

FINAL

Remedial Investigation Report And Sediment Quality Evaluation

M-18 Landfill Site

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



Directorate of Public Works



February 23, 2004

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United States Army
Fort Monmouth, New Jersey

**Remedial Investigation Report and
Sediment Quality Evaluation
for the
M-18 Landfill Site**

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February 23, 2004

**REMEDIAL INVESTIGATION REPORT
AND SEDIMENT QUALITY EVALUATION
FOR THE M-18 LANDFILL SITE
FORT MONMOUTH, NEW JERSEY**



PREPARED FOR:

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EXECUTIVE SUMMARY

VERSAR, Inc. (VERSAR) has been contracted by the United States (U.S.) Army Installation, Fort Monmouth (Fort Monmouth), Directorate of Public Works (DPW), Fort Monmouth, New Jersey, to prepare a Remedial Investigation Report (RIR) for data collected during recent sediment sampling events at the M-18 Landfill site. This report describes the remedial investigation activities conducted at the site on April 12, 2000.

The site is a former Army Signal School Training Area and is located in the northern part of the Main Post between Parkers Creek to the north and several Main Post buildings to the south. The M-18 Landfill site occupies approximately 4.1 acres. According to the Roy F. Weston, Inc. (Weston) report, *Site Investigation, Fort Monmouth, New Jersey, Main Post and Charles Wood Areas, Site Investigation Report* (December 1995), the M-18 Landfill site has been used for military training exercises since 1919. Training exercises consisted of the use of a riot control agent as well as gasoline and diesel generators for the support of the training activities. The site is also a suspected former debris disposal site. In the 1995 Site Investigation (SI), Weston conducted soil and groundwater sampling to determine potential impacts associated with the former training facility operations. In addition, a geophysical investigation was conducted to assess the former use of the site as a debris disposal area. No surface water or sediment sampling was conducted during the Weston SI. Weston recommended that a long-term groundwater monitoring program be developed and implemented at the site, but provided no recommendations related to site-specific sediment quality.

Other studies conducted at similar Main Post landfill sites (M-2 and M-8) found polychlorinated biphenyl (PCB) -containing materials (e.g., electrical ballasts) disposed of in each landfill. In addition, PCBs were detected in soil and/or groundwater at both the M-2 and M-8 Landfill sites. Therefore, assuming that other landfills on the Main Post had received similar waste materials, the DPW initiated a sediment sampling investigation in the second quarter of 2000 to evaluate potential impacts to stream sediments in creeks and/or brooks running adjacent to the Main Post and Charles Wood landfill sites (CW-3A only). The M-18 Landfill site was included in the sediment sampling program to supplement the earlier Weston findings related to the soil and groundwater matrices.

To determine potential PCB-related impacts to sediments in Parkers Creek, the DPW obtained eight sediment samples on April 12, 2000, from the surface and near-surface sediments of Parkers Creek. The samples were obtained along the 700-foot portion of Parkers Creek that flows adjacent to the western perimeter of the M-18 Landfill site. All eight sediment samples were analyzed for PCBs and compared to sediment sampling guidance concentrations defined in the New Jersey Department of Environmental Protection (NJDEP) *Guidance for Sediment Quality Evaluations* (November 1998). The analytical data is summarized in table form in this RIR. VERSAR developed this RIR based on the evaluation of these sediment data.

Data presented in **Section 3.0** of this RIR indicate two samples where PCBs were detected above the laboratory Method Detection Limit (MDL). PCBs were not detected in the remaining six samples.

One of these samples [0.22 mg/kg, Boring B-1, 0-6" below ground surface (bgs)] exceeds both the NJDEP Effects Range – Low (ER-L) and Effects Range – Medium (ER-M) guidance concentrations for Total PCBs (0.023 and 0.180 mg/kg, respectively), which represent the concentrations at which adverse benthic effects are found in approximately 10% and 50% of studies, respectively. This sample also exceeds the Arochlor 1254 Lowest Effects Level (LEL), which is the concentration at which adverse benthic impacts may begin to occur (level tolerated by most benthic organisms). However, this exceedance appears to be an isolated occurrence. No other samples in upgradient landfill sites (M-3, M-4 and M-5) presented similar concentrations.

The second sample (0.055 mg/kg, Boring B-2, 0-6" bgs) exceeds only the ER-L guidance concentration for Total PCBs. The magnitude of this exceedance, which marginally exceeds the NJDEP guidance concentration, is similar to the magnitude of exceedances at upgradient landfill sites M-4 and M-5 and is an isolated occurrence.

The site-specific Severe Effects Level (SSEL) was not exceeded for either sample result.

Considering the frequency of occurrences of PCBs and the magnitude of the two exceedances of the guidance criteria for sediment quality, minimal potential exists for significant long-term adverse benthic effects in Parkers Creek. Based on the results of this sediment quality evaluation, No Further Action (NFA) is recommended for the M-18 Landfill site related to potential PCBs impacts to the sediments of Parkers Creek.

1.0 INTRODUCTION

VERSAR has been contracted by the U.S. Army Installation, Fort Monmouth DPW, Fort Monmouth, New Jersey to prepare an RIR and sediment quality evaluation for the M-18 Landfill site located at the Fort Monmouth Main Post Area. This report addresses the remedial investigation activities performed at this site on April 12, 2000.

1.1 Objectives

In other studies conducted at similar Main Post landfill sites (M-2 and M-8), the DPW found PCB-containing materials (e.g., electrical ballasts) disposed of in each landfill. In addition, PCBs were detected in soil and/or groundwater at both the M-2 and M-8 Landfill sites. Therefore, assuming that other landfills on the Main Post had received similar waste materials, the DPW initiated a sediment sampling investigation in the second quarter of 2000 to evaluate potential impacts to stream sediments in creeks and/or brooks running adjacent to the Main Post and Charles Wood (CW-3A only) landfill sites. The M-18 Landfill site was included in the sediment sampling program to supplement the earlier Weston findings related to the soil and groundwater matrices.

The objective of this RIR is to determine potential PCB-related impacts to stream sediments in Parkers Creek, which flows along the western perimeter of the M-18 Landfill site. The remedial investigation was conducted in accordance with New Jersey Administrative Code (NJAC) 7:26E - *Technical Requirements for Site Remediation* (July 1999) and NJDEP *Guidance for Sediment Quality Evaluations* (November 1998).

The remedial investigation encompassed the following:

- Obtaining surface and near-surface sediment samples approximately every 100 feet along the bottom of Parkers Creek.
- Analyzing the samples for PCBs by United States Environmental Protection Agency (USEPA) Method 8082.
- Comparing the analytical results to the screening level criteria defined in the NJDEP *Guidance for Sediment Quality Evaluations* (November 1998).

1.2 Report Organization

This report is organized to minimize repetition. **Section 2.0** provides background information and a general description of the M-18 Landfill site located at the Fort Monmouth Main Post Area. **Section 3.0** describes and summarizes the sampling procedures and activities. **Section 4.0** presents analytical results and compares those results to NJDEP guidance criteria. **Section 5.0** provides a summary of the findings of the remedial investigation and requests an NFA determination from the NJDEP.

2.0 SITE BACKGROUND AND ENVIRONMENTAL SETTING

The following sections describe the site background and environmental setting of the area surrounding Fort Monmouth and the M-18 Landfill site. Included is a description of the site location, background, current conditions and environmental setting.

2.1 Site Location and Description

Fort Monmouth is located in the central-eastern portion of New Jersey in Monmouth County, approximately 45 miles south of New York City and 70 miles northeast of Philadelphia (**Figure 2-1**). In addition to the Main Post, the installation includes two subposts, the Charles Wood Area and the Evans Area. The Main Post encompasses approximately 630 acres and is generally bounded by State Highway 35, Parkers Creek, Lafetra Creek, the New Jersey Transit Railroad and a residential area to the south. The post was established in 1918 during World War I (WWI) as an Army Signal Corps training center. The Main Post currently provides administrative, training, and housing support functions, as well as providing many of the community facilities for Fort Monmouth. The primary mission of Fort Monmouth is to provide command, administrative, and logistical support for Headquarters, U.S. Army Communications and Electronics Command (CECOM). CECOM is a major subordinate command of the U.S. Army Materiel Command (AMC) and is the host tenant at Fort Monmouth.

The M-18 Landfill site is bounded by Parkers Creek to the north and Buildings Nos. 283, T-294, T-293, S-289, and S-145 to the south in the Main Post Area (**Figure 2-2**). The approximate area of the M-18 Landfill site is 177,300 ft² (4.1 acres). Stream bank landfill and stabilization has been performed along the 700-foot portion of Parkers Creek that flows along the western perimeter of the M-18 Landfill site.

The various landfill sites on the Main Post are identified on **Figure 2-3**. The map is provided to identify:

- the relative location of each of the former landfill sites due to the similarity of past site uses, the types debris deposited at these locations, and the nature of the contaminants identified in soil, groundwater, and/or sediment samples during the present and former investigations; and
- the proximity and interrelatedness of the adjacent surface water bodies.

2.2 Site Background

Weston conducted an SI in 1995 at the M-18 Landfill site, documented in the Weston report, *Site Investigation - Fort Monmouth, New Jersey, Main Post and Charles Wood Areas, Site Investigation Report* (December 1995). The investigation activities performed by Weston at the M-18 Landfill site included the installation and sampling of groundwater monitoring wells, soil borings and soil sampling, and a geophysical

investigation. No surface water or sediment samples were obtained during the Weston SI. The Weston SI Report identified two compounds of concern in groundwater at concentrations above NJDEP Groundwater Quality Criteria (GWQC), 4,4-DDD and Lead. Soil sampling analytical results identified six Semi-Volatile Organic Compounds (SVOCs) above NJDEP soil cleanup criteria and background concentrations, but well below the impact-to-groundwater criteria. The geophysical investigation identified several anomalies indicative of buried waste and fill material, including one indicative of an underground storage tank or storage tank component, within the boundaries of the M-18 Landfill site. The Weston SI Report recommended exploratory trenching to determine the presence of the underground storage tank or storage tank component; excavation of contaminated soils; and a long-term groundwater-monitoring program due to the historical site use as a landfill. The present investigation was undertaken to further expand the Weston SI report and assess the potential PCB-related impacts to stream sediments based on past Site use.

2.3 Current Conditions

VERSAR conducted a site walk on December 11, 2000 to assess current conditions at the M-18 Landfill site. At the time of the site walk, the site was being backfilled. The site consisted of a partially wooded lot with tall grasses in the center and trees along Parkers Creek, which is located to the north, and was bounded by a fence to the south. Also present was unexploded ordnance including several shells and a missile. Site photographs are provided in **Appendix A**.

2.4 Environmental Setting

The following is a description of the geological/hydrogeological setting of the area surrounding the M-18 Landfill site. Included is a description of the regional geology and hydrogeology of the area surrounding Fort Monmouth.

2.4.1 Regional Geology

Monmouth County lies within the New Jersey Section of the Atlantic Coastal Plain physiographic province. The M-18 Landfill site is located in what may be referred to as the Outer Coastal Plain subprovince, or the Outer Lowlands. The geologic map of New Jersey is provided as **Figure 2-3**.

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

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

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. The upper part of the Tinton is often highly oxidized and iron oxide encrusted (Minard, 1969). Groundwater occurs beneath the site at a depth of approximately 2 to 12 feet bgs.

The Kirkwood Formation (part of the Kirkwood-Cohansey system) crops out southeast of the Main Post and dips to the southeast at a slope of 20 feet per mile (Jablonski, 1968). The Kirkwood Formation consists of alternating layers of sand and clay. The upper unit is a light gray to yellowish-brown, fine-grained quartz sand with quartz nodules and small pebbles. The lower unit is a brown silt in Monmouth County (Jablonski, 1968).

As presented in the *Site Investigation Report - Main Post and Charles Wood Areas, Fort Monmouth, New Jersey*, prepared by Weston, Inc, December 1995 (Weston SI), several natural and anthropogenic factors contribute to the wide range in concentrations of metals in soils, which further impact the concentration of metals in groundwater. Soils derived from the glauconitic sands contain abundant aluminum, calcium, potassium, iron, magnesium and manganese (among others), which are likely to be present at elevated concentrations in the groundwater, particularly when sediments are entrained in the collected groundwater samples.

2.4.2 Hydrogeology

Fort Monmouth lies in the Atlantic and Eastern Gulf Coastal Plain groundwater region (Meisler et al., 1988). This groundwater region is underlain by undeformed,

unconsolidated to semi-consolidated sedimentary deposits. The chemistry of the water near the surface is variable with low dissolved solids and high iron concentrations. The water chemistry in areas underlain by glauconitic sediments (such as Red Bank, Tinton and Hornerstown Sands) is dominated by calcium, magnesium, manganese, aluminum and iron. The sediments in the area of Fort Monmouth were deposited in fluvial-deltaic to near shore environments.

The water table aquifer in the Main Post Area is identified as part of the “Navesink-Hornerstown 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. These geologic formations comprise a “Composite Confining Bed” for the Wenonah Mount Laurel Aquifer (Zapeczka, 1984).

Wells installed in the Red Bank and Tinton Sands produce 2 to 25 gallons per minute (gpm) (Jablonski, 1968). Groundwater is typically encountered at the Main Post and in the surrounding areas at shallow depths below ground surface (2 to 9 feet bgs). Water in the surficial aquifer generally flows east toward the Atlantic Ocean.

Based on a review of the NJDEP GWQS (NJAC 7:9-6), January 7, 1993, Versar has determined that the site is underlain by a Class III-A aquifer. A formal presentation of this finding was made to the NJDEP on April 17, 2001. The primary designated use for Class III-A groundwater is the release or transmittal of groundwater to adjacent classification areas and surface water, as relevant. Secondary designated uses in Class III-A include any reasonable use.

Shallow groundwater may be locally influenced within the Main Post Area by the following factors:

- Tidal influence (based on proximity to the Atlantic Ocean, rivers, and tributaries)
- Topography
- Nature of the fill material within the Main Post Area
- Presence of clay and silt lenses in the natural overburden deposits
- Local groundwater recharge areas (e.g., streams, lakes)
- Roadways, utility conduits and stormwater culverts

Due to the fluvial nature of the overburden deposits (e.g., sand and clay lenses), shallow groundwater flow direction is best determined on a case-by-case basis. The groundwater flow near the M-18 Landfill site is west-northwest towards Parkers Creek (Weston, 1995).

As presented in the Weston SI, the field logs from monitoring well and soil boring installations at the M-18 Landfill site indicate that the site-specific lithology consists of fill intermixed with a poorly sorted gray-olive-brown silty fine-coarse-grained sand with

trace amounts of clay. The manmade components of the fill materials observed in the borings consisted of asphalt, wood fragments and roof shingles. Groundwater saturation was observed in monitoring wells at approximately 6 feet bgs. Water-level elevation data collected during the Weston SI indicate groundwater flows is toward Parkers Creek.

2.4.3 Soils

According to the U.S. Department of Agriculture (USDA), Soil Conservation Service, Monmouth County Soil Survey, the majority of the Main Post Area is covered by urban land (**Figure 2-4**). The soil survey described urban land as areas where concrete, asphalt, buildings, shopping centers, airports or other impervious surfaces cover 80 percent or more of the surface. In addition, the survey indicated that the natural subsurface soils have largely been replaced with artificial or foreign fill materials (developed land with disturbed soils). The following soil series and classification units are mapped in the Main Post Area:

- DoB Downer sandy loam (with 2 to 5 percent slopes);
- FrB Freehold sandy loam (with 2 to 5 percent slopes);
- FUB Freehold sandy loam/urban land complex (with 0 to 10 percent slopes);
- HV Humaquepts, frequently flooded;
- KvA Kresson loam (with 0 to 5 percent slopes);
- UA Udorthents, smoothed; and
- UD Udorthents – urban land complex (with 0 to 3 percent slopes).

The Downer series soils are well-drained soils that are found on uplands and terraces. The soils are formed in acid, silty coastal plain sediments. The Freehold soils are also well drained and are formed in acid, loamy, coastal plain sediments that, by volume, are 1 to 10 percent glauconite and are found on uplands. The Humaquepts soils are somewhat poorly- to very poorly- drained soils that are formed in stratified, sandy, or loamy sediments of fluvial origins. The Humaquepts soils are located on the floodplain and are subject to flooding several times each year. The Kresson loam is a nearly level to gently sloping soil and is somewhat poorly drained. The soil is found on low divides and in depressions. The Udorthents soils have been altered by excavation or filling activities. In filled areas, these soils consist of loamy material that is more than 20 inches thick. The filled areas include floodplain, tidal marshes and areas with moderately, well drained to very poorly drained soils. Some Udorthent soils contain concrete, asphalt, metal and glass. The soils in the vicinity of the M-18 Landfill site are classified as HV – Humaquepts, frequently flooded.

2.4.4 Topography and Surface Drainage

Over the last 80 years, the natural topography of Fort Monmouth has been altered by excavation and filling activities by the military. The M-18 Landfill site is located on the floodplain of Parkers Creek. The USGS topographic map (**Figure 2-1**) shows that the land surface of the site is relatively flat at an elevation of less than 20 feet above mean sea level (amsl).

Surface water bodies from the western part of the Main Post flow into the Lafetra Creek to the north or into the Mill Creek to the south. The USGS topographic map (**Figure 2-1**) shows the Lafetra Creek as Parkers Creek Branch and Mill Creek as Wampum. Both Mill and Lafetra Creek originate off-post. Mill Creek flows along the southern boundary of the Main Post, turning north just past the Auto Craft Shop. Mill Creek is channelized and flows past the north side of the M-2 Landfill site where it merges into Lafetra Creek. Lafetra Creek forms the northern boundary of the Main Post and joins Mill Creek to form Parkers Creek just west and upstream of the M-18 Landfill site. Parkers Creek flows eastward along the northern boundary and joins Oceanport Creek east of the post. Most of Parkers Creek, Lafetra Creek and Mill Creek are tidally influenced.

The U.S. Fish and Wildlife Service (FWS) National Wetland Inventory Long Branch quadrangle maps indicate the presence of wetlands at the Main Post. Parkers and Oceanport Creeks are classified as estuarine intertidal aquatic beds. The area of Parkers Creek and the part of Oceanport Creek/Husky Brook are classified as estuarine intertidal emergent wetlands. Lafetra Creek and Mill Creek are classified as riverine lower perennial open water/unknown bottom.

3.0 SEDIMENT SAMPLING ACTIVITIES

Fort Monmouth DPW conducted sediment sampling in Parkers Creek to evaluate potential PCB impacts to stream sediments from the M-18 Landfill site. On April 12, 2000, four borings were installed at a maximum spacing of approximately every 100 feet, ranging from approximately 60-130 feet, along the bottom of Parkers Creek, as shown in **Figure 3-1**. The locations extended from downstream at Boring B-1 to upstream at Boring B-4, and were sampled accordingly in that order (**Appendix D**). The sediment sampling program was conducted in accordance with the *Installation Landfill Program Sediment Sampling Plan for Nine Former Landfill Sites* (TVS, March 2000) found in **Appendix B** with one exception: borings were installed at rates different than one boring per 100 feet in order to target depositional areas along Parkers Creek. The Sediment Sampling Plan (SSP) was approved by the NJDEP on April 3, 2000.

Eight sediment samples were collected from four borings using a Wildco Sediment Sampler. The samples were obtained along the 700-foot portion of Parkers Creek that flows along the western perimeter of the M-18 Landfill site. Sample depths ranged from surface (0-6 inches) to near surface (6-12 inches bgs) at each boring location. The samples consisted of yellow to black fine sand and silty sand with some large to medium rounds. Boring logs are provided in **Appendix C**.

Sampling equipment was thoroughly decontaminated before and after each use, in accordance with the SSP. The sediment samples were collected using a Wildco Sampler and immediately placed in laboratory-supplied bottleware. The sample containers were labeled, sealed, packed in ice and transported to the Fort Monmouth Environmental Testing Laboratory (FMETL), New Jersey Certification Number NJDEP 13461, under proper chain-of-custody procedures. The samples were analyzed by the FMETL on April 12, 2000 for PCBs utilizing USEPA Method 8082. Copies of the chain-of-custody for the laboratory analysis are presented in **Appendix D**. A summary of the borings, including sample IDs, sample collection date/time, sample depths, northing/easting coordinates, analysis and general soil descriptions is provided in **Table 3-1**.

4.0 SITE CHEMICAL CHARACTERIZATION

On April 12, 2000, the DPW collected eight sediment samples along the bottom of Parkers Creek to evaluate potential PCB impacts to stream sediments from the adjacent M-18 Landfill site. Four borings were installed at a maximum spacing of approximately every 100 feet, ranging from approximately 60-130 feet along the bottom of the creek. Eight samples were collected from four borings at depths ranging from surface (0-6 inches) to near-surface (6-12 inches bgs) at each boring location. Samples were identified in the field using the following nomenclature: M-18/1 0-6", M-18/1 6"-12" to M-18/4 0-6", M-18/4 6"-12". The samples were analyzed for PCBs utilizing USEPA Method 8082.

4.1 Chemical Characterization

The sediment laboratory analytical data were compared to the established screening level criteria, as presented in the *NJDEP Guidance for Sediment Quality Evaluations* (November 1998). This evaluation included at least two samples from each boring to assess the sampling data and to identify potential contaminants of concern. For marine/estuarine sediment screenings, the guidelines define two guidance concentrations for Total PCBs, an Effects Range-Low (ER-L) and an Effects Range-Medium (ER-M). The ER-L (0.023 mg/kg Total PCBs) represents the concentration at which adverse benthic effects are found in approximately 10% of studies. The ER-M (0.180 mg/kg Total PCBs) represents the concentration at which a greater than 50% incidence of adverse effects to sensitive species and/or life stages is likely to occur. The ER-L and ER-M are not regulatory cleanup standards. An exceedence indicates a potential risk to the benthic community and helps determine the need for further investigations (e.g., toxicity testing, tissue bioassays, etc.). However, an exceedence of the ER-L/ER-M criteria does not necessarily mandate further investigations if the sediments proximal to the site have similar contaminant concentration ranges to upgradient sediments. As stated previously, the samples were collected beginning with the downstream location (B-1) and proceeding to the upstream location (B-4). Therefore, the upgradient sediments are most closely represented by the laboratory data results for boring location B-4 (see **Table 4-1**). No PCBs were detected in sediment samples collected at this location.

Based on the *NJDEP Guidance for Sediment Quality Evaluations* (November 1998), the Lowest Effects Levels (LELs) and the Severe Effects Levels (SELs) are to be used as guidelines for individual Arochlors. Arochlor 1254 is the only Arochlor found at the landfill sites shown on **Figure 2-3**. The LEL indicates concentrations at which adverse benthic impacts may begin to occur (level tolerated by most benthic organisms). The SEL is a contamination level that indicates severe impacts to the benthic community in most cases studied. Both the LEL and the SEL are derived from freshwater sediment screening criteria; however, they are used in conjunction with the marine/estuarine ER-L and ER-M values for screening purposes. The ER-L and ER-M apply to Total PCBs, whereas the LEL and SEL can be used for screening purposes for individual Arochlors.

In the case of non-polar organic compounds, such as PCBs, it may be necessary to modify the SEL to create a site-specific SEL (SSEL) based on the Total Organic Carbon (TOC) fraction present in the sample. The TOC fraction is used to determine if the samples were collected in depositional zones, evidenced by a higher percentage of fine-grained particles. Depositional zones are generally the areas of highest potential contamination and are targeted during site sampling events. To calculate a SSEL, the SEL is multiplied by the TOC fraction. If the TOC of the samples is not measured during sampling, as is the case at the M-18 Landfill site, a default value of 1% is used. In this instance, each SEL is multiplied by 0.01 to derive the SSEL for comparison purposes. At the M-18 Landfill site, the only Arochlor detected in the sediments was Arochlor 1254. The LEL, SEL and SSEL for Arochlor 1254 are shown below.

Polychlorinated Biphenyl	LEL (mg/kg, dry weight)	SEL (mg/kg organic carbon, dry weight)	SSEL (mg/kg)
Arochlor 1254	0.060	34	0.34

mg/kg=milligrams per kilogram

The USEPA, Region II, and the NJDEP Bureau of Environmental Evaluation and Risk Assessment/Environmental Toxicology and Risk Assessment (BEERA/ETRA) have discontinued the SSEL approach for general screening purposes except in cases of borderline screening exceedances and/or a weight of professional evidence suggesting that the SSEL is appropriate. The SSEL approach is discussed here for completeness, but was not otherwise used to formulate site-related environmental risk decisions or conclusions.

The results of the PCB laboratory analysis indicate two of the eight samples with detections above the laboratory Method Detection Limit (MDL). PCBs were not detected above the laboratory MDL in the remaining six samples. One of the sample results (Boring B-1, 0.22 mg/kg at 0-6" bgs) exceeds both the NJDEP Effects Range – Low (ER-L) and Effects Range – Medium (ER-M) guidance concentrations for Total PCBs (0.023 mg/kg and 0.180 mg/kg, respectively). The ER-L and ER-M represent the concentrations at which adverse benthic effects are found in approximately 10% and 50% of studies, respectively. This sample also exceeds the Arochlor 1254 LEL of 0.060 mg/kg, the concentration at which adverse benthic impacts may begin to occur (the level tolerated by most benthic organisms). Arochlor 1254 was the only Arochlor detected at the site. The result appears to be an isolated occurrence because no other upgradient Landfill sites (M-3, M-4 and M-5) have presented similar PCB exceedances. As such, this anomalous result is unlikely to result in long-term adverse benthic effects in Parkers Creek.

The second sample (Boring B-2, 0.055 mg/kg at 0-6" bgs) exceeds only the ER-L guidance concentration for Total PCBs (0.023 mg/kg). The ER-M of 0.180 mg/kg for Total PCBs and the LEL of 0.060 mg/kg for Arochlor 1254 were not exceeded. The magnitude of the ER-L exceedence is similar to the exceedences detected at upgradient landfill sites M-4 and M-5 and is expected to have no potential for long-term adverse benthic effects in Parkers Creek.

The two PCB detections did not exceed the SSEL for Arochlor 1254 (0.34 mg/kg). The sample results are summarized in **Table 4-1**. The laboratory data sheets are available in **Appendix D**.

4.2 QA/QC

In order to verify the reliability of the analytical results, VERSAR reviewed the holding times for each sample and the results of the analysis of each sample. All samples were analyzed by the FMETL within the prescribed holding time requirements for each analytical method.

No field duplicate samples were taken.

5.0 CONCLUSIONS

Based on a review of the laboratory analytical results for PCBs, the two exceedences of the NJDEP guidance concentrations for sediment quality are expected to have minimal potential for long-term adverse benthic effects in Parkers Creek. The most significant exceedence of the ER-L/ER-M and the LEL criteria, identified in Boring B-1 (0.22 mg/kg), is isolated and likely anomalous because no other upgradient Landfill sites have displayed similar exceedences. No detections of this magnitude were identified during the present investigation. Six of the eight samples at the M-18 Landfill site were ND (e.g., below laboratory MDLs) for PCBs.

The second exceedence identified in Boring B-2 (0.055 mg/kg) exceeds the NJDEP ER-L guidance concentration and is similar to the few exceedences identified in upgradient landfill sites M-4 and M-5. The ER-M and LEL were not exceeded at Boring B-2. The SSEL for Arochlor 1254 was not exceeded at any location.

Considering the frequency of occurrences of PCBs and the magnitude of the two exceedences of the guidance criteria for sediment quality, minimal potential exists for significant long-term adverse benthic effects in Parkers Creek. Based on the results of this sediment quality evaluation, NFA is recommended for the M-18 Landfill site related to potential PCBs impacts to the sediments of Parkers Creek.

6.0 REFERENCES

- Fort Monmouth DPW *Installation Landfill Program Sediment Sampling Plan for Nine Former Landfill Sites (March 2000)*.
- Fort Monmouth Environmental Testing Laboratory (FMETL), *Analytical Data Package – Stream Sediments – M3 Landfill*, April 19, 2000
- Jablonski, L.A., 1968. *Groundwater Resources of Monmouth County, New Jersey. USGS Special Report 23*. USGS, Washington, DC.
- Meisler, H., J.A. Miller, L.L. Knobel, and R.L. Wait. 1988. "Region 22, Atlantic and Eastern Gulf Coastal Plan." *In: Hydrogeology: The Geology of North America*, W. Back, J.S. Rosenhein, and P.R. Seaber, editors. Vol. 0-2. pp. 209-218.
- Minard, J.P., 1969. *Geology of Sandy Hook Quadrangle in Monmouth County, New Jersey*. U.S. Government Printing Office, Washington, DC.
- New Jersey Administrative Code (NJAC) 7:26E - *Technical Requirements for Site Remediation*.
- New Jersey Department of Environmental Protection - *NJDEP Guidance for Sediment Quality Evaluations (November 1998)*.
- New Jersey Geological Survey Map, 1994.
- TVS (TECOM-Vinnell Services), 2000. *SITE INVESTIGATION PLAN – Installation Landfill Program Sediment Sampling Plan for Nine Former Landfill Sites*.
- USGS (U.S. Geological Survey), 1981. Long Branch Quadrangle Map.
- Versar, Inc. (VERSAR), September 8, 1999. Subject: *Indefinite Quantity Delivery Contract No. DACA51-98-D0006, Fort Monmouth, Contract Support Services Relating to the Development of Four Remedial Action Reports*.
- WESTON (Roy F. Weston, Inc.), 1993. *Investigation of Suspected Waste Sites at Fort Monmouth, New Jersey*.
- WESTON (Roy F. Weston, Inc.), 1995. *Site Investigation, Fort Monmouth, New Jersey, Main Post and Charles Wood Areas, Site Investigation Report*, December 1995.
- Zapeczka, O. 1989. *Hydrogeologic Framework of the New Jersey Coastal Plain*. USGS Professional Paper 1404-B. U.S. Government Printing Office, Washington, DC.

TABLES

Table 3-1
Sediment Sampling Summary
M-18 Landfill Site
Fort Monmouth, New Jersey

Boring ID	Field Sample Location ID	Laboratory Sample ID	Date Collected	Time Collected	Sample Depth (in bgs) ⁽¹⁾	Coordinates Northing	Coordinates Easting	Analysis	General Soil Description
B-1	M18/ 1 0-6"	5336.01	4/12/2000	1319	0-6"	540630.021	618253.112	PCBs ⁽²⁾ (SW-846 Method 8082)	Black Fine Sandy Silt
	M18/ 1 6-12"	5336.02	4/12/2000	1321	6"-12"				
B-2	M18/ 2 0-6"	5336.03	4/12/2000	1326	0-6"	540497.945	618251.908	PCBs (SW-846 Method 8082)	Yellow to Black Fine Sand w/Large to Medium Rounds
	M18/ 2 6-12"	5336.04	4/12/2000	1328	6"-12"				
B-3	M18/ 3 0-6"	5336.05	4/12/2000	1330	0-6"	540399.214	618236.865	PCBs (SW-846 Method 8082)	Black Fine Sand to Silty Sand
	M18/ 3 6-12"	5336.06	4/12/2000	1332	6"-12"				
B-4	M18/ 4 0-6"	5336.07	4/12/2000	1334	0-6"	540347.335	618208.879	PCBs (SW-846 Method 8082)	Black Fine Sand
	M18/ 4 6-12"	5336.08	4/12/2000	1336	6"-12"				

⁽¹⁾ bgs = below ground surface

⁽²⁾ PCBs = Polychlorinated Biphenyls

Table 4-1
PCB Sampling Results
M-18 Landfill Site
Fort Monmouth, New Jersey

Boring ID	Sample Depth (bgs)	Field Sample Location ID	Laboratory Sample ID	Date Collected	Analytical Results ⁽⁵⁾	MDL ⁽⁶⁾
Total PCBs ER-L⁽¹⁾					0.023	
Total PCBs ER-M⁽²⁾					0.180	
Arochlor 1254 LEL⁽³⁾					0.060	
Arochlor 1254 SEL⁽⁴⁾					34	
B1	0-6"	M18/ 1 0-6"	5336.01	4/12/2000	0.22	0.0183
	6-12"	M18/ 1 6-12"	5336.02	4/12/2000	ND	0.0199
B2	0-6"	M18/ 2 0-6"	5336.03	4/12/2000	0.055	0.017
	6-12"	M18/ 2 6-12"	5336.04	4/12/2000	ND	0.0202
B3	0-6"	M18/ 3 0-6"	5336.05	4/12/2000	ND	0.0121
	6-12"	M18/ 3 6-12"	5336.06	4/12/2000	ND	0.012
B4	0-6"	M18/ 4 0-6"	5336.07	4/12/2000	ND	0.022
	6-12"	M18/ 4 6-12"	5336.08	4/12/2000	ND	0.0207

Notes:

⁽¹⁾NJDEP Guidance For Sediment Quality Evaluations, November 1998 (ER-L) - Effects Range-Low

⁽²⁾NJDEP Guidance For Sediment Quality Evaluations, November 1998 (ER-M) - Effects Range-Medium

⁽³⁾NJDEP Guidance For Sediment Quality Evaluations, November 1998 (LEL) - Lowest Effects Level

⁽⁴⁾NJDEP Guidance For Sediment Quality Evaluations, November 1998 (SEL) - Severe Effects Level

⁽⁵⁾All Results in milligrams per kilogram (mg/kg)

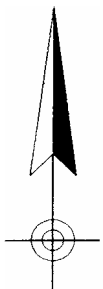
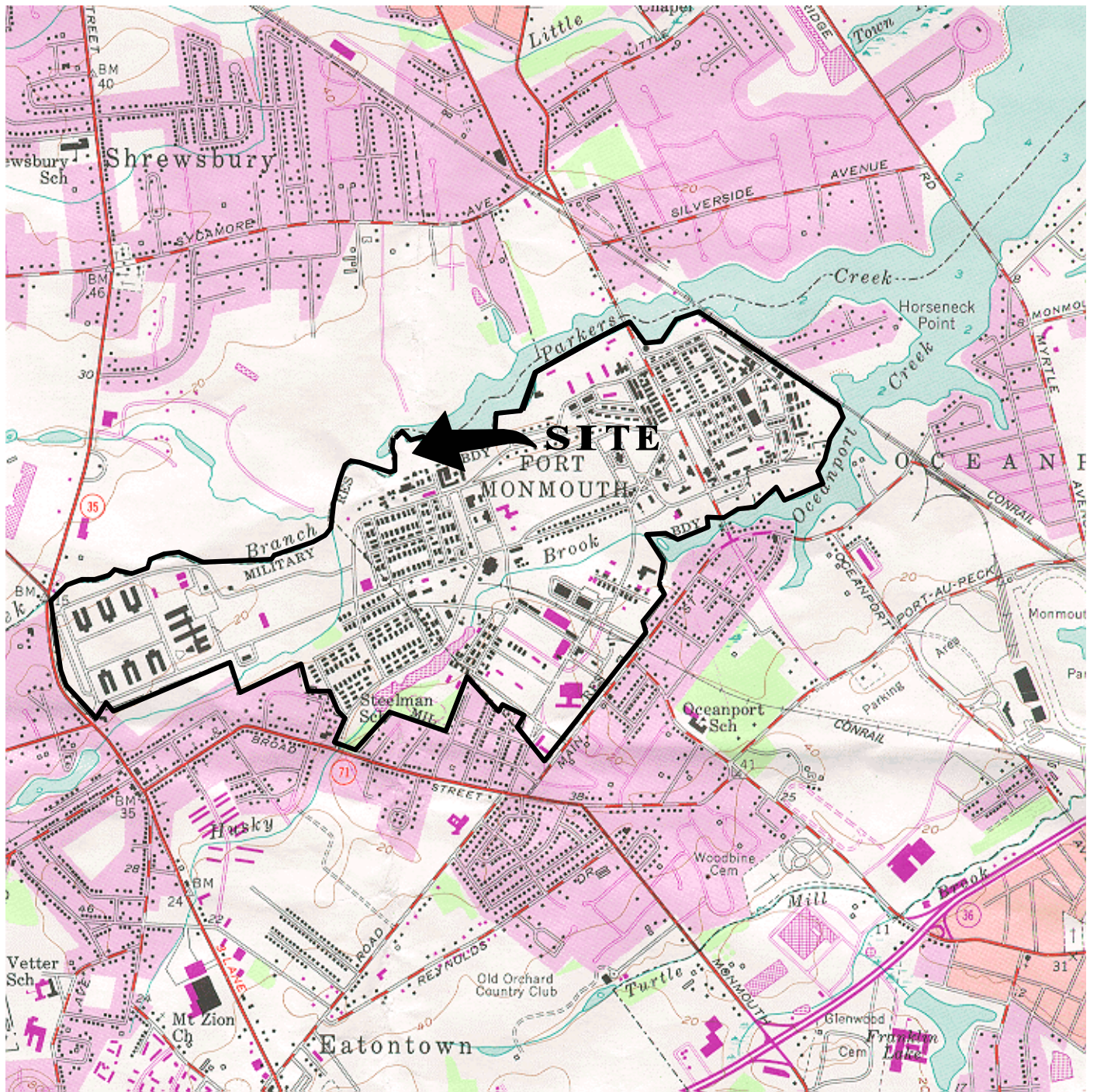
⁽⁶⁾Method Detection Limit (mg/kg) representing Total PCBs

ND = Analyte Not Detected in Sample

Exceedances of the NJDEP Guidances are shaded and printed **inbold-faced** type

PCBs = Polychlorinated Biphenyls

FIGURES



LONG BRANCH, N. J.

40073-C8-TF-024

1954

PHOTOREVISED 1981

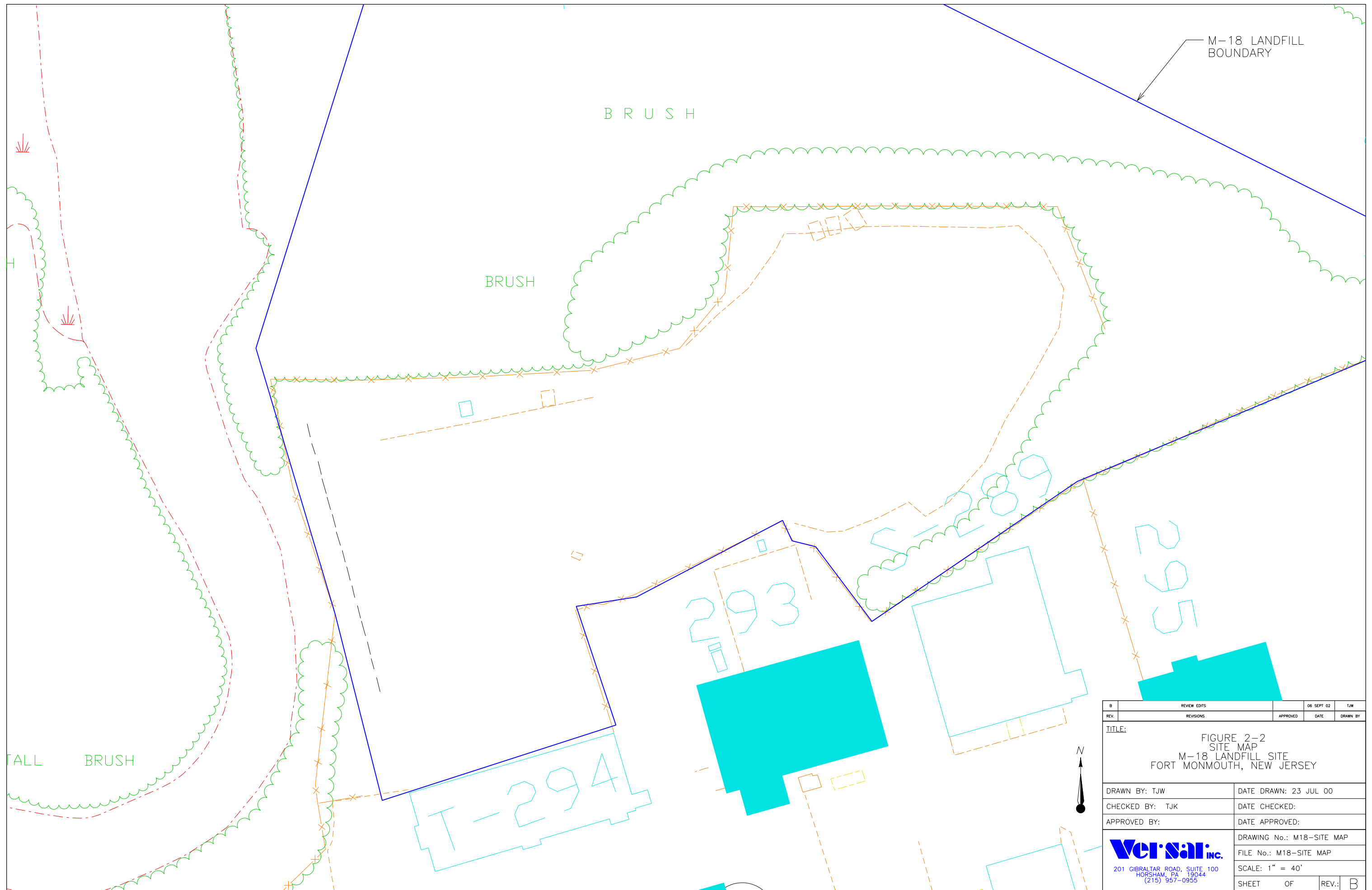
DMA 6164 1 SE-SERIES V822

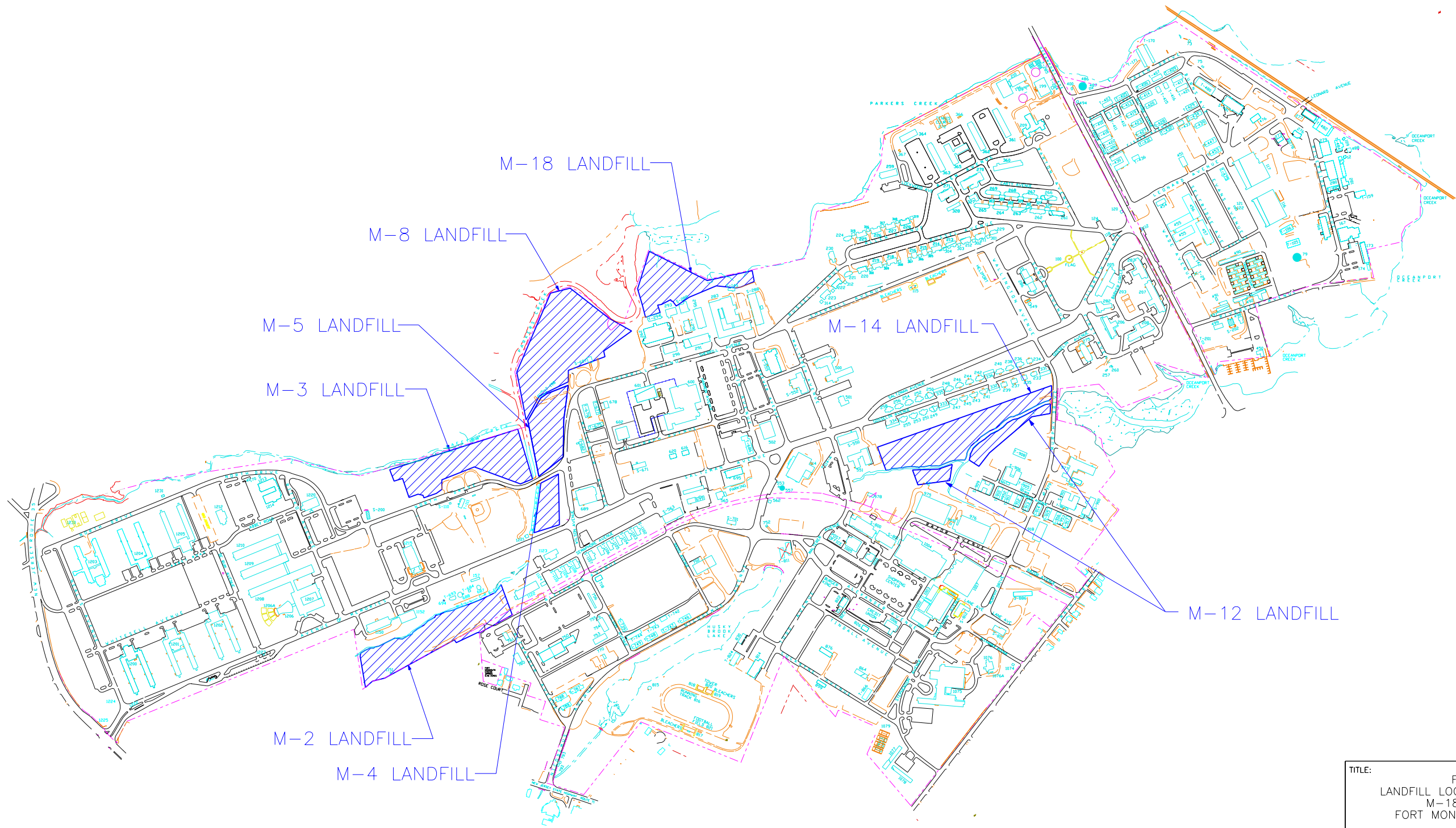


QUADRANGLE LOCATION

Figure 2-1
Site Location Map
M-18 Landfill Site
Fort Monmouth, New Jersey

Versar INC. 201 Gibraltar Road, Suite 100
Horsham, PA 19044
(215) 957-0955





TITLE: FIGURE 2-3 LANDFILL LOCATIONS ON MAIN POST M-18 LANDFILL SITE FORT MONMOUTH, NEW JERSEY	
DRAWN BY: EPM	DATE DRAWN: 02 MARCH 01
CHECKED BY:	DATE CHECKED:
APPROVED BY:	DATE APPROVED:
Versar inc. 201 GIBRALTAR ROAD, SUITE 100 HORSHAM, PA 19044 (215) 957-0955	DRAWING No.: FIG. 2-3
	FILE No.: M-18 FIG. 2-3
	SCALE: 1" = 800'
SHEET	OF
REV.: A	

Geologic Map of New Jersey

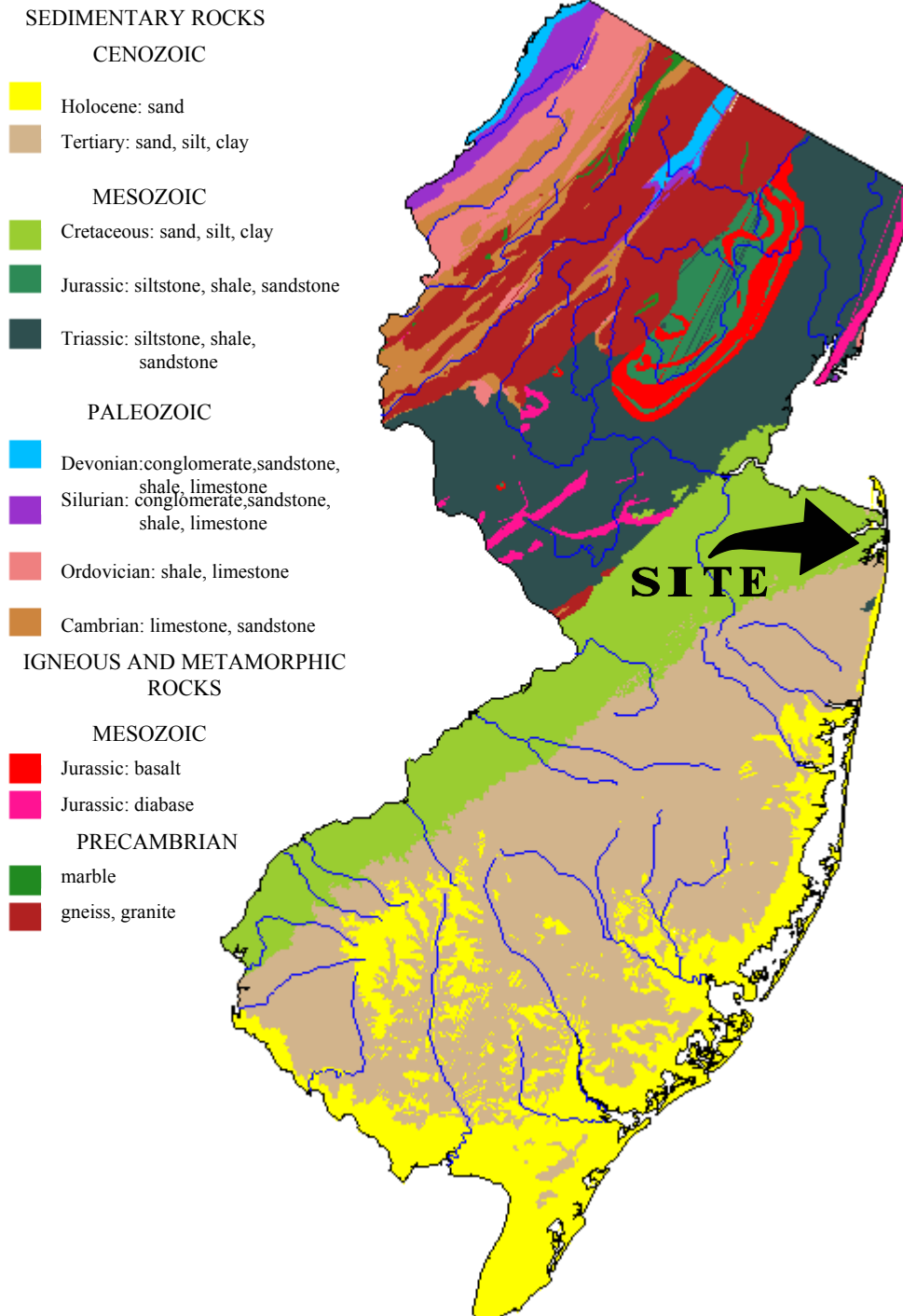
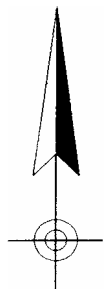
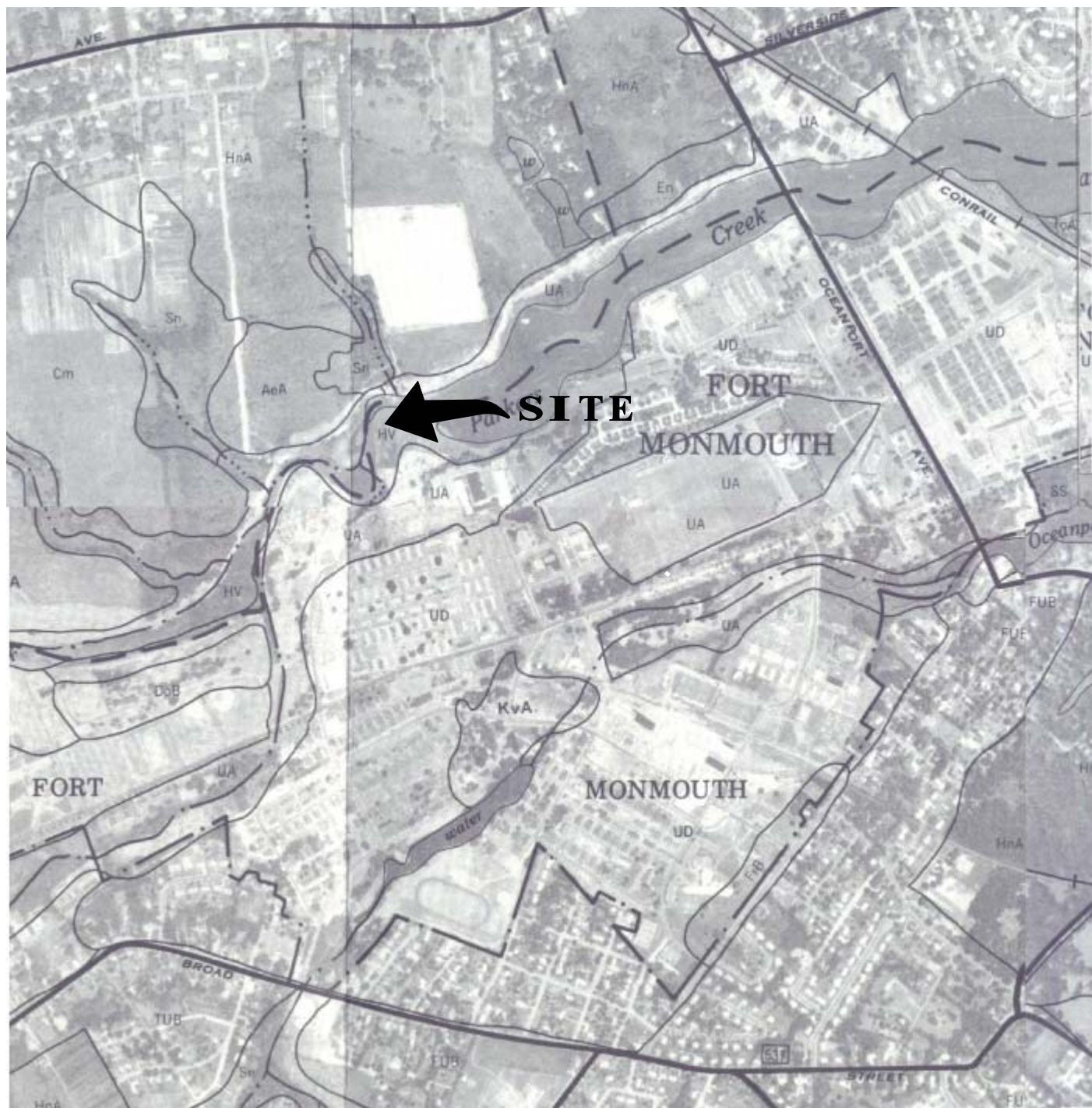


Figure 2-4
Geologic Map of New Jersey
M-18 Landfill Site
Fort Monmouth, New Jersey

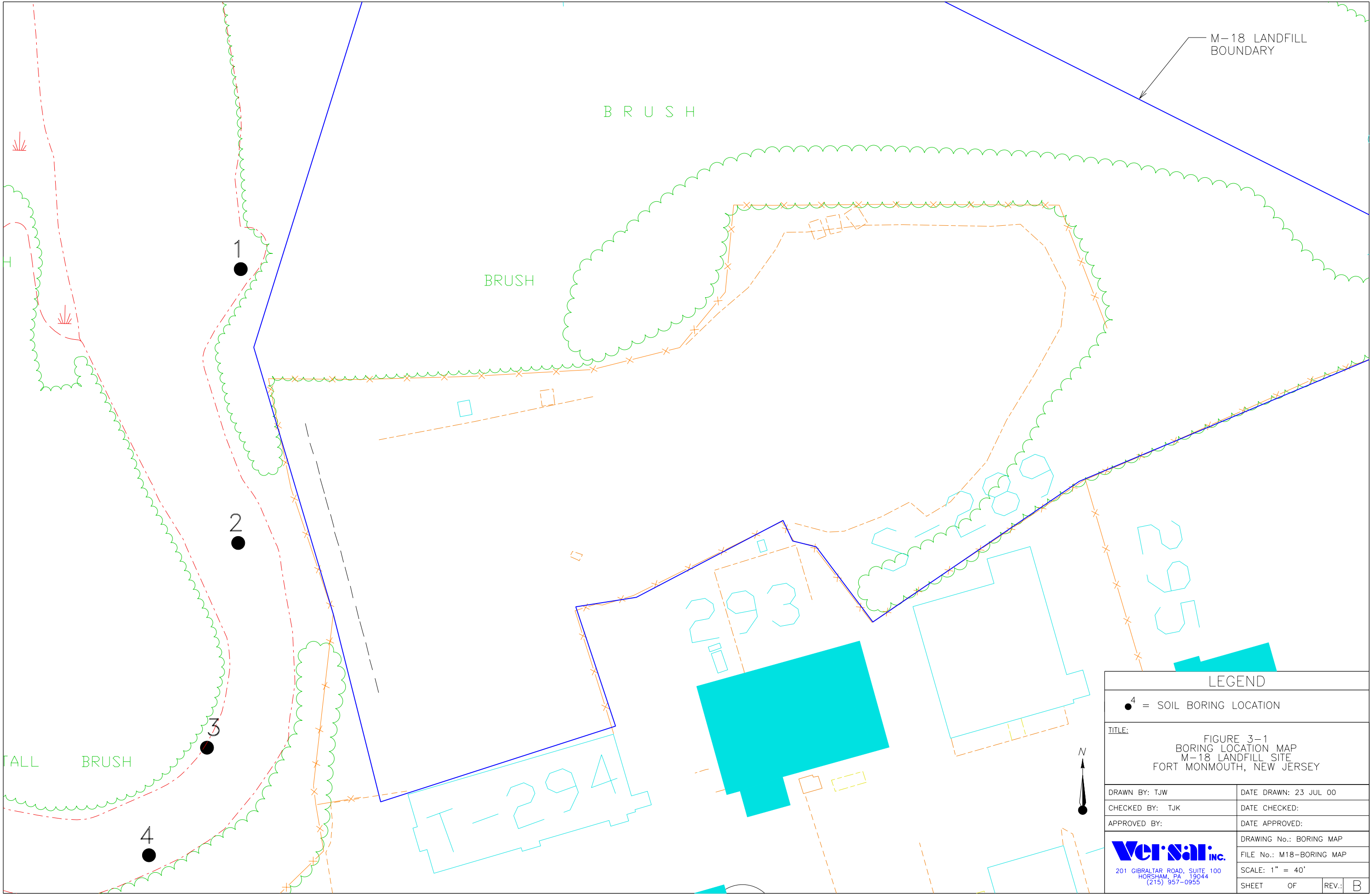
Versar INC. 201 Gibraltar Road, Suite 100
 Horsham, PA 19044
 (215) 957-0955



US Department of Agriculture
Soil Conservation Service
Soil Survey of Monmouth County, NJ
April 1989

Figure 2-5
Soil Map of Monmouth County
M-18 Landfill Site
Fort Monmouth, New Jersey

Versar INC. 201 Gibraltar Road, Suite 100
Horsham, PA 19044
(215) 957-0955



APPENDICES

Appendix A

Current Conditions Site Photographs

Appendix A
Current Conditions Site Photographs
M-18 Landfill Site
Fort Monmouth, New Jersey







Appendix B

Sediment Sampling Plan for Nine Former Landfill Sites (TVS, March 2000)



State of New Jersey

Christine Todd Whitman
Governor

Department of Environmental Protection

Robert C. Shinn, Jr.
Commissioner

Mr. Joseph Fallon
Directorate of Public Works
Headquarters, U.S. Army Garrison Fort Monmouth
Fort Monmouth, NJ 07703 - 5101

APR 03 2000

Re: Sediment Sampling Plan
Sites M-2, M-3, M-4, M-5, M-8, M-12, M-14, M-18 and CW-3A
Fort Monmouth Main Post/Charles Wood
Tinton Falls, Monmouth County

Dear Mr. Fallon:

The NJDEP has reviewed the March 29, 2000 Sediment sampling plan for the nine former landfill sites referenced above and we accept the plan as submitted.

The referenced document, developed with NJDEP using appropriate technical guidance documents and requirements, is specifically designed to determine if PCBs have impacted adjacent surface waters.

There are a few brief comments which we have previously discussed, but I wanted to note here as a reminder for you in this investigation.

- The NJDEP requires PCB method 8082 to be utilized.
- Approved sample preservation methods must be used if volatile compounds are to be investigated or reported on.
- Some discussion regarding the sediment criteria utilized along with a discussion on the application to the sample location and water body must be provided in the final report.
- Sampling must be performed on downgradient samples first.

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

Sincerely,

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

FTMMTH65IRC.DOC



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

March 29, 2000

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

Re: Sediment Sampling Plan for Nine Former Landfill Sites
(i.e. M-2, M-3, M-4, M-5, M-8, M-12, M-14, M-18 & CW-3A)
Main Post and Charles Wood Area, Fort Monmouth, New Jersey

Dear Mr. Curtis:

Submitted for your review and approval, please find a copy of the above referenced sampling plan. Said plan should enable the Directorate of Public Works to ascertain whether polychlorinated biphenyls are present within stream sediments bordering the nine referenced landfills. Future site work will be based upon the findings of this sampling initiative.

Should you have any questions or require any additional information regarding this plan, please contact the undersigned at the following telephone number: (732) 532-6223.

Sincerely,

Joseph M. Fallon, CHMM
Environmental Protection Specialist
Directorate of Public Works

Encl.

**United States Army
Directorate of Public Works
Fort Monmouth, New Jersey**

**Installation Restoration Program
Sediment Sampling Plan for
Nine Former Landfill Sites**

March 2000

SITE INVESTIGATION PLAN

Installation Restoration Program Sediment Sampling Plan for Nine Former Landfill Sites

PREPARED FOR:

**JOSEPH FALLON
PROJECT MANAGER
Directorate of Public Works
BUILDING 173
FORT MONMOUTH, NJ 07703
(732)-532-6223**

PREPARED BY:

**TECOM-VINNELL SERVICES (TVS)
ENVIRONMENTAL OFFICE
BUILDING 173
FORT MONMOUTH, NJ 07703**

TABLE OF CONTENTS

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1.3 Health and Safety	5
2.0 SITE INVESTIGATION ACTIVITIES	
2.1 Contacts and Personnel	6
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1.0 SAMPLING ACTIVITIES

1.1 OVERVIEW

This report provides details for a proposed sediment sampling plan as prepared by TECOM-Vinnell Services (TVS) on the behalf of the U.S. Army Fort Monmouth, Directorate of Public Works (DPW), Fort Monmouth, New Jersey. The purpose of this sampling initiative is to ascertain whether Polychlorinated Biphenyls (PCBs) are present within stream sediments which border nine former landfill sites (i.e. M-2, M-3, M-4, M-5, M-8, M-12, M-14, M-18 and CW-3A). The streams associated with this investigation include Mill Creek, Lafetra Creek, Parkers Creek, Husky Brook, and an unnamed tributary of Wampum Brook (see attachments 1 & 2). The data generated from this study will be used in conjunction with other previously collected data involving surface soils, subsurface soils, ground water and surface water. As part of the larger, ongoing remedial investigation at these nine landfill sites, PCBs were identified within subsurface soils at landfill sites M-2 and M-8. The Final Site Investigation (SI) Report, Fort Monmouth, New Jersey, Main Post and Charles Wood Areas (December 1995) identifies electronic components as one of the waste types being disposed of within the subject landfills. Said components (i.e. electrical ballasts) typically contained small quantities of insulating oil which may or may not have contained PCBs. Based upon the potential presence of electronic components at the other seven landfill sites, PCBs may also exist within subsurface soils at these locations. As part of previously conducted sampling initiatives, the DPW has been able to document that the PCBs identified at sites M-2 and M-8 have not impacted site ground water or surface water. Furthermore, PCBs have not been identified within site ground water or surface water at the other landfill sites. The overall goal of the proposed sampling plan is to document that the presence of PCBs at sites M-2 and M-8 have not impacted the nearby stream sediments.

This investigation will be conducted by TVS personnel in accordance with the specifications required for collecting sediment samples as determined by the New Jersey Department of Environmental Protection (NJDEP) Field Sampling Procedures Manual (May 1992) and the NJDEP Guidance For Sediment Quality Evaluations (November 1998).

1.2 SITE DESCRIPTION

Mill Creek is located along the northern side of the M-2 landfill (approximate distance 1,400 feet) and along the western side of the M-4 landfill (approximate distance 360 feet) and the M-5 landfill (approximate distance 570 feet). Lafetra Creek runs along the northern side of the M-3 landfill (approximate distance 1,200 feet), joining with Mill Creek to form Parkers Creek. Parkers Creek surrounds the M-8 landfill (approximate distance 1,500 feet) on the western, northern, and eastern sides. It then runs along the western side of the M-18 landfill (approximate distance 700 feet). Husky Brook runs along the northern side of the M-12 landfill, eventually running between the M-12 and M-14 landfills (combined approximate distance 1,700 feet) before flowing into Oceanport Creek. An unnamed tributary of Wampum Brook is located along the northern side of the CW-3A landfill (approximate distance 600 feet). Stream banks along the landfills vary from heavily vegetated with trees and bramble to simply grass. A stream bank restoration project is currently underway at the landfill sites located on the Main Post. The project entails stabilizing the stream banks through a combination of hard (rip-rap) and soft (vegetative plantings) engineering practices. All sites vary in steepness and have various access points. The streams flow constantly even in drought conditions and all but the unnamed tributary of Wampum Brook are tidally influenced. Currents and depth vary with tide.

1.3 HEALTH AND SAFETY

Before sampling activities commence, potential site hazards (physical, chemical and biological) will be evaluated by the TVS Health and Safety Office. A site specific Health and Safety Plan shall be prepared accordingly.

2.0 SITE INVESTIGATION ACTIVITIES

2.1 CONTACTS AND PERSONNEL

The following is a listing of all contacts and personnel involved in the investigation. All analyses are to be performed and reported by U.S. Army Fort Monmouth Environmental Laboratory, NJDEP- Certification # 13461. All sampling will be performed under the direct supervision of a NJDEP trained sample technician according to the methods described in the NJDEP Field Sampling Procedures Manual (1992) and as defined in this sampling plan.

The following parties are participants in this investigation:

- Environmental Protection Specialist: Joseph Fallon, CHMM
Employer: U.S. Army, Fort Monmouth Phone Number: (732) 532-6223
- Field Technician: Corey McCormack
Employer: TECOM-Vinnell Services (TVS) Phone Number: (732) 532-0989
- Analytical Laboratory: U.S. Army Fort Monmouth Environmental Laboratory
Contact Person: Daniel Wright - Phone Number: (732) 532-4359
Employer: TECOM-Vinnell Services
NJDEP Certification No.: 13461
- Field Technician Supervisor: Mark Laura
Employer: TECOM-Vinnell Services (TVS) Phone Number: (732) 532-0989
- Health and Safety Personnel: Bruce Wadlington, Chandra Jennings, and John Wierbowski. Employer: TVS - Phone Number: (732) 532-1706

2.2 SAMPLING PROCEDURES AND PROTOCOL

During the investigation, all samples will be collected with proper attention to quality assurance protocols and in accordance with the guidelines set forth by the New Jersey Department of Environmental Protection (NJDEP) Field Sampling Procedures Manual (May, 1992), the Technical Requirements for Site Remediation (NJAC 7:26E, June, 1993) and the NJDEP Guidance for Sediment Quality Evaluations (November 1998).

2.2.1 SITE ACTIVITIES

Site activities shall include recording field conditions and other relevant observations, sampling sediments, plotting sample locations by use of our Global Positioning System (GPS), decontamination of equipment, and preservation and storage of samples.

2.2.2 SEDIMENT SAMPLING

Sample locations will be determined, sampled, and recorded in the following way:

1. Samples will be taken from clearly discernable depositional areas in and along the streams. In the event that no clear depositional areas can be located, a sample will be taken from the best possible stream bed point at the rate of 1 sample for every 100 feet.
2. Samples will be taken at a depth of 0-6 inches for surface deposits and 6-12 inches for subsurface deposits in each sampling event. Based upon the individual thickness of each depositional area, an 18-24 inch deep sample will also be taken if the desired depth is obtainable.
3. Sampling will commence from downstream, working upstream. Care will be taken to minimize disturbance of sediments and washing of samples as collected.
4. Tide, weather, recent activity, and notable observations will be recorded.
5. A boring log shall be created to note any layers, particle sizes, and defining aspects to each boring.
6. Sampling will be conducted using a hand core sediment sampler.
7. Samples for PCBs analysis will be collected into new, pre-cleaned, 4oz. clear glass jars with Teflon lined caps. All samples will be stored in a cooler at 4 degrees Celsius.
8. After each sampling event, equipment will be decontaminated as stated in section 2.3.
9. Each sample location will be plotted using our GPS.

2.2.3 QA/QC

Quality control samples are required to verify that the sample collection and handling process has not affected the quality of the sediment samples. All field quality control samples will be prepared exactly as regular investigation samples with regard to volume and containers. The following quality control samples will be collected for each batch of samples:

- Field duplicate daily or one every 20 samples; homogenized before splitting.

2.3 EQUIPMENT DECONTAMINATION

Decontamination will be done after every sampling event by the following procedure:

1. Alconox and water wash
2. Water rinse
3. Deionized water rinse
4. Air dry

Appendix C

Soil Boring Logs



U.S. ARMY
FORT MONMOUTH
SELF-M-PW-EV

LOG OF BORING B-1

(Page 1 of 1)

US ARMY
FT. MONMOUTH N.J.
SELF-M-PW-EV
JOSEPH FALLON

DATE COMPLETED : 04/12/00
SAMPLE DEVICE : WILDCO SEDIMENT SAMPLER
SAMPLER : COREY MCCORMACK
CONTRACTOR : TVS-PWS-07 ENV.
LOCATON : M18.

M18 Landfill Sediments

Depth in INCHES	Lab No.	Samples	DESCRIPTION	TIME			
0			SANDY SILT, Fine. Black.				
4	5336.01	1		1319			
8	5336.02	2	SILTY SAND, Fine. Black.	1321			
12							
16							
20							
24							

04-21-2000 X:\MTECH\LANDFI-1\M18-1.BOR

 U.S. ARMY FORT MONMOUTH SELF-M-PW-EV			LOG OF BORING B-2 (Page 1 of 1)				
US ARMY FT. MONMOUTH N.J. SELF-M-PW-EV JOSEPH FALLON			DATE COMPLETED : 04/12/00 SAMPLE DEVICE : WILDCO SEDIMENT SAMPLER SAMPLER : COREY MCCORMACK CONTRACTOR : TVS-PWS-07 ENV. LOCATON : M18				
M18 Landfill Sediments							
Depth in INCHES	Lab No.	Samples	DESCRIPTION	TIME			
0			Lg. Rounds. Yellow.				
	5336.03	1	SAND, Fine. Black. Some Lg.-Sm. Rounds. Yellow.	1326			
4							
	5336.04	2	SAND, Fine. Black. Med. Rounds. Yellow.	1328			
8							
12							
16							
20							
24							

04-21-2000 X:\MTECH\ISLAND\1-M18-2.BOR

 U.S. ARMY FORT MONMOUTH SELF-M-PW-EV			LOG OF BORING B-3 (Page 1 of 1)				
US ARMY FT. MONMOUTH N.J. SELF-M-PW-EV JOSEPH FALLON			DATE COMPLETED : 04/12/00 SAMPLE DEVICE : WILDCO SEDIMENT SAMPLER SAMPLER : COREY MCCORMACK CONTRACTOR : TVS-PWS-07 ENV. LOCATON : M18				
M18 Landfill Sediments							
Depth in INCHES	Lab No.	Samples	DESCRIPTION	TIME			
0			SAND, Fine. Black.				
4	5336.05	1		1330			
8	5336.06	2	SILTY SAND, Fine. Black.	1332			
12							
16							
20							
24							

04-21-2000 X:\WTECH\LANDOFF-1\M18-3.BOR

 U.S. ARMY FORT MONMOUTH SELF-M-PW-EV			LOG OF BORING B-4 (Page 1 of 1)				
US ARMY FT. MONMOUTH N.J. SELF-M-PW-EV JOSEPH FALLON			DATE COMPLETED : 04/12/00 SAMPLE DEVICE : WILDCO SEDIMENT SAMPLER SAMPLER : COREY MCCORMACK CONTRACTOR : TVS-PWS-07 ENV. LOCATON : M18				
M18 Landfill Sediments							
Depth in INCHES	Lab No.	Samples	DESCRIPTION	TIME			
0			SAND, Fine. Black.				
5336.07	1			1334			
4							
			SAND, Fine. Black.				
5336.08	2			1336			
8							
12							
16							
20							
24							

04-21-2000 X:\MTECH\LANDOFF-1\W18-4.BOR

Appendix D

Soil Laboratory Data Sheets

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: Stream Sediments

M18 Landfill

Field Sample Location	Laboratory Sample ID#	Matrix	Date and Time of Collection	Date Received
M18/1 0-6"	5336.01	Sediment	12-Apr-00 13:19	04/12/00
M18/1 6-12"	5336.02	Sediment	12-Apr-00 13:21	04/12/00
M18/2 0-6"	5336.03	Sediment	12-Apr-00 13:26	04/12/00
M18/2 6-12"	5336.04	Sediment	12-Apr-00 13:28	04/12/00
M18/3 0-6"	5336.05	Sediment	12-Apr-00 13:30	04/12/00
M18/3 6-12"	5336.06	Sediment	12-Apr-00 13:32	04/12/00
M18/4 0-6"	5336.07	Sediment	12-Apr-00 13:34	04/12/00
M18/4 6-12"	5336.08	Sediment	12-Apr-00 13:36	04/12/00

ANALYSIS:
FORT MONMOUTH ENVIRONMENTAL LAB
PCB's, %SOLIDS

ENCLOSURE:
CHAIN OF CUSTODY
RESULTS

 5-15-00
Daniel Wright/Date
Laboratory Director

CHAIN OF CUSTODY

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

Chain of Custody Record

Customer: J. F. 10/10		Project No:		Analysis Parameters				Comments:	
Phone #: 620223		Location: M1B Landfill							
(X)DERA ()OMA ()Other:		Stream Sediments						24%	
Samplers Name / Company: Carey Mc Cormack, JWS		Sample #						Remarks / Preservation Method	
Lab Sample ID.	Sample Location	Date	Time	Sample Type	bottles				
5336 .01	M1B 1 0-6"	4/12/00	1319	Sed	1				
.02	" 1 6-12"		1321		1				
.03	M1B 2 0-6"		1326		1				
.04	" 2 6-12"		1328		1				
.05	M1B 3 0-6"		1330		1				
.06	" 3 6-12"		1332		1				
.07	M1B 4 0-6"		1334		1				
.08	" 4 6-12"		1336		1				
.09									
.10									
Relinquished by (signature): Carey Mc Cormack		Date/Time: 2/12/00 1530	Received by (signature): J. F. 10/10		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, () JEDD		Turnaround time: () Standard 3 wks, (X) Rush 10 Days, () ASAP Verbal Hrs.		Remarks: Tide: L					

Landfill Stream Sediment PCB's Sample Event Site Field Summary for M18

Parkers Creek runs along the western side of the M18 landfill for approximately 700 feet. A portion of the landfill has had stream bank restoration started. This consists of large rock and rip-rap. Previously the bank was exposed and eroding away. Reeds and some smaller vegetation were present.

Flow here is constant, and the depth varies with the tide. Weather at time of sampling was cold, windy, and sunny. Tide was low and just beginning to return. There was a light rain event the morning of the day prior to sampling.

Depositional areas were hard to find, but some portions of the stream banks had "shelves". These were targeted for sampling. When an area could not be found to sample, 1 sample was taken per 100 feet.

PCB's

U.S. Army, Fort Monmouth Environmental Laboratory
NJDEP Certification # 13461

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

Lab. ID # : PBLK508
Date Rec'd:
Extraction Date: 4/13/00
Analysis Date: 4/18/00

Analysis: SW-846 Method 8082
Matrix: Sediment
Analyst: T. Frankovich

Location :
Field ID:

Pesticide/PCB	Dilution Factor	% Solid	MDL (mg/kg)	Result (mg/kg)	Lowest Effects Level (LEL)*	Severe Effects Level (SEL)*	Weight (g)
Arochlor 1016	1	100.00	0.0022	ND	0.007	53.000	10.00
Arochlor 1221	1	100.00	0.0041	ND	NA	NA	10.00
Arochlor 1232	1	100.00	0.0028	ND	NA	NA	10.00
Arochlor 1242	1	100.00	0.0032	ND	NA	NA	10.00
Arochlor 1248	1	100.00	0.0013	ND	0.030	150.000	10.00
Arochlor 1254	1	100.00	0.0008	ND	0.060	34.000	10.00
Arochlor 1260	1	100.00	0.0007	ND	0.005	24.000	10.00
Total PCB	1	100.00	0.0152	ND	0.070	530.000	10.00

* NJDEP Guidance For Sediment Quality Evaluations, November 1998

ND = Not Detected

MDL = Method Detection Limit

NA = Not Applicable

Column-Primary:

Column-Confirmation:

Rtx-5 30m/.32mmID/.25um

Rtx-1701 30m/.32mmID/.25um

U.S. Army, Fort Monmouth Environmental Laboratory
NJDEP Certification # 13461

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

Lab. ID # : 5336.01
Date Rec'd: 4/12/00
Extraction Date: 4/13/00
Analysis Date: 4/18/00

Analysis: SW-846 Method 8082
Matrix: Sediment
Analyst: T. Frankovich

Location : M18 Landfill
Stream Sediments
Field ID: M18 10-6"

Pesticide/PCB	Dilution Factor	% Solid	MDL (mg/kg)	Result (mg/kg)	Lowest Effects Level (LEL)*	Severe Effects Level (SEL)*	Weight (g)
Arochlor 1016	1	39.80	0.0027	ND	0.007	53.000	10.41
Arochlor 1221	1	39.80	0.0050	ND	NA	NA	10.41
Arochlor 1232	1	39.80	0.0034	ND	NA	NA	10.41
Arochlor 1242	1	39.80	0.0039	ND	NA	NA	10.41
Arochlor 1248	1	39.80	0.0015	ND	0.030	150.000	10.41
Arochlor 1254	1	39.80	0.0010	0.220	0.060	34.000	10.41
Arochlor 1260	1	39.80	0.0009	ND	0.005	24.000	10.41
Total PCB	1	39.80	0.0183	0.220	0.070	530.000	10.41

* NJDEP Guidance For Sediment Quality Evaluations, November 1998

ND = Not Detected

MDL = Method Detection Limit

NA = Not Applicable

Column-Primary:

Rtx-5 30m/.32mmID/.25um

Column-Confirmation:

Rtx-1701 30m/.32mmID/.25um

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

Lab. ID # : 5336.02
Date Rec'd: 4/12/00
Extraction Date: 4/13/00
Analysis Date: 4/18/00

Analysis: SW-846 Method 8082
Matrix: Sediment
Analyst: T. Frankovich

Location : M18 Landfill
Stream Sediments
Field ID: M18 1 6-12"

Pesticide/PCB	Dilution Factor	% Solid	MDL (mg/kg)	Result (mg/kg)	Lowest Effects Level (LEL)*	Severe Effects Level (SEL)*	Weight (g)
Arochlor 1016	1	73.22	0.0029	ND	0.007	53.000	10.42
Arochlor 1221	1	73.22	0.0054	ND	NA	NA	10.42
Arochlor 1232	1	73.22	0.0037	ND	NA	NA	10.42
Arochlor 1242	1	73.22	0.0042	ND	NA	NA	10.42
Arochlor 1248	1	73.22	0.0017	ND	0.030	150.000	10.42
Arochlor 1254	1	73.22	0.0010	ND	0.060	34.000	10.42
Arochlor 1260	1	73.22	0.0009	ND	0.005	24.000	10.42
Total PCB	1	73.22	0.0199	ND	0.070	530.000	10.42

* NJDEP Guidance For Sediment Quality Evaluations, November 1998

ND = Not Detected

MDL = Method Detection Limit

NA = Not Applicable

Column-Primary:

Column-Confirmation:

Rtx-5 30m/.32mmID/.25um

Rtx-1701 30m/.32mmID/.25um

U.S. Army, Fort Monmouth Environmental Laboratory
NJDEP Certification # 13461

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

Lab. ID # : 5336.03
Date Rec'd: 4/12/00
Extraction Date: 4/13/00
Analysis Date: 4/18/00

Analysis: SW-846 Method 8082
Matrix: Sediment
Analyst: T. Frankovich

Location : M18 Landfill
Stream Sediments
Field ID: M18 2 0-6"

Pesticide/PCB	Dilution Factor	% Solid	MDL (mg/kg)	Result (mg/kg)	Lowest Effects Level (LEL)*	Severe Effects Level (SEL)*	Weight (g)
Arochlor 1016	1	86.73	0.0025	ND	0.007	53.000	10.31
Arochlor 1221	1	86.73	0.0046	ND	NA	NA	10.31
Arochlor 1232	1	86.73	0.0031	ND	NA	NA	10.31
Arochlor 1242	1	86.73	0.0036	ND	NA	NA	10.31
Arochlor 1248	1	86.73	0.0014	ND	0.030	150.000	10.31
Arochlor 1254	1	86.73	0.0009	0.055	0.060	34.000	10.31
Arochlor 1260	1	86.73	0.0008	ND	0.005	24.000	10.31
Total PCB	1	86.73	0.0170	0.055	0.070	530.000	10.31

* NJDEP Guidance For Sediment Quality Evaluations, November 1998

ND = Not Detected

MDL = Method Detection Limit

NA = Not Applicable

Column-Primary:

Column-Confirmation:

Rtx-5 30m/.32mmID/.25um

Rtx-1701 30m/.32mmID/.25um

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

Lab. ID # : 5336.04
Date Rec'd: 4/12/00
Extraction Date: 4/13/00
Analysis Date: 4/18/00

Analysis: SW-846 Method 8082
Matrix: Sediment
Analyst: T. Frankovich

Location : M18 Landfill
Stream Sediments
Field ID: M18 2 6-12"

Pesticide/PCB	Dilution Factor	% Solid	MDL (mg/kg)	Result (mg/kg)	Lowest Effects Level (LEL)*	Severe Effects Level (SEL)*	Weight (g)
Arochlor 1016	1	73.54	0.0030	ND	0.007	53.000	10.23
Arochlor 1221	1	73.54	0.0055	ND	NA	NA	10.23
Arochlor 1232	1	73.54	0.0037	ND	NA	NA	10.23
Arochlor 1242	1	73.54	0.0043	ND	NA	NA	10.23
Arochlor 1248	1	73.54	0.0017	ND	0.030	150.000	10.23
Arochlor 1254	1	73.54	0.0011	ND	0.060	34.000	10.23
Arochlor 1260	1	73.54	0.0010	ND	0.005	24.000	10.23
Total PCB	1	73.54	0.0202	ND	0.070	530.000	10.23

* NJDEP Guidance For Sediment Quality Evaluations, November 1998

ND = Not Detected

MDL = Method Detection Limit

NA = Not Applicable

Column-Primary:

Column-Confirmation:

Rtx-5 30m/.32mmID/.25um

Rtx-1701 30m/.32mmID/.25um

U.S. Army, Fort Monmouth Environmental Laboratory
NJDEP Certification # 13461

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

Lab. ID # : 5336.05
Date Rec'd: 4/12/00
Extraction Date: 4/13/00
Analysis Date: 4/18/00

Analysis: SW-846 Method 8082
Matrix: Sediment
Analyst: T. Frankovich

Location : M18 Landfill
Stream Sediments
Field ID: M18 3 0-6"

Pesticide/PCB	Dilution Factor	% Solid	MDL (mg/kg)	Result (mg/kg)	Lowest Effects Level (LEL)*	Severe Effects Level (SEL)*	Weight (g)
Arochlor 1016	1	60.16	0.0018	ND	0.007	53.000	10.40
Arochlor 1221	1	60.16	0.0033	ND	NA	NA	10.40
Arochlor 1232	1	60.16	0.0022	ND	NA	NA	10.40
Arochlor 1242	1	60.16	0.0026	ND	NA	NA	10.40
Arochlor 1248	1	60.16	0.0010	ND	0.030	150.000	10.40
Arochlor 1254	1	60.16	0.0006	ND	0.060	34.000	10.40
Arochlor 1260	1	60.16	0.0006	ND	0.005	24.000	10.40
Total PCB	1	60.16	0.0121	ND	0.070	530.000	10.40

* NJDEP Guidance For Sediment Quality Evaluations, November 1998

ND = Not Detected

MDL = Method Detection Limit

NA = Not Applicable

Column-Primary:

Column-Confirmation:

Rtx-5 30m/.32mmID/.25um

Rtx-1701 30m/.32mmID/.25um

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

Lab. ID # : 5336.06
Date Rec'd: 4/12/00
Extraction Date: 4/13/00
Analysis Date: 4/18/00

Analysis: SW-846 Method 8082
Matrix: Sediment
Analyst: T. Frankovich

Location : M18 Landfill
Stream Sediments
Field ID: M18 3 6-12"

Pesticide/PCB	Dilution Factor	% Solid	MDL (mg/kg)	Result (mg/kg)	Lowest Effects Level (LEL)*	Severe Effects Level (SEL)*	Weight (g)
Arochlor 1016	1	61.81	0.0018	ND	0.007	53.000	10.19
Arochlor 1221	1	61.81	0.0033	ND	NA	NA	10.19
Arochlor 1232	1	61.81	0.0022	ND	NA	NA	10.19
Arochlor 1242	1	61.81	0.0025	ND	NA	NA	10.19
Arochlor 1248	1	61.81	0.0010	ND	0.030	150.000	10.19
Arochlor 1254	1	61.81	0.0006	ND	0.060	34.000	10.19
Arochlor 1260	1	61.81	0.0006	ND	0.005	24.000	10.19
Total PCB	1	61.81	0.0120	ND	0.070	530.000	10.19

* NJDEP Guidance For Sediment Quality Evaluations, November 1998

ND = Not Detected

MDL = Method Detection Limit

NA = Not Applicable

Column-Primary:

Column-Confirmation:

Rtx-5 30m/.32mmID/.25um

Rtx-1701 30m/.32mmID/.25um

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

Lab. ID # : 5336.07
Date Rec'd: 4/12/00
Extraction Date: 4/13/00
Analysis Date: 4/18/00

Analysis: SW-846 Method 8082
Matrix: Sediment
Analyst: T. Frankovich

Location : M18 Landfill
Stream Sediments
Field ID: M18 4 0-6"

Pesticide/PCB	Dilution Factor	% Solid	MDL (mg/kg)	Result (mg/kg)	Lowest Effects Level (LEL)*	Severe Effects Level (SEL)*	Weight (g)
Arochlor 1016	1	66.02	0.0033	ND	0.007	53.000	10.42
Arochlor 1221	1	66.02	0.0060	ND	NA	NA	10.42
Arochlor 1232	1	66.02	0.0041	ND	NA	NA	10.42
Arochlor 1242	1	66.02	0.0047	ND	NA	NA	10.42
Arochlor 1248	1	66.02	0.0019	ND	0.030	150.000	10.42
Arochlor 1254	1	66.02	0.0012	ND	0.060	34.000	10.42
Arochlor 1260	1	66.02	0.0010	ND	0.005	24.000	10.42
Total PCB	1	66.02	0.0220	ND	0.070	530.000	10.42

* NJDEP Guidance For Sediment Quality Evaluations, November 1998

ND = Not Detected

MDL = Method Detection Limit

NA = Not Applicable

Column-Primary:

Column-Confirmation:

Rtx-5 30m/.32mmID/.25um

Rtx-1701 30m/.32mmID/.25um

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

Lab. ID # : 5336.08
Date Rec'd: 4/12/00
Extraction Date: 4/13/00
Analysis Date: 4/18/00

Analysis: SW-846 Method 8082
Matrix: Sediment
Analyst: T. Frankovich

Location : M18 Landfill
Stream Sediments
Field ID: M18 4 6-12"

Pesticide/PCB	Dilution Factor	% Solid	MDL (mg/kg)	Result (mg/kg)	Lowest Effects Level (LEL)*	Severe Effects Level (SEL)*	Weight (g)
Arochlor 1016	1	72.17	0.0031	ND	0.007	53.000	10.13
Arochlor 1221	1	72.17	0.0056	ND	NA	NA	10.13
Arochlor 1232	1	72.17	0.0038	ND	NA	NA	10.13
Arochlor 1242	1	72.17	0.0044	ND	NA	NA	10.13
Arochlor 1248	1	72.17	0.0018	ND	0.030	150.000	10.13
Arochlor 1254	1	72.17	0.0011	ND	0.060	34.000	10.13
Arochlor 1260	1	72.17	0.0010	ND	0.005	24.000	10.13
Total PCB	1	72.17	0.0207	ND	0.070	530.000	10.13

* NJDEP Guidance For Sediment Quality Evaluations, November 1998

ND = Not Detected

MDL = Method Detection Limit

NA = Not Applicable

Column-Primary:

Column-Confirmation:

Rtx-5 30m/.32mmID/.25um

Rtx-1701 30m/.32mmID/.25um