FINAL

Remedial Investigation Report
And
Sediment Quality Evaluation

Pre-1941 Sewage Treatment Plant Site

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

Directorate of Public Works

February 9, 2004

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Remedial Investigation Report and Sediment Quality Evaluation for the Pre-1941 Sewage Treatment Plant Site

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REMEDIAL INVESTIGATION REPORT AND SEDIMENT QUALITY EVALUATION FOR THE PRE-1941 SEWAGE TREATMENT PLANT SITE FORT MONMOUTH, NEW JERSEY

PREPARED FOR:

UNITED STATES ARMY FORT MONMOUTH
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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) and Sediment Quality Evaluation for data collected during recent sediment sampling events at the Pre-1941 Sewage Treatment Plant (STP) Site. This report describes the remedial investigation activities performed at the site on April 7, 2000 as well as the subsequent sediment quality evaluation.

The Pre-1941 STP was located on the Main Post Area of Fort Monmouth on Parkers Creek, north of Allen Avenue at the approximate location of an existing building (Building No. 259). 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 former STP occupied approximately 2.9 acres and was reportedly operated until the Main Post STP became functional in 1941. The date of original construction and the period of operation are unknown. Weston collected a single sediment sample from the approximate location of the former effluent outfall on Parkers Creek and analyzed the sample for the Target Analyte List (TAL) Metals. Nine metals (arsenic, cadmium, chromium, copper, lead, mercury, nickel, silver and zinc) were detected above New Jersey Department of Environmental Protection (NJDEP) sediment quality criteria; four of these (arsenic, cadmium, chromium and zinc) exceeded the maximum background concentrations established by Weston in the Site Investigation (SI) Report. The remaining five metals (copper, lead, mercury, nickel and silver) were detected below established background concentrations. No further action was recommended by Weston based on site-specific sediment quality. However, the DPW elected to expand the initial investigation by performing the remedial investigations and sediment quality evaluation discussed in this report.

To determine potential impacts by metals to sediments in Parkers Creek associated with the former discharge of effluent from the STP, 24 sediment samples were collected from seven borings, including three duplicate samples for quality assurance/quality control (QA/QC) purposes, on April 7, 2000, from the surface and near-surface sediments of Parkers Creek. In addition, nine reference (background) samples were obtained from three additional borings installed at locations that are likely upgradient or side-gradient to the former STP outfall by approximately 400 feet, beyond the expected area of influence of the outfall. The analytical results for these sediment samples were used to establish site-specific background concentrations for the various metal constituents. The site-specific Maximum Background Concentrations (MBC) for the detected metal constituents are presented in **Table 4-1**.

In total, 33 sediment samples were analyzed for TAL Metals and compared to NJDEP sediment quality guidance concentrations defined in the *NJDEP Guidance for Sediment Quality Evaluations* (November 1998). The analytical data are summarized in **Table 4-2**. VERSAR developed this RIR and sediment quality evaluation based on this data set.

The results of the present investigation indicate that similar exceedances of the respective NJDEP Effects Range-Low (ER-L) and Effects Range-Median (ER-M) guidance concentrations for metals in the site-specific samples (e.g., those collected around the former outfall) occurred in the background samples (e.g., those collected upgradient and/or side-gradient to the outfall) with comparable magnitudes and frequencies. Therefore, the NJDEP ER-L and the ER-M criteria cannot be used effectively to make site-related risk management decisions. VERSAR developed site-specific MBC for each metal constituent based on the laboratory results for sediment samples collected at background boring locations. The site-specific MBCs were used to complete a comprehensive data evaluation and make risk management decisions related to the need for further remedial investigations. More specifically, the sediment quality results for borings located at the former STP outfall (Borings B-1 through B-7) were compared to the site-specific MBCs derived from the reference borings (B-8, B-9 and B-10) to identify potential Contaminants of Concern (COCs). For each detected metal analyte, there is no single instance (result) where the location-specific and depth-specific exceedance is more than one order of magnitude greater than the calculated site-specific MBC. Therefore, all 23 metal constituents are expected to pose no significant additional environmental risk and are not identified as COCs.

The similarity of sediment quality conditions at the background locations and the former STP outfall does not suggest an absence of risk to estuarine/marine ecology because the ER-L/ER-M and site-specific MBCs are frequently exceeded. However, it does indicate that the background and site-specific risks are similar. Furthermore, there is no additional site-generated risk because the source (e.g., the Pre-1941 STP) is no longer present. Therefore, it can be concluded that the Pre-1941 STP outfall is likely not the source of the elevated metal constituents in Parkers Creek, based on the comparison of outfall-specific and background sediment quality data. Considering the results of this sediment quality evaluation, No Further Action (NFA) is recommended for the Pre-1941 STP site related to potential metal 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 Pre-1941 Sewage Treatment Plant (STP) site located at the Fort Monmouth Main Post Area. This report addresses the remedial investigation activities performed at this site on April 7, 2000.

1.1 Objectives

The objective of this RIR is to determine potential metal impacts to stream sediments in Parkers Creek from the former Pre-1941 STP. 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 sediment quality evaluation undertaken by the DPW at the site supplements the findings of the 1995 Weston SI related to potential impacts to stream sediments in Parkers Creek.

The remedial investigation encompassed the following:

- Obtaining surface and near-surface sediment samples near the former STP outfall in Parkers Creek.
- Obtaining surface and near-surface background sediment samples at locations approximately 400 feet upgradient/side-gradient to the former outfall location.
- Analyzing the samples for TAL Metals by United States Environmental Protection Agency (USEPA) Method 6010B.
- 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 Pre-1941 STP 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 of this report describe the Site background and environmental setting of the area surrounding Fort Monmouth and the Pre-1941 STP 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 Brook, 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 Pre-1941 STP was located on Parkers Creek north of Allen Avenue at the approximate location of the existing Building No. 259 in the Main Post Area (**Figure 2-2**). The approximate area of the Pre-1941 STP is 130,000 ft^2 (2.9 acres). Parkers Creek is located immediately west of the former STP site and flows along the boundary of the site for approximately 350 feet before making a sharp turn to the east-northeast.

2.2 Site Background

Weston report, *Site Investigation, Fort Monmouth, New Jersey, Main Post and Charles Wood Areas, Site Investigation Report* (December 1995), documents an SI at the Pre-1941 STP. The investigation activities performed by Weston at the former STP site included sediment coring at the approximate location of the STP outfall in Parkers Creek. Weston obtained a single sediment sample that was analyzed for TAL Metals. The Weston SI analytical results indicate that 21 metals were detected above laboratory quantitation limits. Of these 21 metals, nine metals (arsenic, cadmium, chromium, copper, lead, mercury, nickel, silver and zinc) exceeded the NJDEP sediment quality guidance concentrations. Four metals (arsenic, cadmium, chromium and zinc) also exceeded the MBCs established by Weston. The Weston SI Report recommended NFA be taken regarding these exceedences because the samples were obtained at the approximate location of the former outfall, which is representative worse case conditions. The Weston report also concluded that access to the creek is restricted and that the former STP has not been used since 1941. Thus, the local ecology has presumably reached an equilibrium that would be disturbed by further remediation attempts (Weston, 1995).

The present investigation was undertaken to further expand the Weston SI report, more closely quantify site-specific background (reference) conditions for the metal constituents, and assess the potential 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 Pre-1941 STP site. The onsite building (Building No. 259) is constructed of poured concrete and appears to be well maintained. The sign posted outside of the building reads, "*Blair Hall Distinguished Visitors Quarters.*" The area north of the building consists of an open field maintained by routine landscaping with a fence along Parkers Creek. A parking area for the building is located on the south side of the building. 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 Pre-1941 STP 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 Pre-1941 STP 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 (Zapecza, 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 below ground surface (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 (Zapecza, 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 Pre-1941 STP Restoration Site is expected to be west-northwest towards Parkers Creek.

As presented in the Weston SI, lithologic logs from monitoring wells and soil borings installed at the M-18 Landfill site (located upgradient of the former STP site along Parkers Creek) indicate that the soils consist 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 filled 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. Groundwater flow is expected to be west-northwest toward Parkers Creek in the vicinity of the former STP site.

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 Pre-1941 STP site are classified as UA to UD – Udorthents, smoothed or urban land complex.

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 Pre-1941 STP 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 ft 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 Restoration 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

The Fort Monmouth DPW conducted sediment sampling in Parkers Creek to evaluate potential impacts by metals to stream sediments associated with the Pre-1941 STP outfall to Parkers Creek. On April 7, 2000, ten borings were installed in Parkers Creek, as shown in **Figure 3-1**. Seven of the borings were placed at the approximate location of the former outfall of the Pre-1941 STP. The remaining three borings were installed west-northwest of the former STP outfall to establish background (reference) conditions. The background boring locations are located approximately 400 feet upgradient/side-gradient from the former outfall, well beyond the expected area of influence of the STP discharge. Sediment samples were collected from the background locations (B-8, B-9 and B-10) at the end of the sampling event. The sediment sampling was conducted in accordance with the *Site Investigation Plan*, *Field Sampling Plan for Pre-1941 Sanitary Treatment Plant (STP) Sediments, DSERTS Site # FTMM-20* (TVS, December 1999) presented in **Appendix B**. The Field Sampling Plan (FSP) was approved by the NJDEP on March 24, 2000.

Thirty-three sediment samples, including 21 samples collected in the vicinity of the former outfall, nine background samples and three duplicate samples for QA/QC, were collected from ten borings using a Wildco Sediment Sampler. The STP samples were obtained from seven borings (B-1 through B-7) installed at the approximate location of the former outfall associated with the STP in Parkers Creek. Background samples were collected from three borings (B-8, B-9 and B-10) installed approximately 400 feet west-northwest of the former STP outfall location (upgradient to side-gradient). Sample depths ranged from surface (0-6" bgs) to near surface (6-12" bgs) to sub-surface (24-30" bgs) at each boring location. The sediment samples generally consisted of dark brown to black fine silt and silty sand. Boring logs are provided in **Appendix C**.

Sampling equipment was thoroughly decontaminated before and after each use, in accordance with the FSP. The sediment samples were collected using a Wildco Sampler and immediately placed into 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 appropriate chain-of-custody procedures. The samples were analyzed by the FMETL on April 11, 2000 for TAL Metals utilizing USEPA Method 6010B. 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 7, 2000, the DPW collected 33 sediment samples, including nine background and three duplicate samples for QA/QC, from ten borings in or adjacent to Parkers Creek to evaluate potential metal impacts to stream sediments from the Pre-1941 STP. Seven of the borings were placed at the approximate location of the former outfall of the Pre-1941 STP. The remaining three borings were installed west-northwest of the former STP outfall to establish background (reference) conditions. The background boring locations are located approximately 400 feet upgradient/side-gradient from the former outfall, well beyond the expected area of influence of the STP discharge. Thirty-three samples were collected at depths ranging from surface (0-6" bgs) to near-surface (6-12" bgs) to subsurface (24-30" bgs) at each boring location. Samples were identified in the field using the following nomenclature: STP 1 0-6", STP 1 6"-12", STP 1 24"-30" to STP 10 0-6", STP 10 6"-12", STP 10 24"-30". The samples were analyzed for TAL Metals utilizing USEPA Method 6010B.

4.1 Chemical Characterization

The sediment laboratory analytical data are 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 Metals, an ER-L and an ER-M. The ER-L represents the concentration at which adverse benthic effects are found in approximately 10% of studies. The ER-M 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, sediments were collected beginning with the outfall location samples (B-1 through B-7), proceeding to the background locations (B-8, B-9 and B-10). Therefore, the background sediments are most closely represented by the laboratory data results for boring locations B-8, B-9 and B-10 (see **Table 4-1**), which were used to derive site-specific MBC. Metals were detected in sediment samples collected at the background locations at concentrations and frequencies very similar to the outfall sediment sample locations.

Of the 23 metals for which analyses were performed on sediments collected at seven borings around the former STP outfall, nine specific metals have ER-L and ER-M criteria established by the NJDEP (arsenic, cadmium, chromium, copper, lead, mercury, nickel, silver and zinc). The remaining 14 metal analytes (aluminum, antimony, barium, beryllium, calcium, cobalt, iron, magnesium, manganese, potassium, selenium, sodium, thallium and vanadium) do not have established regulatory guidance concentrations.

These compounds were also considered as potential COCs because the NJDEP guidance criteria require that all detections above the Method Detection Limit (MDL) be addressed.

For the nine metals for which regulatory guidance criteria exist (arsenic, cadmium, chromium, copper, lead, mercury, nickel, silver and zinc), the following conclusions are made based on data presented in **Table 4-1**:

- The ER-L for eight of nine metals is exceeded in at least one sample collected over the depth profile studied (0-6", 6-12", and 24-30") at every boring location (B-1 through B-7).
- The ER-L for all nine metals was exceeded at six of seven borings installed around the former outfall location (B-1, B-2, B-4, B-5, B-6 and B-7). The only location that had no exceedances of the ER-L for Copper was B-3.
- The ER-M was exceeded at six of the seven borings (B-1, B-2, B-3, B-5, B-6 and B-7) installed around the former outfall location. Exceedances were identified at a minimum of one sample depth interval (0-6", 6-12", and 24-30") for five of the nine potential COCs (cadmium, mercury, nickel, silver, and zinc).

Due to the frequency of exceedances of the NJDEP sediment quality guidance criteria for these nine metals, comparison of the outfall sample results to the ER-L and ER-M was not useful, and an alternate, technically defensible approach was required. To satisfy this objective, background conditions in Parkers Creek were assessed, and these results were used to determine the potential impacts to sediment quality (if any) resulting from the former STP discharge. Site-specific MBC were developed based on data collected at reference (background) borings (B-8, B-9 and B-10) installed approximately 400 feet upgradient/side-gradient of the borings located at the former STP outfall (B-1 through B-7). The reference boring locations were positioned well beyond the expected area of influence of the former STP outfall. The formulation of site-specific MBC was necessary to facilitate a meaningful comparison of the background and location-specific (e.g., outfall) data because the regulatory guidance criteria (ER-L and ER-M) were routinely exceeded, as discussed above. The calculated MBC were used as the "guidance criteria" at the Pre-1941 STP site in lieu of the ER-L and ER-M based on the elevated background sediment quality conditions (for metals) in Parkers Creek near the former STP outfall.

For the 14 metals for which no regulatory guidance criteria exist (aluminum, antimony, barium, beryllium, calcium, cobalt, iron, magnesium, manganese, potassium, selenium, sodium, thallium, and vanadium), the same approach was used to calculate site-specific MBC based on data for samples collected at the background locations (B-8, B-9 and B-10). The NJDEP requires that these metals be specifically considered as potential COCs if detected at concentrations above the MDL. They cannot be ruled out simply because regulatory guidance concentrations have not been established.

The calculated site-specific MBC for each of 23 metals is shown in **Table 4-1**. Based on these data, the site-specific MBC for each of the nine metals with established regulatory

criteria exceeds the ER-L in 100% of the samples, and exceeds the ER-M in 22% of the samples. The results of this analysis are presented in **Table 4-1**, which defines the calculated site-specific MBC for each of 23 potential COCs for each sample depth interval. The laboratory data for the sediment samples collected at the former STP outfall (Borings B-1 through B-7) are summarized and compared to the site-specific MBC in **Table 4-2**.

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.

Three field duplicate samples were collected during the site sampling events to verify the consistency of the entire sampling and analysis procedure. The results for the three duplicate samples were close to those obtained for the original sample. The relative percent differences (RPDs) were calculated for the duplicate samples. The RPD measures variability introduced by both the laboratory and field operations. The RPDs for the duplicate samples ranged from 3.0% to 176.7 %, and the average RPD was 74.0%. This average RPD exceeds the established limit of 50% for laboratory duplicate samples. However, soil samples are often insufficiently homogenized in the field for proper duplicate analysis.

5.0 CONCLUSIONS

Based on a review of the laboratory analytical results, the sample exceedences identified in this remedial investigation are likely not the result of the Pre-1941 STP operation.

As shown in **Table 4-2**, comparison of the site-specific MBC and the outfall-specific data for borings B-1 through B-7 allows the following conclusions to be made:

- For the metals with established regulatory guidance criteria (arsenic, cadmium, chromium, copper, lead, mercury, nickel, silver, and zinc), detection of a minimum of one of the nine metals occurred at least once (from three distinct depth-interval samples) at each boring location at a concentration that exceeds the site-specific MBC. However, in no instance was the location-specific and depth-specific exceedance more than one order of magnitude greater than the calculated site-specific MBC. Therefore, these metal constituents are unlikely to pose significant additional environmental risk, and are not considered to be COCs.

- Thirteen of the 14 metals with no established regulatory guidance criteria (aluminum, antimony, barium, beryllium, calcium, cobalt, iron, magnesium, manganese, potassium, selenium, sodium, thallium and vanadium) were detected at concentrations that exceed the calculated site-specific MBC in one or more soil samples at a minimum of one boring location.

- A minimum of one result (from three separate depth intervals) at each boring location exceeded the site-specific MBC for at least one metal constituent. However, in no instance was the location-specific and depth-specific exceedance more than one order of magnitude greater than the calculated site-specific MBC.[1] Therefore, these metal constituents are not considered to pose significant additional environmental risk, and are not considered COC.

Justification can be made for elimination of these 23 metals from further consideration as potential COCs. The NJDEP screening criteria were developed based on benthic community studies and do not directly address biomagnification or food chain toxicity to water column species (fishes), birds and mammals. However, the screening criteria found to be protective of the food chain are generally within one order of magnitude of the ER-L. In the present evaluation, it is assumed that the site-specific MBC are more appropriately used as the baseline screening criteria, rather than the ER-L, because background sediment quality conditions have been shown to exceed the ER-L values 100% of the time, and detections above the MDL for all 23 metals were identified. Only nine of the 23 metals have established ER-L screening criteria. Generally, the NJDEP

[1] Two metal constituents, selenium and thallium, had site-specific MBC that were defined as zero based on non-detection in the background borings. However, at several boring locations, selenium (in particular) and thallium were detected in samples collected from the borings installed around the outfall. In these instances, the individual results were compared to the MDL, and were determined to be less than one order of magnitude greater than the MDL.

guidance document states that sediment concentrations within one order of magnitude of the established ER-L screening criteria are protective of the food chain. At this site, Site-specific MBCs were used in lieu of the ER-L screening values due to the high background concentrations of the 23 metal constituents. Considering the same potential for biomagnification and food chain toxicity, it is expected that the site-specific sediment sample results, which indicate metal concentrations within one order of magnitude of the calculated site-specific MBCs, are also protective of the food chain. While the site-specific data at the Pre-1941 STP do not indicate the absence of risk, they do suggest no observable additional site-generated risk because of the similarity of background conditions to actual conditions around the former outfall location.

Based on the frequency of occurrences, the magnitude of the detections, and the methodology developed for data evaluation, no further remedial investigations are warranted at the Pre-1941 STP site with respect to the sediment quality in Parkers Creek.

6.0 REFERENCES

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TABLES

Table 3-1
Sediment Sampling Summary
Pre-1941 Sewage Treatment Plant 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	STP 1 0-6"	**5321.01**	4/7/2000	0830	0-6"	541570.688[2]	620131.368[2]	TAL[3] Metals	Dark Brown/Black Fine Silt w/Some Sand
	STP 1 6-12"	**5321.02**	4/7/2000	0834	6"-12"				
	STP 1 24-30"	**5321.03**	4/7/2000	0836	24"-30"				
B-2	STP 2 0-6"	**5321.04**	4/7/2000	0841	0-6"	541574.403	620134.091	TAL Metals	Dark Brown/Black Fine Silt w/Some Sand
	STP 2 6-12"	**5321.05**	4/7/2000	0844	6"-12"				
	STP 2 24-30"	**5321.06**	4/7/2000	0846	24"-30"				
B-3	STP 3 0-6"	**5321.07**	4/7/2000	0851	0-6"	541576.085	620129.465	TAL Metals	Dark Brown/Black Fine Sandy Silt
	STP 3 6-12"	**5321.08**	4/7/2000	0854	6"-12"				
	STP 3 24-30"	**5321.09**	4/7/2000	0856	24"-30"				
B-4	STP 4 0-6"	**5321.10**	4/7/2000	0904	0-6"	541572.073	620126.684	TAL Metals	Dark Brown/Black Fine Sandy Silt
	STP 4 6-12"	**5321.11**	4/7/2000	0906	6"-12"				
	STP 4 24-30"	**5321.12**	4/7/2000	0908	24"-30"				
B-5	STP 5 0-6"	**5321.13**	4/7/2000	0915	0-6"	541573.751	620122.019	TAL Metals	Dark Brown/Black Fine Silt
	STP 5 6-12"	**5321.14**	4/7/2000	0918	6"-12"				
	STP 5 24-30"	**5321.15**	4/7/2000	0919	24"-30				
B-6	STP 6 0-6"	**5321.16**	4/7/2000	0922	0-6"	541566.577	620129.326	TAL Metals	Dark Brown/Black Fine Sandy Silt to Fine Silt
	STP 6 6-12"	**5321.17**	4/7/2000	0925	6"-12"				
	STP 6 24-30"	**5321.18**	4/7/2000	0927	24"-30"				
B-7	STP 7 0-6"	**5321.19**	4/7/2000	0933	0-6"	541568.379	620124.626	TAL Metals	Dark Brown/Black Fine Sandy Silt to Fine Silt/Sandy Silt
	STP 7 6-12"	**5321.20**	4/7/2000	0935	6"-12"				
	STP 7 24-30"	**5321.22**	4/7/2000	0937	24"-30"				
B-8	STP 8 0-6"	**5321.22**	4/7/2000	0941	0-6"	541856.672[4]	619808.465[4]	TAL Metals	Dark Brown/Black Fine Silt
	STP 8 6-12"	**5321.23**	4/7/2000	0944	6"-12"				
	STP 8 24-30"	**5321.24**	4/7/2000	0947	24"-30"				
B-9	STP 9 0-6"	**5321.25**	4/7/2000	1052	0-6"	541733.346[4]	619767.631[4]	TAL Metals	Dark Brown/Black Fine Silt to Sand
	STP 9 6-12"	**5321.26**	4/7/2000	1055	6"-12"				
	STP 9 24-30"	**5321.27**	4/7/2000	1058	24"-30"				
B-10	STP 10 0-6"	**5321.28**	4/7/2000	1141	0-6"	541672.734[4]	619685.08[4]	TAL Metals	Dark Brown/Black Fine Silt to Silty Sand
	STP 10 6-12"	**5321.29**	4/7/2000	1144	6"-12"				
	STP 10 24-30"	**5321.30**	4/7/2000	1146	24"-30"				

[1] bgs = below ground surface
[2] Estimated Location STPSD-1
[3] TAL = Target Analyte List
[4] Background Samples

Table 4-1
Background Metal Sampling Results
Pre-1941 Sewage Treatment Plant Site
Fort Monmouth, New Jersey

Boring ID						Background B-8				Background B-9				Background B-10			
Matrix						Sediment				Sediment				Sediment			
Analysis[1]	ER-L[2]	ER-M[3]	Depth	Maximum[4]	Mean[5]	Location ID[6]	Sample ID[7]	Result[8]	MDL[9]	Location ID[6]	Sample ID[7]	Result[8]	MDL[9]	Location ID[6]	Sample ID[7]	Result[8]	MDL[9]
Aluminum	*NLE*	*NLE*	(0-6")	12700	9957	*STP 8 0-6"*	5321.22	7810	4.62	*STP 9 0-6"*	5321.25	9360	5.03	*STP 10 0-6"*	5321.28	12700	5.01
			(6-12")	11200	8813	*STP 8 6"-12"*	5321.23	11200	3.69	*STP 9 6"-12"*	5321.26	6870	2.49	*STP 10 6"-12"*	5321.29	8370	3.45
			(24-30")	16900	9273	*STP 8 24"-30"*	5321.24	16900	4.68	*STP 9 24"-30"*	5321.27	8220	4.33	*STP 10 24"-30"*	5321.3	2700	2.61
Antimony	*NLE*	*NLE*	(0-6")	2.71	2.39	*STP 8 0-6"*	5321.22	2.05	0.924	*STP 9 0-6"*	5321.25	2.41	1.01	*STP 10 0-6"*	5321.28	2.71	1
			(6-12")	2.49	2.08	*STP 8 6"-12"*	5321.23	2.49	0.738	*STP 9 6"-12"*	5321.26	1.61	0.498	*STP 10 6"-12"*	5321.29	2.14	0.69
			(24-30")	3.31	2.10	*STP 8 24"-30"*	5321.24	3.31	0.936	*STP 9 24"-30"*	5321.27	1.88	0.865	*STP 10 24"-30"*	5321.3	1.1	0.522
Arsenic	*8.2*	*70*	(0-6")	**27.7**	**21.5**	*STP 8 0-6"*	5321.22	**19.3**	0.924	*STP 9 0-6"*	5321.25	**17.4**	1.01	*STP 10 0-6"*	5321.28	**27.7**	1
			(6-12")	**29.1**	**20.9**	*STP 8 6"-12"*	5321.23	**29.1**	0.738	*STP 9 6"-12"*	5321.26	**13.5**	0.498	*STP 10 6"-12"*	5321.29	**20.2**	0.69
			(24-30")	**25.6**	**17.0**	*STP 8 24"-30"*	5321.24	**25.6**	0.936	*STP 9 24"-30"*	5321.27	**18.2**	0.865	*STP 10 24"-30"*	5321.3	7.06	0.522
Barium	*NLE*	*NLE*	(0-6")	41.1	30.4	*STP 8 0-6"*	5321.22	25.7	0.231	*STP 9 0-6"*	5321.25	24.4	0.251	*STP 10 0-6"*	5321.28	41.1	0.25
			(6-12")	38.9	27.0	*STP 8 6"-12"*	5321.23	38.9	0.184	*STP 9 6"-12"*	5321.26	16.5	0.125	*STP 10 6"-12"*	5321.29	25.7	0.172
			(24-30")	132	52.7	*STP 8 24"-30"*	5321.24	132	0.234	*STP 9 24"-30"*	5321.27	20.6	0.216	*STP 10 24"-30"*	5321.3	5.53	0.131
Beryllium	*NLE*	*NLE*	(0-6")	1.94	1.73	*STP 8 0-6"*	5321.22	1.83	0.231	*STP 9 0-6"*	5321.25	1.41	0.251	*STP 10 0-6"*	5321.28	1.94	0.25
			(6-12")	3.76	2.03	*STP 8 6"-12"*	5321.23	3.76	0.184	*STP 9 6"-12"*	5321.26	1.04	0.125	*STP 10 6"-12"*	5321.29	1.29	0.172
			(24-30")	3.99	1.94	*STP 8 24"-30"*	5321.24	3.99	0.234	*STP 9 24"-30"*	5321.27	1.27	0.216	*STP 10 24"-30"*	5321.3	0.55	0.131
Cadmium	*1.2*	*9.6*	(0-6")	**4.51**	**2.91**	*STP 8 0-6"*	5321.22	**2.11**	0.231	*STP 9 0-6"*	5321.25	**2.12**	0.251	*STP 10 0-6"*	5321.28	**4.51**	0.25
			(6-12")	**2.84**	**2.18**	*STP 8 6"-12"*	5321.23	**2.13**	0.184	*STP 9 6"-12"*	5321.26	**1.56**	0.125	*STP 10 6"-12"*	5321.29	**2.84**	0.172
			(24-30")	**14.3**	**5.57**	*STP 8 24"-30"*	5321.24	**14.3**	0.234	*STP 9 24"-30"*	5321.27	**2.19**	0.216	*STP 10 24"-30"*	5321.3	0.232	0.131
Calcium	*NLE*	*NLE*	(0-6")	2340	1873	*STP 8 0-6"*	5321.22	1420	9.25	*STP 9 0-6"*	5321.25	1860	10.1	*STP 10 0-6"*	5321.28	2340	10
			(6-12")	1950	1358	*STP 8 6"-12"*	5321.23	825	7.38	*STP 9 6"-12"*	5321.26	1950	4.98	*STP 10 6"-12"*	5321.29	1300	6.9
			(24-30")	1580	941	*STP 8 24"-30"*	5321.24	871	9.36	*STP 9 24"-30"*	5321.27	1580	8.65	*STP 10 24"-30"*	5321.3	372	5.22
Chromium	*81*	*370*	(0-6")	**189**	**129**	*STP 8 0-6"*	5321.22	76.2	0.231	*STP 9 0-6"*	5321.25	**189**	0.251	*STP 10 0-6"*	5321.28	**121**	0.25
			(6-12")	**88.1**	75.8	*STP 8 6"-12"*	5321.23	**88.1**	0.184	*STP 9 6"-12"*	5321.26	62.2	0.125	*STP 10 6"-12"*	5321.29	77.2	0.172
			(24-30")	**132**	77.3	*STP 8 24"-30"*	5321.24	**132**	0.234	*STP 9 24"-30"*	5321.27	73.8	0.216	*STP 10 24"-30"*	5321.3	26.1	0.131
Cobalt	*NLE*	*NLE*	(0-6")	43.2	25.6	*STP 8 0-6"*	5321.22	19.1	0.231	*STP 9 0-6"*	5321.25	14.5	0.251	*STP 10 0-6"*	5321.28	43.2	0.25
			(6-12")	13.8	11.9	*STP 8 6"-12"*	5321.23	11.4	0.184	*STP 9 6"-12"*	5321.26	10.5	0.125	*STP 10 6"-12"*	5321.29	13.8	0.172
			(24-30")	25.6	13.9	*STP 8 24"-30"*	5321.24	25.6	0.234	*STP 9 24"-30"*	5321.27	13.8	0.216	*STP 10 24"-30"*	5321.3	2.38	0.131
Copper	*34*	*270*	(0-6")	**109**	**79.7**	*STP 8 0-6"*	5321.22	**45.2**	1.39	*STP 9 0-6"*	5321.25	**109**	1.51	*STP 10 0-6"*	5321.28	**85.0**	1.5
			(6-12")	**40.5**	**38.2**	*STP 8 6"-12"*	5321.23	**36.9**	1.1	*STP 9 6"-12"*	5321.26	**37.2**	0.747	*STP 10 6"-12"*	5321.29	**40.5**	1.035
			(24-30")	**113**	**56.6**	*STP 8 24"-30"*	5321.24	**113**	1.4	*STP 9 24"-30"*	5321.27	**51.8**	1.3	*STP 10 24"-30"*	5321.3	5.03	0.783
Iron	*NLE*	*NLE*	(0-6")	59200	47100	*STP 8 0-6"*	5321.22	39600	4.62	*STP 9 0-6"*	5321.25	42500	5.03	*STP 10 0-6"*	5321.28	59200	5.01
			(6-12")	45500	37767	*STP 8 6"-12"*	5321.23	45500	3.69	*STP 9 6"-12"*	5321.26	30300	2.49	*STP 10 6"-12"*	5321.29	37500	3.45
			(24-30")	60900	38033	*STP 8 24"-30"*	5321.24	60900	4.68	*STP 9 24"-30"*	5321.27	40000	4.33	*STP 10 24"-30"*	5321.3	13200	2.61
Lead	*47*	*218*	(0-6")	**126**	**94.3**	*STP 8 0-6"*	5321.22	**77.1**	0.924	*STP 9 0-6"*	5321.25	**79.9**	1.01	*STP 10 0-6"*	5321.28	**126**	1
			(6-12")	**60.5**	**57.6**	*STP 8 6"-12"*	5321.23	**60.5**	0.738	*STP 9 6"-12"*	5321.26	**53.3**	0.498	*STP 10 6"-12"*	5321.29	**59.0**	0.69
			(24-30")	**86.2**	**56.6**	*STP 8 24"-30"*	5321.24	**86.2**	0.936	*STP 9 24"-30"*	5321.27	**73.8**	0.865	*STP 10 24"-30"*	5321.3	9.87	0.522
Magnesium	*NLE*	*NLE*	(0-6")	6210	4763	*STP 8 0-6"*	5321.22	3430	9.25	*STP 9 0-6"*	5321.25	4650	10.1	*STP 10 0-6"*	5321.28	6210	10
			(6-12")	3960	3753	*STP 8 6"-12"*	5321.23	3870	7.38	*STP 9 6"-12"*	5321.26	3430	4.98	*STP 10 6"-12"*	5321.29	3960	6.9
			(24-30")	5380	3657	*STP 8 24"-30"*	5321.24	5380	9.36	*STP 9 24"-30"*	5321.27	4240	8.65	*STP 10 24"-30"*	5321.3	1350	5.22

Table 4-1
Background Metal Sampling Results
Pre-1941 Sewage Treatment Plant Site
Fort Monmouth, New Jersey

Boring ID						Background B-8				Background B-9				Background B-10			
Matrix						Sediment				Sediment				Sediment			
Analysis[1]	ER-L[2]	ER-M[3]	Depth	Maximum[4]	Mean[5]	Location ID[6]	Sample ID[7]	Result[8]	MDL[9]	Location ID[6]	Sample ID[7]	Result[8]	MDL[9]	Location ID[6]	Sample ID[7]	Result[8]	MDL[9]
Manganese	*NLE*	*NLE*	(0-6")	102	83.8	*STP 8 0-6"*	5321.22	64.0	0.231	*STP 9 0-6"*	5321.25	85.4	0.251	*STP 10 0-6"*	5321.28	102	0.25
			(6-12")	74.5	64.9	*STP 8 6"-12"*	5321.23	62.7	0.184	*STP 9 6"-12"*	5321.26	57.5	0.125	*STP 10 6"-12"*	5321.29	74.5	0.172
			(24-30")	80.3	60.8	*STP 8 24"-30"*	5321.24	80.3	0.234	*STP 9 24"-30"*	5321.27	77.6	0.216	*STP 10 24"-30"*	5321.3	24.6	0.131
Mercury	*0.15*	*0.71*	(0-6")	**0.671**	**0.49**	*STP 8 0-6"*	5321.22	**0.391**	0.043	*STP 9 0-6"*	5321.25	**0.404**	0.05	*STP 10 0-6"*	5321.28	**0.671**	0.056
			(6-12")	**0.88**	**0.63**	*STP 8 6"-12"*	5321.23	**0.88**	0.049	*STP 9 6"-12"*	5321.26	**0.357**	0.04	*STP 10 6"-12"*	5321.29	**0.659**	0.029
			(24-30")	**0.538**	**0.38**	*STP 8 24"-30"*	5321.24	**0.381**	0.038	*STP 9 24"-30"*	5321.27	**0.538**	0.041	*STP 10 24"-30"*	5321.3	**0.213**	0.024
Nickel	*21*	*52*	(0-6")	**43.5**	**33.8**	*STP 8 0-6"*	5321.22	**24.0**	0.231	*STP 9 0-6"*	5321.25	ND	0.229	*STP 10 0-6"*	5321.28	**43.5**	0.25
			(6-12")	**29.3**	**23.5**	*STP 8 6"-12"*	5321.23	**29.3**	0.184	*STP 9 6"-12"*	5321.26	18.5	0.125	*STP 10 6"-12"*	5321.29	**22.6**	0.172
			(24-30")	**34.8**	**22.4**	*STP 8 24"-30"*	5321.24	**34.8**	0.234	*STP 9 24"-30"*	5321.27	**23.5**	0.216	*STP 10 24"-30"*	5321.3	8.77	0.131
Potassium	*NLE*	*NLE*	(0-6")	6190	5060	*STP 8 0-6"*	5321.22	3990	9.25	*STP 9 0-6"*	5321.25	5000	10.1	*STP 10 0-6"*	5321.28	6190	10
			(6-12")	4610	4297	*STP 8 6"-12"*	5321.23	4610	7.38	*STP 9 6"-12"*	5321.26	3900	4.98	*STP 10 6"-12"*	5321.29	4380	6.9
			(24-30")	7920	4713	*STP 8 24"-30"*	5321.24	7920	9.36	*STP 9 24"-30"*	5321.27	4150	8.65	*STP 10 24"-30"*	5321.3	2070	5.22
Selenium	*NLE*	*NLE*	(0-6")	0	0	*STP 8 0-6"*	5321.22	ND	1.39	*STP 9 0-6"*	5321.25	ND	1.51	*STP 10 0-6"*	5321.28	ND	1.5
			(6-12")	1.65	1.33	*STP 8 6"-12"*	5321.23	1.59	1.11	*STP 9 6"-12"*	5321.26	0.757	0.747	*STP 10 6"-12"*	5321.29	1.65	1.04
			(24-30")	0	0	*STP 8 24"-30"*	5321.24	ND	1.4	*STP 9 24"-30"*	5321.27	ND	1.3	*STP 10 24"-30"*	5321.3	ND	0.783
Silver	*1.0*	*3.7*	(0-6")	**11.2**	**6.7**	*STP 8 0-6"*	5321.22	**4.74**	1.39	*STP 9 0-6"*	5321.25	**4.24**	1.51	*STP 10 0-6"*	5321.28	**11.2**	1.5
			(6-12")	**11.5**	**6.8**	*STP 8 6"-12"*	5321.23	**5.6**	1.11	*STP 9 6"-12"*	5321.26	**3.21**	0.747	*STP 10 6"-12"*	5321.29	**11.5**	1.04
			(24-30")	**7.78**	**6.12**	*STP 8 24"-30"*	5321.24	**7.78**	1.4	*STP 9 24"-30"*	5321.27	**4.46**	1.3	*STP 10 24"-30"*	5321.3	ND	0.783
Sodium	*NLE*	*NLE*	(0-6")	5970	4257	*STP 8 0-6"*	5321.22	1810	9.25	*STP 9 0-6"*	5321.25	4990	10.1	*STP 10 0-6"*	5321.28	5970	10
			(6-12")	3790	2743	*STP 8 6"-12"*	5321.23	1140	7.38	*STP 9 6"-12"*	5321.26	3790	4.98	*STP 10 6"-12"*	5321.29	3300	6.9
			(24-30")	4180	2257	*STP 8 24"-30"*	5321.24	1360	9.36	*STP 9 24"-30"*	5321.27	4180	8.65	*STP 10 24"-30"*	5321.3	1230	5.22
Thallium	*NLE*	*NLE*	(0-6")	1.64	1.64	*STP 8 0-6"*	5321.22	1.64	1.39	*STP 9 0-6"*	5321.25	ND	1.51	*STP 10 0-6"*	5321.28	ND	1.5
			(6-12")	1.12	1.12	*STP 8 6"-12"*	5321.23	1.12	1.11	*STP 9 6"-12"*	5321.26	ND	0.747	*STP 10 6"-12"*	5321.29	ND	1.04
			(24-30")	0	0	*STP 8 24"-30"*	5321.24	ND	1.4	*STP 9 24"-30"*	5321.27	ND	1.3	*STP 10 24"-30"*	5321.3	ND	0.783
Vanadium	*NLE*	*NLE*	(0-6")	74.5	59.3	*STP 8 0-6"*	5321.22	50.4	0.462	*STP 9 0-6"*	5321.25	53.1	0.503	*STP 10 0-6"*	5321.28	74.5	0.501
			(6-12")	56.0	46.1	*STP 8 6"-12"*	5321.23	56.0	0.369	*STP 9 6"-12"*	5321.26	38.0	0.249	*STP 10 6"-12"*	5321.29	44.2	0.345
			(24-30")	79.6	49.3	*STP 8 24"-30"*	5321.24	79.6	0.468	*STP 9 24"-30"*	5321.27	50.8	0.433	*STP 10 24"-30"*	5321.3	17.6	0.261
Zinc	*150*	*410*	(0-6")	**415**	**322**	*STP 8 0-6"*	5321.22	**220**	0.462	*STP 9 0-6"*	5321.25	**332**	0.503	*STP 10 0-6"*	5321.28	**415**	0.501
			(6-12")	**255**	**226**	*STP 8 6"-12"*	5321.23	**255**	0.369	*STP 9 6"-12"*	5321.26	**184**	0.249	*STP 10 6"-12"*	5321.29	**239**	0.345
			(24-30")	**387**	**229**	*STP 8 24"-30"*	5321.24	**387**	0.468	*STP 9 24"-30"*	5321.27	**245**	0.433	*STP 10 24"-30"*	5321.3	53.7	0.261

[1] Sediment samples analyzed for TAL Metals by EPA Method 6010B

[2] Effects Range - Low (ER-L) is the concentration at which adverse benthic impacts are found in approx. 10% of studies (mg/kg)

[3] Effects Range-Median (ER-M) is the concentration at which adverse benthic impacts are found in approx. 50% of cases studied (mg/kg)

[4] Site-specific Maximum Background Concentration based on reference Borings B-8, B-9, and B-10 for each sample depth interval and each analyte

[5] Mean is the calculated arithmetic average of each contaminant concentration based on reference Borings B-8, B-9, and B-10

[6] Field Sample Location ID

[7] Laboratory Sample ID

[8] All Results in milligrams per kilogram (mg/kg)

[9] Method Detection Limit (mg/kg)

Colored Text = Concentration Exceeds the ER-L

Colored Text = Concentration Exceeds the ER-L and ER-M

NLE = No Limt Established in NJDEP Sediment Screening Guidelines

ND = Not detected

Table 4-2
Metal Sampling Results
Pre-1941 Sewage Treatment Plant Site
Fort Monmouth, New Jersey

Boring ID					Boring B-1				Boring B-2			
Matrix					Sediment				Sediment			
Analysis[1]	ER-L[2]	ER-M[3]	Depth	Maximum[4]	Location ID[6]	Sample ID[7]	Result[8]	MDL[9]	Location ID[6]	Sample ID[7]	Result[8]	MDL[9]
Aluminum	NLE	NLE	(0-6")	12700	STP 1 0-6"	5321.01	12500	5.28	STP 2 0-6"	5321.04	9390	3.16
			(6-12")	11200	STP 1 6"-12"	5321.02	8370	3.37	STP 2 6"-12"	5321.05	11200	5.65
			(24-30")	16900	STP 1 24"-30"	5321.03	9240	3.04	STP 2 24"-30"	5321.06	3340	2.44
Antimony	NLE	NLE	(0-6")	2.71	STP 1 0-6"	5321.01	4.05	1.05	STP 2 0-6"	5321.04	4.40	0.632
			(6-12")	2.49	STP 1 6"-12"	5321.02	2.64	0.673	STP 2 6"-12"	5321.05	7.51	1.13
			(24-30")	3.31	STP 1 24"-30"	5321.03	1.76	0.608	STP 2 24"-30"	5321.06	1.07	0.487
Arsenic	8.2	70	(0-6")	**27.7**	STP 1 0-6"	5321.01	**27.3**	1.05	STP 2 0-6"	5321.04	**54.2**	0.632
			(6-12")	**29.1**	STP 1 6"-12"	5321.02	**19.4**	0.673	STP 2 6"-12"	5321.05	**59.8**	1.13
			(24-30")	**25.6**	STP 1 24"-30"	5321.03	**10.7**	0.608	STP 2 24"-30"	5321.06	6.49	0.487
Barium	NLE	NLE	(0-6")	41.1	STP 1 0-6"	5321.01	44.0	0.264	STP 2 0-6"	5321.04	26.1	0.158
			(6-12")	38.9	STP 1 6"-12"	5321.02	29.1	0.168	STP 2 6"-12"	5321.05	31.4	0.283
			(24-30")	132	STP 1 24"-30"	5321.03	19.7	0.152	STP 2 24"-30"	5321.06	7.1	0.122
Beryllium	NLE	NLE	(0-6")	1.94	STP 1 0-6"	5321.01	2.05	0.264	STP 2 0-6"	5321.04	1.57	0.158
			(6-12")	3.76	STP 1 6"-12"	5321.02	1.56	0.168	STP 2 6"-12"	5321.05	1.47	0.283
			(24-30")	3.99	STP 1 24"-30"	5321.03	1.79	0.152	STP 2 24"-30"	5321.06	0.889	0.122
Cadmium	1.2	9.6	(0-6")	**4.51**	STP 1 0-6"	5321.01	**5.93**	0.264	STP 2 0-6"	5321.04	**1.55**	0.158
			(6-12")	**2.84**	STP 1 6"-12"	5321.02	**11.2**	0.168	STP 2 6"-12"	5321.05	**2.07**	0.283
			(24-30")	**14.3**	STP 1 24"-30"	5321.03	**5.73**	0.152	STP 2 24"-30"	5321.06	0.183	0.122
Calcium	NLE	NLE	(0-6")	2340	STP 1 0-6"	5321.01	1580	10.5	STP 2 0-6"	5321.04	1240	6.32
			(6-12")	1950	STP 1 6"-12"	5321.02	954	6.74	STP 2 6"-12"	5321.05	1530	11.3
			(24-30")	1580	STP 1 24"-30"	5321.03	685	6.08	STP 2 24"-30"	5321.06	483	4.87
Chromium	81	370	(0-6")	**189**	STP 1 0-6"	5321.01	**142**	0.264	STP 2 0-6"	5321.04	**92.4**	0.158
			(6-12")	**88.1**	STP 1 6"-12"	5321.02	**113**	0.168	STP 2 6"-12"	5321.05	**103**	0.283
			(24-30")	**132**	STP 1 24"-30"	5321.03	**128**	0.152	STP 2 24"-30"	5321.06	40.4	0.122
Cobalt	NLE	NLE	(0-6")	43.2	STP 1 0-6"	5321.01	23.5	0.264	STP 2 0-6"	5321.04	27.7	0.158
			(6-12")	13.8	STP 1 6"-12"	5321.02	5.74	0.168	STP 2 6"-12"	5321.05	31.8	0.283
			(24-30")	25.6	STP 1 24"-30"	5321.03	3.03	0.152	STP 2 24"-30"	5321.06	2.28	0.122
Copper	34	270	(0-6")	**109**	STP 1 0-6"	5321.01	**50.6**	1.59	STP 2 0-6"	5321.04	**77.9**	0.948
			(6-12")	**40.5**	STP 1 6"-12"	5321.02	19.7	1.01	STP 2 6"-12"	5321.05	**67.3**	1.69
			(24-30")	**113**	STP 1 24"-30"	5321.03	6.81	0.912	STP 2 24"-30"	5321.06	3.32	0.73
Iron	NLE	NLE	(0-6")	59200	STP 1 0-6"	5321.01	71300	5.28	STP 2 0-6"	5321.04	107000	3.16
			(6-12")	45500	STP 1 6"-12"	5321.02	43700	3.37	STP 2 6"-12"	5321.05	125000	5.65
			(24-30")	60900	STP 1 24"-30"	5321.03	45200	3.04	STP 2 24"-30"	5321.06	16500	2.44
Lead	47	218	(0-6")	**126**	STP 1 0-6"	5321.01	**97.4**	1.05	STP 2 0-6"	5321.04	**101**	0.632
			(6-12")	**60.5**	STP 1 6"-12"	5321.02	40.6	0.673	STP 2 6"-12"	5321.05	**99.6**	1.13
			(24-30")	**86.2**	STP 1 24"-30"	5321.03	16.4	0.608	STP 2 24"-30"	5321.06	9.19	0.487
Magnesium	NLE	NLE	(0-6")	6210	STP 1 0-6"	5321.01	5500	10.5	STP 2 0-6"	5321.04	4030	6.32
			(6-12")	3960	STP 1 6"-12"	5321.02	4370	6.74	STP 2 6"-12"	5321.05	4310	11.3
			(24-30")	5380	STP 1 24"-30"	5321.03	6190	6.08	STP 2 24"-30"	5321.06	1820	4.87
Manganese	NLE	NLE	(0-6")	102	STP 1 0-6"	5321.01	89.2	0.264	STP 2 0-6"	5321.04	151	0.158
			(6-12")	74.5	STP 1 6"-12"	5321.02	32.3	0.168	STP 2 6"-12"	5321.05	65.1	0.283
			(24-30")	80.3	STP 1 24"-30"	5321.03	22.3	0.152	STP 2 24"-30"	5321.06	14	0.122
Mercury	0.15	0.71	(0-6")	**0.671**	STP 1 0-6"	5321.01	**0.581**	0.053	STP 2 0-6"	5321.04	**0.183**	0.037
			(6-12")	**0.88**	STP 1 6"-12"	5321.02	0.15	0.030	STP 2 6"-12"	5321.05	**0.346**	0.043
			(24-30")	**0.538**	STP 1 24"-30"	5321.03	ND	0.031	STP 2 24"-30"	5321.06	0.05	0.025
Nickel	21	52	(0-6")	**43.5**	STP 1 0-6"	5321.01	**41.8**	0.264	STP 2 0-6"	5321.04	**32.6**	0.158
			(6-12")	**29.3**	STP 1 6"-12"	5321.02	20.6	0.168	STP 2 6"-12"	5321.05	**40**	0.283
			(24-30")	**34.8**	STP 1 24"-30"	5321.03	12.9	0.152	STP 2 24"-30"	5321.06	7.69	0.122
Potassium	NLE	NLE	(0-6")	6190	STP 1 0-6"	5321.01	8170	10.5	STP 2 0-6"	5321.04	6480	6.32
			(6-12")	4610	STP 1 6"-12"	5321.02	7860	6.74	STP 2 6"-12"	5321.05	6090	11.3
			(24-30")	7920	STP 1 24"-30"	5321.03	11900	6.08	STP 2 24"-30"	5321.06	3300	4.87
Selenium	NLE	NLE	(0-6")	0	STP 1 0-6"	5321.01	1.83	1.59	STP 2 0-6"	5321.04	2.36	0.948
			(6-12")	1.65	STP 1 6"-12"	5321.02	1.52	1.01	STP 2 6"-12"	5321.05	3.34	1.69
			(24-30")	0	STP 1 24"-30"	5321.03	ND	0.912	STP 2 24"-30"	5321.06	ND	0.73
Silver	1.0	3.7	(0-6")	**11.2**	STP 1 0-6"	5321.01	**6.12**	1.59	STP 2 0-6"	5321.04	**3.14**	0.948
			(6-12")	**11.5**	STP 1 6"-12"	5321.02	**1.3**	1.01	STP 2 6"-12"	5321.05	**8.54**	1.69
			(24-30")	**7.78**	STP 1 24"-30"	5321.03	ND	0.912	STP 2 24"-30"	5321.06	ND	0.73
Sodium	NLE	NLE	(0-6")	5970	STP 1 0-6"	5321.01	1820	10.5	STP 2 0-6"	5321.04	684	6.32
			(6-12")	3790	STP 1 6"-12"	5321.02	924	6.74	STP 2 6"-12"	5321.05	811	11.3
			(24-30")	4180	STP 1 24"-30"	5321.03	333	6.08	STP 2 24"-30"	5321.06	273	4.87
Thallium	NLE	NLE	(0-6")	1.64	STP 1 0-6"	5321.01	2.63	1.59	STP 2 0-6"	5321.04	ND	0.948
			(6-12")	1.12	STP 1 6"-12"	5321.02	ND	1.01	STP 2 6"-12"	5321.05	ND	1.69
			(24-30")	0	STP 1 24"-30"	5321.03	ND	0.912	STP 2 24"-30"	5321.06	ND	0.73
Vanadium	NLE	NLE	(0-6")	74.5	STP 1 0-6"	5321.01	78.1	0.528	STP 2 0-6"	5321.04	60.9	0.316
			(6-12")	56.0	STP 1 6"-12"	5321.02	51.8	0.337	STP 2 6"-12"	5321.05	73.1	0.565
			(24-30")	79.6	STP 1 24"-30"	5321.03	54.8	0.304	STP 2 24"-30"	5321.06	18.2	0.243
Zinc	150	410	(0-6")	**415**	STP 1 0-6"	5321.01	**564**	0.528	STP 2 0-6"	5321.04	**726**	0.316
			(6-12")	**255**	STP 1 6"-12"	5321.02	**725**	0.337	STP 2 6"-12"	5321.05	**286**	0.565
			(24-30")	**387**	STP 1 24"-30"	5321.03	**347**	0.304	STP 2 24"-30"	5321.06	46.8	0.243

(1) Sediment samples analyzed for TAL Metals by EPA Method 6010B
(2) Effects Range - Low (ER-L) is the concentration at which adverse benthic impacts are found in approx. 10% of studies (mg/kg)
(3) Effects Range-Median (ER-M) is the concentration at which adverse benthic impacts are found inapprox. 50% of cases studied (mg/kg)
(4) Site-specific Maximum Background Concentration based on reference Borings B-8, B-9, and B-10for each sample depth interval and each analyte
(5) Mean is the calculated arithmetic average of each contaminant concentration based on referenceBorings B-8, B-9, and B-10
(6) Field Sample Location ID
(7) Laboratory Sample ID
(8) All Results in milligrams per kilogram (mg/kg)
(9) Method Detection Limit (mg/kg)
Colored Text = Concentration exceeds the ER-L
Colored Text = Concentration exceeds the ER-M
NLE = No Limt Established in NJDEP Sediment Screening Guidelines
ND = Not detected
Duplicate sample collected at Boring B-10
Indicates exceedances of Site-specific MBC

Table 4-2
Metal Sampling Results
Pre-1941 Sewage Treatment Plant Site
Fort Monmouth, New Jersey

Boring ID					Boring B-3				Boring B-4			
Matrix					Sediment				Sediment			
Analysis[1]	ER-L[2]	ER-M[3]	Depth	Maximum[4]	Location ID[6]	Sample ID[7]	Result[8]	MDL[9]	Location ID[6]	Sample ID[7]	Result[8]	MDL[9]
Aluminum	NLE	NLE	(0-6")	12700	STP 3 0-6"	5321.07	7920	2.45	STP 4 0-6"	5321.10	16600	4.96
			(6-12")	11200	STP 3 6"-12"	5321.08	5880	2.53	STP 4 6"-12"	5321.11	9690	3.26
			(24-30")	16900	STP 3 24"-30"	5321.09	5970	2.88	STP 4 24"-30"	5321.12	10300	2.43
Antimony	NLE	NLE	(0-6")	2.71	STP 3 0-6"	5321.07	1.19	0.49	STP 4 0-6"	5321.10	1.8	0.992
			(6-12")	2.49	STP 3 6"-12"	5321.08	0.946	0.507	STP 4 6"-12"	5321.11	2.5	0.652
			(24-30")	3.31	STP 3 24"-30"	5321.09	1.44	0.576	STP 4 24"-30"	5321.12	1.75	0.486
Arsenic	8.2	70	(0-6")	**27.7**	STP 3 0-6"	5321.07	**12.1**	0.49	STP 4 0-6"	5321.10	**28.1**	0.992
			(6-12")	**29.1**	STP 3 6"-12"	5321.08	7.45	0.507	STP 4 6"-12"	5321.11	**16.9**	0.652
			(24-30")	**25.6**	STP 3 24"-30"	5321.09	**8.47**	0.576	STP 4 24"-30"	5321.12	6.34	0.486
Barium	NLE	NLE	(0-6")	41.1	STP 3 0-6"	5321.07	14.7	0.122	STP 4 0-6"	5321.10	44.7	0.248
			(6-12")	38.9	STP 3 6"-12"	5321.08	14	0.127	STP 4 6"-12"	5321.11	40.6	0.163
			(24-30")	132	STP 3 24"-30"	5321.09	18.5	0.144	STP 4 24"-30"	5321.12	13.1	0.122
Beryllium	NLE	NLE	(0-6")	1.94	STP 3 0-6"	5321.07	1.45	0.122	STP 4 0-6"	5321.10	2.38	0.248
			(6-12")	3.76	STP 3 6"-12"	5321.08	1.21	0.127	STP 4 6"-12"	5321.11	1.72	0.163
			(24-30")	3.99	STP 3 24"-30"	5321.09	1.22	0.144	STP 4 24"-30"	5321.12	2.05	0.122
Cadmium	1.2	9.6	(0-6")	**4.51**	STP 3 0-6"	5321.07	**1.24**	0.122	STP 4 0-6"	5321.10	**2.19**	0.248
			(6-12")	**2.84**	STP 3 6"-12"	5321.08	1.02	0.127	STP 4 6"-12"	5321.11	0.955	0.163
			(24-30")	**14.3**	STP 3 24"-30"	5321.09	**1.21**	0.144	STP 4 24"-30"	5321.12	ND	0.122
Calcium	NLE	NLE	(0-6")	2340	STP 3 0-6"	5321.07	1100	4.89	STP 4 0-6"	5321.10	1680	9.92
			(6-12")	1950	STP 3 6"-12"	5321.08	612	5.07	STP 4 6"-12"	5321.11	992	6.52
			(24-30")	1580	STP 3 24"-30"	5321.09	1010	5.76	STP 4 24"-30"	5321.12	584	4.86
Chromium	81	370	(0-6")	**189**	STP 3 0-6"	5321.07	**90.6**	0.122	STP 4 0-6"	5321.10	**157**	0.248
			(6-12")	**88.1**	STP 3 6"-12"	5321.08	**87.1**	0.127	STP 4 6"-12"	5321.11	**123**	0.163
			(24-30")	**132**	STP 3 24"-30"	5321.09	78.7	0.144	STP 4 24"-30"	5321.12	**159**	0.122
Cobalt	NLE	NLE	(0-6")	43.2	STP 3 0-6"	5321.07	10.8	0.122	STP 4 0-6"	5321.10	14	0.248
			(6-12")	13.8	STP 3 6"-12"	5321.08	1.98	0.127	STP 4 6"-12"	5321.11	5.65	0.163
			(24-30")	25.6	STP 3 24"-30"	5321.09	8.76	0.144	STP 4 24"-30"	5321.12	2.35	0.122
Copper	34	270	(0-6")	**109**	STP 3 0-6"	5321.07	30	0.734	STP 4 0-6"	5321.10	**50.8**	1.49
			(6-12")	**40.5**	STP 3 6"-12"	5321.08	4.78	0.76	STP 4 6"-12"	5321.11	16.8	0.978
			(24-30")	**113**	STP 3 24"-30"	5321.09	24.9	0.864	STP 4 24"-30"	5321.12	ND	0.729
Iron	NLE	NLE	(0-6")	59200	STP 3 0-6"	5321.07	40000	2.45	STP 4 0-6"	5321.10	92400	4.96
			(6-12")	45500	STP 3 6"-12"	5321.08	27800	2.53	STP 4 6"-12"	5321.11	47700	3.26
			(24-30")	60900	STP 3 24"-30"	5321.09	30500	2.88	STP 4 24"-30"	5321.12	49700	2.43
Lead	47	218	(0-6")	**126**	STP 3 0-6"	5321.07	**47.6**	0.49	STP 4 0-6"	5321.10	**66.8**	0.992
			(6-12")	**60.5**	STP 3 6"-12"	5321.08	13.8	0.507	STP 4 6"-12"	5321.11	39.1	0.652
			(24-30")	**86.2**	STP 3 24"-30"	5321.09	41.1	0.576	STP 4 24"-30"	5321.12	3.48	0.486
Magnesium	NLE	NLE	(0-6")	6210	STP 3 0-6"	5321.07	4580	4.89	STP 4 0-6"	5321.10	7400	9.92
			(6-12")	3960	STP 3 6"-12"	5321.08	3660	5.07	STP 4 6"-12"	5321.11	4580	6.52
			(24-30")	5380	STP 3 24"-30"	5321.09	3370	5.76	STP 4 24"-30"	5321.12	7280	4.86
Manganese	NLE	NLE	(0-6")	102	STP 3 0-6"	5321.07	36.1	0.122	STP 4 0-6"	5321.10	95.5	0.248
			(6-12")	74.5	STP 3 6"-12"	5321.08	12.8	0.127	STP 4 6"-12"	5321.11	57.1	0.163
			(24-30")	80.3	STP 3 24"-30"	5321.09	21.6	0.144	STP 4 24"-30"	5321.12	12.7	0.122
Mercury	0.15	0.71	(0-6")	**0.671**	STP 3 0-6"	5321.07	**0.225**	0.032	STP 4 0-6"	5321.10	**0.466**	0.052
			(6-12")	**0.88**	STP 3 6"-12"	5321.08	0.023	0.023	STP 4 6"-12"	5321.11	**0.43**	0.036
			(24-30")	**0.538**	STP 3 24"-30"	5321.09	0.145	0.024	STP 4 24"-30"	5321.12	ND	0.023
Nickel	21	52	(0-6")	**43.5**	STP 3 0-6"	5321.07	16.2	0.122	STP 4 0-6"	5321.10	**31.1**	0.248
			(6-12")	**29.3**	STP 3 6"-12"	5321.08	9.85	0.127	STP 4 6"-12"	5321.11	16.9	0.163
			(24-30")	**34.8**	STP 3 24"-30"	5321.09	**65.1**	0.144	STP 4 24"-30"	5321.12	**10.2**	0.122
Potassium	NLE	NLE	(0-6")	6190	STP 3 0-6"	5321.07	6670	4.89	STP 4 0-6"	5321.10	11900	9.92
			(6-12")	4610	STP 3 6"-12"	5321.08	7000	5.07	STP 4 6"-12"	5321.11	7920	6.52
			(24-30")	7920	STP 3 24"-30"	5321.09	6060	5.76	STP 4 24"-30"	5321.12	15200	4.86
Selenium	NLE	NLE	(0-6")	0	STP 3 0-6"	5321.07	ND	0.734	STP 4 0-6"	5321.10	1.85	1.49
			(6-12")	1.65	STP 3 6"-12"	5321.08	ND	0.76	STP 4 6"-12"	5321.11	1.29	0.978
			(24-30")	0	STP 3 24"-30"	5321.09	ND	0.864	STP 4 24"-30"	5321.12	ND	0.729
Silver	1.0	3.7	(0-6")	**11.2**	STP 3 0-6"	5321.07	**1.79**	0.734	STP 4 0-6"	5321.10	**3.28**	1.49
			(6-12")	**11.5**	STP 3 6"-12"	5321.08	ND	0.76	STP 4 6"-12"	5321.11	ND	0.978
			(24-30")	**7.78**	STP 3 24"-30"	5321.09	0.926	0.864	STP 4 24"-30"	5321.12	ND	0.729
Sodium	NLE	NLE	(0-6")	5970	STP 3 0-6"	5321.07	1210	4.89	STP 4 0-6"	5321.10	2230	9.92
			(6-12")	3790	STP 3 6"-12"	5321.08	468	5.07	STP 4 6"-12"	5321.11	676	6.52
			(24-30")	4180	STP 3 24"-30"	5321.09	1050	5.76	STP 4 24"-30"	5321.12	289	4.86
Thallium	NLE	NLE	(0-6")	1.64	STP 3 0-6"	5321.07	ND	0.734	STP 4 0-6"	5321.10	ND	1.49
			(6-12")	1.12	STP 3 6"-12"	5321.08	ND	0.76	STP 4 6"-12"	5321.11	ND	0.978
			(24-30")	0	STP 3 24"-30"	5321.09	ND	0.864	STP 4 24"-30"	5321.12	ND	0.729
Vanadium	NLE	NLE	(0-6")	74.5	STP 3 0-6"	5321.07	52.1	0.245	STP 4 0-6"	5321.10	82.1	0.496
			(6-12")	56.0	STP 3 6"-12"	5321.08	33	0.253	STP 4 6"-12"	5321.11	54.2	0.326
			(24-30")	79.6	STP 3 24"-30"	5321.09	34.8	0.288	STP 4 24"-30"	5321.12	54.6	0.243
Zinc	150	410	(0-6")	**415**	STP 3 0-6"	5321.07	**197**	0.245	STP 4 0-6"	5321.10	**316**	0.496
			(6-12")	**255**	STP 3 6"-12"	5321.08	**167**	0.253	STP 4 6"-12"	5321.11	**184**	0.326
			(24-30")	**387**	STP 3 24"-30"	5321.09	131	0.288	STP 4 24"-30"	5321.12	67.2	0.243

(1) Sediment samples analyzed for TAL Metals by EPA Method 6010B
(2) Effects Range - Low (ER-L) is the concentration at which adverse benthic impacts are found in approx. 10% of studies (mg/kg)
(3) Effects Range-Median (ER-M) is the concentration at which adverse benthic impacts are found inapprox. 50% of cases studied (mg/kg)
(4) Site-specific Maximum Background Concentration based on reference Borings B-8, B-9, and B-10for each sample depth interval and each analyte
(5) Mean is the calculated arithmetic average of each contaminant concentration based on referenceBorings B-8, B-9, and B-10
(6) Field Sample Location ID
(7) Laboratory Sample ID
(8) All Results in milligrams per kilogram (mg/kg)
(9) Method Detection Limit (mg/kg)
Colored Text = Concentration exceeds the ER-L
Colored Text = Concentration exceeds the ER-M
NLE = No Limt Established in NJDEP Sediment Screening Guidelines
ND = Not detected
Duplicate sample collected at Boring B-10
Indicates exceedances of Site-specific MBC

Table 4-2
Metal Sampling Results
Pre-1941 Sewage Treatment Plant Site
Fort Monmouth, New Jersey

Boring ID					Boring B-5				Boring B-6			
Matrix					Sediment				Sediment			
Analysis[1]	ER-L[2]	ER-M[3]	Depth	Maximum[4]	Location ID[6]	Sample ID[7]	Result[8]	MDL[9]	Location ID[6]	Sample ID[7]	Result[8]	MDL[9]
Aluminum	NLE	NLE	(0-6")	12700	STP 5 0-6"	5321.13	14500	3.48	STP 6 0-6"	5321.16	13900	6.6
			(6-12")	11200	STP 5 6"-12"	5321.14	14200	5.46	STP 6 6"-12"	5321.17	7690	2.96
			(24-30")	16900	STP 5 24"-30"	5321.15	12300	5.81	STP 6 24"-30"	5321.18	8510	2.54
Antimony	NLE	NLE	(0-6")	2.71	STP 5 0-6"	5321.13	2.38	0.695	STP 6 0-6"	5321.16	3.96	1.32
			(6-12")	2.49	STP 5 6"-12"	5321.14	2.28	1.09	STP 6 6"-12"	5321.17	ND	0.592
			(24-30")	3.31	STP 5 24"-30"	5321.15	3.9	1.16	STP 6 24"-30"	5321.18	2.48	0.507
Arsenic	8.2	70	(0-6")	**27.7**	STP 5 0-6"	5321.13	**22.0**	0.695	STP 6 0-6"	5321.16	**59.7**	1.32
			(6-12")	**29.1**	STP 5 6"-12"	5321.14	**23.7**	1.09	STP 6 6"-12"	5321.17	7.76	0.592
			(24-30")	**25.6**	STP 5 24"-30"	5321.15	**16.7**	1.16	STP 6 24"-30"	5321.18	**10.8**	0.507
Barium	NLE	NLE	(0-6")	41.1	STP 5 0-6"	5321.13	100	0.174	STP 6 0-6"	5321.16	87.8	0.33
			(6-12")	38.9	STP 5 6"-12"	5321.14	124	0.273	STP 6 6"-12"	5321.17	13.1	0.148
			(24-30")	132	STP 5 24"-30"	5321.15	28.7	0.29	STP 6 24"-30"	5321.18	18.2	0.127
Beryllium	NLE	NLE	(0-6")	1.94	STP 5 0-6"	5321.13	2.06	0.174	STP 6 0-6"	5321.16	1.65	0.33
			(6-12")	3.76	STP 5 6"-12"	5321.14	2.38	0.273	STP 6 6"-12"	5321.17	1.41	0.148
			(24-30")	3.99	STP 5 24"-30"	5321.15	2.31	0.29	STP 6 24"-30"	5321.18	1.97	0.127
Cadmium	1.2	9.6	(0-6")	**4.51**	STP 5 0-6"	5321.13	**2.96**	0.174	STP 6 0-6"	5321.16	**2.43**	0.33
			(6-12")	**2.84**	STP 5 6"-12"	5321.14	**2.65**	0.273	STP 6 6"-12"	5321.17	0.153	0.148
			(24-30")	**14.3**	STP 5 24"-30"	5321.15	0.853	0.29	STP 6 24"-30"	5321.18	0.387	0.127
Calcium	NLE	NLE	(0-6")	2340	STP 5 0-6"	5321.13	1680	6.95	STP 6 0-6"	5321.16	1550	13.2
			(6-12")	1950	STP 5 6"-12"	5321.14	2070	10.9	STP 6 6"-12"	5321.17	611	5.92
			(24-30")	1580	STP 5 24"-30"	5321.15	1280	11.6	STP 6 24"-30"	5321.18	688	5.07
Chromium	81	370	(0-6")	**189**	STP 5 0-6"	5321.13	**146**	0.174	STP 6 0-6"	5321.16	**137**	0.33
			(6-12")	**88.1**	STP 5 6"-12"	5321.14	**149**	0.273	STP 6 6"-12"	5321.17	**81.8**	0.148
			(24-30")	**132**	STP 5 24"-30"	5321.15	**147**	0.29	STP 6 24"-30"	5321.18	**101**	0.127
Cobalt	NLE	NLE	(0-6")	43.2	STP 5 0-6"	5321.13	21.6	0.174	STP 6 0-6"	5321.16	12	0.33
			(6-12")	13.8	STP 5 6"-12"	5321.14	20.4	0.273	STP 6 6"-12"	5321.17	2.74	0.148
			(24-30")	25.6	STP 5 24"-30"	5321.15	6.00	0.29	STP 6 24"-30"	5321.18	3.65	0.127
Copper	34	270	(0-6")	**109**	STP 5 0-6"	5321.13	**68.8**	1.04	STP 6 0-6"	5321.16	**47**	1.98
			(6-12")	**40.5**	STP 5 6"-12"	5321.14	**63.4**	1.64	STP 6 6"-12"	5321.17	3.36	0.887
			(24-30")	**113**	STP 5 24"-30"	5321.15	16.1	1.74	STP 6 24"-30"	5321.18	**45.8**	0.761
Iron	NLE	NLE	(0-6")	59200	STP 5 0-6"	5321.13	61500	3.48	STP 6 0-6"	5321.16	90100	6.6
			(6-12")	45500	STP 5 6"-12"	5321.14	66000	5.46	STP 6 6"-12"	5321.17	36500	2.96
			(24-30")	60900	STP 5 24"-30"	5321.15	72000	5.81	STP 6 24"-30"	5321.18	44600	2.54
Lead	47	218	(0-6")	**126**	STP 5 0-6"	5321.13	**102**	0.695	STP 6 0-6"	5321.16	**88.9**	1.32
			(6-12")	**60.5**	STP 5 6"-12"	5321.14	**98.9**	1.09	STP 6 6"-12"	5321.17	10.1	0.592
			(24-30")	**86.2**	STP 5 24"-30"	5321.15	33.1	1.16	STP 6 24"-30"	5321.18	23.8	0.507
Magnesium	NLE	NLE	(0-6")	6210	STP 5 0-6"	5321.13	6150	6.95	STP 6 0-6"	5321.16	5010	13.2
			(6-12")	3960	STP 5 6"-12"	5321.14	6580	10.9	STP 6 6"-12"	5321.17	4160	5.92
			(24-30")	5380	STP 5 24"-30"	5321.15	6240	11.6	STP 6 24"-30"	5321.18	4720	5.07
Manganese	NLE	NLE	(0-6")	102	STP 5 0-6"	5321.13	77.6	0.174	STP 6 0-6"	5321.16	54.9	0.33
			(6-12")	74.5	STP 5 6"-12"	5321.14	85.9	0.273	STP 6 6"-12"	5321.17	25.2	0.148
			(24-30")	80.3	STP 5 24"-30"	5321.15	116	0.29	STP 6 24"-30"	5321.18	43.9	0.127
Mercury	0.15	0.71	(0-6")	**0.671**	STP 5 0-6"	5321.13	**0.477**	0.034	STP 6 0-6"	5321.16	**0.339**	0.057
			(6-12")	**0.88**	STP 5 6"-12"	5321.14	**0.935**	0.042	STP 6 6"-12"	5321.17	0.057	0.028
			(24-30")	**0.538**	STP 5 24"-30"	5321.15	**0.733**	0.046	STP 6 24"-30"	5321.18	**0.368**	0.033
Nickel	21	52	(0-6")	**43.5**	STP 5 0-6"	5321.13	**32.9**	0.174	STP 6 0-6"	5321.16	**34.6**	0.33
			(6-12")	**29.3**	STP 5 6"-12"	5321.14	**34.3**	0.273	STP 6 6"-12"	5321.17	16.6	0.148
			(24-30")	**34.8**	STP 5 24"-30"	5321.15	20.4	0.29	STP 6 24"-30"	5321.18	14.0	0.127
Potassium	NLE	NLE	(0-6")	6190	STP 5 0-6"	5321.13	9710	6.95	STP 6 0-6"	5321.16	7550	13.2
			(6-12")	4610	STP 5 6"-12"	5321.14	10500	10.9	STP 6 6"-12"	5321.17	8580	5.92
			(24-30")	7920	STP 5 24"-30"	5321.15	12200	11.6	STP 6 24"-30"	5321.18	9700	5.07
Selenium	NLE	NLE	(0-6")	0	STP 5 0-6"	5321.13	1.34	1.04	STP 6 0-6"	5321.16	3.87	1.98
			(6-12")	1.65	STP 5 6"-12"	5321.14	ND	1.64	STP 6 6"-12"	5321.17	ND	0.887
			(24-30")	0	STP 5 24"-30"	5321.15	ND	1.74	STP 6 24"-30"	5321.18	ND	0.761
Silver	1.0	3.7	(0-6")	**11.2**	STP 5 0-6"	5321.13	**5.87**	1.04	STP 6 0-6"	5321.16	**12.7**	0.458
			(6-12")	**11.5**	STP 5 6"-12"	5321.14	**4.84**	1.64	STP 6 6"-12"	5321.17	ND	0.887
			(24-30")	**7.78**	STP 5 24"-30"	5321.15	**3.29**	0.318	STP 6 24"-30"	5321.18	ND	0.761
Sodium	NLE	NLE	(0-6")	5970	STP 5 0-6"	5321.13	1960	6.95	STP 6 0-6"	5321.16	1070	13.2
			(6-12")	3790	STP 5 6"-12"	5321.14	2170	10.9	STP 6 6"-12"	5321.17	378	5.92
			(24-30")	4180	STP 5 24"-30"	5321.15	1460	11.6	STP 6 24"-30"	5321.18	370	5.07
Thallium	NLE	NLE	(0-6")	1.64	STP 5 0-6"	5321.13	ND	1.04	STP 6 0-6"	5321.16	ND	1.98
			(6-12")	1.12	STP 5 6"-12"	5321.14	ND	1.64	STP 6 6"-12"	5321.17	ND	0.887
			(24-30")	0	STP 5 24"-30"	5321.15	ND	1.74	STP 6 24"-30"	5321.18	ND	0.761
Vanadium	NLE	NLE	(0-6")	74.5	STP 5 0-6"	5321.13	78.8	0.347	STP 6 0-6"	5321.16	87.4	0.66
			(6-12")	56.0	STP 5 6"-12"	5321.14	72.5	0.546	STP 6 6"-12"	5321.17	39.2	0.296
			(24-30")	79.6	STP 5 24"-30"	5321.15	57	0.581	STP 6 24"-30"	5321.18	42.8	0.254
Zinc	150	410	(0-6")	**415**	STP 5 0-6"	5321.13	**331**	0.347	STP 6 0-6"	5321.16	**411**	0.66
			(6-12")	**255**	STP 5 6"-12"	5321.14	**451**	0.546	STP 6 6"-12"	5321.17	86.6	0.296
			(24-30")	**387**	STP 5 24"-30"	5321.15	**168**	0.581	STP 6 24"-30"	5321.18	137	0.254

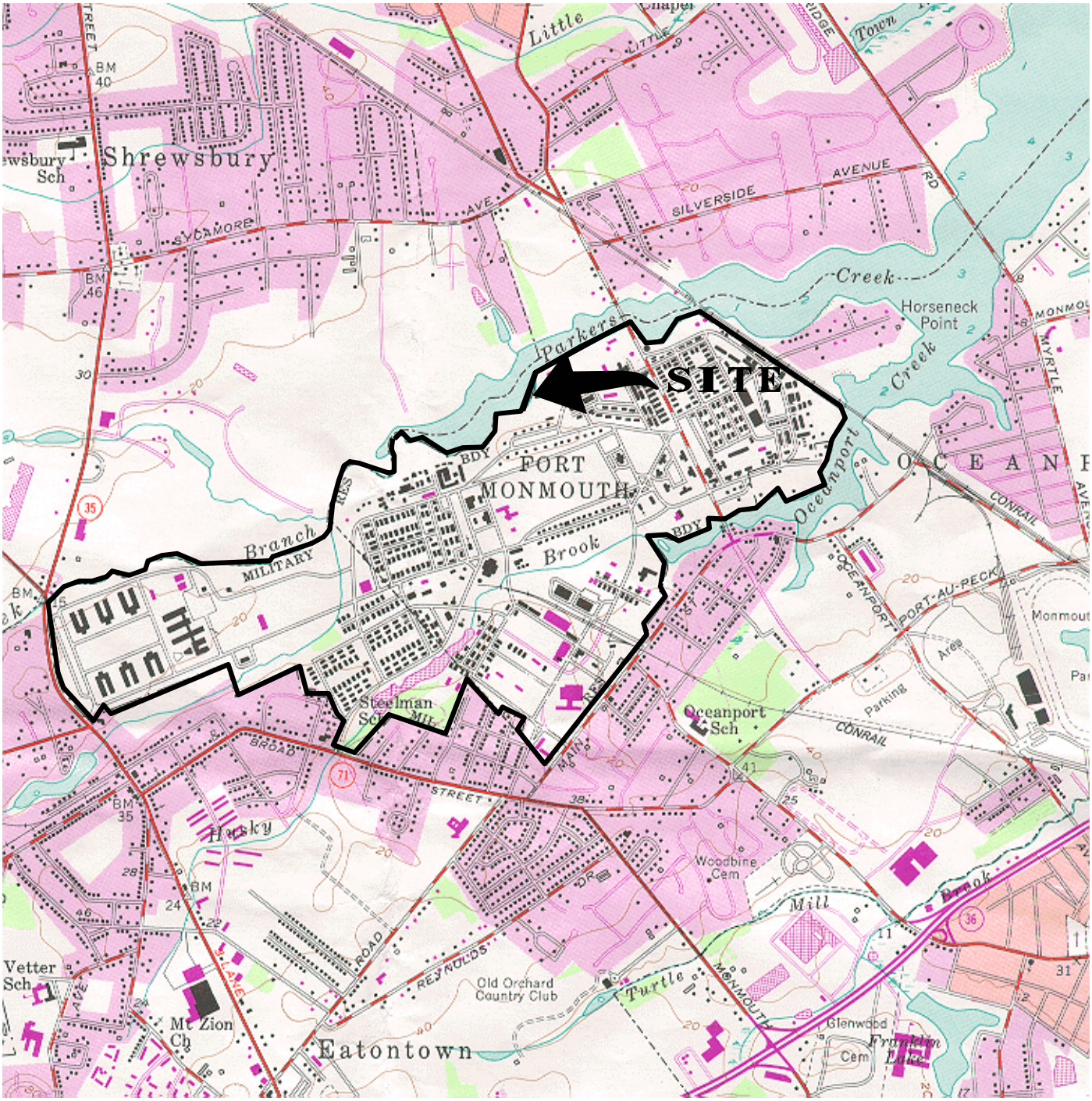
(1) Sediment samples analyzed for TAL Metals by EPA Method 6010B
(2) Effects Range - Low (ER-L) is the concentration at which adverse benthic impacts are found in approx. 10% of studies (mg/kg)
(3) Effects Range-Median (ER-M) is the concentration at which adverse benthic impacts are found inapprox. 50% of cases studied (mg/kg)
(4) Site-specific Maximum Background Concentration based on reference Borings B-8, B-9, and B-10for each sample depth interval and each analyte
(5) Mean is the calculated arithmetic average of each contaminant concentration based on referenceBorings B-8, B-9, and B-10
(6) Field Sample Location ID
(7) Laboratory Sample ID
(8) All Results in milligrams per kilogram (mg/kg)
(9) Method Detection Limit (mg/kg)
Colored Text = Concentration exceeds the ER-L
Colored Text = Concentration exceeds the ER-M
NLE = No Limt Established in NJDEP Sediment Screening Guidelines
ND = Not detected
Duplicate sample collected at Boring B-10
Indicates exceedances of Site-specific MBC

Table 4-2
Metal Sampling Results
Pre-1941 Sewage Treatment Plant Site
Fort Monmouth, New Jersey

Boring ID					Boring B-7				Duplicate			
Matrix					Sediment				Sediment			
Analysis[1]	ER-L[2]	ER-M[3]	Depth	Maximum[4]	Location ID[6]	Sample ID[7]	Result[8]	MDL[9]	Location ID[6]	Sample ID[7]	Result[8]	MDL[9]
Aluminum	NLE	NLE	(0-6")	12700	STP 7 0-6"	5321.19	10400	3.03	STP DUP 0-6"	5321.31	5190	1.98
			(6-12")	11200	STP 7 6"-12"	5321.20	16800	3.7	STP DUP 6"-12"	5321.32	8050	2.17
			(24-30")	16900	STP 7 24"-30"	5321.21	10100	3.54	STP DUP 24"-30"	5321.33	8830	3.14
Antimony	NLE	NLE	(0-6")	2.71	STP 7 0-6"	5321.19	2.53	0.606	STP DUP 0-6"	5321.31	1.33	0.397
			(6-12")	2.49	STP 7 6"-12"	5321.20	2.75	0.739	STP DUP 6"-12"	5321.32	1.61	0.434
			(24-30")	3.31	STP 7 24"-30"	5321.21	1.7	0.708	STP DUP 24"-30"	5321.33	1.37	0.627
Arsenic	8.2	70	(0-6")	**27.7**	STP 7 0-6"	5321.19	**19.7**	0.606	STP DUP 0-6"	5321.31	**8.51**	0.397
			(6-12")	**29.1**	STP 7 6"-12"	5321.20	**21.7**	0.739	STP DUP 6"-12"	5321.32	**18.0**	0.434
			(24-30")	**25.6**	STP 7 24"-30"	5321.21	**20.5**	0.708	STP DUP 24"-30"	5321.33	**15.8**	0.627
Barium	NLE	NLE	(0-6")	41.1	STP 7 0-6"	5321.19	49.5	0.152	STP DUP 0-6"	5321.31	9.85	0.099
			(6-12")	38.9	STP 7 6"-12"	5321.20	37.1	0.185	STP DUP 6"-12"	5321.32	22.8	0.108
			(24-30")	132	STP 7 24"-30"	5321.21	28.2	0.177	STP DUP 24"-30"	5321.33	23.1	0.157
Beryllium	NLE	NLE	(0-6")	1.94	STP 7 0-6"	5321.19	1.46	0.152	STP DUP 0-6"	5321.31	0.895	0.099
			(6-12")	3.76	STP 7 6"-12"	5321.20	2.57	0.185	STP DUP 6"-12"	5321.32	1.23	0.108
			(24-30")	3.99	STP 7 24"-30"	5321.21	1.78	0.177	STP DUP 24"-30"	5321.33	1.26	0.157
Cadmium	1.2	9.6	(0-6")	**4.51**	STP 7 0-6"	5321.19	**4.20**	0.152	STP DUP 0-6"	5321.31	0.482	0.099
			(6-12")	**2.84**	STP 7 6"-12"	5321.20	**3.00**	0.185	STP DUP 6"-12"	5321.32	2.52	0.108
			(24-30")	**14.3**	STP 7 24"-30"	5321.21	**2.71**	0.177	STP DUP 24"-30"	5321.33	2.29	0.157
Calcium	NLE	NLE	(0-6")	2340	STP 7 0-6"	5321.19	1270	6.06	STP DUP 0-6"	5321.31	557	3.97
			(6-12")	1950	STP 7 6"-12"	5321.20	1800	7.39	STP DUP 6"-12"	5321.32	1200	4.34
			(24-30")	1580	STP 7 24"-30"	5321.21	1310	7.08	STP DUP 24"-30"	5321.33	1330	6.27
Chromium	81	370	(0-6")	**189**	STP 7 0-6"	5321.19	**111**	0.152	STP DUP 0-6"	5321.31	52.2	0.099
			(6-12")	**88.1**	STP 7 6"-12"	5321.20	**174**	0.185	STP DUP 6"-12"	5321.32	73.8	0.108
			(24-30")	**132**	STP 7 24"-30"	5321.21	**119**	0.177	STP DUP 24"-30"	5321.33	79.7	0.157
Cobalt	NLE	NLE	(0-6")	43.2	STP 7 0-6"	5321.19	6.23	0.152	STP DUP 0-6"	5321.31	4.44	0.099
			(6-12")	13.8	STP 7 6"-12"	5321.20	19	0.185	STP DUP 6"-12"	5321.32	7.07	0.108
			(24-30")	25.6	STP 7 24"-30"	5321.21	14.2	0.177	STP DUP 24"-30"	5321.33	14.4	0.157
Copper	34	270	(0-6")	**109**	STP 7 0-6"	5321.19	30.2	0.91	STP DUP 0-6"	5321.31	10.3	0.595
			(6-12")	**40.5**	STP 7 6"-12"	5321.20	**45.3**	1.11	STP DUP 6"-12"	5321.32	**36.6**	0.651
			(24-30")	**113**	STP 7 24"-30"	5321.21	**44.9**	1.06	STP DUP 24"-30"	5321.33	**45.7**	0.941
Iron	NLE	NLE	(0-6")	59200	STP 7 0-6"	5321.19	49700	3.03	STP DUP 0-6"	5321.31	22800	1.98
			(6-12")	45500	STP 7 6"-12"	5321.20	65500	3.7	STP DUP 6"-12"	5321.32	34300	2.17
			(24-30")	60900	STP 7 24"-30"	5321.21	48500	3.54	STP DUP 24"-30"	5321.33	36500	3.14
Lead	47	218	(0-6")	**126**	STP 7 0-6"	5321.19	**52.5**	0.606	STP DUP 0-6"	5321.31	18	0.397
			(6-12")	**60.5**	STP 7 6"-12"	5321.20	**69.8**	0.739	STP DUP 6"-12"	5321.32	**53.4**	0.434
			(24-30")	**86.2**	STP 7 24"-30"	5321.21	**71.5**	0.708	STP DUP 24"-30"	5321.33	**62.8**	0.627
Magnesium	NLE	NLE	(0-6")	6210	STP 7 0-6"	5321.19	4630	6.06	STP DUP 0-6"	5321.31	2670	3.97
			(6-12")	3960	STP 7 6"-12"	5321.20	7770	7.39	STP DUP 6"-12"	5321.32	3660	4.34
			(24-30")	5380	STP 7 24"-30"	5321.21	4830	7.08	STP DUP 24"-30"	5321.33	4050	6.27
Manganese	NLE	NLE	(0-6")	102	STP 7 0-6"	5321.19	74.5	0.152	STP DUP 0-6"	5321.31	37.1	0.099
			(6-12")	74.5	STP 7 6"-12"	5321.20	58.8	0.185	STP DUP 6"-12"	5321.32	61.3	0.108
			(24-30")	80.3	STP 7 24"-30"	5321.21	45.3	0.177	STP DUP 24"-30"	5321.33	63.4	0.157
Mercury	0.15	0.71	(0-6")	**0.671**	STP 7 0-6"	5321.19	**0.552**	0.029	STP DUP 0-6"	5321.31	**0.444**	0.034
			(6-12")	**0.88**	STP 7 6"-12"	5321.20	**0.724**	0.043	STP DUP 6"-12"	5321.32	**0.635**	0.035
			(24-30")	**0.538**	STP 7 24"-30"	5321.21	**0.268**	0.038	STP DUP 24"-30"	5321.33	**0.606**	0.036
Nickel	21	52	(0-6")	**43.5**	STP 7 0-6"	5321.19	**21.8**	0.152	STP DUP 0-6"	5321.31	11	0.099
			(6-12")	**29.3**	STP 7 6"-12"	5321.20	**32.1**	0.185	STP DUP 6"-12"	5321.32	19.6	0.108
			(24-30")	**34.8**	STP 7 24"-30"	5321.21	**25.3**	0.177	STP DUP 24"-30"	5321.33	**23.2**	0.157
Potassium	NLE	NLE	(0-6")	6190	STP 7 0-6"	5321.19	6510	6.06	STP DUP 0-6"	5321.31	4110	3.97
			(6-12")	4610	STP 7 6"-12"	5321.20	13400	7.39	STP DUP 6"-12"	5321.32	4250	4.34
			(24-30")	7920	STP 7 24"-30"	5321.21	7820	7.08	STP DUP 24"-30"	5321.33	4760	6.27
Selenium	NLE	NLE	(0-6")	0	STP 7 0-6"	5321.19	2.07	0.91	STP DUP 0-6"	5321.31	ND	0.595
			(6-12")	1.65	STP 7 6"-12"	5321.20	ND	1.11	STP DUP 6"-12"	5321.32	1.10	0.651
			(24-30")	0	STP 7 24"-30"	5321.21	ND	1.06	STP DUP 24"-30"	5321.33	1.33	0.941
Silver	1.0	3.7	(0-6")	**11.2**	STP 7 0-6"	5321.19	**2.16**	0.91	STP DUP 0-6"	5321.31	0.694	0.595
			(6-12")	**11.5**	STP 7 6"-12"	5321.20	**4.67**	1.11	STP DUP 6"-12"	5321.32	**8.72**	0.651
			(24-30")	**7.78**	STP 7 24"-30"	5321.21	**6.34**	1.06	STP DUP 24"-30"	5321.33	**5.60**	0.941
Sodium	NLE	NLE	(0-6")	5970	STP 7 0-6"	5321.19	740	6.06	STP DUP 0-6"	5321.31	1880	3.97
			(6-12")	3790	STP 7 6"-12"	5321.20	1330	7.39	STP DUP 6"-12"	5321.32	2550	4.34
			(24-30")	4180	STP 7 24"-30"	5321.21	975	7.08	STP DUP 24"-30"	5321.33	3220	6.27
Thallium	NLE	NLE	(0-6")	1.64	STP 7 0-6"	5321.19	ND	0.91	STP DUP 0-6"	5321.31	ND	0.595
			(6-12")	1.12	STP 7 6"-12"	5321.20	ND	1.11	STP DUP 6"-12"	5321.32	ND	0.651
			(24-30")	0	STP 7 24"-30"	5321.21	3.38	1.06	STP DUP 24"-30"	5321.33	ND	0.941
Vanadium	NLE	NLE	(0-6")	74.5	STP 7 0-6"	5321.19	59.1	0.303	STP DUP 0-6"	5321.31	32.5	0.198
			(6-12")	56.0	STP 7 6"-12"	5321.20	80.9	0.37	STP DUP 6"-12"	5321.32	40.6	0.217
			(24-30")	79.6	STP 7 24"-30"	5321.21	57.7	0.354	STP DUP 24"-30"	5321.33	47.4	0.314
Zinc	150	410	(0-6")	**415**	STP 7 0-6"	5321.19	**386**	0.303	STP DUP 0-6"	5321.31	75.7	0.198
			(6-12")	**255**	STP 7 6"-12"	5321.20	**349**	0.37	STP DUP 6"-12"	5321.32	**220**	0.217
			(24-30")	**387**	STP 7 24"-30"	5321.21	**293**	0.354	STP DUP 24"-30"	5321.33	**214**	0.314

(1) Sediment samples analyzed for TAL Metals by EPA Method 6010B
(2) Effects Range - Low (ER-L) is the concentration at which adverse benthic impacts are found in approx. 10% of studies (mg/kg)
(3) Effects Range-Median (ER-M) is the concentration at which adverse benthic impacts are found inapprox. 50% of cases studied (mg/kg)
(4) Site-specific Maximum Background Concentration based on reference Borings B-8, B-9, and B-10for each sample depth interval and each analyte
(5) Mean is the calculated arithmetic average of each contaminant concentration based on referenceBorings B-8, B-9, and B-10
(6) Field Sample Location ID
(7) Laboratory Sample ID
(8) All Results in milligrams per kilogram (mg/kg)
(9) Method Detection Limit (mg/kg)
Colored Text = Concentration exceeds the ER-L
Colored Text = Concentration exceeds the ER-M
NLE = No Limt Established in NJDEP Sediment Screening Guidelines
ND = Not detected
Duplicate sample collected at Boring B-10
Indicates exceedances of Site-specific MBC

FIGURES



LONG BRANCH, N. J.

40073-C8-TF-024

1954

PHOTOREVISED 1981

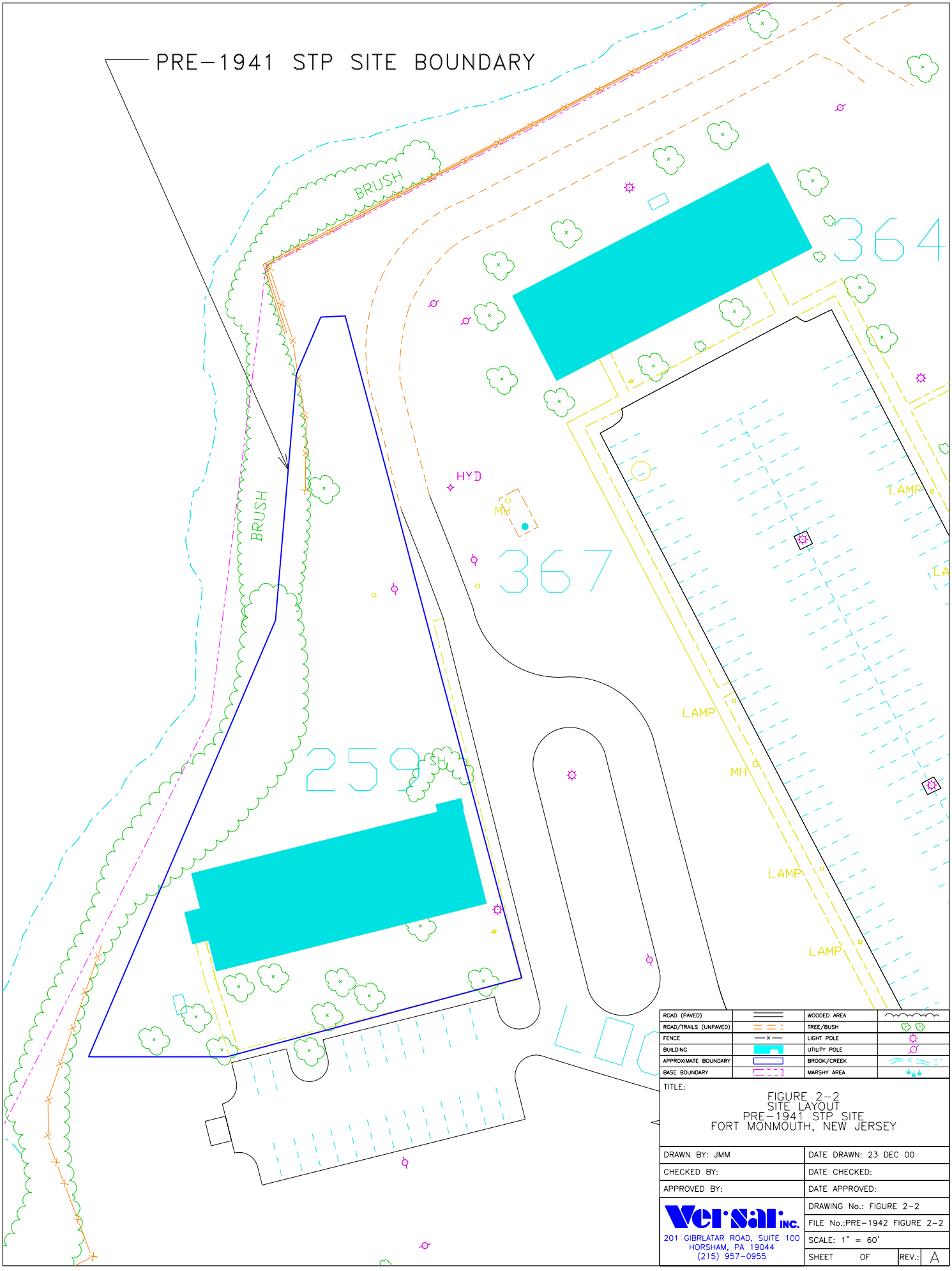
DMA 6164 I SE-SERIES V822

QUADRANGLE LOCATION

Mapped, edited and published by the Geological Survey

Figure 2-1
Site Location Map
Pre-1941 Sewage Treatment Plant 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	—x—	LIGHT POLE	
BUILDING		UTILITY POLE	
APPROXIMATE BOUNDARY		BROOK/CREEK	
BASE BOUNDARY		MARSHY AREA	

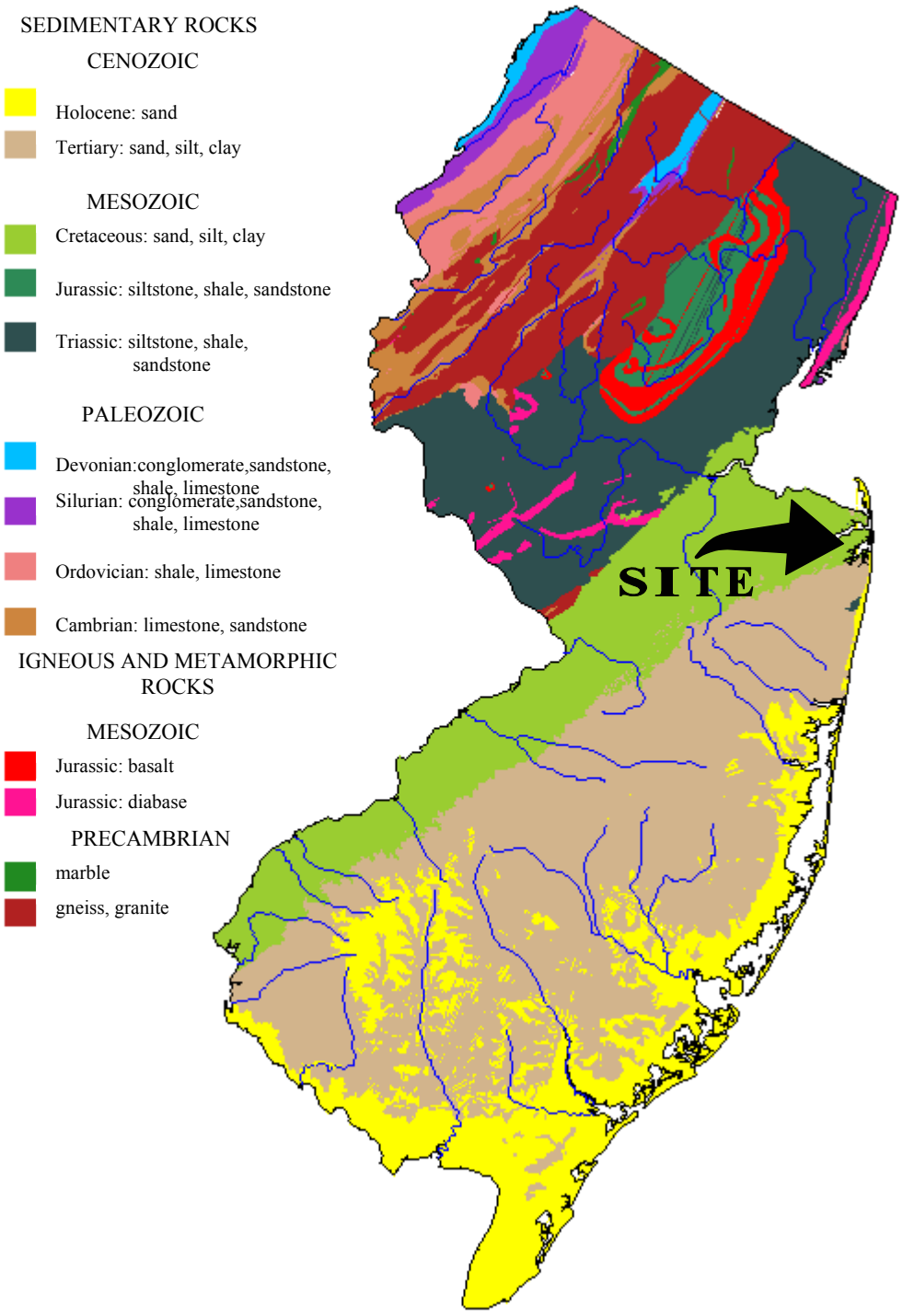
TITLE:

FIGURE 2-2
SITE LAYOUT
PRE-1941 STP SITE
FORT MONMOUTH, NEW JERSEY

DRAWN BY: JMM	DATE DRAWN: 23 DEC 00
CHECKED BY:	DATE CHECKED:
APPROVED BY:	DATE APPROVED:
	DRAWING No.: FIGURE 2-2
	FILE No.:PRE-1942 FIGURE 2-2
	SCALE: 1" = 60'
	SHEET OF REV.: A

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

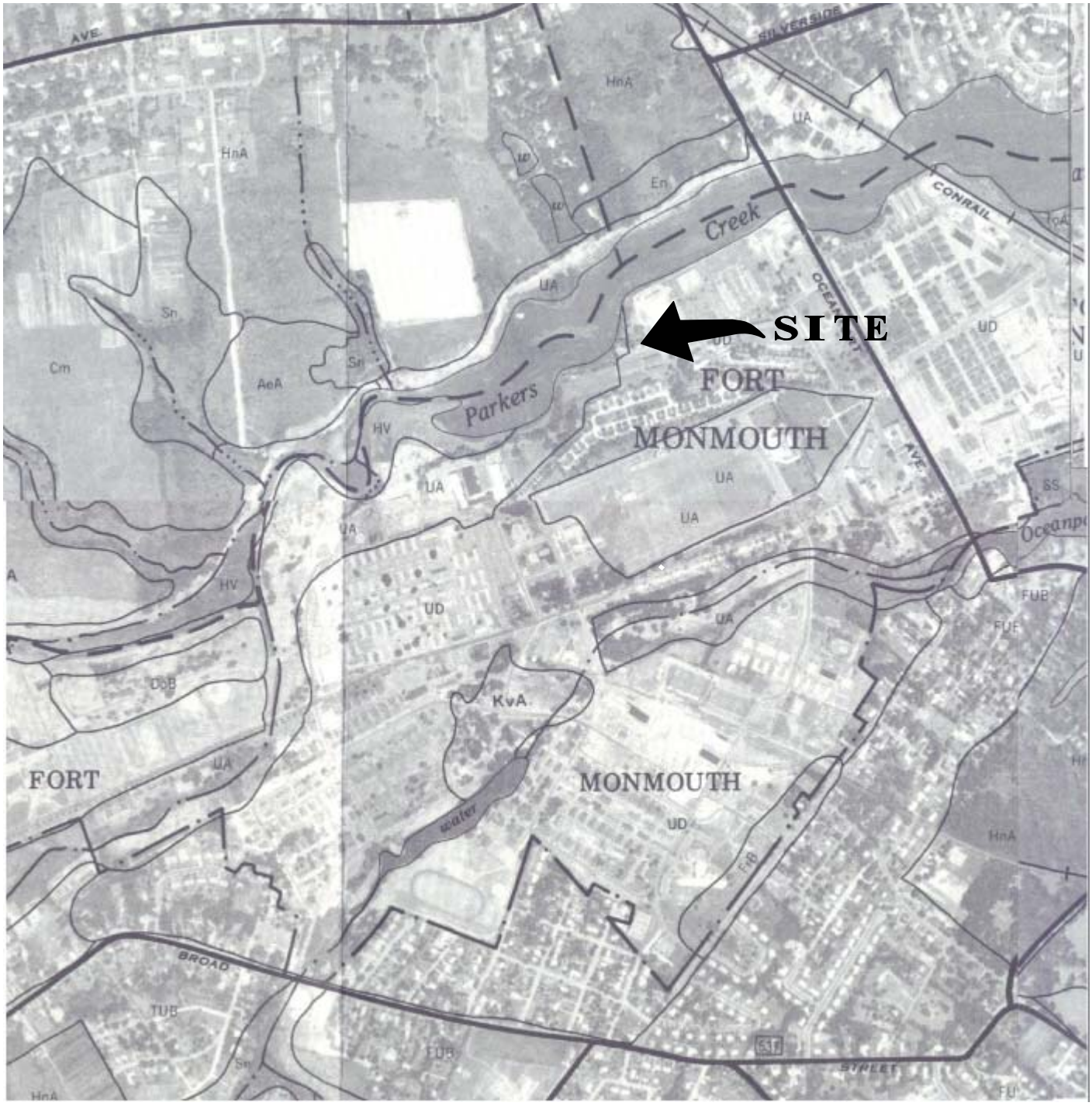
Geologic Map of New Jersey



Source: New Jersey Gelolgic Survey, 1994, *Geologic Map of New Jersey*.

Figure 2-3
Geologic Map of New Jersey
Pre-1941 Sewage Treatment Plant Site
Fort Monmouth, New Jersey

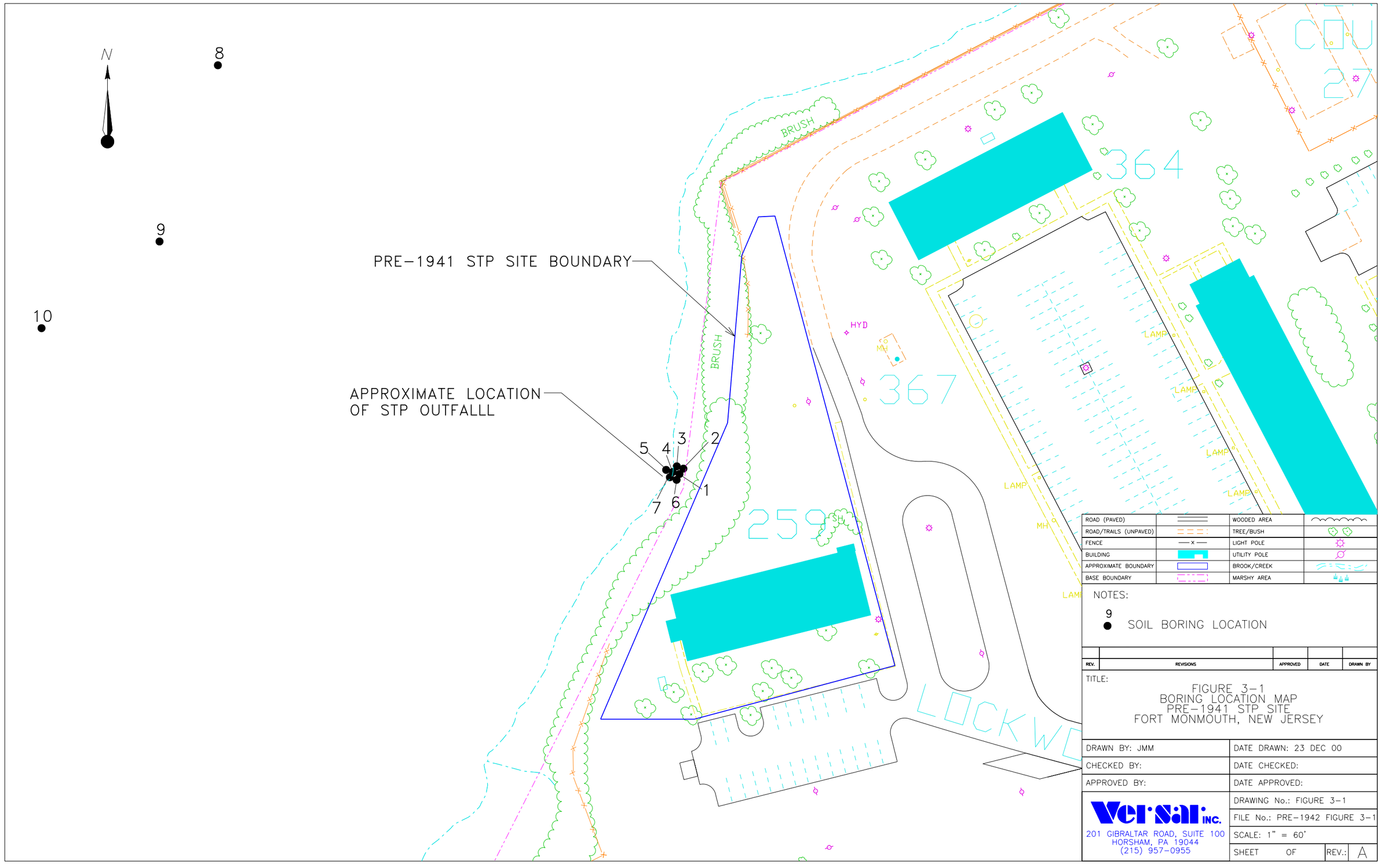
Versar INC.
201 Gibraltar Road, Suite 100
Horsham, PA 19044
(215) 957-0955



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

Figure 2-4
Soil Map of Monmouth County
Pre-1941 Sewage Treatment Plant 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	—x—	LIGHT POLE	
BUILDING		UTILITY POLE	
APPROXIMATE BOUNDARY		BROOK/CREEK	
BASE BOUNDARY		MARSHY AREA	

NOTES:

9 ● SOIL BORING LOCATION

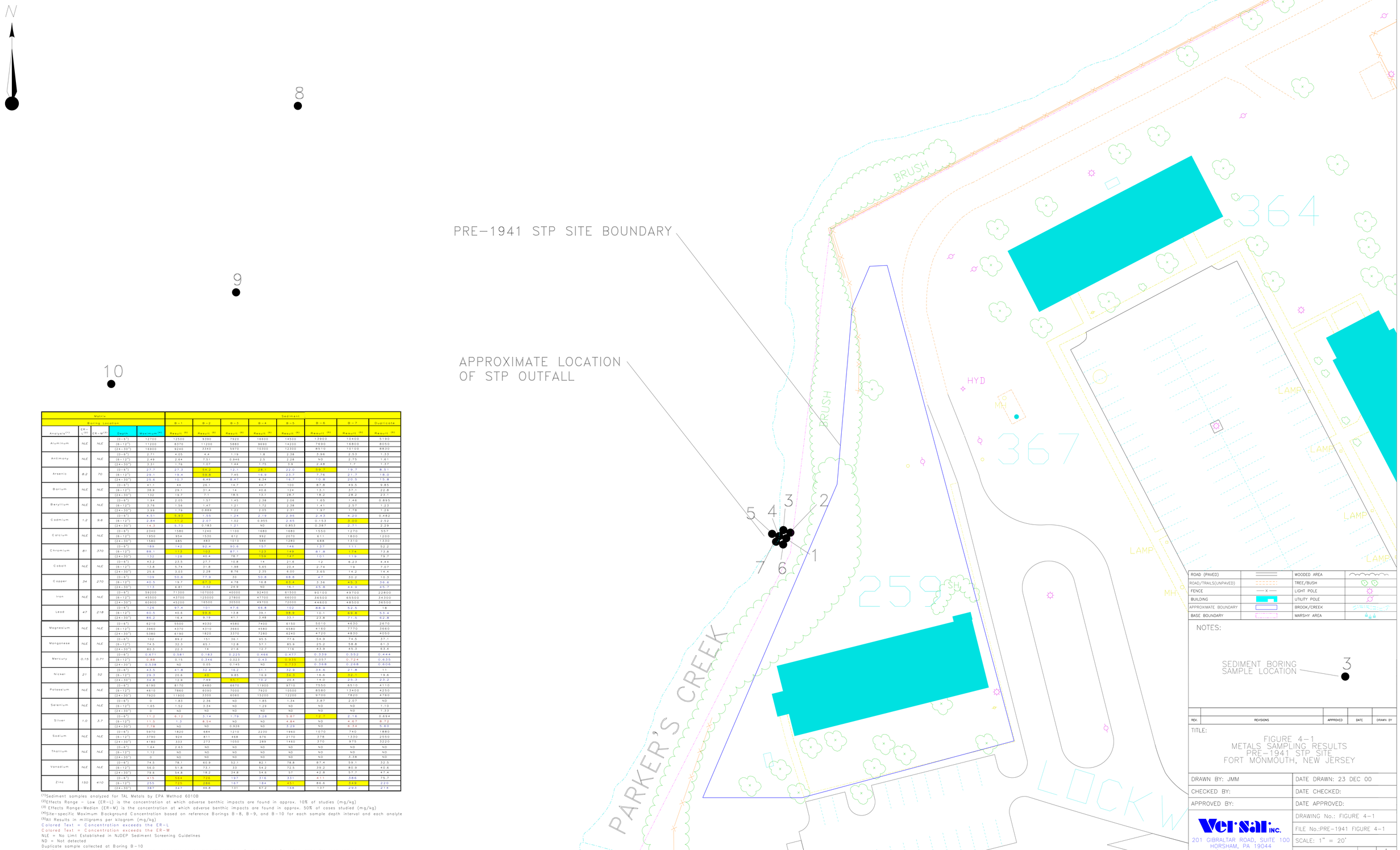
REV.	REVISIONS	APPROVED	DATE	DRAWN BY

TITLE:

FIGURE 3-1
BORING LOCATION MAP
PRE-1941 STP SITE
FORT MONMOUTH, NEW JERSEY

DRAWN BY: JMM	DATE DRAWN: 23 DEC 00
CHECKED BY:	DATE CHECKED:
APPROVED BY:	DATE APPROVED:
	DRAWING No.: FIGURE 3-1
	FILE No.: PRE-1942 FIGURE 3-1
	SCALE: 1" = 60'
	SHEET OF REV.: A

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



Matrix	Sediment								
Boring Location	B-1	B-2	B-3	B-4	B-5	B-6	B-7	Duplicate
Analyte[1]	ER-L[2]	ER-M[3]	Depth	Maximum[4]	Result [5]	Result [5]	Result [5]	Result [5]	Result [5]	Result [5]	Result [5]	Result [5]
Aluminum	NLE	NLE	(0-6")	12700	12500	9390	7920	16600	14500	13900	10400	5190
			(6-12")	11200	8370	11200	5880	9690	14200	7690	16800	8050
			(24-30")	16900	9240	3340	5970	10300	12300	8510	10100	8830
Antimony	NLE	NLE	(0-6")	2.71	4.05	4.4	1.19	1.8	2.38	3.96	2.53	1.33
			(6-12")	2.49	2.64	7.51	0.946	2.5	2.28	ND	2.75	1.61
			(24-30")	3.31	1.76	1.07	1.44	1.75	3.9	2.48	1.7	1.37
Arsenic	8.2	70	(0-6")	27.7	27.3	54.2	12.1	28.1	22.0	59.7	19.7	8.51
			(6-12")	29.1	19.4	59.8	7.45	16.9	23.7	7.74	21.7	18.0
			(24-30")	25.6	10.7	6.49	8.47	6.34	16.7	10.8	20.5	15.8
Barium	NLE	NLE	(0-6")	41.1	44	26.1	14.7	44.7	100	87.8	49.5	9.85
			(6-12")	38.9	29.1	31.4	14	40.6	124	13.1	37.1	22.8
			(24-30")	132	19.7	7.1	18.5	13.1	28.7	18.2	28.2	23.1
Beryllium	NLE	NLE	(0-6")	1.94	2.05	1.57	1.45	2.38	2.06	1.65	1.46	0.895
			(6-12")	2.76	1.56	1.47	1.21	1.72	2.38	1.41	2.57	1.23
			(24-30")	3.99	1.79	0.889	1.22	2.05	2.31	1.97	1.78	1.26
Cadmium	1.2	9.6	(0-6")	4.51	5.93	1.55	1.24	2.19	2.96	2.43	4.20	0.482
			(6-12")	2.84	11.2	2.07	1.02	0.955	2.65	0.153	3.30	2.32
			(24-30")	14.3	5.73	0.183	1.21	ND	0.853	0.387	2.71	2.29
Calcium	NLE	NLE	(0-6")	2340	1580	1240	1100	1680	1680	1550	1270	557
			(6-12")	1950	954	1530	612	892	2070	611	1800	1200
			(24-30")	1580	685	483	1010	584	1280	688	1310	1330
Chromium	81	370	(0-6")	189	142	92.4	90.6	157	146	137	171	52.2
			(6-12")	88.1	113	103	87.1	123	149	81.8	174	73.8
			(24-30")	132	128	40.4	78.7	109	147	101	119	79.7
Cobalt	NLE	NLE	(0-6")	43.2	23.5	27.7	10.8	14	21.6	12	62.2	4.44
			(6-12")	13.8	5.74	31.8	1.98	5.65	20.4	2.74	19	7.07
			(24-30")	25.6	3.03	2.28	8.76	2.35	6.00	3.65	14.2	14.4
Copper	34	270	(0-6")	109	50.6	77.9	20	50.8	68.8	47	352	10.3
			(6-12")	40.5	19.7	67.3	4.78	16.8	63.4	3.36	45.3	36.6
			(24-30")	113	6.81	3.32	24.9	ND	16.1	45.8	44.9	45.7
Iron	NLE	NLE	(0-6")	59200	71300	107000	40000	92400	61500	90100	49700	22800
			(6-12")	45500	43700	125000	27800	49700	66000	36500	65500	34300
			(24-30")	60900	45200	16500	30500	49700	72000	44600	48500	36500
Lead	47	218	(0-6")	126	97.4	101	47.6	86.8	102	88.9	52.5	18
			(6-12")	60.5	49.6	99.6	13.8	39.1	98.8	10.1	69.8	53.4
			(24-30")	86.2	16.4	9.19	41.1	3.48	33.1	23.8	71.9	62.8
Magnesium	NLE	NLE	(0-6")	6210	5500	4030	4580	7400	6150	5010	4630	2670
			(6-12")	3960	4370	4310	3660	4580	6580	4160	7770	3660
			(24-30")	5380	6190	1820	3370	7280	6240	4720	4930	4050
Manganese	NLE	NLE	(0-6")	102	89.2	13.1	36.1	93.5	77.6	54.9	74.5	37.1
			(6-12")	74.5	32.3	65.1	12.8	57.1	85.9	25.2	58.8	61.3
			(24-30")	80.3	22.3	14	21.6	12.7	116	43.9	45.3	63.4
Mercury	0.15	0.71	(0-6")	0.671	0.581	0.183	0.225	0.466	0.477	0.339	0.552	0.444
			(6-12")	0.88	0.15	0.346	0.023	0.43	0.935	0.057	0.724	0.635
			(24-30")	0.338	ND	0.05	0.145	ND	0.733	0.268	0.268	0.606
Nickel	21	52	(0-6")	43.5	41.8	32.6	16.2	31.1	32.9	34.6	21.8	11
			(6-12")	29.3	20.6	40	9.85	16.9	34.3	16.6	32.1	19.6
			(24-30")	34.8	12.9	7.69	65.1	10.2	20.4	14.0	25.3	23.2
Potassium	NLE	NLE	(0-6")	6190	8170	6480	6670	11900	9710	7550	6510	4110
			(6-12")	4610	7860	8090	7000	7920	10500	8580	13400	4250
			(24-30")	7920	11900	2300	6060	13200	12200	9700	7820	4760
Selenium	NLE	NLE	(0-6")	0	1.83	2.36	ND	1.85	1.34	3.87	2.07	ND
			(6-12")	1.65	1.52	3.34	ND	1.29	ND	ND	ND	1.10
			(24-30")	0	ND	ND	ND	ND	ND	ND	ND	1.33
Silver	1.0	3.7	(0-6")	11.2	6.12	3.14	1.79	3.28	5.87	12.7	2.16	0.694
			(6-12")	11.5	1.3	8.54	ND	ND	4.84	ND	4.87	8.72
			(24-30")	7.78	ND	ND	0.924	ND	3.29	ND	6.34	5.60
Sodium	NLE	NLE	(0-6")	5970	1820	684	1210	2230	1960	1070	740	1880
			(6-12")	3790	924	811	468	676	2170	378	1330	2550
			(24-30")	4180	333	273	1050	289	1460	370	975	3220
Thallium	NLE	NLE	(0-6")	1.64	2.63	ND	ND	ND	ND	ND	ND	ND
			(6-12")	1.12	ND	ND	ND	ND	ND	ND	ND	ND
			(24-30")	0	ND	ND	ND	ND	ND	ND	3.38	ND
Vanadium	NLE	NLE	(0-6")	74.5	78.1	60.9	52.1	82.1	78.8	87.4	59.1	32.5
			(6-12")	56.0	51.8	73.1	33	54.2	72.5	39.2	80.9	40.6
			(24-30")	79.6	54.8	18.2	34.8	54.6	57	42.8	57.7	47.4
Zinc	150	410	(0-6")	415	564	726	197	316	331	411	386	75.7
			(6-12")	255	725	286	167	184	451	86.6	349	220
			(24-30")	387	347	48.8	131	67.2	168	137	293	214

(1)Sediment samples analyzed for TAL Metals by EPA Method 6010B
(2)Effects Range – Low (ER-L) is the concentration at which adverse benthic impacts are found in approx. 10% of studies (mg/kg)
(3) Effects Range-Median ((ER-M) is the concentration at which adverse benthic impacts are found in approx. 50% of cases studied (mg/kg)
(4)Site-specific Maximum Background Concentration based on reference Borings B-8, B-9, and B-10 for each sample depth interval and each analyte
(5)All Results in milligrams per kilogram (mg/kg)
Colored Text = Concentration exceeds the ER-L
Colored Text = Concentration exceeds the ER-M
NLE = No Limit Established in NJDEP Sediment Screening Guidelines
ND = Not detected
Duplicate sample collected at Boring B-10
See Tables 4-1 and 4-2 for complete analytical laboratory details including sample ID and Method Detection Limits for each analyte

REV.	REVISIONS	APPROVED	DATE	DRAWN BY

TITLE:
FIGURE 4-1
METALS SAMPLING RESULTS
PRE-1941 STP SITE
FORT MONMOUTH, NEW JERSEY

DRAWN BY: JMM	DATE DRAWN: 23 DEC 00
CHECKED BY:	DATE CHECKED:
APPROVED BY:	DATE APPROVED:
	DRAWING No.: FIGURE 4-1
	FILE No.:PRE-1941 FIGURE 4-1
	SCALE: 1" = 20'
	SHEET OF REV.: A

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
Pre-1941 STP Site
Fort Monmouth, New Jersey

Appendix B

Site Investigation Plan, Field Sampling Plan for Pre-1941 Sanitary Treatment Plant Sediments, DSERTS Site # FTMM-20 (TVS, December 1999)

State of New Jersey
Department of Environmental Protection

Christine Todd Whitman
Governor

Robert C. Shinn, Jr.
Commissioner

MAR 24 2000

Mr. Joseph Fallon
Environmental Protection Specialist
Directorate of Public Works
U.S. Army, Fort Monmouth
Fort Monmouth, NJ 07703

Re: Field Sampling Plan - Pre-1941 Sanitary Treatment Plant
Fort Monmouth Army Base
Fort Monmouth, Monmouth County

The NJDEP has reviewed your December 22, 1999 sampling plan (document noted above) and we approve the document as submitted.

Please note that the NJDEP requires **all** sampling to be GIS mapped and **all** subsequent data to be electronically submitted as we have discussed in the past. No approvals may be issued by me until EDSA requirements have been fulfilled.

Sediments and soils should be preserved using the methanol preservation methods required by the Technical Requirements for Site Remediation. We can discuss this in greater detail if you need further clarification.

If you 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

FTMMTH065IRC.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

December 22, 1999

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: Field Sampling Plan for Pre-1941 Sanitary Treatment Plant,
Main Post, Fort Monmouth, New Jersey
DSERTS Site FTMM-20

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 further delineate site specific contaminants of concern. 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

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

Encl.

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

Field Sampling Plan for Pre-1941 Sanitary Treatment Plant (STP) Sediments

DSERTS SITE # FTMM-20

DECEMBER 1999

SITE INVESTIGATION PLAN

Field Sampling Plan for Pre-1941 Sanitary Treatment Plant (STP) Sediments

PREPARED FOR:

Mr. JOSEPH FALLON
PROJECT MANAGER
DIRECTORATE OF PUBIC WORKS
FORT MONMOUTH, NJ
BUILDING 173
(732)-532-6223

PREPARED BY:

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

Site:
Pre-1941 Sanitary Treatment Plant,
Main Post, U.S. Army Fort Monmouth, NJ

TABLE OF CONTENTS

1.0 SAMPLING ACTIVITIES

1.1 OVERVIEW

This report provides details for a proposed sediment sampling plan to be conducted by TECOM-Vinnell Services, (TVS) in support of the Directorate of Public Works, U.S. Army Fort Monmouth, New Jersey. The area of concern is a pre-1941 sanitary treatment plant (STP) located on the Main Post of Fort Monmouth. Sampling activities shall be conducted in accordance with the specifications required for collecting sediment samples as determined in 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

The pre-1941 sanitary treatment plant (STP) was located on Parkers Creek in an area north of Allen Avenue, in approximately the same area as present Building 259 (Weston, 4.2-17 1). Please refer to Figure 4.2-34. The STP was presumably operated until the Main Post STP (AOC-3) came on line in 1941. One sediment sample was collected in December of 1994 during the Site Investigation phase for this project. The sediment sample was collected adjacent to the former outfall and subsequently tested for Target Analyte List (TAL) Metals. Four metals (arsenic, cadmium, chromium, and zinc) exceeded both the NJDEP Marine/Estuarine Biological Effects Level Criteria and their respective maximum background concentrations. Sample data can be viewed in Table 4.2-21.

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 this 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).

The following parties are participants in this investigation:

- Project Manager: Mr. Joseph Fallon
  U.S. Army Fort Monmouth, Directorate of Public Works
  Telephone Number: (732) 532-6223

- Field Technician: Mr. Corey McCormack
  TECOM-Vinnell Services (TVS)
  Telephone Number: (732) 532-0989

- Laboratory Supervisor: Mr. Daniel Wright
  TECOM-Vinnell Services
  Telephone Number: (732) 532-4359

- Field Technician Supervisor: Mr. Mark Laura
  TECOM-Vinnell Services (TVS)
  Telephone Number: (732) 532-0989

- Health and Safety Officer: Mr. Bruce Wadlington
  TECOM-Vinnell Services (TVS)
  Telephone 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 ACTIVITES

Site activities shall include sampling sediments, identification and quantification of contaminants of concern, horizontal and vertical delineation of contaminants of concern, confirmation of results from a previous sampling event and further determination of background levels for site specific metals.

2.2.2 SEDIMENT SAMPLING

- Sampling will be conducted using a hand core sediment sampler.
- TAL Metals samples will be collected into new, pre-cleaned, 4oz clear glass bottles with Teflon lined caps. All samples will be stored in a cooler at 4 º Celsius.
- After each sampling event, equipment shall be decontaminated as stated in section 2.3.
- Determination of sample locations will be as follows:
  1. Sampling will be conducted using a hand core sediment sampler.
  2. A sample boring will be collected at the former outfall area.
  3. Moving from the outfall area, sample borings will then be taken at 5' intervals upstream along bank, downstream along bank, and directly out into Parkers Creek.
  4. Sample borings will then also be taken at a further 5' intervals from the previous group, in likewise upstream, downstream, and out into creek patterns.

5. In addition, three sample borings will be collected along the north bank of Parkers Creek (opposing stream bank, upstream from the former STP outfall). Sample data will be used to provide additional background level data for site specific metals.
6. The depth at which samples will be taken are 0-6", 6-12"' and 24-30" for each sample boring.
7. Sampling will commence from downstream, working upstream. Care will be taken to minimize disturbance of sediments and washing of samples as collected.
8. Physical measurements will include pH, salinity and temperature of the water above the sampling point.
9. A boring log shall be created to note any layers or defining aspects to the borings. The tide will be recorded as well.

In all, 3 samples per boring will be done over the 10 borings; giving a total of 30 sediment samples that will be taken with the addition of QA/QC samples as mentioned in section 2.2.3.

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, 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**

Table 4.2-21
Fort Monmouth - Main Post
Summary of Detected Compounds in Sediments
Site - Pre-1941 Sanitary Treatment Plant

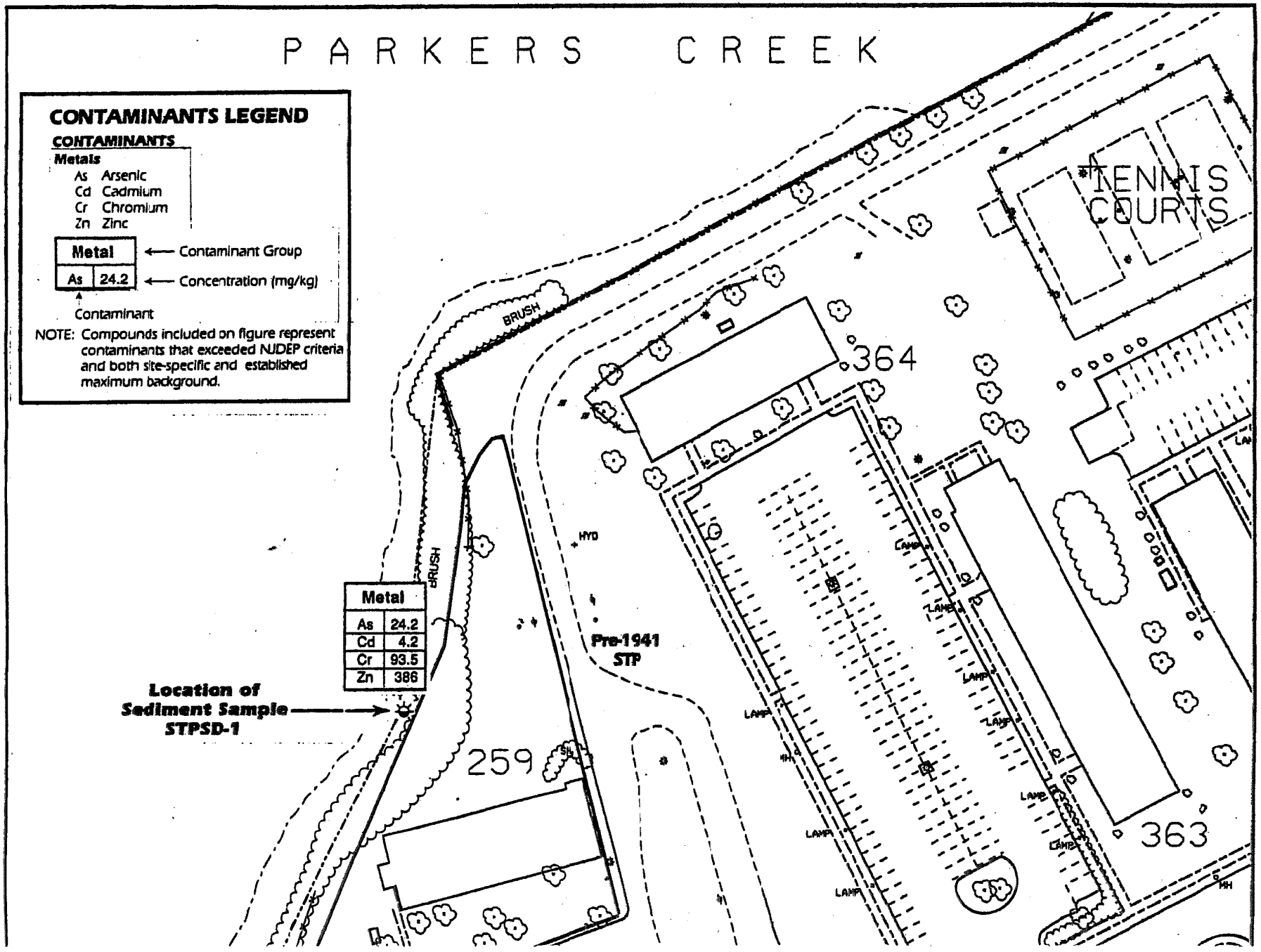
COMPOUND	METHOD DETECTION LIMIT (mg/kg)	MARINE/ESTUARINE BIOLOGICAL EFFECTS LEVEL (ERL)* (mg/kg)	MAXIMUM DETECTED BACKGROUND CONCENTRATION	ANALYTICAL RESULTS STPSD-1 12/1/94
METALS TOTAL (mg/kg)				
Aluminum	18.1	NLE	9060	9240
Arsenic	2.5	8.2	14.5	**24.2**
Barium	1.4	NLE	87.6	27.6
Beryllium	1.0	NLE	3.2	1.3
Cadmium	2.3	1.2	ND	**4.2**
Calcium	8.1	NLE	3180	1010
Chromium	4.3	81	88.1	**93.5**
Cobalt	1.9	NLE	119	13.5
Copper	1.6	34	48.4	**35.2**
Iron	3.2	NLE	61900	49200
Lead	9.9	46.7	64.1	**59**
Magnesium	25.8	NLE	3280	3390
Manganese	1.4	NLE	70.2	39.5
Mercury	0.32	0.15	1.7	**0.57**
Nickel	8.7	20.9	131	**26.5**
Potassium	555	NLE	10200	6760
Selenium	0.56	NLE	1.7	0.88
Silver	2.1	1	ND	**5.2**
Sodium	10.4	NLE	189	2330
Vanadium	2.0	NLE	49.1	49.5
Zinc	1.9	150	162	**386**

Compounds detected above NJDEP Sediment Guidance are noted by bold numbers.

* - Value from Long et al. (1995).

ND - Compound was not detected at or above the quantification limit.

NLE - No Level Established


PARKERS CREEK
CONTAMINANTS LEGEND
CONTAMINANTS
Metals
As Arsenic
Cd Cadmium
Cr Chromium
Zn Zinc
Metal
As 24.2
Contaminant Group
Concentration (mg/kg)
Contaminant
NOTE: Compounds included on figure represent contaminants that exceeded NJDEP criteria and both site-specific and established maximum background.
TENNIS COURTS
BRUSH
364
HYD
Metal
As 24.2
Cd 4.2
Cr 93.5
Zn 386
Location of Sediment Sample STPSD-1
Pre-1941 STP
259
363
LAMP
MH

Appendix C

Soil Boring Logs

U.S.ARMY
FORT MONMOUTH
SELFM-PW-EV

LOG OF BORING B-1

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

PRE-1941 STP

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

Depth in INCHES	Lab No.	Samples	DESCRIPTION	TIME	pH	SALINITY	TEMP.
0							
	5321.01	1	SILT, Fine. Dk. BROWN/BLACK.	0830	7.64	15	12.5
5							
	5321.02	2	SILT, Fine W/ SOME SAND. Dk. BROWN/BLACK.	0834			
10							
			SILT, Fine W/ SOME SAND. Dk. BROWN/BLACK.				
15							
20							
25	5321.03	3		0836			
30							

04-18-2000 X:\MTECH5\PRE194~1\STP-1.BOR

U.S.ARMY
FORT MONMOUTH
SELFM-PW-EV

LOG OF BORING B-2

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

PRE-1941 STP

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

Depth in INCHES	Lab No.	Samples	DESCRIPTION	TIME	pH	SALINITY	TEMP.
0	5321.04	1	SILT, Fine. Dk. BROWN/BLACK.	0841	7.64	15	12.5
5	5321.05	2	SILT, Fine W/ SOME SAND. Dk. BROWN/BLACK.	0844			
10			SILT, Fine W/ SOME SAND. Dk. BROWN/BLACK.				
15							
20							
25	5321.06	3		0846			
30							

04-18-2000 X:\MTECH5\PRE194~1\STP-2.BOR

U.S.ARMY
FORT MONMOUTH
SELFM-PW-EV

LOG OF BORING B-3

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

PRE-1941 STP

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

Depth in INCHES	Lab No.	Samples	DESCRIPTION	TIME	pH	SALINITY	TEMP.
0	5321.07	1	SANDY SILT, Med. Dk. BROWN/BLACK	0851	7.64	15	12.5
5	5321.08	2	SANDY SILT, Fine. Dk. BROWN/BLACK.	0854			
10			SANDY SILT, Fine. Dk. BROWN/BLACK.				
15							
20							
25	5321.09	3		0856			
30							

04-18-2000 X:\MTECH5\PRE1941\STP-3.BOR

U.S.ARMY
FORT MONMOUTH
SELFM-PW-EV

LOG OF BORING B-4

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

PRE-1941 STP

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

Depth in INCHES	Lab No.	Samples	DESCRIPTION	TIME	pH	SALINITY	TEMP.
0							
	5321.10	1	SANDY SILT, Fine. Dk. BROWN/BLACK	0904	7.63	15	12.5
5							
	5321.11	2	SANDY SILT, Fine. Dk. BROWN/BLACK.	0906			
10							
			SANDY SILT, Fine. Dk. BROWN/BLACK.				
15							
20							
25	5321.12	3		0908			
30							

04-18-2000 X:\MTECH5\PRE194~1\STP-4.BOR

U.S.ARMY
FORT MONMOUTH
SELFM-PW-EV

LOG OF BORING B-5

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

PRE-1941 STP

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

Depth in INCHES	Lab No.	Samples	DESCRIPTION	TIME	pH	SALINITY	TEMP.
0							
	5321.13	1	SILT, Fine. Dk. BROWN/BLACK	0915	7.64	15	12.5
5							
	5321.14	2	SILT, Fine. Dk. BROWN/BLACK.	0918			
10							
			SILT, Fine. Dk. BROWN/BLACK.				
15							
20							
25	5321.15	3		0919			
30							

04-18-2000 X:\MTECH5\PRE194-1\STP-5.BOR

U.S.ARMY
FORT MONMOUTH
SELFM-PW-EV

LOG OF BORING B-6

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

PRE-1941 STP

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

Depth in INCHES	Lab No.	Samples	DESCRIPTION	TIME	pH	SALINITY	TEMP.
0	5321.16	1	SANDY SILT, Fine. Dk. BROWN/BLACK	0922	7.64	15	12.5
5	5321.17	2	SILT, Fine. Dk. BROWN/BLACK.	0925			
10			SILT, Fine. Dk. BROWN/BLACK.				
15							
20							
25	5321.18	3		0927			
30							

04-18-2000 X:\WTECH5\PRE1941-1\STP-6.BOR

U.S.ARMY
FORT MONMOUTH
SELFM-PW-EV

LOG OF BORING B-7

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

PRE-1941 STP

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

Depth in INCHES	Lab No.	Samples	DESCRIPTION	TIME	pH	SALINITY	TEMP.
0	5321.19	1	SANDY SILT, Fine. Dk. BROWN/BLACK	0933	7.65	15	12.5
5	5321.20	2	SILT, Fine. Dk. BROWN/BLACK.	0935			
10			SANDY SILT, Fine. Dk. BROWN/BLACK.				
15							
20							
25	5321.21	3		0937			
30							

04-18-2000 X:\MTECH5\PRE1941~1\STP-7.BOR

U.S.ARMY
FORT MONMOUTH
SELFM-PW-EV

LOG OF BORING B-8

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

PRE-1941 STP

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

Depth in INCHES	Lab No.	Samples	DESCRIPTION	TIME	pH	SALINITY	TEMP.
0	5321.22	1	SILT, Fine. Dk. BROWN/BLACK	0941	7.64	15	12.5
5	5321.23	2	SILT, Fine. Dk. BROWN/BLACK.	0944			
10			SILT, Fine. Dk. BROWN/BLACK.				
15							
20							
25	5321.24	3		0947			
30							

04-18-2000 X:\MTECH5\PRE194~1\STP-8.BOR

U.S.ARMY
FORT MONMOUTH
SELFM-PW-EV

LOG OF BORING B-9

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

PRE-1941 STP

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

Depth in INCHES	Lab No.	Samples	DESCRIPTION	TIME	pH	SALINITY	TEMP.
0	5321.25	1	SILT, Fine. Dk. BROWN/BLACK	1052	7.64	15	12.5
5	5321.26	2	SILT, Fine. Dk. BROWN/BLACK.	1055			
10			SAND, Fine. Dk. BROWN/BLACK.				
15							
20							
25	5321.27	3		1058			
30							

04-18-2000 X:\MTECH5\PRE194-1\STP-9.BOR

U.S.ARMY
FORT MONMOUTH
SELFM-PW-EV

LOG OF BORING B-10

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

PRE-1941 STP

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

Depth in INCHES	Lab No.	Samples	DESCRIPTION	TIME	pH	SALINITY	TEMP.
0							
	5321.28	1	SILT, Fine. Dk. BROWN/BLACK	1141	7.63	15	12.5
5							
			SILTY SAND, Fine. Dk. BROWN/BLACK.				
	5321.29	2		1144			
10							
			SILTY SAND, Fine. Dk. BROWN/BLACK.				
15							
20							
25							
	5321.30	3		1146			
30							

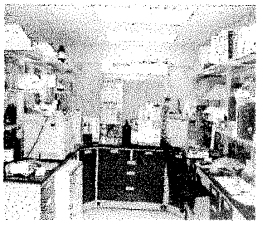
04-18-2000 X:\MTECH5\PRE194~1\STP-10.BOR

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: Pre-1941 STP Sediments

Pre-1941 STP

Field Sample Location	Laboratory Sample ID#	Matrix	Date and Time of Collection	Date Received
STP 1 0-6"	5321.01	Sediment	07-Apr-00 08:30	04/07/00
STP 1 6-12"	5321.02	Sediment	07-Apr-00 08:34	04/07/00
STP 1 24-30"	5321.03	Sediment	07-Apr-00 08:36	04/07/00
STP 2 0-6"	5321.04	Sediment	07-Apr-00 08:41	04/07/00
STP 2 6-12"	5321.05	Sediment	07-Apr-00 08:44	04/07/00
STP 2 24-30"	5321.06	Sediment	07-Apr-00 08:46	04/07/00
STP 3 0-6"	5321.07	Sediment	07-Apr-00 08:51	04/07/00
STP 3 6-12"	5321.08	Sediment	07-Apr-00 08:54	04/07/00
STP 3 24-30"	5321.09	Sediment	07-Apr-00 08:56	04/07/00
STP 4 0-6"	5321.10	Sediment	07-Apr-00 09:04	04/07/00
STP 4 6-12"	5321.11	Sediment	07-Apr-00 09:06	04/07/00
STP 4 24-30"	5321.12	Sediment	07-Apr-00 09:08	04/07/00
STP 5 0-6"	5321.13	Sediment	07-Apr-00 09:15	04/07/00
STP 5 6-12"	5321.14	Sediment	07-Apr-00 09:18	04/07/00
STP 5 24-30"	5321.15	Sediment	07-Apr-00 09:19	04/07/00
STP 6 0-6"	5321.16	Sediment	07-Apr-00 09:22	04/07/00
STP 6 6-12"	5321.17	Sediment	07-Apr-00 09:25	04/07/00
STP 6 24-30"	5321.18	Sediment	07-Apr-00 09:27	04/07/00
STP 7 0-6"	5321.19	Sediment	07-Apr-00 09:33	04/07/00
STP 7 6-12"	5321.20	Sediment	07-Apr-00 09:35	04/07/00
STP 7 24-30"	5321.21	Sediment	07-Apr-00 09:37	04/07/00
STP 8 0-6"	5321.22	Sediment	07-Apr-00 09:41	04/07/00
STP 8 6-12"	5321.23	Sediment	07-Apr-00 09:44	04/07/00
STP 8 24-30"	5321.24	Sediment	07-Apr-00 09:47	04/07/00
STP 9 0-6"	5321.25	Sediment	07-Apr-00 10:52	04/07/00
STP 9 6-12"	5321.26	Sediment	07-Apr-00 10:55	04/07/00
STP 9 24-30"	5321.27	Sediment	07-Apr-00 10:58	04/07/00
STP 10 0-6"	5321.28	Sediment	07-Apr-00 11:41	04/07/00
STP 10 6-12"	5321.29	Sediment	07-Apr-00 11:44	04/07/00
STP 10 24-30"	5321.30	Sediment	07-Apr-00 11:46	04/07/00

SAMPLE LOCATION AND IDENTIFICATION

STP DUP. 0-6"	5321.31	Sediment	07-Apr-00 11:52	04/07/00
STP DUP. 6-12"	5321.32	Sediment	07-Apr-00 11:55	04/07/00
STP DUP. 24-30"	5321.33	Sediment	07-Apr-00 11:57	04/07/00

ANALYSIS:
FORT MONMOUTH ENVIRONMENTAL LAB
TAL METALS, %SOLIDS

4-25-00

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. FALLON
Phone #: 2(6223
( )DERA ( )OMA ( )Other:_____

Project No:
Location: Pre-1941 Sanitary Treatment Plant Sediments

Samplers Name / Company: Corey McCormack, TUS

Lab Sample I.D.	Sample Location	Date	Time	Sample Type	# bottles	TAL MTLS								Remarks / Preservation Method
5321.01	STP 1 0-6"	4/7/00	0830	Sed	1	✓								
.02	STP 1 6-12"		0834			✓								
.03	STP 1 24-30"		0836			✓								
.04	STP 2 0-6"		0841			✓								
.05	STP 2 6-12"		0844			✓								
.06	STP 2 24-30"		0846			✓								
.07	STP 3 0-6"		0851			✓								
.08	STP 3 6-12"		0854			✓								
.09	STP 3 24-30"		0856			✓								
.10	STP 4 0-6"		0904			✓								
.11	STP 4 6-12"		~~1055~~ 0906			✓								
.12	STP 4 24-30"		~~1055~~ chn 0908			✓								
.13	STP 5 0-6"		~~1055~~ con 0915			✓								
.14	STP 5 6-12"	↓	~~1111~~ cm 0918	↓	↓	✓								

Comments: 4°C

Relinquished by (signature):	Date/Time:	Received by (signature):	Relinquished by (signature):	Date/Time:	Received by (signature):
Corey McCormack	4/7/00 1323				
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
Turnaround time: ( )Standard 3 wks, (X)Rush 1WK Days, ( )ASAP Verbal ___ Hrs.

Remarks:
Tide: L → I

print legibly

Coc.xls3/20/00

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. FALLON
Phone #: X2[illegible]23
( )DERA ( )OMA ( )Other:_____

Project No:
Location: Pre-1941 Sanitary Treatment Plant Sediments

Samplers Name / Company: Corey McCormack, TUS

Analysis Parameters: TAL MTLS

Comments: 4°C

Lab Sample I.D.	Sample Location	Date	Time	Sample Type	# bottles	TAL MTLS	Remarks / Preservation Method
53[illegible]21.15	STP 5 24-30"	4/7/00	0919	Sed	1	✓	
.16	STP 6 0-6"		0922			✓	
.17	STP 6 6-12"		0925			✓	
.18	STP 6 24-30"		0927			✓	
.19	STP 7 0-6"		0933			✓	
.20	STP 7 6-12"		0935			✓	
.21	STP 7 24-30"		0937			✓	
.22	STP 8 0-6"		0941			✓	
.23	STP 8 6-12"		0944			✓	
.24	STP 8 24-30"		0947			✓	
.25	STP 9 0-6"		1052			✓	Background Samples
.26	STP 9 6-12"		1055			✓	
.27	STP 9 24-30"		1058			✓	
.28	STP 10 0-6"	↓	1141	↓	↓	✓	

Relinquished by (signature):	Date/Time:	Received by (signature):	Relinquished by (signature):	Date/Time:	Received by (signature):
Corey McCormack	4/7/00 1325	[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
Turnaround time: ( )Standard 3 wks, (X)Rush 1WK Days, ( )ASAP Verbal ___ Hrs.

Remarks:
Tide: L → I

print legibly

Coc.xls3/20/00

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. FALLON
Phone #: x16023
( )DERA ( )OMA ( )Other:_____

Project No:
Location: Pre-1941 Sanitary Treatment Plant Sediments

Samplers Name / Company: Corey McCormack, TVS

Lab Sample I.D.	Sample Location	Date	Time	Sample Type	# bottles	TAL MTLS								Remarks / Preservation Method
5321.29	STP 10 6-12"	4/7/00	1144	Sed	1	✓			} Background Samples					
.30	STP 10 24-30"	↓	1146			✓								
.31	STP Dupe 0-6"		1152			✓								
.32	STP Dupe 6-12"		1155			✓								
.33	STP Dupe 24-30"	↓	1157	↓	↓	✓								

Comments: 24°C

Relinquished by (signature):	Date/Time:	Received by (signature):	Relinquished by (signature):	Date/Time:	Received by (signature):
Corey McCormack	4/7/00 1325	J. Vleyhe			
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
Turnaround time: ( )Standard 3 wks, (X)Rush TWK Days, ( )ASAP Verbal ___ Hrs.

Remarks:
Tide: L -> I

print legibly

Coc.xls3/20/00

Pre-1941 Sanitary Treatment Plant Stream Sediment Sampling Summary from Parkers Creek

The Pre-1941 STP for Main Post was located on Parkers Creek in an area north of Allen Ave. in approximately the same location as the current building 259. In a previous investigation a sample was taken from the approximated outfall for TAL metals. Please refer to Figure 4.2-34.

Upon arriving on site, the approximate location of the previous sample was determined as best possible from current reference points. Once located, sampling commenced. Sampling started downstream 5 feet from the original location, then 5 feet out into Parkers Creek. Then a sample was taken from the original approximate outfall location and another 5 feet out into Parkers Creek. Two more samples were then collected upstream 5 feet, and out 5 feet in similar order. Three additional samples were taken across Parkers Creek on the north bank to be used as background. Sampling started downstream to up at about an interval of 50 feet.

Sample depths were 0-6", 6-12", and 24-30" deep. Boring logs were created to denote particle size, lithology, and notable observations. Samples were collected for TAL metals. A dupe was taken at a boring 10 for QA/QC purposes. In all, 10 borings were done resulting in 30 samples that were collected: 21 from the outfall area (borings 1-7) and 9 as background. The background borings were taken from across Parkers Creek, upstream. They were borings numbered 8, 9, and 10.

The creek is tidally affected here, with depth varying from 0' feet to 2.5' feet. Sampling occurred at low tide and continued into the returning high tide. The water above each of the sediment sample sites was physically measured for pH, salinity, and temperature. It was determined from these readings that the water was brackish/saltwater. There was some floating/deposited man made waste and garbage nearby. Drift wood, glass, and some brick/concrete material was present nearby as well.

Sampling was conducted using a sediment corer with liners, and was decontaminated after every use. Samplers wore chest waders, latex gloves for shore sampling and life preservers when sampling and using the boat.

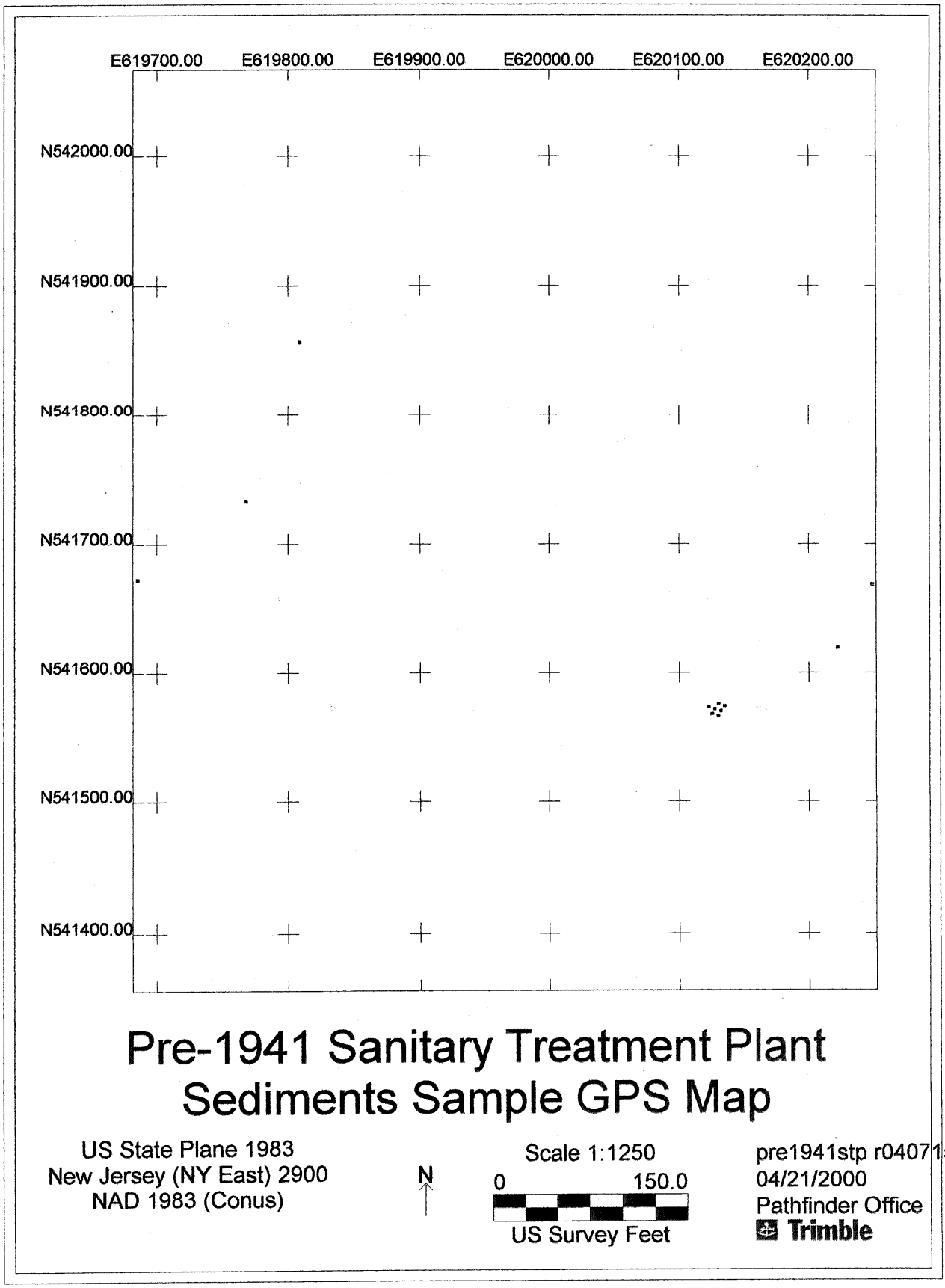
All sample locations were then recorded using GPS, and markers removed.

REFERENCE:

"Field Sampling Plan for Pre-1941 Sanitary Treatment Plant (STP) Sediments DSERTS Site # FTMM-20". United States Army DPW Fort Monmouth, NJ. December 1999.

"*Safety and Health Plan for Sediment Sampling*". TVS Industrial Hygiene & Safety Office.

"*Final Site Investigation Fort Monmouth, New Jersey Main Post and Charles Wood Areas*". *Roy F. Weston, INC. December 1995.*



Pre-1941 Sanitary Treatment Plant Sediments Sample GPS Map

US State Plane 1983
New Jersey (NY East) 2900
NAD 1983 (Conus)

N

Scale 1:1250
0 150.0
US Survey Feet

pre1941stp r040715a n r04
04/21/2000
Pathfinder Office
Trimble

PRE-1941 SANITARY TREATMENT PLANT SEDIMENT SAMPLES GPS COORDINATES & POSITIONS

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

(IN US SURVEY FEET)

SAMPLE POINTS

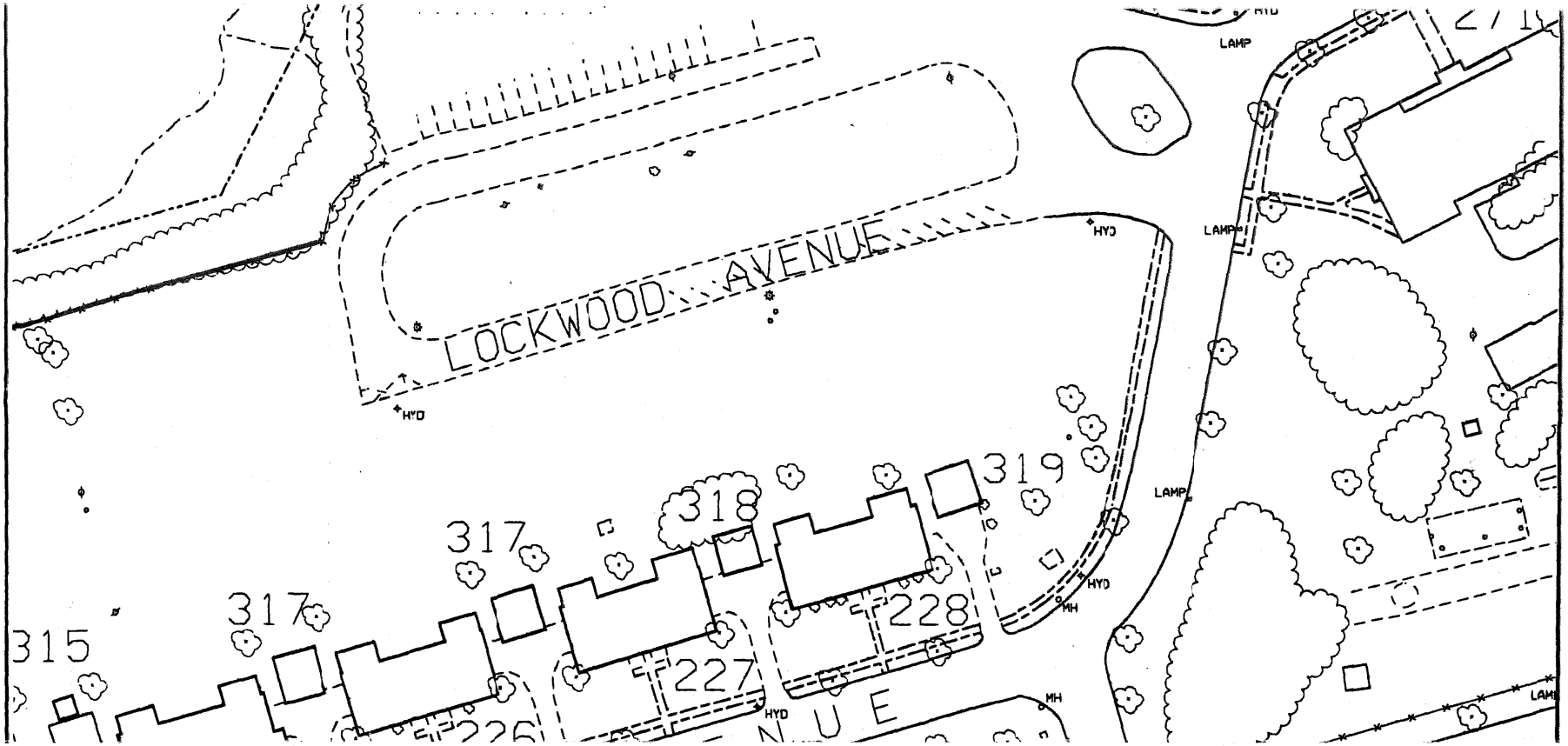
POSITION / DESC.	Y COORD. (NORTHING)	X COORD. (EASTING)
1 (EST. Locale STPSD-1)	541570.688	620131.368
2	541574.403	620134.091
3	541576.085	620129.465
4	541572.073	620126.684
5	541573.751	620122.019
6	541566.577	620129.326
7	541568.379	620124.626
8 (Background)	541856.672	619808.465
9 (Background)	541733.346	619767.631
10 (Background)	541672.734	619685.08

REFERENCE POINTS

POSITION / DESC.	Y COORD. (NORTHING)	X COORD. (EASTING)
HYDRANT 41 YELLOW	541668.742	620248.531
TELE POLE	541619.503	620221.826

Field Duplicate Identification

Sample ID	Lab ID	Field Duplicate
STP 10 0-6"	5321.28	5321.31
STP 10 6-12"	5321.29	5321.32
STP 10 24-30"	5321.30	5321.33


LOCKWOOD AVENUE
HYD
LAMP
315
317
317
318
319
227
228
MH

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 #: 5321
Sample Prepared: 04/11/00

Site: Ft. Monmouth
Pre-1941 Sanitary Treatment Plant Sediments

Field ID#: Method Blank

TAL-METALS RESULTS SUMMARY (mg/L)

Element	Date of Analysis	Result	MDL
Aluminum	04/11/00	0.016	0.01
Antimony	04/11/00	0.004	0.002
Arsenic	04/11/00	ND	0.002
Barium	04/11/00	0.0016	0.0005
Beryllium	04/11/00	ND	0.0005
Cadmium	04/11/00	ND	0.0005
Calcium	04/11/00	0.183	0.02
Chromium	04/11/00	ND	0.0005
Cobalt	04/11/00	ND	0.0005
Copper	04/11/00	0.006	0.003
Iron	04/11/00	0.043	0.01
Lead	04/11/00	ND	0.002
Magnesium	04/11/00	0.073	0.02
Manganese	04/11/00	0.0007	0.0005
Mercury	04/11/00	ND	0.0001
Nickel	04/11/00	ND	0.0005
Potassium	04/11/00	0.686	0.02
Selenium	04/11/00	ND	0.002
Silver	04/11/00	ND	0.003
Sodium	04/11/00	0.258	0.02
Thallium	04/11/00	ND	0.003
Vanadium	04/11/00	ND	0.001
Zinc	04/11/00	0.035	0.001

ND = Not Detected, MDL = Method Detection Limit

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 #: 5321.01
Sample Received: 04/07/00
Sample Matrix: Solid

Site: Ft. Monmouth
Pre-1941 Sanitary Treatment Plant Sediments

Field ID: STP 1 0-6"

Method of Digestion: EPA SW-846 Method 3051A
Method of Analysis: EPA SW-846 Method 6010B, 7471A

TAL-METALS RESULTS SUMMARY (mg/Kg)

Element	Date of Analysis	Result	Marine/Estuarine Biological Effects Level*	MDL
Aluminum	04/11/00	12500	NLE	5.28
Antimony	04/11/00	4.05	NLE	1.05
Arsenic	04/11/00	27.3	8.2	1.05
Barium	04/11/00	44.0	NLE	0.264
Beryllium	04/11/00	2.05	NLE	0.264
Cadmium	04/11/00	5.93	1.2	0.264
Calcium	04/11/00	1580	NLE	10.5
Chromium	04/11/00	142	81	0.264
Cobalt	04/11/00	23.5	NLE	0.264
Copper	04/11/00	50.6	34	1.59
Iron	04/11/00	71300	NLE	5.28
Lead	04/11/00	97.4	47	1.05
Magnesium	04/11/00	5500	NLE	10.5
Manganese	04/11/00	89.2	NLE	0.264
Mercury	04/11/00	0.581	0.15	0.053
Nickel	04/11/00	41.8	21	0.264
Potassium	04/11/00	8170	NLE	10.5
Selenium	04/11/00	1.83	NLE	1.59
Silver	04/11/00	6.12	1	1.59
Sodium	04/11/00	1820	NLE	10.5
Thallium	04/11/00	2.63	NLE	1.59
Vanadium	04/11/00	78.1	NLE	0.528
Zinc	04/11/00	564	150	0.528

ND = Not Detected, MDL = Method Detection Limit, NLE = No Limit Established
* NJDEP Guidance for Sediment Quality Evaluations, November 1998

Report of Analysis
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NJDEP Certification # 13461

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

Lab ID #: 5321.02
Sample Received: 04/07/00
Sample Matrix: Solid

Site: Ft. Monmouth
Pre-1941 Sanitary Treatment Plant Sediments

Field ID: STP 1 6-12"

Method of Digestion: EPA SW-846 Method 3051A
Method of Analysis: EPA SW-846 Method 6010B, 7471A

TAL-METALS RESULTS SUMMARY (mg/Kg)

Element	Date of Analysis	Result	Marine/Estuarine Biological Effects Level*	MDL
Aluminum	04/11/00	8370	NLE	3.37
Antimony	04/11/00	2.64	NLE	0.673
Arsenic	04/11/00	19.4	8.2	0.673
Barium	04/11/00	29.1	NLE	0.168
Beryllium	04/11/00	1.56	NLE	0.168
Cadmium	04/11/00	11.2	1.2	0.168
Calcium	04/11/00	954	NLE	6.74
Chromium	04/11/00	113	81	0.168
Cobalt	04/11/00	5.74	NLE	0.168
Copper	04/11/00	19.7	34	1.01
Iron	04/11/00	43700	NLE	3.37
Lead	04/11/00	40.6	47	0.673
Magnesium	04/11/00	4370	NLE	6.74
Manganese	04/11/00	32.3	NLE	0.168
Mercury	04/11/00	0.150	0.15	0.030
Nickel	04/11/00	20.6	21	0.168
Potassium	04/11/00	7860	NLE	6.74
Selenium	04/11/00	1.52	NLE	1.01
Silver	04/11/00	1.30	1	1.01
Sodium	04/11/00	924	NLE	6.74
Thallium	04/11/00	ND	NLE	1.01
Vanadium	04/11/00	51.8	NLE	0.337
Zinc	04/11/00	725	150	0.337

ND = Not Detected, MDL = Method Detection Limit, NLE = No Limit Established
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Report of Analysis
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NJDEP Certification # 13461

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

Lab ID #: 5321.03
Sample Received: 04/07/00
Sample Matrix: Solid

Site: Ft. Monmouth
Pre-1941 Sanitary Treatment Plant Sediments

Field ID: STP 1 24-30"

Method of Digestion: EPA SW-846 Method 3051A
Method of Analysis: EPA SW-846 Method 6010B, 7471A

TAL-METALS RESULTS SUMMARY (mg/Kg)

Element	Date of Analysis	Result	Marine/Estuarine Biological Effects Level*	MDL
Aluminum	04/11/00	9240	NLE	3.04
Antimony	04/11/00	1.76	NLE	0.608
Arsenic	04/11/00	10.7	8.2	0.608
Barium	04/11/00	19.7	NLE	0.152
Beryllium	04/11/00	1.79	NLE	0.152
Cadmium	04/11/00	5.73	1.2	0.152
Calcium	04/11/00	685	NLE	6.08
Chromium	04/11/00	128	81	0.152
Cobalt	04/11/00	3.03	NLE	0.152
Copper	04/11/00	6.81	34	0.912
Iron	04/11/00	45200	NLE	3.04
Lead	04/11/00	16.4	47	0.608
Magnesium	04/11/00	6190	NLE	6.08
Manganese	04/11/00	22.3	NLE	0.152
Mercury	04/11/00	ND	0.15	0.031
Nickel	04/11/00	12.9	21	0.152
Potassium	04/11/00	11900	NLE	6.08
Selenium	04/11/00	ND	NLE	0.912
Silver	04/11/00	ND	1	0.912
Sodium	04/11/00	333	NLE	6.08
Thallium	04/11/00	ND	NLE	0.912
Vanadium	04/11/00	54.8	NLE	0.304
Zinc	04/11/00	347	150	0.304

ND = Not Detected, MDL = Method Detection Limit, NLE = No Limit Established
* NJDEP Guidance for Sediment Quality Evaluations, November 1998

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 #: 5321.04
Sample Received: 04/07/00
Sample Matrix: Solid

Site: Ft. Monmouth
Pre-1941 Sanitary Treatment Plant Sediments

Field ID: STP 2 0-6"

Method of Digestion: EPA SW-846 Method 3051A
Method of Analysis: EPA SW-846 Method 6010B, 7471A

TAL-METALS RESULTS SUMMARY (mg/Kg)

Element	Date of Analysis	Result	Marine/Estuarine Biological Effects Level*	MDL
Aluminum	04/11/00	9390	NLE	3.16
Antimony	04/11/00	4.40	NLE	0.632
Arsenic	04/11/00	54.2	8.2	0.632
Barium	04/11/00	26.1	NLE	0.158
Beryllium	04/11/00	1.57	NLE	0.158
Cadmium	04/11/00	1.55	1.2	0.158
Calcium	04/11/00	1240	NLE	6.32
Chromium	04/11/00	92.4	81	0.158
Cobalt	04/11/00	27.7	NLE	0.158
Copper	04/11/00	77.9	34	0.948
Iron	04/11/00	107000	NLE	3.16
Lead	04/11/00	101	47	0.632
Magnesium	04/11/00	4030	NLE	6.32
Manganese	04/11/00	151	NLE	0.158
Mercury	04/11/00	0.183	0.15	0.037
Nickel	04/11/00	32.6	21	0.158
Potassium	04/11/00	6480	NLE	6.32
Selenium	04/11/00	2.36	NLE	0.948
Silver	04/11/00	3.14	1	0.948
Sodium	04/11/00	684	NLE	6.32
Thallium	04/11/00	ND	NLE	0.948
Vanadium	04/11/00	60.9	NLE	0.316
Zinc	04/11/00	726	150	0.316

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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 #: 5321.05
Sample Received: 04/07/00
Sample Matrix: Solid

Site: Ft. Monmouth
Pre-1941 Sanitary Treatment Plant Sediments

Field ID: STP 2 6-12"

Method of Digestion: EPA SW-846 Method 3051A
Method of Analysis: EPA SW-846 Method 6010B, 7471A

TAL-METALS RESULTS SUMMARY (mg/Kg)

Element	Date of Analysis	Result	Marine/Estuarine Biological Effects Level*	MDL
Aluminum	04/11/00	11200	NLE	5.65
Antimony	04/11/00	7.51	NLE	1.13
Arsenic	04/11/00	59.8	8.2	1.13
Barium	04/11/00	31.4	NLE	0.283
Beryllium	04/11/00	1.47	NLE	0.283
Cadmium	04/11/00	2.07	1.2	0.283
Calcium	04/11/00	1530	NLE	11.3
Chromium	04/11/00	103	81	0.283
Cobalt	04/11/00	31.8	NLE	0.283
Copper	04/11/00	67.3	34	1.69
Iron	04/11/00	125000	NLE	5.65
Lead	04/11/00	99.6	47	1.13
Magnesium	04/11/00	4310	NLE	11.3
Manganese	04/11/00	65.1	NLE	0.283
Mercury	04/11/00	0.346	0.15	0.043
Nickel	04/11/00	40.0	21	0.283
Potassium	04/11/00	6090	NLE	11.3
Selenium	04/11/00	3.34	NLE	1.69
Silver	04/11/00	8.54	1	1.69
Sodium	04/11/00	811	NLE	11.3
Thallium	04/11/00	ND	NLE	1.69
Vanadium	04/11/00	73.1	NLE	0.565
Zinc	04/11/00	286	150	0.565

ND = Not Detected, MDL = Method Detection Limit, NLE = No Limit Established
* NJDEP Guidance for Sediment Quality Evaluations, November 1998

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 #: 5321.06
Sample Received: 04/07/00
Sample Matrix: Solid

Site: Ft. Monmouth
Pre-1941 Sanitary Treatment Plant Sediments

Field ID: STP 2 24-30"

Method of Digestion: EPA SW-846 Method 3051A
Method of Analysis: EPA SW-846 Method 6010B, 7471A

TAL-METALS RESULTS SUMMARY (mg/Kg)

Element	Date of Analysis	Result	Marine/Estuarine Biological Effects Level*	MDL
Aluminum	04/11/00	3340	NLE	2.44
Antimony	04/11/00	1.07	NLE	0.487
Arsenic	04/11/00	6.49	8.2	0.487
Barium	04/11/00	7.10	NLE	0.122
Beryllium	04/11/00	0.889	NLE	0.122
Cadmium	04/11/00	0.183	1.2	0.122
Calcium	04/11/00	483	NLE	4.87
Chromium	04/11/00	40.4	81	0.122
Cobalt	04/11/00	2.28	NLE	0.122
Copper	04/11/00	3.32	34	0.730
Iron	04/11/00	16500	NLE	2.44
Lead	04/11/00	9.19	47	0.487
Magnesium	04/11/00	1820	NLE	4.87
Manganese	04/11/00	14.0	NLE	0.122
Mercury	04/11/00	0.050	0.15	0.025
Nickel	04/11/00	7.69	21	0.122
Potassium	04/11/00	3300	NLE	4.87
Selenium	04/11/00	ND	NLE	0.730
Silver	04/11/00	ND	1	0.730
Sodium	04/11/00	273	NLE	4.87
Thallium	04/11/00	ND	NLE	0.730
Vanadium	04/11/00	18.2	NLE	0.243
Zinc	04/11/00	46.8	150	0.243

ND = Not Detected, MDL = Method Detection Limit, NLE = No Limit Established
* NJDEP Guidance for Sediment Quality Evaluations, November 1998

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 #: 5321.07
Sample Received: 04/07/00
Sample Matrix: Solid

Site: Ft. Monmouth
Pre-1941 Sanitary Treatment Plant Sediments

Field ID: STP 3 0-6"

Method of Digestion: EPA SW-846 Method 3051A
Method of Analysis: EPA SW-846 Method 6010B, 7471A

TAL-METALS RESULTS SUMMARY (mg/Kg)

Element	Date of Analysis	Result	Marine/Estuarine Biological Effects Level*	MDL
Aluminum	04/11/00	7920	NLE	2.45
Antimony	04/11/00	1.19	NLE	0.490
Arsenic	04/11/00	12.1	8.2	0.490
Barium	04/11/00	14.7	NLE	0.122
Beryllium	04/11/00	1.45	NLE	0.122
Cadmium	04/11/00	1.24	1.2	0.122
Calcium	04/11/00	1100	NLE	4.89
Chromium	04/11/00	90.6	81	0.122
Cobalt	04/11/00	10.8	NLE	0.122
Copper	04/11/00	30.0	34	0.734
Iron	04/11/00	40000	NLE	2.45
Lead	04/11/00	47.6	47	0.490
Magnesium	04/11/00	4580	NLE	4.89
Manganese	04/11/00	36.1	NLE	0.122
Mercury	04/11/00	0.225	0.15	0.032
Nickel	04/11/00	16.2	21	0.122
Potassium	04/11/00	6670	NLE	4.89
Selenium	04/11/00	ND	NLE	0.734
Silver	04/11/00	1.79	1	0.734
Sodium	04/11/00	1210	NLE	4.89
Thallium	04/11/00	ND	NLE	0.734
Vanadium	04/11/00	52.1	NLE	0.245
Zinc	04/11/00	197	150	0.245

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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 #: 5321.08
Sample Received: 04/07/00
Sample Matrix: Solid

Site: Ft. Monmouth
Pre-1941 Sanitary Treatment Plant Sediments

Field ID: STP 3 6-12"

Method of Digestion: EPA SW-846 Method 3051A
Method of Analysis: EPA SW-846 Method 6010B, 7471A

TAL-METALS RESULTS SUMMARY (mg/Kg)

Element	Date of Analysis	Result	Marine/Estuarine Biological Effects Level*	MDL
Aluminum	04/11/00	5880	NLE	2.53
Antimony	04/11/00	0.946	NLE	0.507
Arsenic	04/11/00	7.45	8.2	0.507
Barium	04/11/00	14.0	NLE	0.127
Beryllium	04/11/00	1.21	NLE	0.127
Cadmium	04/11/00	1.02	1.2	0.127
Calcium	04/11/00	612	NLE	5.07
Chromium	04/11/00	87.1	81	0.127
Cobalt	04/11/00	1.98	NLE	0.127
Copper	04/11/00	4.78	34	0.760
Iron	04/11/00	27800	NLE	2.53
Lead	04/11/00	13.8	47	0.507
Magnesium	04/11/00	3660	NLE	5.07
Manganese	04/11/00	12.8	NLE	0.127
Mercury	04/11/00	0.023	0.15	0.023
Nickel	04/11/00	9.85	21	0.127
Potassium	04/11/00	7000	NLE	5.07
Selenium	04/11/00	ND	NLE	0.760
Silver	04/11/00	ND	1	0.760
Sodium	04/11/00	468	NLE	5.07
Thallium	04/11/00	ND	NLE	0.760
Vanadium	04/11/00	33.0	NLE	0.253
Zinc	04/11/00	167	150	0.253

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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 #: 5321.09
Sample Received: 04/07/00
Sample Matrix: Solid

Site: Ft. Monmouth
Pre-1941 Sanitary Treatment Plant Sediments

Field ID: STP 3 24-30"

Method of Digestion: EPA SW-846 Method 3051A
Method of Analysis: EPA SW-846 Method 6010B, 7471A

TAL-METALS RESULTS SUMMARY (mg/Kg)

Element	Date of Analysis	Result	Marine/Estuarine Biological Effects Level*	MDL
Aluminum	04/11/00	5970	NLE	2.88
Antimony	04/11/00	1.44	NLE	0.576
Arsenic	04/11/00	8.47	8.2	0.576
Barium	04/11/00	18.5	NLE	0.144
Beryllium	04/11/00	1.22	NLE	0.144
Cadmium	04/11/00	1.21	1.2	0.144
Calcium	04/11/00	1010	NLE	5.76
Chromium	04/11/00	78.7	81	0.144
Cobalt	04/11/00	8.76	NLE	0.144
Copper	04/11/00	24.9	34	0.864
Iron	04/11/00	30500	NLE	2.88
Lead	04/11/00	41.1	47	0.576
Magnesium	04/11/00	3370	NLE	5.76
Manganese	04/11/00	21.6	NLE	0.144
Mercury	04/11/00	0.145	0.15	0.024
Nickel	04/11/00	65.1	21	0.144
Potassium	04/11/00	6060	NLE	5.76
Selenium	04/11/00	ND	NLE	0.864
Silver	04/11/00	0.926	1	0.864
Sodium	04/11/00	1050	NLE	5.76
Thallium	04/11/00	ND	NLE	0.864
Vanadium	04/11/00	34.8	NLE	0.288
Zinc	04/11/00	131	150	0.288

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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 #: 5321.10
Sample Received: 04/07/00
Sample Matrix: Solid

Site: Ft. Monmouth
Pre-1941 Sanitary Treatment Plant Sediments

Field ID: STP 4 0-6"

Method of Digestion: EPA SW-846 Method 3051A
Method of Analysis: EPA SW-846 Method 6010B, 7471A

TAL-METALS RESULTS SUMMARY (mg/Kg)

Element	Date of Analysis	Result	Marine/Estuarine Biological Effects Level*	MDL
Aluminum	04/11/00	16600	NLE	4.96
Antimony	04/11/00	1.80	NLE	0.992
Arsenic	04/11/00	28.1	8.2	0.992
Barium	04/11/00	44.7	NLE	0.248
Beryllium	04/11/00	2.38	NLE	0.248
Cadmium	04/11/00	2.19	1.2	0.248
Calcium	04/11/00	1680	NLE	9.92
Chromium	04/11/00	157	81	0.248
Cobalt	04/11/00	14.0	NLE	0.248
Copper	04/11/00	50.8	34	1.49
Iron	04/11/00	92400	NLE	4.96
Lead	04/11/00	66.8	47	0.992
Magnesium	04/11/00	7400	NLE	9.92
Manganese	04/11/00	95.5	NLE	0.248
Mercury	04/11/00	0.466	0.15	0.052
Nickel	04/11/00	31.1	21	0.248
Potassium	04/11/00	11900	NLE	9.92
Selenium	04/11/00	1.85	NLE	1.49
Silver	04/11/00	3.28	1	1.49
Sodium	04/11/00	2230	NLE	9.92
Thallium	04/11/00	ND	NLE	1.49
Vanadium	04/11/00	82.1	NLE	0.496
Zinc	04/11/00	316	150	0.496

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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 #: 5321.11
Sample Received: 04/07/00
Sample Matrix: Solid

Site: Ft. Monmouth
Pre-1941 Sanitary Treatment Plant Sediments

Field ID: STP 4 6-12"

Method of Digestion: EPA SW-846 Method 3051A
Method of Analysis: EPA SW-846 Method 6010B, 7471A

TAL-METALS RESULTS SUMMARY (mg/Kg)

Element	Date of Analysis	Result	Marine/Estuarine Biological Effects Level*	MDL
Aluminum	04/11/00	9690	NLE	3.26
Antimony	04/11/00	2.50	NLE	0.652
Arsenic	04/11/00	16.9	8.2	0.652
Barium	04/11/00	40.6	NLE	0.163
Beryllium	04/11/00	1.72	NLE	0.163
Cadmium	04/11/00	0.955	1.2	0.163
Calcium	04/11/00	992	NLE	6.52
Chromium	04/11/00	123	81	0.163
Cobalt	04/11/00	5.65	NLE	0.163
Copper	04/11/00	16.8	34	0.978
Iron	04/11/00	47700	NLE	3.26
Lead	04/11/00	39.1	47	0.652
Magnesium	04/11/00	4580	NLE	6.52
Manganese	04/11/00	57.1	NLE	0.163
Mercury	04/11/00	0.430	0.15	0.036
Nickel	04/11/00	16.9	21	0.163
Potassium	04/11/00	7920	NLE	6.52
Selenium	04/11/00	1.29	NLE	0.978
Silver	04/11/00	ND	1	0.978
Sodium	04/11/00	676	NLE	6.52
Thallium	04/11/00	ND	NLE	0.978
Vanadium	04/11/00	54.2	NLE	0.326
Zinc	04/11/00	184	150	0.326

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Report of Analysis
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NJDEP Certification # 13461

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

Lab ID #: 5321.12
Sample Received: 04/07/00
Sample Matrix: Solid

Site: Ft. Monmouth
Pre-1941 Sanitary Treatment Plant Sediments

Field ID: STP 4 24-30"

Method of Digestion: EPA SW-846 Method 3051A
Method of Analysis: EPA SW-846 Method 6010B, 7471A

TAL-METALS RESULTS SUMMARY (mg/Kg)

Element	Date of Analysis	Result	Marine/Estuarine Biological Effects Level*	MDL
Aluminum	04/11/00	10300	NLE	2.43
Antimony	04/11/00	1.75	NLE	0.486
Arsenic	04/11/00	6.34	8.2	0.486
Barium	04/11/00	13.1	NLE	0.122
Beryllium	04/11/00	2.05	NLE	0.122
Cadmium	04/11/00	ND	1.2	0.122
Calcium	04/11/00	584	NLE	4.86
Chromium	04/11/00	159	81	0.122
Cobalt	04/11/00	2.35	NLE	0.122
Copper	04/11/00	ND	34	0.729
Iron	04/11/00	49700	NLE	2.43
Lead	04/11/00	3.48	47	0.486
Magnesium	04/11/00	7280	NLE	4.86
Manganese	04/11/00	12.7	NLE	0.122
Mercury	04/11/00	ND	0.15	0.023
Nickel	04/11/00	10.2	21	0.122
Potassium	04/11/00	15200	NLE	4.86
Selenium	04/11/00	ND	NLE	0.729
Silver	04/11/00	ND	1	0.729
Sodium	04/11/00	289	NLE	4.86
Thallium	04/11/00	ND	NLE	0.729
Vanadium	04/11/00	54.6	NLE	0.243
Zinc	04/11/00	67.2	150	0.243

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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 #: 5321.13
Sample Received: 04/07/00
Sample Matrix: Solid

Site: Ft. Monmouth
Pre-1941 Sanitary Treatment Plant Sediments

Field ID: STP 5 0-6"

Method of Digestion: EPA SW-846 Method 3051A
Method of Analysis: EPA SW-846 Method 6010B, 7471A

TAL-METALS RESULTS SUMMARY (mg/Kg)

Element	Date of Analysis	Result	Marine/Estuarine Biological Effects Level*	MDL
Aluminum	04/11/00	14500	NLE	3.48
Antimony	04/11/00	2.38	NLE	0.695
Arsenic	04/11/00	22.0	8.2	0.695
Barium	04/11/00	100.0	NLE	0.174
Beryllium	04/11/00	2.06	NLE	0.174
Cadmium	04/11/00	2.96	1.2	0.174
Calcium	04/11/00	1680	NLE	-6.95
Chromium	04/11/00	146	81	0.174
Cobalt	04/11/00	21.6	NLE	0.174
Copper	04/11/00	68.8	34	1.04
Iron	04/11/00	61500	NLE	3.48
Lead	04/11/00	102	47	0.695
Magnesium	04/11/00	6150	NLE	6.95
Manganese	04/11/00	77.6	NLE	0.174
Mercury	04/11/00	0.477	0.15	0.034
Nickel	04/11/00	32.9	21	0.174
Potassium	04/11/00	9710	NLE	6.95
Selenium	04/11/00	1.34	NLE	1.04
Silver	04/11/00	5.87	1	1.04
Sodium	04/11/00	1960	NLE	6.95
Thallium	04/11/00	ND	NLE	1.04
Vanadium	04/11/00	78.8	NLE	0.347
Zinc	04/11/00	331	150	0.347

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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 #: 5321.14
Sample Received: 04/07/00
Sample Matrix: Solid

Site: Ft. Monmouth
Pre-1941 Sanitary Treatment Plant Sediments

Field ID: STP 5 6-12"

Method of Digestion: EPA SW-846 Method 3051A
Method of Analysis: EPA SW-846 Method 6010B, 7471A

TAL-METALS RESULTS SUMMARY (mg/Kg)

Element	Date of Analysis	Result	Marine/Estuarine Biological Effects Level*	MDL
Aluminum	04/11/00	14200	NLE	5.46
Antimony	04/11/00	2.28	NLE	1.09
Arsenic	04/11/00	23.7	8.2	1.09
Barium	04/11/00	124	NLE	0.273
Beryllium	04/11/00	2.38	NLE	0.273
Cadmium	04/11/00	2.65	1.2	0.273
Calcium	04/11/00	2070	NLE	10.9
Chromium	04/11/00	149	81	0.273
Cobalt	04/11/00	20.4	NLE	0.273
Copper	04/11/00	63.4	34	1.64
Iron	04/11/00	66000	NLE	5.46
Lead	04/11/00	98.9	47	1.09
Magnesium	04/11/00	6580	NLE	10.9
Manganese	04/11/00	85.9	NLE	0.273
Mercury	04/11/00	0.935	0.15	0.042
Nickel	04/11/00	34.3	21	0.273
Potassium	04/11/00	10500	NLE	10.9
Selenium	04/11/00	ND	NLE	1.64
Silver	04/11/00	4.84	1	1.64
Sodium	04/11/00	2170	NLE	10.9
Thallium	04/11/00	ND	NLE	1.64
Vanadium	04/11/00	72.5	NLE	0.546
Zinc	04/11/00	451	150	0.546

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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 #: 5321.15
Sample Received: 04/07/00
Sample Matrix: Solid

Site: Ft. Monmouth
Pre-1941 Sanitary Treatment Plant Sediments

Field ID: STP 5 24-30"

Method of Digestion: EPA SW-846 Method 3051A
Method of Analysis: EPA SW-846 Method 6010B, 7471A

TAL-METALS RESULTS SUMMARY (mg/Kg)

Element	Date of Analysis	Result	Marine/Estuarine Biological Effects Level*	MDL
Aluminum	04/11/00	12300	NLE	5.81
Antimony	04/11/00	3.90	NLE	1.16
Arsenic	04/11/00	16.7	8.2	1.16
Barium	04/11/00	28.7	NLE	0.290
Beryllium	04/11/00	2.31	NLE	0.290
Cadmium	04/11/00	0.853	1.2	0.290
Calcium	04/11/00	1280	NLE	11.6
Chromium	04/11/00	147	81	0.290
Cobalt	04/11/00	6.00	NLE	0.290
Copper	04/11/00	16.1	34	1.74
Iron	04/11/00	72000	NLE	5.81
Lead	04/11/00	33.1	47	1.16
Magnesium	04/11/00	6240	NLE	11.6
Manganese	04/11/00	116	NLE	0.290
Mercury	04/11/00	0.733	0.15	0.046
Nickel	04/11/00	20.4	21	0.290
Potassium	04/11/00	12200	NLE	11.6
Selenium	04/11/00	ND	NLE	1.74
Silver	04/14/00	3.29	1	0.318
Sodium	04/11/00	1460	NLE	11.6
Thallium	04/11/00	ND	NLE	1.74
Vanadium	04/11/00	57.0	NLE	0.581
Zinc	04/11/00	168	150	0.581

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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 #: 5321.16
Sample Received: 04/07/00
Sample Matrix: Solid

Site: Ft. Monmouth
Pre-1941 Sanitary Treatment Plant Sediments

Field ID: STP 6 0-6"

Method of Digestion: EPA SW-846 Method 3051A
Method of Analysis: EPA SW-846 Method 6010B, 7471A

TAL-METALS RESULTS SUMMARY (mg/Kg)

Element	Date of Analysis	Result	Marine/Estuarine Biological Effects Level*	MDL
Aluminum	04/11/00	13900	NLE	6.60
Antimony	04/11/00	3.96	NLE	1.32
Arsenic	04/11/00	59.7	8.2	1.32
Barium	04/11/00	87.8	NLE	0.330
Beryllium	04/11/00	1.65	NLE	0.330
Cadmium	04/11/00	2.43	1.2	0.330
Calcium	04/11/00	1550	NLE	13.2
Chromium	04/11/00	137	81	0.330
Cobalt	04/11/00	12.0	NLE	0.330
Copper	04/11/00	47.0	34	1.98
Iron	04/11/00	90100	NLE	6.60
Lead	04/11/00	88.9	47	1.32
Magnesium	04/11/00	5010	NLE	13.2
Manganese	04/11/00	54.9	NLE	0.330
Mercury	04/11/00	0.339	0.15	0.057
Nickel	04/11/00	34.6	21	0.330
Potassium	04/11/00	7550	NLE	13.2
Selenium	04/11/00	3.87	NLE	1.98
Silver	04/14/00	12.7	1	0.458
Sodium	04/11/00	1070	NLE	13.2
Thallium	04/11/00	ND	NLE	1.98
Vanadium	04/11/00	87.4	NLE	0.660
Zinc	04/11/00	411	150	0.660

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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 #: 5321.17
Sample Received: 04/07/00
Sample Matrix: Solid

Site: Ft. Monmouth
Pre-1941 Sanitary Treatment Plant Sediments

Field ID: STP 6 6-12"

Method of Digestion: EPA SW-846 Method 3051A
Method of Analysis: EPA SW-846 Method 6010B, 7471A

TAL-METALS RESULTS SUMMARY (mg/Kg)

Element	Date of Analysis	Result	Marine/Estuarine Biological Effects Level*	MDL
Aluminum	04/11/00	7690	NLE	2.96
Antimony	04/11/00	ND	NLE	0.592
Arsenic	04/11/00	7.76	8.2	0.592
Barium	04/11/00	13.1	NLE	0.148
Beryllium	04/11/00	1.41	NLE	0.148
Cadmium	04/11/00	0.153	1.2	0.148
Calcium	04/11/00	611	NLE	5.92
Chromium	04/11/00	81.8	81	0.148
Cobalt	04/11/00	2.74	NLE	0.148
Copper	04/11/00	3.36	34	0.887
Iron	04/11/00	36500	NLE	2.96
Lead	04/11/00	10.1	47	0.592
Magnesium	04/11/00	4160	NLE	5.92
Manganese	04/11/00	25.2	NLE	0.148
Mercury	04/11/00	0.057	0.15	0.028
Nickel	04/11/00	16.6	21	0.148
Potassium	04/11/00	8580	NLE	5.92
Selenium	04/11/00	ND	NLE	0.887
Silver	04/11/00	ND	1	0.887
Sodium	04/11/00	378	NLE	5.92
Thallium	04/11/00	ND	NLE	0.887
Vanadium	04/11/00	39.2	NLE	0.296
Zinc	04/11/00	86.6	150	0.296

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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 #: 5321.18
Sample Received: 04/07/00
Sample Matrix: Solid

Sitc: Ft. Monmouth
Pre-1941 Sanitary Treatment Plant Sediments

Ficld ID: STP 6 24-30"

Method of Digestion: EPA SW-846 Method 3051A
Method of Analysis: EPA SW-846 Method 6010B, 7471A

TAL-METALS RESULTS SUMMARY (mg/Kg)

Element	Date of Analysis	Result	Marine/Estuarine Biological Effects Level*	MDL
Aluminum	04/11/00	8510	NLE	2.54
Antimony	04/11/00	2.48	NLE	0.507
Arsenic	04/11/00	10.8	8.2	0.507
Barium	04/11/00	18.2	NLE	0.127
Beryllium	04/11/00	1.97	NLE	0.127
Cadmium	04/11/00	0.387	1.2	0.127
Calcium	04/11/00	688	NLE	5.07
Chromium	04/11/00	101	81	0.127
Cobalt	04/11/00	3.65	NLE	0.127
Copper	04/11/00	45.8	34	0.761
Iron	04/11/00	44600	NLE	2.54
Lead	04/11/00	23.8	47	0.507
Magnesium	04/11/00	4720	NLE	5.07
Manganese	04/11/00	43.9	NLE	0.127
Mercury	04/11/00	0.368	0.15	0.033
Nickel	04/11/00	14.0	21	0.127
Potassium	04/11/00	9700	NLE	5.07
Selenium	04/11/00	ND	NLE	0.761
Silver	04/11/00	ND	1	0.761
Sodium	04/11/00	370	NLE	5.07
Thallium	04/11/00	ND	NLE	0.761
Vanadium	04/11/00	42.8	NLE	0.254
Zinc	04/11/00	137	150	0.254

ND = Not Detected, MDL = Method Detection Limit, NLE = No Limit Established
* NJDEP Guidance for Sediment Quality Evaluations, November 1998

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 #: 5321.19
Sample Received: 04/07/00
Sample Matrix: Solid

Site: Ft. Monmouth
Pre-1941 Sanitary Treatment Plant Sediments

Field ID: STP 7 0-6"

Method of Digestion: EPA SW 846 Method 3051A
Method of Analysis: EPA SW-846 Method 6010B, 7471A

TAL-METALS RESULTS SUMMARY (mg/Kg)

Element	Date of Analysis	Result	Marine/Estuarine Biological Effects Level*	MDL
Aluminum	04/11/00	10400	NLE	3.03
Antimony	04/11/00	2.53	NLE	0.606
Arsenic	04/11/00	19.7	8.2	0.606
Barium	04/11/00	49.5	NLE	0.152
Beryllium	04/11/00	1.46	NLE	0.152
Cadmium	04/11/00	4.20	1.2	0.152
Calcium	04/11/00	1270	NLE	6.06
Chromium	04/11/00	111	81	0.152
Cobalt	04/11/00	6.23	NLE	0.152
Copper	04/11/00	30.2	34	0.910
Iron	04/11/00	49700	NLE	3.03
Lead	04/11/00	52.5	47	0.606
Magnesium	04/11/00	4630	NLE	6.06
Manganese	04/11/00	74.5	NLE	0.152
Mercury	04/11/00	0.552	0.15	0.029
Nickel	04/11/00	21.8	21	0.152
Potassium	04/11/00	6510	NLE	6.06
Selenium	04/11/00	2.07	NLE	0.910
Silver	04/11/00	2.16	1	0.910
Sodium	04/11/00	740	NLE	6.06
Thallium	04/11/00	ND	NLE	0.910
Vanadium	04/11/00	59.1	NLE	0.303
Zinc	04/11/00	386	150	0.303

ND = Not Detected, MDL = Method Detection Limit, NLE = No Limit Established
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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 #: 5321.20
Sample Received: 04/07/00
Sample Matrix: Solid

Site: Ft. Monmouth
Pre-1941 Sanitary Treatment Plant Sediments

Field ID: STP 7 6-12"

Method of Digestion: EPA SW-846 Method 3051A
Method of Analysis: EPA SW-846 Method 6010B, 7471A

TAL-METALS RESULTS SUMMARY (mg/Kg)

Element	Date of Analysis	Result	Marine/Estuarine Biological Effects Level*	MDL
Aluminum	04/11/00	16800	NLE	3.70
Antimony	04/11/00	2.75	NLE	0.739
Arsenic	04/11/00	21.7	8.2	0.739
Barium	04/11/00	37.1	NLE	0.185
Beryllium	04/11/00	2.57	NLE	0.185
Cadmium	04/11/00	3.00	1.2	0.185
Calcium	04/11/00	1800	NLE	7.39
Chromium	04/11/00	174	81	0.185
Cobalt	04/11/00	19.0	NLE	0.185
Copper	04/11/00	45.3	34	1.11
Iron	04/11/00	65500	NLE	3.70
Lead	04/11/00	69.8	47	0.739
Magnesium	04/11/00	7770	NLE	7.39
Manganese	04/11/00	58.8	NLE	0.185
Mercury	04/11/00	0.724	0.15	0.043
Nickel	04/11/00	32.1	21	0.185
Potassium	04/11/00	13400	NLE	7.39
Selenium	04/11/00	ND	NLE	1.11
Silver	04/11/00	4.67	1	1.11
Sodium	04/11/00	1330	NLE	7.39
Thallium	04/11/00	ND	NLE	1.11
Vanadium	04/11/00	80.9	NLE	0.370
Zinc	04/11/00	349	150	0.370

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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 #: 5321.21
Sample Received: 04/07/00
Sample Matrix: Solid

Site: Ft. Monmouth
Pre-1941 Sanitary Treatment Plant Sediments

Field ID: STP 7 24 30"

Method of Digestion: EPA SW-846 Method 3051A
Method of Analysis: EPA SW-846 Method 6010B, 7471A

TAL-METALS RESULTS SUMMARY (mg/Kg)

Element	Date of Analysis	Result	Marine/Estuarine Biological Effects Level*	MDL
Aluminum	04/11/00	10100	NLE	3.54
Antimony	04/11/00	1.70	NLE	0.708
Arsenic	04/11/00	20.5	8.2	0.708
Barium	04/11/00	28.2	NLE	0.177
Beryllium	04/11/00	1.78	NLE	0.177
Cadmium	04/11/00	2.71	1.2	0.177
Calcium	04/11/00	1310	NLE	7.08
Chromium	04/11/00	119	81	0.177
Cobalt	04/11/00	14.2	NLE	0.177
Copper	04/11/00	44.9	34	1.06
Iron	04/11/00	48500	NLE	3.54
Lead	04/11/00	71.5	47	0.708
Magnesium	04/11/00	4830	NLE	7.08
Manganese	04/11/00	45.3	NLE	0.177
Mercury	04/11/00	0.268	0.15	0.038
Nickel	04/11/00	25.3	21	0.177
Potassium	04/11/00	7820	NLE	7.08
Selenium	04/11/00	ND	NLE	1.06
Silver	04/11/00	6.34	1	1.06
Sodium	04/11/00	975	NLE	7.08
Thallium	04/11/00	3.38	NLE	1.06
Vanadium	04/11/00	57.7	NLE	0.354
Zinc	04/11/00	293	150	0.354

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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 #: 5321.22
Sample Received: 04/07/00
Sample Matrix: Solid

Site: Ft. Monmouth
Pre-1941 Sanitary Treatment Plant Sediments

Field ID: STP 8 0-6"

Method of Digestion: EPA SW-846 Method 3051A
Method of Analysis: EPA SW-846 Method 6010B, 7471A

TAL-METALS RESULTS SUMMARY (mg/Kg)

Element	Date of Analysis	Result	Marine/Estuarine Biological Effects Level*	MDL
Aluminum	04/11/00	7810	NLE	4.62
Antimony	04/11/00	2.05	NLE	0.924
Arsenic	04/11/00	19.3	8.2	0.924
Barium	04/11/00	25.7	NLE	0.231
Beryllium	04/11/00	1.83	NLE	0.231
Cadmium	04/11/00	2.11	1.2	0.231
Calcium	04/11/00	1420	NLE	9.25
Chromium	04/11/00	76.2	81	0.231
Cobalt	04/11/00	19.1	NLE	0.231
Copper	04/11/00	45.2	34	1.39
Iron	04/11/00	39600	NLE	4.62
Lead	04/11/00	77.1	47	0.924
Magnesium	04/11/00	3430	NLE	9.25
Manganese	04/11/00	64.0	NLE	0.231
Mercury	04/11/00	0.391	0.15	0.043
Nickel	04/11/00	24.0	21	0.231
Potassium	04/11/00	3990	NLE	9.25
Selenium	04/11/00	ND	NLE	1.39
Silver	04/11/00	4.74	1	1.39
Sodium	04/11/00	1810	NLE	9.25
Thallium	04/11/00	1.64	NLE	1.39
Vanadium	04/11/00	50.4	NLE	0.462
Zinc	04/11/00	220	150	0.462

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NJDEP Certification # 13461

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

Lab ID #: 5321.23
Sample Received: 04/07/00
Sample Matrix: Solid

Site: Ft. Monmouth
Pre-1941 Sanitary Treatment Plant Sediments

Field ID: STP 8 6-12"

Method of Digestion: EPA SW-846 Method 3051A
Method of Analysis: EPA SW-846 Method 6010B, 7471A

TAL-METALS RESULTS SUMMARY (mg/Kg)

Element	Date of Analysis	Result	Marine/Estuarine Biological Effects Level*	MDL
Aluminum	04/11/00	11200	NLE	3.69
Antimony	04/11/00	2.49	NLE	0.738
Arsenic	04/11/00	29.1	8.2	0.738
Barium	04/11/00	38.9	NLE	0.184
Beryllium	04/11/00	3.76	NLE	0.184
Cadmium	04/11/00	2.13	1.2	0.184
Calcium	04/11/00	825	NLE	7.38
Chromium	04/11/00	88.1	81	0.184
Cobalt	04/11/00	11.4	NLE	0.184
Copper	04/11/00	36.9	34	1.1
Iron	04/11/00	45500	NLE	3.69
Lead	04/11/00	60.5	47	0.738
Magnesium	04/11/00	3870	NLE	7.38
Manganese	04/11/00	62.7	NLE	0.184
Mercury	04/11/00	0.880	0.15	0.049
Nickel	04/11/00	29.3	21	0.184
Potassium	04/11/00	4610	NLE	7.38
Selenium	04/11/00	1.59	NLE	1.11
Silver	04/11/00	5.60	1	1.11
Sodium	04/11/00	1140	NLE	7.38
Thallium	04/11/00	1.12	NLE	1.11
Vanadium	04/11/00	56.0	NLE	0.369
Zinc	04/11/00	255	150	0.369

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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 #: 5321.24
Sample Received: 04/07/00
Sample Matrix: Solid

Site: Ft. Monmouth
Pre-1941 Sanitary Treatment Plant Sediments

Field ID: STP 8 24-30"

Method of Digestion: EPA SW-846 Method 3051A
Method of Analysis: EPA SW-846 Method 6010B, 7471A

TAL-METALS RESULTS SUMMARY (mg/Kg)

Element	Date of Analysis	Result	Marine/Estuarine Biological Effects Level*	MDL
Aluminum	04/11/00	16900	NLE	4.68
Antimony	04/11/00	3.31	NLE	0.936
Arsenic	04/11/00	25.6	8.2	0.936
Barium	04/11/00	132	NLE	0.234
Beryllium	04/11/00	3.99	NLE	0.234
Cadmium	04/11/00	14.3	1.2	0.234
Calcium	04/11/00	871	NLE	9.36
Chromium	04/11/00	132	81	0.234
Cobalt	04/11/00	25.6	NLE	0.234
Copper	04/11/00	113	34	1.40
Iron	04/11/00	60900	NLE	4.68
Lead	04/11/00	86.2	47	0.936
Magnesium	04/11/00	5380	NLE	9.36
Manganese	04/11/00	80.3	NLE	0.234
Mercury	04/11/00	0.381	0.15	0.038
Nickel	04/11/00	34.8	21	0.234
Potassium	04/11/00	7920	NLE	9.36
Selenium	04/11/00	ND	NLE	1.40
Silver	04/11/00	7.78	1	1.40
Sodium	04/11/00	1360	NLE	9.36
Thallium	04/11/00	ND	NLE	1.40
Vanadium	04/11/00	79.6	NLE	0.468
Zinc	04/11/00	387	150	0.468

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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 #: 5321.25
Sample Received: 04/07/00
Sample Matrix: Solid

Site: Ft. Monmouth
Pre-1941 Sanitary Treatment Plant Sediments

Field ID: STP 9 0-6"

Method of Digestion: EPA SW-846 Method 3051A
Method of Analysis: EPA SW-846 Method 6010B, 7471A

TAL-METALS RESULTS SUMMARY (mg/Kg)

Element	Date of Analysis	Result	Marine/Estuarine Biological Effects Level*	MDL
Aluminum	04/11/00	9360	NLE	5.03
Antimony	04/11/00	2.41	NLE	1.01
Arsenic	04/11/00	17.4	8.2	1.01
Barium	04/11/00	24.4	NLE	0.251
Beryllium	04/11/00	1.41	NLE	0.251
Cadmium	04/11/00	2.12	1.2	0.251
Calcium	04/11/00	1860	NLE	10.1
Chromium	04/11/00	189	81	0.251
Cobalt	04/11/00	14.5	NLE	0.251
Copper	04/11/00	109	34	1.51
Iron	04/11/00	42500	NLE	5.03
Lead	04/11/00	79.9	47	1.01
Magnesium	04/11/00	4650	NLE	10.1
Manganese	04/11/00	85.4	NLE	0.251
Mercury	04/11/00	0.404	0.15	0.050
Nickel	04/24/00	ND	21	0.229
Potassium	04/11/00	5000	NLE	10.1
Selenium	04/11/00	ND	NLE	1.51
Silver	04/11/00	4.24	1	1.51
Sodium	04/11/00	4990	NLE	10.1
Thallium	04/11/00	ND	NLE	1.51
Vanadium	04/11/00	53.1	NLE	0.503
Zinc	04/11/00	332	150	0.503

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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 #: 5321.26
Sample Received: 04/07/00
Sample Matrix: Solid

Site: Ft. Monmouth
Pre-1941 Sanitary Treatment Plant Sediments

Field ID: STP 9 6-12"

Method of Digestion: EPA SW-846 Method 3051A
Method of Analysis: EPA SW-846 Method 6010B, 7471A

TAL-METALS RESULTS SUMMARY (mg/Kg)

Element	Date of Analysis	Result	Marine/Estuarine Biological Effects Level*	MDL
Aluminum	04/11/00	6870	NLE	2.49
Antimony	04/11/00	1.61	NLE	0.498
Arsenic	04/11/00	13.5	8.2	0.498
Barium	04/11/00	16.5	NLE	0.125
Beryllium	04/11/00	1.04	NLE	0.125
Cadmium	04/11/00	1.56	1.2	0.125
Calcium	04/11/00	1950	NLE	4.98
Chromium	04/11/00	62.2	81	0.125
Cobalt	04/11/00	10.5	NLE	0.125
Copper	04/11/00	37.2	34	0.747
Iron	04/11/00	30300	NLE	2.49
Lead	04/11/00	53.3	47	0.498
Magnesium	04/11/00	3430	NLE	4.98
Manganese	04/11/00	57.5	NLE	0.125
Mercury	04/11/00	0.357	0.15	0.040
Nickel	04/11/00	18.5	21	0.125
Potassium	04/11/00	3900	NLE	4.98
Selenium	04/11/00	0.757	NLE	0.747
Silver	04/11/00	3.21	1	0.747
Sodium	04/11/00	3790	NLE	4.98
Thallium	04/11/00	ND	NLE	0.747
Vanadium	04/11/00	38.0	NLE	0.249
Zinc	04/11/00	184	150	0.249

ND = Not Detected, MDL = Method Detection Limit, NLE = No Limit Established
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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 #: 5321.27
Sample Received: 04/07/00
Sample Matrix: Solid

Site: Ft. Monmouth
Pre-1941 Sanitary Treatment Plant Sediments

Field ID: STP 9 24-30"

Method of Digestion: EPA SW-846 Method 3051A
Method of Analysis: EPA SW-846 Method 6010B, 7471A

TAL-METALS RESULTS SUMMARY (mg/Kg)

Element	Date of Analysis	Result	Marine/Estuarine Biological Effects Level*	MDL
Aluminum	04/11/00	8220	NLE	4.33
Antimony	04/11/00	1.88	NLE	0.865
Arsenic	04/11/00	18.2	8.2	0.865
Barium	04/11/00	20.6	NLE	0.216
Beryllium	04/11/00	1.27	NLE	0.216
Cadmium	04/11/00	2.19	1.2	0.216
Calcium	04/11/00	1580	NLE	8.65
Chromium	04/11/00	73.8	81	0.216
Cobalt	04/11/00	13.8	NLE	0.216
Copper	04/11/00	51.8	34	1.30
Iron	04/11/00	40000	NLE	4.33
Lead	04/11/00	73.8	47	0.865
Magnesium	04/11/00	4240	NLE	8.65
Manganese	04/11/00	77.6	NLE	0.216
Mercury	04/11/00	0.538	0.15	0.041
Nickel	04/11/00	23.5	21	0.216
Potassium	04/11/00	4150	NLE	8.65
Selenium	04/11/00	ND	NLE	1.30
Silver	04/11/00	4.46	1	1.30
Sodium	04/11/00	4180	NLE	8.65
Thallium	04/11/00	ND	NLE	1.30
Vanadium	04/11/00	50.8	NLE	0.433
Zinc	04/11/00	245	150	0.433

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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 #: 5321.28
Sample Received: 04/07/00
Sample Matrix: Solid

Site: Ft. Monmouth
Pre-1941 Sanitary Treatment Plant Sediments

Field ID: STP 10 0-6"

Method of Digestion: EPA SW-846 Method 3051A
Method of Analysis: EPA SW-846 Method 6010B, 7471A

TAL-METALS RESULTS SUMMARY (mg/Kg)

Element	Date of Analysis	Result	Marine/Estuarine Biological Effects Level*	MDL
Aluminum	04/11/00	12700	NLE	5.01
Antimony	04/11/00	2.71	NLE	1.00
Arsenic	04/11/00	27.7	8.2	1.00
Barium	04/11/00	41.1	NLE	0.250
Beryllium	04/11/00	1.94	NLE	0.250
Cadmium	04/11/00	4.51	1.2	0.250
Calcium	04/11/00	2340	NLE	10.0
Chromium	04/11/00	121	81	0.250
Cobalt	04/11/00	43.2	NLE	0.250
Copper	04/11/00	85.0	34	1.50
Iron	04/11/00	59200	NLE	5.01
Lead	04/11/00	126	47	1.00
Magnesium	04/11/00	6210	NLE	10.0
Manganese	04/11/00	102	NLE	0.250
Mercury	04/11/00	0.671	0.15	0.056
Nickel	04/11/00	43.5	21	0.250
Potassium	04/11/00	6190	NLE	10.0
Selenium	04/11/00	ND	NLE	1.50
Silver	04/11/00	11.2	1	1.50
Sodium	04/11/00	5970	NLE	10.0
Thallium	04/11/00	ND	NLE	1.50
Vanadium	04/11/00	74.5	NLE	0.501
Zinc	04/11/00	415	150	0.501

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

Lab ID #: 5321.29
Sample Received: 04/07/00
Sample Matrix: Solid

Site: Ft. Monmouth
Pre-1941 Sanitary Treatment Plant Sediments

Field ID: STP 10 6-12"

Method of Digestion: EPA SW-846 Method 3051A
Method of Analysis: EPA SW-846 Method 6010B, 7471A

TAL-METALS RESULTS SUMMARY (mg/Kg)

Element	Date of Analysis	Result	Marine/Estuarine Biological Effects Level*	MDL
Aluminum	04/11/00	8370	NLE	3.45
Antimony	04/11/00	2.14	NLE	0.690
Arsenic	04/11/00	20.2	8.2	0.690
Barium	04/11/00	25.7	NLE	0.172
Beryllium	04/11/00	1.29	NLE	0.172
Cadmium	04/11/00	2.84	1.2	0.172
Calcium	04/11/00	1300	NLE	6.90
Chromium	04/11/00	77.2	81	0.172
Cobalt	04/11/00	13.8	NLE	0.172
Copper	04/11/00	40.5	34	1.035
Iron	04/11/00	37500	NLE	3.45
Lead	04/11/00	59.0	47	0.690
Magnesium	04/11/00	3960	NLE	6.90
Manganese	04/11/00	74.5	NLE	0.172
Mercury	04/11/00	0.659	0.15	0.029
Nickel	04/11/00	22.6	21	0.172
Potassium	04/11/00	4380	NLE	6.90
Selenium	04/11/00	1.65	NLE	1.04
Silver	04/11/00	11.5	1	1.04
Sodium	04/11/00	3300	NLE	6.90
Thallium	04/11/00	ND	NLE	1.04
Vanadium	04/11/00	44.2	NLE	0.345
Zinc	04/11/00	239	150	0.345

ND = Not Detected, MDL = Method Detection Limit, NLE = No Limit Established
* NJDEP Guidance for Sediment Quality Evaluations, November 1998

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 #: 5321.30
Sample Received: 04/07/00
Sample Matrix: Solid

Site: Ft. Monmouth
Pre-1941 Sanitary Treatment Plant Sediments

Field ID: STP 10 24-30"

Method of Digestion: EPA SW-846 Method 3051A
Method of Analysis: EPA SW-846 Method 6010B, 7471A

TAL-METALS RESULTS SUMMARY (mg/Kg)

Element	Date of Analysis	Result	Marine/Estuarine Biological Effects Level*	MDL
Aluminum	04/11/00	2700	NLE	2.61
Antimony	04/11/00	1.10	NLE	0.522
Arsenic	04/11/00	7.06	8.2	0.522
Barium	04/11/00	5.53	NLE	0.131
Beryllium	04/11/00	0.550	NLE	0.131
Cadmium	04/11/00	0.232	1.2	0.131
Calcium	04/11/00	372	NLE	5.22
Chromium	04/11/00	26.1	81	0.131
Cobalt	04/11/00	2.38	NLE	0.131
Copper	04/11/00	5.03	34	0.783
Iron	04/11/00	13200	NLE	2.61
Lead	04/11/00	9.87	47	0.522
Magnesium	04/11/00	1350	NLE	5.22
Manganese	04/11/00	24.6	NLE	0.131
Mercury	04/11/00	0.213	0.15	0.024
Nickel	04/11/00	8.77	21	0.131
Potassium	04/11/00	2070	NLE	5.22
Selenium	04/11/00	ND	NLE	0.783
Silver	04/11/00	ND	1	0.783
Sodium	04/11/00	1230	NLE	5.22
Thallium	04/11/00	ND	NLE	0.783
Vanadium	04/11/00	17.6	NLE	0.261
Zinc	04/11/00	53.7	150	0.261

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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 #: 5321.31
Sample Received: 04/07/00
Sample Matrix: Solid

Site: Ft. Monmouth
Pre-1941 Sanitary Treatment Plant Sediments

Field ID: STP Dupe 0-6"

Method of Digestion: EPA SW-846 Method 3051A
Method of Analysis: EPA SW-846 Method 6010B, 7471A

TAL-METALS RESULTS SUMMARY (mg/Kg)

Element	Date of Analysis	Result	Marine/Estuarine Biological Effects Level*	MDL
Aluminum	04/11/00	5190	NLE	1.98
Antimony	04/11/00	1.33	NLE	0.397
Arsenic	04/11/00	8.51	8.2	0.397
Barium	04/11/00	9.85	NLE	0.099
Beryllium	04/11/00	0.895	NLE	0.099
Cadmium	04/11/00	0.482	1.2	0.099
Calcium	04/11/00	557	NLE	3.97
Chromium	04/11/00	52.2	81	0.099
Cobalt	04/11/00	4.44	NLE	0.099
Copper	04/11/00	10.3	34	0.595
Iron	04/11/00	22800	NLE	1.98
Lead	04/11/00	18.0	47	0.397
Magnesium	04/11/00	2670	NLE	3.97
Manganese	04/11/00	37.1	NLE	0.099
Mercury	04/11/00	0.444	0.15	0.034
Nickel	04/11/00	11.0	21	0.099
Potassium	04/11/00	4110	NLE	3.97
Selenium	04/11/00	ND	NLE	0.595
Silver	04/11/00	0.694	1	0.595
Sodium	04/11/00	1880	NLE	3.97
Thallium	04/11/00	ND	NLE	0.595
Vanadium	04/11/00	32.5	NLE	0.198
Zinc	04/11/00	75.7	150	0.198

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Vanadium	04/11/00	40.0	NLE	0.217
Zinc	04/11/00	220	150	0.217

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