REMEDIAL ACTION WORK PLAN

LANDFILL M-8

MAIN POST
FORT MONMOUTH, NEW JERSEY

SEPTEMBER 2000

PROJECT NO.: 68.02711.00002
CONTRACT NO.: DACA51-96-D-0018

PREPARED FOR:

UNITED STATES ARMY, FORT MONMOUTH, NEW JERSEY
DIRECTORATE OF PUBLIC WORKS
BUILDING 167
FORT MONMOUTH, NJ 07703

PREPARED BY:

BCM ENGINEERS
A DIVISION OF ATC ASSOCIATES, INC.
BROMLEY CORPORATE CENTER
THREE TERRI LANE
BURLINGTON, NEW JERSEY 08016

CLASSIFICATION EXCEPTION AREA/WELL RESTRICTION AREA FACT SHEET

Site Name: Fort Monmouth Landfill M-8 **Date:** October 10, 2000
Location: (Include Address Municipality and County) U.S. Army Fort Monmouth, Monmouth County, New Jersey, 07703
Block(s):
Lot(s):
See Figure 1 (Site Location Map)

Site Contact Person: Joseph Fallon
Address: U.S. Army Fort Monmouth, New Jersey, Directorate of Public Works, Building 167, Fort Monmouth, NJ 07703
Phone Number: (732) 532-6223

DEP Lead Program 609-633-1455
DEP Remedial Action Workplan Approval Document Dated

Description of CEA:

Pursuant to N.J.A.C. 7:9-6.5, this area is presently designated as Class II-A. The primary designated use for Class II-A ground water is potable water; secondary uses include agricultural and industrial water. Any proposed ground water use within the CEA will require Department review for feasibility of well installation and modifications that would be protective of any impacts from these contaminants for the duration of the CEA.

This CEA/WRA applies only to the contaminants listed in the table below. The ground water criteria/primary drinking water standards for these contaminants are listed in parts per billion (ppb). All constituent standards (N.J.A.C. 7:9-6) apply at the designated boundary.

Contaminant	Ground Water Quality Criteria (ppb)
Chlorobenzene	4
Tetrachloroethene (PCE)	1
Benzene	1

CEA boundaries:

Horizontal Boundaries: See Figure 22 (CEA/WRA Location Map)

Projected term of CEA: Five Years

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EXECUTIVE SUMMARY

Based on recommendations specified in the December 1995 *Final Site Investigation Report,* prepared by Roy F. Weston of West Chester, Pennsylvania (Weston), the Fort Monmouth Directorate of Public Works (DPW) performed a Remedial Investigation of Landfill M8 at Fort Monmouth – Main Post between May 1997 through March 2000. The results of the Weston investigation at Landfill M8 indicated that low chlorobenzene concentrations were detected in the shallow groundwater in excess of the New Jersey Department of Environmental Protection (NJDEP) February 1994 Ground Water Quality Criteria (GWQC). The purpose of the DPW investigation was to install additional monitoring wells and piezometric wells in order to collect groundwater samples, to collect surface water samples, and to drill soil borings in order to collect soil samples and sediment samples. These activities were performed in order to evaluate groundwater, surface water, soil, and sediment quality at and in the vicinity of the Landfill M8, and to prepare a Remedial Action Work Plan (RAWP) to address the need for remediation of these media, if necessary. In general, the Remedial Investigation activities were conducted by the DPW. BCM Engineers, a division of ATC Associates, Inc. (BCM) was contracted by the DPW to evaluate the data and to prepare this RAWP.

This Remedial Investigation involved:

- installing two new shallow groundwater monitoring wells and seven piezometric wells;
- surveying newly installed monitoring and piezometric wells;
- sampling monitoring well MW-12 for 14 events over 12 consecutive quarterly periods;
- sampling monitoring wells MW-13, MW-14, MW-15 for 12 events over 12 consecutive quarterly periods;
- sampling monitoring wells MW-16 through MW-22 for seven events over six consecutive quarterly periods;
- sampling MW-23 for five sampling events over four consecutive quarterly periods;
- sampling MW-24 for four sampling events;
- sampling MW-697-01 for 11 consecutive quarterly periods;
- sampling four surface water points for 18 events;
- sampling three surface water points for two events;
- sampling two seep locations for two events;
- drilling 22 soil borings to collect 293 soil samples;
- drilling ten sediment borings to collect 21 sediment samples.

The results of this investigation indicate that the shallow groundwater contained VOCs, (tetrachloroethene [PCE], chlorobenzene and benzene) and pesticides (4,4'-DDE, 4,4'-DDD, 4,4'DDT, alpha chlordane and gamma-chlordane) in excess of the New Jersey Department of Environmental Protection (NJDEP) Ground Water Quality Criteria (GWQC). PCE contamination, detected in two monitoring wells located adjacent to Landfill M-5, and pesticides contamination, detected in only one monitoring well located at Landfill M-5, are derived from Landfill M-5 and will be addressed during remedial activities performed at Landfill M-5

(hydrogen release compounds program). The concentrations and distribution of PCE, chlorobenzene, benzene, and detected pesticides in the groundwater and hydrogeological characteristics at Landfill M-8, combined with remedial activities performed at landfill M-5 adjacent to landfill M-8, suggest that this location is suitable for a Natural Remediation program. In general, PCE, chlorobenzene and benzene concentrations are expected to come into compliance with the NJDEP Class II GWQC within a five-year period, and the plumes are not expected to migrate beyond five feet during this time frame.

1.0 REMEDIAL INVESTIGATION REPORT

This document is a Remedial Action Work Plan (RAWP) for the shallow groundwater, soil and sediment at Landfill M-8, located on the Main Post of Fort Monmouth, New Jersey (Figures 1 and 2). It has been prepared by ATC Associates, Inc. (ATC), on behalf of the Fort Monmouth Directorate of Public Works (DPW), and is based on the data presented in the December 1995 *Site Investigation Report* (SIR), by Roy F. Weston, Inc. (Weston), as well as groundwater, surface water, soil and sediment sampling data collected by the DPW between October 1996 and March 2000. This RAWP has been prepared in accordance with the New Jersey Department of Environmental Protection's (NJDEP) July 1993 *Technical Requirements for Site Remediation - NJAC 7:26E* (Technical Requirements).

1.1 Historical Information

According to the SIR, Landfill M-8 was in use as a landfill between 1962 and 1981. Prior to commencing landfill activities, a masonry dike was built around the site perimeter and the southern part of the landfill was excavated to approximately 12 feet below grade. Materials reported to have been disposed of at Landfill M-8 include unwashed pesticide/herbicide cans, batteries, fluorescent tubes, electronic components, garbage, asbestos wrappings from pipes, soot and boiler scale, sludge from sanitary treatment plants (STPs), small quantities of outdated drugs, outdated photographic chemicals in glass bottles, building rubble (including asbestos-containing materials [ACM]), incinerator ash, sand from oil spill cleanups, leaves, brush, and other debris.

1.2 Physical Setting

1.2.1 Site Description

Landfill M-8 is located north of Buildings T-692 and S-697 in a bend of Parkers Creek. As mentioned previously, a masonry dike was constructed around the landfill perimeter, adjacent to Parkers Creek. The area within the dike is 9.5 acres, of which approximately 7.2 acres contains waste material. The approximate area of Landfill M-8 is 315,000 ft^2 (7.2 acres). Presently, the site is covered with heavy brush and small trees.

1.2.2 Regional Geology

Fort Monmouth is located within the New Jersey Section of the Atlantic Coastal Plain physiographic province. In general, New Jersey Coastal Plain formations consist of northeast striking deposits of unconsolidated clay, silt, and gravel. 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.

Over 20 regional geologic units are present within the sediments of the New Jersey 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 vary greatly (i.e., from several feet to several hundred feet).

1.2.3 Local Geology

Based on the regional geologic map (Jablonski, 1968), the Cretaceous age Red Bank and Tinton Sands outcrop at the Main Post area. The Red Bank sand conformably overlies the Navesink Formation and dips to the southeast at 35 feet per mile. The upper member (Shrewsbury) of the Red Bank sand is a yellowish-gray to reddish brown clayey, medium- to coarse-grained sand that contains abundant rock fragments, minor mica and glauconite (Jablonski). The lower member (Sandy Hook) is a dark gray to black, medium-to-fine grained sand with abundant clay, mica, and glauconite.

The Tinton sand conformably overlies the Red Bank Sand and ranges from a clayey medium to very coarse grained feldspathic quartz and glauconite sand to a glauconitic coarse sand. The color varies from dark yellowish orange or light brown to moderate brown and from light olive to grayish olive. Glauconite may constitute 60 to 80 percent of the sand fraction in the upper part of the unit (Minard, 1969). The upper part of the Tinton is often highly oxidized and iron oxide encrusted (Minard).

The boring logs from the downgradient on-site monitoring wells (MW-13, MW-14, and MW-15) installed in December 1994 indicate that the soils in this area consist of a thin soil cover of brown silty sand (approximately one foot thick), underlain by approximately 11 feet of gray/brown sandy silt. Fill material was also encountered at these depths, with large wood fragments, trace of wires, and amber glass fragments visible. A layer of grayish-brown elastic silty sand extends from 12 feet to at least 15 feet below grade. The boring log from the remaining on-site monitoring well, MW-12, located upgradient of the landfill boundary, indicates that the soils in this area consist of a soil cover (approximately 2.5 feet) of brown silt with sand, underlain by approximately 12 feet of orange/brown to dark green poorly graded sand with silt.

In order to better characterize the geology in the M3, M5 and M8 areas, and in order to determine the vertical extent of soil contamination, three soil borings were drilled at M5 area at depths between approximately 42 feet and approximately 60 feet. A comparison of the boring logs from these soil borings versus the soil borings drilled at landfill M8 confirmed that between surface to approximately 15 feet below surface the same layers were encountered in both M8 and M5 areas. It is assumed that the dry and dark green dense to very dense silty sand/clayey sand, with clay contents increasing with depth, which extends from 16- to at least 60-feet below grade or the depth of the borings in M5 area will be encountered also in M8 area.

Over the last 80 years, the natural topography of Fort Monmouth has been altered by excavation and filling activities by the military. Topographic elevations for Landfill M-8 range from 5 feet above mean sea level (MSL) to 13.5 feet above MSL.

1.2.4 Hydrogeology

The water table aquifer in the Main Post area is identified as part of the "composite confining units", or minor aquifers. The minor aquifers include the Navesink formation, Red Bank Sand, Tinton Sand, Hornerstown Sand, Vincentown Formation, Manasquan Formation, Shark River Formation, Piney Point Formation, and the basal clay of the Kirkwood Formation.

Based on records of wells drilled in the Main Post area, water was typically encountered at depths of 2 to 9 feet below ground surface (bgs). According to the boring logs for MW-12, MW-13, MW-14, and MW-15, groundwater was encountered during drilling activities at 8, 2, 6, and 5 feet bgs, respectively. During several monitoring events performed at M-8, groundwater was encountered at depths between 3.50 feet and 19.2 feet bgs. According to Jablonski, wells drilled in the Red Bank and Tinton Sands may produce 2 to 25 gallons per minute (gpm). According to the boring logs, MW-12 produced 3.5 gpm, MW-13 produced 4 gpm, MW-14 produced 0.5 gpm, and MW-15 produced 2 gpm.

Due to the proximity of the Atlantic Ocean to Fort Monmouth, shallow groundwater may be tidally influenced and may flow toward creeks and brooks as the tide goes out, and away from creeks and brooks as the tide comes in. According to the SIR, the site-specific groundwater flow direction is estimated to be north towards Parkers Creek. Groundwater elevation contour maps from 12 sampling events are included as Figures 3 through 14.

1.3 Technical Overview

1.3.1 Reliability of Laboratory Data

All data was collected in accordance with Fort Monmouth's December 1994 *Chemical Data Acquisition Plan* (CDAP), the NJDEP's May 1992 *Field Sampling Procedures Manual*, and the Technical Requirements. All groundwater samples were analyzed within the requisite holding times by Fort Monmouth Environmental Testing Laboratory, a New Jersey certified laboratory (Laboratory Certification Number 13461).

1.3.2 Summary of Contamination

The sampling program conducted at Landfill M-8 revealed the presence, above their respective method detection limits in at least one sampling round, of 18 volatile organic compounds (VOCs), 15 semivolatile organic compounds (SVOCs), nine pesticides, one PCB, and 23 priority pollutant metals (PPMs) in groundwater samples collected. Of these detected compounds, five VOCs (chlorobenzene, tetrachloroethene, benzene, methylene chloride and trichloroethene), one SVOCs [bis(2-Ethylhexyl)phthalate], six pesticides (alpha-BHC, 4,4'-DDE, 4,4-DDD, 4,4'-DDT, alpha-chlordane, gamma-chlordane), one PCB (arochlor 1242) and eleven PPMs (aluminum, arsenic, cadmium, chromium, iron, lead, manganese, mercury, nickel, silver, and sodium) were detected, during at least one sampling event, at concentrations exceeding their respective NJDEP Class II Ground Water Quality Criteria (GWQC).

A detailed description of the groundwater and surface water impacts in the Landfill M-8 area is presented in Section 1.5 of this document.

1.4 Remedial Investigation Methodology

1.4.1 Monitoring Well Installation

Four monitoring wells, MW-12, MW-13, MW-14, and MW-15 were installed in 1995 by Weston during site investigation field activities. Well logs and well construction were included in Weston's SIR and are also included in Appendix A of this report. In order to confirm that groundwater contamination is not exceeding NJDEP Ground Water Quality Criteria (GWQC) at the boundaries of Landfill M-8, seven piezometric wells (MW-16 through MW-22) were installed along Parkers Creek. Two additional monitoring wells (MW-23 and MW-24) were installed at Landfill M-8 during remedial investigation activities performed at Landfill M-5 located immediately adjacent to Landfill M-8. One more monitoring well, MW-697-01, was installed southeast of Landfill M-8, during underground storage tank (UST) closure activities performed at building number 697. Locations of these piezometric wells and monitoring wells are shown on Figure 2.

Piezometric wells MW-21 and MW-22 were installed on August 20, 1998, MW-18, MW-19, and MW-20 were installed on August 22, 1998, MW-17 was installed on August 31, 1998, and MW-16, was installed on September 1, 1998. The locations of these wells are depicted on Figure 2. A hollow stem auger drill rig was used to advance the boring at each well location. The wells were constructed of 2-inch diameter schedule 40 PVC screen and casing, and were installed at depths between approximately 13 feet to approximately 20 feet below surface grade. The screen interval in each well extends from approximately 5 feet below ground surface (bgs) to the bottom of the well. The annular space surrounding the screen was filled with #2 grade sand to a level at least one foot above the top of the screen in each well. The remainder of the annular space surrounding each well was filled with cement/bentonite grout to surface. Each piezometric well was finished with approximately 2.5 feet PVC casing above land surface protected by a 6-inch diameter steel protective casing. Upon completion, the wells were developed, using a submersible pump, until the groundwater was visibly free of sediments. The wells were installed and developed by Groundwater and Environmental Services, Inc., a licensed New Jersey drilling company. The wells were installed in accordance with standard NJDEP procedures for the installation of wells in unconsolidated materials. Monitoring well logs, construction details and monitoring well records are included as Appendix A.

Monitoring wells MW-23 and MW-24 were installed on March 30, 1999 and March 29, 1999, respectively. The wells were constructed of 4-inch diameter schedule 40 PVC screen and casing, and were installed at depths of approximately 15 feet and approximately 18 feet, respectively. The screen interval in each well extends from approximately 3 to 5 feet to the bottom of the well. The annular space surrounding the screen was filled with #2 grade sand to a level at least one foot above the top of the screen in each well. The remainder of the annular space surrounding each well was filled with cement/bentonite grout to surface. Each monitoring well was finished with approximately 3.0 feet PVC casing above land surface protected by a 6-inch diameter steel

protective casing. Upon completion, the monitoring wells were developed, using a submersible pump, until the ground water was visibly free of sediments. The wells were installed and developed by Lutz Environmental Inc., a licensed New Jersey drilling company, under the direct supervision of the ATC professional geologist. The monitoring wells were installed in accordance with standard NJDEP procedures for the installation of wells in unconsolidated materials. Monitoring well logs, construction details, and monitoring well records are attached in Appendix A.

On November 11, 1999, due to lack of water, monitoring well MW-24 was sealed, and a new monitoring well was installed in approximately the same location. This new monitoring well was installed to a depth of approximately 40 feet, following the same standard NJDEP procedures for the installation of wells in unconsolidated materials. Abandonment forms and monitoring well records for newly installed monitoring well are attached in Appendix A.

1.4.2 Survey of the Piezometer and Monitoring Wells

The newly installed piezometer and monitoring wells (MW-16 through MW-24) were surveyed relative to NJGCS Monument Number 9235, with an elevation of 56.69 feet, by Frederick W. Kocen Jr., Professional Land Surveyor (License # 34008). Copies of the Ground Water Monitoring Well Certification - Form B - Location Certification are attached in Appendix A.

1.4.3 Quarterly Groundwater Sampling (MW-12, MW-13, MW-14, and MW-15)

On June 24, 1997, August 25, 1997, October 31, 1997, February 25, 1998, June 4, 1998, August 28, 1998, November 4, 1998, January 27, 1999, June 22, 1999, September 23, 1999, December 28, 1999, and March 15, 2000, groundwater samples were collected from monitoring wells MW-12, MW-13, MW-14, and MW-15. In addition, on April 14, 1999 and April 28, 1999, groundwater samples were also collected from monitoring well MW-12. Groundwater monitoring and sampling field notes are included in Appendices B through N. Groundwater samples were collected from wells according to the procedures outlined in the Field Sampling and Quality Assurance Plan, attached as Appendix Q and in accordance with the NJDEP's May 1992 *Field Sampling Procedures Manual.* The depth to groundwater was measured in each monitoring well using a sonic interface probe, and the volume of groundwater in the well casing was calculated. Subsequently, approximately three well volumes were purged from the well. After purging, each sample was collected using a dedicated teflon bailer. Groundwater depth, temperature, pH, dissolved oxygen, and electrical conductivity were recorded prior to purging, after purging, and prior to sampling. Samples were handled and analyzed in accordance with the quality assurance/quality control (QA/QC) protocols given in the *Technical Requirements for Site Remediation.* The water samples collected on above mentioned dates were preserved, chilled to 4°C, and delivered under chain of custody to the Fort Monmouth Environmental Testing Laboratory, Fort Monmouth, New Jersey, where the samples were analyzed for volatile organic compounds including xylenes (VOC+15) using EPA Method 624, Base/Neutral and Acid Extractables using EPA Method 625, Pesticide and PolyChlorinated Biphenyls (PCB) using EPA Method 608, and Target Analyte List Metals using standard methods [Atomic Absorption /Inductively Coupled Argon Plasma (AA/ICP)]. The results of quarterly groundwater sampling

are presented in Section 1.5.1 of this document. Laboratory reports are attached as Appendices B through N. These quarterly sampling data are summarized on Tables 1 through 4.

1.4.4 Groundwater Sampling (MW-16 through MW-22)

One round of groundwater sampling was conducted on September 23, 1998 for monitoring wells MW-16 and MW-17 and on September 30, 1998 for monitoring wells MW-18 through MW-22. A confirmatory round of groundwater sampling was performed on October 20, 1998 (MW-16 through MW-19) and October 21, 1998 (MW-20 through MW-22). Starting on January 27, 1999, all seven piezometric wells were included in the monitoring sampling program performed at Landfill M-8. Groundwater samples were collected from wells according to the procedures outlined in the Field Sampling and Quality Assurance Plan, attached as Appendix Q and in accordance with the NJDEP's May 1992 *Field Sampling Procedures Manual.* The depth to groundwater was measured in each monitoring well using a sonic interface probe, and the volume of groundwater in the well casing was calculated. Subsequently, approximately three well volumes were purged from the well. After purging, each sample was collected using a dedicated teflon bailer. Groundwater depth, temperature, pH, dissolved oxygen, and electrical conductivity were recorded prior to purging, after purging, and prior to sampling. Samples were handled and analyzed in accordance with the quality assurance/quality control (QA/QC) protocols given in the *Technical Requirements for Site Remediation.* Groundwater monitoring and sampling field notes are included as Appendices I through M, O and P. The water samples collected on above mentioned dates were preserved, chilled to 4°C, and delivered under chain of custody to the Fort Monmouth Environmental Testing Laboratory, Fort Monmouth, New Jersey, where the samples were analyzed for VOC+15, including xylenes, according to EPA Method 624, Base/Neutral and Acid Extractables using EPA Method 625, Pesticides/PCBs using EPA Method 608, and TAL Metals using standard methods AA/ICP. The results of these groundwater sampling events are presented in Section 1.5.1 of this document. Laboratory reports are attached as Appendices I through M, O and P. These quarterly sampling data are summarized on Tables 5 through 11.

One round of groundwater sampling, using low flow pump purging methodology, was performed on July 25, 2000 for monitoring wells MW-16 and MW-17. Groundwater samples were collected from wells according to the procedures outlined in the Field Sampling and Quality Assurance Plan, attached as Appendix Q and in accordance with the NJDEP's May 1992 *Field Sampling Procedures Manual.* After purging, each sample was collected from the purge line. Groundwater depth, temperature, pH, dissolved oxygen, and electrical conductivity were recorded prior to purging, after purging, and prior to sampling. Samples were handled and analyzed in accordance with the quality assurance/quality control (QA/QC) protocols given in the *Technical Requirements for Site Remediation.* Groundwater monitoring and sampling field notes are included as Appendix R. The water samples collected on above mentioned date were preserved, chilled to 4°C, and delivered under chain of custody to the Fort Monmouth Environmental Testing Laboratory, Fort Monmouth, New Jersey, where the samples were analyzed for TAL Metals using standard methods AA/ICP. The results of these groundwater sampling events are presented in Section 1.5.1 of this document. Laboratory reports are attached as Appendix R and sampling data are summarized on Tables 5 and 6.

1.4.5 Groundwater Sampling (MW-23 and MW-24)

One round of groundwater sampling was conducted on April 14, 1999 for monitoring wells MW-23 and MW-24. A confirmatory round of groundwater sampling was performed on April 28, 1999. Starting on September 23, 1999, monitoring wells MW-23 and MW-24, installed at Landfill M-5, were included in the monitoring sampling program performed at Landfill M-8. On December 28, 1999, monitoring well MW-24 was not sample due to lack of water (dry). As mentioned in Section 1.4, monitoring well MW-24 was sealed, and a new monitoring well was installed in approximately the same location. Starting with March 15, 2000, newly installed monitoring well MW-24 was included in the monitoring sampling program performed at Landfill M8.

Groundwater samples were collected from wells according to the procedures outlined in the Field Sampling and Quality Assurance Plan, attached as Appendix Q and in accordance with the NJDEP's May 1992 *Field Sampling Procedures Manual.* The depth to groundwater was measured in each monitoring well using a sonic interface probe and the volume of groundwater in the well casing was calculated. Subsequently, approximately three well volumes were purged from the well. After purging, each sample was collected using a dedicated teflon bailer. Groundwater depth, temperature, pH, dissolved oxygen, and electrical conductivity were recorded prior to purging, after purging, and prior to sampling. Samples were handled and analyzed in accordance with the quality assurance/quality control (QA/QC) protocols given in the *Technical Requirements for Site Remediation.* Groundwater monitoring and sampling field notes are included as Appendices K through N. The water samples collected on above mentioned dates were preserved, chilled to 4°C, and delivered under chain of custody to the Fort Monmouth Environmental Testing Laboratory, Fort Monmouth, New Jersey, where the samples were analyzed for VOC+15, including xylenes, according to EPA Method 624, Base/Neutral and Acid Extractables using EPA Method 625, Pesticides/PCBs using EPA Method 608, and TAL Metals using standard methods AA/ICP. The results of these groundwater sampling events are presented in Section 1.5.1 of this document. Laboratory reports are attached as Appendices K through N and sampling data are summarized on Tables 12 and 13.

On January 6, 2000 and January 27, 2000, groundwater samples were collected from MW-24, and on February 8, 2000 and February 22, 2000, groundwater samples were collected from MW-23 using low flow pump purging methodology. Groundwater samples were collected from wells according to the procedures outlined in the Field Sampling and Quality Assurance Plan, attached as Appendix Q and in accordance with the NJDEP's May 1992 *Field Sampling Procedures Manual.* After purging, each sample was collected from the purge line. Groundwater depth, temperature, pH, dissolved oxygen, and electrical conductivity were recorded prior to purging, after purging, and prior to sampling. Samples were handled and analyzed in accordance with the quality assurance/quality control (QA/QC) protocols given in the *Technical Requirements for Site Remediation.* Groundwater monitoring and sampling field notes are included as Appendix R. The water samples collected on above mentioned date were preserved, chilled to 4°C, and delivered under chain of custody to the Fort Monmouth Environmental Testing Laboratory, Fort Monmouth, New Jersey. Groundwater samples collected from MW-23 and MW-24 were analyzed for TAL Metals using standard methods AA/ICP and samples collected from MW-24

were further analyzed for PCBs using EPA Method 608. The results of these groundwater sampling events are presented in Section 1.5.1 of this document. Laboratory reports are attached as Appendix S and sampling data are summarized on Tables 12 and 13.

1.4.6 Groundwater Sampling (MW-697-01)

On August 27, 1997, October 29, 1997, February 26, 1998, June 4, 1998, August 28, 1998, November 4, 1998, January 27, 1999, June 22, 1999, September 23, 1999, December 28, 1999, and March 15, 2000, groundwater samples were collected from monitoring well MW-697-01. Groundwater samples were collected according to the following procedures and in accordance with the NJDEP's May 1992 *Field Sampling Procedures Manual.* The depth to groundwater was measured in each monitoring well using a sonic interface probe, and the volume of groundwater in the well casing was calculated. Subsequently, approximately three well volumes were purged from the well. After purging, each sample was collected using a dedicated teflon bailer. Groundwater depth, temperature, pH, dissolved oxygen, and electrical conductivity were recorded prior to purging, after purging, and prior to sampling. Samples were handled and analyzed in accordance with the quality assurance/quality control (QA/QC) protocols given in the *Technical Requirements for Site Remediation.* Groundwater monitoring and sampling field notes are included in Appendices C through M. The groundwater samples collected on the above mentioned dates were preserved, chilled to 4°C, and delivered under chain of custody to the Fort Monmouth Environmental Testing Laboratory, Fort Monmouth, New Jersey, where the samples were analyzed for VOC+15 using EPA Method 624, Base/Neutral and Acid Extractables using EPA Method 625, Pesticides/PCBs using EPA Method 608, and Target Analyte List Metals using standard methods (Atomic Absorption/Inductively Coupled Argon Plasma [AA/ICP]). The results of quarterly groundwater sampling are presented in Section 1.5.1 of this document. Laboratory reports are attached as Appendices C through M. These quarterly sampling data are summarized on Table 14.

1.4.7 Surface Water Body Sample Collection

The objective of the surface water investigation was to obtain an indication of the surface water quality of Parkers Creek, which borders Landfill M-8 on the west, north, and east. Due to salinity concentrations greater than 3.5 parts per thousand at mean high tide, the NJDEP classifies this creek as SE - saline waters of estuaries. Between October 1996 and March 1, 2000, 18 rounds of samples were taken from several surface water sampling points along this water body, as well as from two other water bodies on the Fort Monmouth Main Post: Mill Creek and Lafetra Creek. Surface water sample SS-5 is located upstream from Landfill M-8, to the southwest of Landfill M-8 near the confluence of Mill Creek and Lafetra Creek. Surface water sample SS-7 is located to the east and down gradient of Landfill M-8, along Parkers Creek. Sampling point SS-14 is located upstream from Landfill M-8, where Lafetra Creek enters the Fort Monmouth Main Post. Sampling point SS-15 is located upstream from Landfill M-8, where Mill Creek enters the Fort Monmouth Main Post. Surface water samples were handled and analyzed in accordance with the *Technical Requirements for Site Remediation.* The surface water samples collected on above mentioned dates were preserved, chilled to 4°C, and delivered under chain of custody to the Fort Monmouth Environmental Testing Laboratory, Fort Monmouth, New Jersey, where the samples were analyzed for VOC+15, including xylenes,

according to EPA Method 624. The results of these surface water samples are presented in Section 1.5.2 of this document. Laboratory reports are attached as Appendix T, and sampling data are summarized on Table 15 and Figure 15.

During the low tide events, two surface water sampling events (on June 1 and 8, 2000) were performed. Surface water samples were collected from SS-4, SS-7 and from SS-28. Surface water body locations are shown on Figure 2. Surface water samples were handled and analyzed in accordance with the *Technical Requirements for Site Remediation*. The surface water samples collected on above mentioned dates were preserved, chilled to 4°C, and delivered under chain of custody to the Fort Monmouth Environmental Testing Laboratory, Fort Monmouth, New Jersey, where the samples were analyzed for PCBs using EPA Method 608. The results of these surface water samples are presented in Section 1.5.2 of this document. Laboratory reports are attached as Appendix U, and sampling data are summarized on Table 16 and Figure 15. Surface water SWS-4 and SWS-28 will be added to the quarterly stream monitoring program and PCB sampling and analysis will be added to the VOC+15 requirements.

On November 12, and 18, 1998, two surface water samples (Seep #1 and Seep #2) were collected from two seeps observed to discharge into Parker Creek. The surface water sampling locations are shown on Figure 2. Surface water samples were handled and analyzed in accordance with the *Technical Requirements for Site Remediation*. The surface water samples collected on the above mentioned dates were preserved, chilled to 4°C, and delivered under chain of custody to the Fort Monmouth Environmental Testing Laboratory, Fort Monmouth, New Jersey, where the samples were analyzed for VOC+15, including xylenes, according to EPA Method 624, Base/Neutral and Acid Extractables using EPA Method 625, Pesticides/PCBs using EPA Method 608, and Target Analyte List Metals using standard methods [Atomic Absorption/Inductively Coupled Argon Plasma (AA/ICP)]. The results of these surface water samples are presented in Section 1.5.2 of this document. Laboratory reports are attached as Appendix V and sampling data are summarized on Table 17 and Figure 15.

1.4.8 Soil and Stream Sediment Sampling for PCBs Delineation

On April 14, 1999 and April 28, 1999, groundwater samples collected from monitoring well MW-24 exhibited concentrations of Arochlor 1242 at 4.188 micrograms per liter (ug/L) and 8.84 ug/L, respectively, above the NJDEP criteria of 0.5 ug/L for this compound. In order to confirm that soils were the source of groundwater contamination, the DPW performed PCB soil delineation in the area surrounding MW-24. Between August 10,1999 and October 1, 1999, a total of 22 Geoprobe points (B1 through B22) were drilled. Two hundred ninety three (293) soil samples were collected and analyzed for PCBs. Soil samples were collected from the 0-6 inch interval initially, then at alternating 6-inch intervals (0-6, 12-18, 24-30, 36-42, 48-54, etc) to depths between 90-inches and 186-inches (bottom of the Geoprobe soil borings). Soil samples at landfill M-8 were collected in accordance with the NJDEP Field Sampling Procedures Manual (May, 1992), the Technical Requirements for Site Remediation (NJAC 7:26E, June, 1993), and the DPW - Standard Operating Procedure for Geoprobe Sampling Methods for Site M-8 PCB (attached as Appendix Q). Geoprobe soil locations are shown on Figure 17, analytical results are summarized in Table 18 and the laboratory report is included as Appendix W.

On March 29, 2000, the DPW submitted for review and approval to NJDEP a sediment sampling plan for nine landfills (one of them being M8), to ascertain whether PCBs are present within stream sediments bordering the landfills. The stream sediment sampling plan was approved by the NJDEP on April 3, 2000. The NJDEP's approval letter is attached as Appendix Q. Sediment samples at landfill M8 were collected in accordance with the NJDEP Field Sampling Procedures Manual (May, 1992), the Technical Requirements for Site Remediation (NJAC 7:26E, June, 1993), the NJDEP Guidance for Sediment Quality Evaluations (November 1998) and the DPW - Standard Operating Procedure for Geoprobe Sampling Methods for Site M-8 PCB (attached as Appendix Q). On April 12, 2000 and April 13, 2000, ten soil borings were advanced to depths of approximately 12-inch, except soil boring M8/3 advanced to a depth of approximately 24-inch, at locations shown on Figure 16. Three sediment samples were collected from M8/3 from 0-6 inches, 6-12 inches and 18-24 inches intervals, and two sediment samples were collected from the remaining nine soil borings from intervals of 0-6 inches and 6-12 inches. Sediment samples were analyzed for PCBs. Table 19 summarizes analytical results and the laboratory report is included as Appendix X.

1.4.9 Aquifer Pump Test

A slug test was conducted on June 4, 1999, at the site in order to determine the hydraulic conductivity of the unconfined aquifer. In-situ hydraulic conductivity of the shallow, saturated, unconsolidated materials underlying the site was determined by means of falling head and rising head slug tests. Slug tests are simple, single well tests that are used to approximate the hydraulic conductivity of the aquifer in which the well is screened. A slug test consists of rapidly changing the water level in the well and recording the response of the aquifer.

To minimize the impact to the aquifer and the volume of waste generated, no water was removed or added to the tested wells. Instead, a cylindrical object (slug) was submerged in each well to displace water and create an initial increase in hydraulic head. This is comparable to adding water to the well. The subsequent decrease in water level was measured (falling head). When water levels stabilized following the insertion, the slug was removed resulting in an initial decrease in hydraulic head. The subsequent rise in water level was measured (rising head). Water levels in the well during both the insertion and the removal were measured and recorded using a pressure transducer and data logger. Monitoring well MW13 was utilized to conduct the slug test.

1.5 Remedial Investigation Results

1.5.1 Groundwater Quality

Historically, separate phase hydrocarbons were not reported in any of the monitoring wells. The compounds detected above their respective method detection limits, during the groundwater sampling events, are summarized in Tables 1 through 14. Eighteen (18) VOCs, 15 SVOCs, nine pesticides, one PCB, and 23 PPMs were detected above their respective method detection limits (MDL) in at least one sampling round. Of these detected compounds, five VOCs (chlorobenzene, tetrachloroethene, benzene, methylene chloride and trichloroethene), one SVOCs [bis(2-Ethylhexyl)phthalate], six pesticides (alpha-BHC, 4,4'-DDE, 4,4-DDD, 4,4'-

DDT, alpha-chlordane, gamma-chlordane), one PCB (arochlor 1242) and eleven PPMs (aluminum, arsenic, cadmium, chromium, iron, lead, manganese, mercury, nickel, silver, and sodium) were detected at concentrations exceeding their respective NJDEP Class II Ground Water Quality Criteria (GWQC). These exceedances are mapped on Figure 15.

Methylene chloride was detected above its GWQC in MW-12 on October 31, 1997 and in MW-14 on August 25, 1997, after which methylene chloride concentrations decreased to ND for the remaining eleven and ten sampling events in both monitoring wells. Based on these results methylene chloride is not considered a contaminant of concern.

Tetrachloroethene was detected above its GWQC of 1 microgram per liter (ug/L) in MW-12 in 12 of 14 sampling events, with concentrations fluctuating between a low of 2.25µg/L on February 25, 1998 to a high of 46.06 on June 22, 1999. Monitoring well MW697-01 showed a one time exceedance for tetrachloroethene on November 4, 1998 (1.18 ug/L), followed by five consecutive rounds of ND concentrations. In MW-23, tetrachloroethene was found above the NJDEP GWQC on April 14, 1999 (6.56 ug/L), September 23, 1999 (1.62 ug/L), and December 28, 1999 (7.38 ug/L), followed by one round of ND concentrations. Due to high and constant concentrations of tetrachloroethene detected in MW-12, considered an upgradient well due to its location at Landfill M-5, this compound is considered a contaminant of concern at Landfill M-5. A bioremediation treatment program will be implemented at Landfill M-5 to increase the degradation rate of the contaminant of concern (PCE) in groundwater at the Landfill M-5 and Landfill M-8. A tetrachloroethene isopleth map for March 15, 2000 sampling event is attached as Figure 18. Tetrachloroethene is not considered a contaminant of concern for Landfill M-8.

Chlorobenzene was detected above its GWQC of 4 ug/L in MW-14 in nine of 12 sampling events with a highest concentration of 15.59 ug/L reported on June 24, 1997, and decreasing to ND on December 28, 1999, and a concentration of 2.91 ug/L reported during the last sampling event on March 15, 2000. In monitoring well MW-15 chlorobenzene was detected above its GWQC in eight of 12 sampling events. Concentrations ranged from 29.43 ug/L on November 4, 1998, to ND on March 15, 2000. In MW-16, chlorobenzene was detected on June 22, 1999, at a concentration of 18.38 ug/L, followed by three consecutive rounds of samples with concentrations reported ND or below NJDEP-GWQC. In MW-17, chlorobenzene was detected above the NJDEP-GWQC in three of seven sampling events with the highest concentration of 6.61 ug/L reported on October 20, 1998 and ND concentration reported for the last sampling event performed on March 15, 2000. MW-18 showed exceedances for chlorobenzene in all seven sample events, fluctuating from 10.42µg/L to 18.38µg/L, with a concentration of 12.56 reported on March 15, 2000, last sampling event. Due to concentrations of chlorobenzene, above the NJDEP-GWQC, detected in MW-14, MW-15 and MW-18, this compound is considered a contaminant of concern at Landfill M-8. A chlorobenzene isopleth map for March 15, 2000 is attached as Figure 19.

Benzene was detected above its GWQC of 1 ug/L in MW-15 on June 24, 1997 (1.52 ug/L), August 25, 1997 (1.28 ug/L), August 28, 1998 (2.3 ug/L), November 4, 1998 (3.11 ug/L), and June 22, 1999 (2.09 ug/L), after which benzene concentrations decreased to ND for the remaining three sampling events. Benzene was also detected above its NJDEP-GWQC in MW-16 on June 22, 1999 (2.48 ug/L), followed by three consecutive sampling events with ND

concentrations. In MW-24, benzene concentrations were not detected above the MDL for three consecutive sampling events and on March 15, 2000 benzene was detected at a concentration of 1.67µg/L, slightly above the NJDEP-GWQC of 1 ug/L. Benzene is a contaminant of concern for the Landfill M-8. A benzene isopleth map for March 15, 2000 is attached as Figure 20.

Trichloroethene (TCE) was detected above the NJDEP-GWQC of 1 ug/L on September 23, 1999 (1.94 ug/L), and March 15, 2000 (2.7 ug/L) only in monitoring well MW-23. Since a bioremediation treatment program will be implemented at Landfill M-5 to increase the degradation rate for contaminants of concern (PCE and TCE) in groundwater at the Landfill M-5 and Landfill M-8, TCE is not considered a contaminant of concern for Landfill M-8.

Bis(2-Ethylhexyl)phthalate was detected above its GWQC with a concentration of 58.53µg/L in MW-16 on January 27, 1999, followed by three consecutive rounds of ND concentrations and 3.15 ug/L, below its NJDEP-GWQC of 30 ug/L, on March 15, 2000. Based on these results Bis(2-Ethylhexyl)phthalate is not considered a contaminant of concern.

Monitoring well MW697-01, is the only well reporting six pesticides exceeding their respective NJDEP-GWQC. The pesticides detected at concentrations exceeding their respective GWQC were alpha-BHC, 4,4'-DDE, 4,4-DDD, 4,4'-DDT, alpha-chlordane and gamma-chlordane. Over 11 rounds of groundwater sampling, the concentrations of these six pesticides have all shown decreases. In the last ten rounds of sampling, alpha-BHC concentrations were reported ND. In the last six rounds of sampling, gamma-chlordane was reported at concentrations below the NJDEP-GWQC of 0.5 ug/L for this compound. 4,4'–DDE was reported above its NJDEP-GWQC of 0.1 ug/L only on June 4, 1998, followed by four rounds with concentrations reported below the NJDEP criteria and three rounds with ND. 4,4'–DDT concentrations were reported at concentrations slightly above the NJDEP criteria of 0.1 ug/L in five of 11 sampling events, with the last two rounds of samples reported at concentrations below the NJDEP-GWQC. The 4,4–DDD concentrations decreased from 2.080 ug/L on August 27, 1997 to 0.229 ug/L on March 15, 20000, slightly above the NJDEP-GWQC of 0.1 ug/L. Pesticide (4,4'-DDD) isopleth map for March 15, 2000 is attached as Figure 21. The 4,4-DDD concentrations may be the result of the biodegradation of 4,4-DDT, both of which were widely used pesticides prior to being banned in the United States in the early 1970s (*Hayes, W. J., Jr. Toxicology of Pesticides Baltimore: Williams & Wilkins, 1975. 302*). 4,4-DDD is typically persistent in the environment and strongly adsorbs onto fine soil particles such as silts and clays. In addition, as mentioned in the *Groundwater Chemicals - Desk Reference, Second Edition, John H. Montgomery*, 4,4-DDD exhibits a very low solubility (<1 mg/l). For these reasons it is not expected to be mobile in the environment, either in the soil column or via groundwater transport. Its occurrence in groundwater may be due to suspended sediments in the groundwater samples collected at Landfill M-8. 4,4-DDD concentrations are not widespread across Landfill M-8, but rather occur only in one location at concentrations only slightly above GWQS. Further, remediation of 4,4-DDD at these very low concentrations is not considered practicable or cost-effective. Since monitoring well MW697-01 located at Landfill M-5 will be included in the bioremediation treatment program implemented at Landfill M-5, and for reasons given above, the six pesticides exceeding their respective NJDEP-GWQC are not considered contaminants of concern.

Monitoring well MW-24, is the only well reporting one PCB, Arochlor 1242, exceeding its NJDEP-GWQC. Arochlor 1242 was reported above its NJDEP-GWQC of 0.5 ug/L on April 14, 1999 and April 28, 1999 followed by four quarterly sampling rounds with concentrations reported ND. Based on these results, Arochlor 1242 is not considered a contaminant of concern.

Of the eleven PPMs (aluminum, arsenic, cadmium, chromium, iron, lead, manganese, mercury, nickel, silver, and sodium) detected above their respective GWQCs, four of them – aluminum, iron, manganese, and sodium – exceeded their respective GWQCs for nearly every sample taken during this groundwater monitoring program. However, aluminum, manganese, sodium, and iron were found in concentrations below those determined for site-specific and Monmouth County maximum background levels. As mentioned in the Weston SIR, several natural and anthropogenic factors contribute to the wide range in concentrations of metals in soils. Soils derived from the glauconitic sands contain abundant iron, aluminum, calcium, magnesium, manganese, and potassium. Although aluminum concentrations exceeded the NJDEP GWQC, the measured concentrations did not exceed the site-specific maximum background level noted in the Weston report (121,000 µg/L). Similarly, iron concentrations did not exceed the site-specific maximum background level noted in the Weston report (431,000 µg/L). Elevated sodium concentrations may be the result of saline water intrusion into the groundwater, since the Landfill M-8 wells are located near the Parkers Creek saline estuary. Elevated manganese concentrations may be the result of the groundwater flowing through glauconitic soil formations. In addition, manganese is a common metal in tidally influenced environments (Weston report Section 4.1-21). Based on this information, aluminum, iron, manganese and sodium are not contaminants of concern at Landfill M-8.

Anthropogenic influences on the background metal concentrations include deposition of airborne dust, and historical applications of fertilizers, pesticides, and herbicides can account for the elevated levels of mercury, lead, cadmium, and arsenic (Weston report Section 4.1-22). On July 25, 2000, February 8 and 22, 2000 and January 6 and 27, 2000, a low flow pump purging and sampling procedure was performed at monitoring wells MW-16, MW-17, MW-23 and MW-24 in order to collect groundwater samples with minimum turbidity. The analytical results are included on Tables 5, 6, 12, and 13.

Arsenic was detected at concentrations below the GWQC in eight of 14 monitoring wells. In monitoring wells MW-13, MW-16, MW-17, MW-21, MW-22, and MW-23 arsenic was detected above its GWQC of 8 ug/L for one or two sampling events, followed by five to seven consecutive rounds of sampling with arsenic reported at concentrations below NJDEP criteria or at ND. Furthermore, the analytical results of groundwater samples collected using a low flow pump purging and sampling procedure showed arsenic concentrations below NJDEP criteria or at ND in all above monitoring wells. Arsenic is not considered a contaminant of concern at Landfill M-8.

Cadmium was reported in seven of 14 monitoring wells. In monitoring wells MW-17, MW-19, MW-20, MW-21, MW-22, and MW-23, cadmium was detected above the GWQC of 4 ug/L for one, two or three sampling events. In monitoring well MW-16, cadmium concentrations historically have fluctuated between 50.9 ug/L to 0.649 ug/L. However, the analytical results of groundwater samples collected using a low flow pump purging and sampling procedure showed

cadmium concentrations at ND in monitoring wells MW-16, MW-17, MW-23 and MW-24. Cadmium is not considered a contaminant of concern at Landfill M-8.

Chromium was reported above the GWQC only in monitoring well MW-16 on September 23, 1998 at a concentration of 137 ug/L. However, the analytical results of groundwater samples collected using a low flow pump purging and sampling procedure showed chromium concentrations below NJDEP criteria of 100 ug/L in monitoring well MW-16. Chromium is not considered a contaminant of concern at Landfill M-8.

Lead was detected at concentration above GWQC of 10 ug/L in 13 of 14 monitoring wells. In nine of 13 monitoring wells, lead was detected above GWQC for one or two sampling events, followed by five to nine consecutive rounds of sampling with lead reported at concentrations below NJDEP criteria of 10 ug/L or at ND. In MW-16, lead concentrations historically have fluctuated between 256 ug/L to 3.41 ug/L. In MW-17, lead concentrations historically fluctuated between 61 ug/L to 3.14 ug/L. During the last round of sampling, lead concentrations in MW-16 and MW-17 were reported at ND utilizing the low flow pump purging and sampling procedure. Lead is not considered a contaminant of concern at Landfill M-8.

Mercury was detected at a concentration of 2.74 ug/L, above the GWQC of 2.0 ug/L, in MW-23 on April 14, 1999. For the next six consecutive rounds, mercury was ND or if detected was below the GWQC. Mercury was also detected in MW-16 at a highest concentration of 11.4 ug/L on September 29, 1998, decreasing in the next seven rounds of sampling events to a concentration of 1 ug/L below the NJDEP criteria of 2 ug/L. On February 8 and 22, 2000 in MW-23, and on July 2000 in MW-16, when a low pump purging and sampling procedure was used, mercury concentrations were reported below NJDEP criteria or ND. Mercury is not considered a contaminant of concern at Landfill M-8.

Nickel was reported above the GWQC of 100 ug/L only in monitoring well MW-16 on December 28, 1999, at a concentration of 108 ug/L. Prior to December 28, 1999, for five consecutive quarterly sampling rounds and after December 28, 1999 for two consecutive quarterly sampling rounds, nickel concentrations were reported below NJDEP criteria or ND. Nickel is not considered a contaminant of concern at Landfill M-8.

Silver was noted within the first two quarterly sampling events for monitoring wells MW-12, MW-13, MW-14, MW-15 and MW697-01 at elevated levels; however, this analyte was also detected at elevated levels in associated method blanks. Silver is not considered a contaminant of concern at Landfill M-8.

1.5.2 Surface Water Quality

Laboratory results for all surface water and seep sampling points are summarized on Table 15, 16 and 17. Referring to Table 15, VOC analysis for the stream sampling points revealed that acetone, cis-1,2-dichloroethene, methylene chloride, methyl-tert-Butyl ether (MTBE), TCE, and PCE were present in concentrations above their respective method detection limits. Of these, only PCE was detected in samples collected from SS-5, SS-7 and SS-15, at concentrations exceeding its NJDEP Surface Water Quality Standard (SWQS) of 4.29 µg/L (as per N.J.A.C. 7:9-

6 (2) - September 1997). PCE concentrations ranging from 1.24 to 10.38 μg/L were detected. The exceedances are mapped on Figure 15. Referring to Figure 15, during each sampling event, PCE concentrations in surface water collected from SS-15 were reported at higher concentrations than surface water collected from SS-5 and SS-7. Since SS-15 is located close to where the stream enters Fort Monmouth, and since SS-15 is located upstream of landfill M-8, it suggests that surface water is impacted prior to flowing into Fort Monmouth property and that Landfill M-8 is not a contributor of PCE contamination to the Parkers Creek. Also, in all sentinel wells located downgradient of Landfill M-8 and along the Parkers Creek, PCE concentrations were not detected above the NJDEP-GWQC.

Referring to Table 16, PCBs were not detected above the MDL in any of the surface water samples collected during the two low tide events. Referring to Table 17, VOC analysis from the seep sampling points revealed that chlorobenzene and 1,4-Dichlorobenzene were present in concentrations above their respective method detection limits. Of these, only chlorobenzene was detected in the sample collected from Seep #2, on November 12, 1998, at a concentration of 4.16 ug/L, slightly above its NJDEP-GWQC of 4 ug/L. Semi-volatiles analysis revealed that acenaphthene, fluoranthene, and pyrene were present in concentrations above their respective MDLs, but below of their respective NJDEP-GWQC. Pesticides/PCBs were not detected above their specific MDLs. For metals, only aluminum, arsenic, chromium, iron, lead, manganese, and sodium exceeded the NJDEP-GWQC.

1.5.3 Soil and Stream Sediment Sampling for PCBs Delineation

Soil sampling analytical results are presented in Table 18. Between August 10,1999 and October 1, 1999, a total of 293 soil samples were collected and analyzed in order to delineate PCB contamination around monitoring well MW-24. Arochlor 1242 was reported only in three soil samples collected from boring B-11 at depths between 24 inches to 54 inches. The highest concentration of 274.712 mg/Kg was detected at a depth of 48-54 inches, above the soil cleanup criteria of 0.49 mg/Kg. Arochlor 1254 was reported only in one soil sample collected from B-3 at a depth of 168 to 174 inches at a concentration of 342.484 mg/Kg, above the soil cleanup criteria of 0.49 mg/Kg. Arochlor 1260 was reported in 48 soil samples collected at concentrations between 0.101 mg/Kg to 30.03 mg/Kg, with 22 soil samples exceeding the soil cleanup criteria of 0.49 mg/Kg. Referring to Table 18, in all soil borings, except boring B-06, the next sampling interval below the interval with the highest concentration showed a ND. Referring to Figure 21, only two small spots with PCBs concentration exceeding NJDEP criteria were identified at soil borings B-11 and B-13.

Stream sediment analytical results are presented in Table 19. Arochlor 1254 was detected in two of the 21 samples collected, at concentrations above lowest effects level of 0.060 milligram per Kilogram (mg/Kg) but well below the severe effects level of 34 mg/Kg. Concentrations of 1.455 mg/Kg and 0.138 mg/Kg were reported only in sediment samples collected from M8/7 - 0-6 inches and from M8/8 – 0-6 inches, respectively. These sediment samples were collected from two points located very close to a storm drain discharge area. Since this storm drain crosses Landfill M-8, it is possible that impacted soils from Landfill M-8 have been transported via the storm drain and have impacted the sediments.

1.5.4 Aquifer Characteristics

The Hvorslev Method and the Bower-Rice Method (1976) of determining hydraulic conductivity of unconfined aquifers were employed, with the following assumptions (Kruseman and de Ridder, 1990):

- The aquifer is unconfined and has an apparently infinite areal extent;
- The aquifer is homogeneous, isotropic, and of uniform thickness over the area influenced by the slug test;
- Prior to the test, the water table is horizontal over the area that will be influenced by the test;
- The head in the well is changed instantaneously at $t_0=0$; the drawdown in the water table around the well is negligible;
- The inertia of the water column in the well and the linear and non-linear well losses are negligible;
- The well either partially or fully penetrates the saturated thickness of the aquifer;
- The well diameter is finite; hence storage in the well cannot be neglected; and
- The flow to the well is in a steady state.

The results of the slug test and associated calculation are presented in Appendix T. The average hydraulic conductivity (K) from the slug test conducted on MW13 is 0.85 ft/day.

1.6 Sensitive Receptor Survey

1.6.1 Well Search Data

All available DPW records and files were reviewed for information concerning wells located within Fort Monmouth. Also, two Well Search reports prepared by Roy F. Weston, in November 1993 and February 1994, were reviewed for information concerning wells within a one mile radius surrounding the center point of Landfill M-8. The well information is summarize on Table 20 and locations were plotted on a scaled map, included as Figure 23.

The results of the well search indicate the following:

Monitoring Wells: 119 monitoring wells were identified within one mile of the site. These wells were completed at depths between ten and 28 feet, with open or screened intervals ranging between one and 28 feet.

Domestic Wells: Five domestic wells were identified within one mile of the site. The depths of these wells ranged between 15 and 323 feet, with open or screened intervals ranging between 40 and 323 feet.

Irrigation Wells: Eight lawn irrigation wells were identified within one mile of the site. The depths of these wells ranged between 45 and 250 feet, with open or screened intervals ranging between 35 and 250 feet.

Public Supply Wells: No public supply wells were identified within one mile of the site.

1.6.2 Receptor Evaluation

Typically, groundwater, surface water, soil, and sediment impacts may give rise to concern about human and ecological receptors. However, in the case of Landfill M8, based on the following, no receptors are expected to be impacted:

1. Since there are no domestic, irrigation or public supply wells immediately downgradient of Landfill M8, and since impacted groundwater is expected to naturally attenuate in a very short distance (see Section 1.7), no concerns exist with respect to human exposure to impacted groundwater.

2. Parkers Creek represents a potential ecological receptor, since the monitoring wells nearest the stream (MW-14, MW-15, MW16 and MW-18) have been shown to be contaminated with chlorobenzene at levels exceeding the NJDEP GWQC. However, the chlorobenzene levels detected in these wells (ranging from ND to 29.43 µg/L) are not high enough to put Parkers Creek's surface water into violation of the applicable NJDEP SWQS for chlorobenzene, which is 21,000 µg/L (N.J.A.C. 7:9BB-1.14). Benzene, a contaminant of concern at Landfill M-8 was not detected in any of the surface water samples collected from Parkers Creek. Based on the discussion in Section 1.5.2 and the discussion in Section 1.7, the impacted groundwater in Landfill M8 is not expected to substantially affect Parkers Creek.

3. Although Parkers Creek represents a potential ecological receptor, as discussed previously, Parkers Creek is impacted with tetrachloroethene by sources upgradient of Landfill M8. Since tetrachloroethene was not detected in sentinel wells and based on the discussion in Section 1.5 and the discussion in Section 1.7, the tetrachloroethene impacted groundwater in Landfill M-8 does not appear to have adversely affected Parkers Creek, and is not expected to do so.

4. There are no concerns with respect to direct exposure by humans to impacted soil, because soil impacts were very minor, they exist at depth, and are contained in a relatively small area. The cover afforded by the M8 Landfill is expected to be adequate to continue to provide a barrier to human exposure. In addition, the M-8 landfill is fenced on all sides, with the exception of the landfill stream boundary, and the access to landfill area is controlled and limited to environmental personnel.

1.7 Classification Exception Area

A CEA is a mechanism that has been established by the NJDEP to temporarily except a defined area where groundwater does not meet the GWQC. As required by the *Ground Water Quality Standards* (N.J.A.C 7:9-6 et seq.), a CEA must be established whenever constituent standards applicable to a groundwater classification area are not met, or will not be met for the term of the remediation program. According to the NJDEP's *Final Guidance on Designation of Classification Exception Areas* (April 17, 1995), a CEA is defined by both physical boundaries,

and the amount of time that will be required for the groundwater contaminant(s) to achieve compliance with the GWQC.

The Fort Monmouth DPW proposes that a CEA be established for chlorobenzene, tetrachloroethene (PCE), and benzene in the vicinity of Landfill M-8. A CEA is appropriate for this site since all sources of contamination have been addressed, no receptors are at risk, and groundwater contamination remains at a level where the residual contaminant plume will not migrate beyond the designated boundary set forth below.

The classification exception area was determined using the analytical solution model option. Darcy's law was used as the model and was used to predict the duration of the CEA and the distance the contaminant will migrate before groundwater quality standards are achieved.

Determination of the Duration of the CEA for chlorobenzene, PCE, and benzene

A first order decay equation shown below, was used to calculate the duration of the CEA, since the degradation of the petroleum-based compounds has been shown to be logarithmic.

$$C = C_o * e^{-kt} \qquad \textbf{--Eq. 1}$$

where,

C = Final concentration of the contaminant
C_o = Initial concentration of the contaminant
k = Reaction rate constant
t = Time in days

The reaction rate constant k can be determined by the following equation:

$$k = \frac{0.693}{t^{1/2}} \qquad \textbf{--Eq. 2}$$

where,

$t^{1/2}$ = the half life of the corresponding contaminant in days

Data from monitoring well MW18 was used to define the CEA for chlorobenzene since the latest analytical data from the March 15, 2000 sampling event indicated the presence of chlorobenzene at a concentration of 12.56 µg/L (C_o). The final concentration of the chlorobenzene contaminant will be 4 µg/L (C) as per the NJDEP's Class II GWQC.

Data from monitoring well MW-12 was used to define the CEA for PCE since the latest analytical data from the March 15, 2000 sampling event indicated the presence of PCE at a concentration of 15.64 µg/L (C_o). The final concentration of the PCE contaminant will be 1 µg/L (C), as per the NJDEP's Class II GWQC.

Data from monitoring well MW-24 was used to define the CEA for benzene since the latest analytical data from the March 15, 2000 sampling event indicated the presence of benzene at a concentration of 1.67 µg/L (C_o). The final concentration of the benzene contaminant will be 1 µg/L (C), as per the NJDEP's Class II GWQC.

As reported in *The Handbook of Environmental Degradation Rates* (Howard, et al., 1991) the aqueous anaerobic low and high half life of chlorobenzene in ground water is estimated at 272 days and 600 days, respectively. The high half life of 600 days for chlorobenzene was used in the following calculations. Substituting the above values, the reaction rate constant k is calculated as 0.001155 days $^{-1}$.

Rearranging **Equation 1**, the time duration of the CEA can be determined as follows:

$$t = \frac{\ln\left(\frac{C}{C_o}\right)}{-k} \qquad \text{-- Eq. 3}$$

Substituting the values of C, C_o and k in **Equation 3**, the duration of the CEA is calculated as follows:

$$t = \frac{\ln\left(\frac{4}{10.22}\right)}{-0.001155}$$

t-(chlorobenzene) = 990.669 (approximately 3 years)

Using the same equations and using an average value of 400 days for the half life ($\mathbf{t}^{1/2}$) of PCE the duration of the CEA for PCE was calculated to be:

T (PCE)= 1,589.48 days (approximately 4.5 years)

Using the same equations and using an average value of 100 days (*NJDEP-Final Guidance on Designation of CEAs*) for the half life ($\mathbf{t}^{1/2}$) of benzene the duration of the CEA for benzene was calculated to be:

T (benzene)= 74 days

Calculation of the CEA Boundary for Chlorobenzene, PCE, and benzene

The boundary of the CEA is determined by calculating the distance of travel of the contaminant. Distance of travel is calculated from the pollutant transport rate. Seepage velocity (V_s) and Retardation factor (R_d) must be calculated for this purpose. The seepage velocity was calculated using the following equation:

$$V_s = \frac{(K * i)}{n_o}$$ **--Eq. 4**

where,

K= Hydraulic conductivity of the affected aquifer, (ft/day)
i = Hydraulic gradient (ft/ft)
n_e= Effective porosity

The average hydraulic conductivity of 0.85 ft/day, determined from the slug test performed at landfill M8 was used. The effective porosity of the formation (dense mixed grained sand) is taken as 30%. The hydraulic gradient at the site is calculated as 0.01048 ft/ft. Substituting these values in **Equation 4**:

$$V_s = \frac{(0.07 * 0.01048)}{0.3}$$

$V_s = 0.029$ ft/day

The retardation factor was calculated using the equation:

$$R_d = 1 + \frac{(K_d * \sigma_b)}{n_o}$$ **-- Eq. 5**

where,

ρ_b = bulk density of the formation
K_d = Distribution co-efficient
n_e = Effective porosity

The distribution co-efficient is calculated from the relation:

$$K_d = 0.63 * K_{ow} * f_{oc}$$ **-- Eq. 6**

where,

K_{ow} = n-octonol/water partition coefficient
f_{oc} = fraction of the organic carbon in the matrix

Since Landfill M8 is adjacent to Landfill M-5, and a comparison of soil boring logs drilled at these two landfills revealed the same lithology beneath the sites, the results of the Total Organic Carbon (TOC) content in soil samples collected from Landfill M-5 were used. It was estimated that TOC at the site is present at an average level of 5 mg/kg. From this the fraction of TOC in the soil matrix, f_{oc} was determined to be 0.000005. According to the *Superfund Public Health Evaluation Manual* (United States Environmental Protection Agency, Office of Emergency and Remedial Response, 1986), the value of K_{ow} is 130. Substituting these values,

$$K_d = 0.63 * 130 * 0.000005$$

$K_d = 0.00041$

The bulk density of the formation was estimated as 1.5 g/cm^3. Substituting the value of K_d, ρ_b and n_e into **Equation 5**, the retardation factor R_d is calculated as follows:

$$R_d = 1 + \frac{(0.00041 * 1.5)}{0.3}$$

R_d= 1.002

From the above parameters, the pollutant transport rate (V_{pt}) is determined by dividing the seepage velocity (V_s) by the retardation factor (R_d):

$$V_{pt} = \frac{V_s}{R_d} \qquad \textbf{-- Eq. 7}$$

$$V_{pt} = \frac{0.029}{1.002}$$

V_{pt} = 0.0296 ft/day

The distance traveled by the contaminant is calculated by the relationship, Distance = Transport Rate * Time:

$$d = V_{pt} * t \qquad \textbf{-- Eq. 8}$$

d-chlorobenzene = 0.0296 ft/day * 990.669 days = 29.35 feet

d-PCE = 0.0296 * 1,589.48 = 47.04 feet

d-benzene = 0.0296*100 = 2.96 feet

From the calculations, it appears that the migration of contaminants from monitoring wells MW-18, MW-12, and MW-24 is minimal (no more than 50 feet), and chlorobenzene, PCE and benzene concentrations can be expected to naturally attenuate in approximately 5 years. Monitoring wells MW-16, MW-17, MW-18, MW-19 MW-20 and MW-21 are proposed as sentinel wells. The latitude and longitude (taken from the NJDEP Monitoring Well Location Certification forms) of the monitoring wells that mark the area of the CEA are as follows:

Well No.	Latitude	Longitude
MW-16	40°18'56.9"	74°02'55.3"
MW-17	40°18'58.8"	74°02'58.0"
MW-18	40°18'59.3"	74°03'01.6"
MW-19	40°18'57.8"	74°03'-02.6"
MW-20	40°18'55.8"	74°03'03.8"
MW-21	40°18'54.1"	74°03'04.8"

Figure 22 presents the proposed CEA boundary map compatible with the NJDEP's Geographic Information System. Based upon the well search data (Section 1.6.1) domestic, irrigation, industrial or supply wells do not exist within the proposed boundaries of the CEA and there is reasonable expectation that they will be not installed in the future. Since no groundwater use within proposed CEA boundaries is occurring or is anticipated to occur, the aquifer beneath the Landfill M-8 is not considered a ground water use area.

Based on the CEA calculations and based on the analytical results of quarterly sampling events, the DPW proposes a maximum CEA duration of five years for chlorobenzene, tetrachloroethene and benzene to degrade to their GWQC of 4 μg/L, 1 μg/L, and 1 μg/L respectively, assuming natural degradation rates.

1.8 Conclusions and Recommendations

Based on the investigation conducted to date, the DPW concludes the following:

- In the Main Post area, groundwater is typically encountered at depths of 2 to 9 feet below ground surface. Ground water flow was calculated to be toward the north, toward Parkers Creek, consistent with the previous data.
- Historically, separate phase hydrocarbons were not reported in any of the monitoring wells.
- Groundwater analytical results identified chlorobenzene, tetrachloroethene (PCE), benzene, methylene chloride, trichloroethene (TCE), bis(2-ethylhexyl)phthalate concentrations in groundwater across the Landfill M-8 in excess of NJDEP GWQC. As mentioned in Section 1.5 only chlorobenzene, PCE, and benzene are considered contaminants of concern.
- Historically, a decrease in chlorobenzene concentrations was noted in all on-site monitoring wells, except monitoring well MW-18. Also, none of the chlorobenzene concentrations exceed the Federal or State maximum contaminant levels (MCLs).
- Tetrachloroethene concentrations were reported above the NJDEP-GWQC in only two monitoring wells, MW-12 (located at Landfill M-5 and adjacent to Landfill M-8) and MW-23 (located north and adjacent of Landfill M-5). Tetrachloroethene concentrations in these two small areas of concern, limited in extent, can be expected to naturally degrade over time without significant migration. Furthermore, concentrations of tetrachloroethene reported in these monitoring wells will be addressed during the Hydrogen Release Compound (HRC) Program to be implemented at Landfill M-5.
- Benzene, a contaminant of concern at Landfill M-8 was detected in monitoring wells MW-15 and MW-16, and monitoring well MW-24, located adjacent to Landfill M-5, at concentrations slightly above its NJDEP-GWQC of 1 ug/L. Benzene will be addressed through the implementation of a natural remediation program at Landfill M-8.
- The duration of the CEA for chlorobenzene, PCE, and benzene was calculated to be less than one year for benzene, three years for chlorobenzene and approximately 4.5 years for PCE.
- Since pesticides concentrations were detected only in the groundwater samples collected from monitoring well 697MW-1, located adjacent to Landfill M8, and were not detected in any of the on-site groundwater monitoring wells, it suggests that these compounds are not a concern for Landfill M8.

- Only one PCB, Arochlor 1242, was detected in MW-24 on April 14 and 28, 1999, and was reported ND for the last four sampling events. Based on this, and based on the low solubility of PCBs in water, Archolor 1242 in groundwater is not considered a contaminant of concern.
- Based on the discussion in Section 1.5.2 and the discussion in Section 1.7, the impacted groundwater in Landfill M-8 is not expected to substantially affect Parkers Creek.
- As discussed previously, Parkers Creek is impacted with tetrachloroethene by sources upgradient of Landfill M8. Since tetrachloroethene was not detected in sentinel wells and based on the discussion in Section 1.5 and the discussion in Section 1.7, the tetrachloroethene impacted groundwater in Landfill M-8 does not appear to have adversely affected Parkers Creek, and is not expected to do so.
- Stream sediment analytical results indicated that only Arochlor 1254 was detected in two of the 21 samples collected at concentrations above lowest effects level of 0.060 milligram per Kilogram (mg/Kg) but well below the severe effects level of 34 mg/Kg.
- A review of analytical results from Geoprobe soil samples revealed that Arochlor 1242, Arochlor 1254, and Arochlor 1260 concentrations exceeded the NJDEP-IGWSCC of 0.49 mg/Kg at 26 of 293 soil sample locations, collected around of MW-24 (an approximate area of 40 feet x 35 feet). Soil impacts were very minor, they exist at depth and the next sampling intervals below the intervals with the highest concentrations showed ND results. Also, since the solubility of PCBs in water is very low (between 0.59 mg/L to 5 mg/L [*John H. Montgomery, Groundwater Chemicals-Desk Reference, Second Edition-1955*]) the possibility of PCBs to migrate is minimal. Based upon this data, PCBs do not pose a threat to human health.

Based on the above conclusions, the DPW proposes the following:

- To address the groundwater in Landfill M-8, the DPW will implement a natural remediation program. As part of the CEA-Public Notice Requirements, the DPW will notify Monmouth County Health Department and Oceanport Township.
- Based on the low levels of PCBs detected in two of the ten sediment samples collected, and the likelihood that remediation of these two sediment sampling locations will cause more ecological damage to the flora and fauna of Parkers Creek than leaving the PCB concentrations in place, the DPW proposes no further action with regard to sediments. However, since a storm water drainage system crossing the Landfill M-8 discharges to the area where contaminated sediment was reported, the DPW will seal the storm drain and the section of the storm water drainage system crossing the Landfill M-8. A new storm water drainage system will be constructed to reroute the storm water around Landfill M-8.
- To address the PCB concentrations detected in soil in Landfill M-8, the DPW will incorporate a Declaration of Environmental Restriction (DER) equivalency to the Installation Master Plan. The DPW is lead agency for all land use issues at Fort Monmouth. The Installation Master plan resides in the Engineering Services and Planning Division of the DPW. A formal DER cannot be established due to the fact that a deed for Fort Monmouth property is not on record with any of the local municipalities. As stated previously, the existing landfill cover is expected to adequately prevent human contact with the concentrations of PCBs. In addition, the M-8 landfill is fenced on all sides, with the

exception of the landfill stream boundary, and the access to landfill area is controlled and limited to environmental personnel.

2.0 STATEMENT OF INTENT TO COMPLETE N.J.A.C. 7:26E

It is the DPW's intention that adherence to the remediation program outlined in this RAWP will result in compliance with the criteria set forth in N.J.A.C. 7-26E (7/93).

3.0 APPLICABLE REMEDIATION STANDARDS

The remediation standards for the groundwater in the vicinity of Landfill M-8 will be the NJDEP Ground Water Quality Criteria (GWQC) defined in N.J.A.C. 7:9-6. In the event the GWQC for a particular compound is numerically lower than the practical quantitation limit (PQL) for that compound, the PQL will be applied as the groundwater cleanup level. According to the most recent documentation from the NJDEP, the GWQC for chlorobenzene is 4.0 μg/L, tetrachloroethene is 1 μg/L, and benzene is 1 μg/L.

The remediation standards for the surface water in the vicinity of Landfill M-8 will be the NJDEP Surface Water Quality Standards (SWQS). In the event the SWQS for a particular compound is numerically lower than the practical quantitation limit (PQL) for that compound, the PQL will be applied as the surface water cleanup level. According to the most recent documentation from the NJDEP, the SWQC for tetrachloroethene is 4.29 μg/L.

4.0 REMEDIAL ACTION ALTERNATIVES

4.1 Considered Remedial Actions

There are several technologies proven to be effective for remediating groundwater contaminated with volatile organic compounds (VOCs). However, the applicability of these technologies is dependent on site-specific data, including the nature and extent of the contamination, and the geologic and hydrologic conditions. The following are brief descriptions of possible remedial alternatives based predominantly on their potential for treating VOCs. Site-specific conditions were fully considered during the selection of the best remedial alternative for Landfill M8.

Two-Phase Vacuum Extraction - Two-Phase Vacuum Extraction (TPVE) consists of extracting contaminated ground water and soil vapors simultaneously using an array of extraction wells, separating the water and vapor phases, and passing each through a surface treatment system. The vapor phase is subsequently discharged to the atmosphere and the water phase is discharged to either the ground water, surface water, or a sanitary sewer. This technology addresses both soil and ground water contamination, and its benefits are most cost-effective when soil and groundwater concentrations are relatively high. In addition, TPVE often requires a follow-up remedial technology to further reduce contaminant concentrations to within NJDEP's regulatory limits. A pilot study must be performed to evaluate effectiveness prior to full-scale implementation.

Since chlorobenzene and tetrachloroethene concentrations are relatively low at Landfill M8, TPVE is not suitable for this site.

In-Situ Aeration (Air Sparging) - Air sparging treats contaminated groundwater by volatilizing organic compounds. Clean air is injected into the contaminated aquifer through vertical and/or horizontal wells. The air volatilizes the dissolved phase VOCs and transfers the contaminated vapors from the saturated zone into the unsaturated zone. The organic vapors are then extracted from the unsaturated zone through a Soil Vapor Extraction (SVE) system and treated at a surface unit. A pilot study must be performed to evaluate effectiveness prior to full-scale implementation.

As mentioned in Section 1.2.4, ground water is typically encountered at depths of 2 to 9 feet bgs. Due to minimal thickness of the unsaturated zone, an SVE system likely could not be successfully operated. Also, the air injection into the aquifer should be performed under a rigorous control in order to prevent migration of the contamination toward the Parkers Creek. Based on these factors, an air-sparging system is not suitable for Landfill M8.

Pump and Treat - Contaminated ground water is extracted out of the ground with a system of pumping wells and is treated with an air stripper, carbon adsorption unit, or other pertinent treatment unit. Remediated water is then discharged to a ground water recharge zone, a stream, or a sanitary sewer. A pilot study must be performed to evaluate effectiveness prior to full-scale implementation. This is the most commonly used groundwater remediation technology.

As mentioned in Section 1.8, a decrease in chlorobenzene concentrations was noted in all on-site monitoring wells, except monitoring well MW18. Based on this fact and based on the aquifer characteristics this remedial alternative method is not suitable for Landfill M8.

Anaerobic Bioremediation - Biodegradation reduces contaminant mass by introducing contaminant-degrading microorganisms, or enhancing indigenous microbial activity within the contaminated area. The microorganisms convert the organic compounds to carbon dioxide, inorganic salts, and water. Bioremediation can be used in either in situ or ex situ environments. Bioremediation is a developed technology, and a variety of bioremediation systems have been used at remediation sites.

Since chlorobenzene and tetrachloroethene concentrations are relatively low at Landfill M8, anaerobic biremediation is not recommended for this site.

Natural Remediation - Natural remediation is a method of groundwater remediation where contaminant concentrations will decrease to applicable groundwater quality standards via degradation, retardation, or dispersion under present site conditions. This alternative method is discussed in detail in Section 4.2 below.

4.2 Proposed Remedial Action

The DPW proposes to implement a natural remediation program at Landfill M-8. A conditional no further action under a CEA designation is requested for the groundwater portion of this investigation. The following NJDEP requirements were factors that indicate that natural remediation is a viable course of action for this site:

- Groundwater contamination does not appear to be resulting from a specific soil source;
- Groundwater contamination at the site has been delineated;
- As mentioned in Section 1.8, a decrease in chlorobenzene concentrations was noted in all on-site monitoring wells, except monitoring well MW18.
- Groundwater PCE contamination is localized in two small areas of concern (MW-12 and MW-23), limited in extent, and can be expected to naturally degrade overtime without significant migration.
- Groundwater benzene contamination is localized in small area of concerns (around MW-15, MW-16 and MW-24) and can be expected to naturally degrade overtime without significant migration.
- Based upon the CEA calculation, the chlorobenzene, PCE and benzene contaminant plumes will not migrate more than approximately 50 feet over a period of approximately 5 years.
- Parkers Creek, which is a potential ecological receptor, is not contaminated with chlorobenzene at levels exceeding the applicable NJDEP GWQS, and is not expected to be adversely impacted over the duration of the CEA.
- The surface water samples collected from four locations along Parkers Creek, show that Landfill M8 site is not a contributor of PCE contamination of the Parkers Creek.

5.0 QUALITY ASSURANCE PROJECT PLAN

In order to maintain quality assurance, the DPW's SOP for Sample Handling will be followed during all sampling activities.

6.0 REQUIRED PERMITS

No permits are necessary during the natural remediation program.

7.0 EROSION, DUST, AND ODOR CONTROL

Erosion, dust, and odor control measures are not necessary during the implementation of the natural remediation program.

8.0 HEALTH AND SAFETY PLAN

The DPW will be responsible for preparation of a site-specific Health and Safety Plan (HASP) encompassing the groundwater sampling and monitoring program.

9.0 SITE RESTORATION

No site restoration will be necessary during the implementation of the natural remediation program.

10.0 POST-REMEDIAL ACTION SAMPLING

The DPW proposes to continue its quarterly groundwater sampling program at Landfill M8, for the duration of the CEA (5 years). All monitoring wells and piezometer wells will be sampled and analyzed for VOCs, semi-volatiles, pesticide/PCBs, and priority pollutant metals to monitor the effectiveness of natural remediation. In addition, surface water sampling points, SWS4, SWS5, SWS7 and SWS28 will be sampled as part of the DPW's quarterly monitoring program.

If the chlorobenzene, PCE, and benzene concentrations remain below their respective NJDEP-GWQC and NJDEP-SWQS for eight consecutive quarterly rounds of sampling, the DPW will apply to the NJDEP for No Further Action (NFA) status. Upon issuance of NFA status, the DPW will seal all on-site monitoring wells.

11.0 ESTIMATED COST OF RAWP IMPLEMENTATION

The anticipated costs for implementing the proposed remedial action are summarized below:

REMEDIATION COSTS	
• Costs for groundwater sampling and laboratory (5 years)	=$150,000
• Costs for surface water sampling and laboratory (5 years)	=$ 35,000
• Costs for well abandonment	=$ 20,000
• Costs for quarterly progress reports (20 reports)	=$ 55,000
TOTAL REMEDIAL ACTION COSTS	=$260,000

12.0 PROPOSED SCHEDULE

Identification of Project Tasks:

- RAWP submittal and NJDEP approval
- Quarterly groundwater sampling events
- Preparation and submittal of quarterly progress reports (5 years)
- Quarterly post-remedial sampling
- NJDEP approval of No Further Action

A schedule for the proposed remedial programs shown in Figure 24. If it becomes necessary to modify the schedule, the DPW will submit a revised schedule to the NJDEP.

Table 1
Quarterly Groundwater Sampling Results
Fort Monmouth Main Post, Fort Monmouth, New Jersey
Monitoring Well MW-12, Landfill M-8
June 1997 - March 2000

Lab Sample ID	2731.03	2930.06	3125.06	3366.03	3619.03	3843.07	4029.03	4227.03	4419.07	4447.05	4566.03	4811.04	5051.04	5250.04	NJDEP
Sample Date	24-Jun-97	25-Aug-97	31-Oct-97	25-Feb-98	4-Jun-98	28-Aug-98	4-Nov-98	27-Jan-99	14-Apr-99	28-Apr-99	22-Jun-99	23-Sep-99	28-Dec-99	15-Mar-00	GWQC
Volatiles															
Methylene Chloride	ND	ND	**3.75**	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	3
2-Butanone (MEK)	ND	ND	ND	ND	ND	2.50	ND	ND	ND	ND	2.89	ND	ND	ND	300
Toluene	ND	ND	1.02	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	1000
Tetrachloroethene	**5.04**	**4.96**	**7.64**	**2.25**	**5.49**	**5.56**	**21.68**	**4.27**	ND	ND	**46.06**	**11.77**	**19.76**	**15.64**	1
Semi-Volatiles															
4-Methylphenol	ND	ND	ND	ND	1.03	ND	ND	ND	ND	ND	ND	ND	ND	1.72	NLE
Di-n-butylphthalate	ND	ND	23.36	5.49	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	900
bis(2-Ethylhexyl)phthalate	1.51	ND	ND	2.48	ND	ND	2.23	ND	ND	ND	ND	ND	ND	ND	30
Pesticides/PCBs															
none detected															
Metals															
Aluminum	56.4	170.4	182	**7205**	**1210**	**6580**	**1110**	**5040**	**373**	**265**	197	**1930**	ND	**1240**	200
Antimony	ND	ND	ND	ND	ND	4.83	ND	ND	ND	ND	ND	ND	5.95	ND	20
Arsenic	ND	ND	ND	7	2.6	6.1	ND	ND	ND	ND	ND	ND	ND	ND	8
Barium	6.4	ND	5.8	28.6	9.3	25.9	7.16	14.8	7.85	7.26	8.49	9.31	4.28	10.4	2000
Beryllium	ND	ND	ND	ND	ND	0.797	ND	ND	ND	ND	ND	ND	ND	ND	20
Cadmium	ND	ND	ND	ND	ND	ND	ND	1.81	ND	0.579	0.841	ND	ND	ND	4
Calcium	10240	8750	7750	4190	5161	9480	10300	4950	6210	6660	18200	7650	9020	8710	NLE
Chromium	ND	83	2.3	53.3	1.4	56	8.23	42.5	2.91	1.52	1.53	14.4	0.978	4.78	100
Cobalt	ND	ND	ND	1.2	ND	1.06	0.778	1.54	0.959	0.703	0.947	0.636	ND	ND	NLE
Copper	5	9	9	16	3.6	ND	ND	36.8	ND	ND	ND	11	9.22	6.83	1000
Iron	**370**	**760**	**378**	**18860**	**6520**	**18800**	**3360**	**16700**	**3750**	**2040**	**1380**	**5190**	144	**3860**	300
Lead	ND	1	**19**	**10**	ND	**12.6**	ND	3	ND	ND	ND	ND	ND	ND	10
Magnesium	3330	43	1990	2690	1337	3890	3120	2390	1390	1350	4410	2330	2410	2390	NLE
Manganese	22	**4000**	7.7	34.8	14.1	**55.5**	13	27.3	8.98	6.31	13.6	12.9	6.8	12	50
Mercury	ND	ND	ND	0.5	ND	0.11	ND	ND	ND	0.14	ND	ND	ND	ND	2
Nickel	ND	ND	1.9	6	3.9	5.18	12.7	6.04	ND	ND	4.4	3.26	2.78	3.43	100
Potassium	2510	2550	2310	5710	2692	12000	3400	4430	1750	1560	3120	3130	1960	2440	NLE
Selenium	2	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	50
Silver	**28**	**25**	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	20
Sodium	38400	32350	18610	15640	16820	30700	22100	20800	14300	13700	38000	25000	24100	16800	50000
Thallium	ND	ND	ND	ND	ND	ND	ND	ND	4.1	6.04	ND	ND	ND	ND	10
Vanadium	ND	ND	ND	29	7.8	28.3	4.96	20.7	2.27	1.55	1.21	8.26	ND	7.03	NLE
Zinc	18	2	51	55	7.7	ND	43.4	39.8	11.9	9.7	ND	16.2	15.5	30.1	5000

All concentrations are given in micrograms per liter (ug/L), equivalent to parts per billion (ppb).
NA: Sample not tested for this analyte.
ND: Analyte not detected in sample.
NJDEP GWQC: New Jersey Department of Environmental Protection Groundwater Quality Criteria.
NLE: No GWQC exists for this analyte.

Table 2
Quarterly Groundwater Sampling Results
Fort Monmouth Main Post, Fort Monmouth, New Jersey
Monitoring Well MW-13, Landfill M-8
June 1997 - March 2000

Lab Sample ID Sample Date	2731.04 24-Jun-97	2930.03 25-Aug-97	3125.03 31-Oct-97	3366.04 25-Feb-98	3619.04 4-Jun-98	3843.05 28-Aug-98	4029.06 4-Nov-98	4227.10 27-Jan-99	4566.04 22-Jun-99	4811.05 23-Sep-99	5051.05 28-Dec-99	5250.05 15-Mar-00	NJDEP GWQC
Volatiles													
Acetone	ND	ND	ND	ND	13.59	ND	ND	ND	ND	ND	ND	ND	700
Semi-Volatiles													
Di-n-butylphthalate	NS	ND	13.16	1.7	ND	ND	ND	ND	ND	ND	ND	ND	900
Butlybenzylphthalate	NS	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	2.11	100
bis(2-Ethylhexyl)phthalate	NS	ND	ND	3.83	ND	ND	ND	ND	ND	2.01	ND	ND	30
Pesticides/PCBs													
4,4'-DDE	ND	ND	ND	ND	ND	ND	ND	0.009	ND	ND	ND	ND	0.1
Metals													
Aluminum	**364.4**	**660.9**	**231**	**3514**	**2039**	**225**	**292**	**577**	**1720**	138	**360**	**815**	200
Antimony	ND	2.4	ND	ND	2.8	ND	ND	2.39	ND	ND	7.47	ND	20
Arsenic	ND	**10**	ND	ND	**8.2**	2.31	5.03	ND	3.12	ND	ND	2.31	8
Barium	110.5	530	117.1	31.5	107	321	138	28.1	80.4	105	34.8	50.1	2000
Beryllium	ND	0.08	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	20
Cadmium	ND	ND	ND	ND	1.2	ND	2.78	1.24	1.19	1.83	2.12	1.36	4
Calcium	136800	242000	289500	51590	236300	427000	250000	225000	232000	323000	238000	189000	NLE
Chromium	1	93	2.8	10	1.7	3.87	2.55	7.72	3.05	11.1	7.09	8.32	100
Cobalt	ND	ND	1.6	ND	ND	1.59	1.23	ND	ND	ND	ND	ND	NLE
Copper	19	39	7	23	37.1	ND	280	19.3	ND	19.1	18.8	14.6	1000
Iron	**23650**	**21830**	**12560**	**12190**	**41310**	**24800**	**18300**	**5640**	**26200**	**14400**	**6410**	**6950**	300
Lead	5.6	1	5	**13**	**28.2**	ND	ND	3.61	ND	3.76	5.96	4.14	10
Magnesium	118800	135	370900	14780	51350	277000	551000	29000	360000	194000	38900	30500	NLE
Manganese	**148**	**280600**	**234.4**	35.5	**170**	**165**	**160**	30.5	**204**	**149**	14.3	9.23	50
Mercury	ND	ND	ND	0.4	0.5	0.12	ND	0.2	ND	ND	0.1	ND	2
Nickel	ND	ND	6.8	6.3	7.3	6.15	17.2	8.39	5.84	10.4	8.04	10.5	100
Potassium	37790	82980	155800	15170	34120	195000	204000	9420	125000	67900	13100	11900	NLE
Selenium	8	ND	ND	ND	ND	ND	3.88	5.91	3.86	ND	ND	3.67	50
Silver	**54**	**34**	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	20
Sodium	**1083000**	**155200**	**3854000**	**113900**	**139700**	**3640000**	**4500000**	**139000**	**2800000**	**1420000**	**204000**	**131000**	50000
Vanadium	3.7	500	ND	7	13	ND	2.05	1.45	6.69	1.44	1.56	4.56	NLE
Zinc	170	277	188	215	361	294	614	414	123	193	446	632	5000

All concentrations are given in micrograms per liter (ug/L), equivalent to parts per billion (ppb).
NA: Sample not tested for this analyte.
ND: Analyte not detected in sample.
NJDEP GWQC: New Jersey Department of Environmental Protection Groundwater Quality Criteria.
NLE: No GWQC exists for this analyte.
NS: Semi-Volatile data for lab sample 2731.04 unavaliable

Table 3
Quarterly Groundwater Sampling Results
Fort Monmouth Main Post, Fort Monmouth, New Jersey
Monitoring Well MW-14, Landfill M-8
June 1997 - March 2000

Lab Sample ID	2731.05	2930.04	3125.04	3366.05	3619.05	3843.04	4029.07	4227.12	4566.05	4811.06	5051.06	5250.06	NJDEP
Sample Date	24-Jun-97	25-Aug-97	31-Oct-97	25-Feb-98	4-Jun-98	28-Aug-98	4-Nov-98	27-Jan-99	22-Jun-99	23-Sep-99	28-Dec-99	15-Mar-00	GWQC
Volatiles													
Acetone	ND	ND	20.01	ND	11.47	13.7	ND	ND	4.29	ND	ND	ND	700
Methylene Chloride	ND	**8.48**	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	3
2-Butanone (MEK)	ND	ND	ND	ND	ND	4.05	ND	ND	ND	ND	ND	ND	300
Chlorobenzene	**15.59**	**6.49**	**4.38**	**4.97**	**7.79**	**6.47**	**6.21**	3.95	**5.12**	**4.43**	ND	2.91	4
1,4-Dichlorobenzene	6.36	3.54	3.84	ND	4.09	4.93	4.86	ND	4.27	3.31	ND	1.67	75
Semi-Volatiles													
1,3-Dichlorobenzene	NS	ND	2.10	2.30	ND	ND	ND	ND	ND	ND	ND	ND	600
1,4-Dichlorobenzene	NS	1.40	2.04	ND	2.40	ND	ND	ND	2.53	1.96	ND	ND	75
Acenaphthene	NS	ND	1.58	1.22	1.42	ND	ND	ND	1.61	1.50	ND	ND	400
Di-n-butylphthalate	NS	ND	3.19	1.69	ND	ND	ND	ND	ND	ND	ND	ND	900
bis(2-Ethylhexyl)phthalate	NS	ND	ND	3.02	ND	ND	ND	ND	ND	ND	ND	ND	30
Pesticides/PCBs													
none detected													
Metals													
Aluminum	**227.3**	65	**203**	**1029**	**727**	**275**	**226**	**215**	**685**	**246**	**1480**	**396**	200
Antimony	ND	1	ND	ND	2.7	ND	ND	ND	ND	3.84	11.4	ND	20
Arsenic	ND	4	ND	ND	3.3	ND	ND	ND	ND	ND	ND	ND	8
Barium	1488	420	317.6	364.4	527	447	543	422	354	352	66.6	279	2000
Beryllium	ND	0.09	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	20
Cadmium	ND	ND	ND	2	1.6	ND	ND	3.65	1.37	3.61	**10.1**	0.618	4
Calcium	172400	187000	150600	113700	165800	169000	233000	159000	173000	157000	77800	120000	NLE
Chromium	1	69	2.7	6.6	ND	3.3	12	10.6	8.47	8.86	12	7.34	100
Cobalt	ND	ND	2.3	2	1.4	2.51	3.8	2.24	2.94	2.26	0.872	ND	NLE
Copper	9	13	8	16	6.9	ND	ND	17.3	ND	39.2	30.2	3.54	1000
Iron	**47040**	**20880**	**25450**	**33710**	**43420**	**34800**	**41900**	**37400**	**33000**	**26600**	**26900**	**21000**	300
Lead	0.5	1.4	6	7	6.4	ND	3.28	2.73	ND	5.89	**15.90**	ND	10
Magnesium	50160	549	40450	32310	52570	56800	83400	41000	59500	44700	7290	31900	NLE
Manganese	**288**	**29600**	**340.3**	**366.2**	**332**	**315**	**380**	**402**	**306**	**296**	**90.9**	**236**	50
Mercury	ND	ND	ND	0.8	0.2	0.13	ND	0.6	ND	ND	0.3	0.1	2
Nickel	ND	ND	11.7	12.1	5.9	ND	6.22	11.5	1.24	9.08	11.2	7.4	100
Potassium	49400	35350	58850	48880	44760	48000	71900	36700	50600	40800	7780	27800	NLE
Selenium	4	ND	ND	ND	3.9	6.16	12.5	10.9	4.09	ND	ND	5.44	50
Silver	**37**	**52**	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	20
Sodium	**178800**	**125800**	**182300**	**109200**	**204600**	**288000**	**447000**	**195000**	**342000**	**215000**	19300	**93700**	50000
Vanadium	4.9	400	ND	5	7.3	2.28	2.24	2.03	4.54	2.54	10.3	3.94	NLE
Zinc	37	1270	354	309	121	ND	70.6	951	304	586	2420	330	5000

All concentrations are given in micrograms per liter (ug/L), equivalent to parts per billion (ppb).
NA: Sample not tested for this analyte.
ND: Analyte not detected in sample.
NJDEP GWQC: New Jersey Department of Environmental Protection Groundwater Quality Criteria.
NLE: No GWQC exists for this analyte.
NS: Semi-Volatile data for lab sample 2731.05 unavaliable.

Quarterly Groundwater Sampling Results
Fort Monmouth Main Post, Fort Monmouth, New Jersey
Monitoring Well MW-15, Landfill M-8
June 1997 - March 2000

Lab Sample ID	2731.06	2930.05	3125.05	3366.06	3619.06	3843.06	4029.05	4227.05	4566.06	4811.07	5051.07	5250.07	NJDEP
Sample Date	24-Jun-97	25-Aug-97	31-Oct-97	25-Feb-98	4-Jun-98	28-Aug-98	4-Nov-98	27-Jan-99	22-Jun-99	23-Sep-99	28-Dec-99	15-Mar-00	GWQC
Volatiles													
Acetone	ND	ND	ND	ND	10.44	10.24	ND	ND	5.01	ND	ND	ND	700
2-Butanone (MEK)	ND	ND	ND	ND	ND	2.44	ND	ND	2.81	ND	ND	ND	300
Benzene	**1.52**	**1.28**	ND	ND	ND	**2.3**	**3.11**	ND	**2.09**	ND	ND	ND	1
Chlorobenzene	**13.73**	**9.30**	**6.44**	ND	**12.09**	**17.78**	**29.43**	ND	**16.16**	2.91	**5.17**	ND	4
1,3-Dichlorobenzene	ND	ND	ND	ND	ND	1.35	2.2	ND	1.24	ND	ND	ND	600
1,4-Dichlorobenzene	3.26	ND	ND	ND	ND	2.91	4.69	ND	2.62	ND	ND	ND	75
1,2-Dichlorobenzene	ND	ND	ND	ND	ND	1	1.67	ND	ND	ND	ND	ND	600
Semi-Volatiles													
1,3-Dichlorobenzene	1.35	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	600
1,4-Dichlorobenzene	2.93	3.75	1.54	ND	1.97	ND	ND	ND	1.69	ND	ND	ND	75
1,2-Dichlorobenzene	0.86	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	600
bis(2-Ethylhexyl)phthalate	ND	ND	ND	ND	ND	ND	ND	5.15	ND	ND	ND	ND	30
4-Methylphenol	ND	ND	ND	ND	1.28	ND	ND	ND	ND	ND	ND	ND	NLE
2-Methylnaphthalene	ND	ND	1.13	ND	ND	ND	ND	ND	ND	ND	ND	ND	NLE
Acenaphthene	14.59	19.24	6.13	ND	8.82	11.56	8.8	ND	9.39	ND	1.74	ND	400
Dibenzofuran	5.62	7.76	1.92	ND	3.37	4.44	2.95	ND	3.60	ND	ND	ND	NLE
Fluorene	7.80	10.63	2.86	ND	4.08	6.63	4.37	ND	5.36	ND	ND	ND	300
Di-n-butylphthalate	ND	ND	1.49	ND	ND	ND	ND	ND	ND	ND	ND	ND	900
Pesticides/PCBs													
none detected													
Metals													
Aluminum	136.5	57.7	**515**	**777**	**318**	194	140	**341**	**258**	23.1	101	**1670**	200
Antimony	ND	0.7	ND	ND	ND	10	ND	ND	ND	2.98	6.13	ND	20
Arsenic	ND	6	ND	5	3.9	7	ND	ND	4.69	3.1	ND	3.21	8
Barium	299.5	340	104.2	60.8	204	248	190	54.4	230	95.2	74.3	56	2000
Beryllium	ND	0.06	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	20
Cadmium	ND	ND	ND	1.7	3.9	ND	2.74	1.31	1.88	2.27	2.23	1.29	4
Calcium	329100	266900	215600	124500	289600	284000	325000	106000	270000	204000	124000	88400	NLE
Chromium	ND	78	5.3	3.6	ND	2.8	11	8.25	7.46	6.64	5.74	17.6	100
Cobalt	ND	ND	2.8	5.7	ND	2.7	4.59	10.2	3.75	1.31	0.585	0.945	NLE
Copper	12	18	20	17	4.5	ND	ND	13	ND	23.8	4.99	11.5	1000
Iron	**9670**	**14870**	**7332**	**15210**	**15770**	**9240**	**8740**	**3150**	**14700**	**2950**	**7800**	**6090**	300
Lead	0.5	1	**21**	ND	2.7	2	2.85	2.79	ND	3.38	2.58	7.19	10
Magnesium	58170	348	48110	26850	50110	75700	84700	25000	66200	42800	24400	21400	NLE
Manganese	**239**	**66000**	**267.2**	**507.9**	**364**	**247**	**357**	**106**	**252**	**73.4**	**123**	**76.7**	50
Mercury	ND	ND	ND	1.7	ND	0.17	0.2	0.2	ND	ND	0.3	0.1	2
Nickel	ND	ND	5.1	15.1	5.3	3.4	10.6	11.5	6.34	12.4	8.29	12.1	100
Potassium	27930	41250	64010	18630	49010	45200	55300	10700	41500	23000	10100	13700	NLE
Selenium	3	ND	ND	ND	3.6	ND	8.22	ND	ND	ND	5.84	ND	50
Silver	**41**	**34**	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	20
Sodium	**200400**	**224700**	**147500**	**84840**	**116500**	**314000**	**326000**	46400	**266000**	**120000**	**68900**	**72700**	50000
Vanadium	2.5	500	3	3	4.5	2	3.34	3.1	5.53	2.64	1.68	10.9	NLE
Zinc	9	7	106	33	46	ND	48.4	118	35.1	34.4	80.3	87.9	5000

All concentrations are given in micrograms per liter (ug/L), equivalent to parts per billion (ppb).
NA: Sample not tested for this analyte.
ND: Analyte not detected in sample.
NJDEP GWQC: New Jersey Department of Environmental Protection Groundwater Quality Criteria.
NLE: No GWQC exists for this analyte.

Table 5
Quarterly Groundwater Sampling Results
Fort Monmouth Main Post, Fort Monmouth, New Jersey
Monitoring Well MW-16, Landfill M-8
September 1998 - July 2000

Lab Sample ID Sample Date	3904.03 23-Sep-98	3990.05 20-Oct-98	4277.07 27-Jan-99	4566.08 22-Jun-99	4811.09 23-Sep-99	5051.08 28-Dec-99	5250.09 15-Mar-00	5565.03* 25-Jul-00	NJDEP GWQC
Volatiles									
Benzene	ND	ND	ND	**2.48**	ND	ND	ND	N/A	1
Chlorobenzene	1.16	ND	1.12	**18.38**	1.74	ND	ND	N/A	4
1,4-Dichlorobenzene	ND	ND	ND	4.35	ND	ND	ND	N/A	75
Semi-Volatiles									
1,4 - Dichlorobenzene	ND	ND	ND	2.40	ND	ND	ND	N/A	75
bis(2-Ethylhexyl)phthalate	ND	ND	**58.53**	ND	ND	ND	3.15	N/A	30
Di-n-octylphthalate	ND	ND	2.38	ND	ND	ND	ND	N/A	100
Pyrene	1.02	ND	ND	ND	ND	ND	ND	N/A	200
Pesticides/PCBs									
4,4'-DDE	0.030	0.018	ND	ND	ND	ND	ND	N/A	0.10
Dieldrin	ND	ND	ND	0.020	0.026	ND	ND	N/A	0.03
4,4'-DDD	0.050	0.029	ND	ND	ND	ND	ND	N/A	0.10
4,4'-DDT	0.014	ND	ND	ND	ND	ND	ND	N/A	0.10
Metals									
Aluminum	**20200**	**1830**	**1230**	**1480**	**20500**	**29800**	**4970**	**225**	200
Antimony	ND	ND	ND	ND	3.1	9.42	ND	ND	20
Arsenic	**36**	3.51	3.73	3.8	5.68	7.71	3.61	6.07	8
Barium	350	123	61.8	67.7	126	105	49.3	116	2000
Beryllium	2	ND	ND	ND	1.12	1.94	0.984	ND	20
Cadmium	**4.3**	0.649	**6.91**	**7.52**	**27.1**	**50.9**	**41.3**	ND	4
Calcium	291	197000	232000	249000	310000	288000	146000	278000	NLE
Chromium	**137**	16.2	17.5	10.3	37.8	65.4	12.6	25.4	100
Cobalt	19.2	1.96	3.37	3.46	18.7	18	9.3	2.38	NLE
Copper	122	5.04	16.10	8.14	86.4	114	31	ND	1000
Iron	**86100**	**30200**	**20800**	**50800**	**26000**	**49600**	**29300**	**52900**	300
Lead	**256**	**12.2**	6.01	3.41	**20**	**45.2**	4.77	ND	10
Magnesium	358000	231000	86000	69100	59800	45100	17400	125000	NLE
Manganese	**1420**	**838**	**611**	**1290**	**1710**	**945**	**449**	**1620**	50
Mercury	**11.4**	1.02	0.5	0.6	**3.1**	**4.11**	1	0.23	2
Nickel	32.3	ND	14.4	13.5	65.9	**108**	83	21.5	100
Potassium	147000	93600	36800	32400	36900	27200	14400	44900	NLE
Selenium	ND	ND	3.44	13.9	ND	ND	ND	12.8	50
Silver	10	ND	ND	ND	ND	ND	1.55	ND	20
Sodium	**3860000**	**2710000**	**933000**	**191000**	**188000**	**127000**	27600	**574000**	50000
Vanadium	123	9.76	4.1	4.64	17.4	36.6	11.6	ND	NLE
Zinc	531	36.7	295	220	917	1570	1250	315	5000

All concentrations are given in micrograms per liter (ug/L), equivalent to parts per billion (ppb).
NA: Sample not tested for this analyte.
ND: Analyte not detected in sample.
NJDEP GWQC: New Jersey Department of Environmental Protection Groundwater Quality Criteria.
NLE: No GWQC exists for this analyte.
* Low Flow Data for sample date July 25, 2000 metals only

Table 6
Quarterly Groundwater Sampling Results
Fort Monmouth Main Post, Fort Monmouth, New Jersey
Monitoring Well MW-17, Landfill M-8
September 1998 - July 2000

Lab Sample ID Sample Date	3904.04 23-Sep-98	3990.06 20-Oct-98	4227.06 27-Jan-99	4566.09 22-Jun-99	4811.10 23-Sep-99	5051.09 28-Dec-99	5250.10 15-Mar-00	5565.04* 25-Jul-00	NJDEP GWQC
Volatiles									
2-Butanone	20.19	ND	ND	ND	ND	ND	ND	N/A	300
Chlorobenzene	2.82	**6.61**	ND	**5.59**	ND	**5.98**	ND	N/A	4
1,4-Dichlorobenzene	ND	1.77	ND	1.46	ND	2.05	ND	N/A	75
Semi-Volatiles									
1,4-Dichlorobenzene	ND	ND	ND	1.27	ND	ND	ND	N/A	75
Acenaphthene	ND	ND	4.66	17.33	12.17	13.45	2.67	N/A	400
bis(2-Ethlyhexyl)phthalate	ND	ND	ND	ND	ND	ND	3.01	N/A	30
Dibenzofuran	ND	ND	ND	1.74	ND	1.77	ND	N/A	NLE
Pesticides/PCBs									
4,4'-DDE	0.082	ND	ND	ND	ND	ND	ND	N/A	0.10
4,4'-DDD	0.052	ND	ND	ND	ND	ND	ND	N/A	0.10
4,4'-DDT	0.040	ND	ND	ND	ND	ND	ND	N/A	0.10
Metals									
Aluminum	**8040**	**3650**	**1860**	**2930**	**1100**	**6430**	115	130	200
Antimony	ND	ND	2.49	2.68	ND	6.68	ND	ND	20
Arsenic	**19**	ND	2.47	6.83	6.26	6.65	ND	4.18	8
Barium	517	0.358	58	249	146	259	38	115	2000
Beryllium	1.2	ND	ND	ND	ND	0.63	ND	ND	20
Cadmium	ND	**6.05**	1.21	2.35	2.69	**8.31**	ND	ND	4
Calcium	471	422000	192000	399000	329000	369000	156000	280000	NLE
Chromium	74.7	26.6	18.7	26.9	15.7	64.5	4.23	24.7	100
Cobalt	20.8	13.8	4.68	11.9	4.7	20.3	1.99	2.38	NLE
Copper	29	19.4	13.9	15.1	10.2	23.2	18.3	ND	1000
Iron	**41900**	**25600**	**15100**	**16300**	**28600**	**41500**	**18600**	**25800**	300
Lead	**61**	**26.4**	**10.2**	**17.7**	9.48	**42.2**	3.14	ND	10
Magnesium	215000	139800	14000	65100	41900	55800	11400	124000	NLE
Manganese	**543**	**452**	**111**	**408**	**694**	**695**	**621**	**1640**	50
Mercury	0.7	0.13	0.3	ND	0.2	0.9	ND	0.18	2
Nickel	19.3	8.46	5.22	5.83	5.76	15.2	ND	20.9	100
Potassium	77400	83600	6610	32200	17900	30000	3810	44900	NLE
Selenium	ND	ND	7.23	7.66	ND	14.20	9.57	10.1	50
Sodium	**2120000**	**796000**	**66600**	**267000**	**247000**	**157000**	34600	**663000**	50000
Vanadium	58	18.9	8.84	19.7	7.05	36.5	5.08	ND	NLE
Zinc	281	104	84.3	155	26.4	197	12.7	259	5000

All concentrations are given in micrograms per liter (ug/L), equivalent to parts per billion (ppb).
NA: Sample not tested for this analyte.
ND: Analyte not detected in sample.
NJDEP GWQC: New Jersey Department of Environmental Protection Groundwater Quality Criteria.
NLE: No GWQC exists for this analyte.
* Low Flow Data for sample date July 25, 2000 metals only

Table 7
Quarterly Groundwater Sampling Results
Fort Monmouth Main Post, Fort Monmouth, New Jersey
Monitoring Well MW-18, Landfill M-8
September 1998 - March 2000

Lab Sample ID Sample Date	3926.03 30-Sep-98	3990.07 20-Oct-98	4227.13 27-Jan-99	4566.10 22-Jun-99	4811.11 23-Sep-99	5051.10 28-Dec-99	5250.11 15-Mar-00	NJDEP GWQC
Volatiles								
Acetone	7.63	ND	ND	ND	ND	ND	ND	700
2-Butanone (MEK)	3.43	ND	ND	ND	ND	ND	ND	300
Chlorobenzene	**16.41**	**14.60**	**17.64**	**18.38**	**14.35**	**10.42**	**12.56**	4
1,4-Dichlorobenzene	5.8	5.13	5.96	5.35	4.44	4.33	3	75
Semi-Volatiles								
1,4-Dichlorobenzene	ND	ND	ND	3.20	3.34	2.56	2.71	75
bis(2-Ethylhexyl)phthalate	ND	ND	ND	ND	ND	8.01	3.48	30
Pesticides/PCBs								
4,4'-DDD	ND	ND	ND	0.015	ND	ND	ND	0.10
4,4'-DDE	ND	ND	0.011	ND	ND	ND	ND	0.10
Metals								
Aluminum	**378**	**1050**	190	**216**	**244**	**300**	**333**	200
Antimony	ND	ND	ND	ND	3.91	6.65	ND	20
Barium	793	704	501	552	578	434	531	2000
Cadmium	ND	ND	1.16	0.606	1.05	1.65	0.575	4
Calcium	221000	206000	181000	198000	221000	176000	173000	NLE
Chromium	6.5	11.4	15.1	9.23	13.4	12.4	12.3	100
Cobalt	0.9	2.7	0.733	1.59	0.959	0.914	0.579	NLE
Copper	ND	ND	23.6	ND	12.3	56.3	4.16	1000
Iron	**10100**	**8510**	**10300**	**12000**	**2900**	**5840**	**16400**	300
Lead	4	**15.6**	4.96	3.38	6.38	6.79	ND	10
Magnesium	147000	140000	96000	86100	145000	96100	64400	NLE
Manganese	**532**	**452**	**570**	**531**	**397**	**456**	**645**	50
Mercury	ND	ND	0.5	ND	ND	0.2	ND	2
Nickel	1.5	0.656	2.77	0.582	5.43	1.25	4.11	100
Potassium	83400	82000	62300	68100	86700	69300	51500	NLE
Selenium	ND	ND	9.09	6.14	ND	8.51	6.96	50
Sodium	**1260000**	**1430000**	**724000**	**466000**	**910000**	**541000**	**181000**	50000
Vanadium	5	7.34	2.88	3.29	3.52	3.64	4.16	NLE
Zinc	ND	60.4	112	ND	106	88.6	79.9	5000

All concentrations are given in micrograms per liter (ug/L), equivalent to parts per billion (ppb).
NA: Sample not tested for this analyte.
ND: Analyte not detected in sample.
NJDEP GWQC: New Jersey Department of Environmental Protection Groundwater Quality Criteria.
NLE: No GWQC exists for this analyte.

Table 8
Quarterly Groundwater Sampling Results
Fort Monmouth Main Post, Fort Monmouth, New Jersey
Monitoring Well MW-19, Landfill M-8
September 1998 - March 2000

Lab Sample ID Sample Date	3926.04 30-Sep-98	3990.08 20-Oct-98	4227.14 27-Jan-99	4566.11 22-Jun-99	4811.12 23-Sep-99	5051.11 28-Dec-99	5250.12 15-Mar-00	NJDEP GWQC
Volatiles								
Acetone	5.05	ND	ND	ND	ND	ND	o ND	700
2-Butanone (MEK)	2.63	2.31	ND	ND	ND	ND	ND	300
Trichlorofluoromethane	ND	ND	13.24	ND	ND	ND	ND	NLE
Semi-Volatiles								
bis(2-Ethylhexyl)phthalate	ND	ND	ND	ND	ND	ND	3.21	30
Pesticides/PCBs								
none detected								
Metals								
Aluminum	**1170**	**5100**	**2100**	162	103	**456**	**267**	200
Antimony	ND	ND	4.58	ND	ND	7.16	3.3	20
Arsenic	5	7.09	3.17	ND	ND	6.78	3.79	8
Barium	48.2	58.7	71.6	55.7	73.3	87.9	73.1	2000
Cadmium	3.7	ND	**15.5**	2.4	1.92	**4.86**	ND	4
Calcium	43400	38200	161000	62600	90900	128000	135000	NLE
Chromium	8.1	35	17.3	5.05	6	7	3.64	100
Cobalt	2.6	7.46	1.69	1.16	1.06	2.11	ND	NLE
Copper	ND	ND	7.78	ND	ND	31.3	ND	1000
Iron	**20100**	**38600**	**14800**	**20200**	**17400**	**29900**	**10300**	300
Lead	2	**18**	8.5	ND	2.84	6.17	ND	10
Magnesium	46800	41500	20500	52200	37600	26100	16300	NLE
Manganese	**92.1**	**104**	**98.3**	**95.3**	**234**	**257**	**102**	50
Mercury	ND	ND	0.3	0.2	ND	0.2	0.1	2
Nickel	5.5	9.94	35	0.656	11.6	20.8	31.2	100
Potassium	44700	41400	8460	20200	16700	11600	6960	NLE
Selenium	ND	ND	ND	ND	ND	4.9	ND	50
Sodium	**278000**	**252000**	**68800**	**278000**	**183000**	**120000**	37400	50000
Vanadium	7	24.7	8.27	2.05	1.40	5.27	3.73	NLE
Zinc	ND	83.5	2090	128	76.8	774	1800	5000

All concentrations are given in micrograms per liter (ug/L), equivalent to parts per billion (ppb).
NA: Sample not tested for this analyte.
ND: Analyte not detected in sample.
NJDEP GWQC: New Jersey Department of Environmental Protection Groundwater Quality Criteria.
NLE: No GWQC exists for this analyte.

Table 9
Quarterly Groundwater Sampling Results
Fort Monmouth Main Post, Fort Monmouth, New Jersey
Monitoring Well MW-20, Landfill M-8
September 1998 - March 2000

Lab Sample ID Sample Date	3926.05 30-Sep-98	3994.03 21-Oct-98	4227.11 27-Jan-99	4566.12 22-Jun-99	4811.13 23-Sep-99	5051.12 28-Dec-99	5250.13 15-Mar-00	NJDEP GWQC
Volatiles								
Acetone	9.43	ND	ND	ND	ND	ND	ND	700
2-Butanone (MEK)	4.10	ND	ND	ND	ND	ND	ND	300
Chlorobenzene	2.16	2.42	ND	1.97	1.24	ND	1.6	4
Semi-Volatiles								
bis(2-Ethylhexyl)phthalate	ND	ND	ND	ND	ND	ND	3.26	30
Phenanthrene	1.91	ND	ND	ND	ND	ND	ND	NLE
Pesticides/PCBs								
none detected								
Metals								
Aluminum	**1560**	**2470**	**3190**	**4110**	**590**	**4520**	**418**	200
Antimony	ND	5.37	ND	ND	2.48	6.34	4.12	20
Arsenic	5	2.91	ND	ND	ND	2.85	ND	8
Barium	308	377	204	205	215	48.3	190	2000
Beryllium	ND	0.618	ND	ND	ND	ND	ND	20
Cadmium	ND	ND	2.2	3.11	1.66	**7.23**	1.99	4
Calcium	294	365000	145000	24000	249000	57100	204000	NLE
Chromium	18	19.2	44.1	32.7	26.9	65	24.4	100
Cobalt	1.6	1.17	1.02	2.63	1.09	5.41	ND	NLE
Copper	ND	3.81	13	ND	ND	29.4	6.93	1000
Iron	**10100**	**8360**	**28400**	**10600**	**10300**	**22200**	**5770**	300
Lead	ND	4.67	**11.4**	9.9	2.97	**19.5**	ND	10
Magnesium	119000	118000	79600	110000	153000	60100	77600	NLE
Manganese	**242**	**231**	**189**	**196**	**235**	**84.1**	**201**	50
Mercury	ND	ND	0.4	0.4	ND	0.2	0.2	2
Nickel	3.1	ND	2.95	1.52	3.59	12.2	4.04	100
Potassium	42800	40200	36500	48200	69900	38900	35700	NLE
Selenium	4	7.28	9.68	3.7	ND	9.15	8.02	50
Sodium	**802000**	**595000**	**575000**	**587000**	**990000**	**412000**	**240000**	50000
Vanadium	15	17.7	24.6	26.2	12.5	37.6	8.55	NLE
Zinc	42	65.7	113	144	25.9	259	84.2	5000

All concentrations are given in micrograms per liter (ug/L), equivalent to parts per billion (ppb).
NA: Sample not tested for this analyte.
ND: Analyte not detected in sample.
NJDEP GWQC: New Jersey Department of Environmental Protection Groundwater Quality Criteria.
NLE: No GWQC exists for this analyte.

Table 10
Quarterly Groundwater Sampling Results
Fort Monmouth Main Post, Fort Monmouth, New Jersey
Monitoring Well MW-21, Landfill M-8
September 1998 - March 2000

Lab Sample ID Sample Date	3926.06 30-Sep-98	3994.04 21-Oct-98	4227.09 27-Jan-99	4566.13 22-Jun-99	4811.14 23-Sep-99	5051.13 28-Dec-99	5250.14 15-Mar-00	NJDEP GWQC
Volatiles								
Acetone	14.43	ND	ND	ND	ND	ND	ND	700
2-Butanone (MEK)	6.76	ND	ND	ND	ND	ND	ND	300
2-Hexanone	2.12	ND	ND	ND	ND	ND	ND	6
Semi-Volatiles								
bis(2-Ethylhexyl)phthalate	ND	ND	ND	ND	2.17	ND	2.87	30
Pesticides/PCBs								
none detected								
Metals								
Aluminum	**3040**	**1530**	**2280**	**3270**	**1820**	**2310**	**2390**	200
Antimony	ND	ND	ND	ND	ND	8.25	ND	20
Arsenic	**9**	7	2.27	6.17	3.86	ND	4.49	8
Barium	68.5	52	15.2	67	55.8	21.7	23.1	2000
Beryllium	1	ND	ND	ND	ND	ND	ND	20
Cadmium	ND	ND	**4.59**	2.87	**5.29**	3.18	2.13	4
Calcium	194000	183000	166000	215000	250000	131000	122000	NLE
Chromium	13.6	14.1	28.5	12.1	17.1	25.5	27.5	100
Cobalt	2	ND	4.37	ND	1.31	2.34	0.588	NLE
Copper	5	17	20.1	4.54	8.41	26.4	15.20	1000
Iron	**50800**	**31700**	**23000**	**38900**	**23100**	**8020**	**12400**	300
Lead	ND	ND	5.14	ND	4.45	**11.5**	3.27	10
Magnesium	480000	458000	117000	350000	340000	95600	71500	NLE
Manganese	**947**	**671**	**183**	**289**	**385**	**98.2**	**59.2**	50
Mercury	ND	ND	0.2	0.4	0.2	0.2	0.2	2
Nickel	11.8	3.51	18.3	0.585	27.8	10	10.4	100
Potassium	213000	205000	42100	125000	135000	36500	29000	NLE
Sodium	**5660000**	**4840000**	**1210000**	**2730000**	**2750000**	**601000**	**334000**	50000
Vanadium	22	8.5	11.6	13.6	8.15	8.89	11.3	NLE
Zinc	137	40.6	474	62.2	578	199	242	5000

All concentrations are given in micrograms per liter (ug/L), equivalent to parts per billion (ppb).
NA: Sample not tested for this analyte.
ND: Analyte not detected in sample.
NJDEP GWQC: New Jersey Department of Environmental Protection Groundwater Quality Criteria.
NLE: No GWQC exists for this analyte.

Table 11
Quarterly Groundwater Sampling Results
Fort Monmouth Main Post, Fort Monmouth, New Jersey
Monitoring Well MW-22, Landfill M-8
September 1998 - March 2000

Lab Sample ID Sample Date	3926.07 30-Sep-98	3994.05 21-Oct-98	4227.08 27-Jan-99	4566.14 22-Jun-99	4811.15 23-Sep-99	5051.14 28-Dec-99	5250.15 15-Mar-00	NJDEP GWQC
Volatiles								
Acetone	6.49	4.85	ND	ND	ND	ND	ND	700
Semi-Volatiles								
bis(2-Ethylhexyl)phthalate	ND	ND	1.69	ND	ND	ND	2.64	30
Pesticides/PCBs								
none detected								
Metals								
Aluminum	**2800**	**3230**	**2370**	**2860**	**3860**	130	**870**	200
Antimony	ND	ND	ND	ND	2.83	8.72	ND	20
Arsenic	**13**	7.05	ND	ND	ND	ND	ND	8
Barium	1180	873	88.4	68.7	86.2	30.8	48.5	2000
Beryllium	ND	0.843	1.04	2.06	2.9	ND	0.656	20
Cadmium	ND	ND	**6.67**	**6.7**	**8.01**	1.35	1.8	4
Calcium	267000	194000	36400	163000	162000	51500	53400	NLE
Chromium	25.5	28.4	14.8	8.42	11.7	11.1	19.7	100
Cobalt	ND	ND	12.1	23.5	16.4	5.13	6.52	NLE
Copper	ND	21.4	34.5	63.5	76.5	14.3	16.9	1000
Iron	**87800**	**59800**	**18900**	**20800**	**18400**	128	**4440**	300
Lead	ND	6.8	7.85	**15.5**	**70.7**	4.34	**12.7**	10
Magnesium	396000	334000	75700	377000	417000	128000	114000	NLE
Manganese	**1870**	**1290**	**301**	**726**	**601**	**230**	**366**	50
Mercury	ND	ND	0.2	ND	0.3	0.4	0.2	2
Nickel	3	3.05	23.9	45.8	39.8	9.57	17.5	100
Potassium	161000	126000	33600	122000	182000	74000	52500	NLE
Sodium	**4820000**	**3790000**	**882000**	**2740000**	**3300000**	**1140000**	**575000**	50000
Vanadium	17	17.9	1.61	2.26	1.84	ND	ND	NLE
Zinc	102	67.3	663	1670	1460	324	617	5000

All concentrations are given in micrograms per liter (ug/L), equivalent to parts per billion (ppb).
NA: Sample not tested for this analyte.
ND: Analyte not detected in sample.
NJDEP GWQC: New Jersey Department of Environmental Protection Groundwater Quality Criteria.
NLE: No GWQC exists for this analyte.

Table 12
Quarterly Groundwater Sampling Results
Fort Monmouth Main Post, Fort Monmouth, New Jersey
Monitoring Well MW-23, Landfill M-8
September 1999 - March 2000

Lab Sample ID Sample Date	4419.09 14-Apr-99	4447.09 28-Apr-99	4811.16 23-Sep-99	5051.15 28-Dec-99	5156.01* 8-Feb-00	5192.02* 22-Feb-00	5250.16 15-Mar-00	NJDEP GWQC
Volatiles								
Vinyl Chloride	ND	ND	1.18	ND	NA	NA	ND	5
cis-1,2-Dichloroethene	ND	2.74	6.44	ND	NA	NA	5.47	10
Trichloroethene	ND	ND	**1.94**	ND	NA	NA	**2.7**	1
Tetrachloroethene	**6.56**	ND	**1.62**	**7.38**	NA	NA	ND	1
Semi-Volatiles								
none detected	ND	ND	ND	ND	NA	NA	ND	
Pesticides/PCBs								
none detected	ND	ND	ND	ND	NA	NA	ND	
Metals								
Aluminum	**8440**	150	27.6	71.6	128	ND	63	200
Antimony	ND	ND	ND	6.84	8.43	ND	ND	20
Arsenic	**26.4**	**15.8**	3.47	ND	ND	ND	2.61	8
Barium	142	65.9	89.9	65.6	61.8	57.9	49.5	2000
Beryllium	0.723	ND	ND	ND	ND	ND	ND	20
Cadmium	**6.11**	1.13	0.607	0.634	ND	0.518	ND	4
Calcium	24900	30700	28000	10500	21900	25100	33700	NLE
Chromium	58.9	4.3	5.63	4.78	4.7	1.16	1.74	100
Cobalt	18.2	13.2	1.55	1.58	0.975	2.42	1.69	NLE
Copper	371	ND	21.4	3.34	259	ND	4.02	1000
Iron	**27700**	**1940**	**5290**	**910**	**1820**	**1730**	**2580**	300
Lead	**464**	8.1	5.92	3.82	7.15	ND	ND	10
Magnesium	10800	7640	10700	11500	8070	10000	8980	NLE
Manganese	**1720**	**787**	**1280**	**986**	**787**	**861**	**748**	50
Mercury	**2.74**	0.18	ND	0.2	ND	ND	0.2	2
Nickel	47.4	31.8	6.15	5.74	6.03	6.56	9.03	100
Potassium	10100	5780	5260	6670	4890	5010	4240	NLE
Selenium	ND	ND	ND	ND	3.75	4.09	ND	50
Sodium	19200	28200	46900	28900	25000	20700	30600	50000
Vanadium	31.5	ND	ND	ND	1.14	1.38	1.38	NLE
Zinc	**5440**	3690	237	660	460	467	261	5000

All concentrations are given in micrograms per liter (ug/L), equivalent to parts per billion (ppb).
NA: Sample not tested for this analyte.
ND: Analyte not detected in sample.
NJDEP GWQC: New Jersey Department of Environmental Protection Groundwater Quality Criteria.
NLE: No GWQC exists for this analyte.
*Low Flow Sampling. TAL Metals Only.

Table 13
Quarterly Groundwater Sampling Results
Fort Monmouth Main Post, Fort Monmouth, New Jersey
Monitoring Well MW-24, Landfill M-8
April 1999 - March 2000

Lab Sample ID Sample Date	4419.03 14-Apr-99	4447.03 28-Apr-99	4811.17 23-Sep-99	5074.02* 6-Jan-00	5124.01* 27-Jan-00	5250.17 15-Mar-00	NJDEP GWQC
Volatiles							
Benzene	ND	ND	ND	NA	NA	**1.67**	1
Toluene	ND	ND	ND	NA	NA	3.75	1000
Chlorobenzene	ND	ND	1.01	NA	NA	1.99	4
m+p-Xylene	4.77	1.16	8.2	NA	NA	2.2	67**
o-Xylene	1.27	ND	2.56	NA	NA	ND	67**
Ethylbenzene	1.78	ND	4.05	NA	NA	1.06	700
Semi-Volatiles							
bis(2-Ethylhexyl)phthalate	ND	ND	1.74	NA	NA	1.78	30
4-Methylphenol	ND	ND	38.58	NA	NA	ND	NLE
2,4-Dimethylphenol	ND	3.14	ND	NA	NA	ND	100
Napthalene	1.24	ND	3.24	NA	NA	ND	NLE
Pesticides/PCBs							
Arochlor 1242	**4.188**	**8.84**	ND	ND	ND	ND	0.5
4,4'-DDD	ND	0.05	ND	ND	ND	ND	0.1
Metals							
Aluminum	**531**	**5960**	**327**	107	ND	124	200
Antimony	ND	3.5	ND	2	ND	ND	20
Arsenic	ND	7.16	3.77	ND	ND	ND	8
Barium	96.1	262	276	57.6	87.4	137	2000
Cadmium	ND	2.89	1.83	ND	ND	ND	4
Calcium	384000	409000	470000	41500	52800	54000	NLE
Chromium	8.01	39.3	8.75	2.8	ND	2.75	100
Cobalt	1.17	2.07	ND	ND	ND	ND	NLE
Copper	22.4	196	29.3	53	ND	ND	1000
Iron	**13100**	**13500**	**36600**	**1980**	**4620**	**7840**	300
Lead	**50.5**	**385**	**27.1**	ND	ND	ND	10
Magnesium	21100	25500	29200	4860	7730	8450	NLE
Manganese	**885**	**1260**	**1500**	**52.5**	**74.2**	**110**	50
Mercury	ND	1.03	0.2	ND	0.61	0.2	2
Nickel	1.51	7.97	3.59	1.4	ND	1.78	100
Potassium	10000	15100	16700	8390	11500	11400	NLE
Selenium	7.13	10.6	ND	ND	4	ND	50
Silver	ND	18.6	ND	ND	ND	ND	20
Sodium	15400	29600	59600	10900	26500	21400	50000
Vanadium	2.64	21.3	3.74	ND	ND	1.46	NLE
Zinc	85.3	779	69.1	29	ND	23	5000

All concentrations are given in micrograms per liter (ug/L), equivalent to parts per billion (ppb).
NA: Sample not tested for this analyte.
ND: Analyte not detected in sample.
NJDEP GWQC: New Jersey Department of Environmental Protection Groundwater Quality Criteria.
NLE: No GWQC exists for this analyte.
*Low Flow Sampling. PCB's and TAL Metals Only.
** Total Xylenes

Ta 4

Quarterly Groundwater Sampling Results
Fort Monmouth Main Post, Fort Monmouth, New Jersey
Monitoring Well MW697-01, Landfill M-8
August 1997 - March 2000

Lab Sample ID	2937.03	3118.01	3368.03	3619.07	3843.08	4029.04	4227.04	4566.07	4811.08	5051.16	5250.08	NJDEP
Sample Date	27-Aug-97	29-Oct-97	26-Feb-98	4-Jun-98	28-Aug-98	4-Nov-98	27-Jan-99	22-Jun-99	23-Sep-99	28-Dec-99	15-Mar-00	GWQC
Volatiles												
Chlorobenzene	ND	ND	ND	ND	ND	ND	1.17	ND	1.04	1.97	ND	4
Tetrachloroethene	ND	ND	ND	ND	ND	**1.18**	ND	ND	ND	ND	ND	1
Semi-Volatiles												
Di-n-butylphthalate	ND	9.37	1.28	ND	ND	ND	ND	ND	ND	ND	ND	900
bis(2-Ethylhexyl)phthalate	ND	ND	3.21	ND	ND	ND	ND	ND	ND	ND	3.11	30
Pesticides/PCBs												
alpha-BHC	**0.030**	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.02
Heptachlor	0.190	0.100	0.050	0.139	0.099	0.049	ND	0.084	0.094	ND	0.020	0.4
Heptachlor Epoxide	ND	ND	ND	ND	0.018	ND	0.025	ND	ND	ND	ND	0.2
4,4'-DDE	ND	0.090	0.078	**0.105**	0.023	0.033	0.011	0.026	ND	ND	ND	0.1
4,4-DDD	**2.080**	**0.850**	**0.850**	**0.888**	**0.930**	**0.176**	**0.20**	**0.499**	**0.660**	**0.312**	**0.229**	0.1
4,4'-DDT	0.023	**0.120**	0.030	**0.314**	**0.202**	0.065	0.066	**0.166**	**0.303**	0.061	0.051	0.1
Alpha-chlordane	**0.960**	0.415	0.339	**0.711**	**0.558**	0.184	0.150	0.309	**0.501**	0.183	0.150	0.5
Gamma-chlordane	**0.790**	0.317	0.253	**0.808**	**0.617**	0.218	0.147	0.294	0.410	0.139	0.121	0.5
Metals												
Aluminum	**340.2**	99	**418**	63	**218**	52	ND	ND	ND	ND	33.3	200
Antimony	ND	ND	ND	ND	2.4	ND	ND	ND	ND	6.07	ND	20
Arsenic	2.0	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	8
Barium	ND	23.6	20	13.3	12.8	11.4	19.2	12.5	13.1	18.9	22.7	2000
Cadmium	ND	ND	1.3	0.6	ND	ND	ND	ND	0.835	0.71	0.89	4
Calcium	11670	13950	10260	9843	8020	8010	9130	8410	10000	11500	14700	NLE
Chromium	19.0	1.6	2.6	ND	2.84	0.669	1.34	ND	1.94	1.06	ND	100
Cobalt	ND	2.3	1.7	1.6	1.43	1.44	1.41	1.61	1.3	2.47	1.77	NLE
Copper	14	9	17	ND	12.3	ND	5.67	ND	45.3	ND	ND	1000
Iron	**10520**	**2331**	**1617**	**1666**	**2360**	**825**	**310**	278	**903**	**894**	**589**	300
Lead	1.8	**17**	ND	ND	ND	ND	ND	ND	6.18	ND	ND	10
Magnesium	59.0	4120	2890	3294	2760	2880	2520	2730	2750	3690	5020	NLE
Manganese	**4200**	23.9	23.1	16.5	11	11.8	20.8	9.5	14	26.2	25.2	50
Mercury	ND	ND	0.5	ND	ND	ND	0.2	ND	ND	ND	ND	2
Nickel	60	8.9	10.5	8.3	5.7	22.4	9.67	5.06	9.91	11.3	14.2	100
Potassium	2650	2770	4490	2812	2920	2160	1870	2060	2190	2200	2310	NLE
Silver	**24**	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	20
Sodium	22850	20150	18570	15120	15200	19300	17400	15900	16400	17700	13500	50000
Vanadium	ND	ND	ND	1.7	1.95	ND	ND	ND	ND	ND	ND	NLE
Zinc	4	60	56	14.5	ND	212	14.6	1.31	39.8	32.4	31.5	5000

All concentrations are given in micrograms per liter (ug/L), equivalent to parts per billion (ppb).
NA: Sample not tested for this analyte.
ND: Analyte not detected in sample.
NJDEP GWQC: New Jersey Department of Environmental Protection Groundwater Quality Criteria.
NLE: No GWQC exists for this analyte.

Table 15 (page1 of 2)
Stream Sampling Analytical Results
Fort Monmouth Main Post, Fort Monmouth, New Jersey

Stream Sampling Location SS-14
October 1996 - March 2000

Lab Sample ID Date	2178.14 8-Oct-96	2223.16 25-Nov-96	2246.16 12-Dec-96	2298.16 29-Jan-97	2361.16 26-Feb-97	2375.16 10-Mar-97	2439.16 8-Apr-97	2810.16 17-Jul-97	3121.16 30-Oct-97	3331.16 10-Feb-98	3499.16 21-Apr-98	3816.16 19-Aug-98	4069.10 18-Nov-98	4300.16 25-Feb-99	4579.18 29-Jun-99	4806.09 Sp-22-99	4997.15 Dec-8-99	5211.15 Mar-1-00	NJDEP SWQS (ug/L)
Acetone	NA	NA	NA	8.06	ND	ND	3.94	ND	ND	ND	ND	ND	3.32	ND	ND	ND	ND	ND	NLE
Bromomethane	ND	ND	ND	2.46	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	NLE
cis - 1,2 - Dichloroethene	NA	NA	NA	ND	ND	ND	ND	ND	1.59	ND	ND	ND	ND	ND	ND	ND	11.26	ND	NLE
Methylene chloride	3.65	3.81	ND	4.22	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	1600
Trichloroethene (TCE)	ND	ND	ND	ND	ND	ND	ND	ND	1.75	ND	ND	ND	ND	ND	ND	ND	ND	ND	81
Tetrachloroethene (PCE)	0.01	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	4.29

Stream Sampling Location SS-15
October 1996 - March 2000

Lab Sample ID Sample Date	2178.15 8-Oct-96	2223.09 25-Nov-96	2246.09 12-Dec-96	2298.09 29-Jan-97	2361.09 26-Feb-97	2375.09 10-Mar-97	2439.09 8-Apr-97	2810.09 17-Jul-97	3121.09 30-Oct-97	3331.09 10-Feb-98	3499.09 21-Apr-98	3816.09 19-Aug-98	4069.08 18-Nov-98	4300.09 25-Feb-99	4579.11 29-Jun-99	4802.11 Sp-21-99	4997.17 Dec-8-99	5211.17 Mar-1-00	NJDEP SWQS (ug/L)
Acetone	NA	NA	NA	4.22	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	NLE
cis-1,2-Dichloroethene	NA	NA	NA	1.57	1.46	ND	2.69	5.53	2.57	ND	1.22	3.89	ND	ND	4.17	3.59	ND	1.39	NLE
Methyl-tert-Butyl ether	NA	NA	NA	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	2.38	NLE
Methylene chloride	3.85	2.98	5.51	2.68	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	1600
Trichloroethene (TCE)	2.58	2.54	1.31	1.33	ND	ND	1.60	2.50	ND	1.03	1.21	2.06	ND	ND	2.40	1.37	ND	1.39	81
Tetrachloroethene (PCE)	**8.41**	**10.38**	**5.63**	**5.68**	**7.84**	3.39	**6.00**	**7.12**	2.72	**6.90**	**5.72**	**5.39**	ND	**7.33**	**7.86**	2.61	4.08	**6.95**	4.29

Only detected compounds are listed.
All concentrations are given in micrograms per liter (ug/L), equivalent to parts per billion (ppb).
NA: Sample not analyzed for this parameter./ Not Applicable.
ND: Parameter not detected in this sample.
NLE: No regulatory limit has been established for this parameter.
NJDEP SWQS: Higher of the New Jersey Department of Environmental Protection Surface Water Quality Standards for SE and SC classified streams.
Exceedances of the NJDEP SWQS are printed in bold type and highlighted.

Table 15 (page2 of 2)
Stream Sampling Analytical Results
Fort Monmouth Main Post, Fort Monmouth, New Jersey

Stream Sampling Location SS-5
October 1996 - March 2000

Lab Sample ID Sample Date	2178.5 8-Oct-96	2223.14 25-Nov-96	2246.14 Dec-12-98	2298.14 29-Jan-97	2361.13 26-Feb-97	2375.13 Mar-10-97	2439.13 8-Apr-97	2810.13 17-Jul-97	3121.13 30-Oct-97	3331.13 10-Feb-98	3499.13 21-Apr-98	3816.11 19-Aug-98	4060.10 17-Nov-98	4300.13 25-Feb-99	4579.15 29-Jun-99	4806.06 22-Sep-99	4997.11 8-Dec-99	5211.11 1-Mar-00	NJDEP SWQS (ug/L)
cis-1,2-Dichloroethene	NA	NA	NA	1.19	ND	ND	1.80	3.66	1.83	ND	ND	2.28	1.67	ND	2.74	1.96	1.6	1.27	NLE
Methyl-tert-Butyl ether	NA	NA	NA	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	2.34	NLE
Methylene chloride	3.52	3.08	3.47	3.41	ND	ND	1.96	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	1600
Trichloroethene (TCE)	0.81	1.86	0.71	1.04	ND	ND	ND	ND	ND	ND	ND	1.27	ND	ND	1.74	ND	ND	1.36	81
Tetrachloroethene (PCE)	2.76	**7.53**	2.98	**4.76**	**5.32**	2.42	2.28	3.54	1.70	**6.34**	**4.48**	3.39	2.17	**5.45**	**6.04**	1.82	3.82	**6.62**	4.29

Stream Sampling Location SS-7
October 1996 - March 2000

Lab Sample ID Sample Date	2178.7 8-Oct-96	2223.11 25-Nov-96	2246.11 12-Dec-96	2298.11 29-Jan-97	2361.11 26-Feb-97	2375.11 10-Mar-97	2439.11 8-Apr-97	2810.11 17-Jul-97	3121.11 30-Oct-97	3331.11 10-Feb-98	3499.11 21-Apr-98	3816.13 19-Aug-98	4060.08 17-Nov-98	4300.11 25-Feb-99	4579.13 29-Jun-99	4806.04 22-Sep-99	4997.09 8-Dec-99	5211.09 1-Mar-00	NJDEP SWQS (ug/L)
Acetone	NA	NA	NA	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	2.94	ND	ND	ND	NLE
Methyl-tert-Butyl ether	NA	NA	NA	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	2	ND	ND	2.14	NLE
Methylene Chloride	3.59	3.31	2.70	2.75	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	1600
cis-1,2 -Dichloroethene	NA	NA	NA	ND	ND	ND	ND	1.14	ND	ND	ND	ND	ND	ND	ND	ND	ND	1.19	NLE
Trichloroethene	0.11	0.46	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	1.3	81
Tetrachloroethene	0.39	1.87	0.60	1.89	3.09	ND	ND	1.08	ND	2.04	2.40	ND	ND	2.85	1.42	ND	ND	**6.47**	4.29

Only detected compounds are listed.
All concentrations are given in micrograms per liter (ug/L), equivalent to parts per billion (ppb).
NA: Sample not analyzed for this parameter./ Not Applicable.
ND: Parameter not detected in this sample.
NLE: No regulatory limit has been established for this parameter.
NJDEP SWQS: Higher of the New Jersey Department of Environmental Protection Surface Water Quality Standards for SE and SC classified streams.
Exceedances of the NJDEP SWQS are printed in bold type and highlighted.

Table 16
Surface Water Body - Low Tide Sampling Analytical Results
Fort Monmouth Post, Fort Monmouth, New Jersey
June 1 and 8, 2000

Field Sample Location	Laboratory Sample ID#	Date and Time of Collection	Total PCB's	Regulatory Level
M8/Stream Site #4	5449.01	6/1/00 14:45	ND	0.5
M8/Stream Site #7	5449.02	6/1/00 14:40	ND	0.5
M8/Stream Site #28	5449.03	6/1/00 14:50	ND	0.5
M8/Stream Site #4	5462.01	6/8/00 10:41	ND	0.5
M8/Stream Site #7	5462.02	6/8/00 10:32	ND	0.5
M8/Stream Site #28	5462.03	6/8/00 10:47	ND	0.5

Table 17
Seep Survey Sampling Results
Fort Monmouth Main Post, Fort Monmouth, New Jersey
Parkers Creek, near Landfill M-8
November 1998

Lab Sample ID Field ID Sample Date	4049.02 Seep #1 12-Nov-98	4071.02 Seep #1 18-Nov-98	4049.03 Seep #2 12-Nov-98	4071.01 Seep #2 18-Nov-98	NJDEP GWQC (ug/L)
Wet Chemistry					
pH	NA	7.01	NA	7.07	NLE
Specific Conductivity (uS/cm)	NA	1797	NA	1257	NLE
Ammonia (mg/L)	NA	3.74	NA	7.57	NLE
Nitrates (mg/L)	NA	0.6	NA	1.9	NLE
Phosphates (mg/L)	NA	ND	NA	0.84	NLE
Sulfates (mg/L)	NA	850	NA	700	NLE
Dissolved Oxygen (mg/L)	NA	8.47	NA	8.30	NLE
Volatiles					
Chlorobenzene	ND	NA	**4.16**	NA	4
1,4-Dichlorobenzene	ND	NA	1.13	NA	75
Semi-Volatiles					
Acenaphthene	ND	NA	13.32	NA	400
Fluoranthene	ND	NA	1.89	NA	300
Pyrene	ND	NA	1.57	NA	200
Pesticides/PCBs					
none detected	ND	NA	ND	NA	
Metals					
Aluminum	**5330**	NA	**15900**	NA	200
Antimony	ND	NA	2.76	NA	20
Arsenic	ND	NA	**15.1**	NA	8
Barium	1050	NA	335	NA	2000
Beryllium	ND	NA	1.79	NA	20
Cadmium	ND	NA	3.18	NA	4
Calcium	315000	NA	460000	NA	NLE
Chromium	27	NA	**109**	NA	100
Cobalt	3.52	NA	15.7	NA	NLE
Copper	90.5	NA	83.6	NA	1000
Iron	**5670**	NA	**61300**	NA	300
Lead	**17.4**	NA	**114**	NA	10
Magnesium	417000	NA	142000	NA	NLE
Manganese	**811**	NA	**530**	NA	50
Mercury	ND	NA	0.8	NA	2
Nickel	16	NA	32.6	NA	100
Potassium	148000	NA	52500	NA	NLE
Selenium	6.25	NA	15.1	NA	50
Sodium	**3330000**	NA	**883000**	NA	50000
Vanadium	14.8	NA	79	NA	NLE
Zinc	47.3	NA	390	NA	5000

All concentrations are given in micrograms per liter (ug/L), equivalent to parts per billion (ppb).
uS/cm: microsiemens per centimeter.
mg/L: milligrams per liter.
NA: Sample not tested for this analyte.
ND: Analyte not detected in sample.
NJDEP GWQC: New Jersey Department of Environmental Protection Groundwater Quality Criteria.
NLE: No GWQC exists for this analyte.

Table 18
Soil Sampling Analytical Results - PCB'S Delineation
Fort Monmouth Main Post, Fort Monmouth, New Jersey
Monitoring Well 24, Landfill M-8
August 10 - October 1, 1999

Field Sample Location	Laboratory Sample ID#	Date and Time of Collection	Arochlor 1242 (mg/kg)	Arochlor 1254 (mg/kg)	Arochlor 1260 (mg/kg)	Total PCB's	Cleanup Criteria (mg/kg)
B-1 0-6"	4709.01	10-Aug-99 10:30	ND	ND	ND	ND	0.49
B-1 12-18"	4709.02	10-Aug-99 10:30	ND	ND	ND	ND	0.49
B-1 24-30"	4709.03	10-Aug-99 10:30	ND	ND	ND	ND	0.49
B-1 36-42"	4709.04	10-Aug-99 10:30	ND	ND	ND	ND	0.49
B-1 48-54"	4709.05	10-Aug-99 10:40	ND	ND	ND	ND	0.49
B-1 60-66"	4709.06	10-Aug-99 10:40	ND	ND	ND	ND	0.49
B-1 72-78"	4709.07	10-Aug-99 10:40	ND	ND	ND	ND	0.49
B-1 84-90"	4709.08	10-Aug-99 10:40	ND	ND	ND	ND	0.49
B-2 0-6"	4709.09	10-Aug-99 13:30	ND	ND	ND	ND	0.49
B-2 12-18"	4709.1	10-Aug-99 13:30	ND	ND	0.102	0.102	0.49
B-2 24-30"	4709.11	10-Aug-99 13:30	ND	ND	ND	ND	0.49
B-2 36-42"	4709.12	10-Aug-99 13:30	ND	ND	ND	ND	0.49
B-2 48-54"	4709.13	10-Aug-99 13:30	ND	ND	ND	ND	0.49
B-2 60-66"	4709.14	10-Aug-99 13:40	ND	ND	ND	ND	0.49
B-2 72-78"	4709.15	10-Aug-99 13:40	ND	ND	ND	ND	0.49
B-2 84-90"	4709.16	10-Aug-99 13:40	ND	ND	ND	ND	0.49
B-2 96-102"	4709.17	10-Aug-99 13:40	ND	ND	ND	ND	0.49
B-2 108-114"	4709.18	10-Aug-99 13:40	ND	ND	ND	ND	0.49
B-2 120-126"	4709.19	10-Aug-99 13:45	ND	ND	ND	ND	0.49
B-2 132-138"	4709.2	10-Aug-99 13:45	ND	ND	ND	ND	0.49
B-2 144-150"	4709.21	10-Aug-99 13:45	ND	ND	ND	ND	0.49
B-2 156-162"	4709.22	10-Aug-99 13:50	ND	ND	ND	ND	0.49
B-2 168-174"	4709.23	10-Aug-99 13:50	ND	ND	ND	ND	0.49
B-2 180-186"	4709.24	10-Aug-99 13:50	ND	ND	ND	ND	0.49
B-3 0-6"	4709.25	10-Aug-99 14:55	ND	ND	ND	ND	0.49
B-3 12-18"	4709.26	10-Aug-99 14:55	ND	ND	0.213	0.213	0.49
B-3 24-30"	4709.27	10-Aug-99 14:55	ND	ND	ND	ND	0.49
B-3 36-42"	4709.28	10-Aug-99 14:55	ND	ND	ND	ND	0.49
B-3 48-54"	4709.29	10-Aug-99 14:55	ND	ND	ND	ND	0.49
B-3 60-66"	4709.3	10-Aug-99 15:05	ND	ND	ND	ND	0.49
B-3 72-78"	4709.31	10-Aug-99 15:05	ND	ND	ND	ND	0.49
B-3 84-90"	4709.32	10-Aug-99 15:05	ND	ND	ND	ND	0.49
B-3 96-102"	4709.33	10-Aug-99 15:05	ND	ND	ND	ND	0.49
B-3 108-114"	4709.34	10-Aug-99 15:05	ND	ND	ND	ND	0.49
B-3 120-126"	4709.35	10-Aug-99 15:10	ND	ND	ND	ND	0.49
B-3 132-136"	4709.36	10-Aug-99 15:10	ND	ND	ND	ND	0.49
B-3 144-150"	4709.37	10-Aug-99 15:10	ND	ND	ND	ND	0.49
B-3 156-162"	4709.38	10-Aug-99 15:10	ND	ND	ND	ND	0.49
B-3 168-174"	4709.39	10-Aug-99 15:20	ND	**342.484**	ND	**342.484**	0.49
B-3 180-186"	4709.4	10-Aug-99 15:20	ND	ND	ND	ND	0.49
B-4 0-6"	4711.01	11-Aug-99 09:30	ND	ND	0.087	0.087	0.49
B-4 12-18"	4711.02	11-Aug-99 09:30	ND	ND	**3.028**	**3.028**	0.49
B-4 24-30"	4711.03	11-Aug-99 09:30	ND	ND	**1.267**	**1.267**	0.49
B-4 36-42"	4711.04	11-Aug-99 09:30	ND	ND	ND	ND	0.49
B-4 48-54"	4711.05	11-Aug-99 09:38	ND	ND	0.276	0.276	0.49
B-4 60-66"	4711.06	11-Aug-99 09:38	ND	ND	ND	ND	0.49
B-4 72-78"	4711.07	11-Aug-99 09:38	ND	ND	ND	ND	0.49
B-4 84-90"	4711.08	11-Aug-99 09:38	ND	ND	ND	ND	0.49
B-4 96-102"	4711.09	11-Aug-99 09:44	ND	ND	ND	ND	0.49
B-4 108-114"	4711.1	11-Aug-99 09:44	ND	ND	ND	ND	0.49
B-4 120-126"	4711.11	11-Aug-99 09:44	ND	ND	ND	ND	0.49
B-4 132-138"	4711.12	11-Aug-99 09:44	ND	ND	ND	ND	0.49
B-4 144-150"	4711.13	11-Aug-99 09:52	ND	ND	ND	ND	0.49
B-4 156-162"	4711.14	11-Aug-99 09:52	ND	ND	ND	ND	0.49
B-4 168-174"	4711.15	11-Aug-99 09:52	ND	ND	ND	ND	0.49
B-4 180-186"	4711.16	11-Aug-99 09:52	ND	ND	ND	ND	0.49
B-5 0-6"	4711.17	11-Aug-99 10:50	ND	ND	ND	ND	0.49
B-5 12-18"	4711.18	11-Aug-99 10:50	ND	ND	ND	ND	0.49
B-5 24-30"	4711.19	11-Aug-99 10:50	ND	ND	0.246	0.246	0.49
B-5 36-42"	4711.2	11-Aug-99 10:50	ND	ND	ND	ND	0.49
B-5 48-54"	4711.21	11-Aug-99 11:00	ND	ND	ND	ND	0.49
B-5 60-66"	4711.22	11-Aug-99 11:00	ND	ND	**3.894**	**3.894**	0.49
B-5 72-78"	4711.23	11-Aug-99 11:00	ND	ND	ND	ND	0.49
B-5 84-90"	4711.24	11-Aug-99 11:00	ND	ND	ND	ND	0.49
B-5 96-102"	4711.25	11-Aug-99 11:05	ND	ND	ND	ND	0.49
B-5 108-114"	4711.26	11-Aug-99 11:05	ND	ND	ND	ND	0.49
B-5 120-126"	4711.27	11-Aug-99 11:05	ND	ND	ND	ND	0.49
B-5 132-138"	4711.28	11-Aug-99 11:05	ND	ND	ND	ND	0.49

Table 18
Soil Sampling Analytical Results - PCB'S Delineation
Fort Monmouth Main Post, Fort Monmouth, New Jersey
Monitoring Well 24, Landfill M-8
August 10 - October 1, 1999

Field Sample Location	Laboratory Sample ID#	Date and Time of Collection	Arochlor 1242 (mg/kg)	Arochlor 1254 (mg/kg)	Arochlor 1260 (mg/kg)	Total PCB's	Cleanup Criteria (mg/kg)
B-5 144-150"	4711.29	11-Aug-99 11:14	ND	ND	ND	ND	0.49
B-5 156-162"	4711.3	11-Aug-99 11:14	ND	ND	ND	ND	0.49
B-5 168-174"	4711.31	11-Aug-99 11:14	ND	ND	0.264	0.264	0.49
B-5 180-186"	4711.32	11-Aug-99 11:14	ND	ND	**0.603**	**0.603**	0.49
B-6 0-6"	4711.33	11-Aug-99 12:45	ND	ND	**0.66**	**0.66**	0.49
B-6 12-18"	4711.34	11-Aug-99 12:45	ND	ND	ND	ND	0.49
B-6 24-30"	4711.35	11-Aug-99 12:45	ND	ND	ND	ND	0.49
B-6 36-42"	4711.36	11-Aug-99 12:45	ND	ND	ND	ND	0.49
B-6 48-54"	4711.37	11-Aug-99 13:00	ND	ND	ND	ND	0.49
B-6 60-66"	4711.38	11-Aug-99 13:00	ND	ND	ND	ND	0.49
B-6 72-78"	4711.39	11-Aug-99 13:00	ND	ND	ND	ND	0.49
B-6 84-90"	4711.4	11-Aug-99 13:00	ND	ND	ND	ND	0.49
B-6 96-102"	4711.41	11-Aug-99 13:15	ND	ND	ND	ND	0.49
B-6 108-114"	4711.42	11-Aug-99 13:15	ND	ND	ND	ND	0.49
B-6 120-126"	4711.43	11-Aug-99 13:15	ND	ND	ND	ND	0.49
B-6 132-138"	4711.44	11-Aug-99 13:15	ND	ND	ND	ND	0.49
B-6 144-150"	4711.45	11-Aug-99 13:20	ND	ND	ND	ND	0.49
B-6 156-162"	4711.46	11-Aug-99 13:20	ND	ND	ND	ND	0.49
B-6 168-174"	4711.47	11-Aug-99 13:20	ND	ND	ND	ND	0.49
B-6 180-186"	4711.48	11-Aug-99 13:20	ND	ND	ND	ND	0.49
B-7 0-6"	4711.49	11-Aug-99 14:15	ND	ND	ND	ND	0.49
B-7 12-18"	4711.5	11-Aug-99 14:15	ND	ND	ND	ND	0.49
B-7 24-30"	4711.51	11-Aug-99 14:15	ND	ND	ND	ND	0.49
B-7 36-42"	4711.52	11-Aug-99 14:15	ND	ND	ND	ND	0.49
B-7 48-54"	4711.53	11-Aug-99 14:23	ND	ND	**30.03**	**30.03**	0.49
B-7 60-66"	4711.54	11-Aug-99 14:23	ND	ND	**0.713**	**0.713**	0.49
B-7 72-78"	4711.55	11-Aug-99 14:23	ND	ND	ND	ND	0.49
B-7 84-90"	4711.56	11-Aug-99 14:23	ND	ND	ND	ND	0.49
B-7 96-102"	4711.57	11-Aug-99 14:30	ND	ND	**4.81**	**4.81**	0.49
B-7 108-114"	4711.58	11-Aug-99 14:30	ND	ND	ND	ND	0.49
B-7 120-126"	4711.59	11-Aug-99 14:30	ND	ND	ND	ND	0.49
B-7 132-138"	4711.6	11-Aug-99 14:30	ND	ND	ND	ND	0.49
B-7 144-150"	4711.61	11-Aug-99 14:40	ND	ND	ND	ND	0.49
B-7 156-162"	4711.62	11-Aug-99 14:40	ND	ND	0.462	0.462	0.49
B-7 168-174"	4711.63	11-Aug-99 14:40	ND	ND	ND	ND	0.49
B-7 180-186"	4711.64	11-Aug-99 14:40	ND	ND	ND	ND	0.49
B-8 0-6"	4723.01	13-Aug-99 9:40	ND	ND	ND	ND	0.49
B-8 12-18"	4723.02	13-Aug-99 9:40	ND	ND	ND	ND	0.49
B-8 24-30"	4723.03	13-Aug-99 9:40	ND	ND	ND	ND	0.49
B-8 36-42"	4723.04	13-Aug-99 9:40	ND	ND	ND	ND	0.49
B-8 48-54"	4723.05	13-Aug-99 9:55	ND	ND	ND	ND	0.49
B-8 60-66"	4723.06	13-Aug-99 9:55	ND	ND	ND	ND	0.49
B-8 72-78"	4723.07	13-Aug-99 9:55	ND	ND	ND	ND	0.49
B-8 84-90"	4723.08	13-Aug-99 9:55	ND	ND	ND	ND	0.49
B-8 96-102"	4723.09	13-Aug-99 10:10	ND	ND	ND	ND	0.49
B-8 108-114"	4723.1	13-Aug-99 10:10	ND	ND	ND	ND	0.49
B-8 120-126"	4723.11	13-Aug-99 10:10	ND	ND	ND	ND	0.49
B-8 132-138"	4723.12	13-Aug-99 10:10	ND	ND	ND	ND	0.49
B-8 144-150"	4723.13	13-Aug-99 10:20	ND	ND	ND	ND	0.49
B-8 156-162"	4723.14	13-Aug-99 10:20	ND	ND	ND	ND	0.49
B-8 168-174"	4723.15	13-Aug-99 10:20	ND	ND	ND	ND	0.49
B-8 180-186"	4723.16	13-Aug-99 10:20	ND	ND	ND	ND	0.49
B-9 0-6"	4723.17	13-Aug-99 11:10	ND	ND	ND	ND	0.49
B-9 12-18"	4723.18	13-Aug-99 11:10	ND	ND	ND	ND	0.49
B-9 24-30"	4723.19	13-Aug-99 11:10	ND	ND	ND	ND	0.49
B-9 36-42"	4723.2	13-Aug-99 11:10	ND	ND	ND	ND	0.49
B-9 48-54"	4723.21	13-Aug-99 11:20	ND	ND	ND	ND	0.49
B-9 60-66"	4723.22	13-Aug-99 11:20	ND	ND	ND	ND	0.49
B-9 72-78"	4723.23	13-Aug-99 11:20	ND	ND	ND	ND	0.49
B-9 84-90"	4723.24	13-Aug-99 11:20	ND	ND	ND	ND	0.49
B-9 96-102"	4723.25	13-Aug-99 11:30	ND	ND	ND	ND	0.49
B-9 108-114"	4723.26	13-Aug-99 11:30	ND	ND	ND	ND	0.49
B-9 120-126"	4723.27	13-Aug-99 11:30	ND	ND	ND	ND	0.49
B-9 132-138"	4723.28	13-Aug-99 11:30	ND	ND	ND	ND	0.49
B-9 144-150"	4723.29	13-Aug-99 11:40	ND	ND	**0.507**	**0.507**	0.49
B-9 156-162"	4723.3	13-Aug-99 11:40	ND	ND	ND	ND	0.49
B-9 168-174"	4723.31	13-Aug-99 11:40	ND	ND	ND	ND	0.49
B-9 180-186"	4723.32	13-Aug-99 11:40	ND	ND	ND	ND	0.49
B-10 0-6"	4728.01	17-Aug-99 09:50	ND	ND	ND	ND	0.49
B-10 12-18"	4728.02	17-Aug-99 09:50	ND	ND	ND	ND	0.49
B-10 24-30"	4728.03	17-Aug-99 09:50	ND	ND	**0.783**	**0.783**	0.49

Table 18
Soil Sampling Analytical Results - PCB'S Delineation
Fort Monmouth Main Post, Fort Monmouth, New Jersey
Monitoring Well 24, Landfill M-8
August 10 - October 1, 1999

Field Sample Location	Laboratory Sample ID#	Date and Time of Collection	Arochlor 1242 (mg/kg)	Arochlor 1254 (mg/kg)	Arochlor 1260 (mg/kg)	Total PCB's	Cleanup Criteria (mg/kg)
B-10 36-42"	4728.04	17-Aug-99 09:50	ND	ND	ND	ND	0.49
B-10 48-54"	4728.05	17-Aug-99 10:05	ND	ND	ND	ND	0.49
B-10 60-66"	4728.06	17-Aug-99 10:05	ND	ND	ND	ND	0.49
B-10 120-126"	4728.11	17-Aug-99 10:15	ND	ND	ND	ND	0.49
B-10 132-138"	4728.12	17-Aug-99 10:15	ND	ND	ND	ND	0.49
B-10 144-150"	4728.13	17-Aug-99 10:25	ND	ND	ND	ND	0.49
B-10 156-162"	4728.14	17-Aug-99 10:25	ND	ND	ND	ND	0.49
B-10 168-174"	4728.15	17-Aug-99 10:25	ND	ND	ND	ND	0.49
B-10 180-186"	4728.16	17-Aug-99 10:25	ND	ND	ND	ND	0.49
B-11 0-6"	4728.17	17-Aug-99 10:30	ND	ND	ND	ND	0.49
B-11 12-18"	4728.18	17-Aug-99 10:38	ND	ND	0.138	0.138	0.49
B-11 24-30"	4728.19	17-Aug-99 10:50	**0.791**	ND	ND	**0.791**	0.49
B-11 36-42"	4728.2	17-Aug-99 11:15	**8.549**	ND	ND	**8.549**	0.49
B-11 48-54"	4728.21	17-Aug-99	**274.712**	ND	ND	**274.712**	0.49
B-11 60-66"	4787.01	13-Sep-99 08:55	ND	ND	ND	ND	0.49
B-11 72-78"	4787.02	13-Sep-99 08:55	ND	ND	ND	ND	0.49
B-11 84-90"	4787.03	13-Sep-99 08:55	ND	ND	ND	ND	0.49
B-11 96-102"	4787.04	13-Sep-99 08:55	ND	ND	ND	ND	0.49
B-11 108-114"	4787.05	13-Sep-99 08:55	ND	ND	ND	ND	0.49
B-11 120-126"	4787.06	13-Sep-99 08:55	ND	ND	ND	ND	0.49
B-11 132-138"	4787.07	13-Sep-99 08:55	ND	ND	ND	ND	0.49
B-12 0-6"	4787.08	13-Sep-99 10:00	ND	ND	ND	ND	0.49
B-12 12-18"	4787.09	13-Sep-99 10:00	ND	ND	0.176	0.176	0.49
B-12 24-30"	4787.10	13-Sep-99 10:00	ND	ND	ND	ND	0.49
B-12 36-42"	4787.11	13-Sep-99 10:00	ND	ND	ND	ND	0.49
B-12 48-54"	4787.12	13-Sep-99 10:00	ND	ND	ND	ND	0.49
B-12 60-66"	4787.13	13-Sep-99 10:00	ND	ND	ND	ND	0.49
B-12 72-78"	4787.14	13-Sep-99 10:00	ND	ND	ND	ND	0.49
B-12 84-90"	4787.15	13-Sep-99 10:00	ND	ND	ND	ND	0.49
B-12 96-102"	4787.16	13-Sep-99 10:00	ND	ND	ND	ND	0.49
B-13 0-6"	4787.17	13-Sep-99 11:00	ND	ND	ND	ND	0.49
B-13 12-18"	4787.18	13-Sep-99 11:00	ND	ND	ND	ND	0.49
B-13 24-30"	4787.19	13-Sep-99 11:00	ND	ND	ND	ND	0.49
B-13 36-42"	4787.20	13-Sep-99 11:00	ND	ND	ND	ND	0.49
B-13 48-54"	4787.21	13-Sep-99 11:00	ND	ND	ND	ND	0.49
B-13 60-66"	4787.22	13-Sep-99 11:00	ND	ND	ND	ND	0.49
B-13 72-78"	4787.23	13-Sep-99 11:00	ND	ND	ND	ND	0.49
B-13 84-90"	4787.24	13-Sep-99 11:00	ND	ND	**0.899**	**0.899**	0.49
B-13 96-102"	4787.25	13-Sep-99 11:00	ND	ND	ND	ND	0.49
B-13 108-114"	4787.26	13-Sep-99 11:00	ND	ND	ND	ND	0.49
B-13 120-126"	4787.27	13-Sep-99 11:00	ND	ND	ND	ND	0.49
B-13 132-138"	4787.28	13-Sep-99 11:00	ND	ND	ND	ND	0.49
B-14 0-6"	4787.29	13-Sep-99 12:10	ND	ND	ND	ND	0.49
B-14 12-18"	4787.30	13-Sep-99 12:10	ND	ND	0.221	0.221	0.49
B-14 24-30"	4787.31	13-Sep-99 12:10	ND	ND	**0.704**	**0.704**	0.49
B-14 36-42"	4787.32	13-Sep-99 12:10	ND	ND	0.107	0.107	0.49
B-14 48-54"	4787.33	13-Sep-99 12:10	ND	ND	ND	ND	0.49
B-14 60-66"	4787.34	13-Sep-99 12:10	ND	ND	ND	ND	0.49
B-14 72-78"	4787.35	13-Sep-99 12:10	ND	ND	ND	ND	0.49
B-14 84-90"	4787.36	13-Sep-99 12:10	ND	ND	ND	ND	0.49
B-14 96-102"	4787.37	13-Sep-99 12:10	ND	ND	ND	ND	0.49
B-14 108-11"	4787.38	13-Sep-99 12:10	ND	ND	ND	ND	0.49
B-14 120-126"	4787.39	13-Sep-99 12:10	ND	ND	ND	ND	0.49
B-14 132-138 "	4787.40	13-Sep-99 12:10	ND	ND	ND	ND	0.49
B-15 0-6"	4787.41	13-Sep-99 14:00	ND	ND	ND	ND	0.49
B-15 12-18"	4787.42	13-Sep-99 14:00	ND	ND	0.367	0.367	0.49
B-15 24-30"	4787.43	13-Sep-99 14:00	ND	ND	0.157	0.157	0.49
B-15 36-42"	4787.44	13-Sep-99 14:00	ND	ND	0.369	0.369	0.49
B-15 48-54"	4787.45	13-Sep-99 14:00	ND	ND	ND	ND	0.49
B-15 60-66"	4787.46	13-Sep-99 14:00	ND	ND	ND	ND	0.49
B-15 72-78"	4787.47	13-Sep-99 14:00	ND	ND	ND	ND	0.49
B-15 84-90"	4787.48	13-Sep-99 14:00	ND	ND	**0.565**	**0.565**	0.49
B-15 96-102"	4787.49	13-Sep-99 14:00	ND	ND	**11.885**	**11.885**	0.49
B-15 108-114"	4787.50	13-Sep-99 14:00	ND	ND	ND	ND	0.49
B-15 120-126"	4787.51	13-Sep-99 14:00	ND	ND	ND	ND	0.49
B-15 132-138"	4787.52	13-Sep-99 14:00	ND	ND	ND	ND	0.49
B-16 36-42"	4787.56	13-Sep-99 14:30	ND	ND	ND	ND	0.49
B-16 48-54"	4787.57	13-Sep-99 14:30	ND	ND	ND	ND	0.49
B-16 60-66"	4787.58	13-Sep-99 14:30	ND	ND	ND	ND	0.49
B-16 72-78"	4787.59	13-Sep-99 14:30	ND	ND	0.153	0.153	0.49
B-16 84-90"	4787.60	13-Sep-99 14:30	ND	ND	0.114	0.114	0.49
B-16 96-102"	4787.61	13-Sep-99 14:30	ND	ND	ND	ND	0.49
B-16 108-114"	4787.62	13-Sep-99 14:30	ND	ND	ND	ND	0.49
B-16 120-126"	4787.63	13-Sep-99 14:30	ND	ND	ND	ND	0.49

Table 18
Soil Sampling Analytical Results - PCB'S Delineation
Fort Monmouth Main Post, Fort Monmouth, New Jersey
Monitoring Well 24, Landfill M-8
August 10 - October 1, 1999

Field Sample Location	Laboratory Sample ID#	Date and Time of Collection	Arochlor 1242 (mg/kg)	Arochlor 1254 (mg/kg)	Arochlor 1260 (mg/kg)	Total PCB's	Cleanup Criteria (mg/kg)
B-16 132-138"	4787.64	13-Sep-99 14:30	ND	ND	ND	ND	0.49
B-17 0-6"	4787.65	13-Sep-99 15:25	ND	ND	ND	ND	0.49
B-17 12-18"	4787.66	13-Sep-99 15:25	ND	ND	ND	ND	0.49
B-17 24-30"	4787.67	13-Sep-99 15:25	ND	ND	**0.569**	**0.569**	0.49
B-17 36-42"	4787.68	13-Sep-99 15:25	ND	ND	ND	ND	0.49
B-17 48-54"	4787.69	13-Sep-99 15:25	ND	ND	ND	ND	0.49
B-17 60-66"	4787.70	13-Sep-99 15:25	ND	ND	ND	ND	0.49
B-17 72-78"	4787.71	13-Sep-99 15:25	ND	ND	ND	ND	0.49
B-17 84-90"	4787.72	13-Sep-99 15:25	ND	ND	ND	ND	0.49
B-17 96-102"	4787.73	13-Sep-99 15:25	ND	ND	ND	ND	0.49
B-17 108-114"	4787.74	13-Sep-99 15:25	ND	ND	ND	ND	0.49
B-17 120-126"	4787.75	13-Sep-99 15:25	ND	ND	ND	ND	0.49
B-17 132-138"	4787.76	13-Sep-99 15:25	ND	ND	ND	ND	0.49
B-18 0-6"	4833.01	01-Oct-99 10:15	ND	ND	ND	ND	0.49
B-18 12-18"	4833.02	01-Oct-99 10:15	ND	ND	ND	ND	0.49
B-18 24-30"	4833.03	01-Oct-99 10:15	ND	ND	**0.598**	**0.598**	0.49
B-18 36-42"	4833.04	01-Oct-99 10:15	ND	ND	0.123	0.123	0.49
B-18 48-54"	4833.05	01-Oct-99 10:15	ND	ND	ND	ND	0.49
B-18 60-66"	4833.06	01-Oct-99 10:15	ND	ND	0.25	0.25	0.49
B-18 72-78"	4833.07	01-Oct-99 10:15	ND	ND	0.215	0.215	0.49
B-18 84-90"	4833.08	01-Oct-99 10:15	ND	ND	ND	ND	0.49
B-18 96-102"	4833.09	01-Oct-99 10:15	ND	ND	ND	ND	0.49
B-18 108-114"	4833.10	01-Oct-99 10:15	ND	ND	ND	ND	0.49
B-18 120-126"	4833.11	01-Oct-99 10:15	ND	ND	ND	ND	0.49
B-18 132-138"	4833.12	01-Oct-99 10:15	ND	ND	ND	ND	0.49
B-19 0-6"	4833.13	01-Oct-99 11:15	ND	ND	0.083	0.083	0.49
B-19 12-18"	4833.14	01-Oct-99 11:15	ND	ND	ND	ND	0.49
B-19 24-30"	4833.15	01-Oct-99 11:15	ND	ND	0.212	0.212	0.49
B-19 36-42"	4833.16	01-Oct-99 11:15	ND	ND	**3.29**	**3.29**	0.49
B-19 48-54"	4833.17	01-Oct-99 11:15	ND	ND	ND	ND	0.49
B-19 60-66"	4833.18	01-Oct-99 11:15	ND	ND	ND	ND	0.49
B-19 72-78"	4833.19	01-Oct-99 11:15	ND	ND	ND	ND	0.49
B-19 84-90"	4833.20	01-Oct-99 11:15	ND	ND	ND	ND	0.49
B-19 96-102"	4833.21	01-Oct-99 11:15	ND	ND	ND	ND	0.49
B-19 108-114"	4833.22	01-Oct-99 11:15	ND	ND	ND	ND	0.49
B-19 120-126"	4833.23	01-Oct-99 11:15	ND	ND	ND	ND	0.49
B-19 132-138"	4833.24	01-Oct-99 11:15	ND	ND	ND	ND	0.49
B-20 0-6"	4833.25	01-Oct-99 12:50	ND	ND	**0.554**	**0.554**	0.49
B-20 12-18"	4833.26	01-Oct-99 12:50	ND	ND	0.221	0.221	0.49
B-20 24-30"	4833.27	01-Oct-99 12:50	ND	ND	**9.174**	**9.174**	0.49
B-20 36-42"	4833.28	01-Oct-99 12:50	ND	ND	ND	ND	0.49
B-20 48-54"	4833.29	01-Oct-99 12:50	ND	ND	ND	ND	0.49
B-20 60-66"	4833.30	01-Oct-99 12:50	ND	ND	ND	ND	0.49
B-20 72-78"	4833.31	01-Oct-99 12:50	ND	ND	ND	ND	0.49
B-20 84-90"	4833.32	01-Oct-99 12:50	ND	ND	ND	ND	0.49
B-20 96-102"	4833.33	01-Oct-99 12:50	ND	ND	ND	ND	0.49
B-20 108-114"	4833.34	01-Oct-99 12:50	ND	ND	ND	ND	0.49
B-20 120-126"	4833.35	01-Oct-99 12:50	ND	ND	ND	ND	0.49
B-20 132-138"	4833.36	01-Oct-99 12:50	ND	ND	ND	ND	0.49
B-21 0-6"	4833.37	01-Oct-99 13:50	ND	ND	ND	ND	0.49
B-21 12-18"	4833.38	01-Oct-99 13:50	ND	ND	ND	ND	0.49
B-21 24-30"	4833.39	01-Oct-99 13:50	ND	ND	0.396	0.396	0.49
B-21 36-42"	4833.40	01-Oct-99 13:50	ND	ND	ND	ND	0.49
B-21 48-54"	4833.41	01-Oct-99 13:50	ND	ND	ND	ND	0.49
B-21 60-66"	4833.42	01-Oct-99 13:50	ND	ND	ND	ND	0.49
B-21 72-78"	4833.43	01-Oct-99 13:50	ND	ND	ND	ND	0.49
B-21 84-90"	4833.44	01-Oct-99 13:50	ND	ND	ND	ND	0.49
B-21 96-102"	4833.45	01-Oct-99 13:50	ND	ND	ND	ND	0.49
B-21 108-114"	4833.46	01-Oct-99 13:50	ND	ND	ND	ND	0.49
B-21 120-126"	4833.47	01-Oct-99 13:50	ND	ND	ND	ND	0.49
B-21 132-138"	4833.48	01-Oct-99 13:50	ND	ND	ND	ND	0.49
B-22 0-6"	4833.49	01-Oct-99 14:30	ND	ND	ND	ND	0.49
B-22 12-18"	4833.50	01-Oct-99 14:30	ND	ND	ND	ND	0.49
B-22 24-30"	483.51	01-Oct-99 14:30	ND	ND	0.866	0.866	0.49
B-22 36-42"	4833.52	01-Oct-99 14:30	ND	ND	0.388	0.388	0.49
B-22 48-54"	4833.53	01-Oct-99 14:30	ND	ND	ND	ND	0.49
B-22 60-66"	4833.54	01-Oct-99 14:30	ND	ND	ND	ND	0.49
B-22 72-78"	4833.55	01-Oct-99 14:30	ND	ND	ND	ND	0.49
B-22 84-90"	4833.56	01-Oct-99 14:30	ND	ND	ND	ND	0.49
B-22 96-102"	4833.57	01-Oct-99 14:30	ND	ND	ND	ND	0.49
B-22 108-114"	4833.58	01-Oct-99 14:30	ND	ND	ND	ND	0.49
B-22 120-126"	4833.59	01-Oct-99 14:30	ND	ND	ND	ND	0.49
B-22 132-138"	4833.60	01-Oct-99 14:30	ND	ND	ND	ND	0.49

ND: Analyte not detected
Arochlor 1016, 1221,1232, 1248, not detected in samples

Table 19
Stream Sediment Sampling Analytical Results
Fort Monmouth Post, Fort Monmouth, New Jersey
April 12, 2000- April 13, 2000

Field Sample Location	Laboratory Sample ID#	Date and Time of Collection	Arochlor 1254	Lowest Effects Level (LEL)*	Severe Effects Level (SEL)*
M8/1 0-6"	5337.01	4/12/00 14:00	ND	0.060	34.000
M8/1 6-12"	5337.02	4/12/00 14:02	ND	0.060	34.000
M8/2 0-6"	5337.03	4/12/00 14:04	ND	0.060	34.000
M8/2 6-12"	5337.04	4/12/00 14:06	ND	0.060	34.000
M8/3 0-6"	5337.05	4/12/00 14:16	ND	0.060	34.000
M8/3 6-12"	5337.06	4/12/00 14:18	ND	0.060	34.000
M8/3 18-24"	5337.07	4/12/00 14:20	ND	0.060	34.000
M8/4 0-6"	5337.08	4/12/00 14:22	ND	0.060	34.000
M8/4 6-12"	5337.09	4/12/00 14:24	ND	0.060	34.000
M8/5 0-6"	5337.10	4/12/00 14:37	ND	0.060	34.000
M8/5 6-12"	5337.11	4/12/00 14:39	ND	0.060	34.000
M8/6 0-6"	5337.12	4/12/00 14:42	ND	0.060	34.000
M8/6 6-12"	5337.13	4/12/00 14:44	ND	0.060	34.000
M8/7 0-6"	5337.14	4/12/00 14:50	**1.455**	0.060	34.000
M8/7 6-12"	5337.15	4/12/00 14:52	ND	0.060	34.000
M8/8 0-6"	5337.16	4/12/00 15:00	**0.138**	0.060	34.000
M8/8 6-12"	5337.17	4/12/00 15:05	ND	0.060	34.000
M8/9 0-6"	5342.01	4/13/00 13:41	ND	0.060	34.000
M8/9 6-12"	5342.02	4/13/00 13:43	ND	0.060	34.000
M8/10 0-6"	5342.03	4/13/00 13:48	ND	0.060	34.000
M8/10 6-12"	5342.04	4/13/00 13:50	ND	0.060	34.000

ND: Not Detected
* NJDEP Guidance For Sediment Quality Evaluations, Nov '98

Table 20
Well Search Summary
Fort Monmouth Main Post
Fort Monmouth, New Jersey

Well ID Number	Well Owner	Well Address	Total Depth (feet bgs)	Casing Length (feet)	Static Water Elevation (feet bgs)	Use Code	NJDEP Permit Number
5	Eatontown Senior Housing	55 Wyckoff Rd., Eatontown	192	177	25	G	29-15006
14	Shell Oil Company	Block 100, Lot 25, Oceanport	12	2	4	M	29-24953
15	Shell Oil Company	Block 100, Lot 25, Oceanport	12	2	3	M	29-24953
16	Shell Oil Company	Block 100, Lot 25, Oceanport	12	2	3	M	29-24953
17	Shell Oil Company	Block 100, Lot 25, Oceanport	11	2	3	M	29-24953
34	Boro of Eatontown	Block 14, Lot 17, Eatontown	20	10	12.1	M	29-28236
35	Dennis	Orchard St. Block 73, Lot	67	52	16	D	29-23690
36	Walter and Patricia Zinn	92 Sunnybrook Dr., Shrewsbury Boro	50	50	5	G	29-22571
37	V. J. Russo Realty	170 Ave. of Commons, Shrewsbury Boro	250	245	4	G	29-27756
38	Price Communications Corp.	1 Register Plaza, Shrewsbury Boro	28	15	8	M	29-26185
39	A. Khristiansen	Trafalger Pl., Block 69.04, Lot 4, Shrewsbury Boro	50	50	5	G	29-22571
40	H. Kodama	83 Sunnybrook Dr., Shrewsbury Bro	250	210	8	D	29-26704
41	Boro of Eatontown	Block 14, Lot 17, Eatontown	20	10	11.7	M	29-29158
42	Boro of Eatontown	Block 14, Lot 17, Eatontown	18	8	10.1	M	29-29159
43	Bill Rudolph	Relwof Ave., Block 98, Lot 1 and 2, Oceanport	45	35	2	G	29-21780
44	Kleiner Bros.	Allenhurst and Myrtle	50	40	5	D	29-6499
64	Travis Thomas	112 Orchid St., Oceanport	323	317	16	D, G	29-14244
65	N. J. Transit	Silverside and Fairview	*	*	*	M	29-13825
97	Shell Oil Company	1 Main St., Oceanport	10	2	2.5	M/S	29-12553
98	Shell Oil Company	1 Main St., Oceanport	9	1	2	M/S	29-12554
99	Shell Oil Company	1 Main St., Oceanport	9	1	2	M/S	29-12555
100	Anthony S. Camara	121 Horseneck Point Rd., Oceanport	15	12	5	D	29-5084

Table 20
Well Search Summary
Fort Monmouth Main Post
Fort Monmouth, New Jersey

Well ID Number	Well Owner	Well Address	Total Depth (feet bgs)	Casing Length (feet)	Static Water Elevation (feet bgs)	Use Code	NJDEP Permit Number
101	Bridgewater Townhouse	57 Bridgewater Dr., Oceanport	180	155	12	G	29-22549
113	Shell Oil Company	Rte. 35 and South St., Eatontown	12	2	4.38	M	29-14180
114	Shell Oil Company	Rte. 35 and South St., Eatontown	12	2	5.1	M	29-14181
115	Shell Oil Company	Rte. 35 and South St., Eatontown	12	2	4.47	M	29-14182
116	Shell Oil Company	Rte. 35 and South St., Eatontown	12	2	4.39	M	29-14183
117	Shell Oil Company	Rte. 35 and South St., Eatontown	12	2	4.75	M	29-14184
118	Shell Oil Company	Rte. 35 and South St., Eatontown	12	2	4.10	M	29-14185
119	Shell Oil Company	Rte. 35 and South St., Eatontown	12	2	4.82	M	29-14186
120	Shell Oil Company	Rte. 35 and South St., Eatontown	12	2	4.30	M	29-14187
121	Shell Oil Company	Rte. 35 and South St., Eatontown	12	2	4.54	M	29-14188
122	Shell Oil Company	Rte. 35 and South St., Eatontown	12	2	4.34	M	29-14189
123	Shell Oil Company	Rte. 35 and South St., Eatontown	12	2	4.22	M	29-14190
124	Shell Oil Company	Rte. 35 and South St., Eatontown	12	2	3.9	M	29-14191
125	Shell Oil Company	Rte. 35 and South St., Eatontown	14.83	4	4	E	29-14192
127	Vincent J. Russo, builder	Block 70.1, Lot 90, Shrewsbury	184	165	5	G	29-14168
128	William Godspeed	30 Alwin Terrace, Little Silver	173	158	6	G	29-22526
129	Exxon Company, USA	Branch & Sycamore Ave., Little Silver	15	5	*	M	29-23732
130	Exxon Company, USA	Branch & Sycamore Ave., Little Silver	15	5	*	M	29-23733
131	Exxon Company, USA	Branch & Sycamore Ave., Little Silver	15	5	*	M	29-23734
132	Exxon Company, USA	Branch & Sycamore Ave., Little Silver	15	5	*	M	29-23735
133	Exxon Company, USA	Branch & Sycamore Ave., Little Silver	15	5	*	M	29-23738
134	Exxon Company, USA	Branch & Sycamore Ave., Little Silver	15	4	*	M	29-23739

Table 20
Well Search Summary
Fort Monmouth Main Post
Fort Monmouth, New Jersey

Well ID Number	Well Owner	Well Address	Total Depth (feet bgs)	Casing Length (feet)	Static Water Elevation (feet bgs)	Use Code	NJDEP Permit Number
135	Exxon Company, USA	Branch & Sycamore Ave., Little Silver	15	5	*	M	29-23740
136	Exxon Company, USA	Branch & Sycamore Ave., Little Silver	15	5	*	M	29-23741
137	Exxon Company, USA	Branch & Sycamore Ave., Little Silver	20	5	7	M	29-27072
138	Exxon Company, USA	Branch & Sycamore Ave., Little Silver	16	3	6	M	29-29208
139	Hunter's Superior Service	333 Willow Dr., Little Silver	10	1	6.36	M	29-12793
140	Hunter's Superior Service	333 Willow Dr., Little Silver	10	1	7.08	M	29-12794
141	Hunter's Superior Service	333 Willow Dr., Little Silver	10	1	6.34	M	29-12795
142	Hunter's Superior Service	333 Willow Dr., Little Silver	10	1	7.59	M	29-12796
143	Hunter's Superior Service	333 Willow Dr., Little Silver	10	1	6.63	M	29-12797
144	Hunter's Superior Service	333 Willow Dr., Little Silver	10	1	6.07	M	29-12798
145	Citgo Oil Co.	700 Branch Ave., Little Silver	9	1	*	M	29-12785
146	Citgo Oil Co.	700 Branch Ave., Little Silver	9	1	*	M	29-12786
147	Citgo Oil Co.	700 Branch Ave., Little Silver	9	1	*	M	29-12787
148	Citgo Oil Co.	700 Branch Ave., Little Silver	10	1	*	M	29-12788
149	Citgo Oil Co.	700 Branch Ave., Little Silver	9	1	*	M	29-12789
150	Citgo Oil Co.	700 Branch Ave., Little Silver	9	1	*	M	29-12790
151	Citgo Oil Co.	700 Branch Ave., Little Silver	9	1	*	M	29-12792
152	Citgo Oil Co.	700 Branch Ave., Little Silver	10	1	*	M	29-12793
153	Mobil Oil Corporation	700 Branch Ave., Little Silver	11	1	*	M	29-12794
154	Mobil Oil Corporation	700 Branch Ave., Little Silver	11	1	*	M	29-12795
155	Mobil Oil Corporation	700 Branch Ave., Little Silver	15	5	7	M	29-25317
156	Mobil Oil Corporation	Hwy. 35 and Tinton Ave., Eatontown	15	2	7	M	29-25316

Table 20
Well Search Summary
Fort Monmouth Main Post
Fort Monmouth, New Jersey

Well ID Number	Well Owner	Well Address	Total Depth (feet bgs)	Casing Length (feet)	Static Water Elevation (feet bgs)	Use Code	NJDEP Permit Number
157	Mobil Oil Corporation	Hwy. 35 and Tinton Ave., Eatontown	15	5	7	M	29-25318
158	Mobil Oil Corporation	Hwy. 35 and Tinton Ave., Eatontown	15	5	7	M	29-25319
159	Mobil Oil Corporation	Hwy. 35 and Tinton Ave., Eatontown	15	5	7	M	29-25320
160	Exxon Oil Company	Hwy. 35 and Tinton Ave., Eatontown	16	3	4.7	M	29-26806
161	Exxon Oil Company	Hwy. 35 and Tinton Ave., Eatontown	17	2	6	M	29-26807
162	Exxon Oil Company	Hwy. 35 and Tinton Ave., Eatontown	15	3	8.2	M	29-26808
163	Exxon Oil Company	Hwy. 35 and Tinton Ave., Eatontown	15	3	5.8	M	29-26809
164	Exxon Oil Company	Hwy. 35 and Tinton Ave., Eatontown	12	2	2.35	M	29-28143
165	Allied Signal, Inc.	118 Rte. 35, Eatontown	*	*	*	M	*
814/1	U.S Army, Ft. Monmouth	Main Post, Bldg. 814, Ft. Monmouth	14	4	4	M	29-26939
750/1	U.S Army, Ft. Monmouth	Main Post, Bldg. 750, Ft. Monmouth	15	5	7.5	M	29-28992
750/2	U.S Army, Ft. Monmouth	Main Post, Bldg. 750, Ft. Monmouth	15	5	7.5	M	29-28993
751/3	U.S Army, Ft. Monmouth	Main Post, Bldg. 750, Ft. Monmouth	15	5	7.5	M	29-28994
751/4	U.S Army, Ft. Monmouth	Main Post, Bldg. 750, Ft. Monmouth	15	5	7.5	M	29-28995
699/1	U.S Army, Ft. Monmouth	Main Post, Bldg. 699, Ft. Monmouth	15	2	4	M	29-236771
699/2	U.S Army, Ft. Monmouth	Main Post, Bldg. 699, Ft. Monmouth	17	1.5	5	M	29-236789
699/3	U.S Army, Ft. Monmouth	Main Post, Bldg. 699, Ft. Monmouth	15	2	4	M	29-236791
699/4	U.S Army, Ft. Monmouth	Main Post, Bldg. 699, Ft. Monmouth	20	2	3	M	29-236807
699/5	U.S Army, Ft. Monmouth	Main Post, Bldg. 699, Ft. Monmouth	15	3	5	M	29-238081
699/6	U.S Army, Ft. Monmouth	Main Post, Bldg. 699, Ft. Monmouth	15	1	4.5	M	29-238099
699/7	U.S Army, Ft. Monmouth	Main Post, Bldg. 699, Ft. Monmouth	15	3	3	M	29-238102
699/8	U.S Army, Ft. Monmouth	Main Post, Bldg. 699, Ft. Monmouth	15	2	4	M	29-238111

Table 20
Well Search Summary
Fort Monmouth Main Post
Fort Monmouth, New Jersey

Well ID Number	Well Owner	Well Address	Total Depth (feet bgs)	Casing Length (feet)	Static Water Elevation (feet bgs)	Use Code	NJDEP Permit Number
699/9	U.S Army, Ft. Monmouth	Main Post, Bldg. 699, Ft. Monmouth	15	2	3	M	29-24639
699/10	U.S Army, Ft. Monmouth	Main Post, Bldg. 699, Ft. Monmouth	14	1	3	M	29-24640
699/11	U.S Army, Ft. Monmouth	Main Post, Bldg. 699, Ft. Monmouth	15	*	*	R	29-28031
699/12	U.S Army, Ft. Monmouth	Main Post, Bldg. 699, Ft. Monmouth	15	5	7.1	M	29-28907
699/13	U.S Army, Ft. Monmouth	Main Post, Bldg. 699, Ft. Monmouth	5	*	*	M	**
699/14	U.S Army, Ft. Monmouth	Main Post, Bldg. 699, Ft. Monmouth	5.7	*	*	M	**
1076/1	U.S Army, Ft. Monmouth	Main Post, Bldg. 1076, Ft. Monmouth	15	3	5.5	M	29-26940
1076/2	U.S Army, Ft. Monmouth	Main Post, Bldg. 1076, Ft. Monmouth	14	4	5	M	29-26941
1076/3	U.S Army, Ft. Monmouth	Main Post, Bldg. 1076, Ft. Monmouth	15	5	6	M	29-26942
65A/1	U.S Army, Ft. Monmouth	Main Post, Bldg. 65A, Ft. Monmouth	12	2	4	M	29-26938
L/1	U.S Army, Ft. Monmouth	Main Post, Landfill, Ft. Monmouth	9.85	3.05	5.08	M	49-000551
L/2	U.S Army, Ft. Monmouth	Main Post, Landfill, Ft. Monmouth	16.99	1.30	*	M	49-000552
L/3	U.S Army, Ft. Monmouth	Main Post, Landfill, Ft. Monmouth	16.43	1.62	10.83	M	49-000553
L/4	U.S Army, Ft. Monmouth	Main Post, Landfill, Ft. Monmouth	10.25	1.90	*	M	49-000554
108/1	U.S Army, Ft. Monmouth	Main Post, Bldg. 108, Ft. Monmouth	13	3	4	M	29-29739
108/2	U.S Army, Ft. Monmouth	Main Post, Bldg. 108, Ft. Monmouth	13	3	4	M	29-29740
108/3	U.S Army, Ft. Monmouth	Main Post, Bldg. 108, Ft. Monmouth	13	3	4	M	29-29741
M2MW1	U.S Army, Ft. Monmouth	Main Post, Landfill M2, Ft. Monmouth	18	17	*	M	29-32584
M2MW2	U.S Army, Ft. Monmouth	Main Post, Landfill M2, Ft. Monmouth	18	17	*	M	29-32585
M2MW3	U.S Army, Ft. Monmouth	Main Post, Landfill M2, Ft. Monmouth	16	15.14	*	M	29-32586
M5MW12	U.S Army, Ft. Monmouth	Main Post, Landfill M5, Ft. Monmouth	15	10	*	M	29-39179
M5MW13	U.S Army, Ft. Monmouth	Main Post, Landfill M5, Ft. Monmouth	20	15	*	M	29-39178

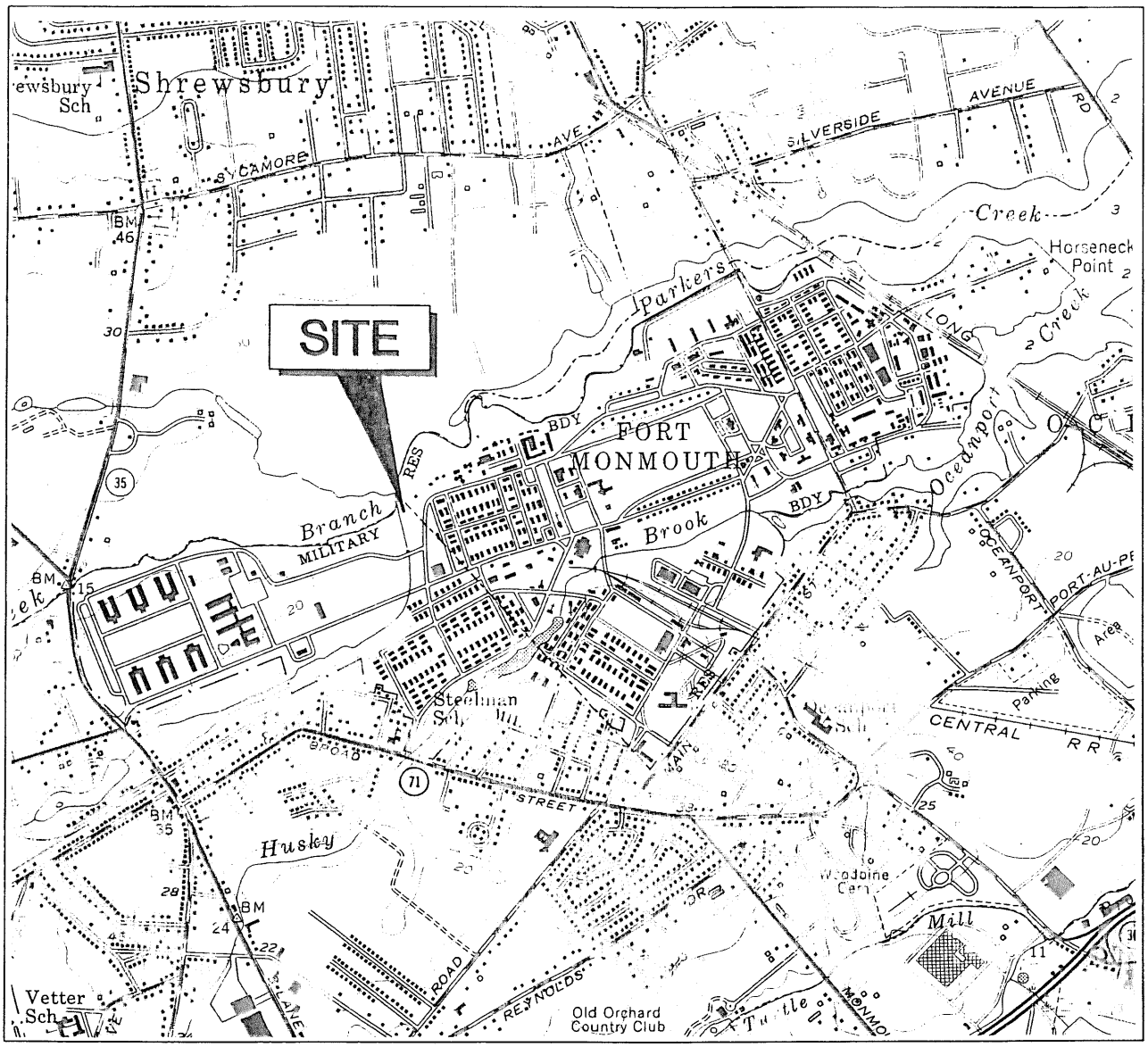
Table 20
Well Search Summary
Fort Monmouth Main Post
Fort Monmouth, New Jersey

Well ID Number	Well Owner	Well Address	Total Depth (feet bgs)	Casing Length (feet)	Static Water Elevation (feet bgs)	Use Code	NJDEP Permit Number
M5MW14	U.S Army, Ft. Monmouth	Main Post, Landfill M5, Ft. Monmouth	20	15	*	M	29-39177
M5MW15	U.S Army, Ft. Monmouth	Main Post, Landfill M5, Ft. Monmouth	20	15	*	M	29-40120
M5MW16	U.S Army, Ft. Monmouth	Main Post, Landfill M5, Ft. Monmouth	16	13	*	M	29-40121
M5MW18	U.S Army, Ft. Monmouth	Main Post, Landfill M5, Ft. Monmouth	18	15	*	M	29-40123
M5MW19	U.S Army, Ft. Monmouth	Main Post, Landfill M5, Ft. Monmouth	18	15	*	M	29-40124
M5MW20	U.S Army, Ft. Monmouth	Main Post, Landfill M5, Ft. Monmouth	14	10	*	M	29-40122
M5MW23	U.S Army, Ft. Monmouth	Main Post, Landfill M5, Ft. Monmouth	18	15	*	M	29-40125
M4MW7	U.S Army, Ft. Monmouth	Main Post, Landfill M4, Ft. Monmouth	16.01	15.55	*	M	29-32571
M4MW8	U.S Army, Ft. Monmouth	Main Post, Landfill M4, Ft. Monmouth	18.64	18.18	*	M	29-32572
M4MW9	U.S Army, Ft. Monmouth	Main Post, Landfill M4, Ft. Monmouth	22.23	22.69	*	M	29-32573
M5MW10	U.S Army, Ft. Monmouth	Main Post, Landfill M5, Ft. Monmouth	15.00	14.54	*	M	29-32574
M5MW11	U.S Army, Ft. Monmouth	Main Post, Landfill M5, Ft. Monmouth	15.00	14.85	*	M	29-32575
M5 MW25	U.S Army, Ft. Monmouth	Main Post, Landfill M5, Ft. Monmouth	25.00	15	*	M	29-40126
M8MW23	U.S Army, Ft. Monmouth	Main Post, Landfill M5, Ft. Monmouth	15.00	12	*	M	29-40128
M8MW24	U.S Army, Ft. Monmouth	Main Post, Landfill M5, Ft. Monmouth	18.00	15	*	M	29-40127
M8MW12	U.S Army, Ft. Monmouth	Main Post, Landfill M8, Ft. Monmouth	15.00	14.54	*	M	29-32560
M8MW13	U.S Army, Ft. Monmouth	Main Post, Landfill M8, Ft. Monmouth	15.00	14.54	*	M	29-32561
M8MW14	U.S Army, Ft. Monmouth	Main Post, Landfill M8, Ft. Monmouth	15.00	14.54	*	M	29-32562
M8MW15	U.S Army, Ft. Monmouth	Main Post, Landfill M8, Ft. Monmouth	15.00	14.54	*	M	29-32563
M12MW 16	U.S Army, Ft. Monmouth	Main Post, Landfill M12, Ft. Monmouth	14.50	14.01	*	M	29-32576
M12MW 17	U.S Army, Ft. Monmouth	Main Post, Landfill M12, Ft. Monmouth	14.50	14.35	*	M	29-32577
M12MW 18	U.S Army, Ft. Monmouth	Main Post, Landfill M12, Ft. Monmouth	14.50	14.04	*	M	29-32578

Table 20
Well Search Summary
Fort Monmouth Main Post
Fort Monmouth, New Jersey

Well ID Number	Well Owner	Well Address	Total Depth (feet bgs)	Casing Length (feet)	Static Water Elevation (feet bgs)	Use Code	NJDEP Permit Number
M14MW 19	U.S Army, Ft. Monmouth	Main Post, Landfill M14, Ft. Monmouth	15.00	14.54	*	M	29-32579
M14MW 20	U.S Army, Ft. Monmouth	Main Post, Landfill M14, Ft. Monmouth	14.50	14.05	*	M	29-32580
M14MW 21	U.S Army, Ft. Monmouth	Main Post, Landfill M14, Ft. Monmouth	16.00	15.54	*	M	29-32581
M16MW 22	U.S Army, Ft. Monmouth	Main Post, Landfill M16, Ft. Monmouth	14.50	14.04	*	M	29-32582
M18MW 24	U.S Army, Ft. Monmouth	Main Post, Landfill M18, Ft. Monmouth	15.00	14.54	*	M	29-32565
M18MW 25	U.S Army, Ft. Monmouth	Main Post, Landfill M18, Ft. Monmouth	15.00	14.54	*	M	29-32566
B1-MW1B	U.S Army, Ft. Monmouth	Main Post, Ft. Monmouth	14.00	13.54	*	M	29-32587
B2-MW2B	U.S Army, Ft. Monmouth	Main Post, Ft. Monmouth	20.00	19.54	*	M	29-32588
B3-MW3B	U.S Army, Ft. Monmouth	Main Post, Ft. Monmouth	26.00	25.54	*	M	29-32589
B4-MW4B	U.S Army, Ft. Monmouth	Main Post, Ft. Monmouth	15.00	14.54	*	M	29-32567
B5-MW5B	U.S Army, Ft. Monmouth	Main Post, Ft. Monmouth	14.50	14.04	*	M	29-32583

* Information Not Applicable
D: Domestic well
E: Recovery/ Decontamination Pollution Control/ Leachate with Pump Capacity
G: Irrigation well
M: Monitoring well
R: Replacement well
S: Sealed well



N

500 1000 0 2000

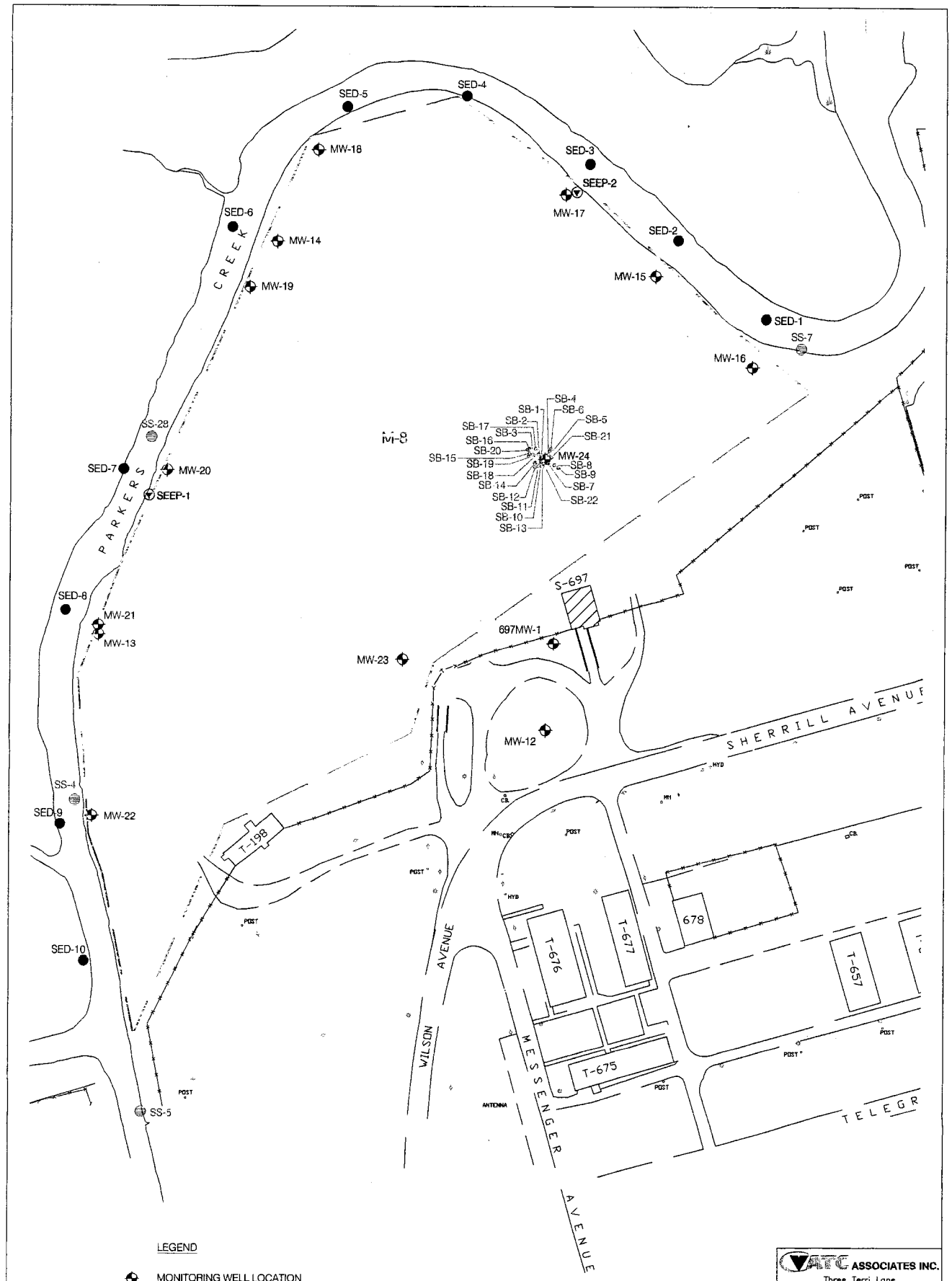
Scale in Feet

NEW JERSEY
QUADRANGLE LOCATION

ATC ASSOCIATES INC.
Three Terri Lane
Burlington, NJ 08016

PROJECT TITLE:	Landfill M-8
DRAWING TITLE:	Site Location Map
LOCATION:	Fort Monmouth Army Base Monmouth County, NJ
DRAWN BY:	JES
SURVEYED BY:	
CHECKED BY:	ASL
PROJECT NO.:	02711.00002
DATE:	07/28/99
SCALE:	AS NOTED
APPROVED BY:	PMN
DRAWING NO.	Figure 1

Source: USGS Topographic Map, Long Branch, New Jersey Quadrangle



LEGEND

- MONITORING WELL LOCATION
- SOIL BORING LOCATION
- SEDIMENT SAMPLE LOCATION
- SURFACE WATER SAMPLING LOCATION
- SEEPS LOCATION
- APPROXIMATE BOUNDARY OF LANDFILL M-8

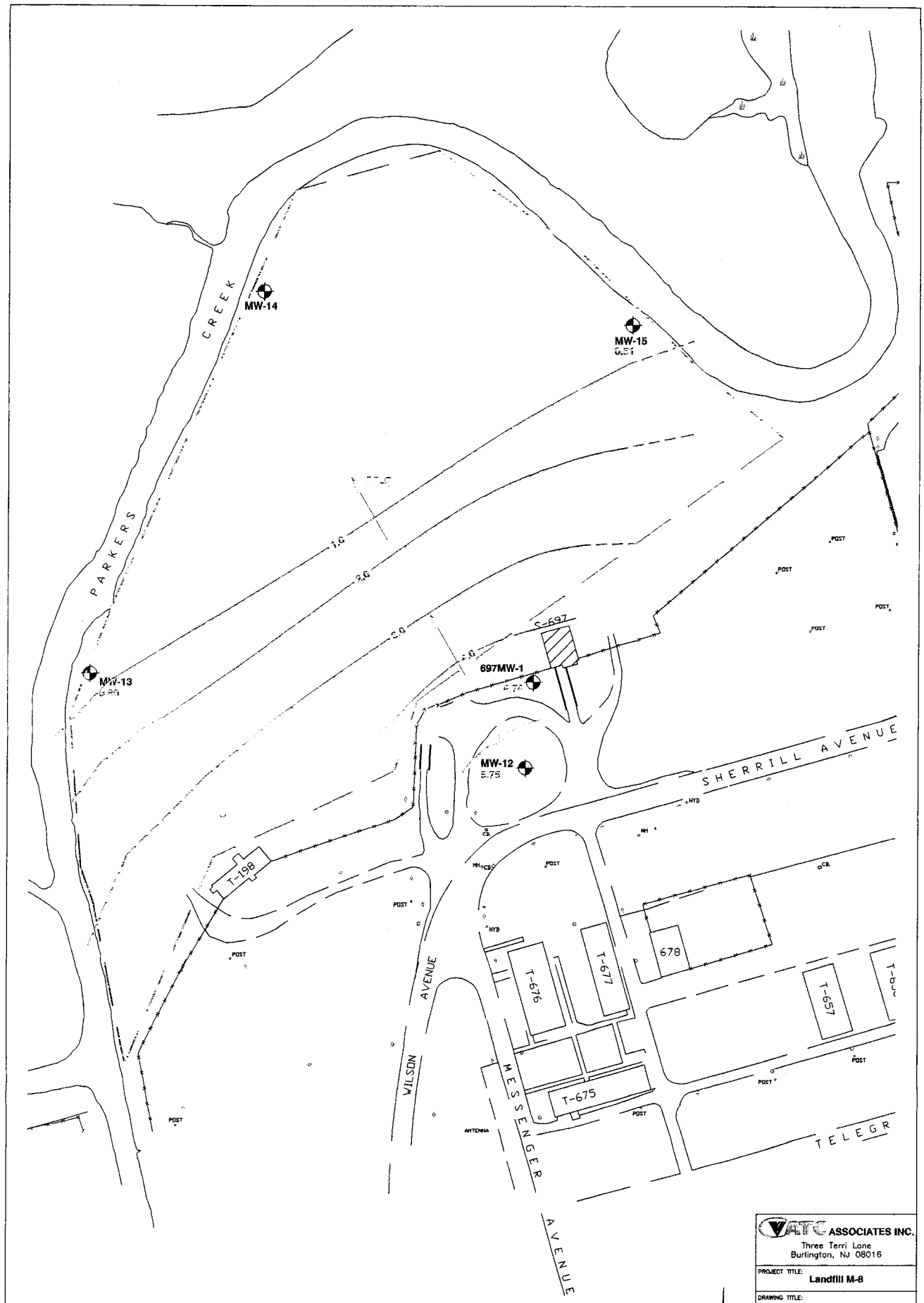
ATC ASSOCIATES INC.
Three Terri Lane
Burlington, NJ 08016

PROJECT TITLE: Landfill M-8

DRAWING TITLE: Site Map

LOCATION: Fort Monmouth Army Base
Monmouth County, NJ

DRAWN BY:	JES	DRAWING NO.
SURVEYED BY:		Figure 2
CHECKED BY:	ASL	
PROJECT NO.:	02711.00002	
DATE:	8/10/99	
SCALE:	1" = 100'	
APPROVED BY:	PMN	



LEGEND

- MW-15 MONITORING WELL LOCATION
- 5.71 GROUNDWATER ELEVATION
- 2.0 GROUNDWATER ELEVATION CONTOUR
- GROUNDWATER FLOW DIRECTION

NOTE

THE GROUNDWATER ELEVATION DATA FROM MW-14 WAS EXCLUDED FROM THIS CONTOUR CALCULATION.

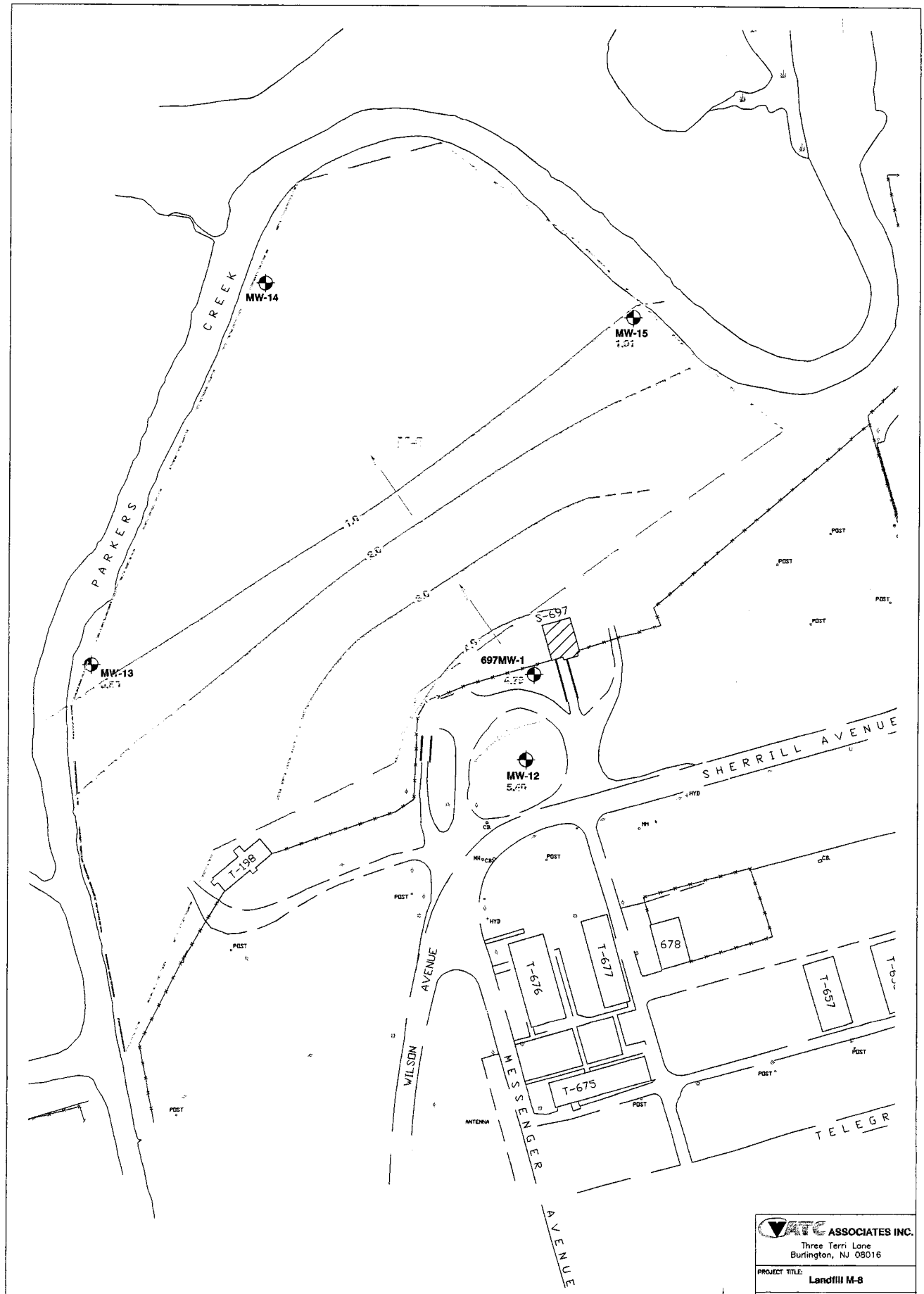
VATC ASSOCIATES INC.
Three Terri Lane
Burlington, NJ 08016

PROJECT TITLE: **Landfill M-8**

DRAWING TITLE: **Groundwater Elevation Contour Map June 24, 1997**

LOCATION: **Fort Monmouth Army Base Monmouth County, NJ**

DRAWN BY:	JES	DRAWING NO.
SURVEYED BY:		
CHECKED BY:	ASL	
PROJECT NO.:	02711.00002	Figure 3
DATE:	8/11/99	
SCALE:	1" = 100'	
APPROVED BY:	PMN	



LEGEND

- MW-15 MONITORING WELL LOCATION
- 3.91 GROUNDWATER ELEVATION
- 2.0 GROUNDWATER ELEVATION CONTOUR
- GROUNDWATER FLOW DIRECTION

NOTE

THE GROUNDWATER ELEVATION DATA FROM MW-14 WAS EXCLUDED FROM THIS CONTOUR CALCULATION.

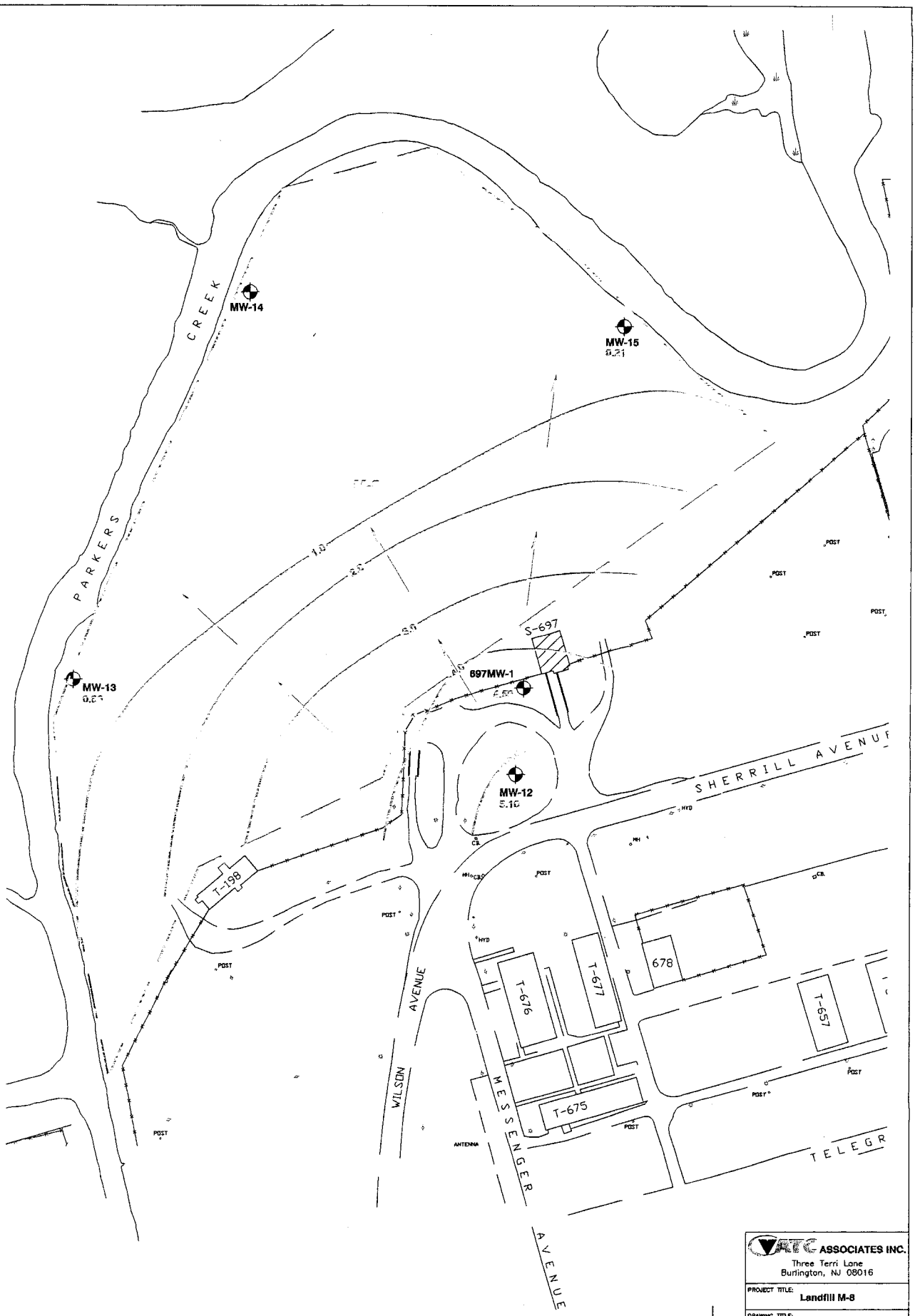
ATC ASSOCIATES INC.
Three Terri Lane
Burlington, NJ 08016

PROJECT TITLE: Landfill M-8

DRAWING TITLE: Groundwater Elevation Contour Map August 27, 1997

LOCATION: Fort Monmouth Army Base Monmouth County, NJ

DRAWN BY:	JES	DRAWING NO.
SURVEYED BY:		Figure 4
CHECKED BY:	ASL	
PROJECT NO.:	02711.00002	
DATE:	8/11/99	
SCALE:	1" = 100'	
APPROVED BY:	PMN	



LEGEND

- MW-15 MONITORING WELL LOCATION
- 3.21 GROUNDWATER ELEVATION
- 2.0 GROUNDWATER ELEVATION CONTOUR
- GROUNDWATER FLOW DIRECTION

NOTE

THE GROUNDWATER ELEVATION DATA FROM MW-14 WAS EXCLUDED FROM THIS CONTOUR CALCULATION.

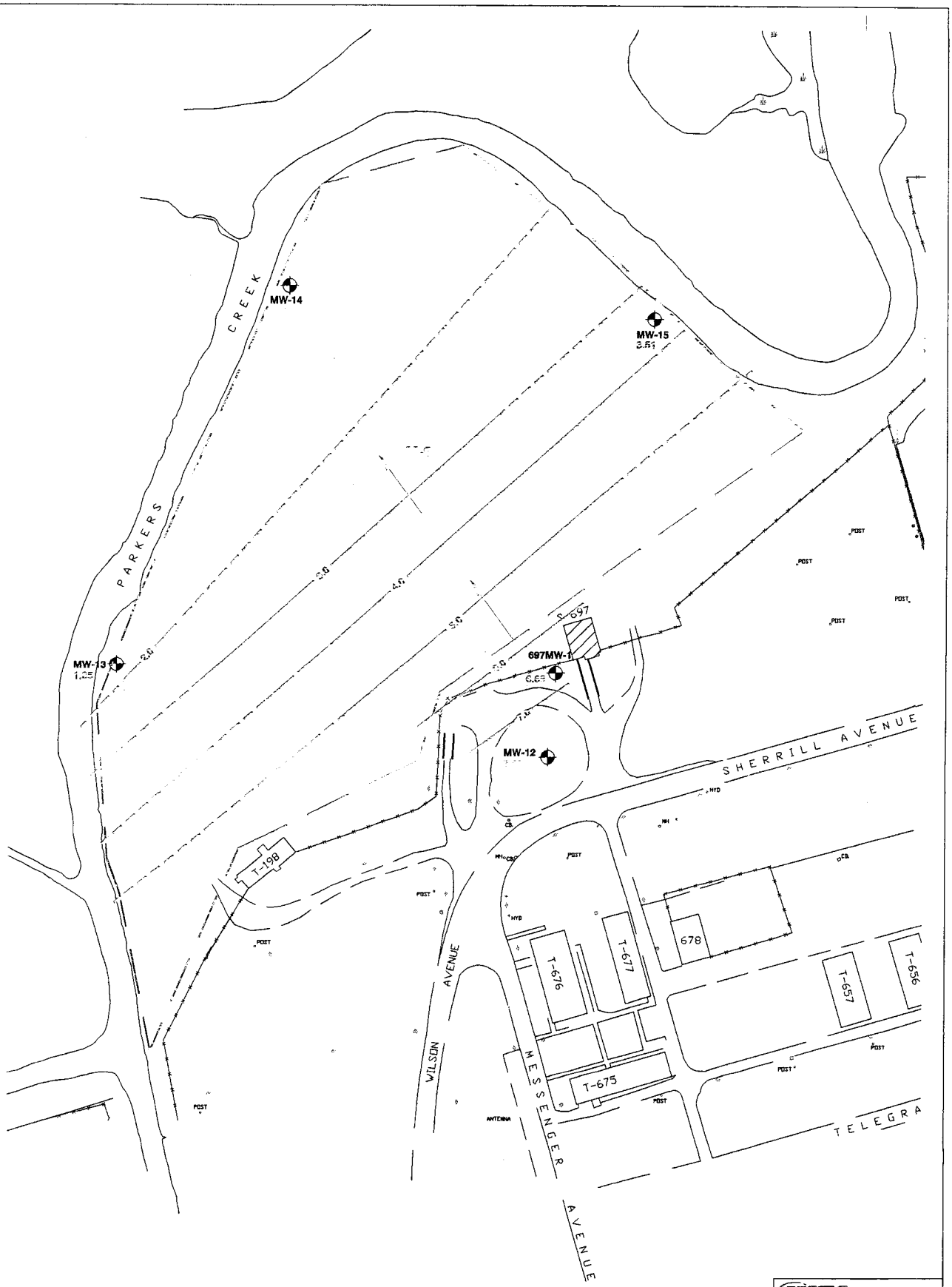
VREC ASSOCIATES INC.
Three Terri Lane
Burlington, NJ 08016

PROJECT TITLE: Landfill M-8

DRAWING TITLE: Groundwater Elevation Contour Map October 31, 1997

LOCATION: Fort Monmouth Army Base Monmouth County, NJ

DRAWN BY:	JES	DRAWING NO.
SURVEYED BY:		
CHECKED BY:	ASL	
PROJECT NO.:	02711.00002	Figure 5
DATE:	8/11/99	
SCALE:	1" = 100'	
APPROVED BY:	PWN	



LEGEND

- MW-15 MONITORING WELL LOCATION
- 3.51 GROUNDWATER ELEVATION
- 3.0 GROUNDWATER ELEVATION CONTOUR
- GROUNDWATER FLOW DIRECTION

NOTE

THE GROUNDWATER ELEVATION DATA FROM MW-14 WAS EXCLUDED FROM THIS CONTOUR CALCULATION.

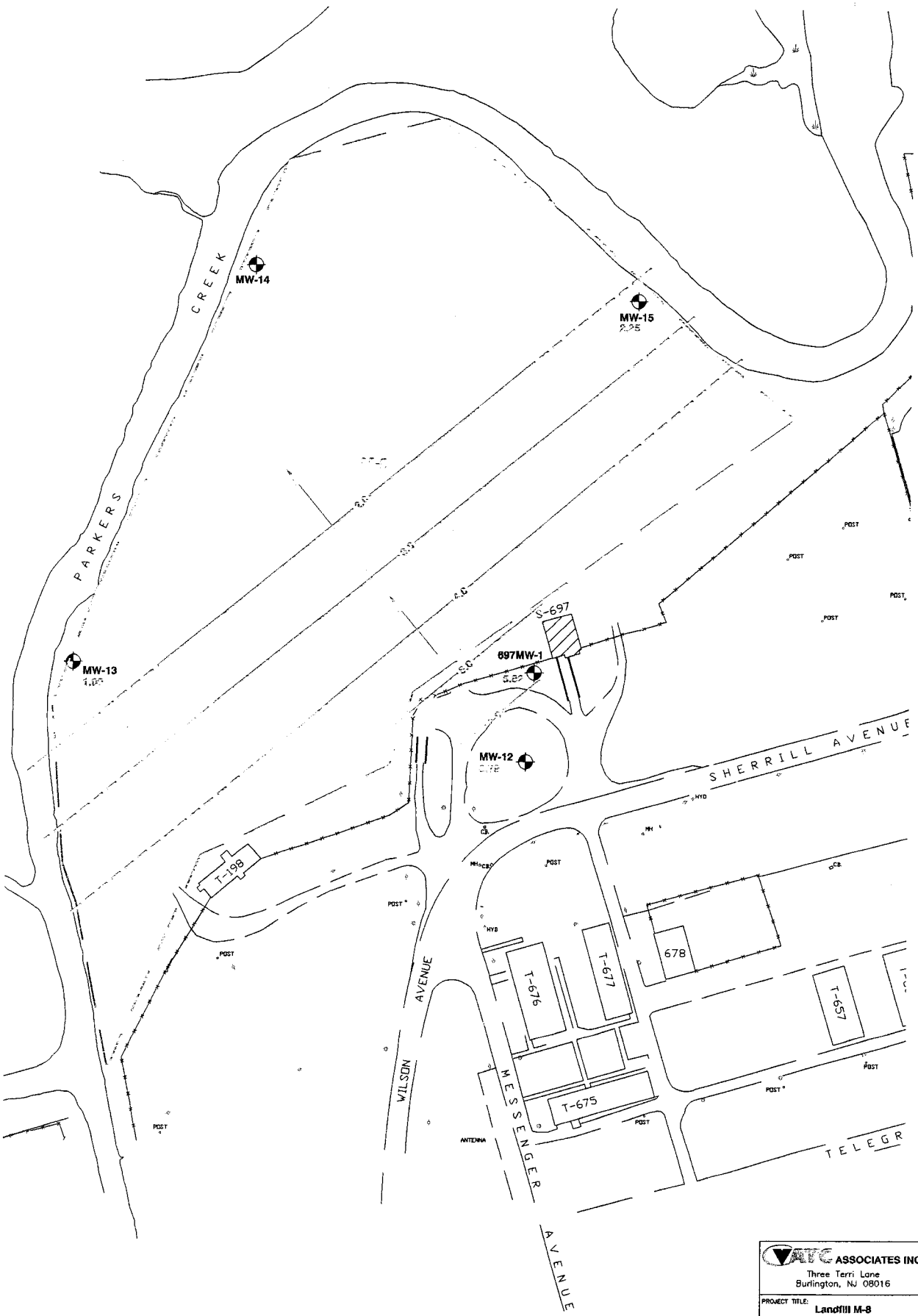
VAC ASSOCIATES INC.
Three Terri Lane
Burlington, NJ 08016

PROJECT TITLE: **Landfill M-8**

DRAWING TITLE: **Groundwater Elevation Contour Map February 25, 1998**

LOCATION: **Fort Monmouth Army Base Monmouth County, NJ**

DRAWN BY:	JES	DRAWING NO.
SURVEYED BY:		
CHECKED BY:	ASL	
PROJECT NO.:	02711.00002	Figure 6
DATE:	8/11/99	
SCALE:	1" = 100'	
APPROVED BY:	PMN	



LEGEND

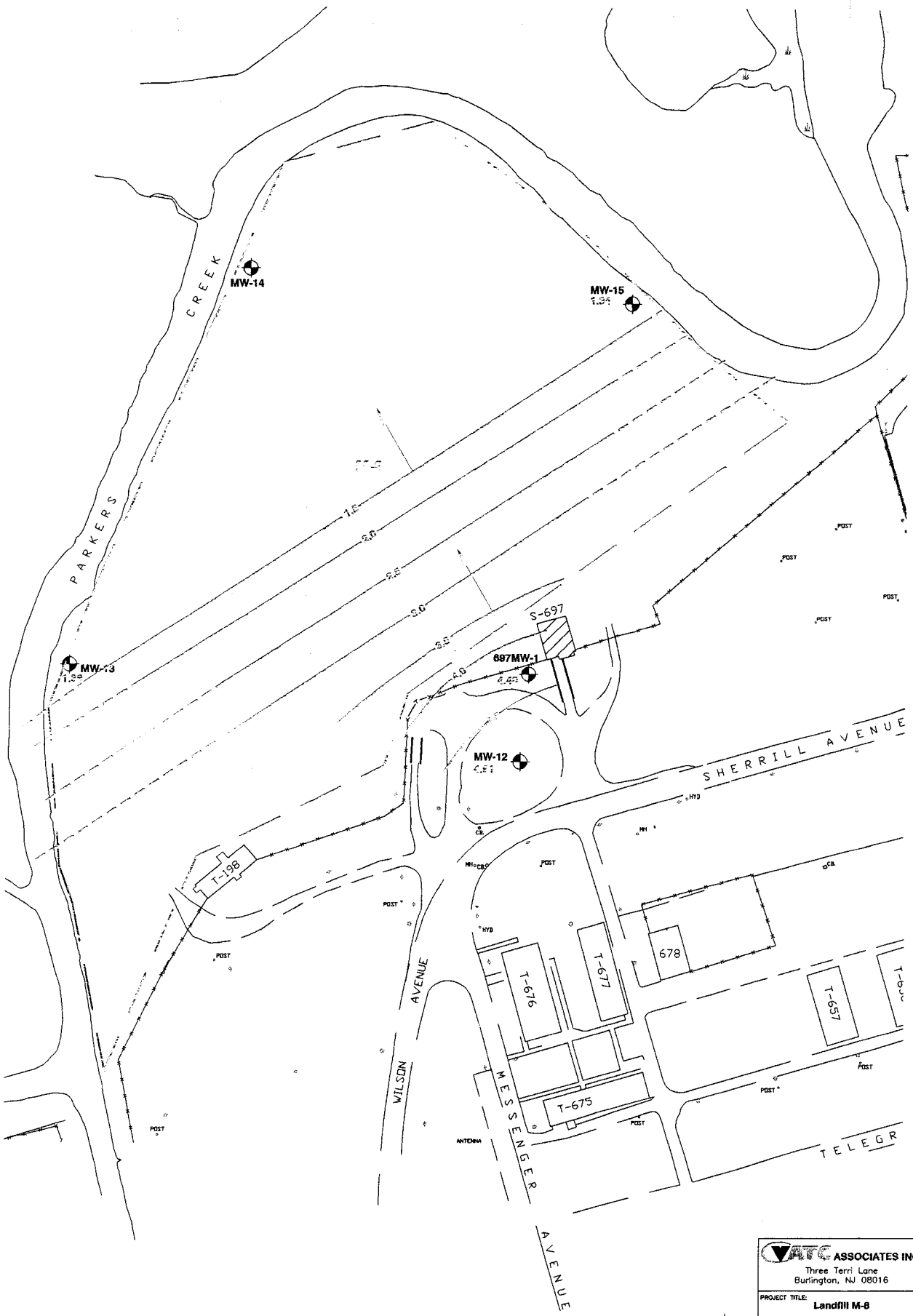
- MW-15 MONITORING WELL LOCATION
- 3.91 GROUNDWATER ELEVATION
- 2.0 GROUNDWATER ELEVATION CONTOUR
- GROUNDWATER FLOW DIRECTION

NOTE

THE GROUNDWATER ELEVATION DATA FROM MW-14 WAS EXCLUDED FROM THIS CONTOUR CALCULATION.

ATC ASSOCIATES INC.
Three Terri Lane
Burlington, NJ 08016

PROJECT TITLE:	Landfill M-8
DRAWING TITLE:	Groundwater Elevation Contour Map June 4, 1998
LOCATION:	Fort Monmouth Army Base Monmouth County, NJ
DRAWN BY:	JES
SURVEYED BY:	
CHECKED BY:	ASL
PROJECT NO.:	02711.00002
DATE:	8/11/99
SCALE:	1" = 100'
APPROVED BY:	PMN
DRAWING NO.	Figure 7



LEGEND

- MW-15 MONITORING WELL LOCATION
- 3.71 GROUNDWATER ELEVATION
- 2.5 GROUNDWATER ELEVATION CONTOUR
- GROUNDWATER FLOW DIRECTION

NOTE

THE GROUNDWATER ELEVATION DATA FROM MW-14 WAS EXCLUDED FROM THIS CONTOUR CALCULATION.

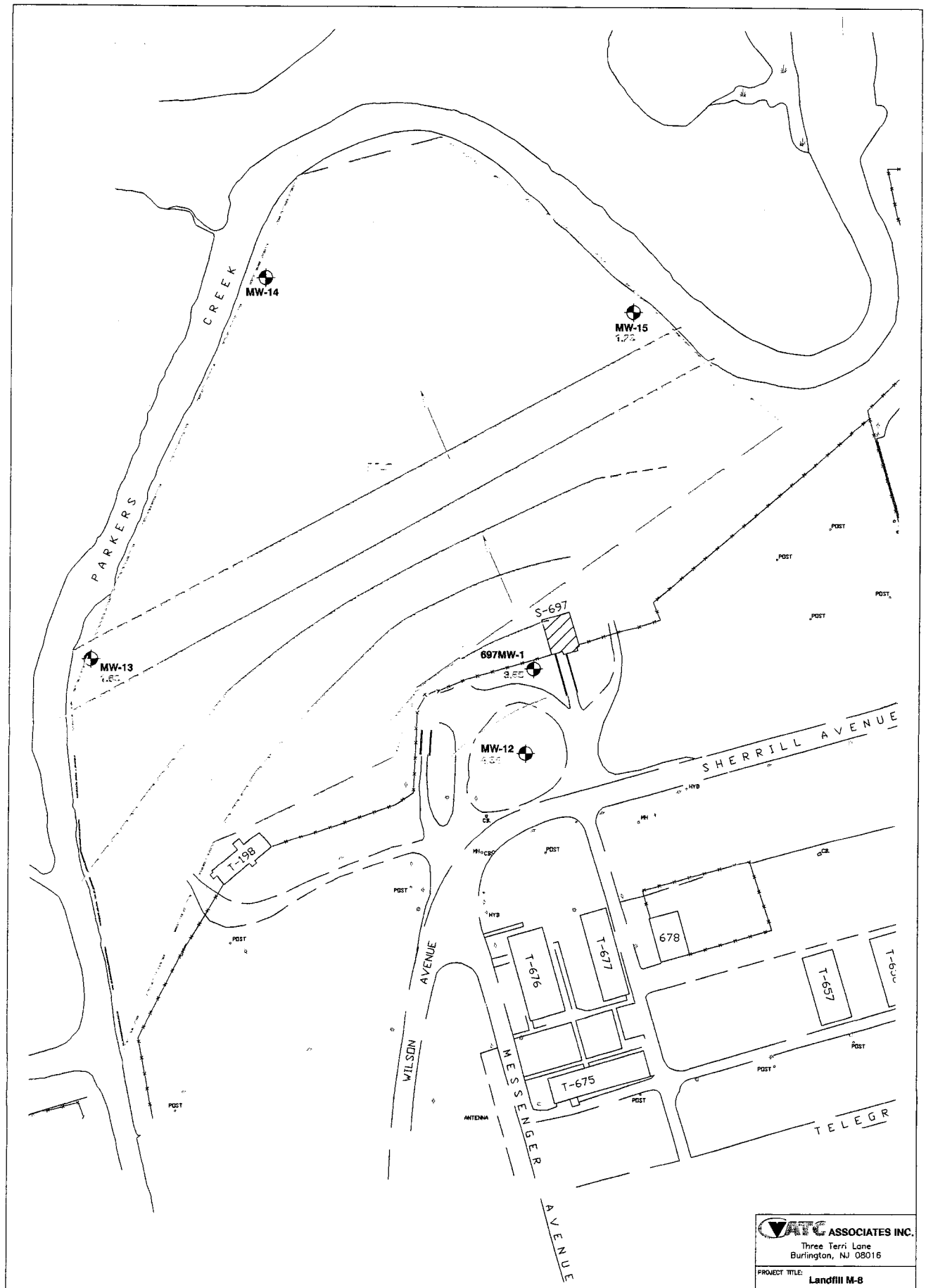
ATC ASSOCIATES INC.
Three Terri Lane
Burlington, NJ 08016

PROJECT TITLE: Landfill M-8

DRAWING TITLE: Groundwater Elevation Contour Map August 28, 1998

LOCATION: Fort Monmouth Army Base Monmouth County, NJ

DRAWN BY:	JES	DRAWING NO.
SURVEYED BY:		Figure 8
CHECKED BY:	ASL	
PROJECT NO.:	02711.00002	
DATE:	8/11/99	
SCALE:	1" = 100'	
APPROVED BY:	PMN	



LEGEND

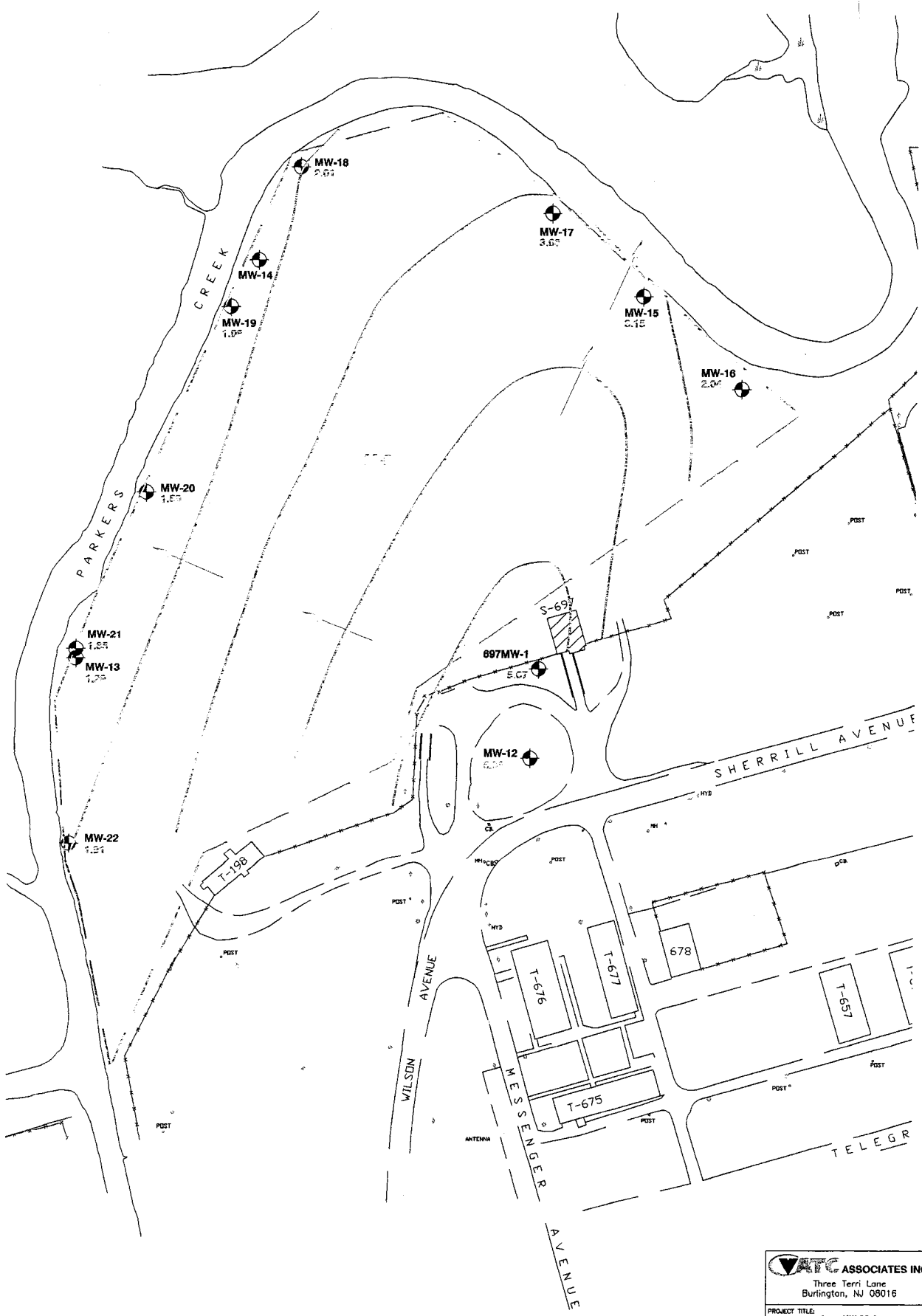
- MW-15 MONITORING WELL LOCATION
- 3.21 GROUNDWATER ELEVATION
- 2.0 GROUNDWATER ELEVATION CONTOUR
- GROUNDWATER FLOW DIRECTION

NOTE

THE GROUNDWATER ELEVATION DATA FROM MW-14 WAS EXCLUDED FROM THIS CONTOUR CALCULATION.

ATC ASSOCIATES INC.
Three Terri Lane
Burlington, NJ 08016

PROJECT TITLE:	Landfill M-8
DRAWING TITLE:	Groundwater Elevation Contour Map November 4, 1998
LOCATION:	Fort Monmouth Army Base Monmouth County, NJ
DRAWN BY:	JES
SURVEYED BY:	
CHECKED BY:	ASL
PROJECT NO.:	02711.00002
DATE:	8/11/99
SCALE:	1" = 100'
APPROVED BY:	PMN
DRAWING NO.	Figure 9



LEGEND

- MW-15 MONITORING WELL LOCATION
- 3.21 GROUNDWATER ELEVATION
- 2.0 GROUNDWATER ELEVATION CONTOUR
- GROUNDWATER FLOW DIRECTION

NOTE

THE GROUNDWATER ELEVATION DATA FROM MW-14 WAS EXCLUDED FROM THIS CONTOUR CALCULATION.

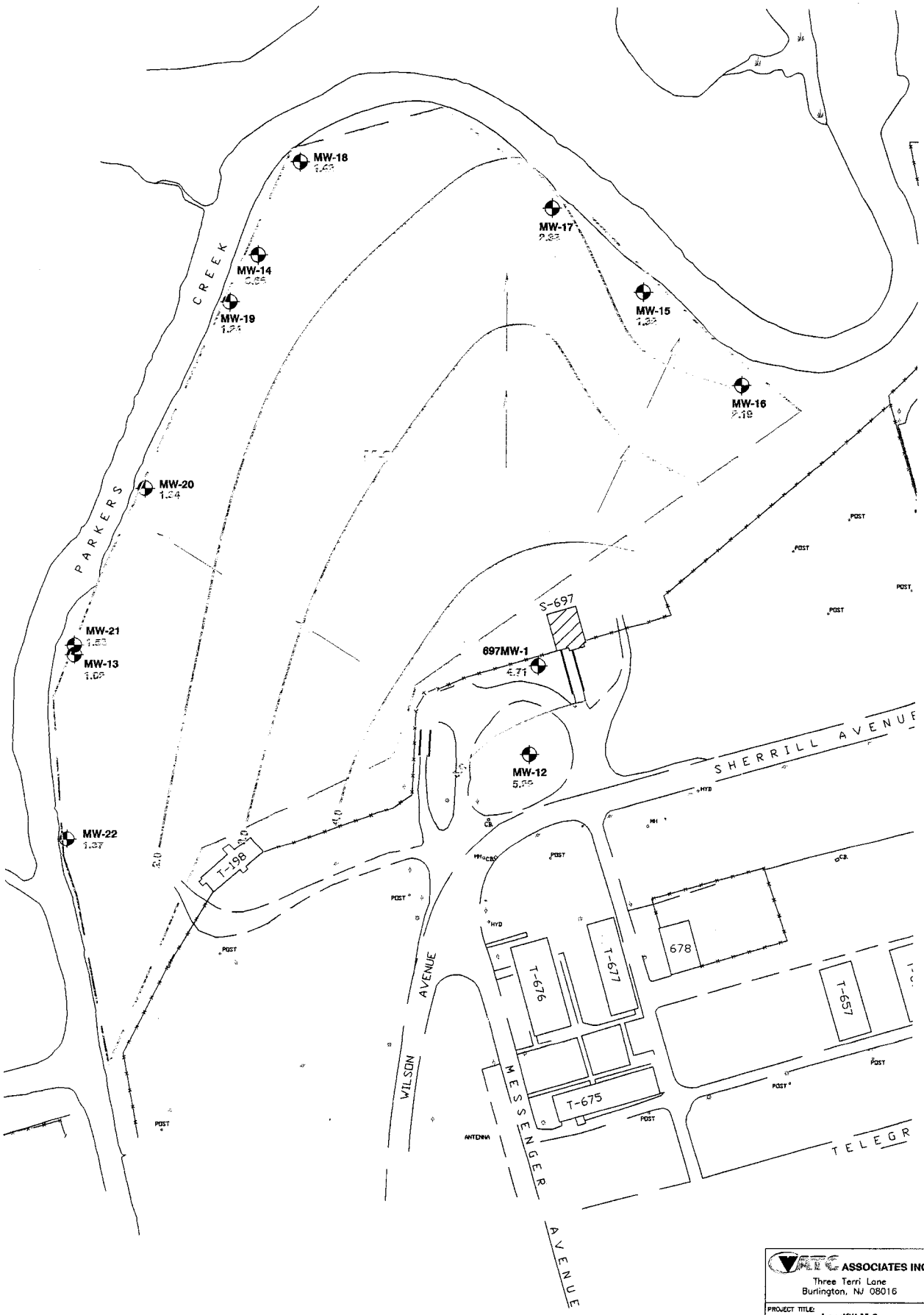
VAFC ASSOCIATES INC.
Three Terri Lane
Burlington, NJ 08016

PROJECT TITLE: **Landfill M-8**

DRAWING TITLE: **Groundwater Elevation Contour Map January 27, 1999**

LOCATION: **Fort Monmouth Army Base Monmouth County, NJ**

DRAWN BY:	JES	DRAWING NO.
SURVEYED BY:		
CHECKED BY:	ASL	
PROJECT NO.:	02711.000002	Figure 10
DATE:	8/11/99	
SCALE:	1" = 100'	
APPROVED BY:	PMN	



LEGEND

- MW-15 MONITORING WELL LOCATION
- 3.21 GROUNDWATER ELEVATION
- 2.0 GROUNDWATER ELEVATION CONTOUR
- GROUNDWATER FLOW DIRECTION

NOTE

THE GROUNDWATER ELEVATION DATA FROM MW-14 WAS EXCLUDED FROM THIS CONTOUR CALCULATION.

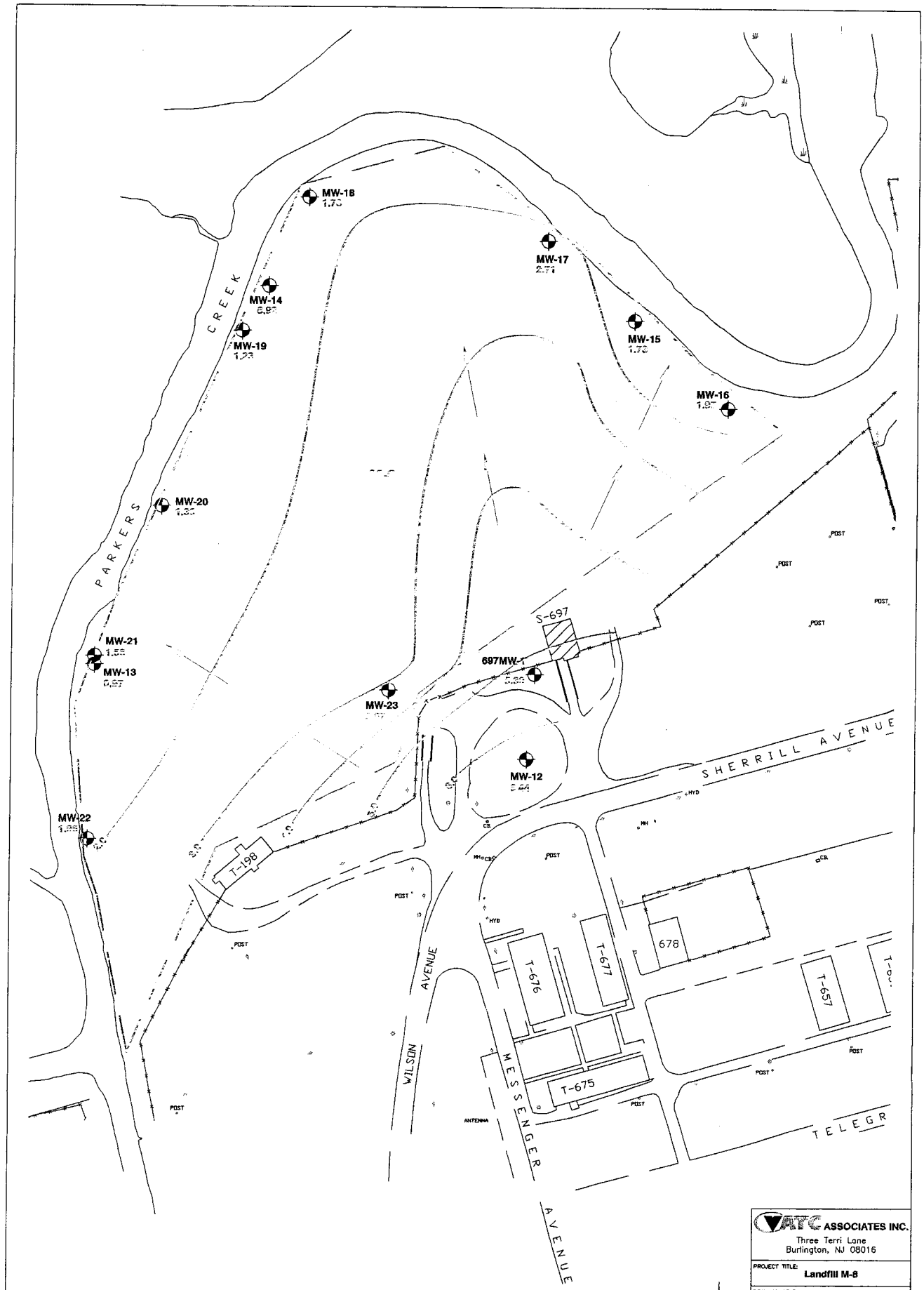
ATC ASSOCIATES INC.
Three Terri Lane
Burlington, NJ 08016

PROJECT TITLE: Landfill M-8

DRAWING TITLE: Groundwater Elevation Contour Map June 22, 1999

LOCATION: Fort Monmouth Army Base Monmouth County, NJ

DRAWN BY:	JES	DRAWING NO.
SURVEYED BY:		Figure 11
CHECKED BY:	ASL	
PROJECT NO.:	02711.00002	
DATE:	06/30/00	
SCALE:	1" = 100'	
APPROVED BY:	PMN	



LEGEND

- MW-15 MONITORING WELL LOCATION
- 5.91 GROUNDWATER ELEVATION
- 0.0 GROUNDWATER ELEVATION CONTOUR
- GROUNDWATER FLOW DIRECTION

NOTE

THE GROUNDWATER ELEVATION DATA FROM MW-14 WAS EXCLUDED FROM THIS CONTOUR CALCULATION.

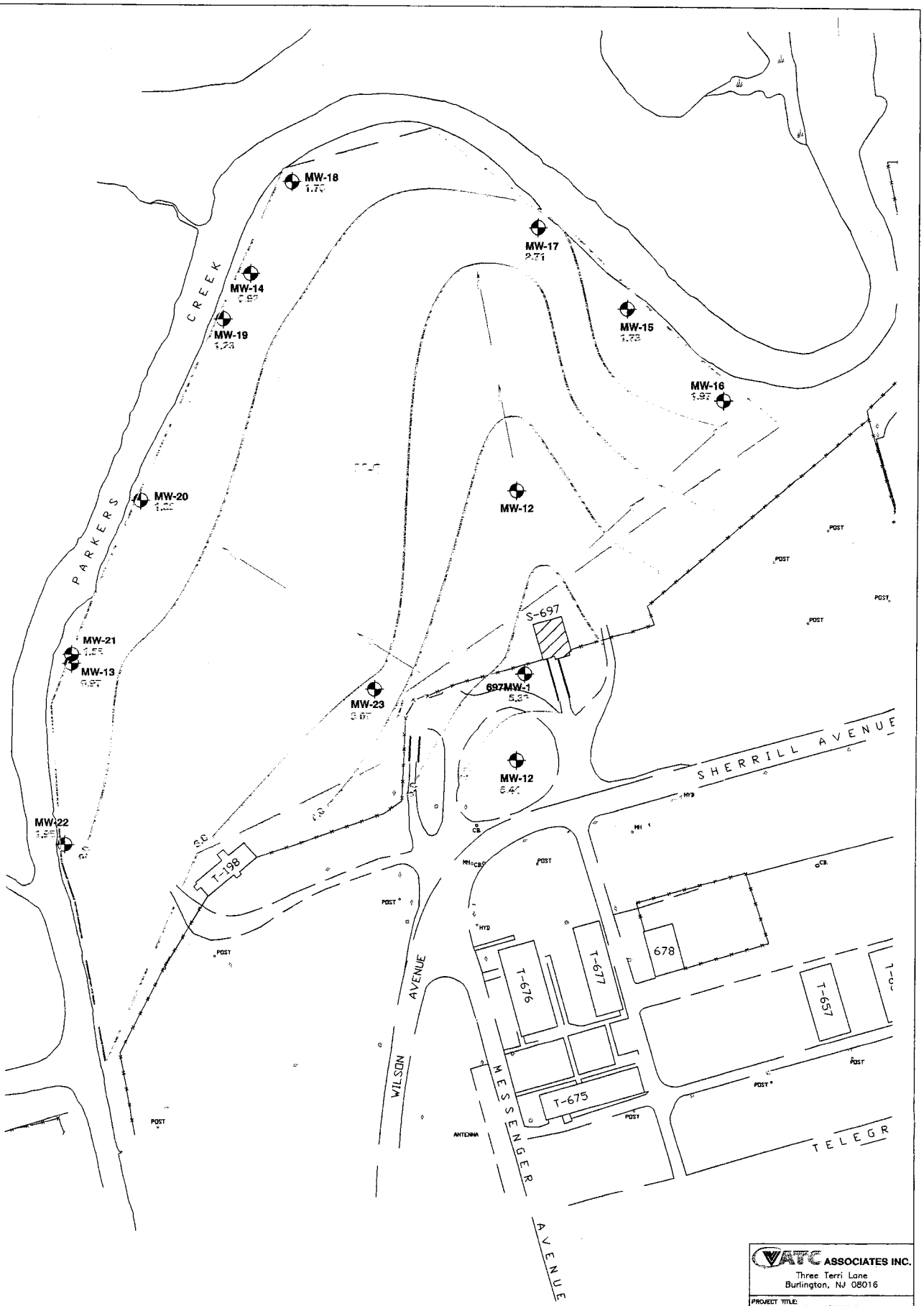
ATC ASSOCIATES INC.
Three Terri Lane
Burlington, NJ 08016

PROJECT TITLE: Landfill M-8

DRAWING TITLE: Groundwater Elevation Contour Map September 23, 1999

LOCATION: Fort Monmouth Army Base Monmouth County, NJ

DRAWN BY:	JES	DRAWING NO.
SURVEYED BY:		Figure 12
CHECKED BY:	ASL	
PROJECT NO.:	02711.00002	
DATE:	06/30/00	
SCALE:	1" = 100'	
APPROVED BY:	PMN	



LEGEND

- MW-15 MONITORING WELL LOCATION
- 3.91 GROUNDWATER ELEVATION
- 2.0 GROUNDWATER ELEVATION CONTOUR
- GROUNDWATER FLOW DIRECTION

NOTE

THE GROUNDWATER ELEVATION DATA FROM MW-14 WAS EXCLUDED FROM THIS CONTOUR CALCULATION.

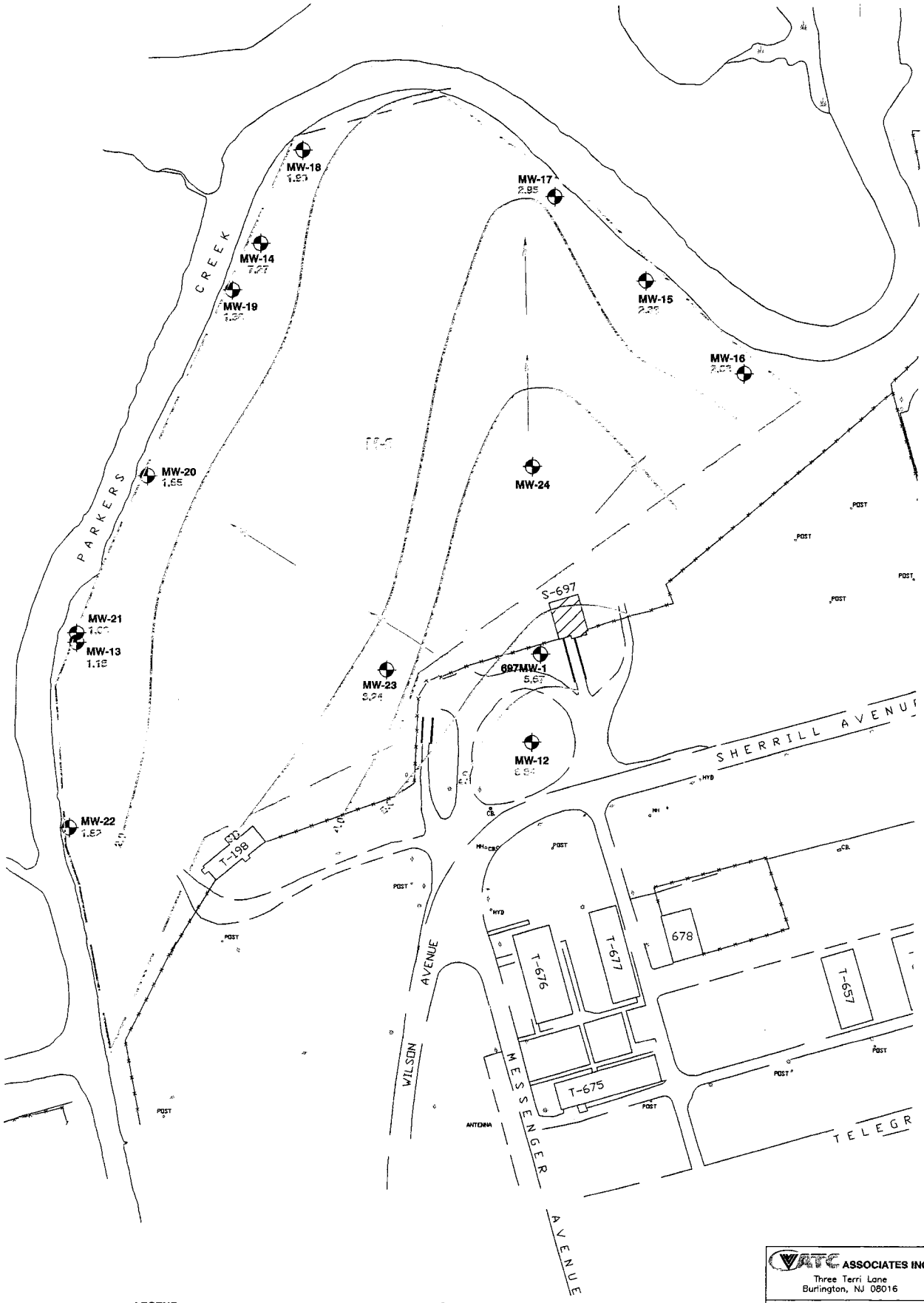
VAC ASSOCIATES INC.
Three Terri Lane
Burlington, NJ 08016

PROJECT TITLE: Landfill M-8

DRAWING TITLE: Groundwater Elevation Contour Map December 28, 1999

LOCATION: Fort Monmouth Army Base Monmouth County, NJ

DRAWN BY:	JCS	DRAWING NO.
SURVEYED BY:		
CHECKED BY:	ASL	
PROJECT NO.:	02711.00002	Figure 13
DATE:	06/30/00	
SCALE:	1" = 100'	
APPROVED BY:	PMN	



LEGEND

- MW-15 MONITORING WELL LOCATION
- 3.23 GROUNDWATER ELEVATION
- 2.6 GROUNDWATER ELEVATION CONTOUR
- GROUNDWATER FLOW DIRECTION

NOTE

THE GROUNDWATER ELEVATION DATA FROM MW-14 WAS EXCLUDED FROM THIS CONTOUR CALCULATION.

ATC ASSOCIATES INC.
Three Terri Lane
Burlington, NJ 08016

PROJECT TITLE:	Landfill M-8
DRAWING TITLE:	Groundwater Elevation Contour Map March 15, 2000
LOCATION:	Fort Monmouth Army Base Monmouth County, NJ
DRAWN BY:	JES
SURVEYED BY:	
CHECKED BY:	ASL
PROJECT NO.:	02711.00002
DATE:	06/30/00
SCALE:	1" = 100'
APPROVED BY:	PMN
DRAWING NO.	Figure 14

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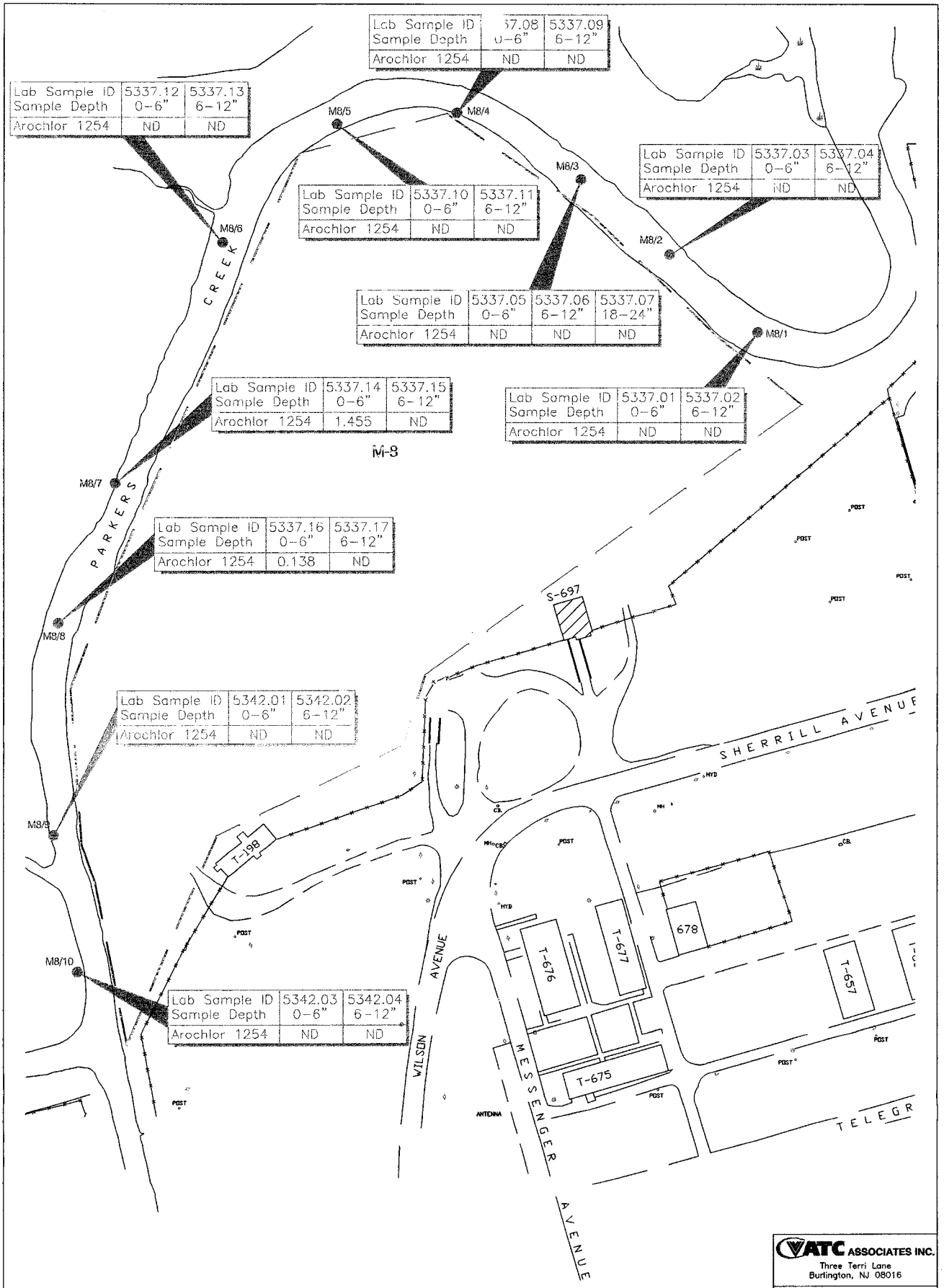


LEGEND

SEDIMENT SAMPLE LOCATION

APPROXIMATE BOUNDARY OF LANDFILL M-8

NOTE

LOWEST EFFECTS LEVEL FOR AROCHLOR 1254 IS 0.060 mg/kg.

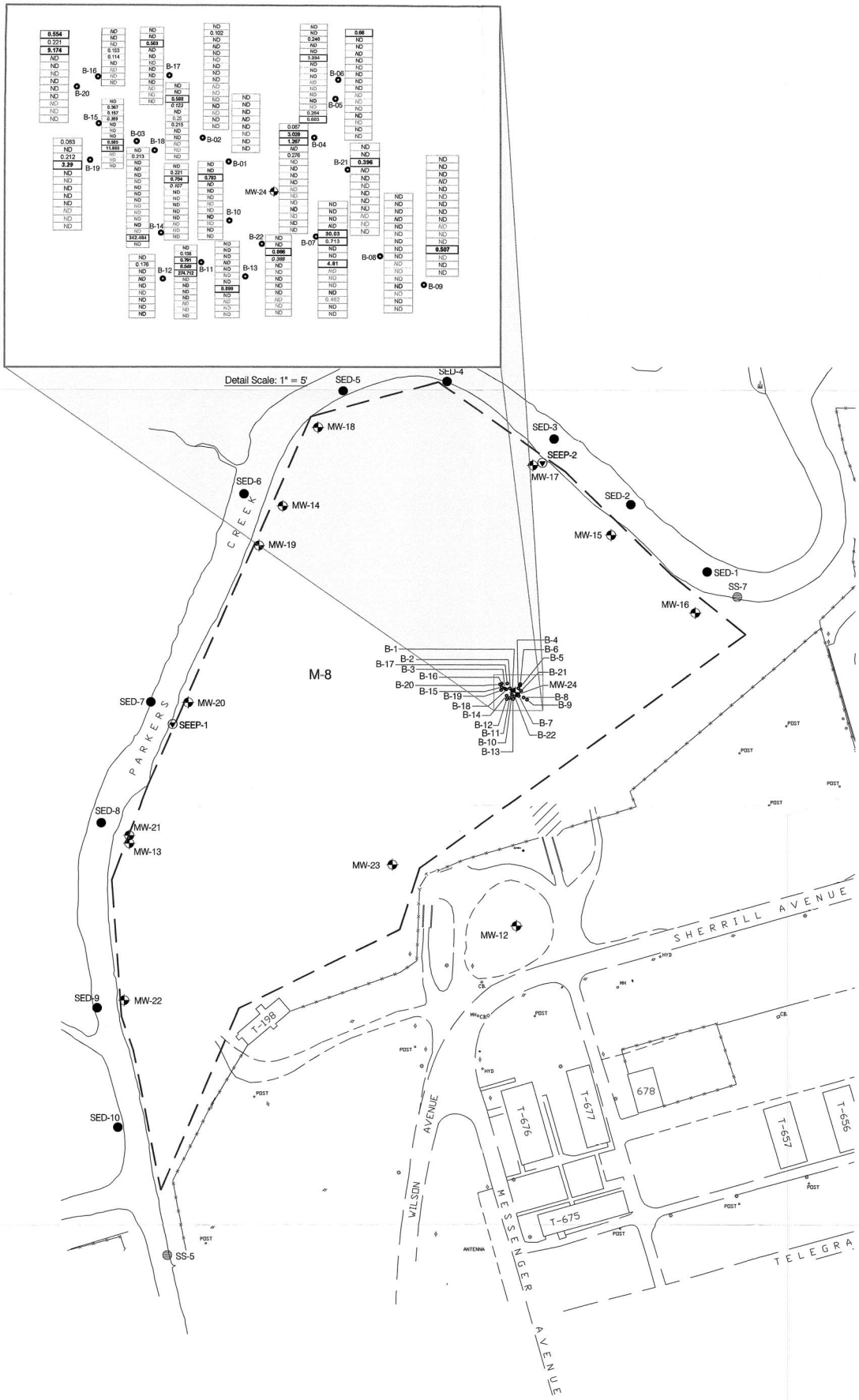
ATC ASSOCIATES INC.
Three Terri Lane
Burlington, NJ 08016

PROJECT TITLE: Landfill M-8

DRAWING TITLE: Stream Sediment Analytical Results Map April 12/13, 2000

LOCATION: Fort Monmouth Army Base Monmouth County, NJ

DRAWN BY:	JES	DRAWING NO.
SURVEYED BY:		
CHECKED BY:	ASL	
PROJECT NO.:	02711.00002	Figure 16
DATE:	06/30/00	
SCALE:	1" = 100'	
APPROVED BY:	PMN	



LEGEND

B-14 ● SOIL SAMPLE LOCATION

ND	0-6"
0.213	12-18"
ND	24-30"
ND	36-42"
ND	48-54"
ND	60-66"
ND	72-76"
ND	84-90"
ND	96-102"
ND	108-114"
ND	120-126"
ND	132-138"
ND	144-150"
ND	156-162"
342.484	168-174"
ND	185-186"

NJDEP RESIDENTIAL DIRECT CONTACT SOIL CLEAN-UP CRITERIA EXCEEDANCES

LEGEND CONTINUED

- MONITORING WELL LOCATION
- SOIL BORING LOCATION
- SEDIMENT SAMPLE LOCATION
- SURFACE WATER SAMPLING LOCATION
- SEEPS LOCATION
- APPROXIMATE BOUNDARY OF LANDFILL M-8

NOTES

1. ALL SAMPLES IN MILLIGRAMS PER KILOGRAM.
2. RDCSCC = 0.49 mg/kg
3. 0.213 = TOTAL PCB CONCENTRATION
4. ND - NONE DETECTED

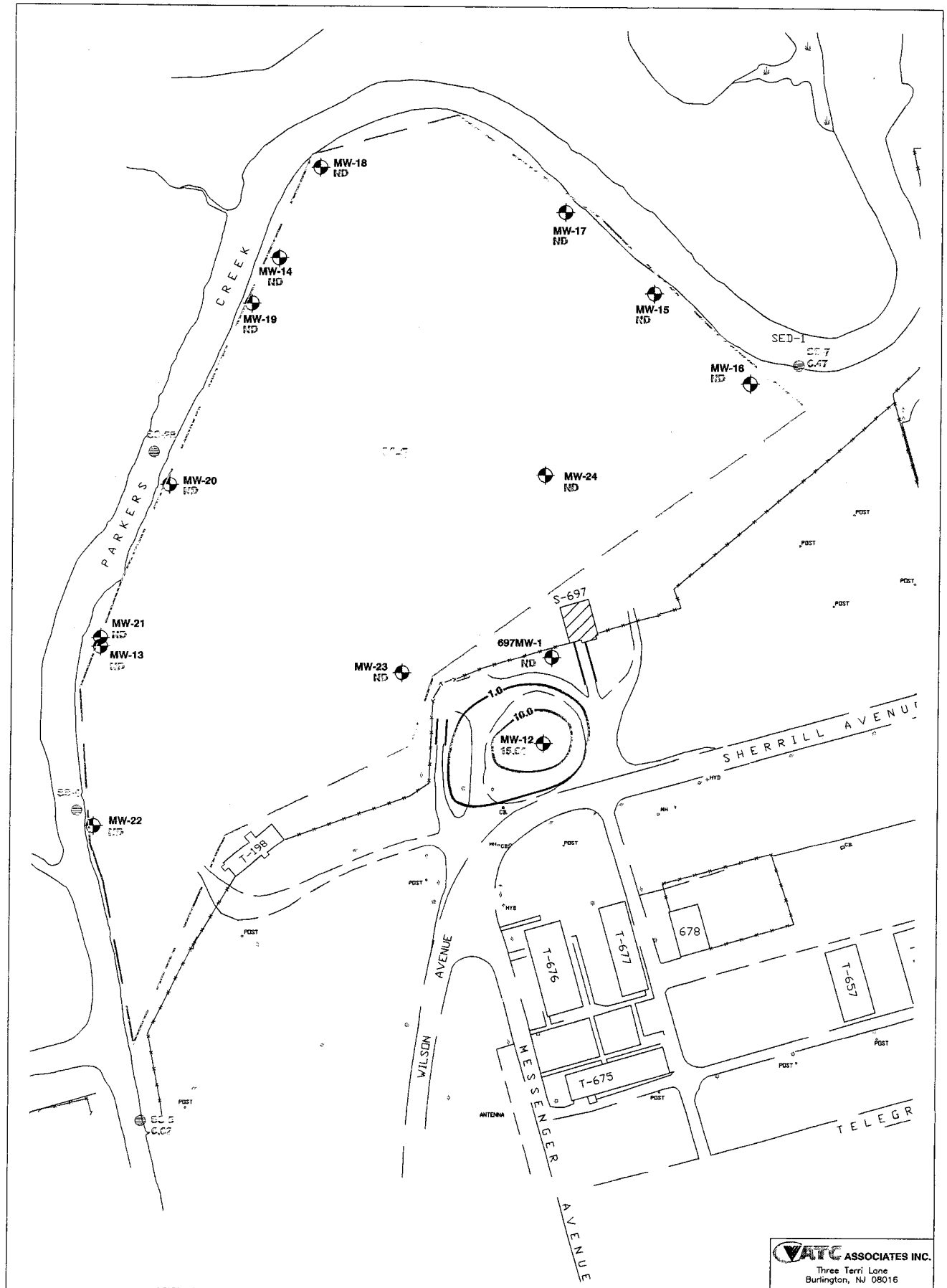
ATC ASSOCIATES INC.
Three Terri Lane
Burlington, NJ 08016

PROJECT TITLE: **Landfill M-8**

DRAWING TITLE: **PCB Delineation Soil Sampling Results Map**

LOCATION: **Fort Monmouth Army Base Monmouth County, NJ**

DRAWN BY:	JES	DRAWING NO.
SURVEYED BY:		**Figure 17**
CHECKED BY:		
PROJECT NO.:	02711.00002	
DATE:	08/18/00	
SCALE:	1" = 80'	
APPROVED BY:	PMN	



LEGEND

MW-15	MONITORING WELL LOCATION
15.00	TETRACHLOROETHENE CONCETRATION
1.0	ISOPLETH ELEVATION CONTOUR
ND	NOT DETECTED ABOVE MDL

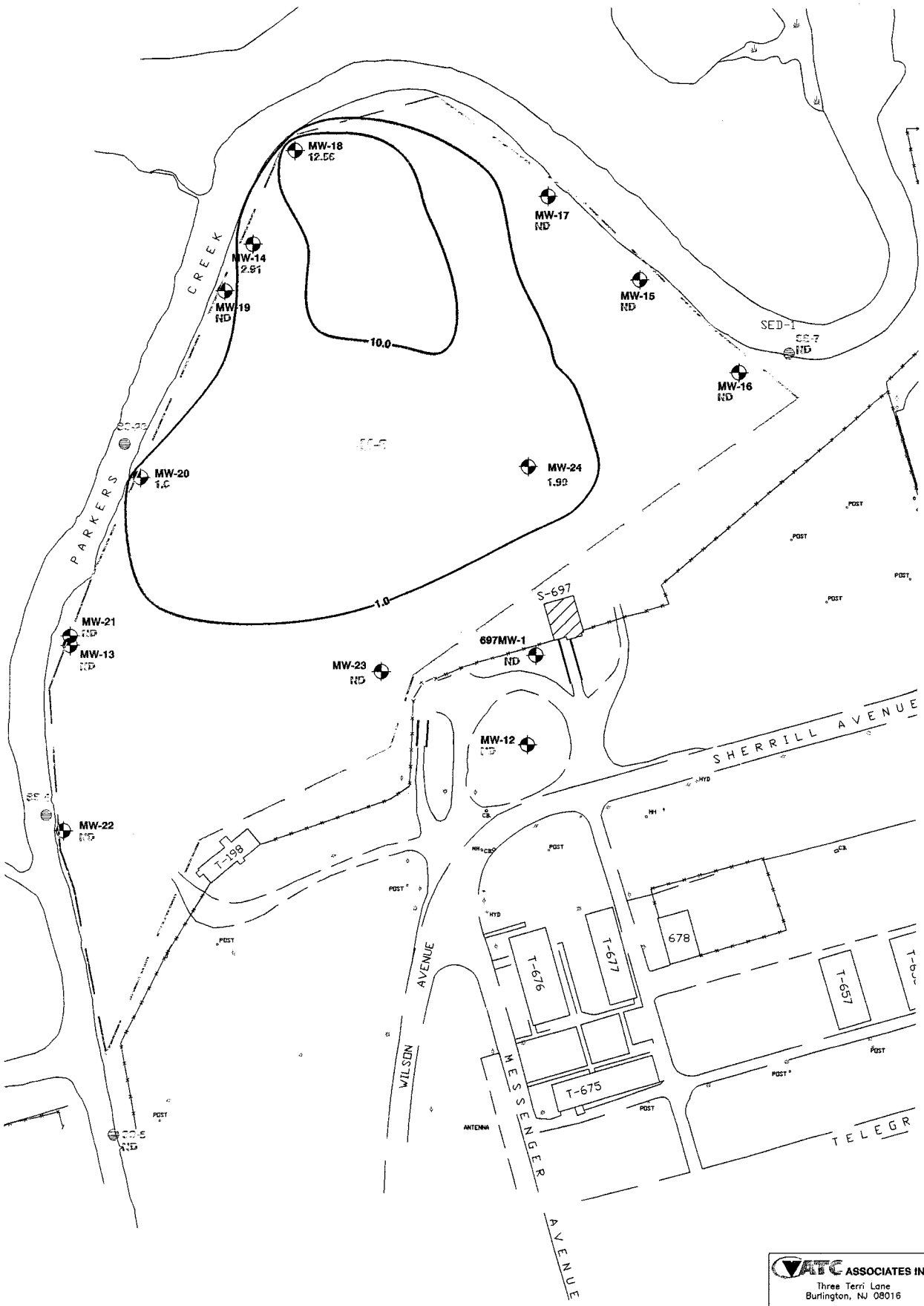
ATC ASSOCIATES INC.
Three Terri Lane
Burlington, NJ 08016

PROJECT TITLE: Landfill M-8

DRAWING TITLE: Tetrachloroethene Isopleth Map March 15, 2000

LOCATION: Fort Monmouth Army Base Monmouth County, NJ

DRAWN BY:	JES	DRAWING NO.
SURVEYED BY:		
CHECKED BY:	ASL	
PROJECT NO.:	02711.00002	Figure 18
DATE:	06/30/00	
SCALE:	1" = 100'	
APPROVED BY:	PMN	



LEGEND

MW-16	MONITORING WELL LOCATION
1.99	CHLOROBENZENE LEVELS DETECTED
1.0	ISOPLETH ELEVATION CONTOUR
ND	NOT DETECTED ABOVE MDL

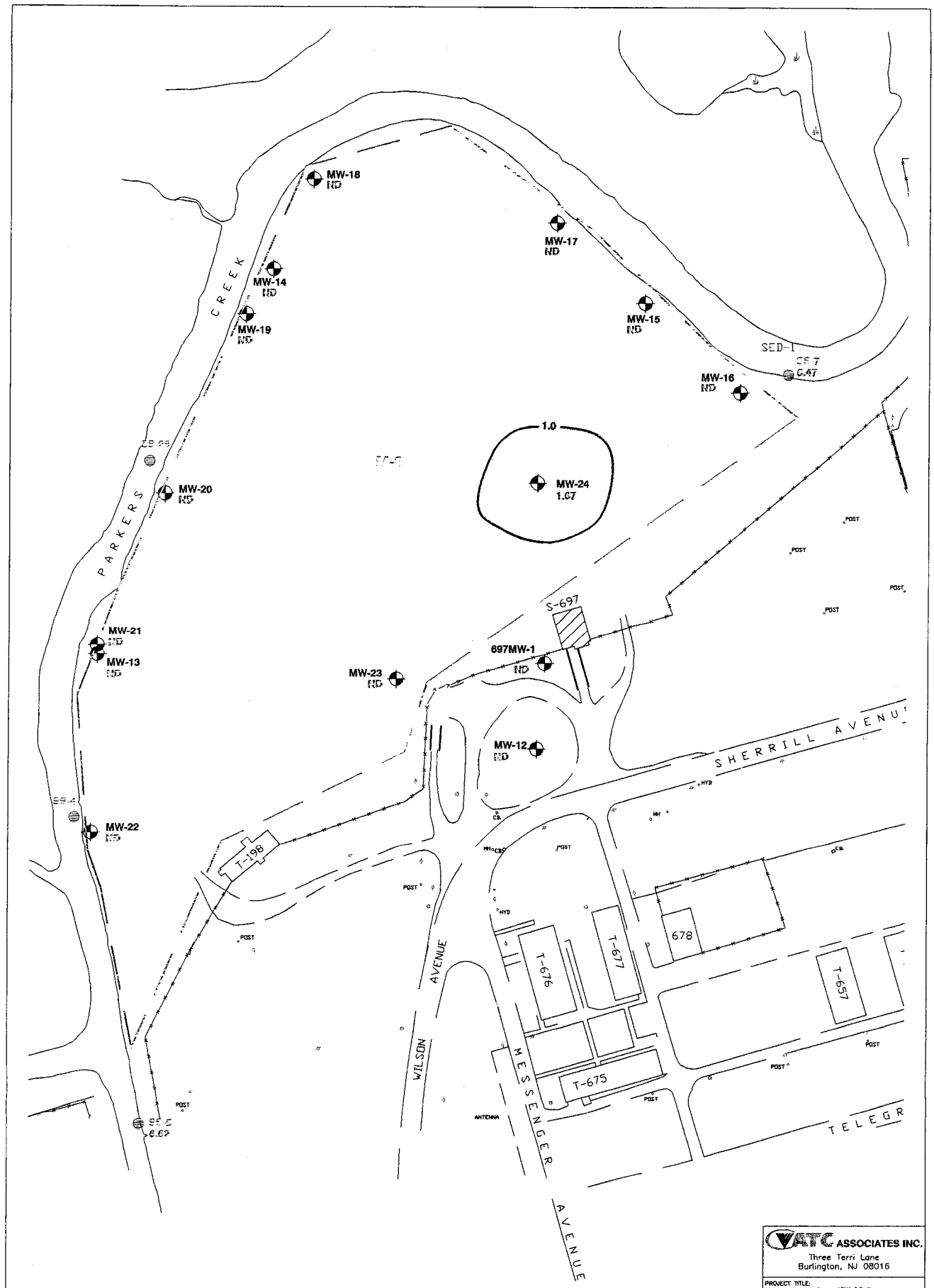
ATC ASSOCIATES INC.
Three Terri Lane
Burlington, NJ 08016

PROJECT TITLE: Landfill M-8

DRAWING TITLE: Chlorobenzene Isopleth Map March 15, 2000

LOCATION: Fort Monmouth Army Base Monmouth County, NJ

DRAWN BY:	JES	DRAWING NO.
SURVEYED BY:		
CHECKED BY:	ASL	
PROJECT NO.:	02711.00002	Figure 19
DATE:	06/30/00	
SCALE:	1" = 100'	
APPROVED BY:	PMN	



LEGEND

MW-15	MONITORING WELL LOCATION
1.07	BENZENE CONCETRATION
1.0	ISOPLETH ELEVATION CONTOUR
ND	NOT DETECTED ABOVE MDL

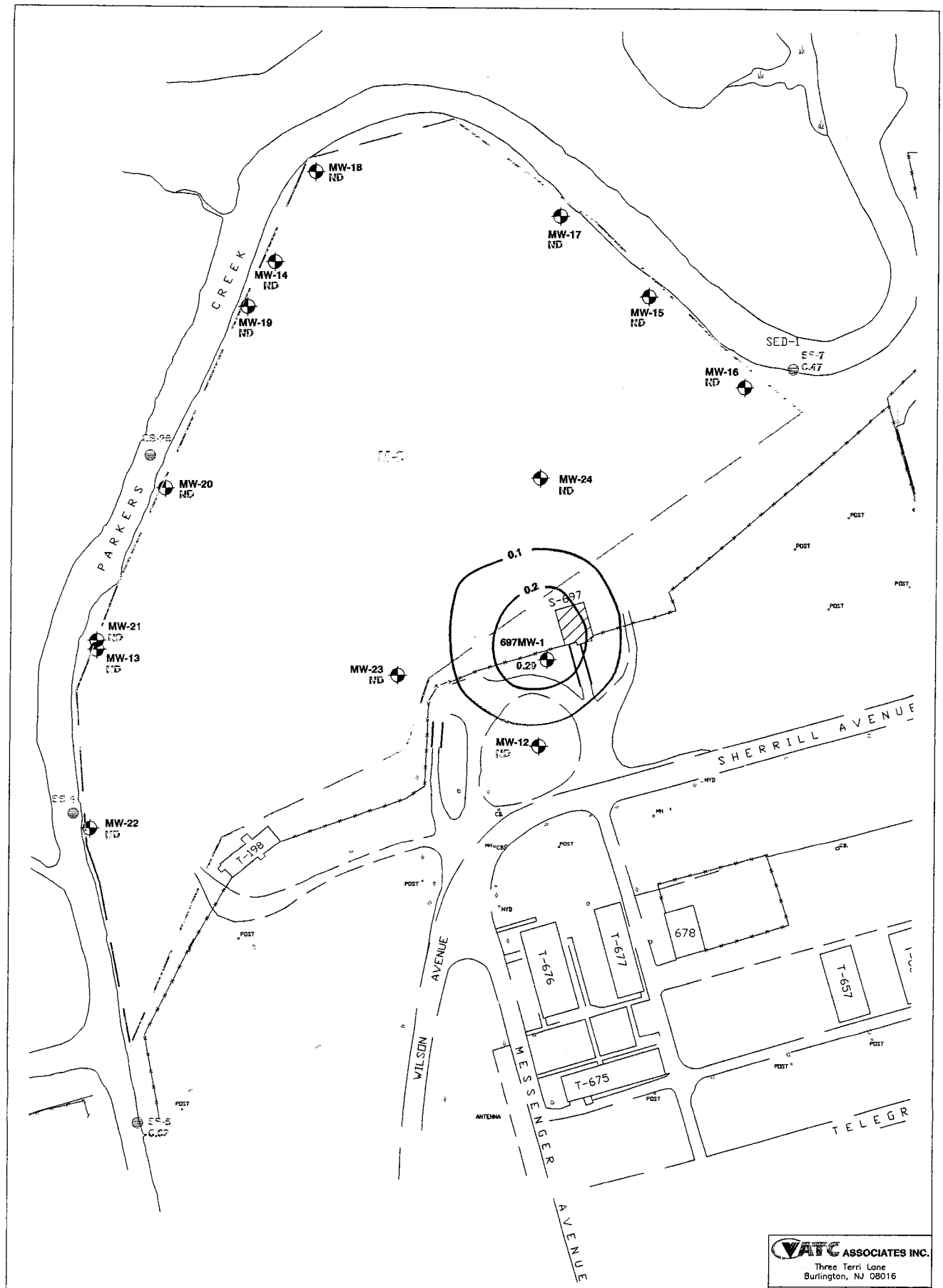
ATC ASSOCIATES INC.
Three Terri Lane
Burlington, NJ 08016

PROJECT TITLE: Landfill M-8

DRAWING TITLE: Benzene Isopleth Map March 15, 2000

LOCATION: Fort Monmouth Army Base Monmouth County, NJ

DRAWN BY:	JES	DRAWING NO.
SURVEYED BY:		Figure 20
CHECKED BY:	ASL	
PROJECT NO.:	02711.00002	
DATE:	06/30/00	
SCALE:	1" = 100'	
APPROVED BY:	PMN	



LEGEND

- MW-15 MONITORING WELL LOCATION
- 4,4'-DDD CONCETRATION
- 1.0 ISOPLETH ELEVATION CONTOUR
- ND NOT DETECTED ABOVE MDL

ATC ASSOCIATES INC.
Three Terri Lane
Burlington, NJ 08016

PROJECT TITLE: Landfill M-8

DRAWING TITLE: 4,4'-DDD Isopleth Map March 15, 2000

LOCATION: Fort Monmouth Army Base Monmouth County, NJ

DRAWN BY:	JES	DRAWING NO.
SURVEYED BY:		Figure 21
CHECKED BY:	ASL	
PROJECT NO.:	02711.00002	
DATE:	06/30/00	
SCALE:	1" = 100'	
APPROVED BY:	PMN	

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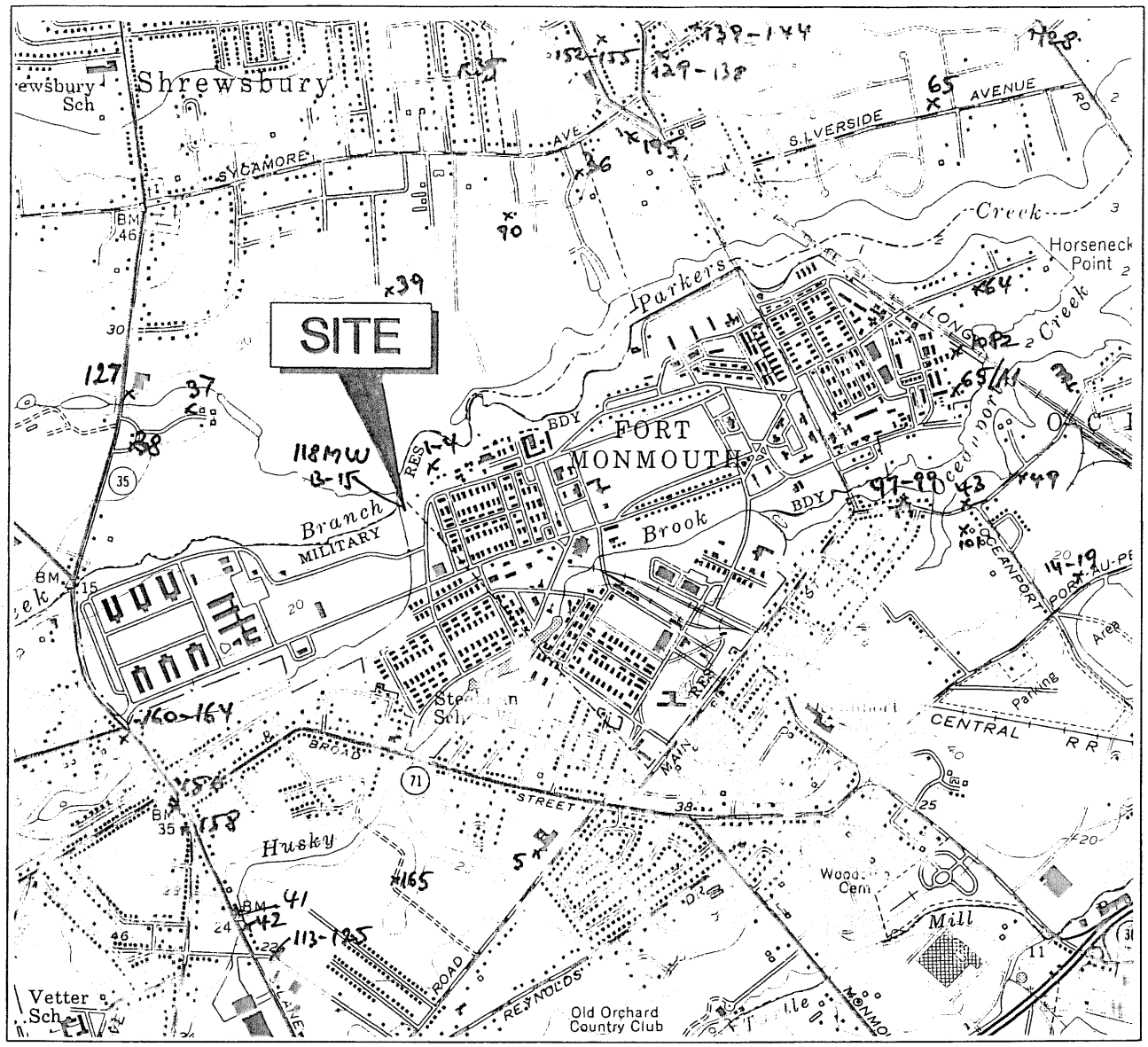
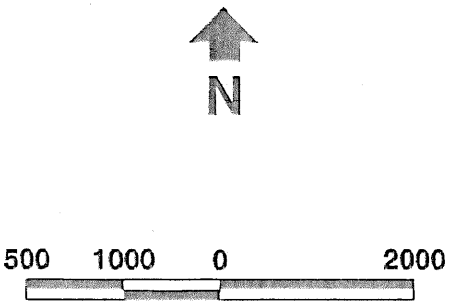


Copied From: United States Geological Survey Topographic Map 7.5 Minute Series, Long Branch, New Jersey Quadrangle (1954, photorevised 1970).



NEW JERSEY QUADRANGLE LOCATION

YATES ASSOCIATES INC.
Three Terri Lane
Burlington, NJ 08016

PROJECT TITLE:	Landfill M-8
DRAWING TITLE:	Well Search Map
LOCATION:	Fort Monmouth Army Base, Monmouth County, NJ
DRAWN BY:	JES
SURVEYED BY:	
CHECKED BY:	ASL
PROJECT NO.:	02711.00002
DATE:	07/28/99
SCALE:	AS NOTED
APPROVED BY:	PMN
DRAWING NO.	Figure 23

Source: USGS Topographic Map, Long Branch, New Jersey Quadrangle

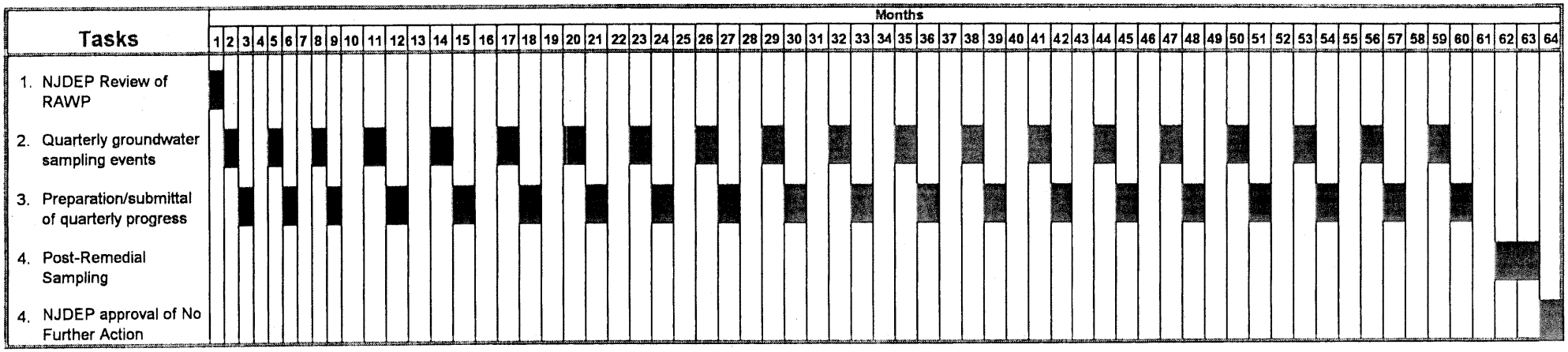



Figure 24
Project Schedule Landfill M-8
Fort Monmouth Main Post, Fort Monmouth, New Jersey