have been closed for at least 17 years and have naturally vegetated over this time period. In order to bring this issue to proper closure, the DPW proposed the collection of surface soil samples from each of the seven landfills to document that the existing cover material does not contain contaminant levels above the applicable regulatory criteria and/or establish background levels. Samples were collected in accordance with the requirements set forth in N.J.A.C. 7:26E, et seq. and the NJDEP *Field Sampling Procedures Manual* and were analyzed for TCL+30 parameters and Target Analyte List (TAL) Metals." A copy of the Fort DPW correspondence is provided in Exhibit III.

- ✓ **July 7, 1998** – The Fort DPW issued correspondence to the NJDEP which proposed a method to demonstrate compliance equivalence of the existing soil cover over the M-8 Landfill with regard to the Solid Waste Disposal Act of 1965. The demonstration would be accomplished by characterizing the near surface soils. A copy of the Fort correspondence is provided in Exhibit III.

- ✓ **August 10, 1998** - The aforementioned DPW proposal was approved by the NJDEP. A copy of the NJDEP correspondence is provided in Exhibit III.

- ✓ **November 1998 through June 1999** – A total of 292 borings were installed at strategic locations over the site. All soil samples from the borings were analyzed for Target Compound List (TCL) organics plus 30 parameters and TAL metals. Data exceeding the laboratory method detection limit (MDL) and/or NJDEP RDCSCC are presented in that report. Laboratory analytical data and soil boring data were provided in the Versar RIR.

  Additionally, the data were evaluated utilizing the "compliance averaging" approach to determine compliance with NJDEP RDCSCC for certain individual contaminants. *Note that compliance averaging was not able to demonstrate compliance for all applicable contaminants and in consideration of the fact that an engineering control (i.e., capping) and institutional control (Deed Notice) are required to properly close the landfill as per NJDEP requirements; compliance averaging is not considered viable and was not further pursued herein.*

5.0 REMEDIAL INVESTIGATION (RI) SITE ACTIVITIES – NOVEMBER 1998 TO JUNE 1999

As discussed above, RI activities were performed from November 1998 to June 1999. The study was conducted in accordance with the NJDEP's *Technical Requirements for Site Remediation* [New Jersey Administrative Code (N.J.A.C.) 7:26E] to characterize soil and assess potential risks to human health and the environment. The RI activities included the collection of near surface soils at the M-8 Landfill at 292 borings (B01 through B250 and B1A through B42PP). A total of 500 soil samples were collected from the borings. Soil sample depths were chosen to minimize recent soil disturbances. Each of the soil samples, except those prepared for volatile organic compound (VOC) analyses, was taken between approximately 0 to 12 inches below ground surface (bgs). (VOC samples were taken from 18 to 24 inches bgs because surface soils would not be expected to retain such volatiles with time.) The soil boring locations were located in the M-8 Landfill as identified in the 1995 Weston SI. The locations of the borings were established in a gridlike pattern within the previously designated boundaries of the M-8 Landfill.

6.0 LABORATORY ANALYTCAL RESULTS

Laboratory analyses of the samples collected at the M-8 Landfill were conducted at the Fort Monmouth Environmental Testing Laboratory (FMETL), New Jersey Certification No. 13461.

Summary: Following is a summary of the results presented in Versar's 2004 RIR. An evaluation is provided which includes a comparison to the current NJDEP NRDCSRS. Results as historically compared to the May 12, 1999 criteria are presented in Table 1 of Versar's RIR.

The analytical data were summarized by Fort representatives and presented in the following tables:

- Table 1 - Soil Sample Collection Summary;
- Table 2 - Soil Sampling Results Summary;
- Table 3 - Borings in which Detections exceeded NJDEP NRDCSRS; and
- Table 4 - Laboratory Analysis - Nonresidential Exceedance Summary.

Laboratory analytical data were also presented on plans/figures by representatives of the Fort. The figures provided are as follows:

- Figure 2 - All Exceedances Contaminant Map, M-8 Landfill (FTMM-08) – Main Post, Fort Monmouth, New Jersey. FOUO. December 10, 2010.
- Figure 3 - Metals Contaminant Map, M-8 Landfill (FTMM-08) – Main Post, Fort Monmouth, New Jersey. FOUO. December 10, 2010.
- Figure 4 - PCBs Contaminant Map, M-8 Landfill (FTMM-08) - Main Post, Fort Monmouth, New Jersey. FOUO. December 10, 2010.
- Figure 5 - Pesticides Contaminant Map, M-8 Landfill (FTMM-08) - Main Post, Fort Monmouth, New Jersey. FOUO. December 10, 2010.
- Figure 6 - SVOC (Semivolatile Organic Compound) Contaminant Map, M-8 Landfill (FTMM-08) - Main Post, Fort Monmouth, New Jersey. FOUO. December 10, 2010.
- Figure 7 – Delineation Trenching Location Map, M-8 Landfill (FTMM-08) – Main Post, Fort Monmouth, New Jersey. FOUO. June 24, 2010.

Volatile Organic Compounds (VOCs)

The VOC samples were collected from M-8 Landfill soils at a depth of 24 inches bgs. There were no exceedances of NJDEP NRDCSRS for VOCs from the 292 soil borings. It should be noted that some MDLs were identified exceeding the current applicable standards (NRDCSRS). Although strict compliance cannot be determined at these locations, these were previously reported as nondetectable (ND) and, therefore, would represent low level contamination if, in fact, contaminants were present.

Taget Analyte List (TAL) Metals
The soil samples from the 292 borings (Figure 3) were analyzed for 24 TAL metals. The samples were collected from depths of 0 to 12 inches.

A summary of the metals NJDEP regulatory exceedances is presented below.

- Arsenic was detected in 14 of the site soil samples at concentrations exceeding the NRDCSRS of 19 milligrams per kilogram (mg/kg). The exceedance concentrations ranged from 19.4 mg/kg (B168) to 9,580 mg/kg (B185).

- Lead was detected at concentrations exceeding the NRDCSRS of 800 mg/kg in 11 site soil samples. The exceedance concentrations ranged from 808 mg/kg (B137) to 5,050 mg/kg (B220).

- Thallium was detected at concentrations exceeding the NRDCSRS of 79 mg/kg in two site soil samples. The exceedance concentrations ranged from 86.9 mg/kg (B85) and 119 mg/kg (B86).

- Mercury was detected at concentrations exceeding the NRDCSRS of 65 mg/kg in one site soil sample (216 mg/kg at B198).

Polychlorinated Biphenyls (PCBs) and Pesticides
PCB and pesticides analyses were conducted on soil samples collected from the 292 borings at the M-8 Landfill (Figures 4 and 5). Each soil sample was collected at approximately the same depth range, 0 to 12 inches bgs. Each soil sample was analyzed for 19 pesticides and seven PCB compounds.

A summary of the PCBs and pesticides NJDEP regulatory exceedances is presented below.

- PCBs were detected in 11 of the site soil samples at concentrations exceeding the NRDCSRS of 1 mg/kg. The exceedance concentrations ranged from 3.27 mg/kg (B214) to 5,654.3 mg/kg (B164).

- Lindane was detected at concentration of 15.07 mg/kg (B117), which exceeds the NRDCSRS of 2 mg/kg.

- Heptachlor epoxide was detected at concentrations exceeding the NRDCSRS of 0.3 mg/kg in one site soil sample. The concentration was 0.48 mg/kg (B117).

- Heptachlor was detected at a concentration of 1.27 mg/kg (B117) which exceeds the NRDCSRS of 0.7 mg/kg.

Semivolatile Organic Compounds (SVOCs)
SVOC analyses were conducted on soil samples collected from the 292 soil borings at the M-8 Landfill (Figure 6). Each of these soil samples was collected at approximately the same depth range, six to 12 inches bgs.

A summary of the SVOC NJDEP regulatory exceedances is presented below.

- Benzidine was detected in five of the soil samples at concentrations exceeding the NRDCSRS of 0.7 mg/kg. The exceedance concentrations ranged from 5.8 mg/kg (B23) to 8.6 mg/kg (B28).

- Benzo(*a*)anthracene was detected in 19 soil samples at concentrations exceeding the NRDCSRS of 2 mg/kg. The exceedance concentrations ranged from 2.5 mg/kg (B18R) to 2,500 mg/kg (B144).

- Benzo(*a*)pyrene was detected in 137 soil samples at concentrations exceeding the NRDCSRS of 0.2 mg/kg. The exceedance concentrations ranged from 0.21 mg/kg (B48, B50, B101, B167, B217, B232) to 1,900 mg/kg (B144).

- Benzo(*b*)fluoranthene was detected in 18 soil samples at concentrations exceeding the NRDCSRS of 2 mg/kg. The exceedance concentrations ranged from 2.1 mg/kg (B18R, B115) to 1,600 mg/kg (B144).

- Benzo(*k*)fluoranthene was detected in four soil samples at concentrations exceeding the NRDCSRS of 23 mg/kg. The exceedance concentrations ranged from 50 mg/kg (B166) to 1,700 mg/kg (B144).

- Chrysene was detected in three soil samples at concentrations exceeding the NRDCSRS of 230 mg/kg. The exceedance concentrations ranged from 570 mg/kg (B145 Duplicate) to 3,800 mg/kg (B144).

- Dibenz(*a*,*h*)anthracene was detected in 18 soil samples at concentrations exceeding the NRDCSRS of 0.2 mg/kg. The exceedance concentrations ranged from 0.21 mg/kg (B97) to 12 mg/kg (B166).

- Hexachlorobenzene was detected in one site soil sample at a concentration of 2 mg/kg (B204) which exceeds the NRDCSRS of 1 mg/kg.

- Indeno(1,2,3-*cd*)pyrene was detected in 10 soil samples at concentrations exceeding the NRDCSRS of 2 mg/kg. The exceedance concentrations ranged from 2.1 mg/kg (B199) to 1,300 mg/kg (B144).

- Naphthalene was detected in four soil samples at concentrations exceeding the NRDCSRS of 17 mg/kg. The exceedance concentrations ranged from 21 mg/kg (B166) to 1,000 mg/kg (B144).

It should be noted that some MDLs were identified exceeding the current applicable standards (NRDCSRS). Although strict compliance cannot be determined at these locations, these were previously reported as ND and, therefore, would represent low level contamination if, in fact, contaminants were present.

Fort Monmouth Plans/Figures Summary

The contaminant exceedances noted above were presented by the Fort on the aforesaid five figures. A review of Figure 2 shows scattered exceedances of NJDEP NRDCSRS for SVOCs, metals, PCBs and Pesticides throughout the majority of the M-8 Landfill. Twenty-four of the 292 boring locations are marked as Order of Magnitude (OM) locations, exhibiting one or more exceedances of an applicable standard by more than a factor of 10.

Figure 3 shows the presence of arsenic, lead, thallium and mercury throughout the M-8 Landfill, with 14 exceedances of arsenic, 11 exceedances of lead, two exceedances of thallium, and one exceedance of mercury. The exceedances of metals are scattered throughout of the landfill. One of the boring locations (B185) is marked as an OM location.

Figure 4 shows the presence of PCBs in random locations at the site with 11 exceedances in the northwestern, eastern and southern portions of the M-8 Landfill. Five of the boring locations (B78, B87, B91, B153, B164) are marked as OCM locations.

Figure 5 shows the presence of pesticides throughout the M-8 Landfill, with one exceedance sample location (B117) in the eastern central portion of the landfill. This location is not an OM location.

Figure 6 shows 135 SVOC exceedances throughout the M-8 Landfill without a distinct pattern. Eighteen of the 292 boring locations (B15, B18R, B25, B26, B28, B32, B66, B88, B92, B93, B141, B144, B145Dup, B151, B166, B184, B199, B250) are marked as OM locations, exhibiting one or more exceedances of an applicable standard by more than a factor of 10.

Landfill Disruption Approval

A *Minor Landfill Disruption Application* was submitted to the NJDEP by Princeton Hydro, LLC in May of 2010 for proposed borings, test pits, piezometer and well installations, groundwater injections, and gas surveys at the Fort landfill sites. This application was prepared for ongoing landfill delineation and investigation activities. A permit approval dated September 16, 2010 was issued by NJDEP for this proposed work. Correspondence and documentation related to the *Minor Landfill Disruption Permit* (including postdisturbance documentation) are provided in Exhibit IV.

7.0 DEPTH OF COVER MATERIAL

"Cover material" is defined as soil and other materials, such as concrete, gravel, brick, sand, clay, silt, active or discontinued structures, used to contain or convey utilities and similar materials that under normal circumstances do not pose a health or safety hazard to individuals using reasonable care. Common landfill debris found at the M-8 Landfill not considered cover material include styrofoam, nails, plastic, cement, porcelain, garbage and garbage bags, cinders, wood, sheet metal, carpet, shingles, clapboard, asphalt, metal pipes, ash, burned wood, and tile. It should be noted that "blue grey sand with strong petroleum odor" was identified for test pit/excavation T-10 at 24 inches.

Depth of cover material was derived from the logs for all 292 borings in 1998/1999 and eight of the 14 trenches and one boring excavated/performed between February and March 2009 listed in the cover material summary table for the primary purpose of delineating the boundaries of the M-8 Landfill. (Soil boring and trench locations are identified on Figures 2 through 7) Soil boring logs and detailed trench logs show the depth of cover found at each boring and trench location. The boring logs are included in the Versar RIR (Exhibit I); the trench logs are provided in Exhibit V. In addition, a summary of the cover material is provided in Table 5.

Summary of Findings

a. The average depth of cover at the M-8 Landfill is 28.5 inches.
b. Depth of cover throughout the landfill varies from a maximum of 48 inches (B10J, B14N, B18R, B22V, B28BB, B37KK, B40NN, B41OO, B43, B48, B49, B53, B54, B62, B63, and Trench T-6A) to zero cover (Trenches T-7 and T-8).
c. Approximately 78% of boring/trench logs (234 out of 300) show depth of cover greater than 24 inches.
d. Approximately 85% of boring/trench logs (255 out of 300) show depth of cover greater than 20 inches.

8.0 PROPOSED FINAL REMEDIAL ACTION

As discussed earlier in this report, concentrations of SVOCs, pesticides, PCBs, and metals were detected at concentrations exceeding NJDEP NRDCSRS. Further analysis of the analytical results did not define a "source area" or level of contamination that necessitated the identification and evaluation of potential remedial actions other than the permanent closure of the landfill.

To address the exceedances of analytes which did not meet SRS, the DPW will incorporate a Deed Notice into the *Fort Master Plan* for these soils. This shall include the entire area of the defined landfill.

Given the inactive and undisturbed status of the landfill, the performance of long-term surface water and groundwater monitoring proximate to the M-8 Landfill, the negligible impacts reported to date, the lack of groundwater use at or downgradient of the landfill, and the low concentrations of contaminants of concern in the shallow surface soils across the site, No Further Action is recommended for the previously evaluated near surface soils at the M-8 Landfill with the exception of the proposed capping.

It is recommended, however, that supplemental soil borings and sampling be performed in the "additional" landfill areas identified during the performance of the 2009 trenches/borings (and not evaluated in the 1998 investigation). This should include test pit/excavation T-10 identified with"blue grey sand with strong petroleum odor."

As per the November 17, 2010, NJDEP *Regulatory Requirements for Fort Monmouth Landfills* (*Regulatory Requirements*) provided in Exhibit III, it is proposed that an additional 12 inches of clean soil cover material be placed throughout the M-8 Landfill.

A capping plan shall be prepared that allows for proper drainage, facilitates growth of vegetation, and ensures that the cover is durable. Should areas of significant surface contamination be encountered during the site capping activities, then "hot spot" removals shall be undertaken as required in the aforesaid November 17, 2010 NJDEP *Regulatory Requirements*. As previously noted, at least one area of suspected petroleum-impacted soil (T-10) was encountered which may require "hot spot" removal. The proposed capping action is an appropriate and prudent additional measure that will provide an ample physical barrier to direct contact by persons and wildlife that may traverse the area and undertake reasonably expected activities.

Brinkerhoff recommends that a formal *Landfill Closure Plan* including the above recommendations be submitted for NJDEP review and approval.

9.0 REFERENCES

Remedial Investigation Report for Soils – M-8 Landfill Site Ft. Monmouth, New Jersey; Versar, Inc.; March 16, 2004.

Site Investigation, Fort Monmouth, New Jersey, Main Post and Charles Wood Areas, Site Investigation Report; Roy F. Weston; December 1995.