

FINAL

Remedial Investigation Report And Sediment Quality Evaluation

M-4 Landfill Site

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



Directorate of Public Works



February 4, 2004

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Fort Monmouth, New Jersey

**Remedial Investigation Report and
Sediment Quality Evaluation
for the
M-4 Landfill Site**

Fort Monmouth, New Jersey

February 4, 2004

**REMEDIAL INVESTIGATION REPORT AND
SEDIMENT QUALITY EVALUATION
FOR THE M-4 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-4 Landfill site. This report describes the remedial investigation activities conducted at the site on April 13, 2000.

The site is located on the Main Post Area of Fort Monmouth in an area bounded by the Avenue of Memories to the south, North Drive to the north, Mill Creek to the west, and by Wilson Avenue to the east. The M-4 Landfill site occupies approximately 1.4 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-4 Landfill site had been used in 1956 for the disposal of building demolition debris from 72 World War II (WWII) buildings that were demolished on the Main Post. Weston conducted groundwater sampling at two downgradient wells and one upgradient well during its 1995 Site Investigation (SI). The results of that investigation indicated that one pesticide compound was detected above the New Jersey Department of Environmental Protection (NJDEP) Groundwater Quality Criteria (GWQC) in both the upgradient well and in a duplicate sample. No pesticides were detected in the downgradient wells (Weston, 1995). Surface water sampling in Mill Creek was not conducted during the Weston 1995 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 (CW-3A only) landfill sites. The M-4 Landfill site was included in the sediment sampling program to supplement the Weston findings related to soil and groundwater matrices.

To determine potential PCB-related impacts to sediments in Mill Creek, the DPW collected 13 sediment samples on April 13, 2000, from the surface and near-surface sediments of Mill Creek. The samples were obtained along the 360-foot portion of Mill Creek that flows adjacent to the western perimeter of the M-4 Landfill site. All 13 sediment samples were analyzed for PCBs and compared to sediment sampling guidance concentrations defined in the 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 only one of 13 samples (0.051 mg/kg, B-5, 6-12" bgs) with Total PCBs detected above the laboratory Method Detection Limit (MDL). This sample result also exceeds the NJDEP Effects Range – Low (ER-L) guidance concentration for Total PCBs, which represents the concentration at which adverse benthic effects are found in approximately 10% of studies. No other guidance criteria were exceeded. Analysis of the remaining 12 samples, including upgradient samples, did not indicate PCBs above laboratory MDLs. Because the result at Boring B-5 exceeds only the ER-L guidance concentration, and the proximal upgradient samples were non-detect (ND) for Total PCBs, no long-term adverse benthic effects are expected in Mill Creek.

Based on the results of this sediment quality evaluation, No Further Action (NFA) is recommended for the M-4 Landfill site related to potential PCB impacts to the sediments of Mill 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-4 Landfill site located at the Fort Monmouth Main Post Area. This report addresses the remedial investigation activities performed at this site on April 13, 2000.

1.1 Objectives

Other studies conducted at similar Main Post landfill sites (M-2 and M-8) 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-4 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 Mill Creek, which flows along the western perimeter of the M-4 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 Mill Creek along the western perimeter of the M-4 Landfill site.
- 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-4 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-4 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-4 Landfill site is bounded by the Avenue of Memories to the south, North Drive to the north, Mill Creek to the west and Wilson Avenue to the east in the Main Post Area (**Figure 2-2**). The approximate area of the M-4 Landfill site is 61,800 ft² (1.4 acres). The 360-foot portion of Mill Creek that flows along the western perimeter of the M-4 Landfill site has reinforced concrete plates covered with grass, various plants and bramble.

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

The Weston report, *Site Investigation, Fort Monmouth, New Jersey, Main Post and Charles Wood Areas, Site Investigation Report* (December 1995), documents the installation and sampling of two downgradient groundwater monitoring wells and one upgradient well. The groundwater samples were analyzed for Volatile Organic

Compounds (VOCs), Semi-Volatile Organic Compounds (SVOCs), Pesticides, PCBs, Target Analyte List (TAL) Metals, and Cyanide. According to the Weston SI report, no VOCs or SVOCs were detected above NJDEP GWQC, and one pesticide was detected slightly above the NJDEP GWQC in the upgradient well and in a duplicate sample. No pesticides were detected in the downgradient wells. No PCBs or Cyanide were detected in any of the sampling rounds. Four metals were detected at concentrations above NJDEP GWQC, but below site-specific and Monmouth County Maximum Background Concentrations (MBC). Surface water sampling was not conducted in Mill Creek during the Weston SI. The Weston SI report recommended the implementation of 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 and findings at other Main Post landfill sites.

2.3 Current Conditions

VERSAR conducted a site walk on December 11, 2000 to assess current conditions at the M-4 Landfill site. The site consisted of an open field, which is maintained through landscaping. 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-4 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-4 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 2-4**.

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 (Zapcza, 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 in the vicinity of the M-4 Landfill site is assumed to be to the west towards Mill Creek.

As presented in the Weston SI, the boring logs from monitoring well installations indicate that the lithology consists of a thin soil cover (0.4 feet) underlain by alternating layers of reworked sand, silt, and broken concrete gravel pieces with interbedded plant-root fragments. Borehole logs also represent a lithology consisting of orange-olive-brown fine-coarse sand with little silt at this site. Groundwater saturation was observed at approximately 7 feet bgs at each well location during drilling activities. Water-level

elevation data collected during the Weston SI indicate that local groundwater flow is west toward Mill 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 2-5**). 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-4 Landfill site are classified as HV – Humaquepts, frequently flooded.

2.4.5 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-4 Landfill site is located on the floodplain of Mill 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 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 Creek 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. Lafetra Creek forms the northern boundary of the Main Post and joins Mill Creek to form Parkers Creek. 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

The Fort Monmouth DPW conducted sediment sampling in Mill Creek to evaluate potential PCB-related impacts to stream sediments associated with the M-4 Landfill site. On April 13, 2000, six borings were installed at a maximum spacing of 80 feet, ranging from approximately 60-80 feet, along the bottom of Mill Creek, as shown in **Figure 3-1**. The locations extended from downstream at Boring B-1 near North Drive to Boring B-6 upstream near the Avenue of Memories, and were sampled accordingly in that order (see chain-of-custody records, **Appendix D**). The sediment sampling was conducted in accordance with the *Installation Landfill Program Sediment Sampling Plan for Nine Former Landfill Sites* (TVS, March 2000) found in **Appendix B**. The Sediment Sampling Plan (SSP) was approved by the NJDEP on April 3, 2000.

Thirteen sediment samples were collected from six borings using a Wildco Sediment Sampler. The samples were obtained along the 360-foot portion of Mill Creek that flows along the western perimeter of the M-4 Landfill site. Sample depths ranged from surface (0-6 inches) to near-surface (6-12 inches bgs) at each boring location, with the exception of Boring B-5, which was also sampled at a depth of 18-24 inches bgs. The sediment samples consisted of yellow to brown to dark brown fine sand and silty sand with small and medium rounds. As required by the SSP, downstream samples were collected first beginning at location B-1 and proceeding upstream to location B-6. 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 13, 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 13, 2000, the DPW collected 13 sediment samples along the bottom of Mill Creek to evaluate potential PCB-related impacts to stream sediments from the adjacent M-4 Landfill site. Six borings were installed at a maximum spacing of 80 feet, ranging from approximately 60-80 feet, along the bottom of Mill Creek. Thirteen samples were collected from six borings at depths ranging from surface (0-6 inches) to near-surface (6-12 inches bgs) at each boring location, with the exception of Borings B-5, which was also sampled at a depth of 18-24 inches bgs. Samples were identified in the field using the following nomenclature: M-4/1 0-6", M-4/1 6"-12" to M-4/6 0-6", M-4/6 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 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-6). Therefore, the upgradient sediments are most closely represented by the laboratory data results for Boring B-6 (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 (LEL) and the Severe Effects Levels (SEL) 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-4 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-4 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 one sample that was detected above the laboratory Method Detection Limit (MDL). This result (0.051 ppm at Boring B-5, 6"-12" bgs) exceeds the ER-L guidance concentration of 0.023 ppm for Total PCBs, but does not exceed the ER-M (0.180 mg/kg) or the LEL for Arochlor 1254 (0.060 mg/kg). Arochlor 1254 is the only Arochlor detected at the site. The SSEL for Arochlor 1254 (0.34 mg/kg) was not exceeded.

As a result of the exceedence of the ER-L at Boring B-5, another sample was obtained at 18-24 inches bgs in Boring B-5. The deeper sample had no detection of PCBs above the MDL. Because the upgradient samples proximal to Boring B-5 did not present detections above the laboratory MDL, the shallow sample result at B-5 is likely isolated. Therefore, PCBs are not expected to have significant long-term adverse benthic effects in Mill Creek. The sample results are summarized in **Table 4-1**. The laboratory data sheets are presented 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, a single exceedence of the ER-L guidance concentration of 0.023 mg/kg for Total PCBs in Boring B-5 was detected (0.051 mg/kg). The 12 remaining sediment samples analyzed during this investigation were ND for PCBs.

The ER-M of 0.180 mg/kg for Total PCBs and the LEL/SSEL of 0.060 mg/kg and 0.34 mg/kg for the individual Arochlor (Arochlor 1254) was not exceeded. The result at Boring B-5 exceeds the ER-L guidance concentration, which indicates the potential for adverse benthic effects in approximately 10% of studies. However, the proximal upgradient sediment samples were all ND for Total PCBs. Therefore, minimal potential exists for significant long-term adverse benthic effects in Mill Creek.

Based on the results of this sediment quality evaluation, NFA is recommended for the M-4 Landfill site related to potential PCB impacts to the sediments of Mill Creek.

6.0 REFERENCES

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- 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-4 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	M4/ 1 0-6"	5343.01	4/13/2000	1440	0-6"	539074.185	617496.603	PCBs ⁽²⁾ (SW-846 Method 8082)	Yellow to Black Fine Sand to Silty Sand, Small Rounds
	M4/ 1 6-12"	5343.02	4/13/2000	1442	6"-12"				
B-2	M4/ 2 0-6"	5343.03	4/13/2000	1450	0-6"	539003.31	617483.618	PCBs (SW-846 Method 8082)	Yellow to Brown to Grey to Black Fine Sand w/Small/Medium Rounds
	M4/ 2 6-12"	5343.04	4/13/2000	1452	6"-12"				
B-3	M4/ 3 0-6"	5343.05	4/13/2000	1459	0-6"	538945.446	617475.776	PCBs (SW-846 Method 8082)	Brown to Grey to Yellow Fine Sand w/Small Rounds
	M4/ 3 6-12"	5343.06	4/13/2000	1503	6"-12"				
B-4	M4/ 4 0-6"	5343.07	4/13/2000	1505	0-6"	538873.112	617470.616	PCBs (SW-846 Method 8082)	Black/Brown/Yellow Fine Sand w/Small/Medium Rounds
	M4/ 4 6-12"	5343.08	4/13/2000	1509	6"-12"				
B-5	M4/ 5 0-6"	5343.09	4/13/2000	1511	0-6"	538794.44	617463.303	PCBs (SW-846 Method 8082)	Black/Brown Fine Sand
	M4/ 5 6-12"	5343.10	4/13/2000	1513	6"-12"				
	M4/ 5 18-24"	5343.11	4/13/2000	1515	18"-24"				
B-6	M4/ 6 0-6"	5343.12	4/13/2000	1517	0-6"	538711.159	617441.908	PCBs (SW-846 Method 8082)	Brown/Dark Brown/Black Fine Sand
	M4/ 6 6-12"	5343.13	4/13/2000	1519	6"-12"				

⁽¹⁾ bgs = below ground surface

⁽²⁾ PCBs = Polychlorinated Biphenyls

Table 4-1
PCB Sampling Results Summary
M-4 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	
B-1	0-6"	M4/ 1 0-6"	5343.01	4/13/2000	ND	0.0124
	6"-12"	M4/ 1 6-12"	5343.02	4/13/2000	ND	0.0127
B-2	0-6"	M4/ 2 0-6"	5343.03	4/13/2000	ND	0.0128
	6"-12"	M4/ 2 6-12"	5343.04	4/13/2000	ND	0.0128
B-3	0-6"	M4/ 3 0-6"	5343.05	4/13/2000	ND	0.0128
	6"-12"	M4/ 3 6-12"	5343.06	4/13/2000	ND	0.0124
B-4	0-6"	M4/ 4 0-6"	5343.07	4/13/2000	ND	0.0109
	6"-12"	M4/ 4 6-12"	5343.08	4/13/2000	ND	0.0114
B-5	0-6"	M4/ 5 0-6"	5343.09	4/13/2000	ND	0.0139
	6"-12"	M4/ 5 6-12"	5343.10	4/13/2000	0.051	0.0128
	18"-24"	M4/ 5 18-24"	5343.11	4/13/2000	ND	0.0134
B-6	0-6"	M4/ 6 0-6"	5343.12	4/13/2000	ND	0.0123
	6"-12"	M4/ 6 6-12"	5343.13	4/13/2000	ND	0.0125

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)

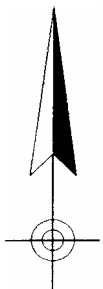
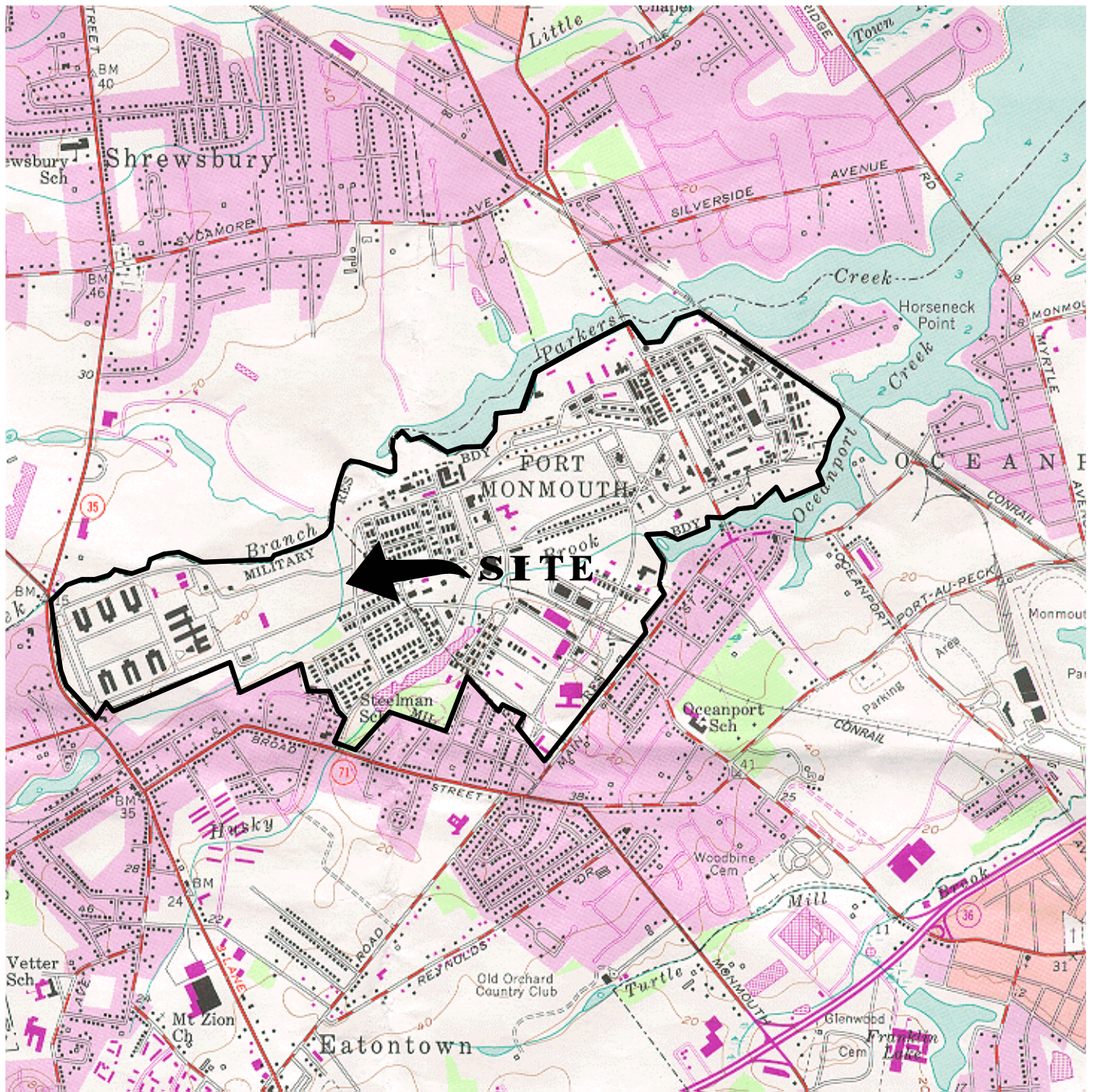
⁽⁶⁾Method Detection Limit (mg/kg) representing Total PCBs

ND = Analyte Not Detected in Sample

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

PCBs = Polychlorinated Biphenyls

FIGURES



LONG BRANCH, N. J.

40073-C8-TF-024

1954

PHOTOREVISED 1981

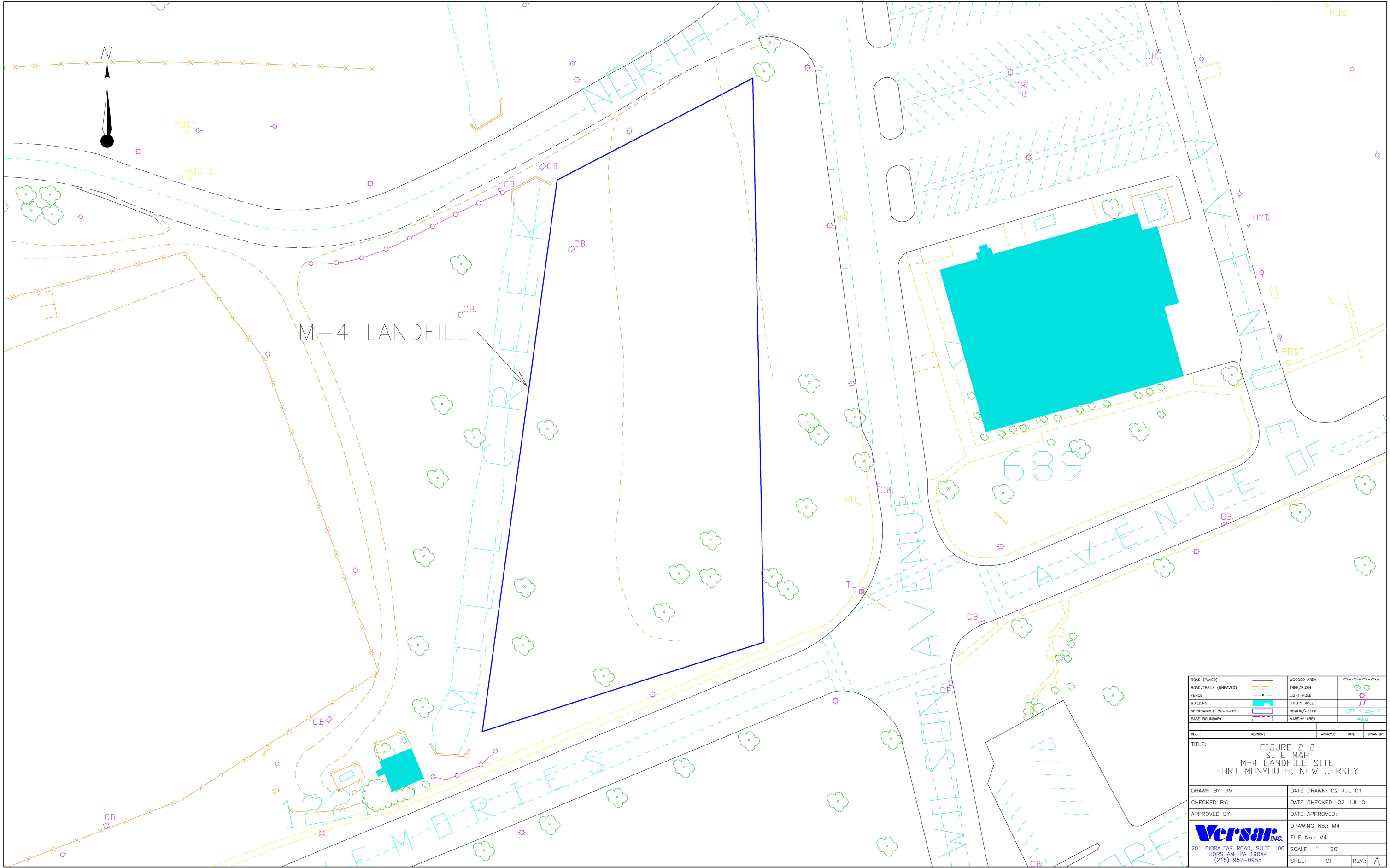
DMA 6164 1 SE-SERIES V822



QUADRANGLE LOCATION

Figure 2-1
Site Location Map
M-4 Landfill Site
Fort Monmouth, New Jersey

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



ROAD (PAVED)		WOODED AREA	
ROAD/TRAILS (UNPAVED)		TREE/BUSH	
FENCE		LIGHT POLE	
BUILDING		UTILITY POLE	
APPROXIMATE BOUNDARY		BROOK/CREEK	
BASE BOUNDARY		MARSHY AREA	

REV.	REVISIONS	APPROVED	DATE	DRAWN BY
TITLE: FIGURE 2-2 SITE MAP M-4 LANDFILL SITE FORT MONMOUTH, NEW JERSEY				
DRAWN BY: JM		DATE DRAWN: 02 JUL 01		
CHECKED BY:		DATE CHECKED: 02 JUL 01		
APPROVED BY:		DATE APPROVED:		
		DRAWING No.: M4		
201 GIBRALTAR ROAD, SUITE 100 HORSHAM, PA 19044 (215) 957-0955		FILE No.: M4		
SCALE: 1" = 60'		SHEET OF REV.: A		

Geologic Map of New Jersey

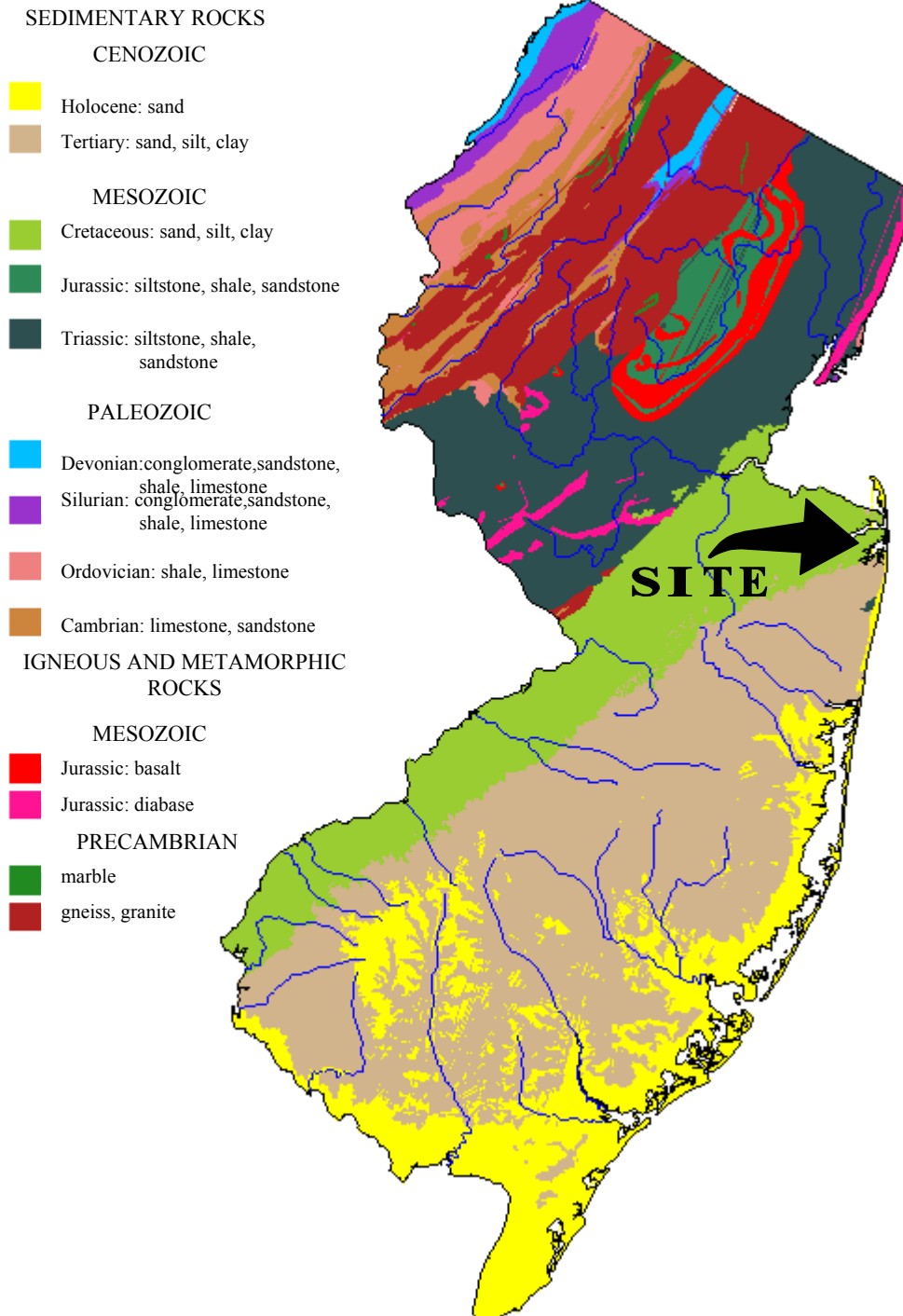
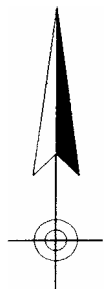
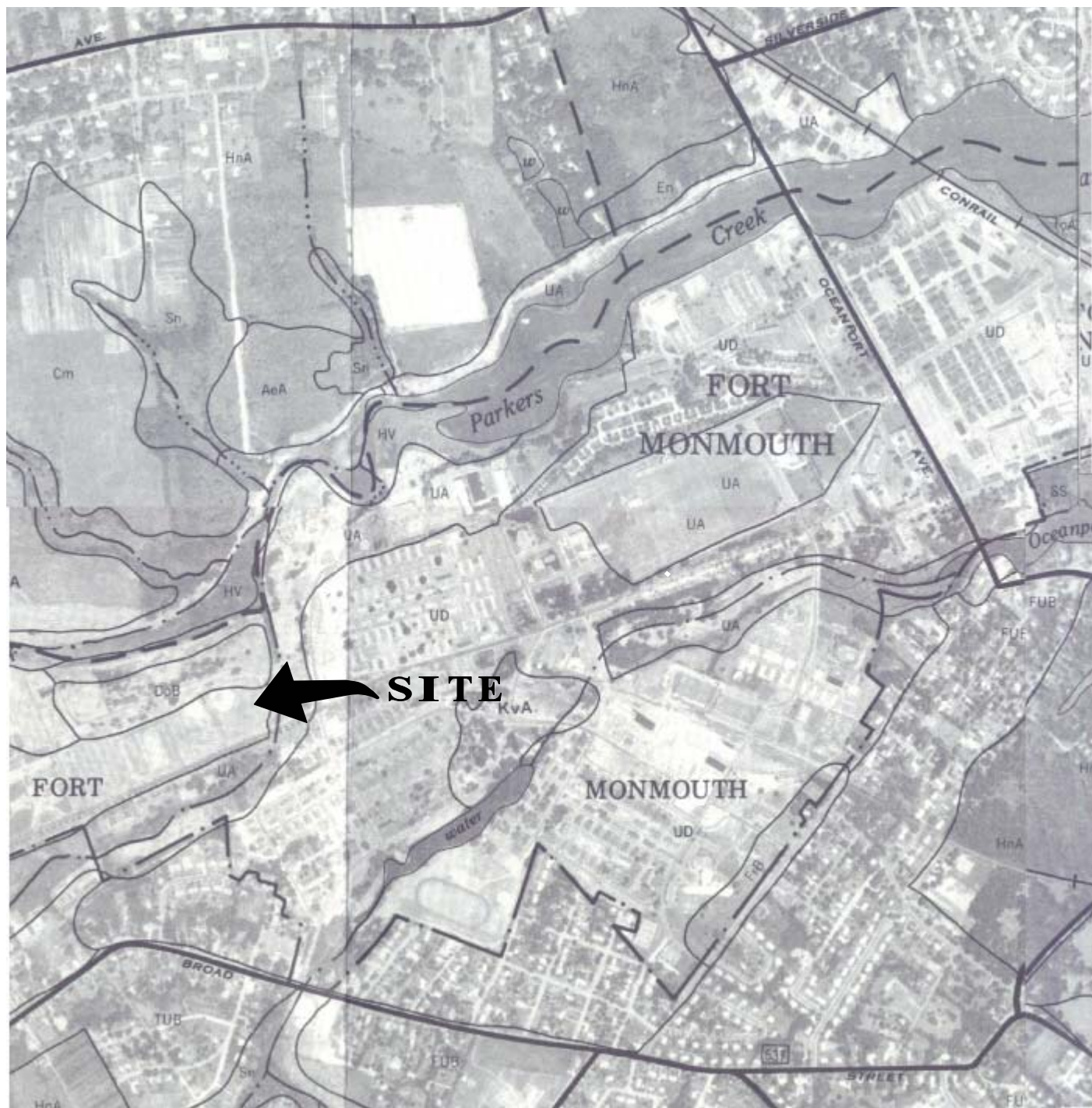


Figure 2-4
Geologic Map of New Jersey
M-4 Landfill Site
Fort Monmouth, New Jersey

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-4 Landfill Site
Fort Monmouth, New Jersey

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



ROAD (PAVED)	ROAD/TRAILS (UNPAVED)	FENCE	BUILDING	APPROXIMATE BOUNDARY	BASE BOUNDARY	WOODED AREA	TREE/BUSH	LIGHT POLE	UTILITY POLE	BROOK/CREEK	WETLAND

REV.	REVISIONS	APPROVED	DATE	DRAWN BY

● 4 = BORING LOCATION

TITLE: FIGURE 3-1
BORING LOCATION MAP
M-4 LANDFILL SITE
FORT MONMOUTH, NEW JERSEY

DRAWN BY: JM	DATE DRAWN: 02 JUL 01
CHECKED BY:	DATE CHECKED: 02 JUL 01
APPROVED BY:	DATE APPROVED:

Versar INC.
201 GIBRALTAR ROAD, SUITE 100
HORSHAM, PA 19044
(215) 957-0955

DRAWING No.: M4	FILE No.: M4
SCALE: 1" = 60'	SHEET OF REV.: A

APPENDICES

Appendix A

Current Conditions Site Photographs

Appendix A
Current Conditions Site Photographs
M-4 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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1.0 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 : 04/13/00
SAMPLE DEVICE : WILDCO SEDIMENT SAMPLER
SAMPLER : COREY MCCORMACK
CONTRACTOR : TVS-PWS-07 ENV.
LOCATON : M4

M4 Landfill Sediments

Depth in INCHES	Lab No.	Samples	DESCRIPTION	TIME			
0			SAND, Fine. Sm. Rounds. Yellow.				
5343.01		1	SAND, Fine. Black.	1440			
4							
8		2	SILTY SAND, Fine. Black.	1442			
5343.02							
12							
16							
20							
24							



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 : 04/13/00
SAMPLE DEVICE : WILDCO SEDIMENT SAMPLER
SAMPLER : COREY MCCORMACK
CONTRACTOR : TVS-PWS-07 ENV.
LOCATON : M4

M4 Landfill Sediments

Depth in INCHES	Lab No.	Samples	DESCRIPTION	TIME			
0			SAND, Fine. Brown. Sm. Rounds. Yellow.				
	5343.03	1	SAND, Fine. Brown/Grey.	1450			
4							
	5343.04	2	SAND, Fine. Black/Grey. Sm. and Med. Rounds. Yellow.	1452			
8							
			SILT, Fine. Black.				
12							
16							
20							
24							



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 : 04/13/00
SAMPLE DEVICE : WILDCO SEDIMENT SAMPLER
SAMPLER : COREY MCCORMACK
CONTRACTOR : TVS-PWS-07 ENV.
LOCATON : M4

M4 Landfill Sediments

Depth in INCHES	Lab No.	Samples	DESCRIPTION	TIME			
0			SAND, Fine. Brown.				
5343.05	1		SAND, Fine. Brown. Sm. Rounds. Yellow.	1459			
4							
8	5343.06	2	SAND, Fine. Grey. Sm. Rounds. Yellow	1503			
12							
16							
20							
24							



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 : 04/13/00
SAMPLE DEVICE : WILDCO SEDIMENT SAMPLER
SAMPLER : COREY MCCORMACK
CONTRACTOR : TVS-PWS-07 ENV.
LOCATON : M4

M4 Landfill Sediments

Depth in INCHES	Lab No.	Samples	DESCRIPTION	TIME			
0							
	5343.07	1	SAND, Fine. Black/Brown. Sm. and Med. Rounds. Yellow.	1505			
4							
	5343.08	2	SAND, Fine. Black/ Brown. Sm. and Med. Rounds. Yellow	1509			
8							
12							
16							
20							
24							



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

LOG OF BORING B-5

(Page 1 of 1)

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

DATE COMPLETED : 04/13/00
SAMPLE DEVICE : WILD CO SEDIMENT SAMPLER
SAMPLER : COREY MCCORMACK
CONTRACTOR : TVS-PWS-07 ENV.
LOCATON : M4

M4 Landfill Sediments

Depth in INCHES	Lab No.	Samples	DESCRIPTION	TIME			
0			SAND, Fine. Black/Brown.				
5343.09	1			1511			
4							
			SAND, Fiine. Black/ Brown.				
8							
5343.10	2			1513			
12			SAND, Fiine. Black/ Brown.				
16							
20							
5343.11	3			1515			
24							

04-18-2000 X:\MTECH\SLANDFI-1\M4-5.BOR



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

LOG OF BORING B-6

(Page 1 of 1)

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

DATE COMPLETED : 04/13/00
SAMPLE DEVICE : WILDCO SEDIMENT SAMPLER
SAMPLER : COREY MCCORMACK
CONTRACTOR : TVS-PWS-07 ENV.
LOCATION : M4

M4 Landfill Sediments

Depth in INCHES	Lab No.	Samples	DESCRIPTION	TIME			
0			SAND, Fine. Brown.				
5343.12	1		SAND, Fine. Black.	1517			
4							
8	5343.13	2	SILT, Fine. Dk. Brown.	1519			
12			SAND, Fine. Black.				
16							
20							
24							

Appendix D

Soil Laboratory Data Sheets

5

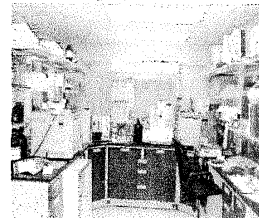
FORT MONMOUTH ENVIRONMENTAL TESTING LABORATORY

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

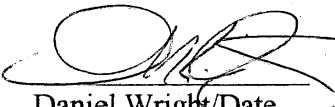
M4/Landfill

Field Sample Location	Laboratory Sample ID#	Matrix	Date and Time of Collection	Date Received
M4/ 1 0-6"	5343.01	Sediment	13-Apr-00 14:40	04/13/00
M4/ 1 6-12"	5343.02	Sediment	13-Apr-00 14:42	04/13/00
M4/ 2 0-6"	5343.03	Sediment	13-Apr-00 14:50	04/13/00
M4/ 2 6-12"	5343.04	Sediment	13-Apr-00 14:52	04/13/00
M4/ 3 0-6"	5343.05	Sediment	13-Apr-00 14:59	04/13/00
M4/ 3 6-12"	5343.06	Sediment	13-Apr-00 15:03	04/13/00
M4/ 4 0-6"	5343.07	Sediment	13-Apr-00 15:05	04/13/00
M4/ 4 6-12"	5343.08	Sediment	13-Apr-00 15:09	04/13/00
M4/ 5 0-6"	5343.09	Sediment	13-Apr-00 15:11	04/13/00
M4/ 5 6-12"	5343.10	Sediment	13-Apr-00 15:13	04/13/00
M4/ 5 18-24"	5343.11	Sediment	13-Apr-00 15:15	04/13/00
M4/ 6 0-6"	5343.12	Sediment	13-Apr-00 15:17	04/13/00
M4/ 6 6-12"	5343.13	Sediment	13-Apr-00 15:19	04/13/00

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

ENCLOSURE:
RESULT
CHAIN OF CUSTODY

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: <u>J. Fallon</u>				Project No:		Analysis Parameters								Comments:	
Phone #: <u>201-223</u>				Location: <u>M4 Landfill</u>		PCB's									24°C
DERA () OMA () Other: _____				Stream Sediments											
Samplers Name / Company: <u>Corey McCormack TUS</u>				Sample #											
Lab Sample I.D.	Sample Location	Date	Time	Type	bottles										Remarks / Preservation Method
534B .01	M4 1 0-6"	4/13/00	1440	Sed	1	✓									
.02	" 1 6-12"		1442		1	✓									
.03	M4 2 0-6"		1450		1	✓									
.04	" 2 6-12"		1452		1	✓									
.05	M4 3 0-6"		1459		1	✓									
.06	" 3 6-12"		1503		1	✓									
.07	M4 4 0-6"		1505		1	✓									
.08	" 4 6-12"		1509		1	✓									
.09	M4 5 0-6"		1511		1	✓									
.10	" 5 6-12"		1513		1	✓									
.11	" 5 18-24"		1515		1	✓									
.12	M4 6 0-6"		1517		1	✓									
.13	" 6 6-12"	✓	1519	✓	1	✓									
Relinquished by (signature): <u>Corey McCormack</u>		Date/Time: <u>4/13/00 1500</u>		Received by (signature): <u>J. Wright</u>		Relinquished by (signature):		Date/Time:		Received by (signature):					
Relinquished by (signature):		Date/Time:		Received by (signature):		Relinquished by (signature):		Date/Time:		Received by (signature):					
Report Type: () Full, () Reduced, (X) Standard, () Screen / non-certified, () EDD						Remarks: <u>Tide: Low</u>									
Turnaround time: () Standard 3 wks, (X) Rush <u>1</u> Days, () ASAP Verbal Hrs.															

Landfill Stream Sediment PCB's Sample Event Site Field Summary for M4

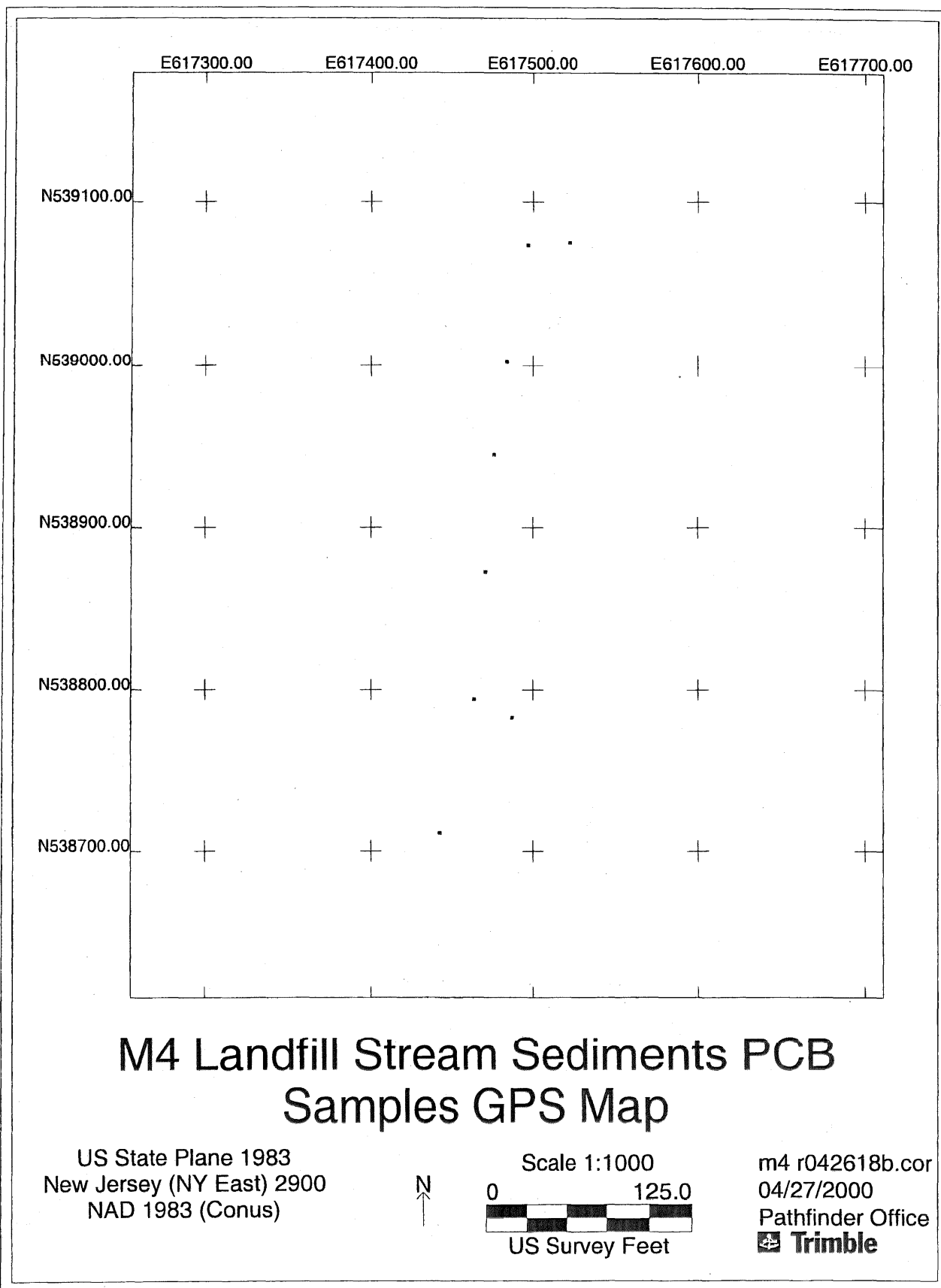
Mill Creek also runs along the western side of the M4 landfill for approximately 360 feet. There has not been any work related to the stream bank restoration project conducted here. It is re-enforced with concrete plates that are covered with grass, various plants, and bramble. An occasional tree is present as well. Some of the concrete plates have slid into the creek, and others are exposed. The streambed has some man made materials in it, most being parts of broken concrete plates.

Flow here is constant. Depth is varied with tide, with pools of about 2-3 feet even at low tide. Weather at time of sampling was sunny, and cool. There was a rain event two days prior to sampling. Tide was low.

Depositional areas were again scattered between the pools. These areas were targeted for sampling. When depositional areas were not found, 1 sample was taken per 100 feet.

In addition, two new seeps were located both about mid point of this landfill.

GPS



M4 LANDFILL STREAM SEDIMENT PCB'S SAMPLE GPS POSITIONS & COORDINATES

US STATE PLANE 1983 NJ (NY EAST) 2900 NAD 1983 (CONUS)

(IN US SURVEY FEET)

SAMPLE POINTS

<u>POSITION / DESC.</u>	<u>Y COORD. (NORTHING)</u>	<u>X COORD. (EASTING)</u>
1	539074.185	617496.603
2	539003.31	617483.618
3	538945.446	617475.776
4	538873.112	617470.616
5	538794.44	617463.303
6	538711.159	617441.908

REFERENCE POINTS

<u>POSITION / DESC.</u>	<u>Y COORD. (NORTHING)</u>	<u>X COORD. (EASTING)</u>
M4 MW09	539075.732	617522.536
M4 MW10	538783.194	617486.804

PCB's

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 # : PBLK510
Date Rec'd:
Extraction Date: 4/18/00
Analysis Date: 4/20/00

Analysis: SW-846 Method 8082

Location :

Matrix: Sediment

Analyst: T. Frankovich

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	0.2	100.00	0.0015	ND	0.007	53.000	15.00
Arochlor 1221	0.2	100.00	0.0027	ND	NA	NA	15.00
Arochlor 1232	0.2	100.00	0.0019	ND	NA	NA	15.00
Arochlor 1242	0.2	100.00	0.0021	ND	NA	NA	15.00
Arochlor 1248	0.2	100.00	0.0009	ND	0.030	150.000	15.00
Arochlor 1254	0.2	100.00	0.0005	ND	0.060	34.000	15.00
Arochlor 1260	0.2	100.00	0.0005	ND	0.005	24.000	15.00
Total PCB	0.2	100.00	0.0101	ND	0.070	530.000	15.00

* NJDEP Guidance For Sediment Quality Evaluations, November 1998

ND = Not Detected

Column-Primary:

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

MDL = Method Detection Limit

Column-Confirmation:

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

NA = Not Applicable

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 # : 5343.01
Date Rec'd: 4/13/00
Extraction Date: 4/18/00
Analysis Date: 4/20/00

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

Location : M4 Landfill
Stream Sediments
Field ID: M4 1 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	0.2	81.13	0.0018	ND	0.007	53.000	15.07
Arochlor 1221	0.2	81.13	0.0034	ND	NA	NA	15.07
Arochlor 1232	0.2	81.13	0.0023	ND	NA	NA	15.07
Arochlor 1242	0.2	81.13	0.0026	ND	NA	NA	15.07
Arochlor 1248	0.2	81.13	0.0010	ND	0.030	150.000	15.07
Arochlor 1254	0.2	81.13	0.0007	ND	0.060	34.000	15.07
Arochlor 1260	0.2	81.13	0.0006	ND	0.005	24.000	15.07
Total PCB	0.2	81.13	0.0124	ND	0.070	530.000	15.07

* 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 # : 5343.02
Date Rec'd: 4/13/00
Extraction Date: 4/18/00
Analysis Date: 4/20/00

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

Location : M4 Landfill
Stream Sediments
Field ID: M4 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	0.2	78.20	0.0019	ND	0.007	53.000	15.31
Arochlor 1221	0.2	78.20	0.0034	ND	NA	NA	15.31
Arochlor 1232	0.2	78.20	0.0023	ND	NA	NA	15.31
Arochlor 1242	0.2	78.20	0.0027	ND	NA	NA	15.31
Arochlor 1248	0.2	78.20	0.0011	ND	0.030	150.000	15.31
Arochlor 1254	0.2	78.20	0.0007	ND	0.060	34.000	15.31
Arochlor 1260	0.2	78.20	0.0006	ND	0.005	24.000	15.31
Total PCB	0.2	78.20	0.0127	ND	0.070	530.000	15.31

* 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 # : 5343.03
Date Rec'd: 4/13/00
Extraction Date: 4/18/00
Analysis Date: 4/20/00

Analysis: SW-846 Method 8082

Location : M4 Landfill

Matrix: Sediment

Stream Sediments

Analyst: T. Frankovich

Field ID: M4 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	0.2	75.03	0.0019	ND	0.007	53.000	15.81
Arochlor 1221	0.2	75.03	0.0035	ND	NA	NA	15.81
Arochlor 1232	0.2	75.03	0.0024	ND	NA	NA	15.81
Arochlor 1242	0.2	75.03	0.0027	ND	NA	NA	15.81
Arochlor 1248	0.2	75.03	0.0011	ND	0.030	150.000	15.81
Arochlor 1254	0.2	75.03	0.0007	ND	0.060	34.000	15.81
Arochlor 1260	0.2	75.03	0.0006	ND	0.005	24.000	15.81
Total PCB	0.2	75.03	0.0128	ND	0.070	530.000	15.81

* NJDEP Guidance For Sediment Quality Evaluations, November 1998

ND = Not Detected

Column-Primary:

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

MDL = Method Detection Limit

Column-Confirmation:

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

NA = Not Applicable

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 # : 5343.04
Date Rec'd: 4/13/00
Extraction Date: 4/18/00
Analysis Date: 4/20/00

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

Location : M4 Landfill
Stream Sediments
Field ID: M4 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	0.2	77.38	0.0019	ND	0.007	53.000	15.25
Arochlor 1221	0.2	77.38	0.0035	ND	NA	NA	15.25
Arochlor 1232	0.2	77.38	0.0024	ND	NA	NA	15.25
Arochlor 1242	0.2	77.38	0.0027	ND	NA	NA	15.25
Arochlor 1248	0.2	77.38	0.0011	ND	0.030	150.000	15.25
Arochlor 1254	0.2	77.38	0.0007	ND	0.060	34.000	15.25
Arochlor 1260	0.2	77.38	0.0006	ND	0.005	24.000	15.25
Total PCB	0.2	77.38	0.0128	ND	0.070	530.000	15.25

* 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 # : 5343.05
Date Rec'd: 4/13/00
Extraction Date: 4/18/00
Analysis Date: 4/20/00

Analysis: SW-846 Method 8082

Matrix: Sediment

Analyst: T. Frankovich

Location : M4 Landfill

Stream Sediments

Field ID: M4 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	0.2	77.50	0.0019	ND	0.007	53.000	15.30
Arochlor 1221	0.2	77.50	0.0035	ND	NA	NA	15.30
Arochlor 1232	0.2	77.50	0.0024	ND	NA	NA	15.30
Arochlor 1242	0.2	77.50	0.0027	ND	NA	NA	15.30
Arochlor 1248	0.2	77.50	0.0011	ND	0.030	150.000	15.30
Arochlor 1254	0.2	77.50	0.0007	ND	0.060	34.000	15.30
Arochlor 1260	0.2	77.50	0.0006	ND	0.005	24.000	15.30
Total PCB	0.2	77.50	0.0128	ND	0.070	530.000	15.30

* 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 # : 5343.06
Date Rec'd: 4/13/00
Extraction Date: 4/18/00
Analysis Date: 4/20/00

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

Location : M4 Landfill
Stream Sediments
Field ID: M4 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	0.2	76.78	0.0018	ND	0.007	53.000	15.98
Arochlor 1221	0.2	76.78	0.0034	ND	NA	NA	15.98
Arochlor 1232	0.2	76.78	0.0023	ND	NA	NA	15.98
Arochlor 1242	0.2	76.78	0.0026	ND	NA	NA	15.98
Arochlor 1248	0.2	76.78	0.0010	ND	0.030	150.000	15.98
Arochlor 1254	0.2	76.78	0.0007	ND	0.060	34.000	15.98
Arochlor 1260	0.2	76.78	0.0006	ND	0.005	24.000	15.98
Total PCB	0.2	76.78	0.0124	ND	0.070	530.000	15.98

* 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 # : 5343.07
Date Rec'd: 4/13/00
Extraction Date: 4/18/00
Analysis Date: 4/20/00

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

Location : M4 Landfill
Stream Sediments
Field ID: M4 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	0.2	88.22	0.0016	ND	0.007	53.000	15.80
Arochlor 1221	0.2	88.22	0.0030	ND	NA	NA	15.80
Arochlor 1232	0.2	88.22	0.0020	ND	NA	NA	15.80
Arochlor 1242	0.2	88.22	0.0023	ND	NA	NA	15.80
Arochlor 1248	0.2	88.22	0.0009	ND	0.030	150.000	15.80
Arochlor 1254	0.2	88.22	0.0006	ND	0.060	34.000	15.80
Arochlor 1260	0.2	88.22	0.0005	ND	0.005	24.000	15.80
Total PCB	0.2	88.22	0.0109	ND	0.070	530.000	15.80

* 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 # : 5343.08
Date Rec'd: 4/13/00
Extraction Date: 4/18/00
Analysis Date: 4/20/00

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

Location : M4 Landfill
Stream Sediments
Field ID: M4 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	0.2	86.21	0.0017	ND	0.007	53.000	15.46
Arochlor 1221	0.2	86.21	0.0031	ND	NA	NA	15.46
Arochlor 1232	0.2	86.21	0.0021	ND	NA	NA	15.46
Arochlor 1242	0.2	86.21	0.0024	ND	NA	NA	15.46
Arochlor 1248	0.2	86.21	0.0010	ND	0.030	150.000	15.46
Arochlor 1254	0.2	86.21	0.0006	ND	0.060	34.000	15.46
Arochlor 1260	0.2	86.21	0.0005	ND	0.005	24.000	15.46
Total PCB	0.2	86.21	0.0114	ND	0.070	530.000	15.46

* 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 # : 5343.09
Date Rec'd: 4/13/00
Extraction Date: 4/18/00
Analysis Date: 4/20/00

Analysis: SW-846 Method 8082

Location : M4 Landfill

Matrix: Sediment

Stream Sediments

Analyst: T. Frankovich

Field ID: M4 5 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	0.2	69.43	0.0021	ND	0.007	53.000	15.71
Arochlor 1221	0.2	69.43	0.0038	ND	NA	NA	15.71
Arochlor 1232	0.2	69.43	0.0026	ND	NA	NA	15.71
Arochlor 1242	0.2	69.43	0.0029	ND	NA	NA	15.71
Arochlor 1248	0.2	69.43	0.0012	ND	0.030	150.000	15.71
Arochlor 1254	0.2	69.43	0.0007	ND	0.060	34.000	15.71
Arochlor 1260	0.2	69.43	0.0007	ND	0.005	24.000	15.71
Total PCB	0.2	69.43	0.0139	ND	0.070	530.000	15.71

* NJDEP Guidance For Sediment Quality Evaluations, November 1998

ND = Not Detected

Column-Primary:

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

MDL = Method Detection Limit

Column-Confirmation:

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

NA = Not Applicable

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 # : 5343.10
Date Rec'd: 4/13/00
Extraction Date: 4/18/00
Analysis Date: 4/20/00

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

Location : M4 Landfill
Stream Sediments
Field ID: M4 5 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	0.2	75.96	0.0019	ND	0.007	53.000	15.55
Arochlor 1221	0.2	75.96	0.0035	ND	NA	NA	15.55
Arochlor 1232	0.2	75.96	0.0024	ND	NA	NA	15.55
Arochlor 1242	0.2	75.96	0.0027	ND	NA	NA	15.55
Arochlor 1248	0.2	75.96	0.0011	ND	0.030	150.000	15.55
Arochlor 1254	0.2	75.96	0.0007	0.051	0.060	34.000	15.55
Arochlor 1260	0.2	75.96	0.0006	ND	0.005	24.000	15.55
Total PCB	0.2	75.96	0.0128	0.051	0.070	530.000	15.55

* 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 # : 5343.11
Date Rec'd: 4/13/00
Extraction Date: 4/18/00
Analysis Date: 4/20/00

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

Location : M4 Landfill
Stream Sediments
Field ID: M4 5 18-24"

Pesticide/PCB	Dilution Factor	% Solid	MDL (mg/kg)	Result (mg/kg)	Lowest Effects Level (LEL)*	Severe Effects Level (SEL)*	Weight (g)
Arochlor 1016	0.2	71.39	0.0020	ND	0.007	53.000	15.84
Arochlor 1221	0.2	71.39	0.0036	ND	NA	NA	15.84
Arochlor 1232	0.2	71.39	0.0025	ND	NA	NA	15.84
Arochlor 1242	0.2	71.39	0.0028	ND	NA	NA	15.84
Arochlor 1248	0.2	71.39	0.0011	ND	0.030	150.000	15.84
Arochlor 1254	0.2	71.39	0.0007	ND	0.060	34.000	15.84
Arochlor 1260	0.2	71.39	0.0006	ND	0.005	24.000	15.84
Total PCB	0.2	71.39	0.0134	ND	0.070	530.000	15.84

* 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 # : 5343.12
Date Rec'd: 4/13/00
Extraction Date: 4/18/00
Analysis Date: 4/20/00

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

Location : M4 Landfill
Stream Sediments
Field ID: M4 6 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	0.2	79.98	0.0018	ND	0.007	53.000	15.45
Arochlor 1221	0.2	79.98	0.0033	ND	NA	NA	15.45
Arochlor 1232	0.2	79.98	0.0023	ND	NA	NA	15.45
Arochlor 1242	0.2	79.98	0.0026	ND	NA	NA	15.45
Arochlor 1248	0.2	79.98	0.0010	ND	0.030	150.000	15.45
Arochlor 1254	0.2	79.98	0.0006	ND	0.060	34.000	15.45
Arochlor 1260	0.2	79.98	0.0006	ND	0.005	24.000	15.45
Total PCB	0.2	79.98	0.0123	ND	0.070	530.000	15.45

* 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 # : 5343.13
Date Rec'd: 4/13/00
Extraction Date: 4/18/00
Analysis Date: 4/20/00

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

Location : M4 Landfill
Stream Sediments
Field ID: M4 6 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	0.2	79.32	0.0018	ND	0.007	53.000	15.29
Arochlor 1221	0.2	79.32	0.0034	ND	NA	NA	15.29
Arochlor 1232	0.2	79.32	0.0023	ND	NA	NA	15.29
Arochlor 1242	0.2	79.32	0.0026	ND	NA	NA	15.29
Arochlor 1248	0.2	79.32	0.0011	ND	0.030	150.000	15.29
Arochlor 1254	0.2	79.32	0.0007	ND	0.060	34.000	15.29
Arochlor 1260	0.2	79.32	0.0006	ND	0.005	24.000	15.29
Total PCB	0.2	79.32	0.0125	ND	0.070	530.000	15.29

* 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