FINAL
INVESTIGATION OF SUSPECTED HAZARDOUS WASTE SITE AT FORT MONMOUTH, NEW JERSEY

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Prepared for

Directorate of Engineering and Housing
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LIST OF ACRONYMS AND ABBREVIATIONS

ACM	asbestos-containing material
AEHA	U.S. Army Environmental Hygiene Agency
AHC	aromatic hydrocarbon
AMC	U.S. Army Materiel Command
AOC	area of concern
ASTM	American Society for Testing and Materials
AVRADA	U.S. Army Aviation Research and Development Activity
AWQC	Ambient Water Quality Criteria
bgs	below ground surface
BNA	base/neutral/acid
CAA	Clean Air Act
CDAP	Chemical Data Acquisition Plan
CECOM	U.S. Army Communications and Electronics Command
CFR	Code of Federal Regulations
CIS	cholinesterase-inhibiting substances
CLP	Contract Laboratory Program
CN	cyanide
COC	chain of custody
CWA	Clean Water Act
DCAA	Defense Contract Audit Agency
DEH	Directorate of Engineering and Housing
DENTAC	U.S. Army Dental Activity
DIS	Defense Investigation Services
DOD	Department of Defense
DOP	di-octyl-phthalate
DOW	depth of well
DRMO	Defense Reutilization Marketing Office
DTW	depth to water
EPA	U.S. Environmental Protection Agency
FIDLER	Field Instrument for Detection of Low-Energy Radiation
FIFRA	Federal Insecticide, Fungicide, and Rodenticide Act
ft	feet
FWS	U.S. Fish and Wildlife Survey
GE	General Electric Company of America
GIS	geographic information system
GOGO	Government owned, government operated
gpm	gallons per minute
GPR	ground-penetrating radar
GSSI	Geophysical Survey Systems, Inc.
GWQC	Groundwater Quality Criteria

LIST OF ACRONYMS AND ABBREVIATIONS
(Continued)

HHC	halogenated hydrocarbon
HSG	Health and Safety Guidance
IA	Installation Assessment
ISC	U.S. Army Information Systems Command
ISCP	Installation Spill Contingency Plan
ISMA	U.S. Army Information System Management Agency
keV	kilo electron Volts
LABCOM	U.S. Army Laboratory Command
LF	linear feet
LLD	lower limit of detection
LTM	long-term monitor
MCL	maximum contaminant level
MCSS	Monmouth County Soil Survey
MEDDAC	U.S. Army Medical Department Activities
MS	matrix spike
MSD	matrix spike duplicate
msl	mean sea level
NaI	sodium iodine
NJAC	New Jersey Administrative Code
NJDEPE	New Jersey Department of Environmental Protection and Energy
NJPDES	New Jersey Pollutant Discharge Elimination System
NMCRSA	Northeast Monmouth County Regional Sewerage Authority
NRC	Nuclear Regulatory Commission
NRL	Naval Radio Laboratory
OSHA	Occupational Safety and Health Administration
OVA	organic vapor analysis, or organic vapor analyzer
OVM	organic vapor monitor
PCB	polychlorinated biphenyl
PCE	tetrachloroethane
pCi/g	picocurie/gram
PHC	petroleum hydrocarbon
ppm	parts per million
PQL	Practical Quantitation Level
PVC	polyvinyl chloride
QA	quality assurance
QAPP	Quality Assurance Program Plan
QA/QC	quality assurance/quality control
R&D	Research and Development
RBC	red blood cell
RCA	Radio Corporation of America

LIST OF ACRONYMS AND ABBREVIATIONS
(Continued)

RCRA	Resource Conservation and Recovery Act
SBA	Small Business Administration
SDWA	Safe Drinking Water Act
SPCCP	Spill Prevention Control and Countermeasures Plan
STP	Sanitary Treatment Plant
TAL	Target Analyte List
TCE	trichloroethane
TCL	Target Compound List
TCLP	Toxicity Characteristic Leachate Procedure
TPH	total petroleum hydrocarbon
TRI-TAC	Joint Tactical Communications Office
TSCA	Toxic Substances and Control Act
USACE	U.S. Army Corps of Engineers
USACHCS	U.S. Army Chaplain Center and School
USAMPS	U.S. Army Military Preparatory School
USATHAMA	U.S. Army Toxic and Hazardous Materials Agency
UST	underground storage tank
V	volts
VLF	very low frequency
VOA	volatile organic analyte
VOC	volatile organic compound
VTSR	verified time of sample receipt

Section 1

SECTION 1

GENERAL INFORMATION

1.1 PURPOSE OF THE SITE INVESTIGATION

The purpose of this assessment was to investigate the potential for contamination at suspected hazardous waste sites at Fort Monmouth (FM), which were identified in a U.S. Army Toxic and Hazardous Materials Agency (USATHAMA) report dated 1980 (updated in 1988). Related to these sites, the New Jersey Department of Environmental Protection and Energy (NJDEPE) issued a letter in 1990 identifying specific areas of concern that were also to be addressed in this assessment.

While the USATHAMA report identified 37 sites with known or suspected waste materials on the Main Post and the two subposts (Charles Wood and Evans Areas), the Fort Monmouth Directorate of Engineering and Housing (DEH) increased the number of sites to be covered in this assessment to 40 to adequately address NJDEPE areas of concern (AOCs). In addition, since the USATHAMA list of sites included several transformer locations, the DEH decided to address all sites where polychlorinated biphenyl (PCB) class transformers were formerly located. The 40 sites are listed in Table 1-1. The NJDEPE AOCs are summarized in Table 1-2.

The assessment presented herein is based on available information, including file information at FM, historical aerial photographs, historic documents, interviews with Fort personnel, and the performance of site inspections. Sampling was not conducted. If warranted, additional investigations are recommended to determine the potential for contamination at a site. Appropriately, investigation procedures that are in compliance with NJDEPE protocols are presented. Quality assurance (QA) and health and safety plans are also presented.

Table 1-1

Locations of Known or Suspected Waste Material (Identified in the 1980 USATHAMA Installation Assessment)

Site Number	Site
Main Post	
M-1	Landfill
M-2	Landfill
M-3	Landfill
M-4	Landfill
M-5	Landfill
M-6	Burning Area
M-7	Burning Area (Building 697)
M-8	Landfill
M-9	PCB Transformer
M-10	Asbestos Storage
M-11	Water Tank
M-12	Landfill
M-13	Pathogenic Waste Incinerator
M-14	Landfill
M-15	Water Tank
M-16	Pesticide Storage (Building 498)
M-17	Pesticide Storage (Building T-65)
M-18	Former Training Area
New *	Former Treatment Plant
New *	Former Firing Range
Charles Wood Area	
CW-1	Wastewater Treatment (Lime Pit)
CW-2	Wastewater Treatment (Lime Pit)
CW-3	Landfill
CW-4	Range (Small Arms) (Building 2537)
CW-5	Heavy Metals
CW-6	Pesticide Storage
CW-7	PCB (Transformers)
CW-8	Sewage Pumping Station (Building 2603)
CW-9	Sludge Dump

Table 1-1

Locations of Known or Suspected Waste Material (Identified in the 1980 USATHAMA Installation Assessment) (Continued)

Site Number	Site
Evans Area	
EA-1	Heavy Metal Potential (Former Treatment Plant)
EA-2	Heavy Metal Potential (Buildings 9004 and 9005)
EA-3	Heavy Metal Potential (Building 9007)
EA-4	Radiological Facility (Buildings 9010 and 9011)
EA-5	Radiological Facility (Buildings 9036 and 9037)
EA-6	Heavy Metal Potential (Buildings 9039, 9040, and 9041)
EA-7	Radiological Storage (Building 9383)
EA-8	Radiological Facility (Building 9401)
EA-9	Radiological Facility (Building 9045)
EA-10	Radiological Storage
EA-11	Range (Small Arms)
EA-12	Suspected Landfill
EA-13	Suspected Landfill

*New site that was identified during performance of this study.

Table 1-2

Summary of NJDEPE Areas of Concern

1.	Required sampling and analysis of groundwater and soil to characterize facility.
2.	Required information about asbestos pit and underground storage tanks (USTs) near Building 1220 (Site M-10).
3.	Required soil samples in area of the former sludge-drying beds (Main Post) (Site AOC-3) and the former sludge storage areas (Charles Wood) (Site CW-9).
4.	Required soil borings in the area for the disposal of administrative waste in the southwest corner of Charles Wood (Site CW-3).
5.	Required sediment samples at the storm sewer discharge points and upstream and downstream on Evans Area (Site EA-3).
6.	Required information about the overflow tank system for (Site AOC-6) the water contained in the cobalt-60 pool irradiator.
7.	Required report on detailed operational, disposal, and storage practices of pesticides, herbicides, and rodenticides. Required soil samples in hazardous waste storage area involved in emergency incident (Site AOC-7).
8.	Required sampling plan for above activities, which describes the purpose; data objectives; number, location, and depths of samples; reason for location; analytical methods; detection levels; and quality assurance/quality control (QA/QC) procedures.

The report is organized as follows:

- Section 1 — This section contains the purpose of the report and provides information on the owner, location, mission, and history of Fort Monmouth.
- Section 2 — This section places Fort Monmouth in its ecological setting by discussing climate, geology, and flora and fauna.
- Section 3 — This section discusses Fort Monmouth's environmental management practices and is provided in response to a request in NJDEPE's letter of June 1990. Topics discussed include water supplies, wastewater, solid waste, hazardous waste, medical waste, PCB management, pesticides and herbicides, and underground storage tanks (USTs).
- Section 4 — Each of the 40 sites and 8 AOCs is discussed in this section. The discussion includes a description, history, discussion of past sampling activities, and recommendations for future activities.
- Section 5 — This section summarizes the recommended investigations.
- Section 6 — This section discusses investigative techniques and sampling methods.
- Section 7 — This section describes requirements for laboratory analytical methods and QA procedures.
- Section 8 — This section details health and safety practices to follow while conducting site investigations.

1.2 OWNER/OPERATOR INFORMATION

Fort Monmouth is a government-owned, government-operated (GOGO) military installation that provides command, administrative, and logistical support for Headquarters, U.S. Army Communications and Electronics Command (CECOM).

1.3 LOCATION OF FORT MONMOUTH

Fort Monmouth is located in the central-eastern portion of New Jersey in Monmouth County. The installation contains two subposts (Charles Wood Area and Evans Area) in addition to the Main Post, which are located within a 12-mile radius of the Main Post.

1.3.1 Main Post

The Main Post (see Figure 1-1) encompasses an area of approximately 630 acres and is generally bounded by State Highway 35 to the west, Parkers Creek and Lafetra Brook to the north, the New Jersey Transit Railroad to the east, and a residential neighborhood on the south. The Main Post provides supporting administrative, training, and housing functions as well as many of the community facilities for Fort Monmouth.

1.3.2 Charles Wood Area

The Charles Wood Area (see Figure 1-1), composed of approximately 511 acres, is located 1 mile west of the Main Post and is bounded generally by Tinton Avenue to the north, residential development, Pine Brook Road to the south, and the Garden State Parkway to the west. This area is used primarily for research, development, and testing and provides the greatest number of housing units available on post.

1.3.3 Evans Area

The Evans Area (see Figure 1-2), composed of approximately 215 acres, is located within Wall Township and is roughly 10 miles south of the Main Post. Evans is generally bounded on the north by Brighton Avenue, on the east by Marconi Road and residential development, on the south by Belmar Boulevard, and on the west by residential development.

1.4 MISSION STATEMENT

The primary mission of Fort Monmouth is to provide command, administrative, and logistical support for Headquarters, CECOM. CECOM is a major subordinate command of the U.S. Army Materiel Command (AMC) and is the host tenant. The support provided is used by tenant activities in the performance of research, development, procurement, and

production of prototype electronic communication material for use by the U.S. Armed Forces.

The major tenant activities to which Headquarters, CECOM is the host tenant include:

- U.S. Army Laboratory Command (LABCOM)
- U.S. Army Aviation Research and Development Activity (AVRADA)
- U.S. Army Information System Management Agency (ISMA)
- Joint Tactical Communications Office (TRI-TAC)
- U.S. Army Chaplain Board
- U.S. Army Chaplain Center and School (USACHCS)
- U.S. Army Military Preparatory School (USAMPS)
- U.S. Army Medical Department Activities (MEDDAC)
- U.S. Army Dental Activity (DENTAC)
- U.S. Army Audit Agency
- Small Business Administration (SBA)
- U.S. Army Information Systems Command (ISC)
- U.S. Army Special Security Detachment
- 902nd Military Intelligence Group
- U.S. Army Criminal Investigation Command
- U.S. Army Commissary
- U.S. Army Newark District Recruiting Command
- U.S. Army Corps of Engineers (USACE), New York District
- Defense Contract Administration Services Management Area, Springfield District

- Defense Investigation Services (DIS)
- Defense Contract Audit Agency (DCAA)
- 513th Military Intelligence Brigade
- Joint Interface Test Force
- 535th Engineer Detachment
- 54th Ordnance Detachment

1.5 HISTORY OF FORT MONMOUTH

This subsection presents a history of Fort Monmouth with emphasis on environmentally significant activities. The subsection is based primarily on the books *A Concise History of Fort Monmouth, New Jersey* and *Fort Monmouth History and Place Names, 1917-1959.*

The Main Post of Fort Monmouth was established on 17 June 1917 as Camp Little Silver. The site of the Main Post had formerly been a horse racetrack, but the track had been idle since 1890. The name of the Camp was changed after 3 months to Camp Alfred Vail. The initial mission of the Camp was to train Signal Corps operators for service in World War I. In the first 19 months of the Camp's existence, 129 semipermanent structures were built, a tent camp established on the site of a former swamp, and a parade ground established on the site of a former marsh. A radio laboratory and an airfield were developed in 1918. After the war, Camp Vail was designated as the site of the Signal Corps School, the only training area for Signal Corpsmen in the country. All but four World War I structures were demolished by 1924.

In 1925 the facility became a permanent post and its name was changed to Fort Monmouth. The primary mission of Fort Monmouth continued to be Signal Corps training and electronics research. In 1934 the laboratory was consolidated in a new building, Squier Laboratory (Building 283), and research on radios and radar continued here. During World War II, the pace of training increased tremendously at Fort Monmouth. The expanded laboratory effort was accomplished by starting laboratories at other Army facilities. Squier

Laboratory continued to be the principal laboratory on Main Post until 1954, when laboratory operations moved to Charles Wood. In 1955 and 1956, 72 World War II wooden structures were demolished to make room for permanent structures. These new buildings were used for residential, administration, commercial, and recreational purposes. A small number of additional administrative buildings were completed during the 1970s and 1980s.

Camp Charles Wood was purchased in 1941 and opened in 1942. The eastern half of the property was formerly a golf course, and the western half was residential and farmland. During World War II, the Camp was used for training Signal Corpsmen. Antenna shelters were constructed on 26.5 acres of land and used by the Signal Corps Laboratory for research and development (R&D) purposes. This operation was placed under command of the Army Air Force until 1951, when the operation moved to another post. Signal Corps training ceased after World War II.

A new R&D laboratory, the Hexagon (Building 2700), was completed in 1954. Research activities that had formerly been conducted at Squier Laboratory on the Main Post, and some activities from the Evans Area were transferred to Charles Wood. The lab continued to develop electronic equipment. A large amount of residential housing was built from 1953 to 1970. In 1956, 90 World War II wooden structures were razed. The Pulsed Power Laboratory was built in the early 1980s.

The Army purchased the land for Camp Evans in 1941 and opened the Camp in 1942. Camp Evans is the only area that had potential environmentally significant activities before being acquired by the Army. The Marconi Wireless Telegraph Company of America purchased a 93-acre farm in Belmar just after the turn of the century in the north-central part of present Camp Evans as the site of receiver equipment for commercial transatlantic radio operations and the site of the Marconi Institute, a school for telegraphy. The Marconi Company built several large antennas that no longer exist and seven buildings that still exist, including the Administration Building, which was built as living quarters, and Buildings 4, 5, and 7, which are discussed in more detail in Subsections 4.3.2 and 4.3.3. During World War I, under war powers, the U.S. Navy took over the Marconi Wireless Company property

to establish the headquarters for transatlantic communications. In 1918, the activities of the U.S. Naval Radio Laboratory (NRL) were transferred to the Belmar receiver station site from Great Lakes, Illinois (Gebhard, 1979). Research at the NRL in 1918 consisted primarily of experiments in very low-frequency (VLF) communications, radio countermeasures interception, and radio-frequency amplication (Gebhard). Under the auspices of the U.S. Navy, the Radio Corporation of America (RCA) was formed as a subsidiary of the General Electric Company of America (GE) in October 1919 to buy out the holdings of American Marconi. President Wilson authorized the return of radio stations taken over by the Navy on 1 March 1920. When the Evans Area was transferred to RCA, RCA operated the Belmar receiver station until it was closed in 1924. In the period between the wars, the Belmar site was used by the Ku Klux Klan and by a religious college, King's College.

Almost all the buildings that exist at the Evans Area today were built during World War II. These include the four long, rectangular buildings (Buildings 9010, 9011, 9036, and 9037) that were built to compose a large laboratory complex. Other laboratories, support buildings, and radio antenna shelters were also built. Barracks were built on the western portion of the facility across Laurel Gulley Brook. The major activity at Evans during this time was radar R&D.

Research in radar technology continued at the Evans Area at the end of World War II. In 1946, a radar signal was bounced off the moon using a specially designed radar antenna (called Diana Tower).

In the early 1950s, a radiation effects laboratory (Building 9401) was constructed. This laboratory is described in more detail in Subsection 4.3.8.

The document *A Concise History of Fort Monmouth, New Jersey* describes a number of R&D activities that were performed by the laboratories at Fort Monmouth. The document does not generally say where these activities were conducted. A partial list of research activities that were conducted at Fort Monmouth laboratories includes:

- Radios including vacuum tubes
- Radar
- Field TV cameras
- Radiation dosimeters
- Satellite instrumentation
- Solar batteries
- Laser communication, range-finding, and relay devices
- Microelectronics
- Night vision devices
- Defibrillator pacemakers
- Lithium batteries

Section 2

SECTION 2

SITE CHARACTERISTICS

2.1 CLIMATE

The climate of Monmouth County, temperate-humid, is characteristic of the temperate zone of the Middle Atlantic states. The mean annual temperature for Monmouth County is 53 °F; summers are generally warm, with an average temperature of 72 °F and a maximum temperature of 103 °F, recorded in July 1954. Winters are moderate, averaging 33 °F; temperatures rarely drop below 0 °F, although the lowest recorded temperature was -8 °F, recorded in Freehold in February 1961.

Precipitation in Monmouth County averages 45.18 inches per year; slightly more than half the total annual precipitation falls between April and September (Jablonski and Baumley, 1989). Thunderstorms generally occur in the summer and may combine high winds with heavy rainfall. Heavy rains have occurred in connection with hurricanes or tropical storms that move northward along the Mid-Atlantic Coast (U.S. Army, 1992). Snow has fallen in Monmouth County in every month between October and April. The average seasonal snowfall is 25 inches, with the greatest amounts falling in December, January, and February Jablonski and Baumley, 1989).

2.2 TOPOGRAPHY

2.2.1 Main Post

The land surface at the Main Post is relatively flat and ranges in elevation from 4 ft above mean sea level (msl) in the east at Oceanport Creek to 32 ft msl at the western end of the post, near Highway 35. The eastern half of the post averages 10 ft msl in elevation. The greatest relief is found at Landfill 8, located on Parkers Creek, and along Lafetra Brook, Mill Creek, and Husky Brook.

2.2.2 Charles Wood

At Charles Wood the land surface slopes from 72 ft msl near Pulse Power in the southwest to 20 ft msl at the eastern end of the golf course. In general, the southwestern corner of Charles Wood is gently rolling and has the greatest relief.

2.2.3 Evans Area

In the Evans Area, the land surface slopes from a high of about 80 ft msl near Brighton Boulevard in the northwest and in the G2 Area in the southeast to a low of approximately 20 ft msl near the Shark River. The central area of Evans, where the laboratories are located, is relatively flat with an elevation range from about 65 to 75 ft msl. The area northeast of the laboratories has the greatest relief.

2.3 SURFACE WATER DRAINAGE AND WETLANDS

2.3.1 Main Post

Surface water runoff from the western part of the Main Post flows into Lafetra Brook to the north or into Mill Brook to the south. Both Mill Brook and Lafetra Brook originate off-post. Mill Brook flows along the southern boundary of Main Post until it turns north just past the Auto Craft Shop. Mill Brook is channelized as it flows past several landfills. Lafetra Brook forms the northern boundary of the Main Post and joins Mill Brook to form Parkers Creek. Parkers Creek flows eastward along the northern boundary and joins Oceanport Creek east of the post. Most of Parkers Creek, Lafetra Brook, and Mill Brook are tidal.

Husky Brook originates off-post and, shortly after it flows onto the post, becomes Husky Brook Lake. Surface water drainage from the southern half of the post flows into Husky Brook and Husky Brook Lake from a series of drainage ditches and outfalls. Husky Brook flows into Oceanport Creek, which forms the southern boundary of the eastern post area. Oceanport Creek and Husky Brook below Husky Brook Lake are tidal.

The U.S. Fish and Wildlife Survey (FWS) National Wetland Inventory Long Branch Quadrangle Maps indicated the presence of wetlands at the Main Post (see Figure 2-1). Parkers and Oceanport Creeks were classified as Estuarine Intertidal Aquatic Beds. The area of Parkers Creek northwest of Building 294 and the part of Oceanport Creek Husky Brook west of Murray Drive and east of Building 551 are classified as Estuarine Intertidal Emergent Wetlands. Lafetra Brook and Mill Creek were identified as Riverine Lower Perennial Open Water/Unknown Bottom. Husky Brook Lake is classified Palustrine Open Water/Unknown Bottom.

2.3.2 Charles Wood

The Charles Wood Area is drained principally by two unnamed tributaries of Wampum Brook; one tributary flows eastward through the center of the camp, and the other flows along the southern boundary. East of Charles Wood, Wampum Brook is joined by several other unnamed tributaries before it becomes Wampum Lake. The discharge from Wampum Lake becomes Mill Brook, which flows through Main Post. Some runoff from the northwestern part of the golf course flows into Lafetra Brook, which is located just north of Tinton Avenue.

At Charles Wood, several wetland areas were identified on the FWS National Wetland Inventory Long Branch Quadrangle Map (see Figure 2-1). The lake on the golf course is classified as Palustrine Open Water/Unknown Bottom. Several areas along the unnamed tributaries to Wampum Brook are classified Palustrine Forested Wetland, Broad-leaved Deciduous.

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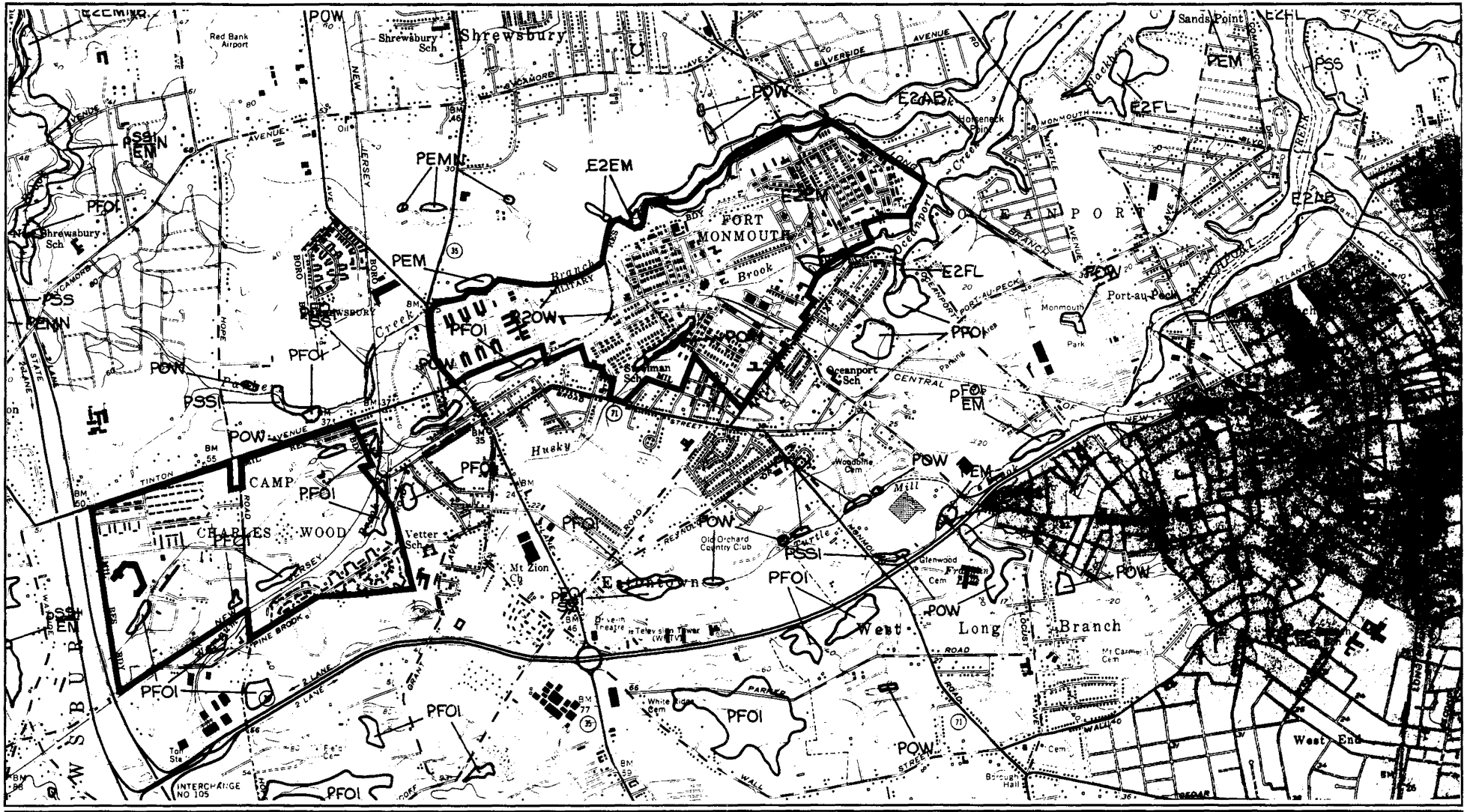


LEGEND

- E2AB Estuarine Intertidal Aquatic Bed
- E2EM Estuarine Intertidal Emergent Wetland
- R2OW Riverine Lower Perennial Open Water/Unknown Bottom
- POW Palustrine Open Water/Unknown Bottom
- PF01 Palustrine Forested Wetland, Broad-leaved Deciduous

Source: USFWS National Wetlands Inventory
Long Branch, New Jersey Quadrangle Map

0 1000 2000 3000 4000
SCALE IN FEET

2017-0600 10/20/93

Fort Monmouth, Main Post and Charles Wood

FIGURE 2-1
MAIN POST AND CHARLES WOOD WETLANDS

2.3.3 Evans Area

Stormwater drainage from most of the Evans Area flows through a storm drain system into Laurel Gulley Brook, which originates off-post, flows through the northern part of Evans (north of Monmouth Boulevard), and drains into the Shark River, a tidal estuary. Some runoff from the easternmost areas flows directly into the Shark River.

In the Evans Area, the FWS National Wetland Inventory Asbury Park Quadrangle Map identifies the Shark River as Estuarine Intertidal Flat (see Figure 2-2). A small area in the northeastern corner of the property is classified as Estuarine Intertidal Emergent Wetlands. The area along Laurel Gulley Brook is classified as Palustrine Forested Wetland, Broad-leaved Deciduous. Additional information on the Evans Area may be found in the Tectonics Wetlands Delineation Report (1990).

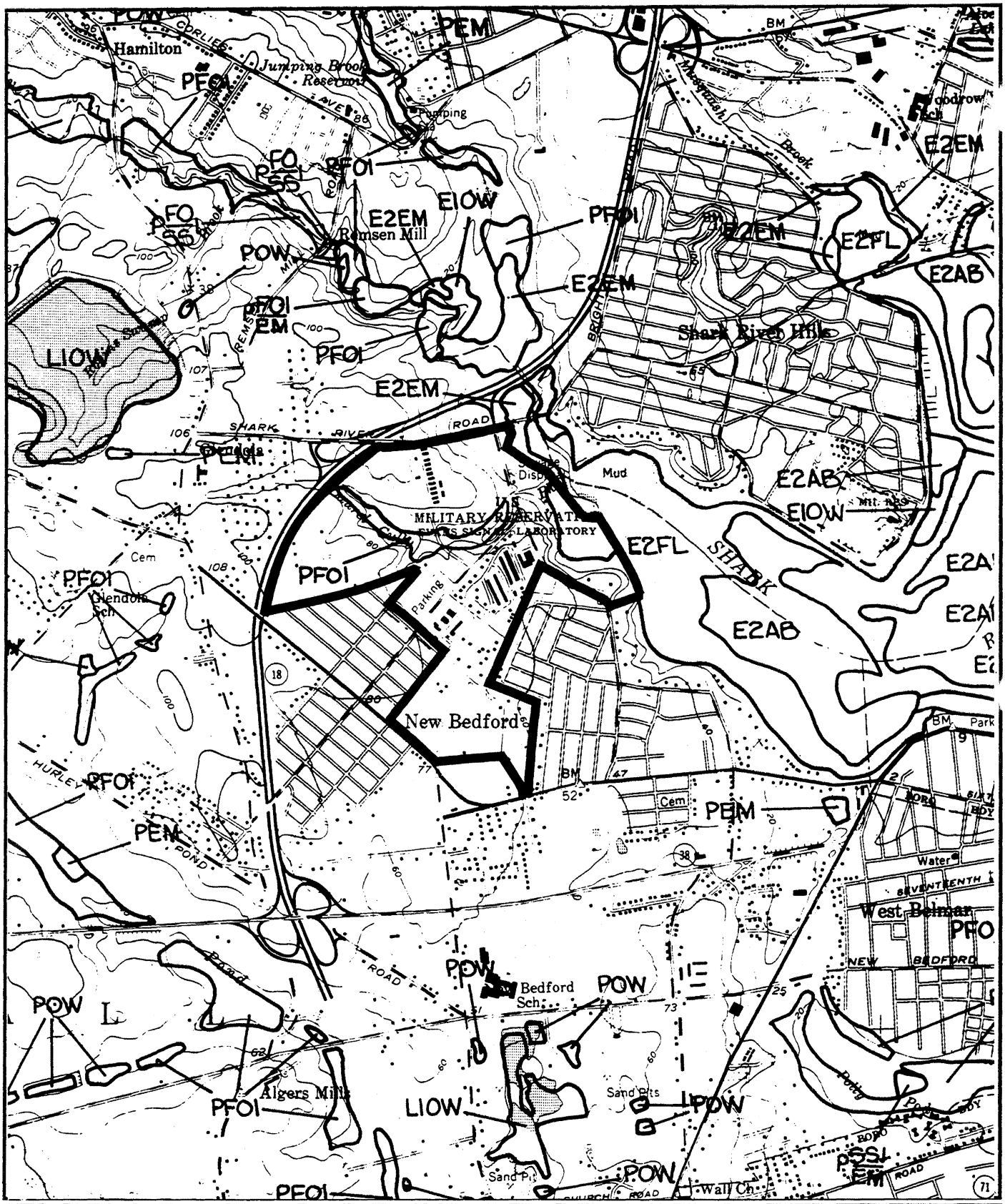
2.4 SOILS

2.4.1 Main Post

According to the Monmouth County Soil Survey (MCSS; Jablonski and Baumley, 1989), much of the Main Post is covered by urban land (developed land with disturbed soils). The following soil series and classification units are mapped in the Main Post area:

- DoB Downer sandy loam, 2 to 5% slopes
- FrB Freehold sandy loam, 2 to 5% slopes
- FUB Freehold sandy loam — urban land complex, 0 to 10% slopes
- HV Humaquepts, frequently flooded
- KvA Kresson loam, 0 to 5% slopes
- UA Udorthents, smoothed
- UD Udorthents — urban land complex, 0 to 3% slopes

Figure 2-3 illustrates the distribution of these soil series.



LEGEND

N

0 1000 2000 3000 4000

SCALE IN FEET

E2FL	Estuarine Intertidal Flat
E2EM	Estuarine Intertidal Emergent Wetland
PF01	Palustrine Forest Wetland, Broad-leaved Deciduous

Source: USFWS National Wetlands Inventory
Asbury Park, New Jersey Quadrangle Map

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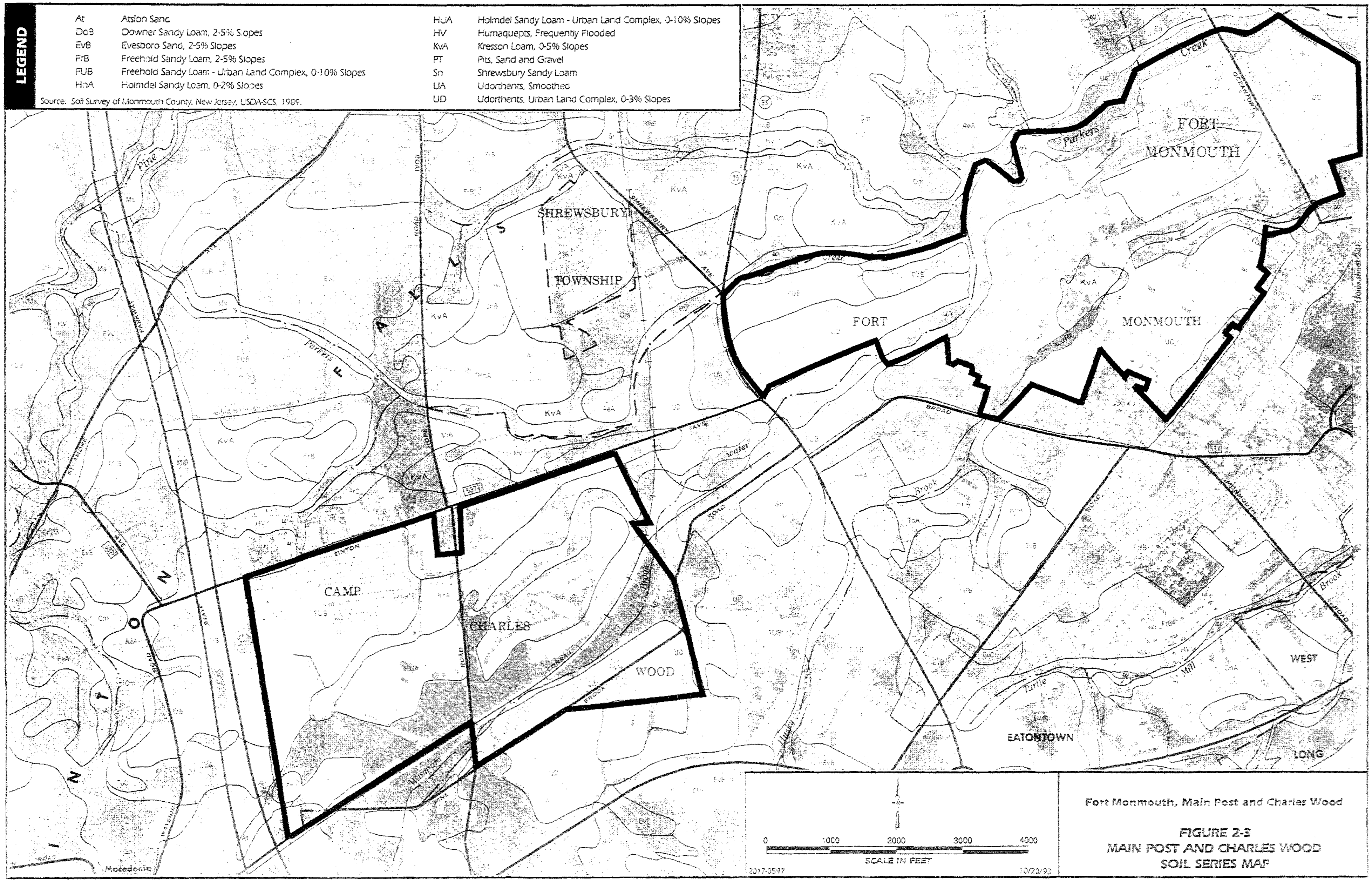
Fort Monmouth, Evans Area

FIGURE 2-2
EVANS AREA WETLANDS



Fort Monmouth, Main Post and Charles Wood

FIGURE 2-3
MAIN POST AND CHARLES WOOD
SOIL SERIES MAP

Downer series soils are well-drained soils found on uplands and terraces. These soils formed in acid, loamy coastal plain sediments. The upper 10 inches are a very friable dark brown sandy loam, which has fine and medium roots and 2% pebbles. The subsoil is 16 inches of strong brown sandy loam with faint clay in bridges between grains, fine and medium roots, and 10% pebbles. The substratum is a strong brown gravelly loamy sand with 35% pebbles, which is strongly acid. Permeability is moderate or moderately rapid in the subsoil and moderately rapid in the substratum. The available water capacity is moderate. The seasonal high water table is at a depth of more than 6 ft. Runoff is slow. The Downer series is represented on-site by the Downer sandy loam, 2 to 5% slopes (DoB). Downer soils are classified as nonhydric (MCSS, 1989).

Freehold soils are well-drained soils that formed in acid, loamy, coastal plain sediments that, by volume, are 1 to 10% glauconite and are found on uplands. The surface layer is a 9-inch-thick, dark yellowish-brown sandy loam. The subsoil is 26 inches thick. The upper 16 inches of the subsoil are a dark brown sandy loam and sandy clay loam with some glauconite. The lower 10 inches are a brown sandy loam with glauconite. The substratum is yellowish-brown loamy sand with much glauconite to a depth of 70 inches. Permeability is moderate in the subsoil and moderate or moderately rapid in the substratum. The available water capacity is high. Runoff is medium. Two Freehold soils are found at Main Post: Freehold sandy loam, 2 to 5% slopes (FrB), and the Freehold sandy loam — urban land complex, with 0 to 10% slopes (FUB). Urban land consists of areas covered by impermeable surfaces, such as buildings, roads, and parking lots. The FUB soils were mapped as a complex because Freehold soils and urban land are found in an intricate pattern that made it impractical to map the Freehold soil separately. Freehold soils are classified as nonhydric (MCSS, 1989).

Humaquept soils are somewhat poorly to very poorly drained soils formed in stratified, sandy, or loamy sediments of fluvial origin. These soils are located on the floodplain and are subject to flooding several times a year. Humaquept soils are nearly always hydric. These soils differ in stratification from place to place. Typically, the surface layer and subsoil consist of stratified layers of sandy loam, loam, and silt loam. The substratum

consists of stratified layers of loamy sand, sandy loam, loam, and silt loam. In some areas, the stratified layers are gravelly or mucky. Permeability is moderate or moderately rapid in the subsoil and the substratum. The available water capacity is high. The apparent seasonal high water table is between the surface and 1.5 ft. Runoff is slow. Organic matter varies from low to high. The soil is subject to frequent flooding in the early spring and during heavy rainfall (MCSS, 1989).

The Kresson loam is a nearly level to gently sloping, somewhat poorly drained soil found on low divides and in depressions. The surface layer is dark brown loam, 9 inches thick. The first 22 inches of the subsoil are a mottled olive-brown clay loam, and below that is a mottled olive-gray clay to a depth of 40 inches. The substratum is mottled, dark grayish-brown stratified sandy loam and sandy clay loam to a depth of 60 inches or more. Permeability of this soil is slow in the subsoil and the substratum. The available water capacity is high. The perched seasonal high water table is at a depth of 1 to 1.5 ft from December to May. Runoff is slow to medium. Organic content is moderate. The soil on-site is found in areas with 2 to 5% slopes (MCSS, 1989).

Udorthent soils have been altered by excavating or filling (MCSS, 1989). In filled areas, these soils consist of loamy material that is more than 20 inches thick. Filled areas include floodplains, tidal marshes, and areas with moderately well-drained to very poorly drained soils. Some Udorthent soils contain concrete, asphalt, metal, or glass. Two Udorthent soils are found at Main Post: Udorthents, smoothed (UA), which may also include old sand and gravel pits that have been smoothed or filled in, and Udorthents — urban land complex, with 0 to 3% slopes (UD).

2.4.2 Charles Wood

The Monmouth County Soil Survey (MCSS, 1989) identified nine soil types at Charles Wood (see Figure 2-3) as follows:

- At Atsion sand
- EvB Evesboro sand, 2 to 5% slopes

- FrB Freehold sandy loam, 2 to 5% slopes
- FUB Freehold sandy loam — urban land complex, 0 to 10% slopes
- HnA Holmdel sandy loam, 0 to 2% slopes
- HUA Holmdel sandy loam — urban land complex, 0 to 5% slopes
- PT Pits, sand, and gravel
- Sn Shrewsbury sandy loam
- UD Udorthents — urban land complex, 0 to 3% slopes

Freehold and Udorthents soils were previously discussed in Subsection 2.4.1 and will not be discussed in this section.

The Atsion sand is a nearly level, poorly drained soil found in depressional areas and on broad flats. The uppermost 2 inches are matted, partly decomposed organic material and roots with 6 inches of black sand below. The subsurface layer is a 14-inch-thick grayish-brown sand. The subsoil is a dark reddish-brown loamy sand, 18 inches thick, with approximately 10 inches of mottled brown sand in the lower layer. The substratum is a mottled yellowish-brown fine sand to a depth of at least 60 inches. Permeability is moderately rapid or rapid in the subsoil and rapid in the substratum. The available water capacity is low. Between November and June, the seasonal high water table ranges from the surface to 1 ft (MCSS, 1989).

Evesboro soils are excessively drained soils that developed in acid, sandy, coastal plain sediments located on uplands. These soils have a 4-inch surface layer where the upper 2 inches are matted decomposed organic matter with 2 inches of grayish-brown sand in the lower layer. The subsurface layer is 5 inches of yellowish-brown sand. The subsoil and substratum are yellowish-brown sand. Permeability is rapid in the subsoil and substratum. The available water capacity is low. The seasonal high water table is at a depth of more than 6 ft. Runoff is slow. At Charles Wood, Evesboro soils are represented by the Evesboro sand with 2 to 5% slopes (EvB) (MCSS, 1989).

Holmdel soils are level, moderately well-drained to somewhat poorly drained soils found in depressions and on low divides. The surface layer is a 12-inch-thick dark grayish-brown sandy loam. The subsoil has two layers: the upper is a yellowish-brown sandy loam,

12 inches thick, and the lower layer is mottled yellowish-brown sandy clay loam to a depth of 38 inches. The substratum is mottled, yellowish-brown and light olive-brown sand and sandy loam to a depth of at least 60 inches. Permeability is moderate in the subsoil and the substratum, and the available water capacity is high. The seasonal high water table ranges from 1.5 to 4 ft between December and May. Runoff is slow. Two Holmdel soils are found at Charles Wood: the Holmdel sandy loam, 0 to 2% slopes (HnA), and the Holmdel sandy loam — urban land complex, with 0 to 5% slopes (HUA) (MCSS, 1989).

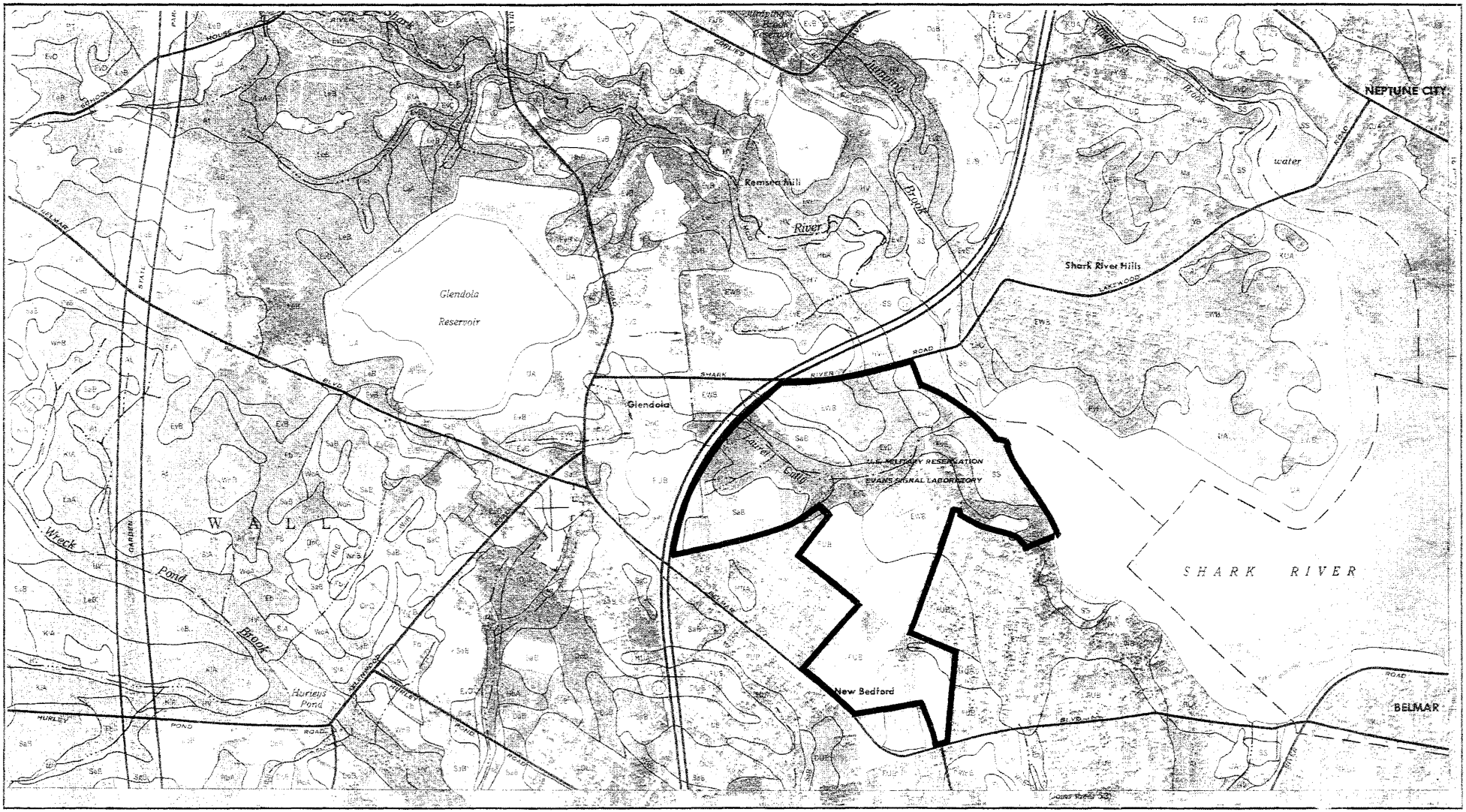
Soils classified as Pits, sand and gravel, have been excavated for sand and gravel. These areas are sand with varying amounts of gravel. The properties of these soils vary from place to place (MCSS, 1989).

The Shrewsbury sandy loam is a level poorly drained soil found in depressions, along drainageways and on broad flats. The first inch is dark reddish-brown matted, partly decomposed organic material and roots with 8 inches of black sandy loam below. The subsurface layer is a 4-inch-thick dark gray sandy loam. The subsoil has a 9-inch-thick mottled grayish-brown sandy clay loam and 9 inches of mottled olive-gray sandy clay loam. The substratum is a mottled dark greenish-gray loamy sand. Permeability is moderately slow or moderate in the subsoil and moderately rapid or rapid in the substratum, and the available water capacity is high. The seasonal high water table is between the surface and a depth of 1 ft from October to June. Runoff is slow and water ponds on the surface (MCSS, 1989).

2.4.3 Evans Area

Ten soil types are identified in the Monmouth County Soil Survey (MCSS, 1989) at the Evans Area (see Figure 2-4):

- EvB Evesboro sand, 2 to 5% slopes
- EvC Evesboro sand, 5 to 10% slopes
- EvD Evesboro sand, 10 to 15% slopes
- EvE Evesboro sand, 15 to 24% slopes
- EWB Evesboro sand — urban land complex, 0 to 10% slopes



LEGEND

EvB	Evesboro Sand, 2-5% Slopes	FUB	Freehold Sandy Loam - Urban Land Complex, 0-10% Slopes
EvC	Evesboro Sand, 5-10% Slopes	HUA	Hamidel Sandy Loam - Urban Land Complex, 0-5% Slopes
EvD	Evesboro Sand, 10-15% Slopes	HV	Humaquepts, Frequently Flooded
EvE	Evesboro Sand, 15-24% Slopes	SaB	Sassafras Sandy Loam, 2-5% Slopes
EWB	Evesboro Sand, Urban Land Complex, 0-10% Slopes	SS	Sulfaquents and Sulfihemists, Frequently Flooded

Source: Soil Survey of Monmouth County, New Jersey, USDA-SCS, 1989.

0 1000 2000 3000 4000

SCALE IN FEET

2017-0598 10/20/93

Fort Monmouth, Evans Area

FIGURE 2-4

EVANS AREA SOIL SERIES MAP

- FuB Freehold sandy loam — urban land complex, 0 to 10% slopes
- HUA Holmdel sandy loam — urban land complex, 0 to 5% slopes
- HV Humaquepts, frequently flooded
- SaB Sassafras sandy loam, 2 to 5% slopes
- SS Sulfaquents and Sulfihemists, frequently flooded

Evesboro, Freehold, Holmdel, and Humaquepts soils were discussed in either Subsection 2.4.1 or 2.4.2 and are not discussed below.

Sassafras soils are well-drained soils formed from acid, loamy, Coastal Plain sediments on uplands. The surface layer is an 11-inch-thick dark brown sandy loam. The upper layer of the subsoil is a yellowish-brown sandy loam and sandy clay loam, 19 inches thick, and the bottom layer is a 6-inch-thick reddish-yellow sandy loam. The substratum is a reddish-yellow loamy sand and sandy loam. Permeability is moderate in the subsoil and moderate to rapid in the substratum, and the available water capacity is high. The seasonal high water table is at a depth of more than 6 ft (MCSS, 1989).

Sulfaquent and Sulfihemist soils are poorly drained to very poorly drained soils found in tidal marshes and estuaries subject to tidal flooding. These soils are mapped together because they are similar in use and management. Permeability of these soils is moderate or moderately rapid in the substratum, and the available water capacity is high. The water table fluctuates with the tides. Runoff is very slow. These soils are classified as hydric soils (MCSS, 1989).

2.5 GEOLOGY

2.5.1 Regional Geology

Monmouth County lies within the New Jersey section of the Atlantic Coastal Plain physiographic province. Main Post, Charles Wood, and the Evans Area are located in what may be referred to as the Outer Coastal Plain subprovince, or the Outer Lowlands.

In general, New Jersey Coastal Plain formations consist of a seaward-dipping wedge of unconsolidated deposits of clay, silt, sand, and gravel. These formations typically strike

northeast-southwest with a dip ranging from 10 to 60 ft per mile and were deposited on Precambrian and lower Paleozoic rocks (Zapecza, 1989). Coastal Plain sediments, predominantly derived from deltaic, shallow marine, and continental shelf environments, date from Cretaceous through the Quaternary Periods. The mineralogy ranges from quartz to glauconite.

The formations record several major transgressive/regressive cycles and contain units that are generally thicker to the southeast and reflect a deeper water environment. More than 20 regional geologic units are present within the sediments of the Coastal Plain (see Table 2-1). 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 thicknesses for these units vary greatly (i.e., from several feet to several hundred feet). The Coastal Plain deposits thicken to the southeast from 0 ft at the Fall Line to greater than 6,500 ft in Cape May County (Brown and Zapecza, 1990).

2.5.2 Local Geology

Based on the regional geologic map (Jablonski, 1968), the Cretaceous Age Red Bank and Tinton Sands outcrop at the Main Post. The Red Bank sand conformably overlies the Navesink Formation and dips to the southeast at 35 ft 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% of the sand

Table 2-1 *Geologic and Hydrogeologic Units in the New Jersey Coastal Plain*

System	Series	Geologic Unit	Lithology	Hydrogeologic Unit	Hydrologic Characteristics
Quaternary	*Holocene*	Alluvial deposits	Sand, silt, and black mud	Undifferentiated	Surficial material, often hydraulically connected to underlaying aquifers. Locally some units may act as confining beds. Thicker sands are capable of yielding large quantities of water.
		Beach sand and gravel	Sand, quartz, light-colored, medium- to coarse-grained, pebbly		
	Pleistocene	Cape May Formation	Sand, quartz, light-colored, heterogeneous, clayey, pebbly		
Tertiary	*Miocene*	Pensauken Formation			
		Bridgeton Formation		Kirkwood-Cohansey aquifer system	A major aquifer system. Groundwater occurs generally under water-table conditions.
		Beacon Hill Gravel	Gravel, quartz, light-colored, sandy		
		Cohansey Sand	Sand, quartz, light-colored, medium- to coarse-grained, pebbly; local clay beds		
		Kirkwood Formation	Sand, quartz, gray and tan, very fine to medium-grained, micaceous, and dark-colored diatomaceous clay	Confining bed	Thick diatomaceous clay bed occurs along coast and for a short distance inland. A thin water-bearing sand occurs within the middle of this unit.
				Rio Grande w-b	
				Confining bed	
				Atlantic City 800-foot sand	A major aquifer along the coast.
				Composite confining bed	Alloway Clay Member or equivalent.
	Eocene	Piney Point Formation	Sand, quartz, and glauconite, fine- to coarse-grained	Piney Point aquifer	Yields moderate quantities of water locally.
		Shark River Formation	Clay, silty and sandy, glauconitic, green, gray, and brown, fine-grained quartz sand		Poorly permeable sediments.
		Manasquan Formation			
	Paleocene	Vincentown Formation	Sand, quartz, gray and green, fine- to coarse-grained, glauconitic, and brown, clayey, very fossiliferous, glauconite and quartz calcarenite	Vincentown aquifer	Yields small to moderate quantities of water in and near its outcrop area.
		Hornerstown Sand	Sand, clayey, glauconitic, dark green, fine- to coarse-grained		Poorly permeable sediments.
Cretaceous	*Upper Cretaceous*	Tinton Sand	Sand, quartz, and glauconite, brown and gray, fine- to coarse-grained, clayey, micaceous		
		Red Bank Sand		Red Bank Sand	Yields small quantities of water in and near its outcrop area.
		Navesink Formation	Sand, clayey, silty, glauconitic, green and black, medium- to coarse-grained		Poorly permeable sediments.
		Mount Laurel Sand	Sand, quartz, brown and gray, fine- to coarse-grained, slightly glauconitic	Wenonah-Mount Laurel aquifer	A major aquifer.
		Wenonah Formation	Sand, very fine to fine-grained, gray and brown, silty, slightly glauconitic		
		Marshalltown Formation	Clay, silty, dark greenish-gray, glauconitic quartz sand	Marshalltown-Wenonah confining bed	A leaky confining bed.
		Englishtown Formation	Sand, quartz, tan and gray, fine- to medium-grained; local clay beds	Englishtown aquifer system	A major aquifer. Two sand units in Monmouth and Ocean Counties.
		Woodbury Clay	Clay, gray and black, micaceous silt	Merchantville-Woodbury confining bed	A major confining bed. Locally the Merchantville Formation may contain a thin water-bearing sand.
		Merchantville Formation	Clay, glauconitic, micaceous, gray and black; locally very fine-grained quartz and glauconitic sand		
		Magothy Formation	Sand, quartz, light-gray, fine- to coarse-grained; local beds of dark-gray lignitic clay	***Potomac-Raritan Magothy aquifer*** Upper aquifer	A major aquifer system. In the northern Coastal Plain, the upper aquifer is equivalent to the Old Bridge aquifer and the middle aquifer is the equivalent of the Farrington aquifer.
		Raritan Formation	Sand, quartz, light-gray, fine- to coarse-grained; pebbly, arkosic, red, white, and variegated clay	Conf. bed / Middle aquifer	
	Lower Cretaceous	Potomac Group	Alternating clay, silt, sand, and gravel	Conf. bed / Lower aquifer	
Pre-Cretaceous		Bedrock	Precambrian and lower Paleozoic crystalline rocks, metamorphic schist and gneiss; locally Triassic basalt, sandstone, and shale and Jurassic diabase	Bedrock confining bed	No wells obtain water from these consolidated rocks, except along the Fall Line.

1614-5277 10/29/93 Adapted from Zapecza, 1989.

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).

Both the Tinton Sand and the Hornerstown Sand (or Marl) outcrop at Charles Wood. The Hornerstown unconformably overlies the Tinton Sand and is a dusky-green to grayish-olive or grayish-olive-green clayey glauconitic sand that may oxidize to moderate reddish brown and dusky red. The percentage of quartz sand ranges from a few percent to 30 percent. Approximately half of this formation is composed of silt and clay.

The Kirkwood Formation (part of the Kirkwood-Cohansey system) outcrops in the Evans Area and dips to the southeast at 20 ft per mile (Jablonski). The Kirkwood consists of alternating layers of sand and clay. The upper unit is a light gray to yellowish-brown fine-grained quartz sand with quartz nodules and small pebbles. The lower unit is a brown silt in Monmouth County (Jablonski).

2.6 HYDROGEOLOGY

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

Based on records from wells drilled at Landfill 8 and for the UST removal program, water is typically encountered at depths of 2 to 9 ft below ground surface (bgs). According to Jablonski, wells drilled in the Red Bank and Tinton sands may produce from 2 to 25 gallons per minute (gpm). Some well owners have reported acidic water that requires treatment to remove iron.

Shallow groundwater at Main Post is tidally influenced and most likely flows toward the creeks and brooks as the tide goes out and at low tide. As the tide comes in and at high tide, groundwater most likely flows away from the surface water drainages.

Because of the high silt and clay content, the Hornerstown sand most likely serves as an aquitard or aquiclude rather than as an aquifer. Jablonski reports that localized areas may yield enough water for domestic use. Water was encountered at 5 to 12 ft bgs in wells drilled for the UST program at Charles Wood.

The water table aquifer in the Evans Area is part of the Kirkwood-Cohansey aquifer system, a major shallow aquifer in southern Monmouth County (Jablonski). Jablonski reported well yields ranging from 15 to 1,236 gpm in this aquifer. Groundwater was encountered at approximately 30 ft bgs in borings completed in the Evans Area, where groundwater generally flows toward the Shark River.

2.7 VEGETATION AND WILDLIFE

The information in this subsection was extracted from the Installation Assessment (IA).

The Fort Monmouth Complex (Main Post, Evans Area, and Charles Wood Area) lies within the outer Atlantic Coastal Plain, a region characterized by salt marsh wetlands. Evans Area also lies within the Oak-Pine Fringe of the New Jersey Pine Barrens.

Ecologically unique areas proximal to Fort Monmouth and its subposts are Parkers Creek, designated as a wildlife habitat bordering the Main Post; and an estuarine pond and Atlantic White Cedar swamp just north of Evans Area, also designated as a wildlife habitat.

All three areas of Fort Monmouth have floodplain salt marsh along or within their boundaries. The ecosystem includes marsh grasses (*Phragmites, Spartina, Distichlis,* and *Scerpus*), small mammals, reptiles, amphibians, and migratory waterfowl.

Of the three major elements of the Fort Monmouth Complex, the Evans Area ecology is the most undisturbed. At the time of the USATHAMA assessment, the Monmouth County Planning Board was considering the Evans Area as a potential nesting site for rare and endangered birds.

Table 2-2 lists trees and shrubs found in Monmouth County. Monmouth County mammals are listed in Table 2-3, and reptiles and amphibians found in Monmouth County are listed in Table 2-4. Table 2-5 lists endangered birds and very rare fish in Monmouth County. Tables 2-2 through 2-5 were adapted from Appendix B of the IA report. Appendix B of the IA also contains a list of vegetation and wildlife found during a survey of nearby Naval Weapons Station Earle. Additional information on vegetation in the Evans Area is presented in the Tectonics Wetlands Delineation Report (1990).

The Fish and Wildlife Service of the U.S. Department of the Interior stated in a letter (included as Appendix E) that there were no federally listed or proposed threatened or endangered flora or fauna on Fort Monmouth. The letter also contains a list of federally endangered and threatened or candidate species in New Jersey. The Office of Natural Lands Mangement of the NJDEPE stated in a letter (included in Appendix E) that there was one observance of a New Jersey listed endangered plant, the clustered sedge, in 1992 but there have been no other observances of federal or state rare species. The letter contained a list of rare species in the general vicinity of each area and in Monmouth County.

Table 2-2

A Partial List of Trees and Shrubs Found in Monmouth County

Trees	
White ash	Green ash
Big-toothed aspen	Quaking aspen
Atlantic white cedar	Basswood
American beech	Black birch
Gray birch	Black gum
Box elder	Black cherry
American chestnut	Flowering dogwood
Eastern red cedar	American elm
Eastern hemlock	Pignut hickory
Shagbark hickory	American holly
Ironwood	Black locust
Honey locust	Norway maple
Red maple	Silver maple
Red mulberry	White mulberry
Black oak	Swamp white oak
Chestnut oak	White oak
Pin oak	Willow oak
Pitch pine	Red pine
White pine	Sassafras
Black spruce	Norway spruce
Tree-of-heaven	Water tupelo
Black walnut	Black willow
Crack willow	Weeping willow
Shrubs	
Pink azalea	Swamp azalea
Wild azalea	Southern bayberry
Blackberry	Blackhaw
Blueberry	Common buttonbush
Chokeberry	Sand cherry
Coralberry	Large cranberry
Red osier dogwood	Swamp dogwood
Common elderberry	Fetter bush
Hawthorn	Huckleberry
Inkberry	Mountain laurel
Sweet pepperbush	Raspberry
Shadbush	Spicebush
Staghorn sumac	Poison sumac
Winged sumac	Arrowwood viburnum
Winterberry	Witch hazel

Table 2-3

Mammals Found in Monmouth County

Mammals	
Opossum	Gray fox
Smokey shrew	Woodchuck
Least shrew	Eastern chipmunk
Short-tail shrew	Eastern gray squirrel
Starnose mole	Red squirrel
Eastern mole	Southern flying squirrel
Keen's myotis (bat)	Beaver
Little brown myotis	White-footed mouse
Small-footed myotis	House mouse
Silver-haired bat	Norway rat
Eastern pipistrel	Southern bog lemming
Red bat	Boreal redback vole
Big brown bat	Meadow vole
Hoary bat	Pine vole
Raccoon	Muskrat
Longtail weasel	Meadow jumping mouse
Mink	Eastern cottontail rabbit
River otter	New England cottontail[1]
Striped skunk	Virginia white-tailed deer
Red fox	European hare

[1]Candidate for List of Endangered Species.

Table 2-4

Reptiles and Amphibians Founds in Monmouth County

Reptiles	
<u>Lizards</u>	
Northern fence	Five-lined skink
	Mud Salamander[1]
<u>Turtles</u>	
Common snapping	Bog[1]
Wood[1]	Spotted
Musk	Eastern mud
Diamond-backed terrapin	Eastern painted
Eastern box	Red-eared
<u>Snakes</u>	
Eastern smooth earth	Red-bellied
Northern brown	Northern water
Eastern garter	Eastern ribbon
Eastern hognose	Eastern worm
Northern ringneck	Rough green
Northern black racer	Northern pine[1]
Black rat	Corn
Scarlet	Eastern milk
Eastern king	Timber rattler[1]
Amphibians	
<u>Toads</u>	
Eastern spadefoot	Fowlers
<u>Tree Frogs</u>	
Spring peeper	Gray
Pine barrens[1]	New Jersey chorus
<u>True Frogs</u>	
Cricket	Carpenter
Pickerel	Green
Northern leopard	Wood
Bull	

[1]On list of endangered or threatened species or candidate for Federal List of Endangered Species.

Table 2-5

Endangered Birds and Very Rare Fish Found in Monmouth County

Birds	
Bald eagle[1,2]	Black skimmer[2]
Peregrine falcon[1]	Least tern[2]
Osprey - Fish hawk - Salt marsh[2]	Eskimo curlew - protected by U.S. Government
Coppershawk	
American bittern[2]	
Barred owl[2]	
Black call[2]	
Bobolink[2]	
Cooper's hawk[2]	
Grasshopper sparrow[2]	
Great Blue Herron[2]	
Loggerhead shrike[2]	
Merlin[2]	
Northern harrier[2]	
Pied-billed crebe[2]	
Piping plover[2]	
Red-Shouldered hawk[2]	
Roseate tern[2]	
Savannah sparrow[2]	
Short-eared owl[2]	
Upland Sand piper[2]	
Vesper sparrow	
Fish	
Short nose sturgeon	

[1]Federal endangered and threatened species.
[2]NJ endangered and threatened species.

Section 3

SECTION 3

CURRENT ENVIRONMENTAL MANAGEMENT PRACTICES

Fort Monmouth maintains a comprehensive environmental management program. The elements of this program are presented in the Environmental Management/Action Plan, last revised 29 October 1993 and prepared by the DEH of Fort Monmouth. In addition, Fort Monmouth has the following plans:

- Installation Hazardous Waste Management Plans
- Installation Pest Management Plan
- Spill Prevention Control and Countermeasures Plan (SPCCP) and Installation Spill Contingency Plan (ISCP)

Elements of the Environmental Management/Action Plan are presented in the following subsections.

3.1 POTABLE WATER SUPPLIES

Fort Monmouth gets its potable water from the Monmouth Consolidated Water Authority and maintains a State-certified water testing laboratory, which is a commercial activity contractor. The laboratory meets the requirements of the New Jersey Drinking Water Act by annually testing its potable water for bacteria and limited chemistry, which include total petroleum hydrocarbons and inorganic compounds. Samples are tested annually to meet New Jersey drinking water standards. Monthly samples are analyzed for total coliform. Samples are analyzed as requested by any facility personnel.

Fort Monmouth's potable water program satisfies the requirements of the U.S. Environmental Protection Agency (EPA), Clean Water Act (CWA), Safe Drinking Water Act (SDWA), and the NJDEPE Safe Drinking Water Act. Fort Monmouth submits an annual Safe Drinking Water Report and a monthly Microbiology Report to the NJDEPE.

3.2 SANITARY WASTEWATER DISPOSAL

Sanitary sewage at Fort Monmouth is discharged to the Northeast Monmouth County Regional Sewerage Authority (NMCRSA). NMCRSA monitors the sewage effluent from Fort Monmouth every month to ensure compliance with NJDEPE's discharge contaminant standards.

3.3 SOLID WASTE DISPOSAL

Fort Monmouth manages waste refuse, contaminated soils from leaking USTs and other spills, and leaf composting. Waste refuse is sent to the Monmouth County Reclamation Center in Tinton Falls for disposal or recycling.

Items recycled in the commercial area of Fort Monmouth include glass, aluminum, bimetals, paper, newspaper, and cardboard. In addition to these items, plastic containers are also recycled in the residential areas. Residential pickup of recyclables occurs twice a month. Fort Monmouth recycles approximately 30% of its solid waste. Other solid waste is transported by an outside licensed contractor to the County Reclamation Center.

Soils that have been contaminated by leaking USTs or other spills are classified into one of three NJDEPE categories: hazardous waste, nonhazardous waste, and soils that contain contaminant levels below regulatory concern. Hazardous waste soils exhibit the characteristics of ignitability, corrosivity, reactivity, toxicity, have PCB concentrations greater than 50 parts per million (ppm), or have total petroleum hydrocarbon (TPH) concentrations greater than 30,000 ppm. Only a small percentage of the contaminated soil found at UST sites have been classified as hazardous waste. This waste is disposed of at a permitted disposal facility in accordance with Resource Conservation and Recovery Act (RCRA) regulations, as discussed in Subsection 3.4.

Most of the contaminated soil at Fort Monmouth is classified as nonhazardous waste. This is soil that has contamination below the limits specified for hazardous waste but above the

limits established by NJDEPE for reuse of soil. Fort Monmouth currently sends this class of soil to recycling facilities where it is thermally treated and used as clean fill. The soil that contains contamination below regulatory levels is reused as clean fill at Fort Monmouth. Only a small percentage of soil waste falls into this category.

Fort Monmouth conducts leaf composting at three sites: two on the Main Post and one on Charles Wood. The technology involves sorting out all other material besides leaves and disposing of it. The leaves are wetted and formed into windrows. The windrows are periodically combined, turned over, and wetted. After 18 months, the leaves are fully composted and reused on site.

The solid waste generated at Fort Monmouth is regulated by EPA RCRA regulations and the NJDEPE Solid Waste Act. Fort Monmouth prepares an annual Operating Statement and a Solid Waste Classification Report for NJDEPE.

Although asbestos is no longer used at Fort Monmouth, asbestos waste is generated during repair work, and it is placed in a dumpster that is designated for asbestos waste. The asbestos is disposed of at a landfill that is permitted for asbestos.

3.4 HAZARDOUS WASTE DISPOSAL

Fort Monmouth is a large-quantity generator of hazardous waste, but it does not have long-term storage and does not treat hazardous waste. Fort Monmouth is a less than 90-day storage facility. It is registered as a generator with EPA and NJDEPE, but it is not required to have a license or permit. Each area has an EPA identification number:

- Main Post ID # NJ 3210020597
- Charles Wood ID # NJ 2210020978
- Camp Evans ID # NJ 3210020324

Hazardous waste is accumulated at the point of generation until 55 gallons or 1 quart of an acutely hazardous waste is accumulated. At that point, the waste container is transferred

to the central storage facility within 3 days. Each area has its own central storage facility that is operated by the Gas and Chemical Section of the Directorate of Logistics. The Gas and Chemical Section coordinates the disposal of the waste through the Defense Reutilization Marketing Office (DRMO), located in Lakehurst, New Jersey. The DRMO arranges for disposal of the waste to an EPA-permitted waste treatment or disposal facility and ensures that the waste is transported by a hauler with an EPA identification number and that a manifest is prepared.

Fort Monmouth has a program to minimize the production of hazardous waste. Waste is minimized by source reduction, recycling, and treatment. Source reduction is the approach most emphasized at Fort Monmouth. Product/material substitution, production process redesign and modernization, and better operating practices are the major components in a source reduction operation. Product/material substitution is the process of replacing hazardous materials with nonhazardous ones. Examples of this at Fort Monmouth are substituting water-based latex paint for oil-based paints and replacing chlorinated degreasing solvents with nonhalogenated, petroleum-based solvents.

Production process redesign and modernization to reduce the amount of hazardous waste produced has been used at Fort Monmouth. An example is the installation of a complete discharge device (CDD) to discharge lithium/sulfur dioxide (Li/SO_2) batteries. Discharging the batteries results in their not exhibiting the hazardous waste characteristics of ignitability or reactivity, allowing them to be disposed of as nonhazardous waste.

Better operating practices means providing proper instruction to employees using hazardous materials, ensuring that only the necessary amounts of hazardous materials are being used, and ensuring that employees work from small containers whenever possible, thereby reducing the likelihood of spills.

Recycling options at Fort Monmouth involve reprocessing the waste material to produce a reusable product. Examples of recycling at Fort Monmouth are reconditioning of waste

antifreeze and the recovery of waste oil filters. Examples of offsite recycling include fuel-blending automotive waste oil and recycling lead/acid storage batteries.

Hazardous waste treatment is not currently performed at Fort Monmouth. However, all hazardous waste generated by Fort Monmouth is processed through the Defense Reutilization Marketing Office (DRMO) and the DRMO normally incinerates wastes. A small neutralization system is being considered for installation in Building 2700 for neutralization of laboratory waste.

Fort Monmouth completes an EPA Biennial Inventory of Federal Hazardous Waste Activities, and an NJDEPE Annual Hazardous Waste Generator Report.

3.5 MEDICAL WASTE DISPOSAL

Fort Monmouth generates medical waste at Patterson Army Community Hospital. All medical waste is placed in red bags and manifested in accordance with New Jersey Medical Waste Regulations. The waste is currently transported by Regional Carting, Inc. of Matawan, New Jersey, for incineration at KF Processing Co. in Marcus Hook, Pennsylvania.

3.6 PCB MANAGEMENT PROGRAM

The Fort Monmouth PCB management program consists of determining the level of PCB in all electrical transformers and removing all PCB-class transformers (i.e., PCB > 500 ppm). Prior to 1988, all oil-filled electrical equipment at Fort Monmouth was assumed to be PCB-class equipment and was labeled as such. In November 1988, Fort Monmouth initiated a program to sample and analyze all equipment that did not have a manufacturer's label indicating that it was non-PCB (i.e., PCB < 50 ppm).

Testing of all oil-filled transformers, capacitors, voltage regulators, and switches was completed by June 1990. Thirty-three pieces of equipment were identified as being PCB class, 96 as being PCB contaminated (PCB concentrations between 50 and 500 ppm), and

520 as being non-PCB. In addition, 224 pieces were identified, from the manufacturer's nameplate, as being non-PCB.

To fulfill the requirements of the Toxic Substances and Control Act (TSCA), Fort Monmouth initiated an action to remove or remediate all PCB-class equipment. Of the 33 PCB-class pieces of equipment, all of which were transformers, 29 were removed and sent to Aptus, Inc. in Coffeyville, Kansas. At the Aptus facility, the PCB oils were drained from their containers and incinerated. The empty metal containers were triple-rinsed and sent to a secure landfill. The other four transformers were drained, and the PCB oil was replaced with non-PCB oil. The drained PCB oil was sent to Aptus for incineration. The four transformers were resampled and tested for PCB content within 90 days after being retrofilled. All four transformers now have PCB levels less than 50 ppm and are classified as being non-PCB. Therefore, there are currently no PCB-class pieces of equipment at Fort Monmouth.

Before the PCB class transformers were removed, each was inspected on a quarterly basis. If a leak was discovered, immediate action was taken to contain the leak and remediate the spill as necessary. As part of this study, the location of each former PCB-class transformer was inspected for evidence of a spill. The results of the inspection and recommendations for additional investigations, as appropriate, are presented in Subsection 4.4.

Although not required by TSCA, Fort Monmouth inspects PCB-contaminated equipment for leaks on a quarterly basis. Fort Monmouth is currently retrofilling all PCB-contaminated equipment and plans to have only non-PCB equipment in a few years.

The remaining PCB-contaminated equipment is regulated under TSCA and NJDEPE Hazardous Waste Management Act. The following reports are completed for the EPA: Notification of PCB Activity Report, the Annual PCB Document, and the Quarterly Inspection Report.

3.7 PESTICIDE AND HERBICIDE PROGRAM

Fort Monmouth operates a pest management plan that provides effective and environmentally acceptable controls. Pest management operates on the principle of Integrated Pest Management. This is a systems approach to reduce pests to tolerable levels through a variety of techniques, including the use of predators and parasites, genetically resistant hosts, natural environmental modifications, mechanical control, proper sanitation, physical exclusion, public education, and, when necessary and appropriate, chemical pesticides. A summary of pest management methods for the major types of pests found at Fort Monmouth is presented in Table 3-1. When chemicals are needed, the chemical that represents the lowest level of human toxicity while still being fully effective on pest populations is selected. A copy of the Pesticide Inventory from the Pest Management Plan is attached as Appendix B.

The pest management program is administered by the DEH and implemented by contractors. The DEH Facility Management Specialist is the Quality Assurance Evaluator of the contractors' activities and also serves as the Pest Management Coordinator. This person is trained and certified by the Department of Defense (DOD) in pest management. The Pest Management Coordinator is advised by Preventive Medicine on the safe uses of pesticides and other health issues. The Coordinator completes a monthly compilation of all pesticides used along with associated data on DOD Form 1532.

The Pest Management Coordinator and all contractor personnel who apply pesticides are part of a medical surveillance program. Each individual receives an annual physical examination to establish that the individual is physically capable of wearing a respirator and to measure red blood cell (RBC) cholinesterase level, test liver and kidney function, and conduct a complete blood count and respiratory evaluation. If cholinesterase-inhibiting substances (CIS) are used, the RBC cholinesterase level will be monitored at least twice a year and more frequently if CIS are heavily used or if the individual exhibits symptoms of CIS poisoning.

Table 3-1

Summary of Pest Management Methods

Pest Category	Specific Pest	Controls	Pesticides/Herbicides
Household and Nuisance Pests	Cockroach, mice, spiders, crickets, ants	Close entry points, improve sanitation, eliminate harborage, apply pesticides, inspect food-handling facilities every 30 days.	Propxur, diazinon, d-phenothrin, dursban, boric acid, pyrethrum, chlorpyrifos, carbaryl
Structural Pests	Termites, old house borers, powder post beetles	Inspect 100 structures per year, repair wood, apply pesticides.	Pyrethrin, chlorpyrifos
Weed Control	Weeds	Apply herbicide at newly constructed facilities, recreation areas, building entrances, and miscellaneous roadsides.	Bromocil, 2,4-D, dicamba, mecoprop
Stored Products Pests	Rodents, insects	Inspect Post Exchange, Commissary, and food storage areas. Improve sanitation, close entry points, apply pesticides, fumigate wood pallets.	Aluminum phosphide, chlorpyrifos
Disease Vectors	Ticks, fleas, mosquitoes, flies, raccoons, skunks, cats, birds	Educate personnel, reduce habitat area by grass-cutting or herbicides, spray stagnant water breeding areas, improve sanitation, trap large pests.	Abate, pyrethrin, permethrin, carbaryl, malathion, bacillus thuringieasis, methomy, chlorpyrifos, polybutene
Pests of Ornamental Plants and Turf	Crabgrass, weeds, grubs, insects, moles	Apply crabgrass, broadleaf, and grub control. Chemically treat leaf-chewing insects.	Zinc phosphide, disodium methanearsonate, dimethyl, carbaryl
Stinging Insects	Bees, wasps	Screen windows and doors, remove nests, apply pesticides	Carbaryl, resinethrin, diazinon
Miscellaneous Pests		Refer to Preventive Medicine Unit specialist or local and state agencies.	

The Pest Management Program operates under the requirements of the Federal Insecticide, Fungicide, and Rodenticide Act (FIFRA), Occupational Safety and Health Administration (OSHA) regulations (29 CFR 1910), Environmental Effects of Army Actions (32 CFR 651), and Recommended Procedures and Criteria for Storage of Pesticides and Pesticide Containers (40 CFR 165).

Each Pest Control Contractor is required to furnish the DEH with the following reports:

- Termite Control Report
- Regulatory Agency Inspection Report
- Notification of Pest Treatment Services Report
- Schedule Report of Cyclic Services
- Pesticide Medical Surveillance Report
- Pest Control Summary Report
- Pesticide Label Copies
- Designation of Key Personnel

3.8 UST MANAGEMENT PROGRAM

The New Jersey Underground Storage Tank Act of 1990 requires that all existing USTs storing gasoline, waste oil, and hazardous materials/wastes must be upgraded to include leak detection and overfill protection by December 1993. Existing tanks storing heating oil for on-site consumption must be upgraded by August 1995. To meet this schedule, Fort Monmouth has instituted a program to remove almost all heating oil USTs and use natural gas for heating. In 1995, the only remaining USTs will be tanks storing gasoline and tanks storing heating oil at the main boiler plants.

Approximately 380 USTs will be removed during this period. The process for removing USTs will be in accordance with NJDEPE regulations and will include a prenotification report to NJDEPE. The report will include the UST registration information, removal procedures, site evaluation methods, and corrective action procedures. Following UST removal, a site assessment report will be sent to NJDEPE. The site assessment report will describe the results of environmental evaluations and corrective actions taken.

The UST management program is regulated by EPA and NJDEPE UST regulations. Fort Monmouth completes UST registrations and permit applications, UST removal site assessments, and Discharge Investigation Corrective Action Reports and files them with NJDEPE.

Section 4

SECTION 4
SITE DISCUSSION

4.1 MAIN POST

Figure 4-1 shows the location of the 21 Main Post sites discussed in this section. Eighteen sites (identified as M-1 to M-18 on Figure 4-1) were identified by USATHAMA in the 1980 IA of Fort Monmouth. The NJDEPE expressed concern about one additional site in a letter dated 8 June 1990 (identified as AOC-3). Two sites have been added, because historical information suggests that they were similar to other sites being investigated.

The analytical results for all samples are summarized in Appendix A. The Groundwater and Surface Water Analytical Results Table, found in Appendix A, presents Main Post analytical data for all parameters that were detected above method detection limits. It should be noted that the Main Post Groundwater and surface water samples were collected in tidally influenced areas; because the solubility of metals is affected by salinity and the samples were most likely not collected at exactly the same tidal stage, the metals concentrations are variable.

4.1.1 Landfill 1 (M-1)

4.1.1.1 Site Location

Site M-1 is identified in the IA as a landfill that was in use prior to World War II. This site is located outside of the Main Post boundaries and southeast of Johnston Gate (see Figure 4-1).

4.1.1.2 Site History

On the 1918 tax map of Eatontown Township, the M-1 area was not included within the base boundary. Interviews with long-term Fort Monmouth employees confirmed that this

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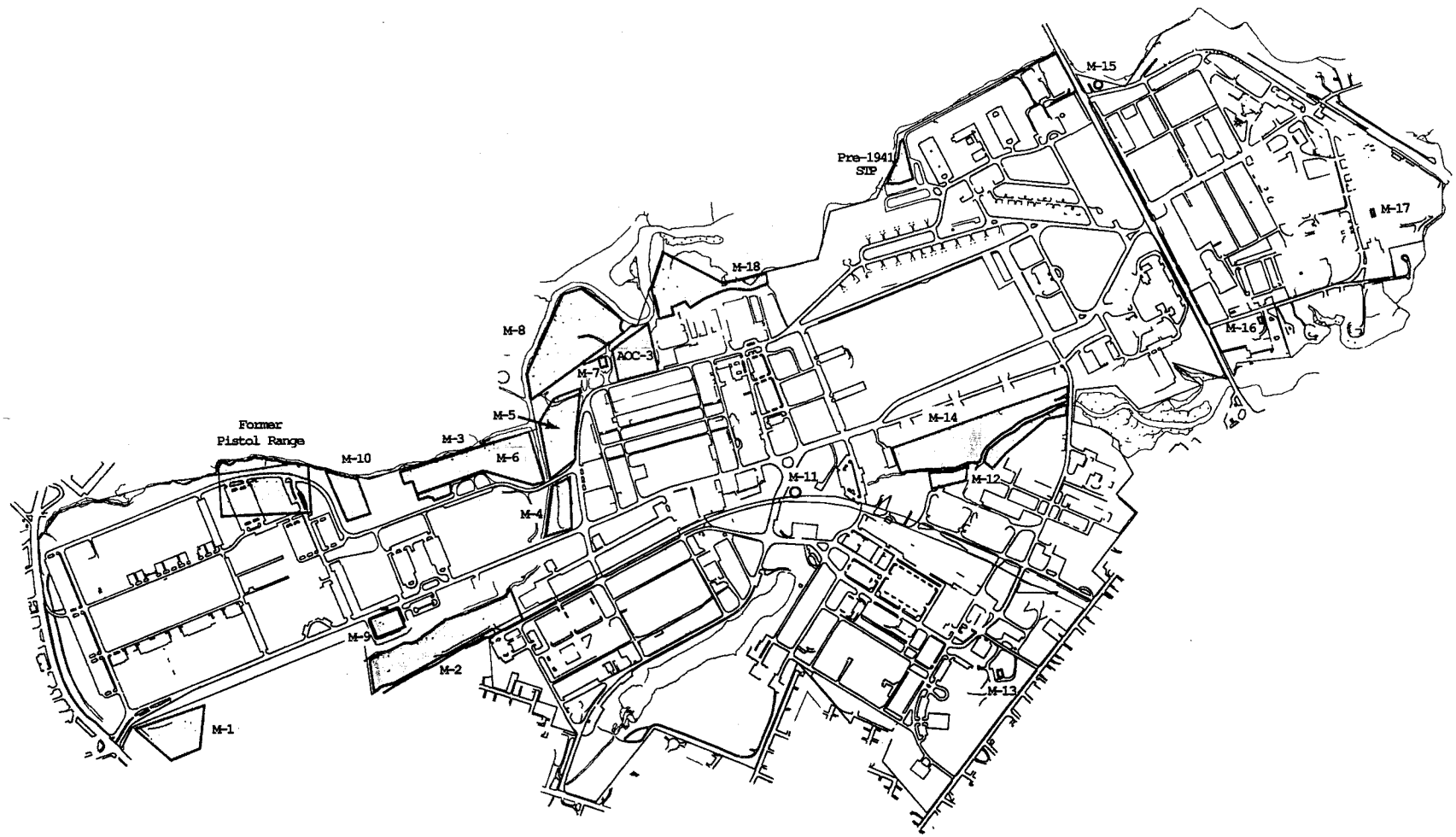
MAINSITE.DGN



LEGEND

Road (paved)
Building
Site
Lake
Marshy Area

0 5200
SCALE IN FEET

2017-0593 10/19/93

Fort Monmouth, Main Post

FIGURE 4-1
MAIN POST SITE LOCATION MAP

property has never belonged to Fort Monmouth and did not receive waste from the post. The present owner of the Triple S Bar and Liquors, located in the western part of the M-1 property, stated that this property was leased by his father from 1946 to 1963 and purchased in 1963. He did not know of any disposal activities associated with this site. In addition, a 1969 aerial photograph shows a house on the eastern part of this property. At present, the site is heavily wooded (see photo of Landfill [M-1] on page P-1, following Section 4).

4.1.1.3 Past Sampling Activities

Sampling has not been conducted in the M-1 area.

4.1.1.4 Strategy

The area identified in the IA report as a pre-World War II landfill has not been part of Fort Monmouth and did not receive solid waste from the post. Therefore, the M-1 area should be removed from consideration as a site of concern with no further action recommended.

4.1.2 Landfill 2 (M-2)

4.1.2.1 Site Location

Landfill 2 (M-2) is located in the southwestern corner of the Main Post, on the south bank of Mill Brook (see Figures 4-1 and 4-2).

4.1.2.2 Site History

According to the IA, Landfill 2 was in use between 1964 and 1968. A review of aerial photographs suggests that the landfill was still in use in 1969. The 1969 aerial photograph shows that the western three-quarters of the site is mostly bare ground with abundant wheel tracks; a 50-by-300-ft area in the center of this western area is covered with small piles of debris; vegetation is visible between some of the piles, suggesting that the piles had been

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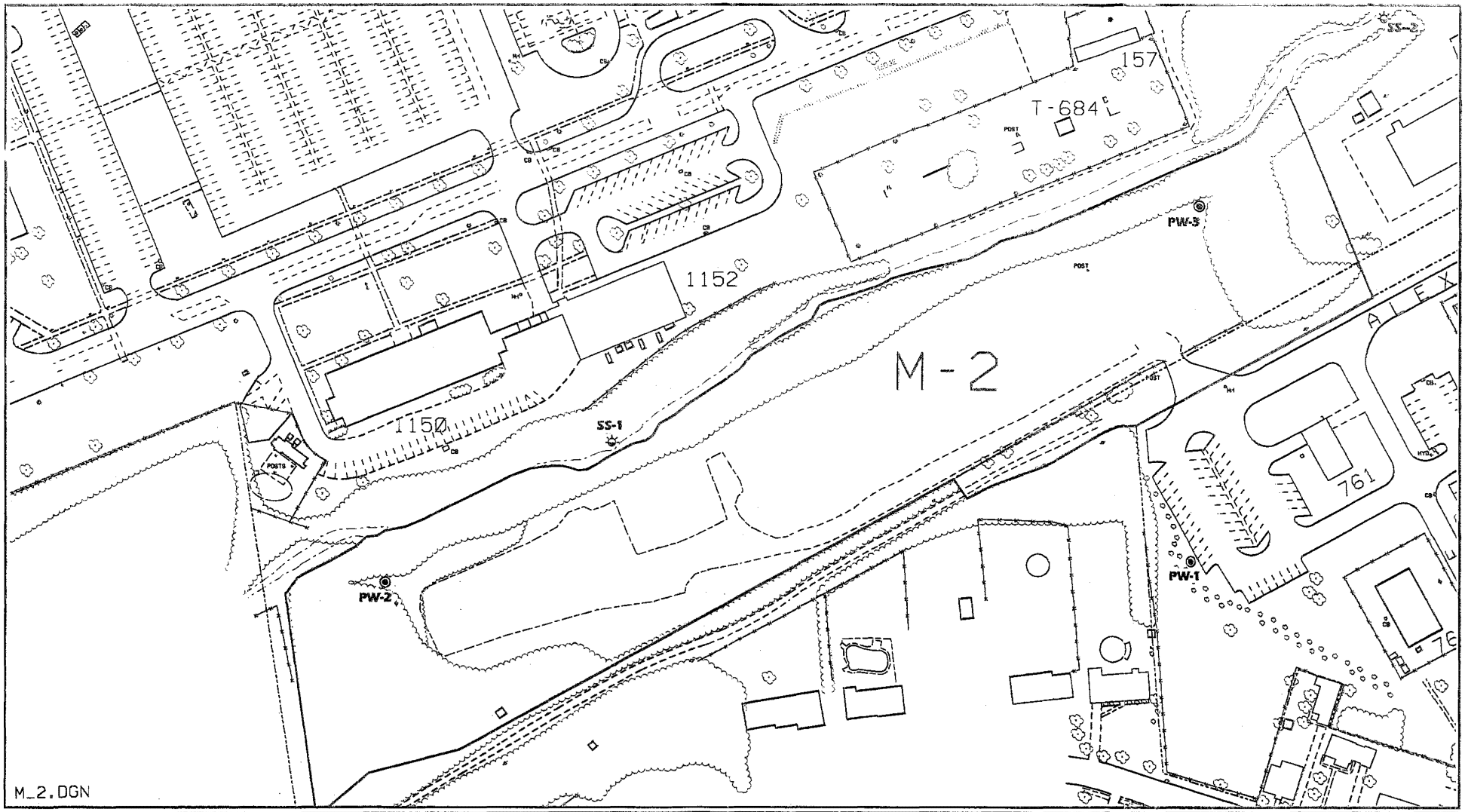


LEGEND

- Proposed Soil Boring
- Proposed Monitor Well
- Existing Surface Water Sampling Location
- Road (paved)
- Road/Trails (unpaved)
- Fence
- Building
- Wooded Area
- Tree/Bush
- Light Pole
- Utility Pole
- Site
- Brook/Creek
- Base Boundary
- Marshy Area

0 400
SCALE IN FEET

2017-0583 10/18/93

Fort Monmouth, Main Post

FIGURE 4-2
LANDFILL 2 (M-2)

there for some time. The eastern quarter of the site is vegetated; a small square building and a steel storage igloo were located near the entrance to the landfill. At present, the Landfill 2 area is permitted by NJDEPE for composting and is used for leaf composting and storage of tree stumps and wood chips (see photo on page P-1).

Materials generally found in Main Post landfills 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, and other debris (IA). According to the IA, specific wastes known to have been put in Landfill 2 include oil in cans, oil burner filters (with approximately 0.5 liter of oil in each), and soot. The banks along Mill Brook near the west end of Landfill 2 were reportedly embedded with building rubble (concrete, cinder blocks, etc.) to stabilize the bank. At times, metal and concrete can be seen protruding from the bank of Mill Creek.

4.1.2.3 Past Sampling Activities

As part of a New Jersey Pollution Discharge Elimination System (NJPDES) Permit (NJ#0057274), surface water samples have been collected from an upstream (SS-1) and a downstream sampling location (SS-2) in Mill Brook since February 1986 (see Figure 4-2). Sampling was conducted on a quarterly basis from February 1986 through April 1987 and subsequently has been conducted semiannually. Volatiles and selected inorganics have been sampled once a year, while certain metals, common anions, and inorganic parameters are sampled during each round.

4.1.2.4 Analytical Results

Table 4-1 compares surface water quality data at sampling points SS-1 and SS-2 on Mill Brook with New Jersey Surface Water Criteria and surface water screening criteria.

Table 4-1

Landfill 2, Surface Water Sampling
Analytical Results Summary

Analyte	New Jersey Surface Water Criteria (µg/L)	EPA Criteria			Number of Samples	Number of Detections	Number of Samples Exceeding Criteria	Maximum Concentration Detected (µg/L)
		Acute AWQC[1] (µg/L)	Chronic AWQC[1] (µg/L)	Fish Consumption (µg/L)				
VOCs								
Methylene chloride	–	–	–	1,600	18	10	0	9 B
Trichloroethene	–	2,000	–	81	18	5	0	9
Tetrachloroethene	–	10,200	450	8.85	18	7	0	6.9
Trans-1,2-dichloroethene	–	224,000	–	140,000	18	1	0	16
Freon	–	–	–	–	2	2	NA	5 B
Acetone	–	–	–	–	4	1	NA	8 JB
Inorganics								
Chloride	250,000	–	–	–	36	36	3	1,138,000
Total Coliform	200/100 ml	–	–	–	12	12	6	20,000[2]
Cyanide	–	1	1	220,000	20	4	4	140
pH	6.5 - 8.5	–	6.5 - 8.5	–	36	NA	7	NA
Total Dissolved Solids	500 ppm	–	–	–	34	34	2	2,776 ppm
Total Suspended Solids	40 ppm	–	–	–	2	2	2	172 ppm
Turbidity (NTU)	10 NTU	–	–	–	20	20	10	27 NTU
Metals								
Copper	–	2.9	2.9	–	36	4	4	40
Lead	50	220	8.5	50	36	3	3	20
Zinc	–	95	66	–	36	31	4	15,280

B - Detected in blank J - Estimated concentration found below instrument detection limit. NA - Not applicable

[1]Salt water

[2]Highest reported number, 25 samples had colonies too numerous to count

Sources: NJAC 7.9-4, EPA 440/5-86-001, EPA 40 CFR Part 131

All detected VOCs are listed in Table 4-1, but only metals and inorganics that exceeded the criteria are included. Under the assumption that this portion of Mill Brook is saline because of tidal influence, saltwater Ambient Water Quality Criteria (AWQC) were used.

Three of the halogenated hydrocarbons (HHCs) detected, trichloroethene (TCE), tetrachloroethene (PCE), and methylene chloride (a common laboratory contaminant), were not detected at concentrations above the surface water criteria, but were detected at concentrations above the New Jersey Groundwater Quality Criteria (GWQC) or Practical Quantitation Levels (PQLs). Because of dilution and volatilization, there could be groundwater contamination in the Landfill 2 area above New Jersey GWQCs. Because the SS-1 sampling location is located just west of Landfill 2, in an area where incoming tides could transport contaminants from Landfill 2 in an "upstream" direction, the HHCs detected in samples from location SS-1 may be from Landfill 2. Alternately, the source of the HHCs could be further upstream.

Eight metals were detected in surface water samples collected from these two sampling points, but only three (copper, lead, and zinc) were detected at concentrations above the chronic AWQC. The detected concentrations of seven inorganic parameters (chloride, total coliform, cyanide, pH, total dissolved solids, total suspended solids, and turbidity) exceeded surface water criteria, but two of them, chloride and pH, are most likely the result of natural conditions. The source of the cyanide is unknown.

A complete list of all detected compounds and metals concentrations may be found in Appendix A.

4.1.2.5 Sampling Strategy

To identify the source of the HHCs detected in surface water samples from locations SS-1 and SS-2 on Mill Brook, a new upstream surface water sampling location and three shallow monitor wells will be installed. The upstream sampling location will be along Mill Brook before it passes under Route 35. Proposed monitor well locations (PW-1 through PW-3)

there for some time. The eastern quarter of the site is vegetated; a small square building and a steel storage igloo were located near the entrance to the landfill. At present, the are shown on Figure 4-2. Tidal water-level monitoring will be conducted for a minimum of 72 hours in the three monitor wells and at SS-1 and SS-2 prior to the collection of analytical samples. Two rounds of groundwater samples for Target Compound List (TCL)+30 parameters, Target Analyte List (TAL) metals, and cyanide will be collected from the monitor wells and three surface water sampling locations (new location, SS-1 and SS-2).

4.1.3 Landfill 3 (M-3)

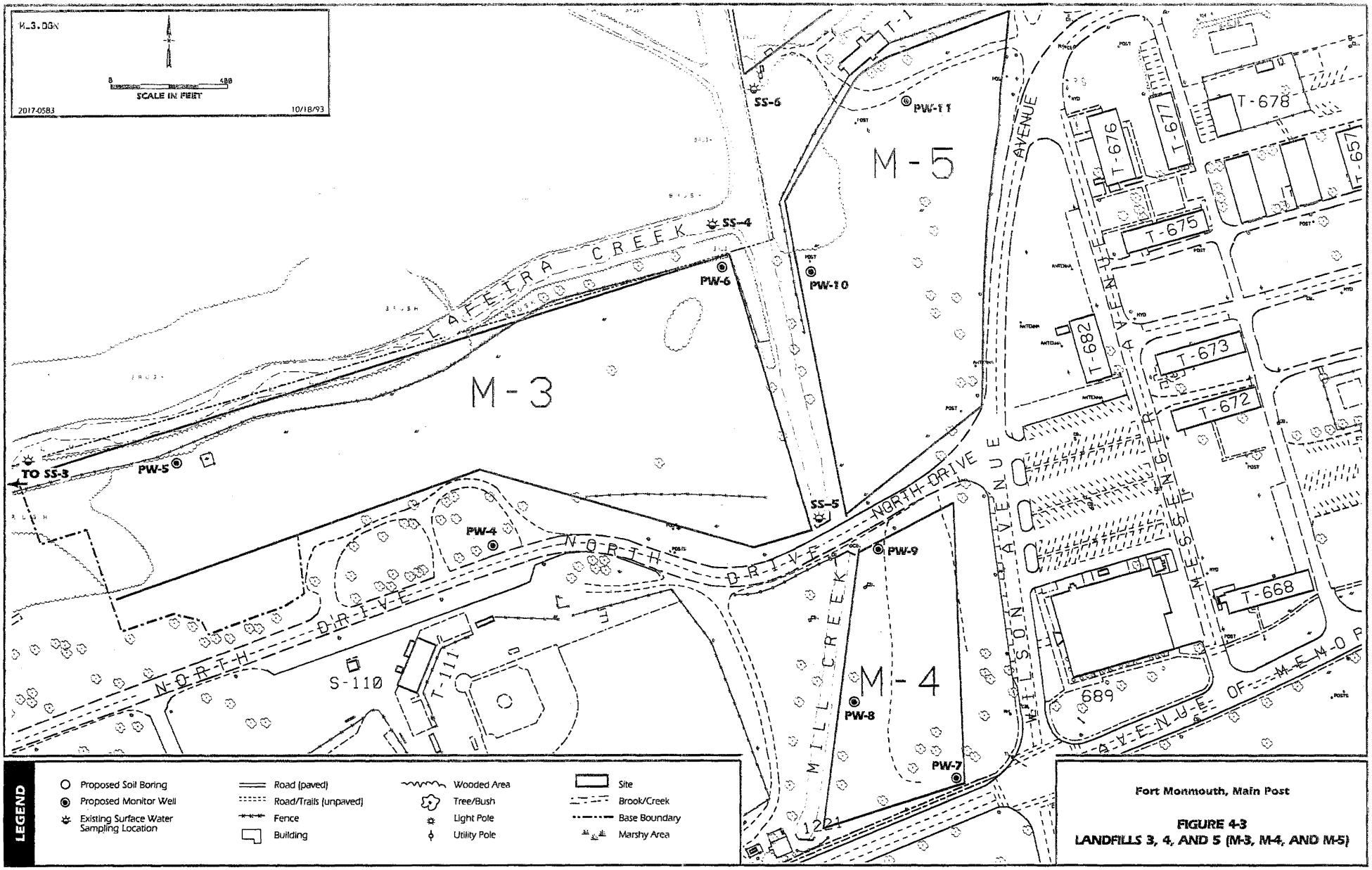
4.1.3.1 Site Location

Landfill 3 (M-3) is located between North Drive and Lafetra Brook in the west central part of the Main Post. The actual boundaries of the landfill are not clear, but have been approximated on Figure 4-3. Burning Area M-6, which is discussed later, was located on Landfill 3.

4.1.3.2 Site History

According to the IA, Landfill 3 was in use between 1959 and 1964, and was used for general purpose disposal of domestic and industrial wastes. The 1969 aerial photograph shows that with the exception of a few areas with vehicle tracks, this area was covered with vegetation. At present, the surface is even and covered with grass (see photo on page P-2).

Landfill 3 (M-3) most likely contained materials similar to those generally found in other Main Post landfills (see Subsection 4.1.2.2). According to long-term Fort Monmouth employees, this landfill also contains wood and coal ash from furnaces and boilers.



Fort Monmouth, Main Post

FIGURE 4-3
LANDFILLS 3, 4, AND 5 (M-3, M-4, AND M-5)

4.1.3.3 Past Sampling Activities

As required by the NJPDES permit, surface water samples have been collected from an upstream (SS-3) and a downstream sampling location (SS-4) in Lafetra Brook (see Figure 4-3) since February 1986. Sampling was conducted on a quarterly basis from February 1986 through April 1987 and subsequently has been conducted semiannually. Volatiles and selected inorganics have been sampled once a year, while certain metals, common anions, and inorganic parameters are sampled during each round.

4.1.3.4 Analytical Results

Table 4-2 compares surface water quality at sampling points SS-3 and SS-4 on Lafetra Brook with New Jersey Surface Water Criteria and surface water screening criteria. All detected VOCs are listed in the table, but only metals and inorganics that exceeded the criteria are included. Saltwater AWQCs were considered applicable.

Similar to analytical results from the Landfill 2 area, three of the HHCs detected, TCE, PCE, and methylene chloride (a common laboratory contaminant), were found at concentrations above the New Jersey GWQC or PQLs, but were not detected at concentrations above the surface water criteria. This suggests that there could be groundwater contamination in the Landfill 3 area above New Jersey criteria. Because SS-3 is located just west of Landfill 3, in an area where incoming tides could transport any discharges from Landfill 3 upstream, the HHCs detected in samples from location SS-3 may be from Landfill 3. Alternately, the HHCs could be from a source further upstream.

Eight metals were detected in surface water samples from these two sampling points, but only three (copper, lead, and zinc) were detected at concentrations above the chronic AWQC. The detected concentrations of seven inorganic parameters exceeded surface water criteria, but two of them, chloride and pH, are most likely a result of natural conditions. The source of the cyanide is unknown.

Table 4-2

Landfill 3, Surface Water Sampling
Analytical Results Summary

Analyte	New Jersey Surface Water Criteria (µg/L)	EPA Criteria			Number of Samples	Number of Detections	Number of Samples Exceeding Criteria	Maximum Concentration Detected (µg/L)
		Acute AWQC[1] (µg/L)	Chronic AWQC[1] (µg/L)	Fish Consumption (µg/L)				
VOCs								
Methylene chloride	–	–	–	1,600	17	7	0	15 B
Acetone	–	–	–	–	4	2	0	12 B
Trichloroethene	–	2,000	–	81	17	2	0	6
Tetrachloroethene	–	10,200	450	8.85	17	3	0	6
1,1,1-Trichloroethane	–	31,200	–	170,000	17	1	0	10
Freon	–	–	–	–	2	2	NA	11 B
Inorganics								
Chloride	250,000	–	–	–	36	36	8	9,665,000
Total Coliform	200/100 ml	–	–	–	12	12	5	10,000
Cyanide	–	1	1	220,000	20	4	4	190
pH	6.5 - 8.5	–	6.5 - 8.5	–	36	36	4	NA
Total Dissolved Solids	500 ppm	–	–	–	34	34	7	17,629 ppm
Total Suspended Solids	40 ppm	–	–	–	2	2	2	249 ppm
Turbidity (NTU)	10 NTU	–	–	–	20	20	12	26 NTU
Metals								
Copper	–	2.9	2.9	–	36	7	7	90
Lead	50	220	8.5	50	36	8	4	40
Zinc	–	95	66	–	36	30	7	10,200

B - Detected in blank
NA - Not applicable
[1]Saltwater
Sources: NJAC 7.9-4, EPA 440/5-86-001, EPA 40 CFR Part 131

The analytical results of surface water sampling conducted at Fort Monmouth are summarized in Appendix A.

4.1.3.5 Sampling Strategy

The extent of Landfill 3 is not known, so surface geophysics will be conducted to investigate the extent of the former landfill. A magnetic survey, including both vertical magnetic gradient and total magnetic field, will be conducted on 10-ft centers. Electromagnetic methods are not recommended because the presence of high-conductivity silts and clays in the subsurface and the potential presence of saltwater would most likely make the results of an electromagnetic survey ambiguous. After completion of the magnetic survey, ground-penetrating radar (GPR) will be used in accessible areas to provide additional definition of landfill boundaries.

Because the source of the HHCs detected in surface water samples from locations SS-3 and SS-4 on Lafetra Brook cannot be determined, a new upstream location will be sampled and three shallow monitor wells will be installed. To minimize the potential impact from Landfill 3, the upstream sampling location will be along Lafetra Brook before it passes under Route 35. Proposed monitor well locations (PW-4 through PW-6) are shown on Figure 4-3, but final locations will be chosen based on the results of the geophysical surveys. The monitor wells and three surface water locations (new location, SS-3 and SS-4) will be sampled twice for TCL+30 parameters, TAL metals, and cyanide.

4.1.4 Landfill 4 (M-4)

4.1.4.1 Site Location

Landfill 4 (M-4) is located in the area bounded by the Avenue of Memories to the south, North Drive to the north, Mill Creek to the west, and Wilson Avenue to the east (see Figure 4-3).

4.1.4.2 Site History

Landfill 4 was used in 1956 for the disposal of building demolition debris. The 1940 aerial photograph shows a swamp at this location. In the latter part of 1955 and during 1956, 72 World War II buildings were demolished on Main Post (*Concise History; History and Place Names*). Potential contaminants associated with demolition debris include lead from paints and piping and asbestos. At present the surface is flat and grass covered (see photo on page P-2). There are trees in the southeast corner.

4.1.4.3 Past Sampling Activities

Surface water sampling location SS-5 located on Mill Creek is downstream from Landfill 4. The analytical results from this sampling location are discussed as part of Landfill 5 in Subsection 4.1.5.4.

4.1.4.4 Sampling Strategy

Three shallow monitor wells (PW-7 through PW-9) around the landfill will be installed. As shown on Figure 4-3, one of these locations is most likely downgradient of Landfill 4 and upgradient of Landfill 5. Two rounds of groundwater samples for TCL+30 parameters, TAL metals, and cyanide will be collected.

4.1.5 Landfill 5 (M-5)

4.1.5.1 Site Location

Landfill 5 (M-5) is located just north of Landfill 4 in the area bounded by North Drive to the south, an unpaved road south of Building T-198 to the north, Wilson Avenue to the east, and Mill and Parkers Creeks to the west (see Figure 4-3).

4.1.5.2 Site History

According to the IA, Landfill 5 was in use between 1952 and 1959, and was reportedly used for the disposal of automobiles as well as for domestic and industrial wastes similar to those mentioned in subsection 4.1.2.2. Like Landfill 4, this landfill was also constructed in a former swamp and is presently flat and grass covered (see photo on page P-3).

4.1.5.3 Past Sampling Activities

As part of the NJPDES permit, surface water samples have been collected from an upstream (SS-5) sampling location on Mill Creek and a downstream sampling location (SS-6) on Parkers Creek since February 1986 (See Figure 4-3). Sampling was conducted on a quarterly basis from February 1986 through April 1987 and subsequently has been conducted semiannually. Volatiles and selected inorganics have been sampled once a year, while certain metals, common anions, and inorganic parameters are sampled during each round.

4.1.5.4 Analytical Results

Table 4-3 compares surface water quality at sampling points SS-5 and SS-6 on Mill and Parkers Creeks with New Jersey Surface Water Criteria and surface water screening criteria. All detected VOCs are listed in the table, but only metals and inorganics that exceeded criteria are included. Saltwater AWQCs were considered applicable because of tidal influence.

Similar to the other main post landfills, two HHCs, PCE and methylene chloride (a common laboratory contaminant), were detected at concentrations above the New Jersey GWQC or PQLs, but were not detected at concentrations above the surface water criteria. This suggests that there could potentially be groundwater contamination above New Jersey criteria in the Landfill 5 area. SS-5 is located just south of Landfill 5, in an area where incoming tides could transport discharges from Landfill 5 upstream. Alternatively, SS-5 could be affected by discharges from Landfill 2 or 4. Because PCE was detected in samples

Table 4-3

Landfill 5, Surface Water Sampling
Analytical Results Summary

Analyte	New Jersey Surface Water Criteria (µg/L)	EPA Criteria			Number of Samples	Number of Detections	Number of Samples Exceeding Criteria	Maximum Concentration Detected (µg/L)
		Acute AWQC[1] (µg/L)	Chronic AWQC[1] (µg/L)	Fish Consumption (µg/L)				
VOCs								
Methylene chloride	–	–	–	1,600	18	7	0	9.2
Acetone	–	–	–	–	4	2	0	10 B
Tetrachloroethene	–	10,200	450	8.85	18	8	0	5.9
1,1,1-Trichloroethane	–	31,200	–	170,000	18	2	0	12
Freon	–	–	–	–	2	2	NA	68
Inorganics								
Chloride	250,000	–	–	–	36	36	8	4,012,000
Total Coliform	200/100 ml	–	–	–	12	12	6	22,000
Cyanide	–	1	1	220,000	20	6	6	130
pH	6.5 - 8.5	–	6.5 - 8.5	–	36	36	6	NA
Sulfate	250,000	–	–	–	36	36	2	1,674,000 ppm
Total Dissolved Solids	500 ppm	–	–	–	34	34	10	6223 ppm
Total Suspended Solids	40 ppm	–	–	–	2	2	2	219 ppm
Turbidity (NTU)	10 NTU	–	–	–	20	20	10	27 NTU
Metals								
Cadmium	10	43	9.3	170	20	3	1	190
Copper	–	2.9	2.9	–	36	3	3	30
Lead	50	220	8.5	50	36	6	5	70
Zinc	-	95	66	–	36	31	7	16,850

B - Detected in blank NA - Not applicable

[1]Salt water

[2]Highest reported number, one sample "too numerous to count"

Sources: NJAC 7.9-4, EPA 440/5-86-001, EPA 40 CFR Part 131

from downstream location SS-6 collected in October 1987 and April 1988, and not detected at upstream locations SS-1, SS-2. and SS-5, the potential source of the PCE could be Landfill 5.

Eight metals were detected in surface water samples from these two sampling points, but only four (cadmium, copper, lead, and zinc) were detected at concentrations above the chronic AWQC. The detected concentrations of eight inorganic parameters exceeded surface water criteria, but two of them, chloride and pH, most likely represent natural levels in a tidally influenced area. The source of the cyanide is unknown. Sulfate was detected above New Jersey Surface Water Criteria, but was not detected at concentrations above the criteria in samples collected upstream (SS-1 and SS-2), suggesting that the source of this compound may be in the Landfill 5 area.

The analytical results of surface water sampling conducted at Fort Monmouth are summarized in Appendix A.

4.1.5.5 Sampling Strategy

Two shallow monitor wells (PW-10 and PW-11) will be installed. The northernmost well proposed for the Landfill 4 area (see Figure 4-3) is most likely upgradient of Landfill 5 and could be used to estimate local groundwater flow direction and evaluate upgradient groundwater quality. These monitor wells will be sampled twice for TCL+30 parameters, TAL metals, sulfate, and cyanide.

4.1.6 Burning Area (M-6)

4.1.6.1 Site Location

According to interviews with Fort Monmouth personnel, Burning Area M-6 consisted of open-air wood burning in small pits located on Landfill 3. Specific pit locations could not be discerned from aerial photograph review.

4.1.6.2 Site History

It is likely that the burning areas on Landfill 3 were used throughout the period when the landfill was in operation, 1959 through 1964. Specific burn areas have not been identified. At present, the surface in the eastern part of Landfill 3 is hummocky and grass covered.

4.1.6.3 Past Sampling Activities

No specific sampling has been conducted for the M-6 area, but these burn areas were reportedly located on Landfill 3. Therefore, data from surface water sampling locations SS-3 and SS-4, which are associated with the Landfill 3 area, are considered relevant. A discussion of the results of the Landfill 3 sampling can be found in Subsection 4.1.3.4.

4.1.6.4 Strategy

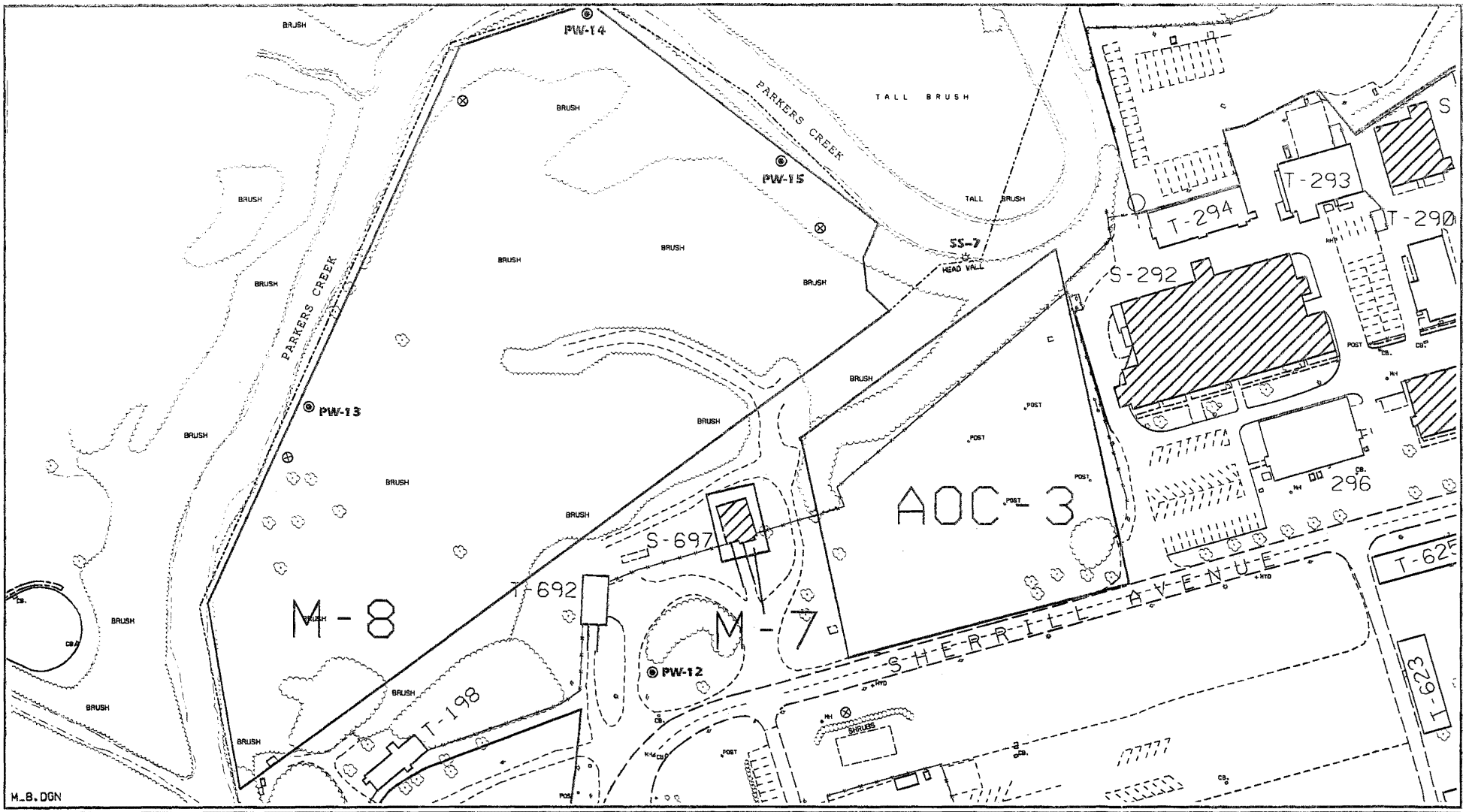
This site will be included in the Landfill 3 (M-3) investigation. The GPR survey may locate specific pits, and the groundwater monitoring program proposed for Landfill 3 should provide adequate data to evaluate the potential impact of the burning area.

4.1.7 Burning Area (M-7)

4.1.7.1 Site Location

The IA identified Site 7 on the Main Post as a burning area. The IA indicated that the site was an incinerator adjacent to Building 697, which was used to burn classified documents. However, rather than being adjacent to the building, the incinerator was actually inside Building 697, which was built to house the incinerator (see photo on page P-3). The site is located in the north central area of the Main Post near Landfill M-8 (see Figure 4-4).

Building 697 is a one-story concrete block building (photograph). The incinerator was built into the north wall but has been removed. Currently, the building is not being used and there is a certain amount of old furniture and concrete debris (see photo on page P-3) but



LEGEND

- Proposed Soil Boring
- Proposed Monitor Well
- Existing Surface Water Sampling Location
- Existing Monitor Well to be Abandoned
- Existing Monitor Well to be Abandoned
- Road (paved)
- Road/Trails (unpaved)
- Fence
- Building
- Wooded Area
- Tree/Bush
- Light Pole
- Utility Pole
- Site
- Brook/Creek
- Base Boundary
- Marshy Area

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SCALE IN FEET

2017-0584 10/18/93

Fort Monmouth, Main Post

FIGURE 4-4
INCINERATOR (M-7) AND LANDFILL 8 (M-8)

no visible ash. The plaster wall immediately above the opening in the wall where the incinerator was formerly located is stained, apparently with soot.

4.1.7.2 Site History

The incinerator operated until 1990. The IA and DEH personnel interviewed all indicated that the incinerator only burned classified documents. The ashes were taken to the on-post landfills, such as Landfill M-8. Since 1990, classified paper has been shredded. The incinerator was dismantled in 1993.

4.1.7.3 Past Sampling Activities

In 1991, three samples of material were taken from the incinerator stock, gasket, and lining and analyzed by polarized light microscopy for asbestos. No asbestos was found (WESTON, 1992).

4.1.7.4 Strategy

Because there is no evidence of contamination, and an asbestos survey has already been conducted, no sampling will be performed.

4.1.8 Landfill 8 (M-8)

4.1.8.1 Site Location

Landfill 8 (M-8) is located north of Buildings T-692 and S-697 in a bend of Parkers Creek (see Figure 4-4). According to the Phase I Engineering Study and Compliance Plan, Fort Monmouth Solid Waste Landfill (Cosulich, 1981b), 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 contain waste material.

4.1.8.2 Site History

Landfill 8 was operated from 1962 through 1981. In preparation for landfill operations, as mentioned above, a masonry dike was constructed around the perimeter. According to Cosulich (1981b), in the southern part of the landfill area, an approximately 0.9-acre area was excavated to 12 ft below grade prior to filling with solid waste. Waste material was deposited directly on the existing surface over the rest of the site. Cosulich found the bottom of fill to be 3 ft below sea level. The 1969 aerial photographs show an uneven surface with both pit-type disposal and piled-up debris. A number of drums stacked near the entrance just west of the Sanitary Treatment Plant are visible in the 1969 photos. The area just west of the stacked drums appears to have randomly strewn drums. In the western half of the site, there were two separate piles of telephone poles. One area in the south central part of the landfill was used for the disposal of trees and brush. The photos also show that soil was used to cover the trash. In 1969, part of the area was covered with vegetation.

At present, the landfill is covered with heavy brush and small trees (see photo on page P-4). There is no visible evidence of the drums observed in the 1969 aerial photographs. Four monitor wells and several piezometers of unknown construction were found during the site walkover.

According to the IA, materials observed in Landfill 8 in 1979 and determined from interviews included unwashed pesticide/herbicide cans, batteries, fluorescent tubes, electronic components, garbage, asbestos wrappings from pipes, soot and boiler scale, sludge from STPs, small quantities of outdated drugs, outdated photographic chemicals in glass bottles, building rubble (including ACMs), incinerator ash, sand from oil spill cleanups, and other debris. Cosulich reported that incinerator ash from the classified document incinerator (Site M-7) ranging in thickness from 2.5 to 6.5 ft was found along the southern boundary of the landfill. Cosulich also reports that leaves and brush were placed in this landfill. From 1992 through the present, an adjacent area to the southeast of Landfill M-8 has been used for a leaf-composting operation.

4.1.8.3 Past Sampling Activities

Groundwater samples from four monitor wells and surface water samples from a single location (SS-7) in Parkers Creek have been collected since February 1986 (See Figure 4-4). Sampling was conducted on a quarterly basis from February 1986 through April 1987 and subsequently has been conducted semiannually. Volatiles and selected inorganics have been sampled once a year, while certain metals, anions, and inorganic parameters are sampled during each round.

4.1.8.4 Analytical Results

Table 4-4 compares surface water quality at sampling point SS-7 on Parkers Creeks with New Jersey Surface Water Criteria and surface water screening criteria. All detected VOCs are listed in the table, but only metals and inorganics that exceeded the criteria are included. Saltwater AWQCs were considered to be applicable.

Three HHCs, TCE, PCE, and methylene chloride (a common laboratory contaminant), were detected at concentrations above the New Jersey GWQC or PQLs, but were not detected at concentrations above the surface water criteria. This suggests that there could be groundwater contamination in the Landfill 8 area above New Jersey criteria. Alternatively, the source of the HHCs may be upstream from Landfill 8.

Eleven metals were detected in surface water samples collected at location SS-7; six of these (cadmium, copper, lead, selenium, silver, and zinc) were detected at concentrations above the chronic AWQC. The detected concentrations of eight inorganic parameters (chloride, total coliform, cyanide, pH, sulfate, total dissolved solids, total suspended solids, and turbidity) exceeded surface water criteria, but two of them, chloride and pH, most likely represent natural conditions in a tidal area. The source of the cyanide is unknown.

Table 4-5 compares groundwater quality at Landfill 8 with New Jersey GWQCs and PQLs and with federal maximum contaminant levels (MCLs). All detected VOCs are listed in the

Table 4-4

Landfill 8, Surface Water Sampling
Analytical Results Summary

Analyte	New Jersey Surface Water Criteria (µg/L)	EPA Criteria			Number of Samples	Number of Detections	Number of Samples Exceeding Criteria	Maximum Concentration Detected (µg/L)
		Acute AWQC[1] (µg/L)	Chronic AWQC[1] (µg/L)	Fish Consumption (µg/L)				
VOCs								
Methylene chloride	–	–	–	1,600	9	3	0	6.3
Trichloroethene	–	2,000	–	81	9	1	0	2.2
Tetrachloroethene	–	10,200	450	8.85	9	3	0	3 J
1,1,1-Trichloroethane	–	31,200	–	170,000	9	1	0	10
Trans-1,2-dichloroethene	–	222,400	–	140,000	9	1	0	2.7
Freon	–	–	–	–	1	1	NA	3 J
Inorganics								
Chloride	250,000	–	–	–	18	18	13	27,000
Total Coliform	200/100 ml	–	–	–	6	6	3	20,000
Cyanide	–	1	1	220,000	10	2	2	130
pH	6.5 - 8.5	–	6.5 - 8.5	–	18	18	3	NA
Sulfate	250,000	–	–	–	18	18	7	710,000
Total Dissolved Solids	500 ppm	–	–	–	17	17	12	7,921 ppm
Total Suspended Solids	40 ppm	–	–	–	1	1	1	3,980 ppm
Turbidity (NTU)	10 NTU	–	–	–	10	10	6	27 NTU
Metals								
Cadmium	10	43	9.3	170	10	2	1	20
Copper	–	2.9	2.9	–	18	5	5	50
Lead	50	220	8.5	50	18	4	4	90
Selenium	10	300	71	6,800	10	1	1	70
Silver	50	2.3	–	–	10	1	1	12
Zinc	–	95	66	–	18	15	4	15,860

J - Estimated concentration found below instrument detection limit
NA - Not applicable
[1]Salt water
Sources: NJAC 7.9-4, EPA 440/5-86-001, EPA 40 CFR Part 131

Table 4-5

Landfill 8, Groundwater Sampling
Analytical Results Summary

Analyte	Federal MCL (µg/L)	New Jersey Groundwater Quality Criteria (µg/L)	New Jersey PQL (µg/L)	Number of Samples	Number of Detections	Number of Samples Exceeding Criteria	Maximum Concentration Detected (µg/L)	Location
VOCs								
Methylene Chloride	5	2	2	35	13	0	10B	MW-1
Acetone	—	700	—	8	5	0	400	MW-1
Benzene	5	0.2	1	35	7	7	9.6	MW-2
Chlorobenzene	—	4	2	35	8	7	39	MW-4
Toluene	1,000	1000	5	35	5	0	11	MW-2
Ethylbenzene	700	700	5	35	4	0	23	MW-2
Total Xylenes	10,000	40	2	15	3	1	90	MW-4
Total Dichlorobenzenes	75	75	5	7	1	0	35	MW-4
1,3 Dichlorobenzene	600	600	5	26	2	0	60	MW-4
1,4 Dichlorobenzene	75	75	5	12	4	0	41	MW-4
1,2 Dichlorobenzene	600	600	5	4	1	0	5J	MW-4
Freon	—	—	—	—	4	4	34	MW-4
Diethylether	—	—	—	4	2	0	41J	MW-4
M and P Xylenes	—	—	2	4	1	1	8	MW-4
Metals								
Arsenic	50	0.02	8	41	9	9	19	MW-1
Cadmium	5	4	2	41	3	1	10	MW-2
Iron	SMCL-300	300	100	73	5	54	148,600	MW-4
Lead	15	5	10	73	31	31	210	MW-4
Manganese	SMCL 50	50	6	41	36	32	1,680	MW-3
Silver	SMCL 100	20	2	41	3	1	21	MW-2
Sodium	—	50,000	400	73	73	38	670,000	MW-2
Zinc	SMCL-5,000	5,000	30	73	60	4	12,460	MW-3

Table 4-5

Landfill 8, Groundwater Sampling
Analytical Results Summary
(Continued)

Analyte	Federal SMCL (µg/L)	New Jersey Groundwater Quality Criteria (µg/L)	New Jersey PQL (µg/L)	Number of Samples	Number of Detections	Number of Samples Exceeding Criteria	Maximum Concentration Detected (µg/L)	Location
Inorganics								
Chloride	250,000	250,000	2,000	73	73	26	4,000	MW-2
Total Coliform	none	none	NA	23	20	20	200[1]	MW-1
Color (CU)	15	10	20	73	70	48	1,500	MW-4
Hardness	—	50<H<250	—	41	41	29	2,100	MW-2
Ammonia	—	500	200	73	51	44	110,000	MW-4
Odor (T.O.N.)	3	3	NA	24	19	14	17	MW-3
pH	6.5-8.5	6.5-8.5	NA	69	69	42	(low)4	MW-1
Phenols	—	4,000	10	69	13	4	44,700	MW-3
Sulfate	250,000	250,000	5,000	72	66	11	2,140	MW-1
Total Dissolved Solids	500,000	500,000	10,000	69	69	53	6,300	MW-2

B - Detected in blank
J - Estimated concentration found below instrument detection limit
NA - Not applicable
Sources: Drinking Water Regulations and Health Advisories, May 1993; NJAC 7:9-6.

table, but only metals and inorganics that exceed New Jersey criteria are included in this table. Four aromatic hydrocarbons (AHCs) (benzene, chlorobenzene, total xylenes, and m and p xylenes) were detected in groundwater samples at concentrations above New Jersey GWQCs or PQLs. Five other AHCs (toluene, ethylbenzene, 1,2-dichlorobenzene, 1,3-dichlorobenzene, and 1,4-dichlorobenzene) were also detected in groundwater samples at concentrations that did not exceed the New Jersey GWQCs or PQLs. The detected concentrations of the HHC, methylene chloride, also exceeded New Jersey GWQCs, but this compound is a common laboratory contaminant.

The detected concentrations of eight metals (arsenic, cadmium, iron, lead, manganese, silver, sodium, and zinc) exceeded New Jersey GWQCs. Since samples are preserved with acid, these elevated metal concentrations may be the result of acid stripping of metals from suspended silt and clay in the groundwater samples rather than landfill activities. It is noted that there was poor recovery of these wells after sampling and Cosulich described highly turbid water in the wells. Cosulich attributes the high content of silt and clay in the water samples and the poor recovery of these wells to inadequate well development at the time of well construction. An alternative explanation is that the sand-pack grain size was not properly selected to minimize the amount of sediment that enters the well through the sand pack.

Ten inorganic parameters (chloride, total coliform, color, hardness, ammonia, odor, pH, total phenols, sulfate, and total dissolved solids) exceeded New Jersey criteria in groundwater samples from one or more of the monitor wells. The elevated level of several of these parameters, including total coliform, ammonia, odor, sulfate, and phenols, may be related to the disposal of sewage sludge in the landfill.

The analytical results of groundwater and surface water sampling conducted at Fort Monmouth are summarized in Appendix A.

4.1.8.5 Sampling Strategy

Because of the poor recovery of the Landfill 8 monitor wells and the highly turbid conditions in the wells, the four existing wells and all piezometers will be abandoned. Four new monitor wells (PW-12 through PW-15 on Figure 4-4) will be installed and sampled twice for TCL+30 parameters, TAL metals, sulfate, ammonia, and cyanide. The new wells will be surveyed and tidal water-elevation monitoring will be conducted in the four new monitor wells and at SS-7.

4.1.9 PCB Transformer (M-9)

4.1.9.1 Site Location

The 1980 IA listed Site M-9 on the Main Post as "PCB (Transformer)" but did not provide any additional information. The location identified in the IA is where Buildings 1150 and 1152 are located. These buildings are located in the western portion of the Main Post, south of the Avenue of the Memories (see Figure 4-1).

4.1.9.2 Site History

There is no indication that any of the transformers at Buildings 1150 and 1152 were leaking in 1980 or at any other time. There is no record of any sampling activities until postwide sampling was performed in 1989. Prior to 1989, the policy at Fort Monmouth was to label all transformers as PCB transformers, because no testing had been done and Fort Monmouth wanted to err on the side of safety. The transformers are currently not leaking, and there are no stains on the concrete pads.

4.1.9.3 Sampling Activities

In 1989 and 1990, Fort Monmouth sampled the oil in every transformer for subsequent PCB analysis, unless the transformer was labeled as being non-PCB. This process identified transformers with PCB concentrations greater than 500 ppm, and these transformers were

eventually removed or retrofitted. This process is discussed in more detail in Subsections 3.6 and 4.4.

Table 4-6 contains a list of the transformers that were in the area of Buildings 1150 and 1152. None of the transformers is a PCB-class transformer (PCB > 500 ppm) or PCB-contaminated (PCB between 50 and 500 ppm) as categorized by TSCA. If the concentration of PCBs is less than 50 ppm, then a leak is not considered a PCB spill under TSCA.

4.1.9.4 Strategy

There is no indication that this site now has or has ever had transformers that contained PCBs at a concentration greater than 50 ppm or transformers that leaked. (For a discussion of the PCB transformer program at Fort Monmouth, see Subsections 3.6 and 4.4.) No further sampling is recommended at this site.

4.1.10 Asbestos Storage (M-10)

4.1.10.1 Site Location

The IA identified Site 10 on the Main Post as Asbestos Storage, and indicated that lined, covered pits located behind Building 1220 were used for temporary storage of asbestos. The exact location of the storage area cannot be pinpointed from the document. Asbestos is no longer stored near Building 1220. To the south and west of Building 1220 are parking lots, to the north is a UST farm, and to the east is a grassy park.

4.1.10.2 Site History

The IA stated that the storage area started operating in the 1970s and was still in use in 1980. Interviews with DEH personnel indicate that the storage area was located across the street to the west of Building 1220 in the grassy park. Containers of new spray-on asbestos were kept temporarily in a metal shed until they could be used elsewhere in the facility.

Table 4-6

Transformers at Site M-9

ID	Date Sampled	PCB Sampling Results (mg/L)	Status
MP-117	See Note 1	—	Non-PCB
MP-118	See Note 1	—	Non-PCB
MP-119	31 October 1989	2	Non-PCB
MP-265	See Note 1	—	Non-PCB
MP-266	30 October 1989	26	Non-PCB
MP-395[2]	30 October 1989	21	Non-PCB
MP-396[2]	30 October 1989	3	Non-PCB
MP-397[2]	30 October 1989	13	Non-PCB
PM-518	See Note 3	—	Non-PCB

[1]Dry transformer, not sampled.
[2]Removed and replaced by other transformers.
[3]Labeled by manufacturer as "non-PCB."

The shed has sheet metal walls and is built on a concrete pad. The primary purpose of the shed has always been to store machine parts for the boiler.

The following information is provided in response to the NJDEPE's request for information about the installation of the USTs at this site. The USTs contain fuel for the boiler plant (Building 1220). Table 4-7 provides information about these USTs. All tanks are single-wall steel tanks emplaced in soil (see photo on page P-4). All are registered with NJDEPE under Site Registration Number 81533. The facility frequently inventories the tanks with a stick to determine if the contents are leaking. The reason that some tanks have been taken out of service is malfunctions in the pressure line.

4.1.10.3 Sampling Activity

The metal shed was inspected during the 1993 site inspection and it contained metal parts only. There was no visible evidence of asbestos.

4.1.10.4 Strategy

Based on the interview information provided by DEH personnel, unused asbestos in containers was stored in a metal shed. There is no evidence of asbestos contamination in the shed. Therefore, no sampling is required.

4.1.11 Water Tank (Elevated) (M-11)

4.1.11.1 Site Location

The water tank at this location is a large elevated tank (Building 557) that contains water (see photo on page P-5). It is located at the center of the Main Post. The tank is used to boost the water pressure in the water distribution system for fire-fighting purposes. There is a similar elevated tank at Charles Wood, although that tank was not cited in the IA.

Table 4-7

USTs at Building 1220

Identification No.	Capacity (gallons)	Contents	Status
175	30,000	#6 Fuel Oil	In use
176	30,000	#6 Fuel Oil	In use
177	30,000	#6 Fuel Oil	Not in use, but still in place
178	30,000	#6 Fuel Oil	Not in use, but still in place
179	30,000	#6 Fuel Oil	Not in use, but still in place
180	30,000	#2 Fuel Oil	In use
181	30,000	#6 Fuel Oil	In use
182	30,000	#6 Fuel Oil	In use
183	30,000	#6 Fuel Oil	In use
184	1,000	#2 Fuel Oil	Not in use, but still in place

4.1.11.2 Site History

Interviews with site personnel and reviews of aerial photographs indicate that the tank was constructed in the 1940s. It is unlikely that it was used to store anything other than water. On the Main Post waste sites map, the IA identified the site as a waste site but did not explain why a water tank was listed.

4.1.11.3 Sampling Activity

There has been no sampling at this site. There are no visible stains in the soil or stressed vegetation under the elevated tank. The entire area under the tank is mowed grass. There is no visible debris, such as paint chips, on the ground.

4.1.11.4 Strategy

There is no evidence of any contamination from the water tank, nor does there appear to be any potential for contamination. It is not known why this site was included on the list of hazardous waste sites. Therefore, no sampling is recommended.

4.1.12 Landfill 12 (M-12)

4.1.12.1 Site Location

Landfill 12 (M-12) is located on the south side of Husky Brook, west of Murphy Drive (see Figure 4-5). The exact location of the landfill is not known. USATHAMA estimated its location to the west, near Building 975, but solid waste has been observed on the south bank of Husky Brook in the area near Murphy Drive. The 1969 aerial photograph shows stressed vegetation extending from Murphy Drive to an area just east of Building T-907.

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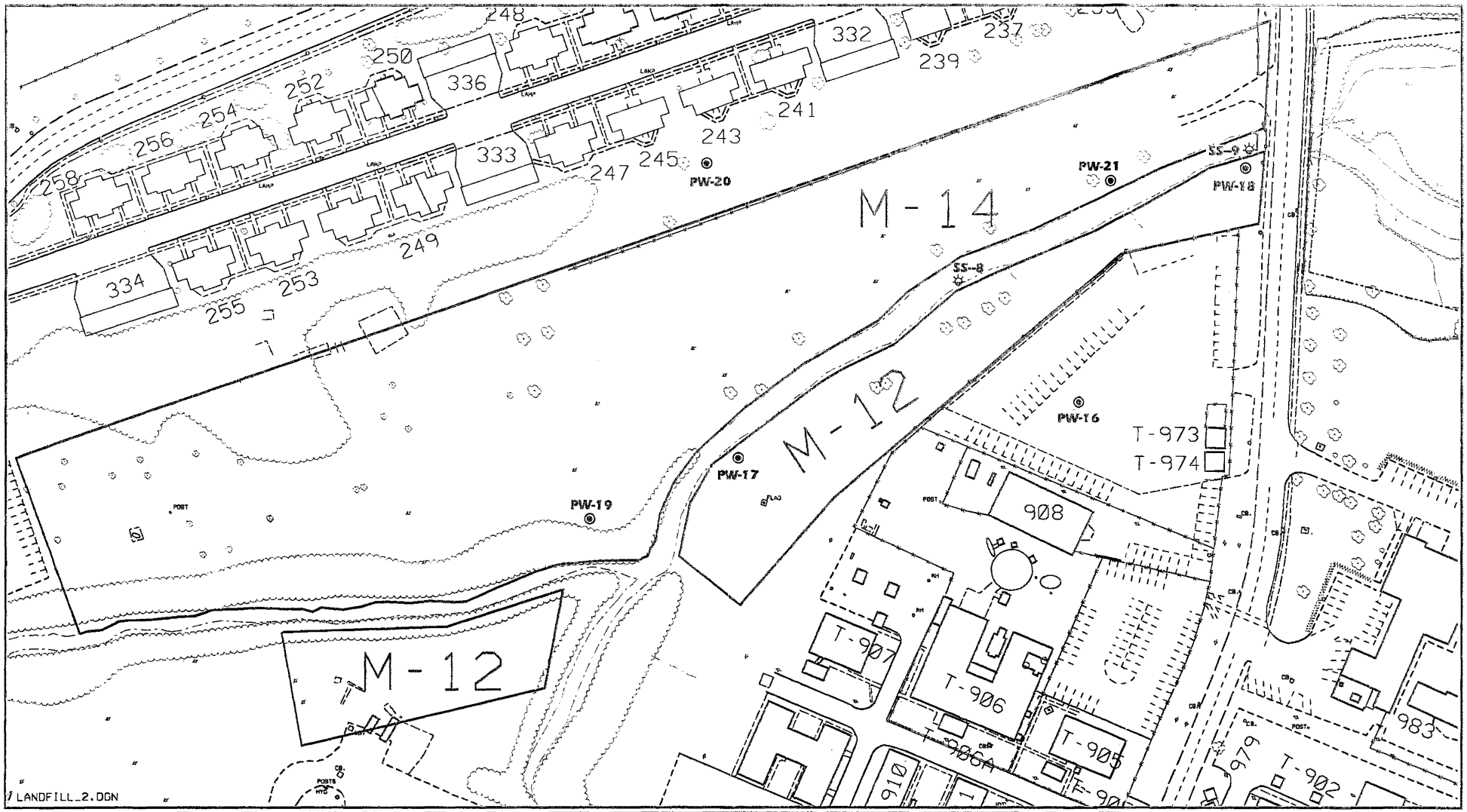

LEGEND

- Proposed Soil Boring
- Proposed Monitor Well
- Existing Surface Water Sampling Location
- Road (paved)
- Road/Trails (unpaved)
- Fence
- Building
- Wooded Area
- Tree/Bush
- Light Pole
- Utility Pole
- Site
- Brook/Creek
- Base Boundary
- Marshy Area

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SCALE IN FEET

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Fort Monmouth, Main Post

FIGURE 4-5
LANDFILLS 12 (M-12) AND 14 (M-14)

4.1.12.2 Site History

The period of operation of Landfill 12 is unknown. Landfill 12 most likely contains domestic and industrial waste similar to that found in other Main Post landfills (see Subsection 4.1.2.2). This landfill may also have been used for automobile disposal. At present, the southern bank of Husky Brook is flat and grass covered.

4.1.12.3 Past Sampling Activities

Surface water samples have been collected from two sampling locations, SS-8 and SS-9, in Husky Brook since February 1986 (see Figure 4-5). Sampling was conducted on a quarterly basis from February 1986 through April 1987 and subsequently has been conducted semiannually. Volatiles and selected inorganics have been sampled once a year, while certain metals, common anions, and inorganic parameters are sampled during each round. In August 1992, two samples of water/leachate from the bank of Husky Brook were collected.

4.1.12.4 Analytical Results

Table 4-8 compares surface water quality data at sampling data points SS-8 and SS-9 with New Jersey Surface Water Criteria and surface water screening criteria. All detected VOCs are listed in the table, but only metals and inorganics that exceeded criteria are included. Saltwater AWQCs were considered applicable.

Two HHCs, TCE and methylene chloride (a common laboratory contaminant), were detected at concentrations that exceed New Jersey GWQCs but do not exceed surface water criteria. Two other HHCs, 1,1,1-TCA and Trans-1,2-DCE, were detected at concentrations above background, which exceeded neither groundwater nor surface water criteria. Samples were also collected at a sampling point upstream of Husky Brook Lake (SS-10), and the concentration of HHCs at this upstream location was either approximately the same or

Table 4-8

Landfills 12 and 14, Surface Water Sampling
Analytical Results Summary

Analyte	New Jersey Surface Water Criteria (µg/L)	EPA Criteria			Number of Samples	Number of Detections	Number of Samples Exceeding Criteria	Maximum Concentration Detected (µg/L)
		Acute AWQC[1] (µg/L)	Chronic AWQC[1] (µg/L)	Fish Consumption (µg/L)				
VOCs								
Methylene chloride	–	–	–	1,600	18	7	0	12
Acetone	–	–	–	–	4	2	NA	10 B
Trichloroethene	–	2,000	–	81	18	3	0	12
1,1,1-Trichloroethane	–	31,200	–	170,000	18	2	0	10
Trans-1,2-dichloroethene	–	224,000	–	140,000	18	5	0	17
Freon	–	–	–	–	2	2	NA	15
Inorganics								
Chloride	250,000	–	–	–	36	36	21	1,183,000
Total Coliform	200/100 ml	–	–	–	12	12	3	9,000
Cyanide	–	1	1	220,000	20	5	5	190
pH	6.5 - 8.5	–	6.5 - 8.5	–	36	36	6	NA
Total Dissolved Solids	500 ppm	–	–	–	34	34	17	6,567 ppm
Total Suspended Solids	40 ppm	–	–	–	2	2	2	1,220 ppm
Turbidity (NTU)	10 NTU	–	–	–	20	20	5	17 NTU
Metals								
Cadmium	10	43	9.3	170	20	5	3	19
Copper	–	2.9	2.9	–	36	8	8	80
Lead	50	220	8.5	50	36	7	5	20
Zinc	–	95	66	–	36	31	8	8,770

B - Detected in blank
NA - Not applicable
[1]Salt water
Sources: NJAC 7.9-4, EPA 440/5-86-001, EPA 40 CFR Part 131

exceeded the concentrations of HHCs detected downstream at SS-8 and SS-9. This suggests that the source of the HHCs may be upstream.

Ten metals were detected in surface water samples collected at locations SS-8 and SS-9; four of these (cadmium, copper, lead, and zinc) were detected at concentrations above the chronic AWQC. The detected concentrations of seven inorganic parameters (chloride, total coliform, cyanide, pH, total dissolved solids, total suspended solids, and turbidity) exceeded surface water criteria, but two of them, chloride and pH, most likely represent natural conditions in a tidal area. The source of the cyanide is unknown.

The leachate samples contained methylene chloride, lead, and zinc above GWQCs or PQLs. The analytical results of surface water sampling conducted at Fort Monmouth are summarized in Appendix A.

4.1.12.5 Sampling Strategy

GPR and magnetics will be used to locate the landfill boundaries. Three monitor wells will be installed at locations based on the results of the geophysical survey. Estimated monitor well locations (PW-16 through PW-17) are shown on Figure 4-5. These wells and surface water sampling locations SS-8 and SS-9 will be sampled twice for TCL+30 parameters, TAL metals, and cyanide. Tidal monitoring will be conducted at the same time as tidal monitoring for Landfill 14.

4.1.13 Pathogenic Waste Incinerator (M-13)

4.1.13.1 Site Location

The pathogenic waste incinerator was located west of Building 1076, the boiler plant (see Figure 4-1). The incinerator was an approximately 5-ft-by-6-ft-by-6-ft-high metal unit. The inside was lined with fire brick (see photo on page P-6). The unit was propane fired. The interior of the incinerator and the grounds around the incinerator appeared to be free of ash and debris.

4.1.13.2 Site History

The incinerator was installed in 1975. It was used to burn tissue wastes from the nearby hospital. Bags of waste were placed into the incinerator and a propane gas flame was ignited to burn the waste. The ash was removed and originally was disposed of at the on-base landfill (Site M-8). After that landfill was closed, the ash was disposed of off-site. The unit was tested for compliance with New Jersey air standards and achieved compliance at a maximum charging rate of 57 lbs/hr in 1977. No State permit was required because the incinerator was operating before the 1977 revision to the Clean Air Act (CAA). The incinerator was closed in December 1992. Pathologic waste is now shipped off-site for disposal. The incinerator was demolished in November 1993.

4.1.13.3 Sampling Activity

Loose debris inside the incinerator was analyzed for asbestos after the unit was closed and none was found.

4.1.13.4 Strategy

Because the incinerator was demolished, no further sampling is required. The demolition contractor was required to appropriately dispose of waste.

4.1.14 Landfill 14 (M-14)

4.1.14.1 Site Location

Landfill 14 (M-14) is located on the north bank of Husky Brook in the area west of Murphy Drive (see Figure 4-5). This area is north of the suspected location of Landfill 12.

4.1.14.2 Site History

Both a 1935 Fort Monmouth map and the 1940s' aerial photograph show a marshy area in this locations. According to the IA, Landfill 14 was used in 1965 and 1966 for the disposal of building rubble that was covered by dredgings from Husky Brook Lake. A figure in Cosulich shows a 1940s-era landfill in the western part of the area. This 1940s' landfill may have contained general domestic and industrial waste similar to that found in other Main Post landfills (see Subsection 4.1.2.2).

4.1.14.3 Past Sampling Activities

Surface water samples have been collected from two sampling locations, SS-8 and SS-9, in Husky Brook since February 1986. Sampling was conducted on a quarterly basis from February 1986 through April 1987 and subsequently has been conducted semiannually. Volatiles and selected inorganics have been sampled once a year, while certain metals, common anions, and inorganic parameters are sampled during each round. The analytical results from these samples were discussed in Subsection 4.1.12.4.

4.1.14.4 Sampling Strategy

Magnetic and GPR surveys will be conducted in the western half of this site to ascertain whether the landfill extends into this area. Three monitor wells (PW-19 through PW-21 on Figure 4-5) will be installed and sampled twice for TCL+30 parameters, TAL metals, and cyanide. Tidal monitoring will be conducted at the same time as the monitoring at Landfill 12.

4.1.15 Water Tank (M-15)

4.1.15.1 Site Location

The water tank is located on the eastern portion of the Main Post (see Figure 4-1). The tank is a vertical aboveground tank mounted on a concrete pad (see photo on Page P-6).

4.1.15.2 Site History

Interviews with site personnel indicate that the tank was constructed in the 1940s and was always used as a water tank. The IA described the site as the "Water Tank," but it was not discussed in the text.

4.1.15.3 Sampling Activity

There has been no sampling conducted at this site. Paint chips and a ring of stressed vegetation that extends around the tank were observed during the 1993 site visit. The ring is about 6 inches wide on the west or uphill side of the tank and 15 ft wide on the east or downhill side of the tank.

4.1.15.4 Strategy

There is no evidence that the water tank or its contents are a potential source of contamination; however, the stressed vegetation may be caused by the use of herbicides and the paint chips may contain lead. Therefore, two surface (0 to 6 inches) soil samples should be taken, one at the bottom of the grade and one halfway up the grade, and analyzed for TAL metals and pesticides.

4.1.16 Pesticide Storage Building (M-16)

4.1.16.1 Site Location

The Pesticide Storage Building (M-16) was misidentified as Building 167 in the IA. The building actually used for pesticide storage was Building 498, which is located on the south-side of Riverside Avenue, west of the marina (see Figure 4-1).

4.1.16.2 Site History

Building 498 was built in 1939. According to long-term Fort Monmouth employees, this building was used as a pesticide control shop in the 1940s and 1950s, before this function was moved to Building T-65. Building 498 is currently used for miscellaneous storage. During the 1993 site visit, workers were bricking in the windows. The front of the building has a tile floor and was most likely used for office space. The back wing of the building has a cement floor with a centrally located floor drain (see photo on page P-7). The southeast corner of the floor has sunk 2 to 3 inches, breaking away from the foundation and creating a crack in the area of the door. The cracks and floor drain could have allowed the release of spilled pesticides. Pesticide mixing reportedly took place inside the building with rinse water dumped in a sink that went to the sanitary sewer.

4.1.16.3 Past Sampling Activities

Analytical samples have not been collected in this area.

4.1.16.4 Sampling Strategy

An attempt will be made to determine whether the floor drain discharges to the sanitary sewer. Four soil samples will be collected from 6 to 12 inches bgs from areas that are not paved south of the building and analyzed for TCL+30 parameters (see Figure 4-6). Soil samples will be collected from two discrete intervals in the monitor well boring and analyzed for TCL+30 parameters. One monitor well (PW-22 on Figure 4-6) will be installed behind the building, between the building and Oceanport Creek. Two rounds of groundwater samples from the monitor well will also be analyzed for TCL+30 parameters.

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LEGEND

- Proposed Soil Boring
- Proposed Monitor Well
- Proposed Surface Soil Sampling Location
- Road (paved)
- Road/Trails (unpaved)
- Fence
- Building
- Wooded Area
- Tree/Bush
- Light Pole
- Utility Pole
- Site
- Brook/Creek
- Base Boundary
- Marshy Area

N

0 200

SCALE IN FEET

2017-0583 10/18/93

Fort Monmouth, Main Post

FIGURE 4-6
PESTICIDE STORAGE BUILDING (M-16)

4.1.17 Pesticide Storage Building T-65 (M-17)

4.1.17.1 Site Location

The Pesticide Storage Building T-65 (Site M-17) is located in the eastern part of the 400 Area of the Main Post, between Buildings T-64 and T-159 (see Figure 4-1). The pesticide storage area was located in the southeastern part of Building T-65.

4.1.17.2 Site History

Building T-65 was used as a supply storage area from the 1960s through the 1980s. Pesticides were stored and mixed in a room now occupied by part of the sign shop. Two small 1-inch-diameter holes were observed in the concrete floor of the pesticide storage area. These holes may have been drilled to facilitate the application of pesticides for termite control.

4.1.17.3 Past Sampling Activities

In June 1989, a preliminary sampling round consisting of two air samples and a soil sample from Building T-65 was conducted. The soil sample was collected through one of the small holes drilled in the floor. In March 1990, 16 additional soil samples were collected from eight borings, two of which were located outside the building. Soil samples were collected from 6 to 12 inches bgs and from a deeper interval (6 inches beginning at either 38, 41, 48, or 60 inches bgs [see table in Appendix A]). A monitor well was installed outside the former pesticide storage room during the removal of an UST (see photo on page P-8).

4.1.17.4 Analytical Results

Analytical results of pesticide testing are included in Appendix A. The preliminary air and soil samples were analyzed for three to six pesticides. Chlordane was detected in both air samples (4 to 16 μg/cubic meter) and in the soil sample (170,000 μg/kg); however, chlordane was only detected in 2 of the 16 soil samples collected during the second sampling

round. The highest concentration in this round was 47,000 μg/kg, collected from 6 to 12 inches in the same boring as the preliminary sample. Chlordane was also detected in a sample from the 6-to-12-inches-bgs interval from a boring located outside the building (1,400 μg/kg). The localized nature of these detections and the concentrations is consistent with termite control practices used on base until 15 April 1988, when all use of chlordane was banned in the United States.

Chlordane was not detected in the groundwater sample collected from the monitor well located approximately 1 ft east of the soil boring in which chlordane was detected outside the building.

4.1.17.5 Strategy

No further sampling is recommended for the Building T-65 former pesticide storage area.

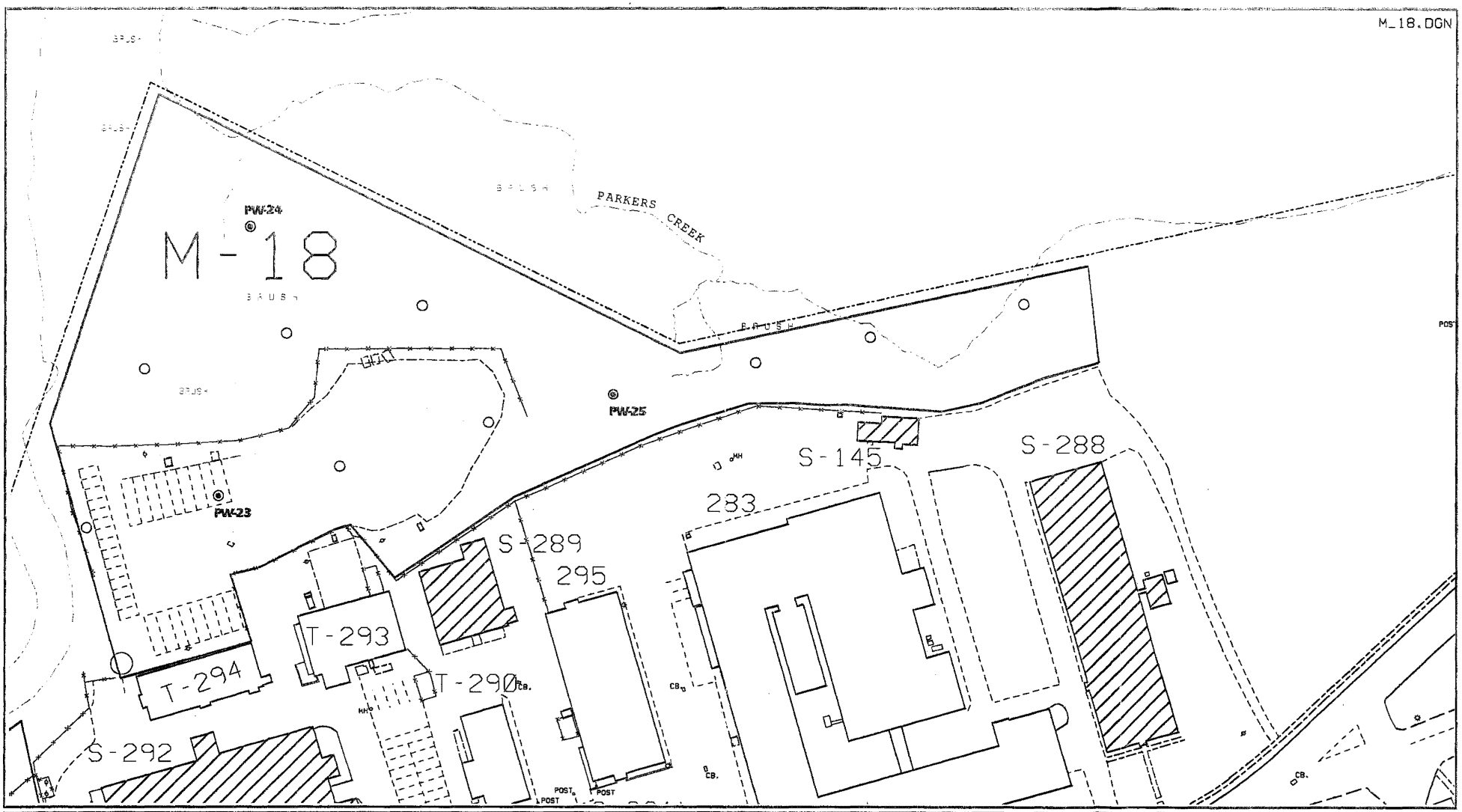
4.1.18 Former Training Area (M-18)

4.1.18.1 Site Location

The Army Signal School Training Area (M-18) is located in the northern part of the Main Post, between Parkers Creek to the north and Buildings 283, T-294, T-293, S-289, and S-145 to the south (see Figure 4-7).

4.1.18.2 Site History

The Army Signal School Training Area has been used for military training exercises since 1919. Diesel and gasoline generators used in support of these field exercises were reported in the IA to have been used 150 meters from Lafetra Brook, although the location shown on Figure 7 of the IA is closer to Parkers Creek. The IA reports that numerous fuel spills occurred in the generator area. Riot Control Agent was also used in this area for troop protective mask training for a limited period of time. During the 1993 site inspection,


M_18.DGN
PARKERS CREEK
M-18
PW-24
PW-25
PW-23
S-145
S-288
233
S-289
295
T-293
T-294
T-290
S-292
BRUSH
POST
CB.
MH
LEGEND
Proposed Soil Boring
Proposed Monitor Well
Road (paved)
Road/Trails (unpaved)
Fence
Building
Wooded Area
Tree/Bush
Light Pole
Utility Pole
Site
Brook/Creek
Base Boundary
Marshy Area
0
400
SCALE IN FEET
2017-0583
10/18/93
Fort Monmouth, Main Post
FIGURE 4-7
FORMER TRAINING AREA (M-18)

military training area exercises were being conducted in the M-18 area. Part of the area is paved (see photo on Page P-9). Based on the presence of concrete at the surface, there is a suspected debris disposal area used for the disposal of building rubble in the area north of Building 289.

4.1.18.3 Past Sampling Activities

Samples have not been collected in the M-18 area.

4.1.18.4 Sampling Strategy

Magnetics and GPR will be used to investigate the extent of debris disposal north of Building 289. Twelve soil borings in a grid pattern will be completed in this area (see Figure 4-7). Soil samples for VOCs and total petroleum hydrocarbon (TPH) analysis will be collected from either 6 to 12 or 12 to 18 inches bgs (to avoid bias from the asphalt that covers about half of this area) and either from intervals with visible staining or from just above the water table. If staining is observed, samples may also be collected for base/neutral/acid (BNA) analysis. If staining or high HNu, organic vapor analyzer (OVA), or organic vapor monitor (OVM) readings are found, a sample may be collected for TCL+30 parameters and TAL metals. Monitor wells will be installed in three of the borings (PW-23 through PW-25), and two rounds of groundwater samples will be collected for TCL+30 parameters, TAL metals, and TPH.

If the IA is correct and training exercises were conducted near Lafetra Brook, this area would be addressed as part of the M-3 investigation.

4.1.19 Main Post Sanitary Treatment Plant (AOC-3)

4.1.19.1 Site Location

The Sanitary Treatment Plant (STP, AOC-3) was located on Parkers Creek north of Sherrill Avenue, between Buildings S-292 to the east and S-697 to the west (see Figure 4-8).

4.1.19.2 Site History

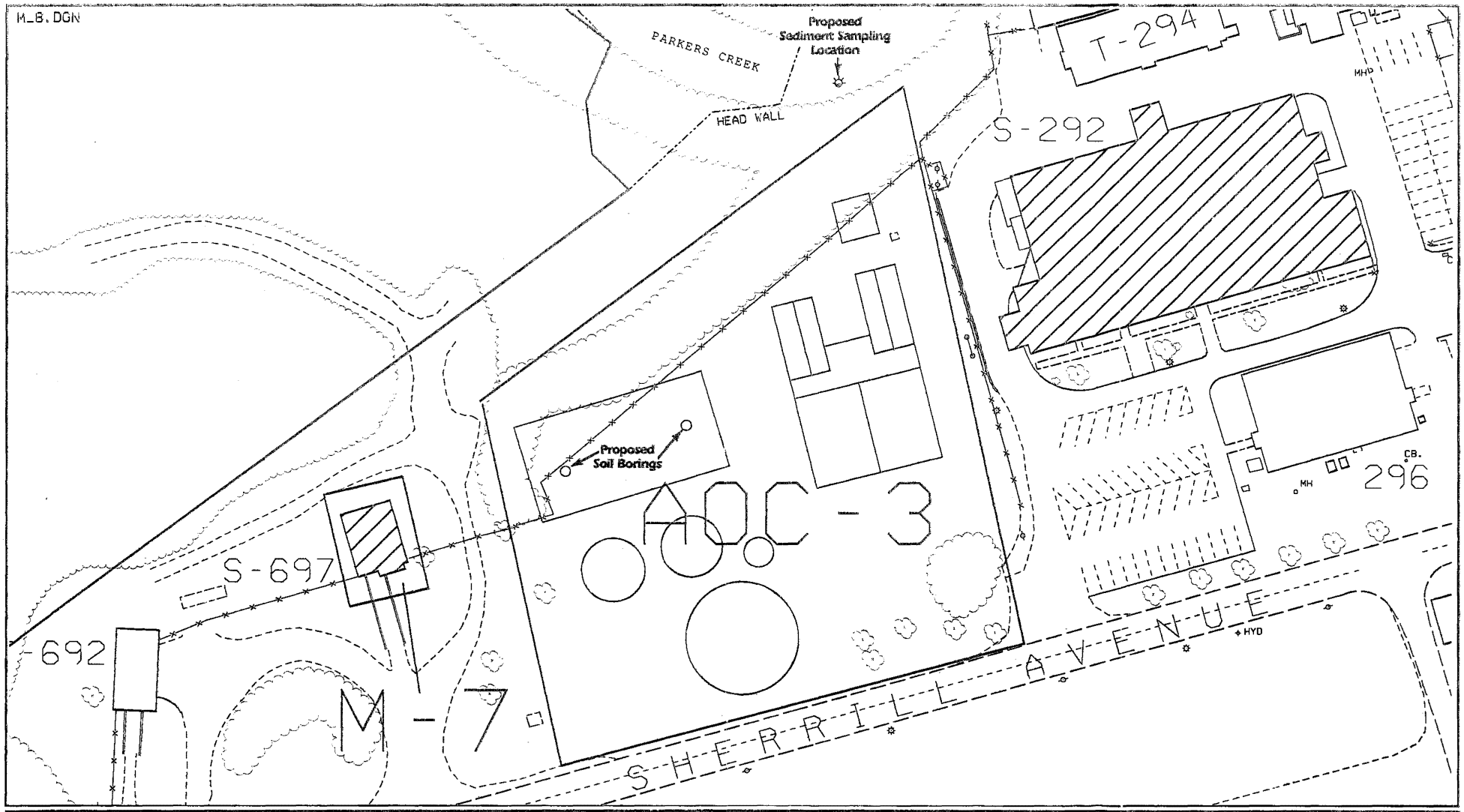
This site was identified by the NJDEPE as an AOC in the 8 June 1990 letter. A 1935 Fort Monmouth map shows a pistol range on this location. The Main Post STP was built in 1941 to handle 700,000 gallons of sewage per day. As described in the IA, this STP consisted of a bar screen and grit chamber, comminutor, primary and secondary settling tanks, a mixing and aeration tank, and a baffled contact chlorination tank. Effluent from the STP was discharged to Parkers Creek. Sludge was treated in a three-stage anaerobic digester and discharged to underdrained sandbeds for drying. According to the IA and DEH employees, sludge was transported to the Charles Wood golf course and to landfills. This STP was closed on 3 September 1975 when the Main Post sewer system was connected to the NMCRSA System. In 1981, all sludges and supernatant liquids were removed from the STP and the facility was cleaned and disinfected. The removal contractor was Modern Transportation Co. of Kearny, New Jersey. The physical facility was demolished in 1983. At present, this area is flat and grass covered (see photo on page P-9).

4.1.19.3 Past Sampling Activities

Sampling has not been conducted at the Main Post STP (AOC-3).

4.1.19.4 Sampling Strategy

Sediments from one location in the Parkers Creek outfall area will be analyzed for TCL+30 parameters, TAL metals, and cyanide. Two soil borings will be completed in the area of the former sludge-drying beds to identify the original land surface and collect soil samples from an interval just below that original surface for TCL+30 parameters, TAL metals, and cyanide (see Figure 4-8).


M_8.DGN
PARKERS CREEK
Proposed Sediment Sampling Location
HEAD WALL
T-294
S-292
MH
Proposed Soil Borings
AOC-3
S-697
S-692
M-7
CB.
296
MH
HYD
SHERRILL AVENUE
LEGEND
Proposed Soil Boring
Proposed Sediment Sampling Location
Road (paved)
Road/Trails (unpaved)
Fence
Building
Wooded Area
Tree/Bush
Light Pole
Utility Pole
Site
Brook/Creek
Base Boundary
Marshy Area
SCALE IN FEET
2017-05B3
10/18/93
Fort Monmouth, Main Post
FIGURE 4-8
SANITARY TREATMENT PLANT (AOC-3)

4.1.20 Former Sanitary Treatment Plant

4.1.20.1 Site Location

The pre-1941 STP for the Main Post was located on Parkers Creek in an area north of Allen Avenue in approximately the same location as current Building 259 (see Figure 4-9).

4.1.20.2 Site History

This STP is shown on a 1935 Fort Monmouth map. The date of construction and period of operation are unknown, although the STP presumably operated until Main Post STP (AOC-3) came on line in 1941.

4.1.20.3 Past Sampling Activities

Sampling has not been conducted at this site.

4.1.20.4 Sampling Strategy

An attempt will be made to locate the former outfall of this STP during late fall, winter, or early spring when vegetation is less likely to obscure the banks of Parkers Creek. If the outfall can be located, sediment coring will be conducted and a sample will be collected for TAL metals analysis.

4.1.21 Former Firing Range

4.1.21.1 Site Location

Evidence of a pistol range along Lafetra Brook was uncovered during preparation of this report. The location of the range is uncertain, but it is believed to be in the area of Buildings 1212, 1213, 1214, and 1220 (see Figure 4-1). This area currently contains buildings, parking lots, roads, and a small amount of lawn.

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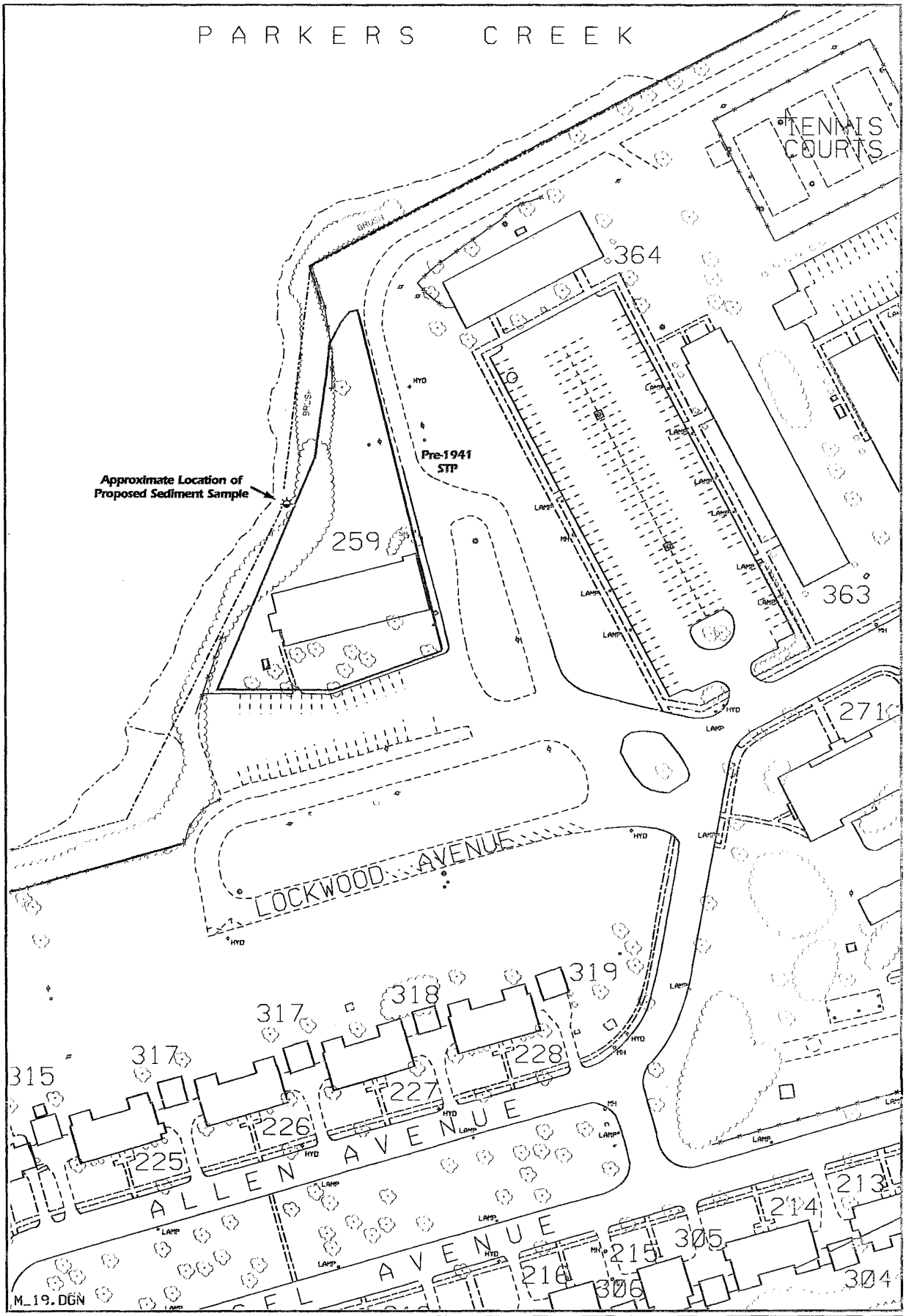
PARKERS CREEK
TENNIS COURTS
364
363
259
271
Pre-1941 STP
Approximate Location of Proposed Sediment Sample
LOCKWOOD AVENUE
ALLEN AVENUE
ALLEN AVENUE
315
317
317
318
319
228
227
226
225
213
214
215
216
305
306
304
M_19.DGN
LEGEND
Proposed Sediment Sampling Location
Road (paved)
Road/Trails (unpaved)
Fence
Building
Wooded Area
Tree/Bush
Light Pole
Utility Pole
Site
Brook/Creek
Base Boundary
Marshy Area
0
400
SCALE IN FEET
2017-0585
10/18/93
Fort Monmouth, Main Post
FIGURE 4-9
PRE-1941 SANITARY TREATMENT PLANT

4.1.21.2 Site History

Only one aerial photograph (1940), which predated the construction of the 1200 Area buildings, was available; the scale did not allow identification of a berm. A 1949 sketch map of the Main Post, from the booklet "This is Fort Monmouth," indicates that a pistol range was in the general area of Buildings 1212, 1213, 1214, and 1220. These buildings were built in the early 1950s. A long-term employee at Fort Monmouth indicated that a pistol range was located in this area and that the pistols were fired into a berm that was razed in the early 1950s.

4.1.21.3 Sampling Activity

There has been no sampling activity except for surface water sampling downstream, which is discussed in Subsection 4.1.3.4.

4.1.21.4 Strategy

The location of this site is very uncertain. The location shown on the 1949 map has been disturbed during the construction of the 1200 area buildings and roads that are there today. Therefore, no sampling will be done.

4.2 CHARLES WOOD

Nine sites with suspected waste materials were identified in the IA. The NJDEPE expressed concern over three of the sites (CW-3, CW-5, and CW-9) and about one additional site (AOC-7). An eleventh site was added to the 1993 investigation when interviews with DEH employees suggested the presence of an additional landfill. Figure 4-10 shows the location of the 11 Charles Wood sites discussed in this section.

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4.2.1 Wastewater Treatment Lime Pit 1 (CW-1)

4.2.1.1 Site Location

Wastewater Treatment Lime Pit 1 (CW-1) is located in the central area of the Hexagon Building (Building 2700) at Charles Woods just east of the west wing of the building (see Figure 4-11).

4.2.1.2 Site History

This lime pit (CW-1) was built concurrently with the Hexagon Building; construction was completed in 1952. This is one of two 4-cubic-meter acid neutralization pits that contain limestone chips; the other pit (CW-2) is discussed in Subsection 4.2.2. Liquid wastes from the north and west wings of the Hexagon Building passed through this pit before being discharged to the sanitary sewer. Chemical wastes of up to 150 cubic meters per day were generated from the shops and laboratories of the Hexagon Building; this waste output was reduced to 115 cubic meters per day in June 1978 (IA). According to the IA, a licensed scavenger was hired to dispose of concentrated wastes like etching solutions and organic solvents from the Hexagon Building, so these wastes were not supposed to be discharged in the pits and the sanitary sewer.

Each neutralization pit has a concrete floor and concrete block and mortar walls and measure 7 by 13 by 8 ft high. The cover is constructed of concrete with a steel access panel (see photo on page P-10). Several wooden baffles divide the pit into sections.

In October 1992 the pit was cleaned out, inspected, and the limestone chips replaced. A vacuum (vac) truck was used to remove the sludge and stones from the pit, after which the pit was rinsed with water. All sludge, stones, and rinse water were placed in drums and disposed of as a hazardous waste. Hazardous waste manifests from the October 1992 cleanout are included in Appendix C. At present, laboratory wastes are managed under the hazardous waste disposal program, which forbids the discharge of these wastes to the sewer.

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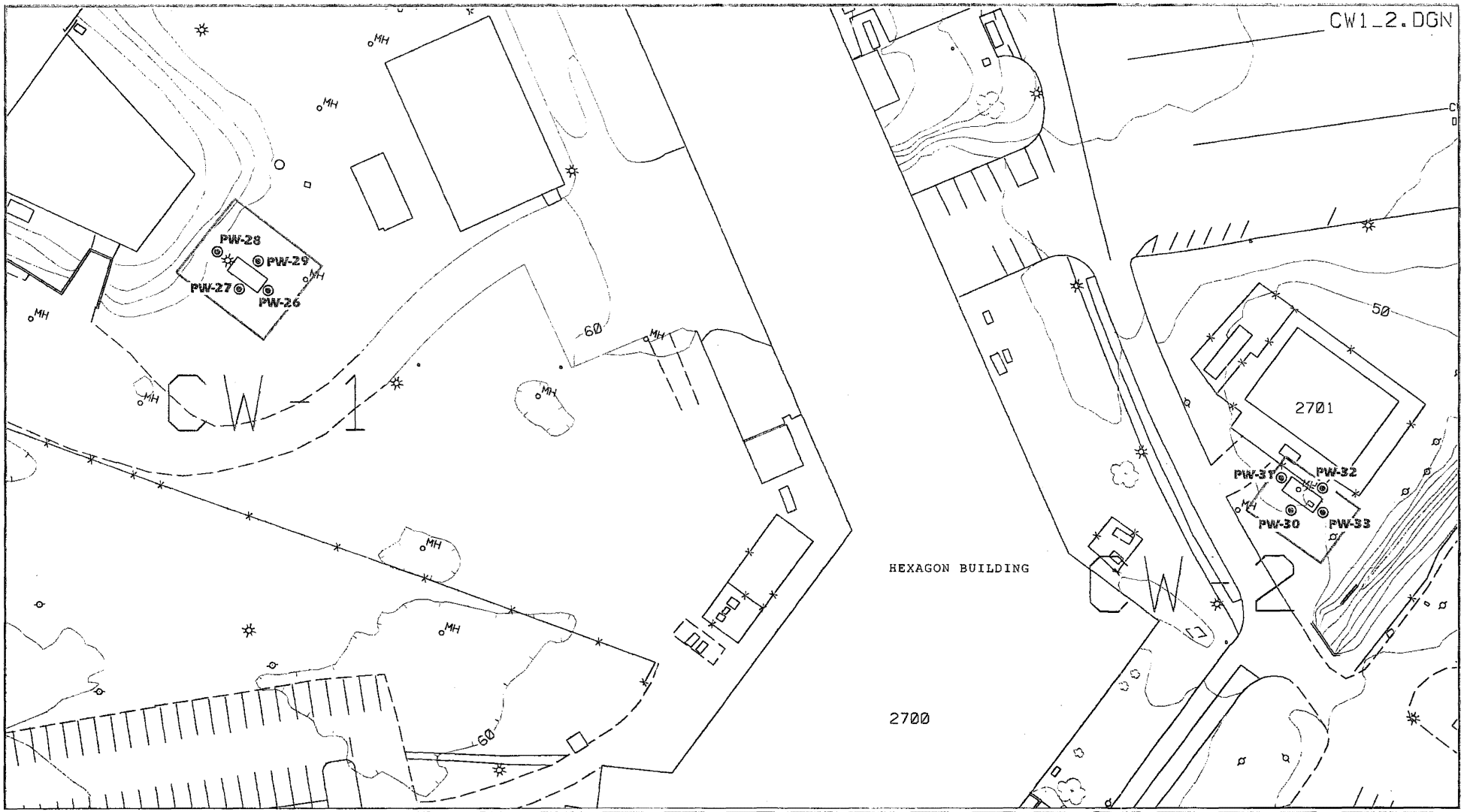
CW1_2.DGN
PW-28
PW-29
PW-27
PW-26
CW-1
60
MH
2701
50
PW-31
PW-32
PW-30
PW-33
HEXAGON BUILDING
2700
LEGEND
Proposed Soil Boring
Proposed Monitor Well
Road (paved)
Road/Trails (unpaved)
Fence
Building
Wooded Area
Tree/Bush
Light Pole
Utility Pole
Site
Brook/Creek
Base Boundary
Marshy Area
0
100
SCALE IN FEET
2017-0583
10/18/93
Fort Monmouth, Charles Wood
FIGURE 4-11
ACID NEUTRALIZATION LIME PITS
(CW-1 AND CW-2)

4.2.1.3 Past Sampling Activities

Four samples were collected during October 1992 to classify the material removed from both lime pits (CW-1 and CW-2) for disposal. Samples included two grab samples from drums (Drum A and Drum B) collected in conjunction with OVM readings for Toxicity Characteristic Leachate Procedure (TCLP) analysis, a sample of rinse water from Pit 2, and a sludge sample.

4.2.1.4 Analytical Results

The analytical data from the October 1992 sampling of the lime pits are summarized in Appendix A. Elevated concentrations of HHCs, including TCE (212 to 85,293 μg/L), vinyl chloride (550.5 to 1218 μg/L), and PCE (40 μg/L), were detected in one or more samples. For purposes of comparison (although three of these were aqueous samples, they were not groundwater samples), the New Jersey GWQC or PQL for these HHCs are, respectively, 1, 5, and 1 μg/L. Elevated concentrations of AHCs were detected for toluene (1,627 to 6,018 μg/L), 1,4-dichlorobenzene (171 to 506 μg/L), m and p xylenes (178.5 μg/L), o-xylene (52.5 μg/L), and 1,2,4-trichlorobenzene (151.4 μg/L). The New Jersey GWQC or PQL for these AHCs are 1,000, 75, 40, 1, and 9, respectively. In general, the TCLP samples had high levels of VOCs. Arsenic, barium, cadmium, chromium, lead, and silver were detected in one or more samples.

4.2.1.5 Conclusions and Sampling Strategy

The elevated concentrations of HHCs found in samples collected during the 1992 cleanout indicates the possibility that solvents were discharged into the lime pits. Neither concrete nor concrete block is an effective barrier to the migration of halogenated solvents. Halogenated solvents may have migrated from the lime pit into surrounding soils and possibly into groundwater. To investigate this potential, a monitor well will be constructed on each side of the lime pit (PW-26 through PW-29 on Figure 4-11). The actual locations of these proposed monitor wells will be adjusted to avoid overhead wires and buried

utilities. Continuous split spoon samples will be screened with an HNu or OVM. If any VOCs are detected, soil samples will be collected from 7 to 9 ft bgs, from the interval with the highest instrument readings, and from just above the water table; otherwise, one sample will be collected from 7 to 9 ft bgs from each boring. Soil samples will be analyzed for TCL+30 parameters and TAL metals. Two rounds of groundwater samples will be collected from each well and analyzed for TCL+30 parameters and TAL metals.

4.2.2 Wastewater Treatment Lime Pit 2 (CW-2)

4.2.2.1 Site Location

Wastewater Treatment Lime Pit 2 (CW-2) is located southeast of the Hexagon Building (Building 2700) at Charles Woods near an electrical substation (see Figure 4-11).

4.2.2.2 Site History

Like Lime Pit 1, Lime Pit 2 (CW-2) was built concurrently with the Hexagon Building; construction was completed in 1952. Liquid wastes from the east and south wings of the Hexagon Building passed through this pit before being discharged to the sanitary sewer. Additional details, including the estimated quantities of wastes discharged through the lime pits, pit construction, and cleanout and replacement of the limestone, were discussed in Subsection 4.2.1.2.

Unlike Lime Pit 1, during cleanout this pit was found to have received sewage. A dye test was conducted and revealed that toilets from the guard shack and a bathroom for the handicapped near the east entrance were mistakenly connected to this pit. The plumbing has been rerouted to discharge the wastewater from the toilets directly to the sanitary sewer. This pit should not currently be receiving laboratory waste fluids.

4.2.2.3 Past Sampling Activities

Samples of sludge, sludge and stones, and rinse water were collected during pit cleanout conducted in 1992, as discussed in Subsection 4.2.1.3. The analytical results of this sampling were discussed in Subsection 4.2.1.4.

4.2.2.4 Conclusions and Sampling Strategy

As in the case of Lime Pit 1, the elevated concentrations of HHCs in sludge, rinse, and grab samples suggest the possibility that solvents were discharged into the lime pits and that they may have migrated from the lime pit into surrounding soils and possibly into groundwater. To investigate this potential, a monitor well will be constructed on each side of the lime pit (PW-30 through PW-33 on Figure 4-11). The actual locations of these proposed monitor wells will most likely have to be adjusted to avoid overhead wires or buried conduit because of the site's location next to an electrical substation. Continuous split spoon samples will be screened with an HNu or OVM. If any VOCs are detected, soil samples will be collected from 7 to 9 ft bgs (near the base of the neutralization pit), from the interval with the highest instrument readings, and from just above the water table; otherwise, one sample will be collected from the 7-to-9-ft interval of each boring. Soil samples will be analyzed for TCL+30 parameters and TAL metals. Two rounds of groundwater samples will be collected from each well and analyzed for TCL+30 parameters and TAL metals.

4.2.3 Landfill 3 (CW-3)

4.2.3.1 Site Location

Landfill 3 is located in the southeastern part of Charles Wood (see Figure 4-12) and has been designated a contractor area.

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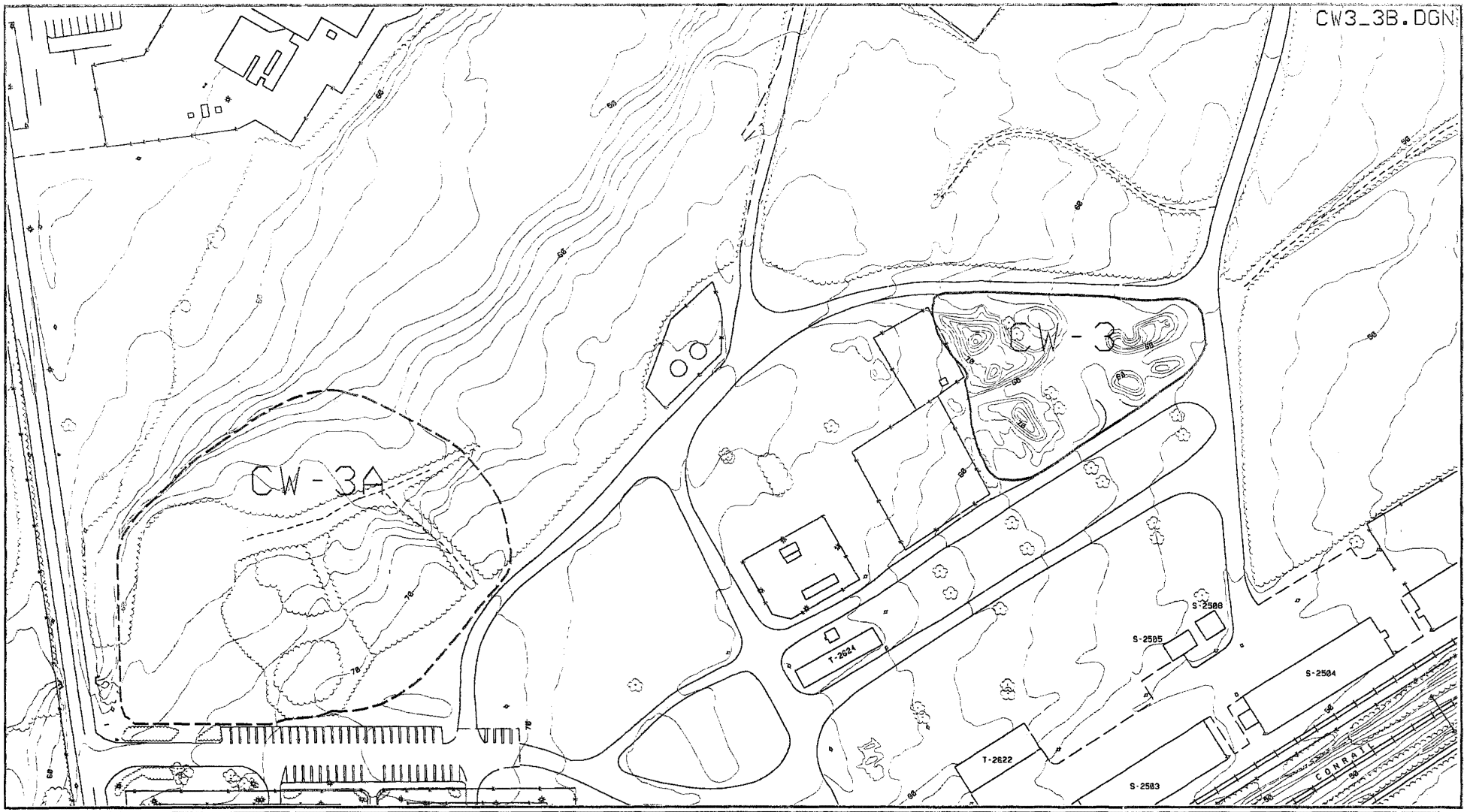

LEGEND

- Road (paved)
- Road/Trails (unpaved)
- Fence
- Building
- Wooded Area
- Tree/Bush
- Light Pole
- Utility Pole
- Site
- Brook/Creek
- Base Boundary
- Marshy Area
- Approximate Boundary

0 200
SCALE IN FEET

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FIGURE 4-12
LANDFILLS 3 (CW-3) AND 3A (CW-3A)

4.2.3.2 Site History

According to the IA, the Army Air Force used this area to dispose of administrative-type wastes and wood in the 1940s. Beginning in 1951, the aerial photographs show a cleared area used for storage. In 1981 and 1986, this area was relatively clear. During the 1993 site visit, the CW-3 area was being used as a contractor rubble dump (see photo on page P-10). Material observed included soil piles, brush, concrete, wood demolition debris, wood pallets, metal, and polyvinyl chloride (PVC) pipe. There is no evidence of a subsurface landfill, and long-term Fort Monmouth employees said that this area was not used as a landfill.

4.2.3.3 Past Analytical Sampling

Analytical samples have not been collected in this area.

4.2.3.4 Strategy

The facility will remove contractor rubble from this area. If any evidence of surface soil staining is found, surface soil samples will be collected for TCL+30 parameters and TAL metals. If high levels of chemical constituents are found in soils, monitor wells will be installed and sampled twice for TCL+30 parameters and TAL metals.

4.2.4 Debris Site (CW-3A)

4.2.4.1 Site Location

Debris Site CW-3A is located west of the CW-3 area, north of Pulse Power, Building 2707 (see Figure 4-12).

4.2.4.2 Site History

According to long-term Fort Monmouth employees, the area north of Pulse Power was used as a disposal area. The 1957 aerial photograph shows the CW-3A area with bare ground.

ground. According to *Fort Monmouth History and Place Names, 1917-1959*, 90 buildings at Charles Wood were razed in late 1955 and during 1956. It is possible that the demolition debris from these buildings was placed in this area. In the 1974 photo, a steel igloo is visible on the aerial photograph of this area. By 1986, the western part of this area had not revegetated. During the 1993 site visit, some small debris was observed in the woods (see photo on page P-11).

4.2.4.3 Past Sampling Activities

Analytical samples have not been collected in this area.

4.2.4.4 Strategy

Surface geophysics will be conducted in this area, because it is not known if subsurface disposal has occurred in this area and in accessible cleared areas to the southeast in the contractor areas. Magnetic and electromagnetic (EM-31) measurements should be collected on 10-ft centers. If there are cleared areas (tree roots interfere with GPR), GPR should be used to assess the degree of subsurface soil disturbance. If evidence of subsurface debris is found, four monitor wells will be installed around the perimeter of the disposal area and groundwater samples will be collected for TCL+30 parameters and TAL metals.

4.2.5 Range (Small Arms)(CW-4)

4.2.5.1 Site Location

The small arms firing range is a one-story building (Building T-2537) located in the central portion of the Charles Wood Area (see Figures 4-10 and 4-13). The range is used for indoor firing of small arms. The small arms are fired into a metal baffle that deflects the rounds down into a sand pit. Currently, the sand is sifted and spent rounds and shell-casings are disposed of off-site. The firing range area is ventilated by a blower through a filter. The filter currently used is a Flanders Filters Model No. 0-00J-C-11-00-CL-12-00-GGF. It has an efficiency of 95%, based on a di-octyl-phthalate (DOP) test. A manufacturer's

LEGEND

- Proposed Soil Boring
- Proposed Surface Soil Sampling Location
- Proposed Sediment Sampling Location
- Road (paved)
- Road/Trails (unpaved)
- Fence
- Building
- Wooded Area
- Tree/Bush
- Light Pole
- Utility Pole
- Site
- Brook/Creek
- Base Boundary
- Marshy Area

0 200

SCALE IN FEET

2017-0583 10/18/93

Fort Monmouth, Charles Wood

FIGURE 4-13
SMALL ARMS RANGE (CW-4) AND SANITARY TREATMENT PLANT (CW-5)

representative stated that he believes this filter would be close to 100% efficient in removing the likely particulates generated in a firing range.

4.2.5.2 Site History

Interviews with facility personnel indicate that the interior of the building is cleaned periodically. The building is currently in use.

4.2.5.3 Sampling Activity

There is no record of any sampling activity around Building T-2537. During the site inspection in 1993, there was no sign of stressed vegetation at the outlet of the blower. However, about 30 ft to the northeast of the building is a 3-ft-diameter area with no vegetation and spent rounds and shell casings on the soil. Directly in the back of the building (the northwest) is a 1-ft-high pile of what appears to be clean sand (see photo on page P-11). Those two piles are outside of a side- and a backdoor, respectively.

4.2.5.4 Sampling Strategy

The facility intends to excavate the soil at the bare patch until spent rounds and shell casings are no longer visible. Before the excavation is backfilled, three surface soil samples from the bottom of the excavation will be collected. The sand pile in back appears to be clean; however, since waste material is known to have been discarded in one area near one door, the suspicion exists that waste may have also been discarded beside the door at the sand pile. A scoop should be used to dig in the sand pile to 6 inches below the bottom of the pile in three locations. A discrete sample should be taken if spent rounds and casings are visible. Otherwise, the sand pile will be removed and a composite sample of the soil from beneath the pile will be taken. Both samples will be analyzed for TAL metals.

4.2.6 Sanitary Treatment Plant (CW-5)

4.2.6.1 Site Location

The former STP at Charles Wood was located in the southwest corner of the area bounded by Hope Road to the east, Corregidor Road to the north, Guam Lane to the west, and Laboratory Road to the south (See Figure 4-13).

4.2.6.2 Site History

The Charles Wood STP was built in 1942 to handle 800,000 gallons of sewage per day. As described in the IA, this STP consisted of a grit chamber screen, comminutor, primary and secondary settling tanks, biofilters, and a baffled contact chlorination tank. Sludge was treated in two anaerobic digesters and discharged to underdrained sand beds for final drying. Supernatant liquid from digester sludge and drainage from the sand beds were recycled through the STP for additional treatment. The chlorinated effluent was discharged to a tributary of Wampum Brook on the east side of Hope Road. Sludge went to the golf course and to landfills. This STP was closed on 29 October 1975 when the Charles Wood sewer system was connected to the NMCRSA system. In 1981, all sludges and supernatant liquids were removed from the STP and the facility was cleaned and disinfected. The removal contractor was Modern Transportation Co. of Kearny, New Jersey. Mercury used in the distributor seal on the biofilter was removed and disposed of by the Directorate of Logistics. The physical facility was demolished in 1983. In 1993, a youth center was constructed on this site (see photo on page P-12).

4.2.6.3 Past Sampling Activities

Two samples of digester sludge and one sample from the sludge-drying bed were collected in 1981 for TCLP metals analysis. None of the eight TCLP metals was detected.

4.2.6.4 Sampling Strategy

One sediment sample from the outfall area east of Hope Road will be collected and analyzed for TCL+30 parameters, TAL metals, and cyanide. If the youth center building is not on top of the former drying beds, two soil borings will be completed in the area of the former sludge drying beds to identify the original land surface and collect soil samples for TCL+30 parameters, TAL metals, and cyanide.

4.2.7 Pesticide Storage Building T-2044 (CW-6)

4.2.7.1 Site Location

Building T-2044 is part of a small complex of buildings in the south-central portion of Charles Wood Area. The complex consists of Building T-2044, Building T-2070, and two metal igloos. The buildings are currently used to store course maintenance and landscaping equipment, such as mowers and tractors.

4.2.7.2 Site History

The golf course maintenance complex may predate the purchase of the golf course by the Army. Pesticides and herbicides were formerly stored and mixed in this area. The IA contains a 1979 inventory of pesticides and herbicides that were used on the golf course and stored in Building T-2044. Some of the pesticides that were present in significant quantities are malathion, floriable sevin, resmithrin, Borocel IV, chlordane, and Dibrom. The IA also discusses a pest control program that was in effect in 1979. The compounds that were used in large quantities include carbaryl (sevin), malathion, chlordane, and diazinon. Some of the herbicides mentioned in the IA include 2,4-D, Dacthal, 2,4,5-T, and sodium arsenite.

The course groundskeeper, who has been part of the grounds crew for 33 years (1960 to 1993), said pesticides and herbicides were kept in a metal igloo (see photo on page P-12) and were mixed in two areas marked A and B on Figure 4-13. Location A is on a currently grass-covered area south of the igloo. Area B is on pavement near the office door in

T-2044. This paved area has a drain that empties into a ditch in the woods immediately behind T-2044. The supervisor said that pesticide containers were not rinsed but were disposed of to the landfill as is. Prior to 1980, the containers would have been disposed of at a landfill on the Main Post, such as Site M-8.

Pesticides and herbicide are not currently stored or mixed on-site. The facility has hired an outside contractor to come in and apply pesticides and herbicides.

4.2.7.3 Past Sampling Activities

In 1989 four surface soil samples were taken around Building T-2044 and analyzed for pesticides. The samples were taken with a stainless steel trowel to a depth of 0 to 6 inches. One sample (PS-4) appears to have been taken at the southeast corner of Building T-2044 where mixing was reported to have occurred, and another (PS-3) appears to be near the steel igloo where pesticides were stored and outside of which pesticides were mixed. Two other soil samples (PS-1 and PS-2) were to the east of Building T-2044.

Chlordane, 4,4-DDT, and 4,4-DDE were found in samples PS-2, PS-3, and PS-4; while 4,4-DDD was found in PS-4 (see Table 4-9).

The proposed New Jersey cleanup standards for contaminated sites have residential surface soil cleanup standards for 4,4-DDD of 3 mg/kg and 2 mg/kg for 4,4-DDT and 4,4-DDE. Therefore, the concentrations of these compounds exceed the proposed cleanup standards for PS-3 but are less than the standard for the other samples. The proposed New Jersey standards do not list soil cleanup standards for chlordane. Limits for chlordane can be derived using the risk-based procedures contained in the proposed cleanup standards.

4.2.7.4 Sampling Strategy

Limited sampling in 1989 determined that New Jersey soil cleanup standards were exceeded in one soil sample. The sampling report did not clearly identify the location of the sample.

Table 4-9

Pesticide Concentrations in Soil at Building T-2044
(mg/kg)

Compound	PS-2	PS-3	PS-4
Chlordane	3.6	595	2.1
4,4-DDT	0.1	5.5	0.07
4,4-DDE	0.2	2.6	0.02
4,4-DDD	<0.2	<7.0	0.1

Also, nothing is known of the depth of potential contamination or whether groundwater is contaminated. To confirm the existence of contamination and evaluate the effect on groundwater, soil borings will be completed at locations where pesticides mixing was believed to have occurred. These locations are approximately 20 ft north of the igloo and just to the south of the pavement that extends in front of T-2044. The borings will be taken to the water table and soil samples will be taken at 6 to 12 inches and at 2 ft and analyzed for TCL+30 parameters. Monitor wells will be installed in these borings (PW-34 and PW-35 on Figure 4-14), and groundwater samples will be collected in two sampling rounds and analyzed for TCL+30 parameters.

4.2.8 PCB Transformer (CW-7)

4.2.8.1 Site Location

The 1980 IA listed Site CW-7 at Charles Wood as PCB (transformers) but did not provide any additional information. The location identified on the site map is where Buildings 2000, 2018, 2019, 2020, 2021, and 2067 are located (see Figure 4-10). These buildings are all associated with the golf course clubhouse (Gibbs Hall). There are several transformers located at this site.

4.2.8.2 Site History

There is no indication in the IA that the transformers in this area were leaking. There is no record of any sampling activities being completed until the postwide sampling was performed in 1989. Prior to 1989, the policy at Fort Monmouth was to label all transformers as PCB transformers, because no testing had been done and Fort Monmouth wanted to err on the side of safety. Three transformers from this area were determined to be PCB transformers (PCB > 500 ppm) and were removed in 1990.

LEGEND

- Proposed Soil Boring
- Proposed Monitor Well
- Proposed Surface Soil Sampling Location
- Road (paved)
- Road/Trails (unpaved)
- Fence
- Building
- Wooded Area
- Tree/Bush
- Light Pole
- Utility Pole
- Site
- Brook/Creek
- Base Boundary
- Marshy Area

0 200
SCALE IN FEET

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Fort Monmouth, Charles Wood

FIGURE 4-14
PESTICIDE STORAGE BUILDING (CW-6) AND SLUDGE DUMP (CW-9)

4.2.8.3 Sampling Activity

In 1989 and 1990, Fort Monmouth sampled the oil for PCBs in every transformer that was not labeled as non-PCB. This process identified three transformers with PCB concentrations greater than 500 ppm at this site, and these transformers were eventually removed. This process is discussed in more detail in Subsections 3.6 and 4.4.

Table 4-10 contains a list of transformers at the site, which were present in 1989 or have since been put into use. As indicated on Table 4-10, three transformers at this site were tested as having PCB levels greater than 500 ppm. CW-035 was located on a concrete pad at the northeast corner of Building 2000. CW-039 and CW-040 were located on a pole south of Building 2018. All were removed in 1990. All the other transformers have manufacturers' labels indicating that they are non-PCB transformers or were sampled and have PCB concentrations of less than 50 ppm. If the PCB concentration is less than 50 ppm, then the transformer is categorized as a non-PCB transformer under TSCA.

The transformers at this site were inspected during WESTON's 1993 site visit. The non-PCB transformers are pole mounted and there are no visible stains in the soil.

4.2.8.4 Sampling Strategy

The strategy for sampling at the location of these three former PCB transformers is discussed in Subsection 4.4. There are no visible signs of leakage from the non-PCB transformers. Therefore, no further investigation will be done for the non-PCB transformers at this site.

Table 4-10

Transformers at CW-7

ID	Date Sampled	PCB Sampling Results (ppm)	Status
CW-039[1]	27 October 1989	22,309	PCB
CW-036	See Note 2	—	Non-PCB
CW-039[1]	13 November 1989	1,554	PCB
CW-040[1]	13 November 1989	1,355	PCB
CW-214	14 November 1989	3	Non-PCB
CW-265	8 November 1989	18	Non-PCB
CW-266	8 November 1989	17	Non-PCB
CW-267	See Note 2	—	Non-PCB
CW-268[3]	See Note 2	—	Non-PCB
CW-269[3]	See Note 2	—	Non-PCB
CW-270[3]	See Note 2	—	Non-PCB

[1]Removed and replaced by other transformers.
[2]Labeled by manufacturer as "non-PCB."
[3]Replacement for CW-035.**

4.2.9 Sewage Lift Pumping Station (CW-8)

4.2.9.1 Site Location

The Sewage Lift Pumping Station, Building 2603 (CW-8), is located north of the Wherry Housing area off Pinebrook Road. The lift station is located north of Building 3033 (see Figure 4-15).

4.2.9.2 Site History

This site was misidentified by USATHAMA in the IA as an STP. There has never been an STP in this area. The 1940 aerial photograph shows that this area was heavily wooded. The sewage lift station (Building 2603, see photo on page P-13) was constructed in 1954 when the Wherry Housing area was built to pump sewage into the force main that went to the Charles Wood STP (CW-5). The lift station building appears on the 1957, 1961, 1974, 1981, and 1986 aerial photographs. At present, sewage goes to the NMCRSA System.

4.2.9.3 Past Sampling Activities

Analytical sampling related to sewage pumping has not been done in this area.

4.2.9.4 Strategy

The CW-8 site is a sewage lift station, not an STP. No sampling will be done for this area.

4.2.10 Sludge Dump (CW-9)

4.2.10.1 Site Location

The sludge dump (CW-9) as identified by USATHAMA is located in the southern part of Charles Wood, south and southeast of Building 2070 and west of Green 11 and Tee 12 of the golf course (see Figure 4-14).

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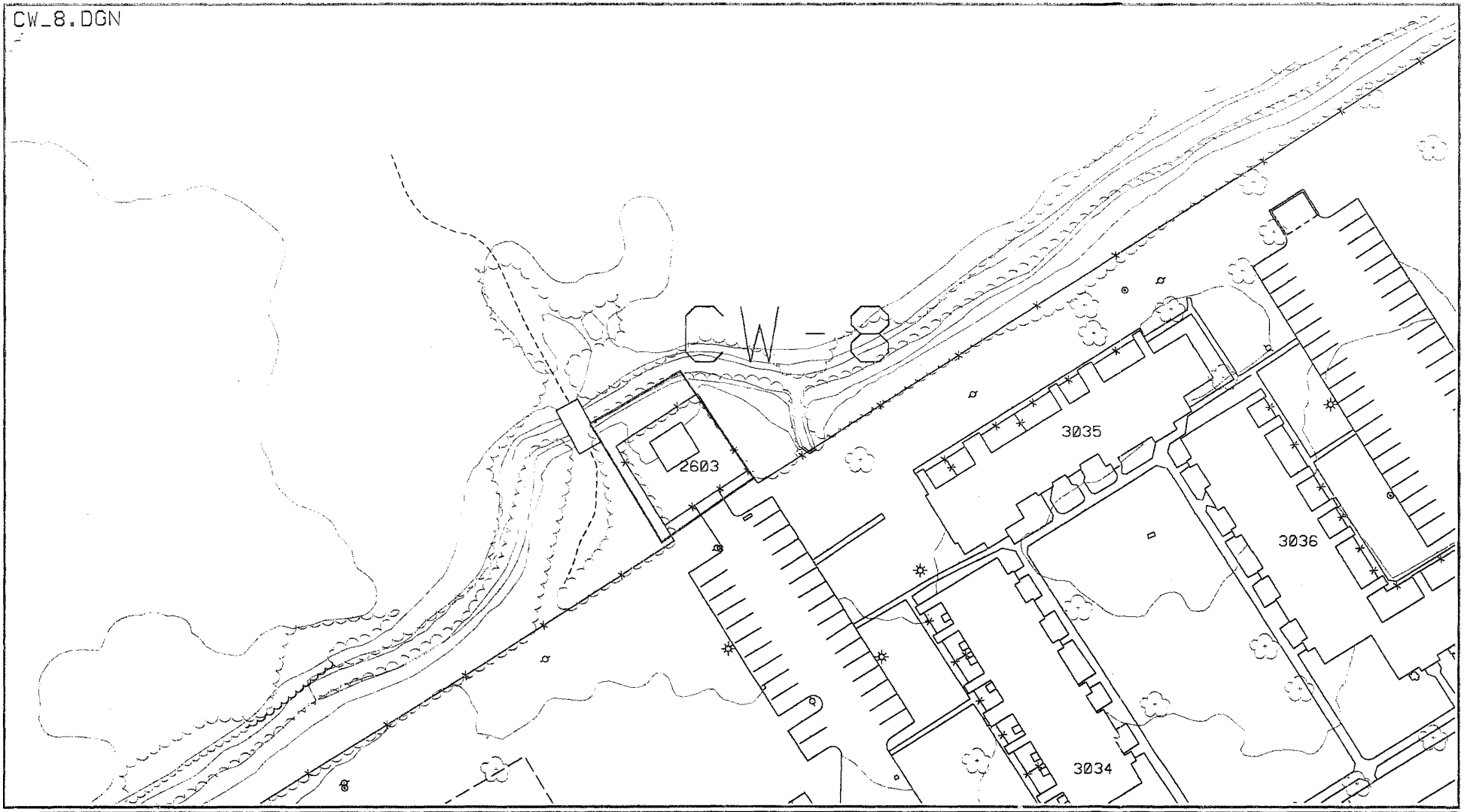


LEGEND

- Road (paved)
- Road/Trails (unpaved)
- Fence
- Building
- Wooded Area
- Tree/Bush
- Light Pole
- Utility Pole
- Site
- Brook/Creek
- Base Boundary
- Marshy Area

0 100

SCALE IN FEET

2017-0583

2/18/93

Fort Monmouth, Charles Wood

FIGURE 4-15
SEWAGE LIFT STATION (CW-8)

4.2.10.2 Site History

Since the 1940s, sludge generated at the STPs has been stored in this area before being used as a soil conditioner and fertilizer on the golf course. Sludge piles are visible on the 1957, 1961, 1974, and 1981 aerial photographs. During the 1993 site visit, a pile of sludge removed from Fairway 1 on the golf course was observed south of Building 2070 (see photo on page P-13). According to long-term Fort Monmouth employees, at least three other fairways (8, 10, and 11) have 4 to 5 inches of sludge over the native sand; sludge may have been used to fill in low areas.

4.2.10.3 Past Sampling Activities

Analytical samples have not been collected from this area.

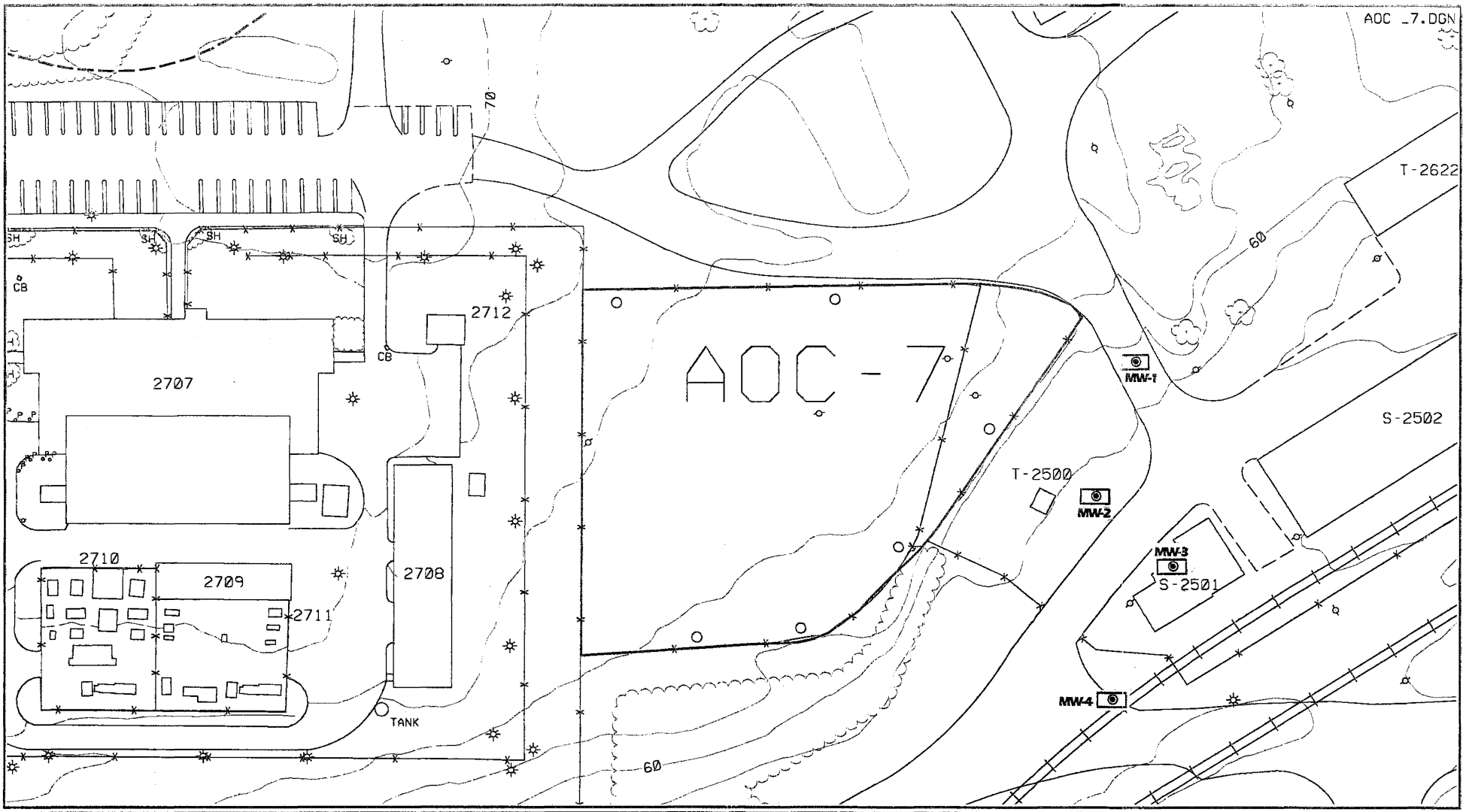
4.2.10.4 Sampling Strategy

Eight surface soil samples from a grid and one sample of the sludge from the Fairway 1 sludge pile will be collected and analyzed for TAL metals. One monitor well (PW-36 on Figure 4-14) will be installed and sampled twice for TCL+30 parameters and TAL metals. Proposed sampling locations are shown on Figure 4-14.

4.2.11 Hazardous Waste Storage Area (AOC-7)

4.1.11.1 Site Location

NJDEPE identified this site as an AOC (NJDEPE, 1990). A temporary hazardous waste storage area was located in an approximately 1-acre fenced site to the east of Building 2708 (see Figure 4-16). The site is currently a grassy field surrounded by a 7-ft-high fence (see photo on page P-14). A former gas station (Building T-2500) is located to the east of the site.


AOC _7.DGN
AOC-7
2707
2708
2709
2710
2711
2712
T-2622
T-2500
S-2502
S-2501
MW-1
MW-2
MW-3
MW-4
TANK
CB
SH
70
60
LEGEND
Proposed Soil Boring
Existing Monitor Well
MW-2
Road (paved)
Road/Trails (unpaved)
Fence
Building
Wooded Area
Tree/Bush
Light Pole
Utility Pole
Site
Brook/Creek
Base Boundary
Marshy Area
SCALE IN FEET
2017-0583
10/18/93
Fort Monmouth, Charles Wood
FIGURE 4-16
HAZARDOUS WASTE STORAGE AREA (AOC-7)

4.2.11.2 Site History

Reviews of aerial photographs from 1961 to 1986 show that this site was a fenced storage area. The 1961 photographs show that the fenced area extended about 50 ft farther to the west than it does today. This western area is now part of the fenced area around Building 2708, which is part of the Pulse Power lab. Large rectangular objects are visible next to the fence on all four sides. These may be cargo or truck vans. The 1969 photograph is similar, but there are three irregular groups of objects at the northwest corner of the lot. The 1974 photograph is similar except there are five circular igloos along the west fence. In 1986, the site is smaller because the Pulsed Power lab is in the western portion of the site. There are objects that appear to be drums along the fence on the south and southeast of the site. The objects are densely packed in a 10- to 20-ft band next to the fence. There are additional objects along the north fence and possibly along the west fence. Personnel interviews indicate that the site was used for a 6-month period in 1987 for temporary storage of hazardous waste (in drums). As part of a program to remove all improperly labeled drums from Fort Monmouth, the facility collected the drums and staged them at this site. The drums were stored on wood pallets, generally along the fence line. The pallets were not usually stored on a plastic ground cover. Clean Venture, Inc. sampled the insufficiently characterized drums, labeled them, completed manifests, and arranged for disposal. For the most part, the drums contained solvents, degreasers, and oils. The drums were screened for external radiation and none was detected. Clean Venture did not characterize the drums to the extent of identifying specific compounds, but some of the solvents that were used on Fort Monmouth at that time are 1,1,2 trichloroethane, 1,1,1,-trichloroethane, and benzene.

The only known release of material during the operation occurred on 7 October 1987. A pallet of 5-gallon containers of malathion, a pesticide, was picked up at Sandy Hook. The containers were deteriorated, so the pallet was placed on a plastic ground cover. During the night, the top popped off of one of the containers. A security guard became temporarily nauseated from the fumes. The next day the containers were repacked in a drum. The quantity of material that was released is considered small, and it is believed that little, if any, material was spilled on the ground.

4.2.11.3 Past Sampling Activities

In 1993, four monitor wells were installed around a former gas station (Building T-2500), which is east of the hazardous waste site and may be downgradient of it (see Figure 4-16). These monitor wells were installed as part of an investigation of the gas station's UST. Groundwater samples were analyzed for VOCs, BNAs, and lead. The results are presented in Table 4-11. All parameters for which results were reported are presented in the table. All measured values were less than the New Jersey groundwater cleanup standards.

4.2.11.4 Sampling Strategy

Six soil borings will be taken at this site. The location of soil borings will be biased towards the fence line as shown in Figure 4-16. One soil sample will be collected at each boring based on screening with a photoionization detector and analyzed for TCL+30 parameters and TAL metals. If contaminants are detected above New Jersey proposed cleanup standards, additional soil borings and monitor wells can be installed to determine the extent of contamination.

4.3 EVANS AREA

Thirteen sites with suspected waste materials were identified in the IA. The NJDEPE expressed concern over two of these sites (EA-1 and EA-3) and over one additional site (AOC-6). The locations of the 14 Evans Area sites are shown on Figure 4-17.

4.3.1 Evans Area Sanitary Treatment Plant (EA-1)

4.3.1.1 Site Location

The Evans Area STP is located on Marconi Road west of the Shark River in the northeastern part of the Evans Area (see Figures 4-17 and 4-18).

Table 4-11

Groundwater Sampling Results Around Building T-2500 (East of Hazardous Waste Storage Site)

Parameter	Samples	Detected	Maximum Value (μg/L)	New Jersey Groundwater Cleanup Std. (μg/L)
Acetone	5	3	3.8 JB	100
Benzyl alcohol	5	2	2.0 J	2,000
Bis (2-Ethylhexyl) phthalate	5	4	3.5 J	30
Butylbenzyl phthalate	5	5	42	100
Methylene chloride	5	2	2.6 J	3
Tetrachloroethene	5	1	8.8	--
Lead	5	0	<50	10

J = Detected Below Detection Limit.
B = Also Present In Blank.

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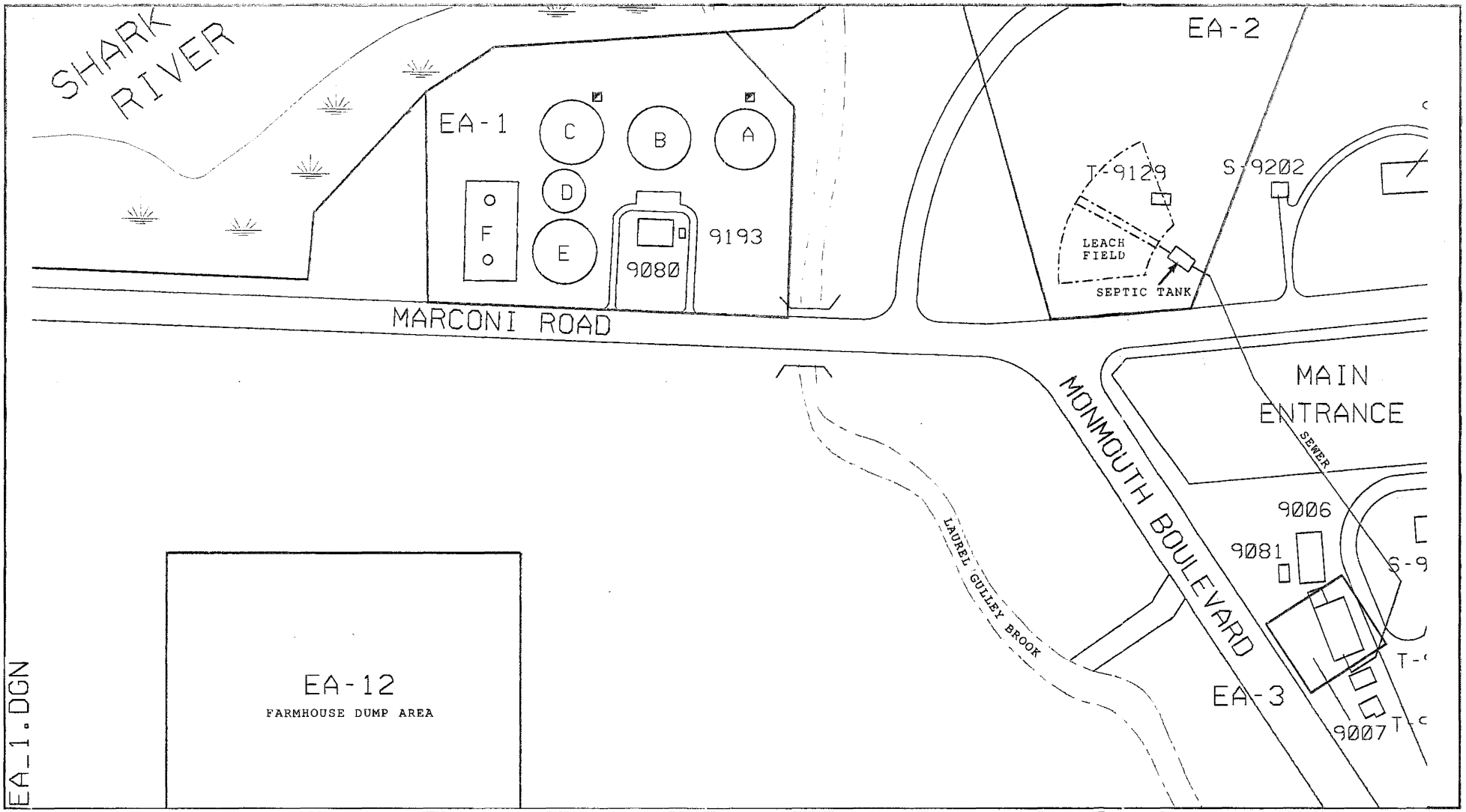

SHARK RIVER
EA-1
C
B
A
D
F
E
9080
9193
EA-2
T-9129
S-9202
LEACH FIELD
SEPTIC TANK
MARCONI ROAD
MAIN ENTRANCE
SEWER
MONMOUTH BOULEVARD
LAUREL GULLEY BROOK
9006
9081
S-9
T-
EA-3
9007
EA-12
FARMHOUSE DUMP AREA
EA_1.DGN
LEGEND
Proposed Soil Boring
Proposed Surface Soil Sampling Location
Road (paved)
Road/Trails (unpaved)
Fence
Building
Wooded Area
Tree/Bush
Light Pole
Utility Pole
Site
Brook/Creek
Base Boundary
Marshy Area
0
300
SCALE IN FEET
2017-0583
10/18/93
Fort Monmouth, Evans Area
FIGURE 4-18
SANITARY TREATMENT PLANT (EA-1) AND FARMHOUSE DUMP AREA (EA-12)

4.3.1.2 Site History

The Evans Area STP was built in 1942 to handle 560,000 gallons of sewage per day. As described in the IA, this STP was similar to the one at Charles Wood and consisted of a grit chamber screen, comminutor, primary and secondary settling tanks, biofilters, and a baffled contact chlorination tank. Although the facilities to provide secondary treatment existed, the low volume of sewage did not provide sufficient hydraulic loading to operate the trickling filter (biofilter). Consequently, wastewater received superchlorination followed by prolonged retention in the primary settling tank. Sludge was pumped from the primary settling tank to an anaerobic digester and was discharged after dewatering to underdrained sand beds (see photo on page P-14). Supernatant liquid from the digester and drainage from the sand beds were recycled through the STP for additional treatment. The chlorinated effluent was discharged to the Shark River. Limited quantities of sludge were produced and disposal of sludge was not necessary. Sludge was removed when the facility was closed in 1981.

This STP was scheduled to be connected to the Wall Township Sewage System, but delays in connection resulted in the STP being in noncompliance with the congressionally mandated 1 July 1977 deadline for secondary treatment. The NJPDES permit expired in October 1979. According to the IA, this STP had been unable to meet the effluent limits of its permit prior to the October 1979 expiration date; however, a letter of exception had been granted stating that Fort Monmouth had shown good-faith efforts to close the plant. The plant was still operating at the time of the USATHAMA site visit in November 1979, when water was observed seeping from near the base of the primary settling tank. Soils were wet around the most northeastern tank in the 1969 and 1974 aerial photographs. This STP was closed in 1981 when the Evans Area sewer system was connected to the Wall Township Sewage System. In 1981, all sludges and supernatant liquids were removed from the STP and the facility was cleaned and disinfected. The removal contractor was Modern Transportation Co. of Kearny, New Jersey. Mercury used in the distributor seal on the biofilter was removed and disposed of by the Directorate of Logistics.

4.3.1.3 Past Sampling Activities

Analytical samples have not been collected from the Evans Area STP or its vicinity.

4.3.1.4 Sampling Strategy

Sediment cores will be collected from two locations along the discharge channel for TCL+30 parameters, TAL metals analysis, and cyanide. Two soil borings will be completed through the sludge-drying beds; samples of soil from immediately beneath the structure will be analyzed for TAL metals and cyanide. Two surface soil samples, collected from 0 to 6 inches, will be analyzed for TAL metals and cyanide. One of the two surface soil samples will be collected from the area observed to be wet on the aerial photographs (east of Tank C) and one from the Shark River side of Tank A. Soil boring and surface soil sampling locations are shown in Figure 4-18; sediment sampling locations will be selected based on site reconnaissance and access. A micro-R meter will be used to screen each sample for radioactivity to evaluate samples for laboratory acceptability.

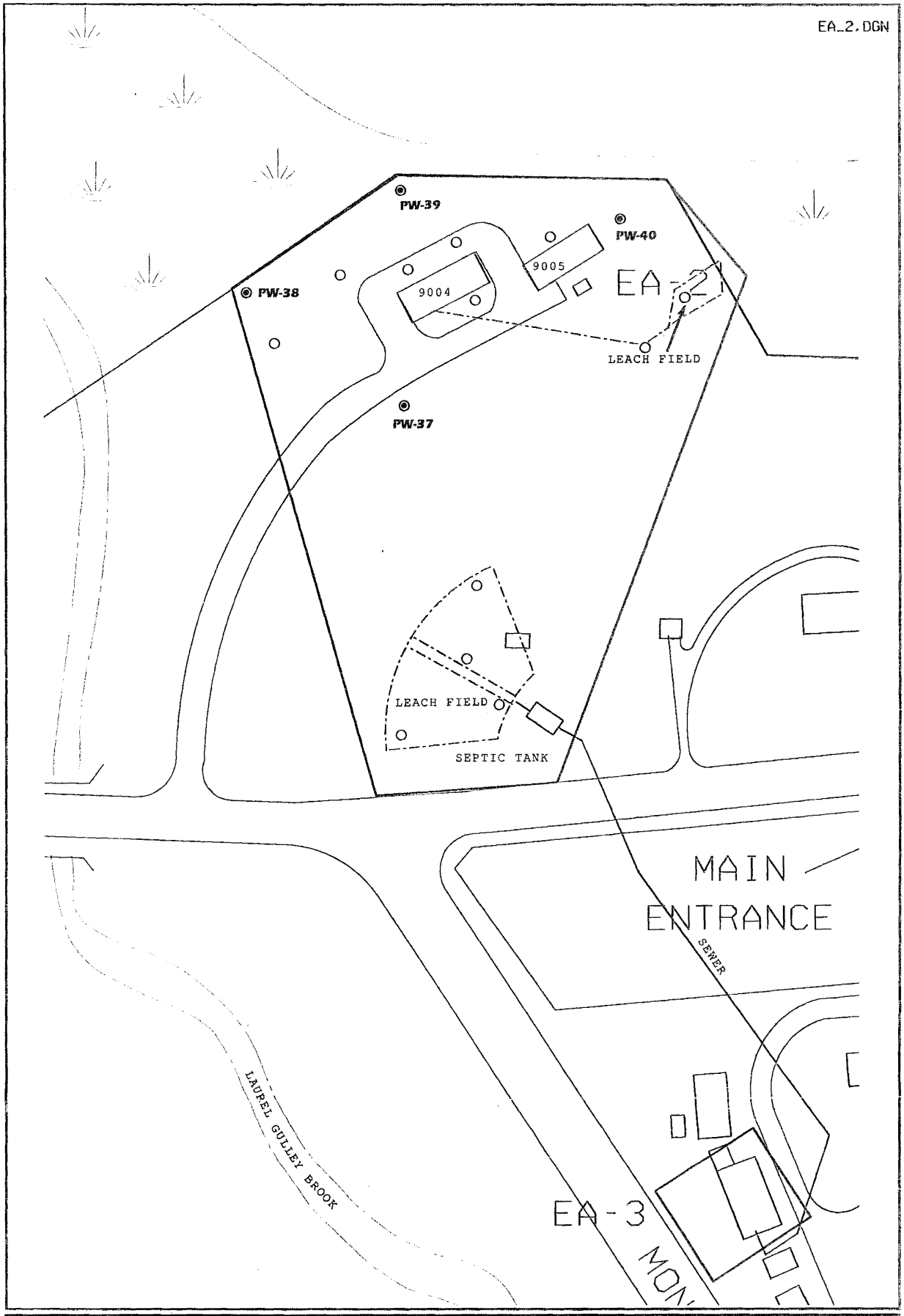
4.3.2 Marconi Buildings (EA-2)

4.3.2.1 Site Location

The Marconi Buildings, 9004 and 9005, are located between Marconi Road and the Shark River in the northeastern part of the Evans Area (see Figures 4-17 and 4-19).

4.3.2.2 Site History

Buildings 9004 and 9005 were built by the Marconi Wireless Telegraph Company of America between the turn of the century and 1914. The actual location of the antennas is not known, but Building 9004 apparently served as the Belmar receiving station for transatlantic wireless communications for the American Marconi Company until the Navy took over the station under war powers in 1917. These buildings were used as a receiver station by American Marconi until 1917, by the Navy and Naval Research Laboratory (1917-


EA_2.DGN
PW-39
PW-40
PW-38
9005
9004
EA-2
LEACH FIELD
PW-37
LEACH FIELD
SEPTIC TANK
MAIN
ENTRANCE
SEWER
LAUREL GULLEY BROOK
EA-3
MON
LEGEND
Proposed Soil Boring
Proposed Monitor Well
Road (paved)
Road/Trails (unpaved)
Fence
Building
Wooded Area
Tree/Bush
Light Pole
Utility Pole
Site
Brook/Creek
Base Boundary
Marshy Area
0
100
SCALE IN FEET
2017-0585
10/18/93
Fort Monmouth, Evans Area
FIGURE 4-19
MARCONI BUILDINGS (EA-2)
AND LEACH FIELD

1919), and by RCA (1919-1924). According to a former Evans Area employee, these buildings were in use in the 1950s, although the actual and post 1950s uses of these buildings are not known. The roof of each building was redone in 1958. From the 1993 site visit, it was evident that the two buildings had not been used in some time (see photo on page P-15).

USATHAMA identified this site as having the potential for heavy metals contamination. There are three possible sources of heavy metals in this area. Figure 13 in the IA identified the area northeast of these buildings as a suspected clean fill area and the site of an old tower. It is possible that the suspected metals contamination may be associated with the fill used in this area.

The second possibility is that the heavy metals contamination potential is directly related to disposal of electronics components like batteries, capacitors, or vacuum tubes. Based on borings completed in 1985, approximately 4 ft of fill has been placed in the area between the buildings. The presence of fill was confirmed during the 1993 site visit, when it was observed that the steps on the east side of Building 9004 had been almost completely buried. Because of the fill, it is not possible to ascertain whether electronic components had been disposed of in this area. Background research has suggested that from the turn of the century until the late 1920s, the active operating period of the receiver station, storage batteries were used to power receiver and transmitter stations as well as to power electronic components. Alternating current electricity was not used to power radios until 1927 (Hallmark,1989). A great deal of research was conducted during the early twentieth century in an attempt to maximize battery life and current production, so storage batteries were not standardized. According to Ruben (1978) and Das Gupta (1989), metals used to construct batteries included aluminum, antimony, cadmium, copper, iron, lead, lithium, manganese, mercury, nickel, palladium, platinum, silver, and vanadium. According to Hallmark (1981), metals used to construct vacuum tubes included barium, iron, mercury, molybdenum, nickel, phosphorus, thorium, and tungsten. Crystal detectors in receivers were usually made of either quartz or galena (a lead ore). Materials used to construct capacitors included aluminum, mica, and zinc, with waxed or oiled paper. After 1931, PCBs or a mixture of

trichlorobenzene and PCBs was used instead of wax or oil (Cichanowski and Newcomb, 1991), but this postdates the Marconi, Naval and RCA use of these facilities.

The third possible source of heavy metal contamination in the EA-2 Area is the former leach field located southwest of the buildings, just off Marconi Road (see Figure 4-19). Engineering drawings from 1941 and 1942 appear to show that sewage from Building 9007 (the former plating shop, CW-3) and several other buildings was piped to a septic tank and leach field in this area. The former leach field has been digitized from the engineering drawings and is shown on Figures 4-18 and 4-19. According to a long-term Fort Monmouth employee, Building 9007 was not connected to the Evans Area STP until 1970, so it is possible that plating waste may have been discharged to this leach field. As discussed in greater detail in Subsection 4.3.3.2, potential contaminants associated with plating wastes include halogenated solvents, cyanide, acids, and metals. Building 9004 also had a small leach field, located south of Building 9005, as shown on Figure 4-19.

4.3.2.3 Past Sampling Activities

Analytical samples have not been collected from the EA-2 Area.

4.3.2.4 Sampling Strategy

Sixteen soil borings will be completed in the EA-2 Area, as shown on Figure 4-19. Monitor wells will be installed in four of the borings (PW-37 through PW-40 on Figure 4-19). One or two soil samples will be collected from each boring for TCL+30 parameters, TAL metals, and cyanide. A micro-R meter will be used to screen each split spoon for radioactivity to evaluate samples for laboratory acceptability. Soil samples for analysis will be collected from the 6 inches below the fill material or from immediately beneath the tile leach field and from a second interval if there is evidence of staining or elevated HNu or OVM readings. Groundwater collected during two sampling rounds will be analyzed for TCL+30 parameters, TAL metals, and cyanide.

4.3.3 Metal Plating Facility (EA-3)

4.3.3.1 Site Location

The former Metal Plating Facility (EA-3) was located in Building 9007, which is located on Monmouth Boulevard, just south of the intersection with Marconi Road (see Figures 4-17 and 4-20).

4.3.3.2 Site History

This building was constructed by the Marconi Wireless Telegraph Company of America sometime between their purchase of the property and 1917. The original purpose of the building is not known, but it may have been associated with the Marconi Institute as either a laboratory or a gymnasium. This two-story-high building has a brick exterior and concrete block interior, with windows that begin about 6 or 7 ft above the floor and extend to the roof. The building has a wood floor, with wood floor joists. The floor was built 12 to 18 inches above the ground surface. On the northern side of the building, there is a series of ground-level drain holes, spaced approximately 10 ft apart (see photo on page P-15), that would allow fluids that accumulate on the ground surface beneath the floor to flow through the foundation footings. There are separate downspouts at the corners of the building to channel rainfall and snow-melt from the roof. Inside the building, pipes run along the walls and beneath the floor. Beneath each window is a radiator.

Building 9007 was used as a metal plating shop from at least 1950 (IA) until 1976, and is presently empty. Contaminants associated with metal plating include solvents (halogenated and aromatic), acids, cyanide, and metal. Stressed vegetation observed on the Monmouth Boulevard side of the building suggests that contaminants may have been released to the ground surface beneath the building and discharged from the drain holes onto the ground outside the building (see photo on page P-15). Because the stressed area is located on a slope on the north side of the building, runoff and/or limited sunlight may also have

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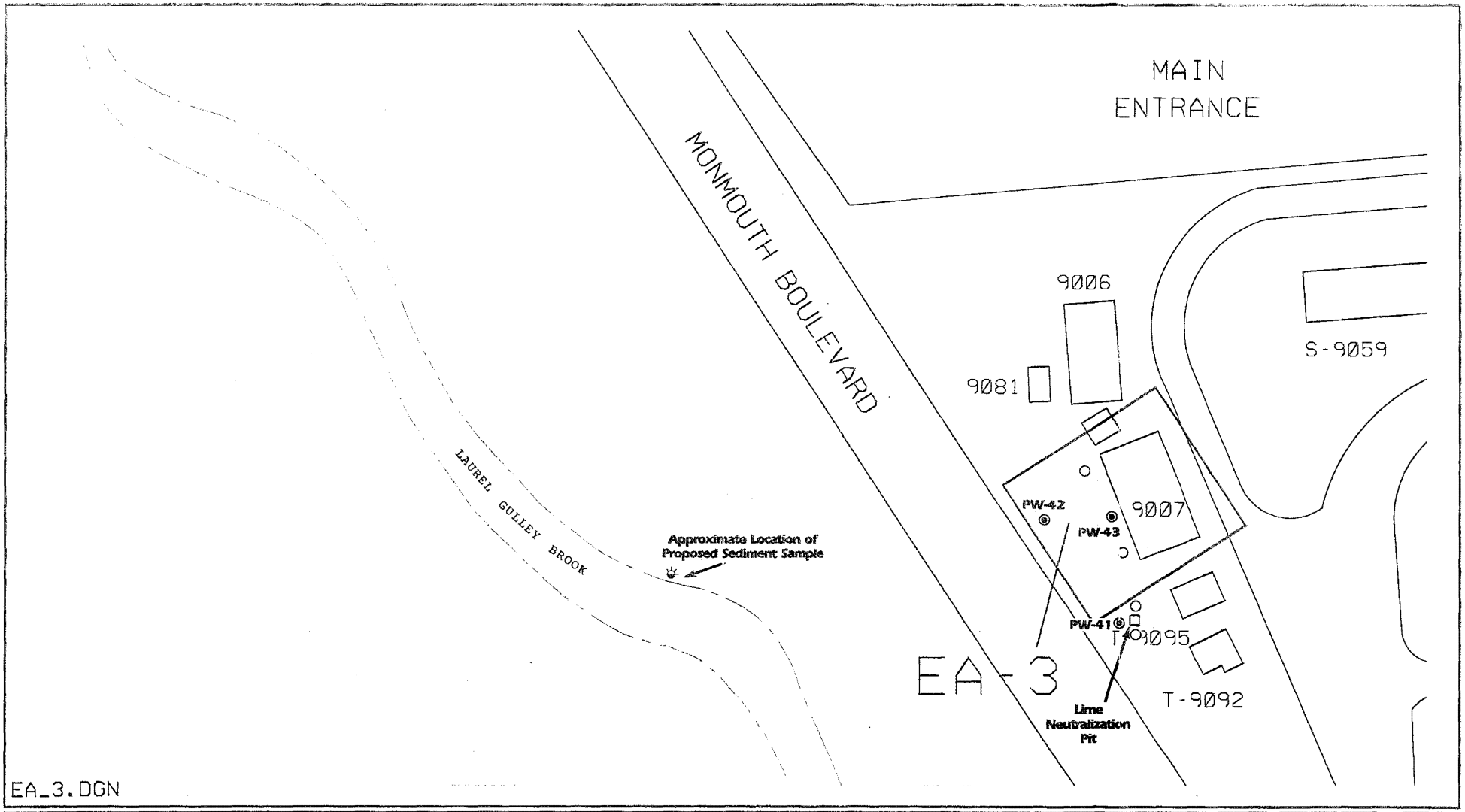

LEGEND

- Proposed Soil Boring
- Proposed Monitor Well
- Proposed Surface Soil Sampling Location
- Proposed Sediment Sampling Location
- Road (paved)
- Road/Trails (unpaved)
- Fence
- Building
- Wooded Area
- Tree/Bush
- Light Pole
- Utility Pole
- Site
- Brook/Creek
- Base Boundary
- Marshy Area

0 100

SCALE IN FEET

2017-0583 10/18/93

Fort Monmouth, Evans Area

FIGURE 4-20
FORMER PLATING SHOP (EA-3)

resulted in sparse vegetation. Runoff from this area was channeled beneath Monmouth Boulevard and discharged to Laurel Gulley Brook. Sewage and possibly waste fluids discharged into sinks and drains were discharged to a leach field southwest of Buildings 9004 and 9005 until approximately 1970, as discussed in Subsection 4.3.2.3.

When Building 9007 was connected to the Evans Area STP, a lime neutralization pit was constructed southwest of the building to neutralize plating wastes before they were discharged to the sanitary sewer. If the construction of this lime pit is similar to those at Charles Wood, the potential exists for solvents to have been released from the pit into adjacent soils.

4.3.3.3 Past Sampling Activities

Analytical samples have not been collected from the EA-3 Area. Three sediment samples for metals analysis were collected from Laurel Gulley Brook, but the hand-sketched map does not allow the sample locations to be identified. Lead, cadmium, and zinc were detected in one or more of these samples (see Appendix A).

4.3.3.4 Sampling Strategy

Seven soil borings will be completed on the Monmouth Boulevard side of the building and near the lime neutralization pit (see Figure 4-20). At least one boring will be completed in the area with stressed vegetation. Soil samples for TCL+30 parameters, TAL metals, and cyanide analysis will be collected from three intervals: 6 to 12 inches bgs; from just above the water table; and either from 6 to 8 ft bgs, from a stained interval, or from an interval with elevated HNu or OVM readings. Three monitor wells (PW-41 through PW-43) will be installed in these seven borings as shown on Figure 4-20. If soil contamination is found in the borings adjacent to the lime neutralization pit, these borings may also be converted to monitor wells. Groundwater will be collected during two sampling rounds and analyzed for TCL+30 parameters, TAL metals, and cyanide. The outfall to Laurel Gulley Brook will be located from engineering drawings and field reconnaissance. One sample of outfall

sediments will be analyzed for TCL+30 parameters, TAL metals, and cyanide. A sample of material from at least 2 ft beneath the surface of the lime pit will also be analyzed for the TCL+30 parameters, TAL metals, and cyanide.

4.3.4 Radiological Facility (EA-4)

4.3.4.1 Site Location

The IA listed Site 4 on the Evans Area as radiological facility and located it in the approximate vicinity of Building 9011 (see Figure 4-17). This site was not discussed in the report. Building 9011 is a brick one-story building measuring about 500 ft by 60 ft.

4.3.4.2 Site History

Old Gotho does!

Interviews with facility personnel indicate that the only use of radiological materials in this area was of glass that contained uranium. The electron tube group used yellow glass that contained uranium to make glass-to-metal connections. The glass was purchased commercially and the seals were fabricated by glass blowing. The concentration of uranium was 4 nanocuries/gram. This material was exempt from requiring a Nuclear Regulatory Commission (NRC) license because of the small quantity of uranium involved. The glass was reportedly used "years ago," but the date when its use was discontinued is not known.

The glassblowing was done in a room in 9011 and the electron tubes were assembled in a room across the hall. Building 9312, a small shed to the northeast of Building 9011, was used to store glassblowing supplies.

Building 9011 was originally constructed as a laboratory in 1941-1942. It is now used as a metal and wood shop.

4.3.4.3 Past Sampling Activities

A radiological survey of Building 9312 was performed on 15 September 1992 by a CECOM Radiological Engineering Branch health physicist (CECOM, 1992). No radiological contamination was found during the survey. The survey was conducted with a ZnS scintillation probe for alpha radiation, an ionization chamber for beta and gamma radiation, and a Geiger-Mueller probe for beta and gamma radiation. Wipe tests were conducted using cloth wipes and counting on a low background alpha/beta counter. The alpha survey did not detect activity greater than background (1 count per minute). The beta-gamma survey did not detect radiation levels greater than background. The lower limit of detection (LLD) for this instrument was 0.2 mR/hr. The activity of the wipes was less than the LLD for both alpha radiation (7.37×10^{-6} microcuries) and beta radiation (6.81×10^{-6} microcuries).

An aerial radiological survey (EG&G, 1989) was conducted over the Evans Area in November 1988. The aerial survey was performed by a helicopter carrying eight 4-inch by 4-inch sodium iodide gamma ray detectors. (The sodium iodide detector produces a gamma ray energy dependent spectrum.) The helicopter survey covered a 4-square-mile area centered on Evans Area at a height of 125 ft. The aerial survey results were correlated with ground measurements and soil sample analyses, including one sample from the G-2 area (Site EA-10). The gamma energy spectrum over the Evans Area was compared with spectrum from background areas to determine if the activity of man-made radionuclides such as cesium-137 and cobalt-60 was present in above-background levels. Although the total detector response varied slightly over the area, the spectrum analysis indicated that, with one exception, the radiation levels were attributed to naturally occurring radionuclides. The one exception was over a strong cesium-137 source in Building 9401. It should be noted, however, that although the presence of cesium-137 was determined from a detail spectrum analysis, the total radiation levels from this source were still comparable to background levels and posed no health threat to persons traveling near or over this building. This survey could not identify small "hot spots," however, it could be concluded that there

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was no evidence of radioactive contamination at the Evans Area that could be attributed to laboratory operations.

4.3.4.4 Strategy

Because the Evans Area has an NRC license for possession of radionuclides and is being closed, a decommissioning plan will be prepared for submittal to the NRC. The plan will discuss the need to survey and decontaminate areas where radionuclides were used. Therefore, no sampling will be done as part of this site investigation.

4.3.5 Radiological Facility (EA-5)

4.3.5.1 Site Location

The IA listed Site 5 on the Evans Area as radiological facility and located it in the approximate vicinity of Building 9036 (see Figure 4-17). This site was not discussed in the report. Building 9036 is a brick one-story buildings measuring about 500 ft by 60 ft.

4.3.5.2 Site History

Vacuum tubes were manufactured in the north end of Building 9036 in the 1950s. As was discussed in Subsection 4.3.4.2, glass containing uranium may have been used for the manufacture of vacuum tubes.

Building 9036 was originally constructed as a laboratory in 1941 and 1942. It continues to be used as an administrative office.

4.3.5.3 Past Sampling Activities

No sampling has been conducted at this site.

4.3.5.4 Strategy

Because the Evans Area has an NRC license for possession of radionuclides and is being closed, a decommissioning plan will be prepared for submittal to the NRC. The plan will discuss the need to survey and decontaminate areas where radionuclides were used. Therefore, no sampling will be done as part of the site investigation.

4.3.6 Heavy Metal Potential (EA-6)

4.3.6.1 Site Location

The IA listed Site 6 on Evans Area as having Heavy Metal Potential but did not discuss the site in the text. The IA located this site in the vicinity of Buildings 9039, 9040, and 9041. Building 9039 is a wood structure approximately 250 ft by 50 ft and Buildings 9040 and 9041 are brick, one-story structures approximately 120 ft by 60 ft.

4.3.6.2 Site History

The buildings were built during the early 1940s to perform R&D on radar and other electrical equipment. They continue to be used for administrative purposes. The IA stated that electroplating was performed at Building 9007 and "smaller scale plating operations" occurred at other locations, implying that small-scale operations occurred in one of the buildings in this area. One former facility employee indicated that electroplating was done in a small shed believed to be T-9097 located between Buildings 9011 and 9037. He stated that electroplating was performed there during the 1950s, 1960s, and early 1970s.

4.3.6.3 Sampling Activity

No sampling has been done at this site. This site was inspected during the site visit, and no stains or stressed vegetation was visible.

4.3.6.4 Strategy

Small-scale plating operations may have occurred at this site, but the actual location is not known. Based on a review of old plans, these buildings appear to have connected to the sanitary sewer system early in the history of the facility. Waste from plating operations may have gone to the STP, which is addressed in this study (Site EA-1). Therefore, no sampling will be done on this site.

4.3.7 Radiological Storage (Building 9383, EA-7)

4.3.7.1 Site Location

Building 9383 is the radioactive waste storage building for the Evans Area. Building 9383 is located near Buildings 9401 and 9045 (see Figure 4-17). It is a small concrete block building, approximately 12 ft by 12 ft (see photo on page P-16). The building currently contains various solid waste; liquid or gaseous radioactive waste have not been stored there in the past 10 years.

4.3.7.2 Site History

Building 9383 has been used for radioactive waste storage for an extended number of years. In the 1950s or 1960s, outdoor experiments using a cobalt-60 source resulted in contamination of the G-2 Area (Site EA-10). Cobalt-60 contamination was subsequently discovered around Building 9383. Soil around the building and a concrete pad at the building door were contaminated (AEHA, 1976). Surface readings greater than three times background extended in a 270 degree arc around the door with a radius of approximately 5 ft, and there was also a small circular area of high activity approximately 15 ft from the door. The soil and the concrete pad were excavated and disposed of at a licensed radioactive waste disposal facility in Barnwell, South Carolina.

4.3.7.3 Past Sampling Activities

After the soil and concrete pad were removed, the U.S. Army Environmental Hygiene Agency (AEHA) resurveyed the area (AEHA, 1977). The survey was done with an Eberline Model PRM 5-3 survey meter with a FIDLER (Field Instrument for Detection of Low-Energy Radiation) scintillation probe optimized to the cobalt-60 energy and was performed on the surface of the grounds surrounding the building. All readings were reported to be less than twice background values. No soil samples were taken after the remediation was completed, although two samples were taken of the contaminated concrete and soil. The cobalt-60 activity for each of these two samples was both 5.8 picocurie/gram (pCi/g).

The identified contaminant, cobalt-60, emits gamma radiation that is readily detectable. The survey instrument, the FIDLER scintillation probe, was designed to detect the low-energy gamma radiation associated with uranium and plutonium, the response of the FIDLER drops off sharply for gamma energies above 100 kilo electron Volts (keV). However, records indicate the instrument was properly calibrated for detection of cobalt-60.

4.3.7.4 Strategy

Because the Evans Area has an NRC license for possession of radionuclides and is being closed, a decommissioning plan will be prepared for submittal to the NRC. The plan will discuss the need to survey and decontaminate areas where radionuclides were used. Therefore, no sampling will be done as part of the site investigation.

4.3.8 Radiological Facility (Building 9401, EA-8)

4.3.8.1 Site Location

Site 8 in the Evans Area is Building 9401 (see Figure 4-17). This building is a radiation-testing facility used to design and test radiation detectors and investigate radiation effects on materials. The building has radiation sources in four areas. Smaller doses can be given with cesium-137 and cobalt-60 sources that are kept in lead shields. X-rays can be produced

by a machine similar to that used for radiation therapy. Stronger cesium-137 and cobalt-60 sources are kept in a hot cell. A very strong cobalt-60 source is located in the bottom of a water-filled pool. The pool is 10 ft wide and 20 ft deep. The source consists of 120 metal rods containing cobalt-60 (Ackermann, 1991). The building also contains a neutron generator that uses deuterium and tritium.

The water in the pool is circulated through a treatment unit to remove impurities. The pool has a water-level monitor. Any overflow goes to two 550-gallon USTs outside the building (see Subsection 4.3.14).

4.3.8.2 Site History

The building was built in 1952 as a radiation-testing facility and has been used for the same purpose to the present (see photo on page P-16). There is no history of any spills or releases of contamination to the environment.

4.3.8.3 Past Sampling Activities

Facility personnel conduct periodic monitoring to ensure that none of the radioactive sources is leaking and no radioactivity is being released to the environment. This monitoring program has been approved by the NRC and is part of the facility's license to possess radioactive materials. Radioactive sources are leak-tested either quarterly or semiannually to ensure that they have retained their integrity. The water in the irradiation pool is sampled and analyzed every 6 months. There is no record of any contamination of the building or pool water. During the 1988 aerial survey (see Subsection 4.3.4.3) the presence of a 66 curie, cesium-137 source was determined from a spectrum analysis of gamma radiation. However, the total gamma radiation levels were comparable to background levels.

4.3.8.4 Strategy

This site is operating under an NRC license. When the Evans Area is closed, a decommissioning plan will be prepared that will include any necessary surveying and decontamination of the building and to terminate the license. Therefore, no sampling will be done as part of this site investigation.

4.3.9 Radiological Facility (Building 9045, EA-9)

4.3.9.1 Site Location

Site 9 in the Evans Area is Building 9045 (see Figure 4-17). This building is primarily used for administrative purposes, although there are some low-activity radioactive sources that are used for instrument calibration. Building 9045 is located near Building 9401 (see Subsection 4.3.8).

4.3.9.2 Site History

Building 9045 was built in the early 1940s (see photo on page P-17). In 1972, two laboratory personnel determined that an approximately 2 curie polonium-210 alpha irradiation was leaking. Contamination was found on a workbench and one floor tile. Those items were removed and disposed of as radioactive waste. The two personnel were tested for radiation contamination and no contamination was found (AEHA, 1971).

4.3.9.3 Sampling Activity

The calibration sources in Building 9045 are leak-tested either quarterly or semiannually to ensure that they have retained integrity. There is no record of any contamination of the building other than the incident mentioned previously.

4.3.9.4 Strategy

This site is operating under an NRC license. When the Evans Area is closed, a decommissioning plan will be prepared that will include any necessary surveying and decontamination of the building and to terminate the license. Therefore, no sampling will be done as part of this site investigation.

4.3.10 Radiological Storage (G-2 Area, EA-10)

4.3.10.1 Site Location

The G-2 Area is located in the southern portion of the Evans Area (see Figure 4-17). It currently is a partially wooded field with a limited number of antennas and electrical equipment (see photo on page P-17).

4.3.10.2 Site History

The G-2 Area was used during the 1950s for open-air experiments using a sealed cobalt-60 source to test radiation detection equipment. During that period, the cobalt-60 source leaked and contaminated the concrete pad on which it was placed and the surrounding soil. An attempt was made to decontaminate the pad by washing with nitric acid; the wash solution ran off into the soil. The soil contamination was described as extending approximately 6 ft from the pad in all directions with contamination extending downhill in a southeasterly direction for 30 ft. There was an approximately 7-ft-by-14-ft area located about 15 ft northwest of the concrete pad and a 10-ft-diameter area located 45 ft east of the pad (AEHA, 1976).

4.3.10.3 Past Sampling Activities

AEHA surveyed the area and recommended that the concrete pad and surrounding soil be excavated. The area excavated was approximately 3,000 ft^2 to a depth of between 1.5 to 5 ft. The excavated soil and concrete were placed in 55-gallon drums and disposed of at a

licensed radioactive waste disposal facility in Barnwell, South Carolina. After the excavation was completed, AEHA resurveyed the area with an Eberline Model PRM 5-3 survey meter with a FIDLER scintillation probe optimized to the cobalt-60 gamma energy. Two areas were found with slightly elevated detector readings. The soil at these areas was excavated and disposed of. After this action, all readings were reported to be less than twice background values. Core samples to a depth of 2 ft were taken at the two areas that originally had slightly elevated instrument readings. The soil core was analyzed for cobalt-60 activity by gamma spectrometry. The activity in one core varied from below the detection limit to 1.0 pCi/g and the activity in the other varied from 1.2 pCi/g to 6.5 pCi/g. There is no specific limit for cobalt-60 in soil.

In 1983, contamination was found at another concrete pad in the G Area. A survey was performed on 11 April 1983 using a micro-R meter with a 1-inch-by-1 inch NaI scintillation probe and taking surface soil samples for radioactivity analysis (AEHA, 1983). The result of the NaI instrument survey was that there was no external radiation hazard present. Twenty soil samples were taken to a depth of 3 inches in a 4-ft-by-5-ft area. The cobalt-60 activities ranged from 3.5 picocuries/gm to 37 picocuries/gm. The top 3 inches of soil, along with vegetation and roots, were removed and disposed of as radioactive waste.

The 1988 aerial survey (see Subsection 4.3.4.3) indicated that gamma radiation levels over the G-2 area were about 10 to 12 microR/hr, which is slightly higher than most of the rest of the 4-square-mile area. However, detached spectrum analyses indicated that only naturally occurring radionuclides were present in this area. The slightly higher gamma radiation levels were attributed to the fact that the areas were open fields so naturally occurring radionuclides in the soil were not shielded by houses or vegetation.

4.3.10.4 Strategy

Because the Evans Area has an NRC license for possession of radionuclides and is being closed, a decommissioning plan will be prepared for submittal to the NRC. The plan will

discuss the need to survey and decontaminate areas where radionuclides were used. Therefore, no sampling will be done as part of the site investigation.

4.3.11 Alleged Range (Small Arms, EA-11)

4.3.11.1 Site Location

The IA listed Site 11 on the Evans Area as a small arms range. The IA said it was an outdoor range with no berm and was located in the southern portion of the Evans Area (see Figure 4-17).

4.3.11.2 Site History

Six interviews were conducted with installation personnel who worked at Evans over the time period 1941 to present. None of the personnel remembered any firing in this area. One person said that the area was used for radar range testing, i.e., objects were elevated so they could be imaged by radar.

Aerial photographs from 1940 to 1986 were analyzed and no evidence of a firing, such as a berm, was observed. Houses were present in 1940 on Belmar Boulevard across from the location of the range identified in the IA (see photo on page P-18).

4.3.11.3 Sampling Activity

In 1989, two surface soil samples were taken in the southern portion of the Evans Area and analyzed for lead. The lead concentrations were measured at 21 and 28 mg/kg. These results are typical for soil and are below the proposed New Jersey soil cleanup standards.

4.3.11.4 Strategy

Based on personnel interviews, there is no information regarding a firing range in this area. It seems unlikely that a firing range would have been operated across the street from

houses. Two soil samples, taken in the general area indicated in the IA, did not measure elevated levels of lead. Therefore, no additional sampling will be performed.

4.3.12 Farmhouse Dump (EA-12)

4.3.12.1 Site Location

The Farmhouse Dump is located between Marconi Road and Watson Avenue in the northern part of the Evans Area (see Figure 4-18).

4.3.12.2 Site History

Part of this area was used as a private dump by residents of a farmhouse. The farmhouse is visible on the 1940 aerial photograph, but is not visible on the 1951 aerial photograph. The farmhouse was most likely demolished shortly after Fort Monmouth purchased the land in 1941. Beginning with the 1957 aerial photograph, the Army used the area just south of the former farmhouse as a practice area, as suggested by evidence of bare soil. Two towers are visible in the 1961 and 1969 aerial photographs, but only one is still visible in the 1974 photo.

Foundations from the farmhouse and outbuildings were located during the 1993 site visit (see photo on page P-18). A discarded appliance, a pile of rusty cans, and a pile of mixed dirt, ceramics, and glass chips were found in a nearby gully. Other material observed in the area included miscellaneous demolition debris, automotive parts (a transmission, a pick-up truck body, and a very old rusty motorcycle), and brush piles. More recently, someone had left a pile of empty 5-gallon containers.

4.3.12.3 Past Sampling Activities

Analytical samples have not been collected in this area.

4.3.12.4 Strategy

The solid waste will be removed. No sampling will be done because most of the solid waste observed is more than 50 years old (it predates the Army's purchase of this land).

4.3.13 Landfill 13 (EA-13)

4.3.13.1 Site Location

There are two open dump areas at the Evans Area. The first, EA-13A on Figure 4-21, is located west of the Gate 3 parking area on Monmouth Boulevard. The second, EA-13B, is located south of Watson Avenue and west of Laurel Gulley Brook (see Figure 4-21).

4.3.13.2 Site History

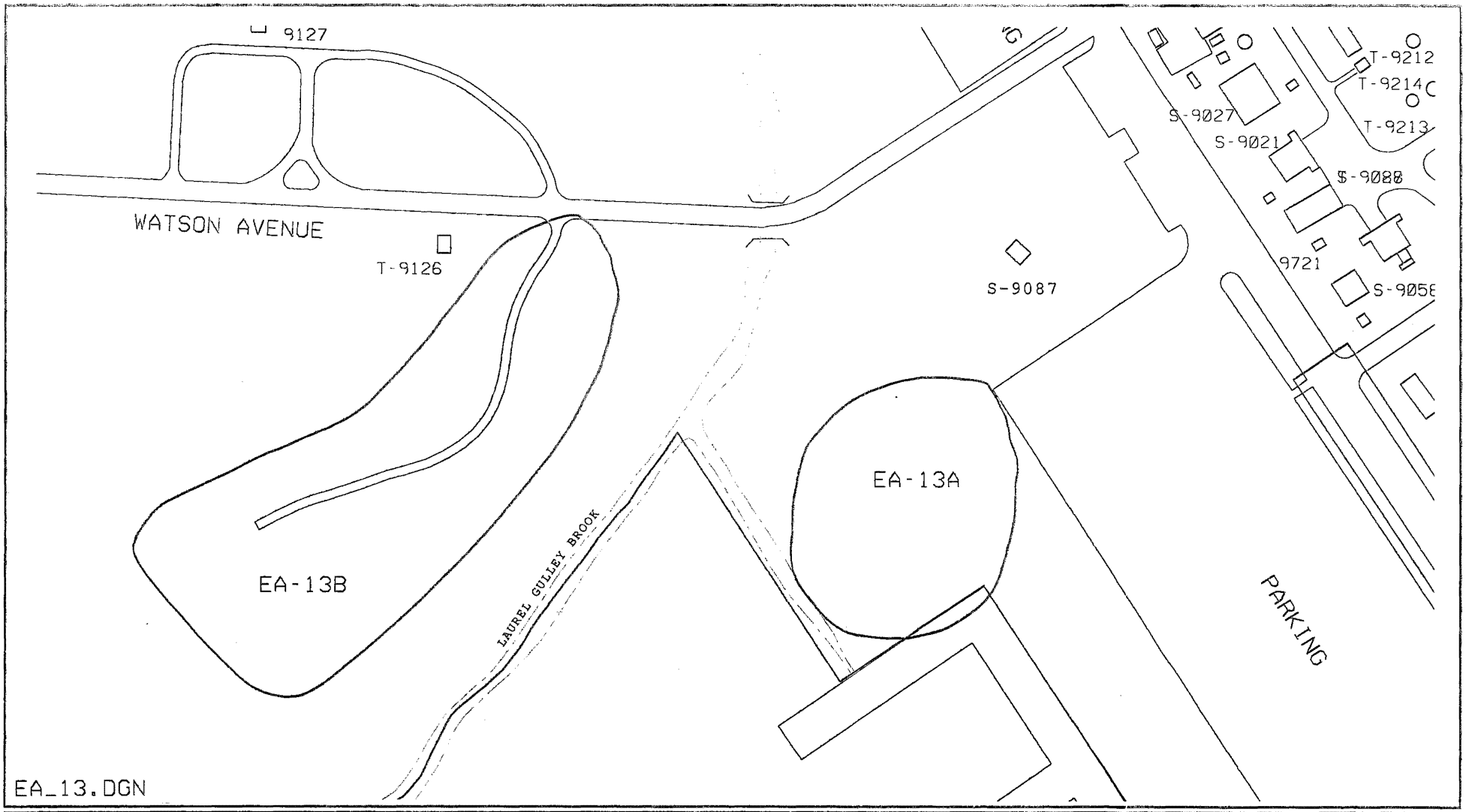
These areas have been used as open dumping areas by local residents since the 1940s. Materials observed in these areas included an engine block, shopping carts, a mattress, a small tent camping trailer, building rubble, wood, and stone as well as miscellaneous litter and brush (see photo on page P-19).

4.3.13.3 Past Sampling Activities

Analytical samples have not been collected from this area.

4.3.13.4 Sampling Strategy

In late fall, winter, or early spring, at a time when the vegetation is minimal and there is no snow on the ground, the extent of surface debris in these two areas will be mapped. During mapping, a geologist will look for evidence of subsurface disposal (clearings in wooded areas, areas with no vegetation, areas with subsidence or partially buried debris, etc.). After mapping the extent of rubbish, the facility will remove the rubbish and the soils beneath the solid debris will be examined for evidence of soil staining. If stains are found, surface soil



Fort Monmouth, Evans Area

FIGURE 4-21
OPEN DUMPING AREAS 13 AND 13B (EA-13)

samples will be collected for TCL+30 parameters and TAL metals. Monitor wells will not be installed unless there are detected concentrations of organic compounds or metals in soil samples that suggest that groundwater could be affected.

If there is evidence of subsurface disposal, surface geophysical surveys will be conducted. Magnetic readings will be collected on 10-ft centers, and GPR will be used in anomalous areas to define the boundaries of the subsurface disposal areas. Monitor wells will then be installed to evaluate the potential impact of the subsurface disposal areas.

4.3.14 Underground Tank System (AOC-6)

4.3.14.1 Site Location

The IA indicated that liquid waste was stored temporarily in an underground tank system prior to discharge to the sanitary sewer. The IA stated that the system had not been used since the early 1970s. The location of the tank system was not given in the IA, but is known to be adjacent to Building 9049. Interviews with site personnel indicate that the only underground tanks that are known to receive potentially radioactive liquid are two 550-gallon USTs adjacent to Building 9401 that receive overflow from the cobalt-60 irradiation pool. The USTs could also receive liquid from the shower drain in the decontamination room. Facility personnel stated that there has never been a need to use the decontamination room, nor has the irradiation pool overflowed except during the test of the overflow system. The pool water is monitored and site personnel indicate that there have been no indication that the pool water is radioactive.

4.3.14.2 Site History

The two USTs are believed to have been installed in the early 1950s when Building 9401 was built. These USTs are scheduled to be removed in 1994.

4.3.14.3 Sampling Activity

All water that is discharged from the USTs is analyzed prior to release, and all discharges have been in accordance with the NRC regulations regarding discharges of liquid to the environment (10 CFR Part 20).

4.3.14.4 Strategy

Site personnel indicated that the site will be monitored for radiation during the excavation of these USTs. Therefore, no additional sampling is required during the site investigation.

4.4 PCB TRANSFORMERS

4.4.1 Introduction

Fort Monmouth tested all electrical transformers between 1989 and 1990 and determined that there were 33 PCB-class transformers (i.e., the transformer oil contains greater than 500-ppm PCB) located on the Main Post and the two subposts. Each of these transformers has been removed or retrofitted, and there are now no PCB-class transformers at Fort Monmouth. As part of this assessment, each of the sites where a PCB-class transformer was formerly located was inspected for any evidence of a spill. This subsection contains the results of the inspection and recommendations for additional sampling, as appropriate. A brief description of the PCB management and testing program at Fort Monmouth was previously presented in Subsection 3.6.

4.4.2 Transformer Site Inspection Results

Each of the 33 PCB transformer sites was visually inspected for evidence of oil leaks. For indoor units and pad-mounted outdoor units, this meant looking for oil stains in the concrete floor or pad. For pole-mounted outdoor units, this meant looking for signs of soil staining or stressed vegetation immediately under the transformer. In addition, the condition of the

floor or concrete pad was noted to determine (for example, if there are cracks in the concrete).

The results of the inspection, along with information about the former PCB transformers, are summarized in Table 4-12. The locations of the transformer sites are shown on Plates 1 through 4. Of the 33 transformers, 11 were mounted on outdoor pads, 9 were mounted on outdoor poles, and 13 were located in indoor vaults. Two outdoor pads and three indoor vaults with visible stains were observed. There were no visible stains or stressed grass observed under pole-mounted outdoor units. A new or retrofilled transformer is currently present at 20 pad or vault sites, making it impossible to completely inspect the concrete in these cases. The pad that contained CE-064 and CE-112 at the Evans Area is partly covered with rubble, making it impossible to completely inspect the pad for stains. In general, the concrete pads or vault floors were in good condition.

4.4.3 Strategy

The recommended sampling at the PCB transformer sites can be summarized as follows:

- Outdoor Pole Mounted — In all cases, take composite of three surface soil samples immediately under the PCB transformer (Pole Protocol).
- Outdoor Pad Mounted (Pad Protocol)
  - If no visible stain, no sampling.
  - If visible stain on pad, take one chip sample in the middle of each distinct stain. Take surface soil sample (0 to 6 inches) at each side of the pad.
- Indoor vault (Vault Protocol)
  - If no visible stain, no sampling.
  - If visible stain, take one chip sample in the middle of each distinct stain.

Table 4-12

Description of and Required Sampling at Former PCB Transformer Sites

Transformer Code	Location	Size (KVA)	Remarks	Description	Recommended Sampling
CE002	9114, pad	833	Replaced by CE138	Located on old approx. 5-ft-by-15-ft concrete pad with 2 other transformers. No stain around CE138. Adjacent transformer, CE001, has large oil stain on pad and ground; not PCB transformer.	No sampling required.
CE006	9114, pad	833	Replaced by CE140	Located on old approx. 5-ft-by-15-ft concrete pad with 2 other transformers. No stain.	No sampling required.
CE056	9126, pole	25	Removed, no replacement	Pole over grass-covered soil. No stains.	Sample per pole protocol.
CE064	9117, pad	150	Removed, no replacement	Various concrete pads on larger approx. 10-ft-by-15-ft concrete pad. No visible stains but pad covered with concrete rubble and debris.	Clear pad. If visible stains, follow pad protocol.
CE088	9007-E side, indoor vault	500	Replaced by CE142	On approx. 3-ft-by-5-ft pad in vault with concrete floor. Pad does not have stains but concrete floor is heavily stained. Personnel said stain is from oil that was drained from a switch in 1982.	Sample per vault protocol.
CE112	9117	500	Removed	See CE064.	See CE064.
CE121	9042-E side, pad	150	Replaced by CE141	On old approx. 3-ft-by-5-ft concrete pad. No visible stain but pad has slot in it directly under transformer.	No sampling required.
CW010	2276-W side on Bataan Ave., pole	37	Replaced by CW261, CW262, and CW263	Pole over grass-covered soil. No stain.	Sample per pole protocol.
CW035	2000-NE side, pad	300	Replaced by CW268, CW269, and CW270	On old approx. 4-ft-by-6-ft concrete pad. Dark stains on pad.	Sample per pad protocol.
CW039	2018-S side, pole	25	Replaced by CW265	Pole over grass-covered soil. No visible stains.	Sample per pole protocol.
CW040	2018-S side, pole	25	Replaced by CW266	See CW039.	Sample per pole protocol.
CW078	2542, underground vault	100	Retrofilled in 1990	Approx. 8-ft-by-15-ft underground vault with concrete floor. No visible stain. Floor has drain.	No sampling required.

Table 4-12

Description of and Required Sampling at Former PCB Transformer Sites (Continued)

Transformer Code	Location	Size (KVA)	Remarks	Description	Recommended Sampling
CW079	2542, underground vault	100	Retrofilled in 1990	See CW 078.	No sampling required.
CW102	2705-SE side, pad	750	Replaced by CW260	On old approx. 6-ft-by-8-ft concrete pad. No visible stain.	No sampling required.
MP-007	718, pole located approx. 75 ft east of Wilson.	37	Replaced by MP-495	Pole located over grass-covered soil. No visible stain.	Sample per pole protocol.
MP-059	290-NW side, pad	167	Retrofilled in 1990	On old approx. 3-ft-by-8-ft concrete pad along with 2 other transformers.	No sampling required.
MP-062	292-NW side, pole	75	Removed, replaced	3 on pole replaced by 3 on old pad that is directly under pole. No visible oil stain on pad.	Sample per pole protocol.
MP-104	686-east, pole	37	Replaced by MP-489	Located over grass-covered soil. No visible stain.	Sample per pole protocol.
MP-124	1220-west side, pad	500	Replaced by MP-493	On old approx. 8-ft-by-10-ft concrete pad. Approx. 1-ft-diameter brown stain on west side of pad.	Sample per pad protocol.
MP-148	167-south side, pad	225	Retrofilled in 1991	On old approx. 5-ft-by-10-ft concrete pad. No visible stains.	No sampling required.
MP-280	1002, indoor vault	750	Replaced by MP-494	Concrete floor not refurbished; in good condition. Stains visible under front and back of new transformer.	Sample per vault protocol.
MP-282	1004, pole located approx. 50 ft west of corner of Razor and Stephenson	10	Removed, no replacement	Pole over pavement and grass-covered soil. No visible stain.	Sample per pole protocol.
MP-283	1004, pole - same as MP-282	10	Removed, no replacement	See MP-282.	Sample per pole protocol.
MP-347	1208, indoor vault	250	Replaced by MP-496	Two small stains, one between MP347 and MP348 and one on NE side of MP349.	Sample per vault protocol.
MP348	1208, indoor vault	250	Replaced by MP497	See MP347.	Sample per vault protocol.

Table 4-12

Description of and Required Sampling at Former PCB Transformer Sites (Continued)

Transformer Code	Location	Size (KVA)	Remarks	Description	Recommended Sampling
MP349	1208, indoor vault	250	Replaced by MP498	See MP347.	Sample per vault protocol.
MP350	1209, indoor vault	250	Replaced by MP499	Concrete was not refurbished; it is in good condition. Very slight stain between MP352 and wall.	Sample per vault protocol.
MP351	1209, indoor vault	250	Replaced by MP500	See MP350.	Sample per vault protocol.
MP352	1209, indoor vault	250	Replaced by MP501	See MP350.	Sample per vault protocol.
MP362	1210, indoor vault	167	Replaced by MP502	Concrete was not refurbished; it is in good condition. No visible stain but part of floor is covered by new large transformer.	No sampling required.
MP363	1210, indoor vault	167	Removed	See MP362.	No sampling required.
MP364	1210, indoor vault	167	Removed	See MP362.	No sampling required.
MP374	1213, pad	500	Replaced by MP503	Mounted on old, approx. 5-ft-by-6-ft concrete pad. No visible oil stains.	No sampling required.

Location:

CE - Evans
CW - Charles Wood
MP - Main Post

RECOMMENDED PROTOCOLS: Pad — take one chip sample for each stain, up to three chip samples. Take one soil sample along each edge of pad if the pad is adjacent to soil. If pad is surrounded by impermeable cover, then take one soil sample at drainage point. Analyze for PCB.
Pole — take one composite of three surface soil samples beneath transformer. Analyze for PCB.
Vault — take one chip sample for each stain up to three chip samples. Analyze for PCB.

Samples would be analyzed for PCBs. This strategy for sampling the former locations of PCB transformers is based on 40 CFR 761 and New Jersey Administrative Code (NJAC) 7:26E. Proposed sampling activities for individual sites are indicated in Table 4-12. The results of the sampling should be compared against the most restrictive of the cleanup levels shown in Table 4-13 to determine if potential remediation is required.

Table 4-13

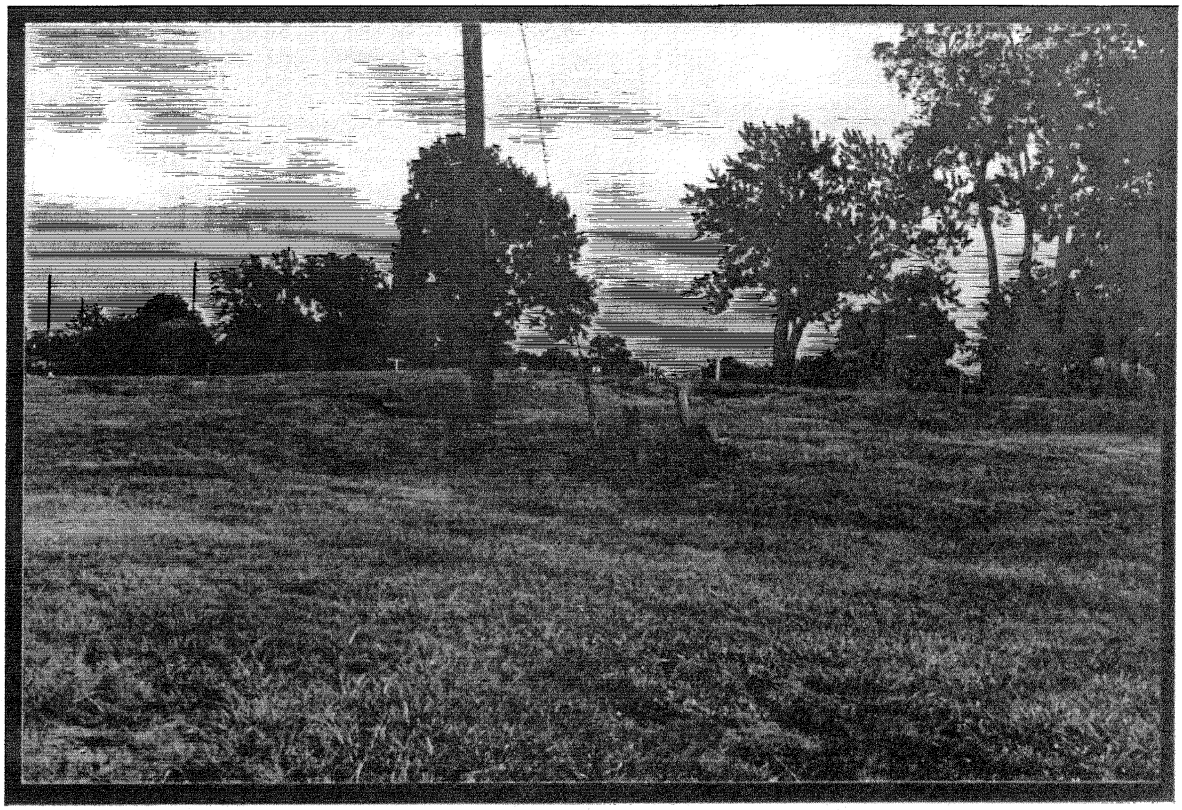
Potentially Applicable PCB Cleanup Levels

TSCA (40 CFR 761) • Restricted Area (greater than 100 m from residential/commercial area and fenced or enclosed). - Indoor areas: wipe test < 10 mg/100 cm^2 - Outdoor (low-contact): wipe test < 100 mg/100 cm^2 - Soil: soil sample < 25 ppm • Nonrestricted Area - All surfaces: wipe test < 10 mg/100 cm^2 - Soil: soil sample < 10 ppm
New Jersey (Proposed 7:26D) • Building Interior - Porous surface (from floor to 6 feet): chip sample < 0.055 $\mu g/g$ - Porous surface (higher than 6 feet): chip sample < 0.11 mg/g - Nonporous surface (from floor to 6 feet): wipe sample < 0.27 mg/m^2 (2.7 mg/100 cm^2) - Nonporous surface (higher than 6 feet): wipe sample < 0.54 mg/m^2 (5.4 μg/100 cm^2) • Soil - Surface Soil:* soil sample < 0.45 mg/kg (ppm) - Subsurface Soil: soil sample < 100 mg/kg (ppm)

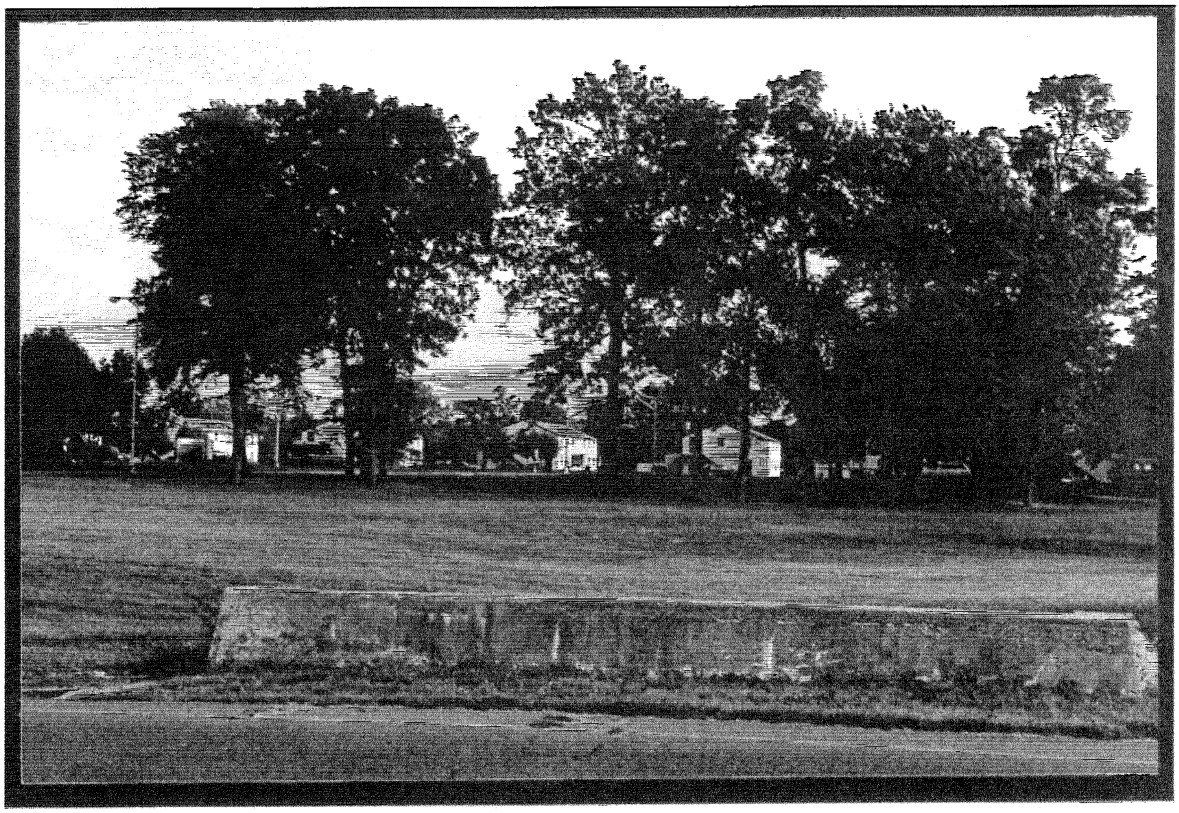
*Surface soil is top 2 ft of soil.

Landfill (M-1)

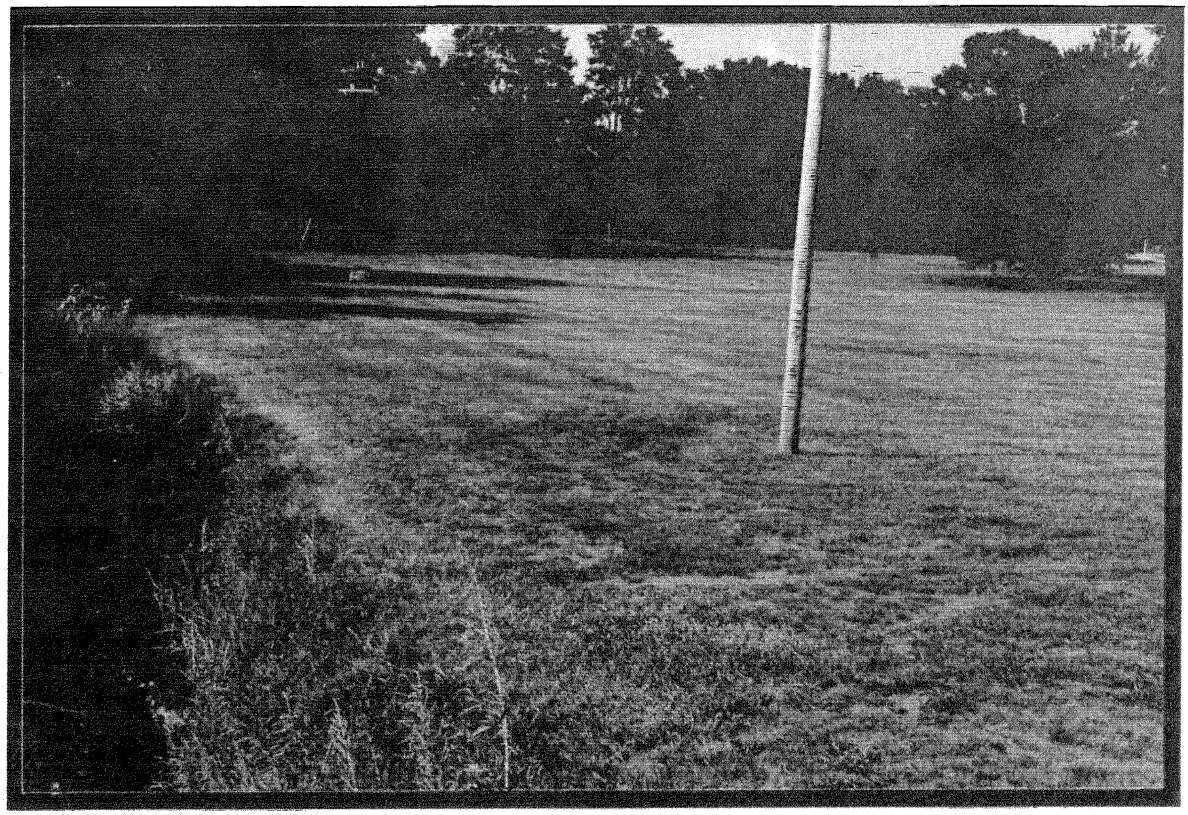
Landfill (M-2)



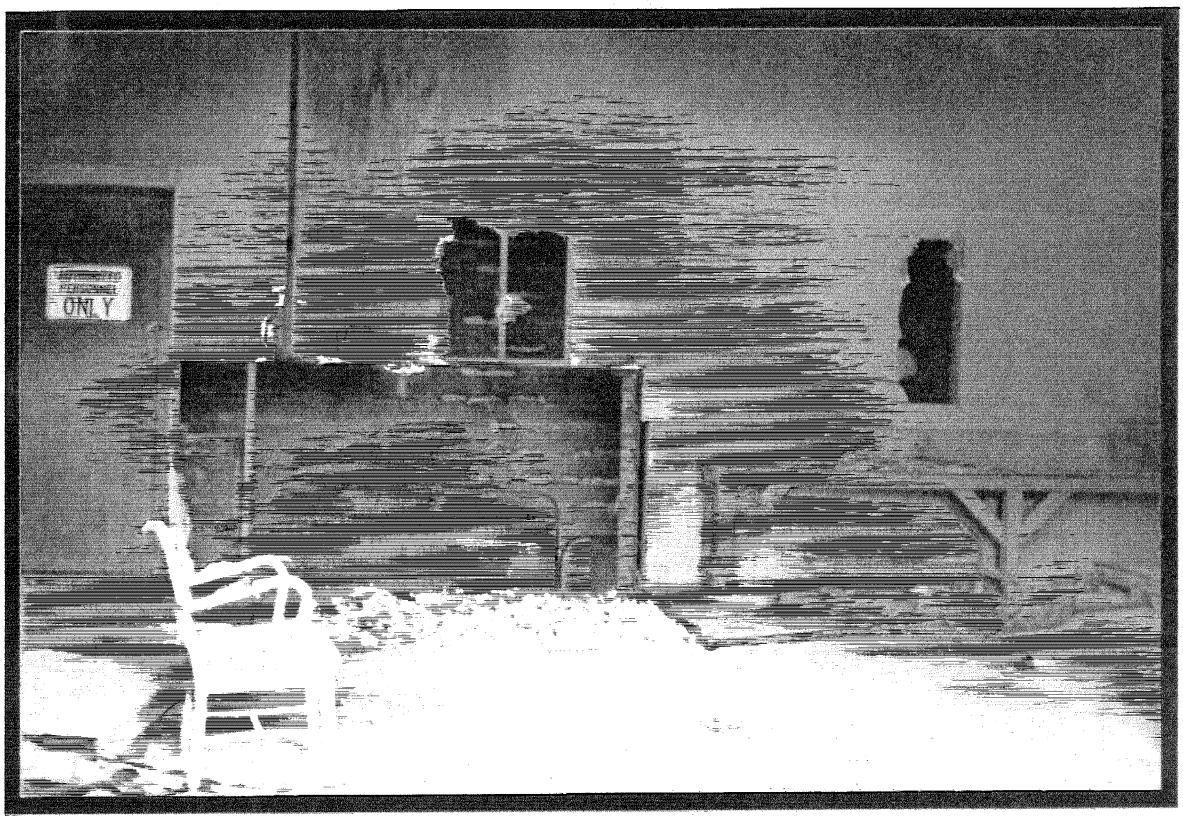
Landfill (M-3, M-6)



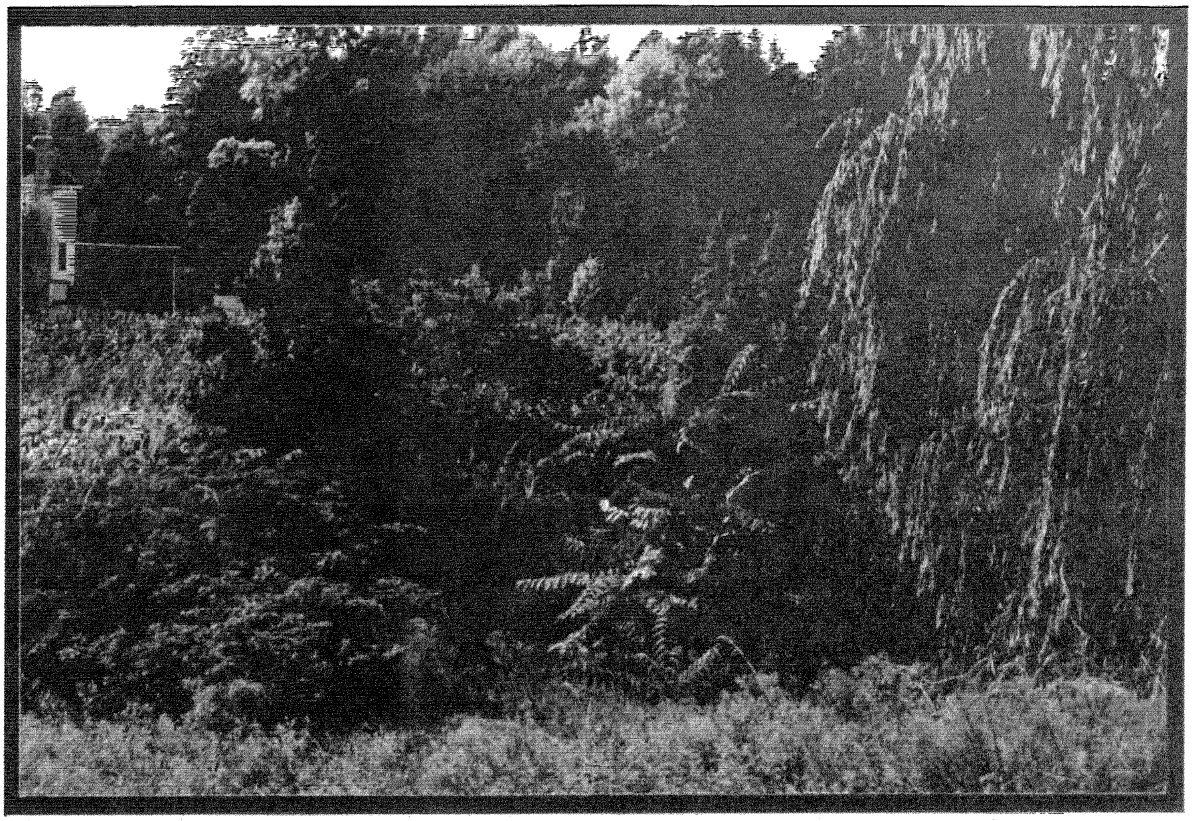
Landfill (M-4)



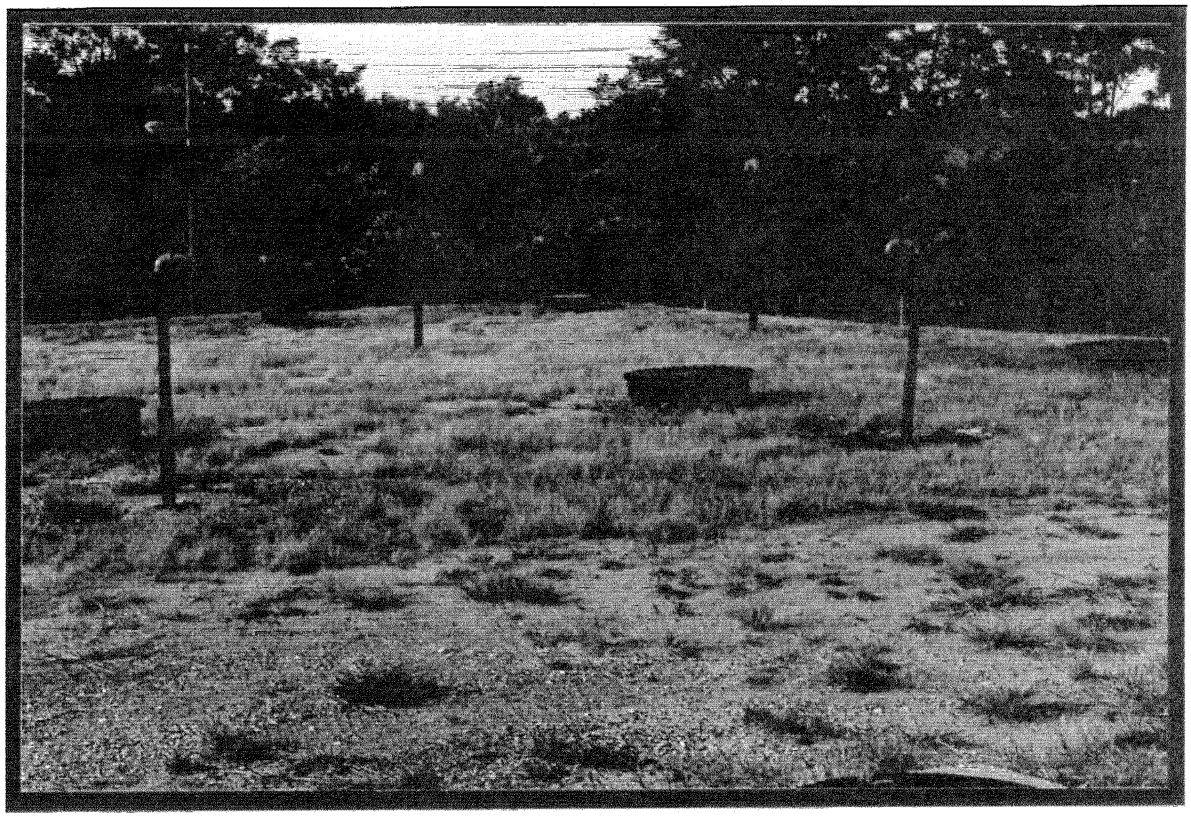
Landfill (M-5)



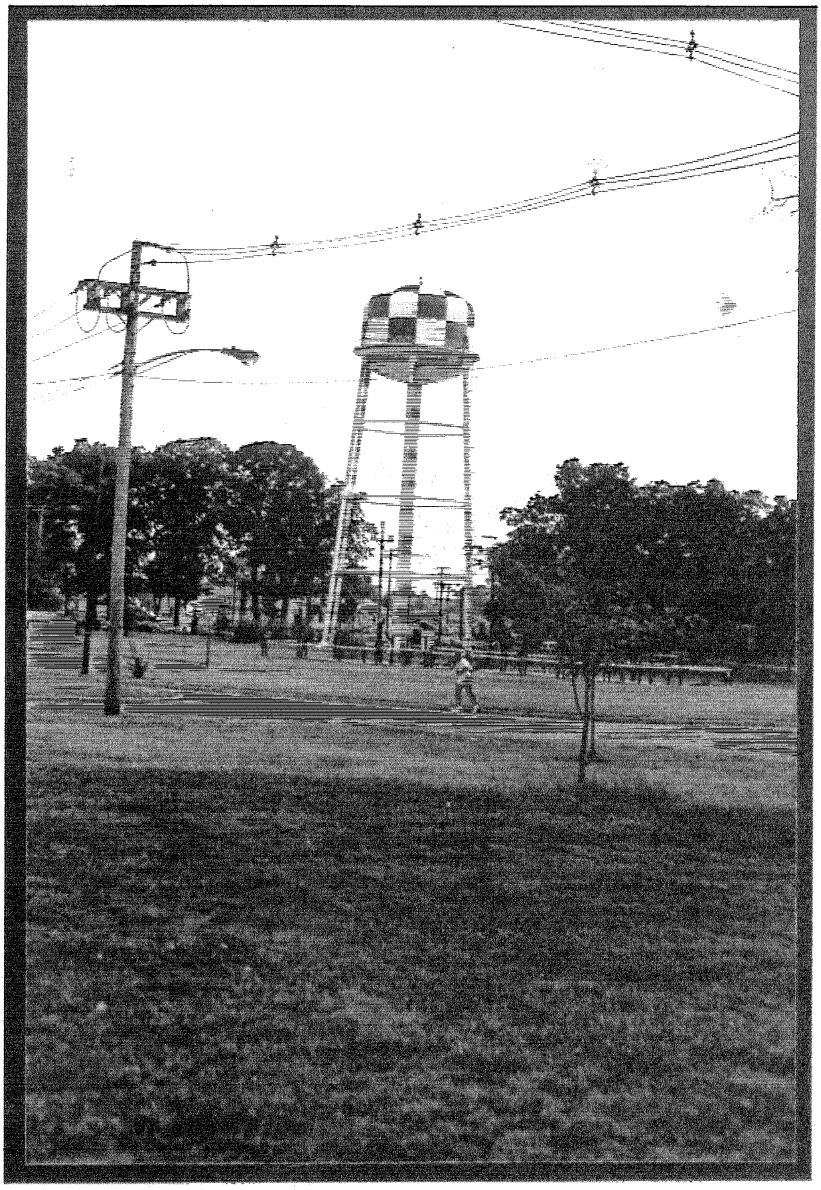
Former Incinerator (M-7)



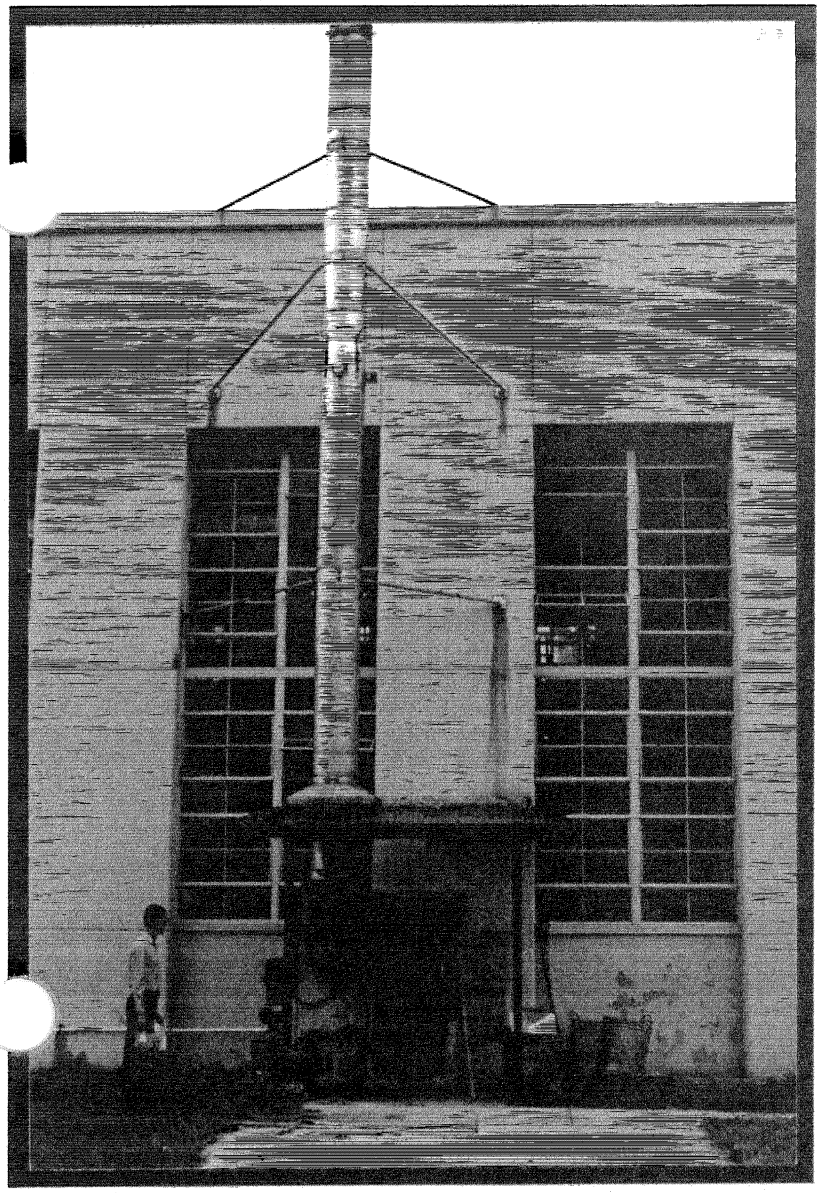
Landfill (M-8)



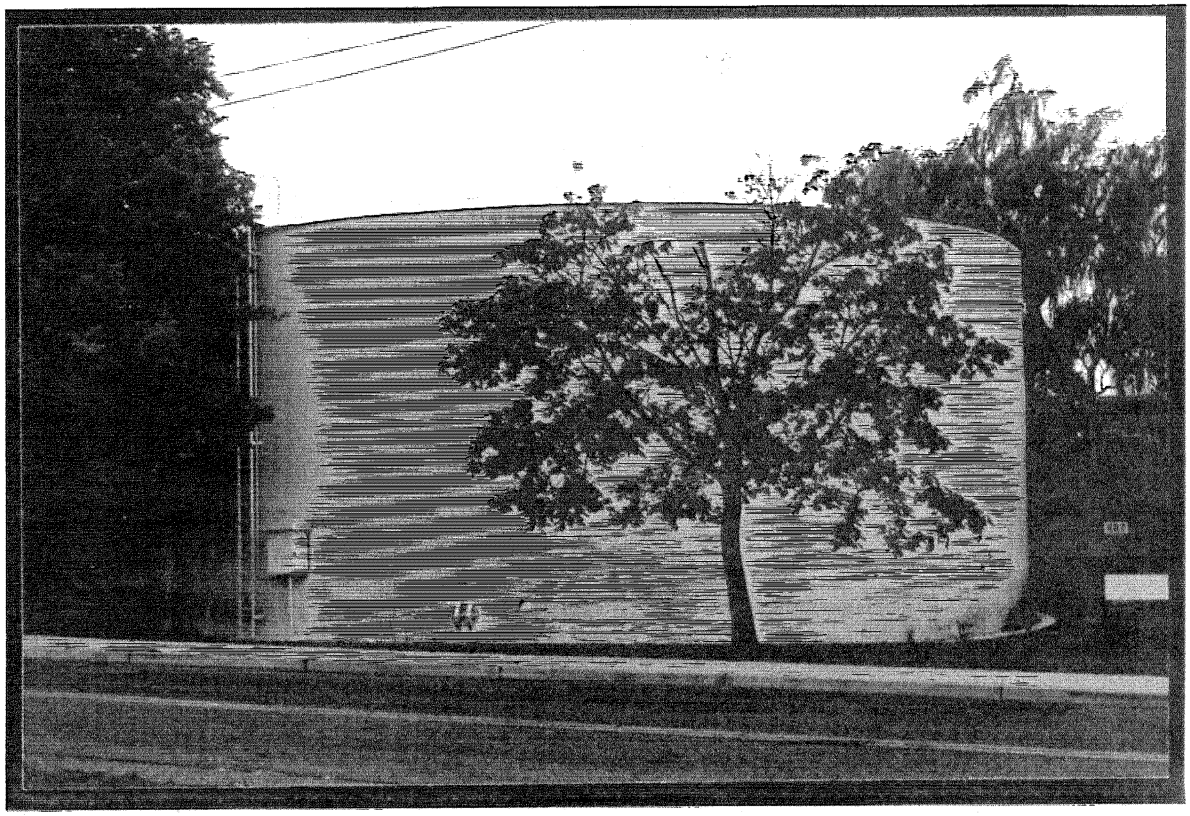
UST Tank Farm (M-10)



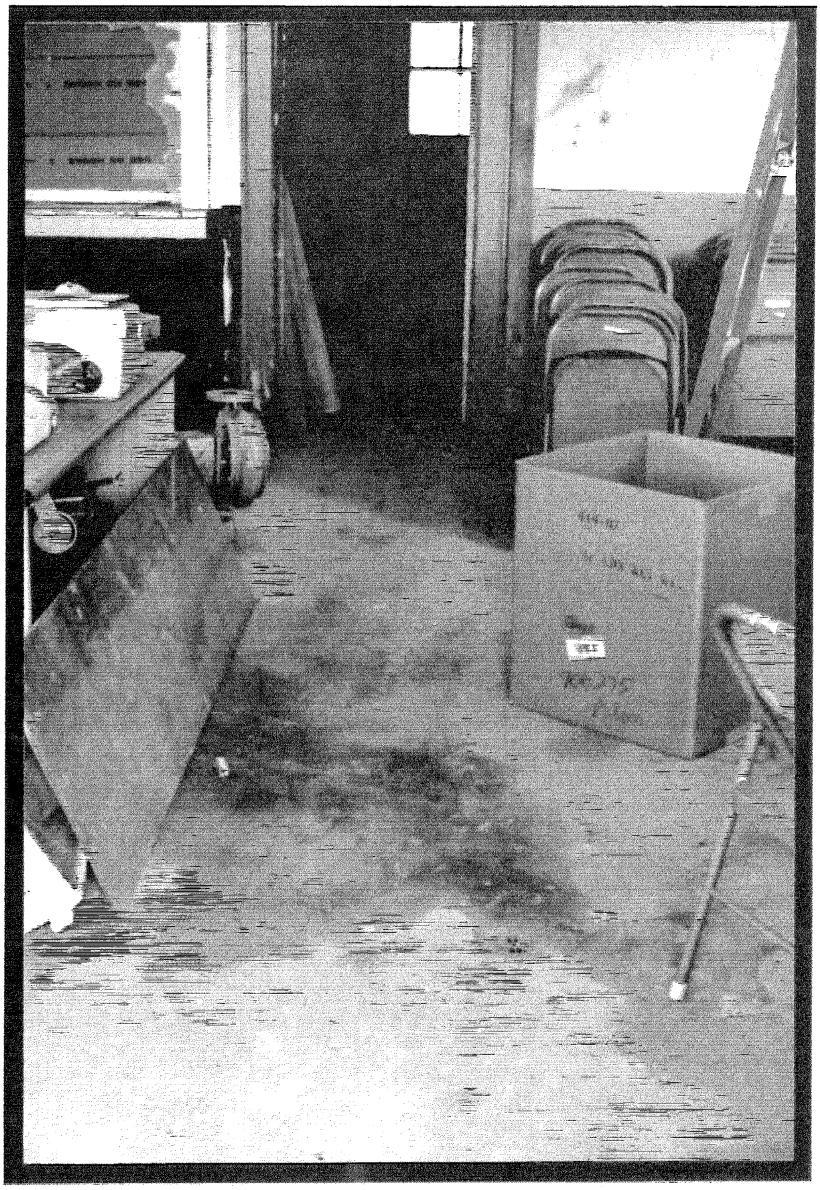
Water Tank (M-11)



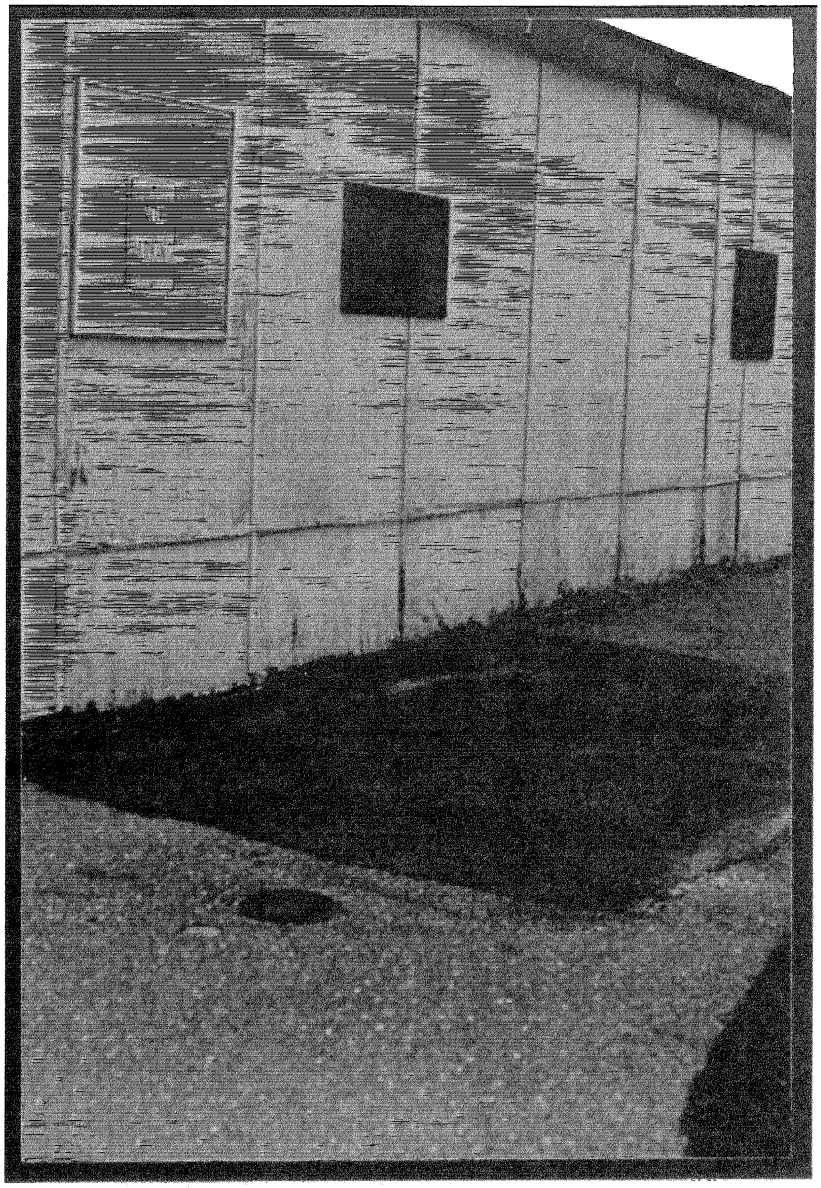
Former
Pathogenic Waste
Incinerator (M-13)



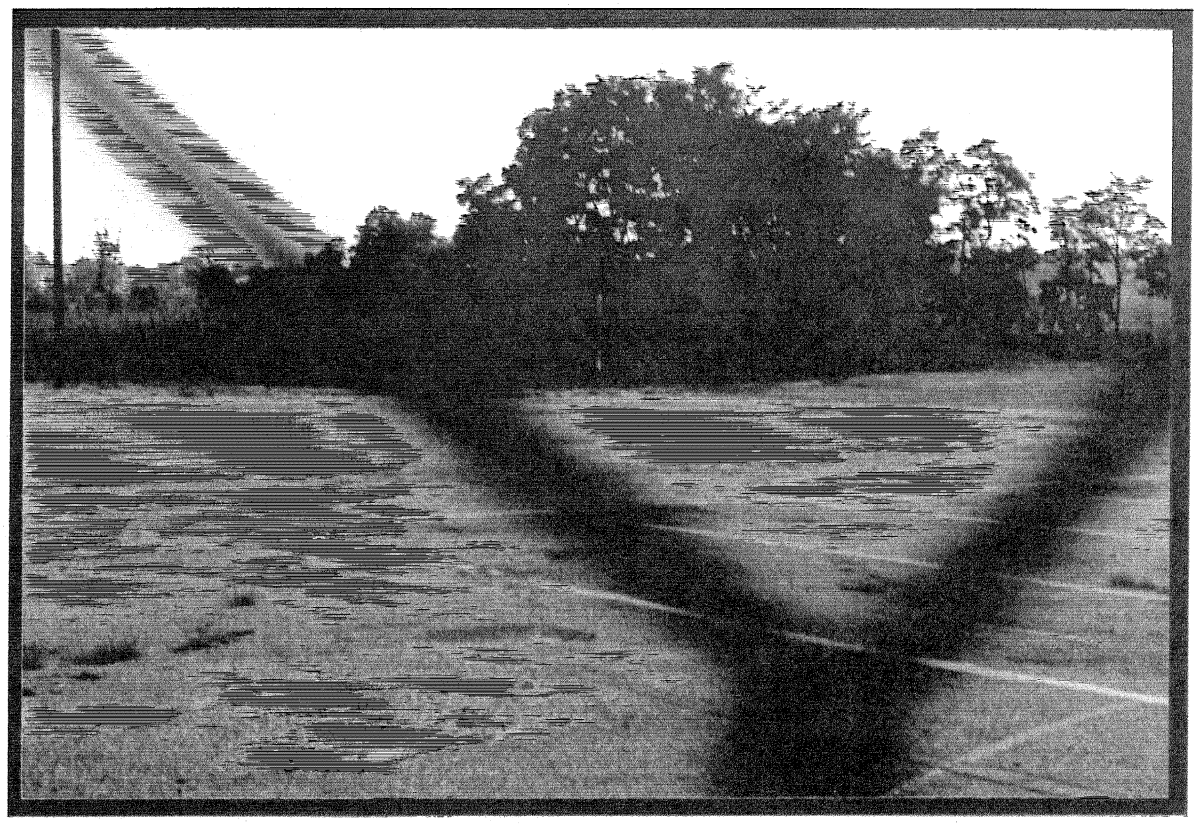
Water Tank (M-15)



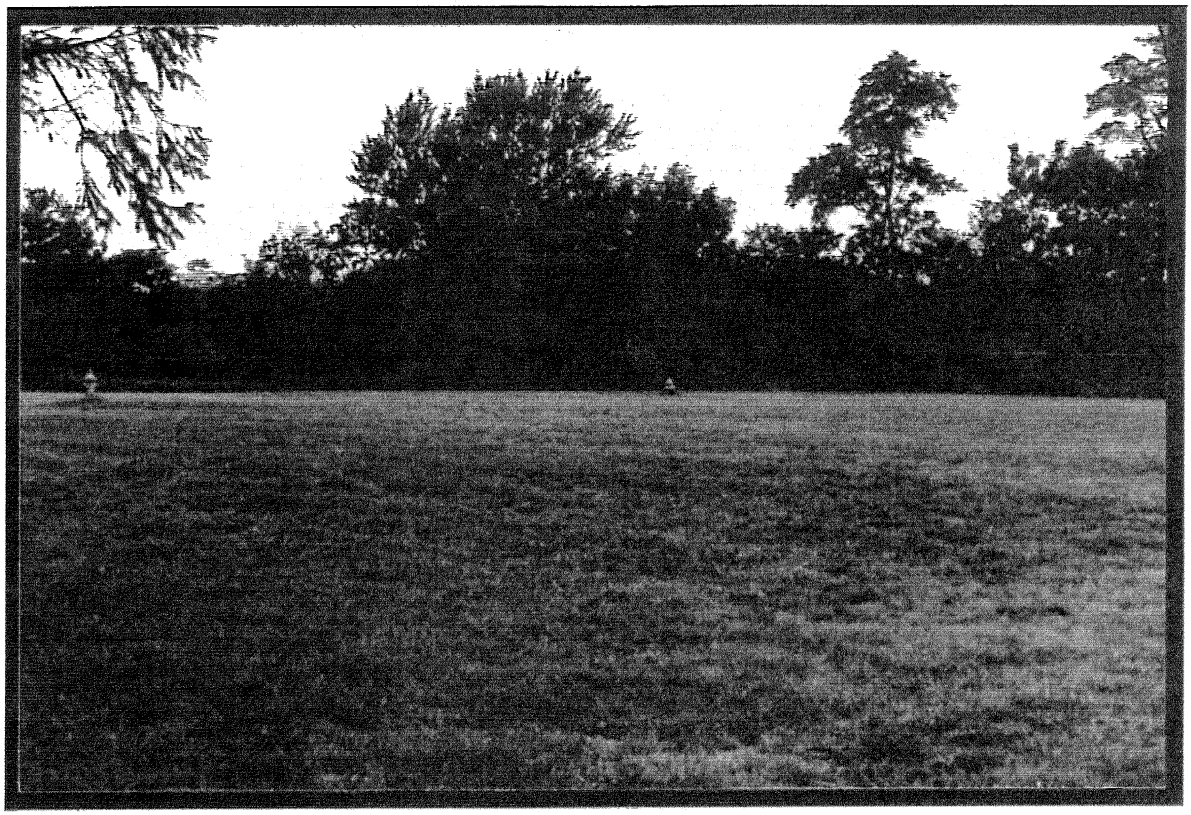
Pesticide Storage
Building 498 (M-16)



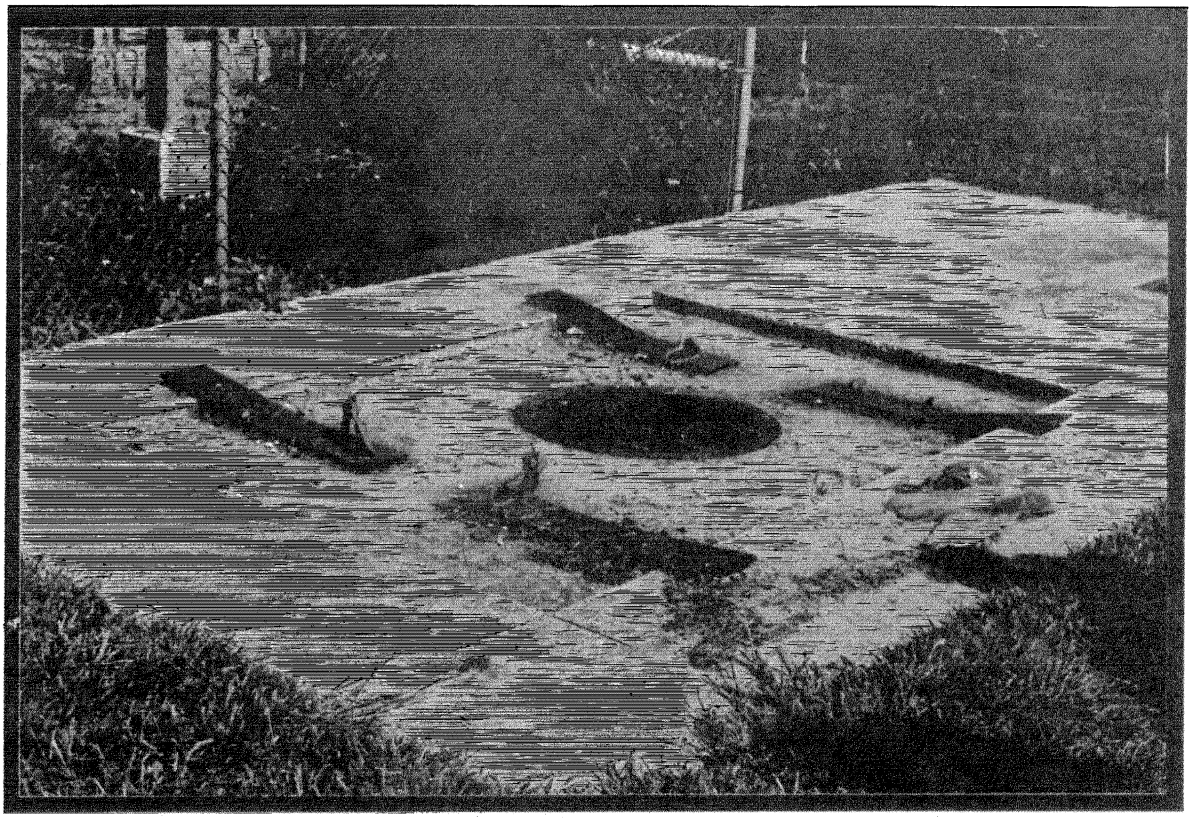
Pesticide Storage Building T-65 (M-17) and Monitor Well



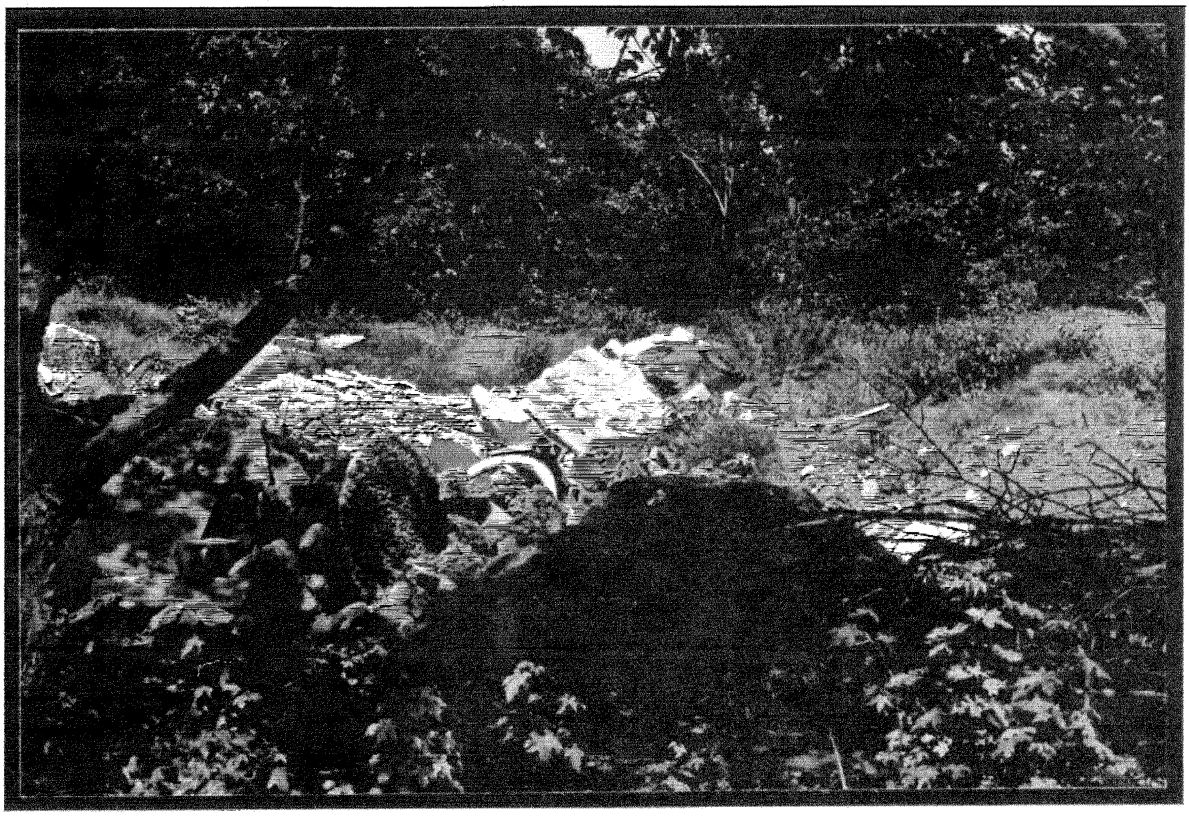
Former Training Area (M-18)



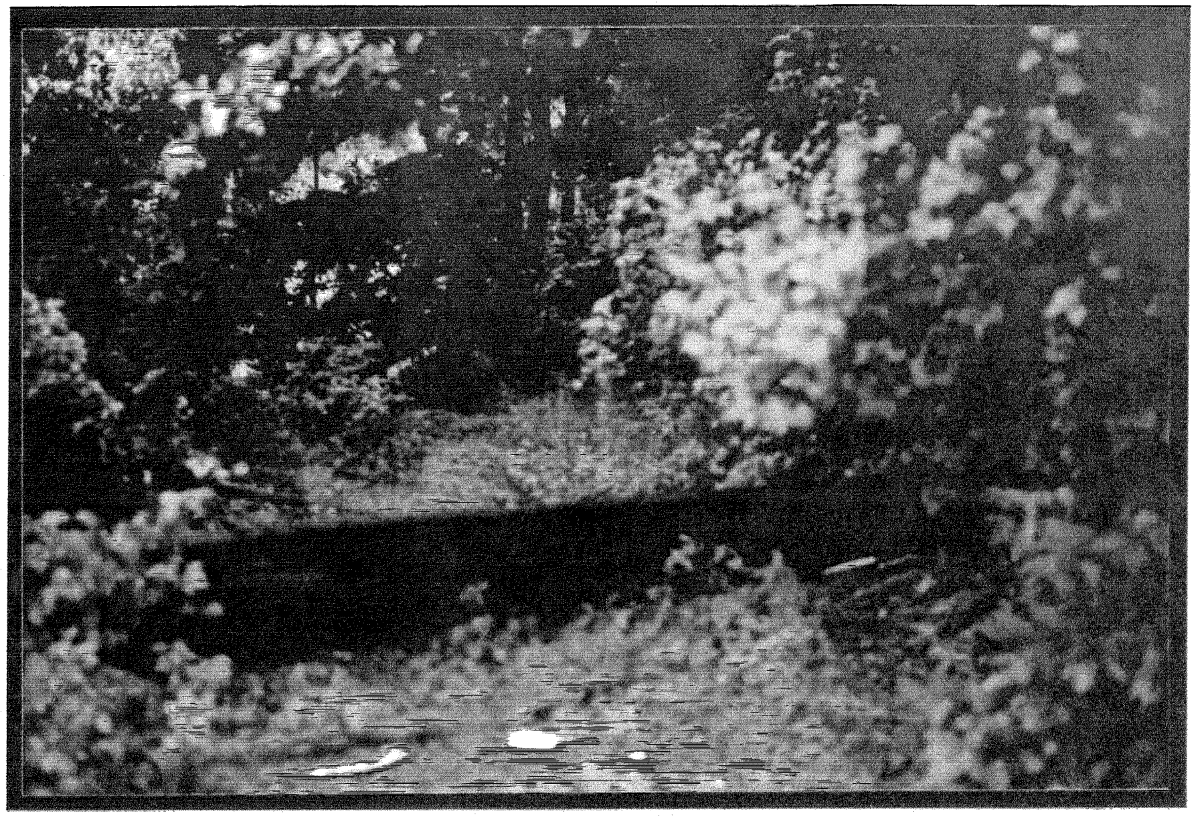
Former Sewage Treatment Plant Site
Main Post (AOC-3)



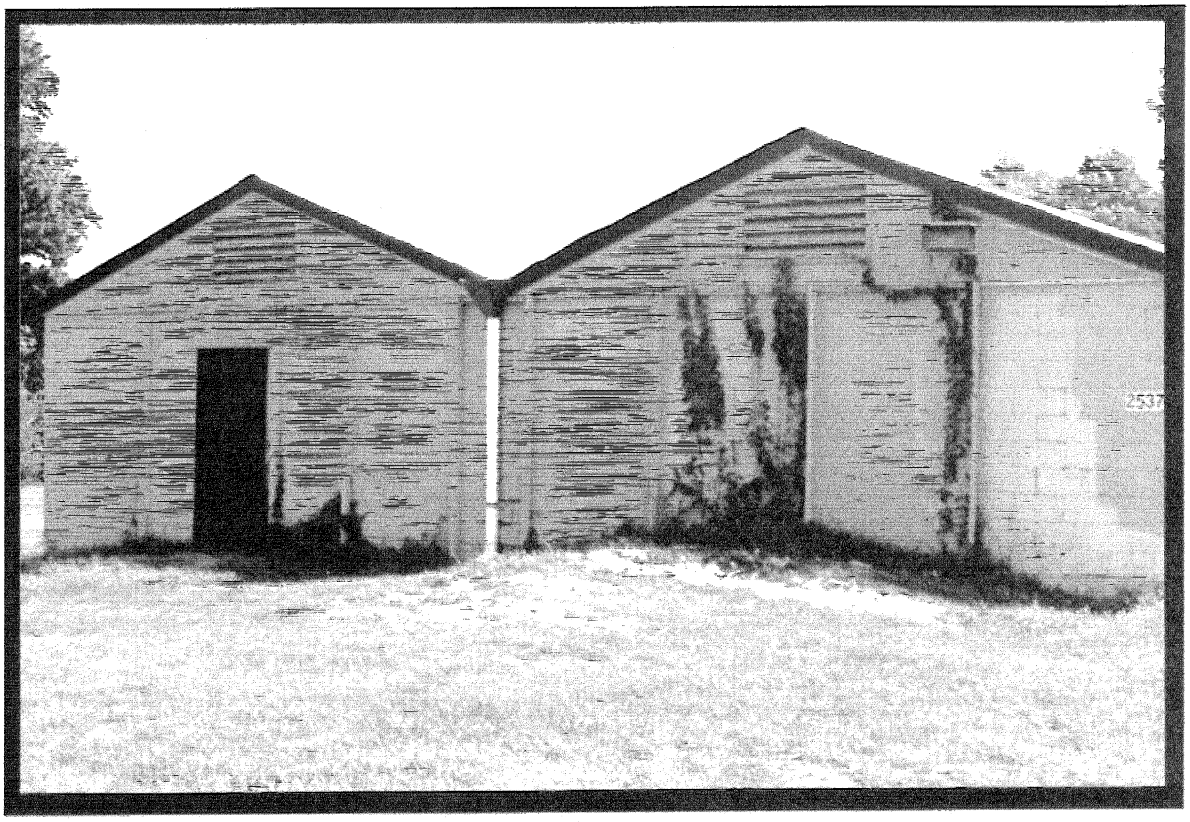
Lime Pit (CW-2)



Contractor Storage Area (CW-3)

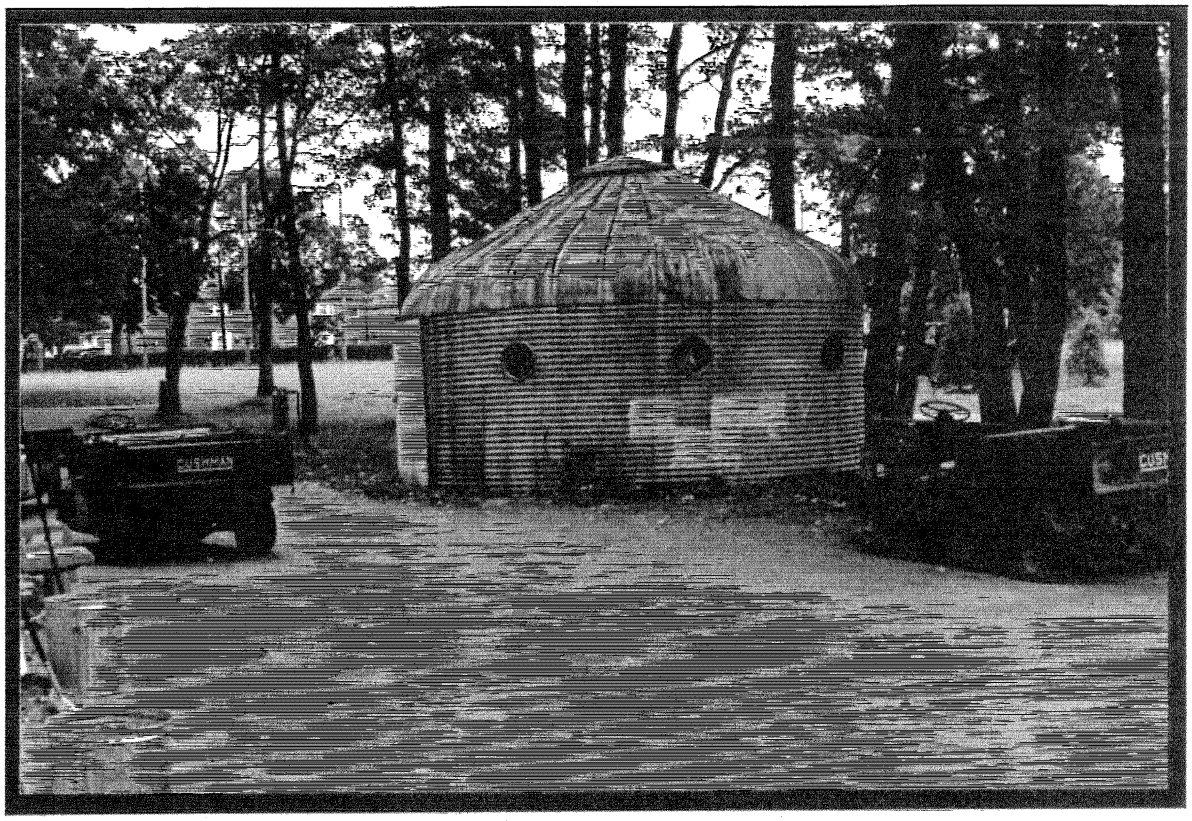


Debris Site (CW-3A)



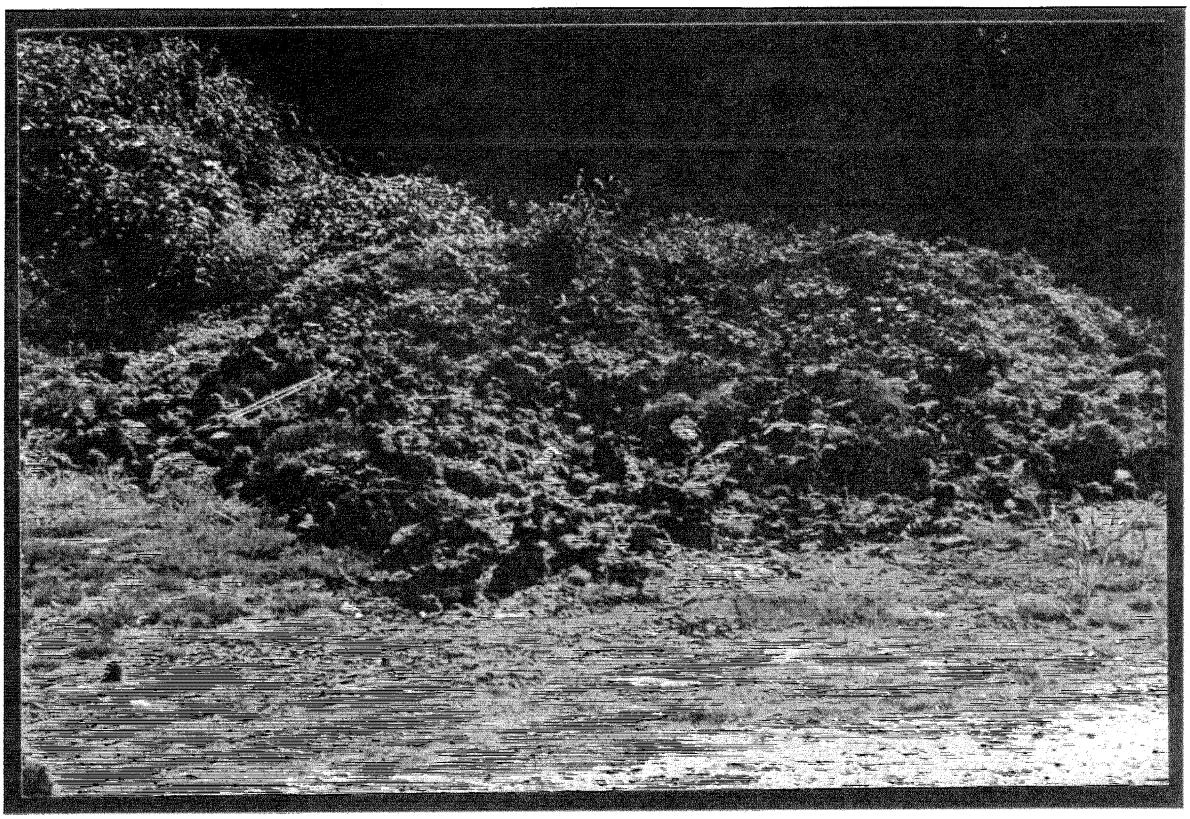
Small Arms Range -
View Showing Sand Pile (CW-4)

Old Treatment Plant Site (CW-5)

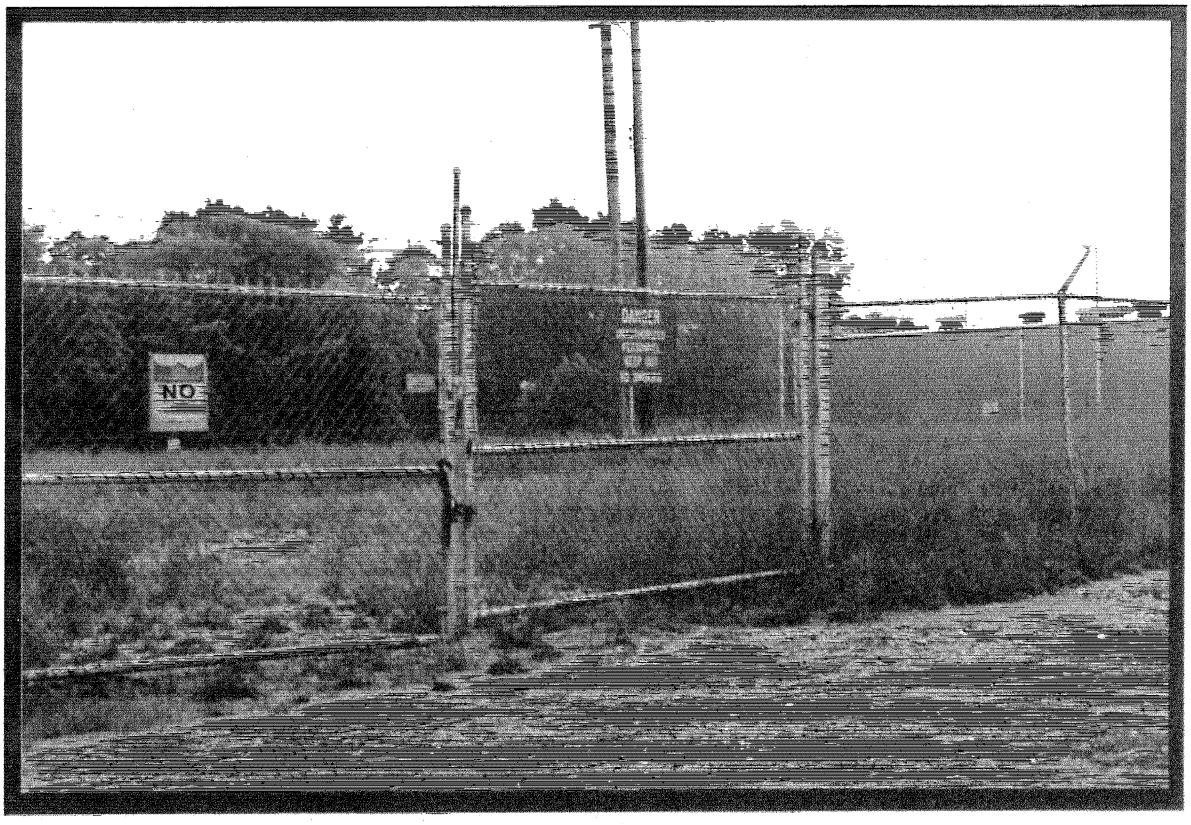


Igloo Formerly Used for Pesticide Storage, Recently Demolished (CW-6)

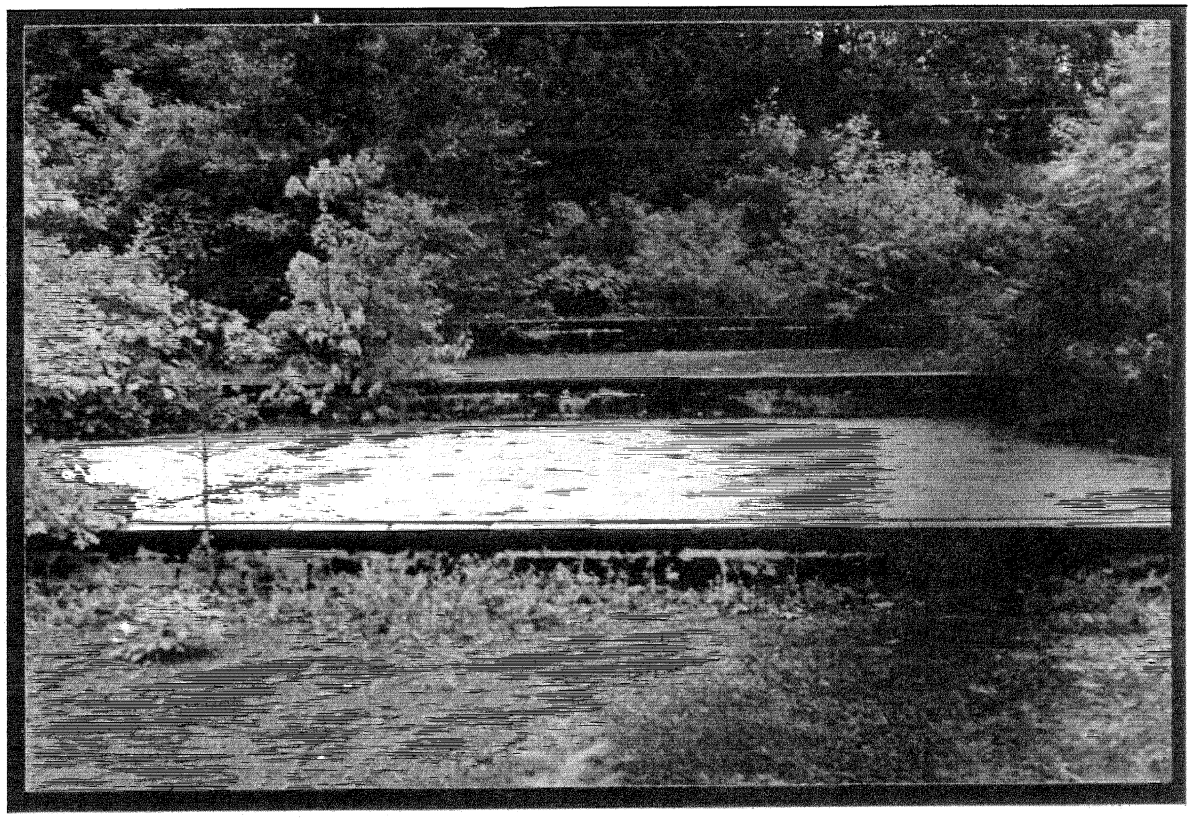
Sewage Pumping Station (CW-8)



Sludge Dump (CW-9)



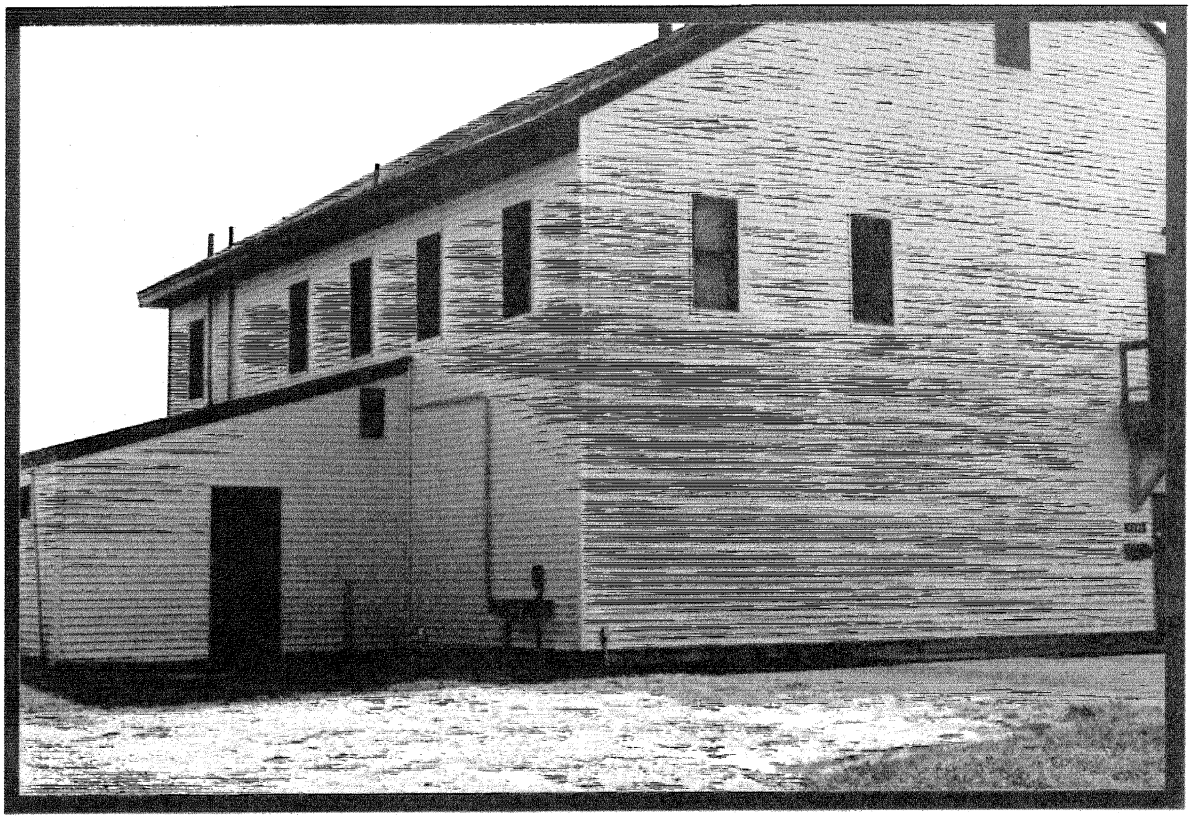
Former Temporary Hazardous Waste Storage Area
at Charles Wood (AOC-7)



Old Treatment Plant -
View of Sludge Drying Beds (EA-1)

Abandoned Marconi Buildings (EA-2)

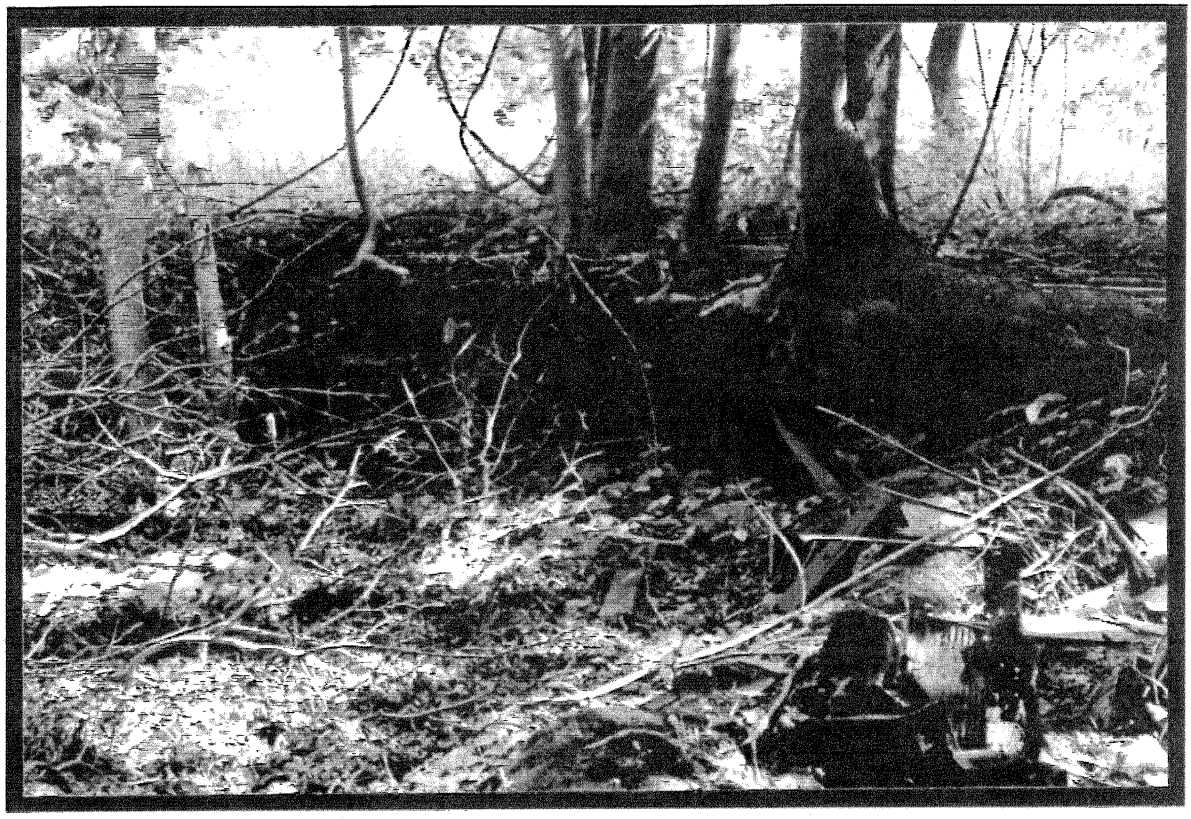
Former Plating Shop (EA-3)



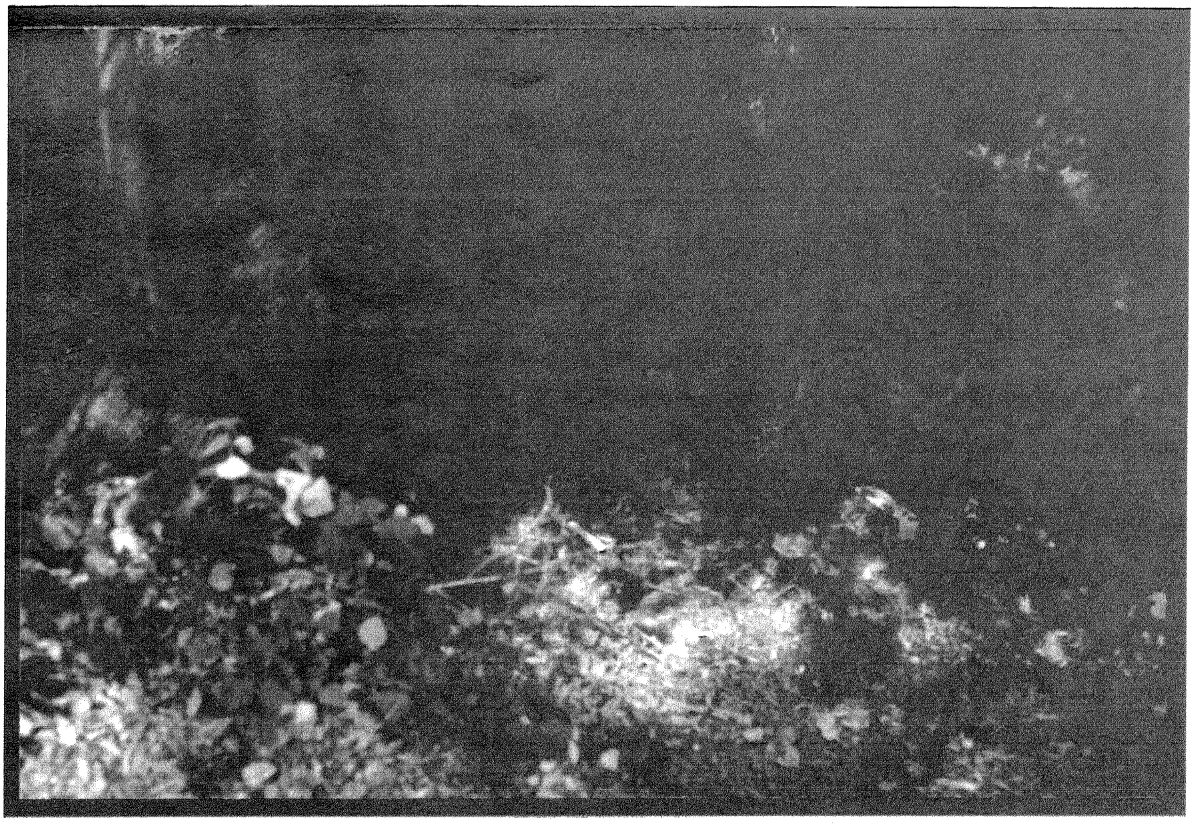
Radiological Facility - Building 9045 (EA-9)

Former Radiological Spill Site (EA-10)

Alleged Site of Firing Range (EA-11)



Old Farmhouse (EA-12)



Debris Site (EA-13)

Section 5

SECTION 5

SUMMARY OF RECOMMENDED INVESTIGATIONS

This section summarizes the recommendations for all the sites discussed in Section 4. The sites can be divided into two general types: those for which no additional action is recommended and those requiring additional investigations. Table 5-1 lists all sites for which there will be no additional action. Table 5-2 lists those sites requiring additional investigation and summarizes the proposed activities. Table 5-3 summarizes proposed activities and analytical sampling by site; note that QA/QC (field rinse blanks, trip blanks, duplicates, MS/MSD samples, etc.) are not included. QA/QC requirements are outlined in Section 6. Table 5-4 is a list of the former transformer sites that require sampling. A summary table of transformer sites can be found in Subsection 4.4.

Background samples will be collected at the Main Post, Charles Wood, and Evans. These samples will be collected in areas believed to be unaffected by potential contaminants. The proposed locations of the background samples are presented in Figures 5-1 through 5-3. The actual sampling locations will be selected during field reconnaissance, in consultation with NJDEPE. Five soil borings will be completed at the MP and each subinstallation. Samples for TCL+30 parameters, TAL metals, and cyanide analysis will be collected from 12 to 24 inches bgs and from either just above the water table or from 10 to 12 feet bgs. Monitor wells will be installed in these soil borings and sampled for TCL+30 parameters, TAL metals, and cyanide. Two background surface water and sediment samples for TCL+30 parameters, TAL metals, and cyanide will be collected at MP an CWA. The background surface water sampling points for MP were discussed in Subsections 4.1.2.5 and 4.1.3.5. Because there is only one brook at the EA, only one background surface water and sediment sample will be collected.

Table 5-1

Sites for Which No Action Is Recommended

Site Number	Site	Description	Potential Waste/ Contaminants	Past Samples and Analyses
MAIN POST				
M-1	Landfill	Prior to World War II (1). Not located on post; did not receive waste from post.		None.
M-7	Burning Area	Bldg. 697. Incinerator that burned classified documents. Had air permit. Operated until mid-1970s. Currently abandoned. Metal incinerator was removed and building is scheduled for demolition.	Ash may contain metals.	None.
M-9	PCB Transformer	Located by Bldgs. 1150 and 1152. There are currently two transformers. There is no indication that they were ever leaking.	PCB.	All transformers were tested for PCBs in 1989. All transformers were identified as being <50 ppm.
M-10	Asbestos storage	IA stated was lined, covered pit used for temporary storage of asbestos waste. Started operating in 1970s. Facility personnel stated it was steel igloo used for storing new asbestos in containers.	Asbestos.	None.
M-11	Water Tank	Bldg. 557. Used for fire-fighting water. Built in 1940s.	Lead from paint.	None.
M-13	Pathogenic Waste Incinerator	Burned pathologic waste from hospital. Started operation in 1969. Ashes landfilled. Taken out of service 12/92. To be removed in 1993.	Pathologic waste.	Was sampled for asbestos; none found (JF).
M-17	Pesticide Storage Building T-65	Found holes in concrete floor where pesticides may have been poured (JF). UST removed outside and MW installed	Pesticides.	Soil under concrete floor analyzed for pesticides; chlordane found (2). MW installed outside building; no pesticides found in groundwater.
New Site, Not Noted in IA Report	Former Firing Range	Site personnel reported range in area of Site M-3	Heavy metals.	None.

Table 5-1

Sites for Which No Action Is Recommended (Continued)

Site Number	Site	Description	Potential Waste/ Contaminants	Past Samples and Analyses
		CHARLES WOODS AREA		
CW-8	Sewage Pumping Station	Location identified in IA is sanitary sewage pumping station. Has not had problems. Pumps sewage from on-base housing to the tie-in with the municipal sewage system.	Heavy metals, organics.	None.
		EVANS AREA		
EA-4	Radiological Storage	Bldgs. 9010 and 9011. Electron tube group used yellow glass containing uranium to make glass to metal connections. Bought glass and used glass blower to make seals. Not licensed material.	Uranium.	None.
EA-5	Radiological Storage	Bldgs. 9036 and 9037. No known activity.	Uranium.	None.
EA-6	Heavy Metal Potential	Approximate location of Bldgs. 9039, 9040, and 9041. No known activity.	Heavy metals.	None.
EA-7	Radiological Spill Site	Bldg. 9383. In late 1950s or early 1960s, soil around storage building contaminated with cobalt-60; soil removed. This site currently used to store rad waste.	Cobalt-60.	Radiological survey by AEHA in 1976. Concluded that site was clean.
EA-8	Radiological Storage	Bldg. 9401. Currently has Co-60 irradiation source in pool. Pool water monitored and sampled. Can be temporarily stored in outside tank. Has deuterium or tritium neutron generator. Also has calibration sources. No liquid or gas rad material.	Cobalt-60, tritium.	Current sampling and monitoring.
EA-9	Radiological Storage	Bldg. 9045. Currently contains calibration sources. Polonium contamination incident resulted in contaminated lab bench in 1970s.	Miscellaneous calibration sources	Current monitoring.
EA-10	Radiological Spill Site	In late 1950s or early 1960s, cobalt-60 leaked onto concrete pad and soil. Pad and soil removed in 1976. Also spill in 1980s. Used 80 Curie cobalt-60 source to test detection equipment.	Cobalt-60.	Radiological survey confirmed that area is clean.

Table 5-1

Sites for Which No Action Is Recommended (Continued)

Site Number	Site	Description	Potential Waste/ Contaminants	Past Samples and Analyses
EVANS AREA (continued)				
EA-11	Range (Small Arms)	Outdoor, no berm. Personnel not aware of a firing range. Said had radar training range, put targets on platforms to look at with radar.	Lead.	Two soil samples taken in 1989 and analyzed for lead. Results (21 and 28 mg/kg) are less than cleanup standards and proposed NJ soil cleanup standards.
AOC-6	Underground Dilution Tank System	IA said liquid waste stored in underground tank system and discharged to sanitary sewer. Facility personnel said USTs used for overflow from irradiation pool. Will be removed.	Radioactive waste.	None.

Table 5-2

Hazardous Waste Sites for Which Investigations Are Proposed

Site Number	Site	Description	Potential Waste/ Contaminants	Past Samples and Analyses	Recommended Investigations
MAIN POST					
M-2	Landfill	Operated 1964-1968. Currently used to store and shred tree stumps. Can see debris protruding from bank of Mill Brook. Was unfenced — covered with soil and gravel from Earle.	Domestic and industrial waste, oil in cans, filters, soot, building rubble.	NJPDES sampling upstream (SW-1) and downstream (SW-2) on Mill Brook. Detected VOCs, metals, and inorganics.	Install and sample 3 monitor wells. Select and sample a new upstream surface water location. Analyze for TCL+30/TAL/CN. Tidal water-level monitoring (72 hr. minimum).
M-3	Landfill	Operated 1959-1964. Was fenced; had skeet shooting. Burned wood debris. Had tear gas training in tent. Currently grass covered, no visible debris.	Domestic and industrial waste (1). Wood and coal ash from stoves, boiler (MG).	NJPDES sampling locations SW-3, SW-4. Detected VOCs, metals, and inorganics.	Need new upstream surface water sampling location. Use GPR and mag to define extent of landfill. Install and sample 3 monitor wells. Analyze for TCL+30/TAL/CN.
M-4	Landfill	Operated 1956 only. Currently grass covered, no visible debris.	Building rubble.	None.	Install and sample 3 monitor wells. Analyze for TCL+30/TAL/CN.
M-5	Landfill	Operated 1952-1959. Currently grass covered, no visible debris.	Domestic and industrial waste.	NJPDES sampling locations SW-5, SW-6. Detected VOCs, metals, and inorganics.	Install and sample 2 monitor wells. Analyze for TCL+30/TAL/CN/sulfate.
M-6	Burning Area	Was located on Landfill M-3. Operated until 1970s. Burned general trash. Currently no visible contamination.	General trash.	None.	See M-3.
M-8	Landfill	Operated 1962-1981. Currently has leaf-composting operation. Was fenced and controlled during operation.	Domestic and industrial waste including pesticide/herbicide cans, batteries, asbestos, sludge from STP, miscellaneous chemicals.	4 monitor wells, NJPDES sampling location SW-7.	Abandon existing wells and piezometers; install 4 new monitor wells. Analyze for TCL+30/TAL/CN/NH_3/sulfate. Tidal monitor well and surface water elevation monitoring for at least 72 hrs.
M-12	Landfill	Date of operation unknown. May be located across Husky Brook from M-14.	Domestic and industrial waste, automobiles, oil, building rubble.	NJPDES sampling locations SW-8, SW-9, and SW-10.	Use GPR and mag to locate landfill and define boundaries. Install 3 monitor wells. Analyze for TCL+30/TAL/CN. Tidal monitoring with M-14.
M-14	Landfill	Operated from 1965-1966. Has NPDES permit.	Building rubble and dredgings from Husky Brook Lake.	NJPDES sampling upstream and downstream on Husky Brook Creek, SW-8, SW-9, and SW-10.	Use GPR and mag in western area. Install and sample 3 monitor wells for TCL+30/TAL/CN. Tidal monitoring with M-12.
M-15	Water Tank	Used for fire-fighting water. Built in 1940s. Paint chips on ground around tank. Stressed vegetation around base of tank.	Lead.	None.	Take 2 surface soil samples. Analyze for TAL and pesticides.

Table 5-2

Hazardous Waste Sites for Which Investigations Are Proposed (Continued)

Site Number	Site	Description	Potential Waste/ Contaminants	Past Samples and Analyses	Recommended Investigations
			MAIN POST (continued)		
M-16	Pesticide Storage 498	Misidentified as Bldg. 167 in (1). Building 498 used for pesticide control shop in the 1940s and 1950s: disposal to sink, which went to sanitary sewer. Not aware of outside disposal (MG)	Pesticides, herbicides.	None.	Trace floor drain, collect 4 soil samples from 6-12 inches. Install soil boring and MW. Analyze for TCL+30/TAL.
M-18	Former Training Area	Army Signal School. Diesel and gasoline generators.	Diesel and oil spilled on ground (1). PAHs, VOCs, TPH, lead.	None.	Complete 12 soil borings, sample 6-12 inches or 12-18 inches, stained areas, and/or just above water table. Install 3 MW in soil borings. Sample soil for VOCs and TPH. Sample water for TCL+30/TAL/TPH.
AOC-3	Sewage Treatment Plant	Operated 1941-1975. Had sludge drying bed on concrete base. Sludge went to golf course and landfills. 1935 map shows pistol range on this location.	Heavy metals, cyanide, pesticides.	Monitor wells to west. Sludge sampled in 1981; no heavy metals detected.	Sample outfall sediments and 2 soil borings in sludge bed area for TCL+30/ TAL/CN.
New Site, Not Noted in IA Report	Former Treatment Plant	Operated until 1941. Located approx. where Bldg. 250 is today. Labeled on 1935 map.	Heavy metals.	None.	Try to locate former outfall. Sample outfall sediment for metals.
			CHARLES WOOD AREA		
CW-1	Wastewater Treatment (Lime Pit)	4-m^3 tank containing limestone for neutralizing liquid waste from Bldg. 2700. Sludge removal periodically. Acid/base drains not currently used. Pit discharges to sewage system. Limestone was replaced in 1992; contractor took limestone off-site. Built with bldg. around 1952.	Solvents, metals.	Analyzed old limestone. Sludge analyzed; found organics, metals.	Install 4 soil boring/piezos; 1 on each side of pit. If any HNu/OVM hits, collect soil samples (2-3 per boring) from 6-8 ft, just above water table; stained interval for TCL+30/TAL. Sample groundwater for same parameters.
CW-2	Wastewater Treatment (Lime Pit)	Same as CW-1.	Solvents, metals.	Analyzed old limestone.	Same as CW-1.

Table 5-2

Hazardous Waste Sites for Which Investigations Are Proposed (Continued)

Site Number	Site	Description	Potential Waste/ Contaminants	Past Samples and Analyses	Recommended Investigations
CHARLES WOOD AREA (continued)					
CW-3, AOC-4	Landfill	Operated during 1940s. Site identified in IA now used for storage of contractor equipment and debris.	Administrative waste, wood.	None.	Remove contractor rubble from area identified in IA. Soil sampling if stains or elevated air concentrations are found during debris removal.
CW-3	Landfill	Site in west was used for leaves and small debris, and by off-site dumpers. 1969 aerial photo shows disturbed soil at west site. One partially buried drum found. May have been used for demolition debris.	Unknown.	None.	Use geophysics (magnetics and EM-31) to determine presence of landfill near Pulsed Power. Install 4 monitor wells. Sample groundwater for TCL+30/TAL.
CW-4	Range (Small Arms)	Bldg. 2537. Indoor range. Cleaned and repainted in 1989. Has metal and sand bullet trap and filtered ventilation system. 3-ft diameter bare area to north of bldg. with spent shells and bullet debris. Appears to be clean sand in back of bldg.	Lead.	None.	Remove visible debris from bare area. 1 soil sample from beneath bare area and 1 composite from sand pile. Analyze for TAL. Field-screen with FID; if indication on FID, then sample for VOCs.
CW-5, AOC-3	Heavy Metals	Old treatment plant. Discharged to stream. Sludge removed from sludge drying bed and plant cleaned, disinfected, and dismantled.	Heavy metals, cyanide.	Sludge analyzed in 1981 — no heavy metals (4).	Sample sludge (see CW-9) for metals. Install 2 soil borings in area of sludge drying beds. Sample sediment at outfall. Analyze for TCL+30/TAL/CN.
CW-6	Pesticide Storage Building T-2044	Pesticides no longer stored in CW area. Use pesticide contractor. Pesticide stored in steel igloo on concrete base. Was mixed outside of igloo and T-2044.	Pesticides, herbicides.	Soil sampled in 1989 for pesticides. High levels of chlordane (up to 595 mg/kg) and trace amount of others detected.	2 soil borings and installation of MW by igloo and T-2044. Analyze for TCL +30.
CW-7	PCB (Transformers)	Several transformers in this area. All transformers were tested in 1990 for PCBs. Those with PCBs > 500 ppm were removed or remediated.	PCB.	Transformers sampled — several > 500 ppm. See transformer list.	Sample PCB transformers per transformer table (CW-035, CW-039, CW-040). No sampling required for others.
CW-9, AOC-3	Sludge Dump	Sludge was placed on golf course. Sludge temporarily stored south of T-2044. Currently has dark gray soil that had been removed from near Hole 1.	Heavy metals.	None.	Install 1 MW for TCL+30/TAL. 8 surface soil samples and 1 sludge sample for TAL metals.

Table 5-2

Hazardous Waste Sites for Which Investigations Are Proposed (Continued)

Site Number	Site	Description	Potential Waste/ Contaminants	Past Samples and Analyses	Recommended Investigations
CHARLES WOOD AREA (continued)					
AOC-7	Hazardous Waste Storage Area	2500 area. Has been used as storage area since 1961. Used as temporary HW storage area in 1987. Security guard overcome by fumes in 1987. Currently open field, no evidence of contamination.	Solvents, oil, metals.	None.	Install 6 soil borings. Analyze for TCL+30.
EVANS AREA					
EA-1, AOC-3	Heavy Metal Potential	Old treatment plant. Built around 1942. Closed in 1980. Had concrete-lined sludge drying bed.	Heavy metals.	Sludge analyzed in 1981 for heavy metals, none found.	Sample outfall at 2 locations. 2 soil borings in drying bed. 2 surface soil samples. Analyze for TCL+30/TAL/CN/rad.
EA-2	Heavy Metal Potential	Bldgs. 9004 and 9005. Both bldgs. currently abandoned. Built by Marconi.	Heavy metals, cyanide, solvents.	None.	16 soil borings. Install wells in 4 borings. Analyze for TCL+30/TAL/CN. Use rad meter.
EA-3, AOC-5	Heavy Metal Potential	Bldg. 9007. Metal plating facility operated from 1950s to 1977. Reportedly plating waste was discharged to storm drain until early 1960. Did plating of electronic boards and electrical connectors; did gold plating. Possibly not connected to sanitary sewer until 1970s. Currently has what appear to be drains from inside bldg. onto ground. Has neutralization lime pit.	Heavy metals, cyanide, solvents.	3 soil samples were taken along Gulley Brook in 1989 and analyzed for heavy metals. Chromium, lead, and zinc were found but below New Jersey ECRA standards.	4 soil borings behind bldg. with one in area with stressed soil. 3 additional borings near lime neutralization pit. Install 3 MW in borings. Sample at 6-12 inches, areas with high HNu/OVM, or at 6-8', and just above water table. Sample sediment at outfall. Sample lime pit. Analyze for TCL+30/TAL/CN.
EA-12	Suspected Landfill	Old farmhouse. Has domestic and automotive debris such as bottles and portions of a truck.	Domestic waste.	None.	Remove solid waste. Document staining.
EA-13	Suspected Landfill	Open dump for furniture, etc. (1). MG mentioned location on other side of Laurel Gully Brook used for dumping of household rubbish since 1940s. Currently has debris in 2 separate areas.	General trash.	None.	Map extent of debris in two areas during late fall or early spring (no snow on ground). Use mag or EM-31 if there is evidence of subsurface disposal. Soil sampling only if staining found; MW only if soil hits.

Table 5-3

Summary of Proposed Investigations and Analytical Sampling, QA/QC Samples Not Included

Site	Program	Surface Soil and Shallow Soil					Soil Borings						Sediment					Groundwater (Number of samples for one round; two rounds will be collected								Surface Water				
		V	B	P/P	M	CN	V	B	P/P	M	CN	TPH	V	B	P/P	M	CN	V	B	P/P	M	CN	S	Am	TPH	V	B	P/P	M	CN
MAIN POST																														
M-2	Upstream SW sample 3 MW, GW sampling Tidal Monitoring																	3	3	3	3	3				3[a]	3[a]	3[a]	3[a]	3[a]
M-3 (includes M-6)	Geophysics: Mag, GPR Upstream SW sample 3 MW - GW sampling																	3	3	3	3	3				3[a]	3[a]	3[a]	3[a]	3[a]
M-4	3 MW - GW sampling																	3	3	3	3	3								
M-5	2 MW - GW sampling																	2	2	2	2	2	2							
M-8	Abandon existing MW+PZ 4 MW - GW sampling Tidal Monitoring																	4	4	4	4	4	4	4						
M-12	Geophysics: Mag, GPR 3 MW - GW sampling Tidal Monitoring (with M-14)																	3	3	3	3	3				2	2	2	2	2
M-14	Geophysics: Mag, GPR - West Half 3 MW - GW sampling Tidal Monitoring (with M-12)																	3	3	3	3	3								
M-15	2 Surface soil samples			2[b]	2																									
M-16	4 Shallow soil samples 1 MW - soil, GW samples	4	4	4	4		2	2	2	2								1	1	1	1									
M-18	Geophysics: Mag, GPR 12 Soil borings - Convert 3 to MW - GW						24	4	1	1		24						3	3	3	3				3					
AOC-3 MP STP	1 Outfall sediment 2 Soil borings						2	2	2	2	2		1	1	1	1	1													
Pre-1941 STP	1 Sediment if outfall found															1														
Background	5 soil borings converted to MW Sediment						10	10	10	10	10		2	2	2	2	2	5	5	5	5	5								

Table 5-3

Summary of Proposed Investigations and Analytical Sampling, QA/QC Samples Not Included (Continued)

Site	Program	Surface Soil and Shallow Soil					Soil Borings						Sediment					Groundwater (Number of samples for one round; two rounds will be collected								Surface Water				
		V	B	P/P	M	CN	V	B	P/P	M	CN	TPH	V	B	P/P	M	CN	V	B	P/P	M	CN	S	Am	TPH	V	B	P/P	M	CN
CHARLES WOOD																														
CW-1	4 MW - soil, GW samples						12	12	12	12								4	4	4	4									
CW-2	4 MW - soil, GW samples						12	12	12	12								4	4	4	4									
CW-3A	Geophysics: Mag, EM-31, GPR																	4[c]	4[c]	4[c]	4[c]									
CW-4	2 Composite soils (hand excavation)				2																									
CW-5	1 Outfall sediment sample 2 Soil borings						2	2	2	2	2		1	1	1	1	1													
CW-6	2 MW - soil, GW samples						4	4	4	4								2	2	2	2									
CW-9	8 Surface soil and 1 sludge sample 1 MW - GW samples				9													1	1	1	1									
AOC-1	6 Soil borings						6	6	6	6																				
Background	5 soil borings converted to MW 2 surface water/sediment						10	10	10	10	10		2	2	2	2	2	5	5	5	5	5				2	2	2	2	2
EVANS AREA																														
EA-1	2 Sediments from outfall (not shown on figure) 2 Soil borings 2 Surface soil samples				2	2				2	2		2	2	2	2	2													
EA-2	16 Soil borings 4 MW (in selected borings) GW sampling						32	32	32	32	32							4	4	4	4	4								
EA-3	1 Outfall sediment 7 Borings 3 MW (in selected borings) GW sampling Lime pit material	1	1	1	1	1	21	21	21	21	21		1	1	1	1	1	3	3	3	3	3								

Table 5-3

Summary of Proposed Investigations and Analytical Sampling, QA/QC Samples Not Included (Continued)

Site	Program	Surface Soil and Shallow Soil					Soil Borings						Sediment					Groundwater (Number of samples for one round; two rounds will be collected								Surface Water				
		V	B	P/P	M	CN	V	B	P/P	M	CN	TPH	V	B	P/P	M	CN	V	B	P/P	M	CN	S	Am	TPH	V	B	P/P	M	CN
EVANS AREA (continued)																														
EA-13A and EA-13B	Map location of debris so facility can remove. Possible geophysics																													
Background	5 Soil borings converted to MW 2 surface water/sediment						10	10	10	10	10		2	2	2	2	2	5	5	5	5	5				2	2	2	2	2
Total		5	5	7	20	3	147	127	124	126	89	24	11	11	11	12	11	62	62	62	62	43	6	4	3	12	12	12	12	12

V = VOA+15
B = BNA+15
P/P = Pesticide/PCB
M = TAL Metals
CN = Cyanide
TPH = Total Petroleum Hydrocarbons
S = Sulfate
Am = Ammonia
SW = Surface Water
MW = Monitor Well(s)
GW = Groundwater

[a]One new upstream sampling location is proposed; however, samples should be collected at existing locations at the same time the new location is sampled.
[b]Pesticide only.
[c]Monitor wells to be installed only if evidence of subsurface debris is found.

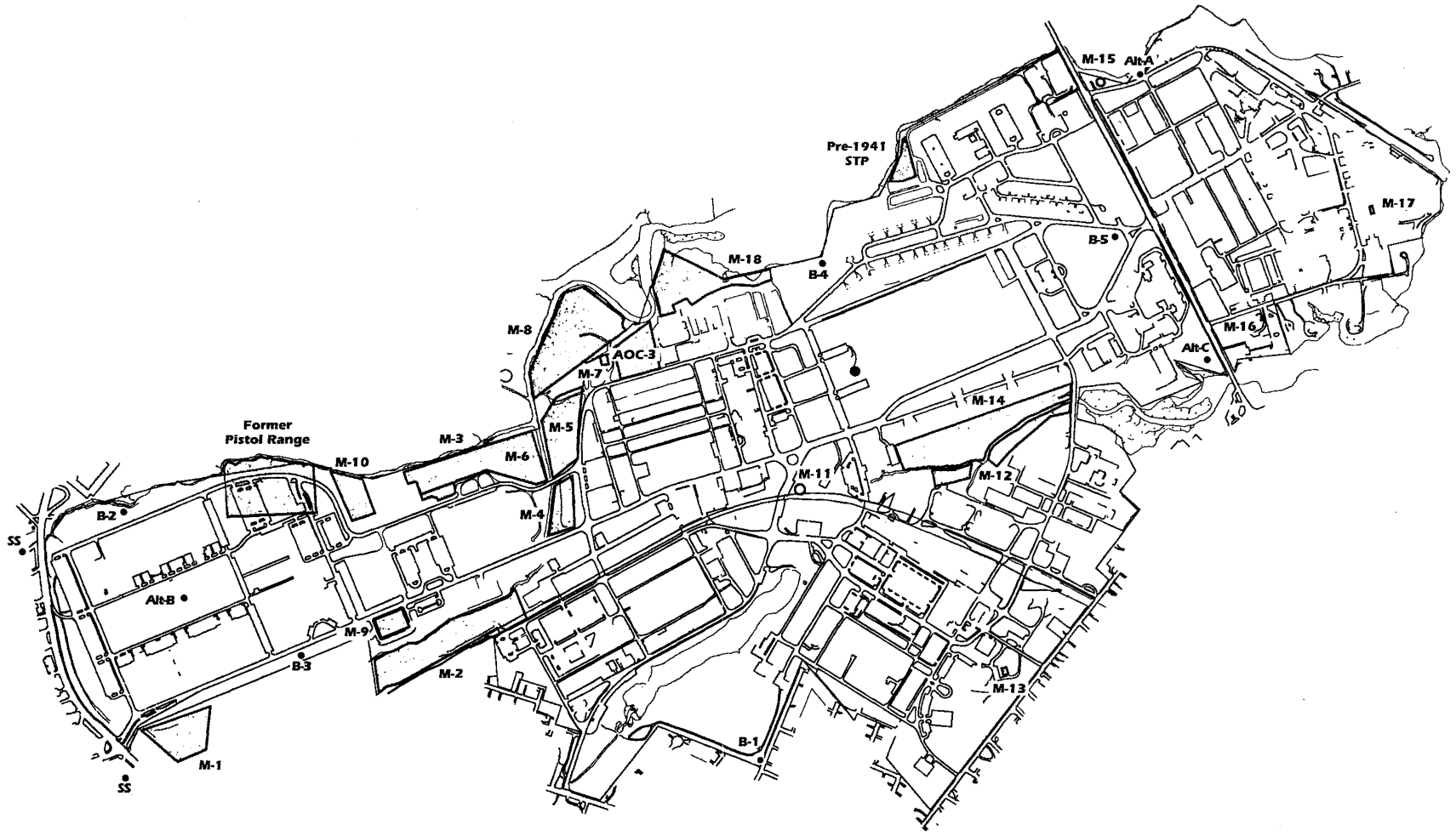
Table 5-4

Former PCB Transformer Sites Where Sampling Is Proposed

Transformer Code	Location	Sampling Protocol*
CE 056	Evans, Building 9126	pole
CE 064, CE 112	Evans, Building 9117	clear pad, inspect
CE 088	Evans, Building 9007	vault
CW 010	Charles Wood, Building 2276	pole
CW 035	Charles Wood, Building 2000	pad
CW 039, CW 040	Charles Wood, Building 2018	pole
MP 007	Main Post, Building 718	pole
MP 062	Main Post, Building 292	pole
MP 104	Main Post, Building 686	pole
MP 124	Main Post, Building 1220	pad
MP 280	Main Post, Building 1002	vault
MP 282, MP 283	Main Post, Building 1004	pole
MP 347, MP 348, MP 349	Main Post, Building 1208	vault
MP 350, MP 351, MP 352	Main Post, Building 1209	vault

*See Subsections 4.4 and 6.10 for a description of sampling protocols.

/FORT/MAIN/MAINSITE.DGN



LEGEND

- Road (paved)
- Building
- Site
- Lake
- Marshy Area
- **B-12** Proposed Background Soil Boring/Monitor Well
- **SS** Proposed Upstream Surface Water and Sediment Samples
- **Alt** Alternate Soil Boring/Monitor Well Location

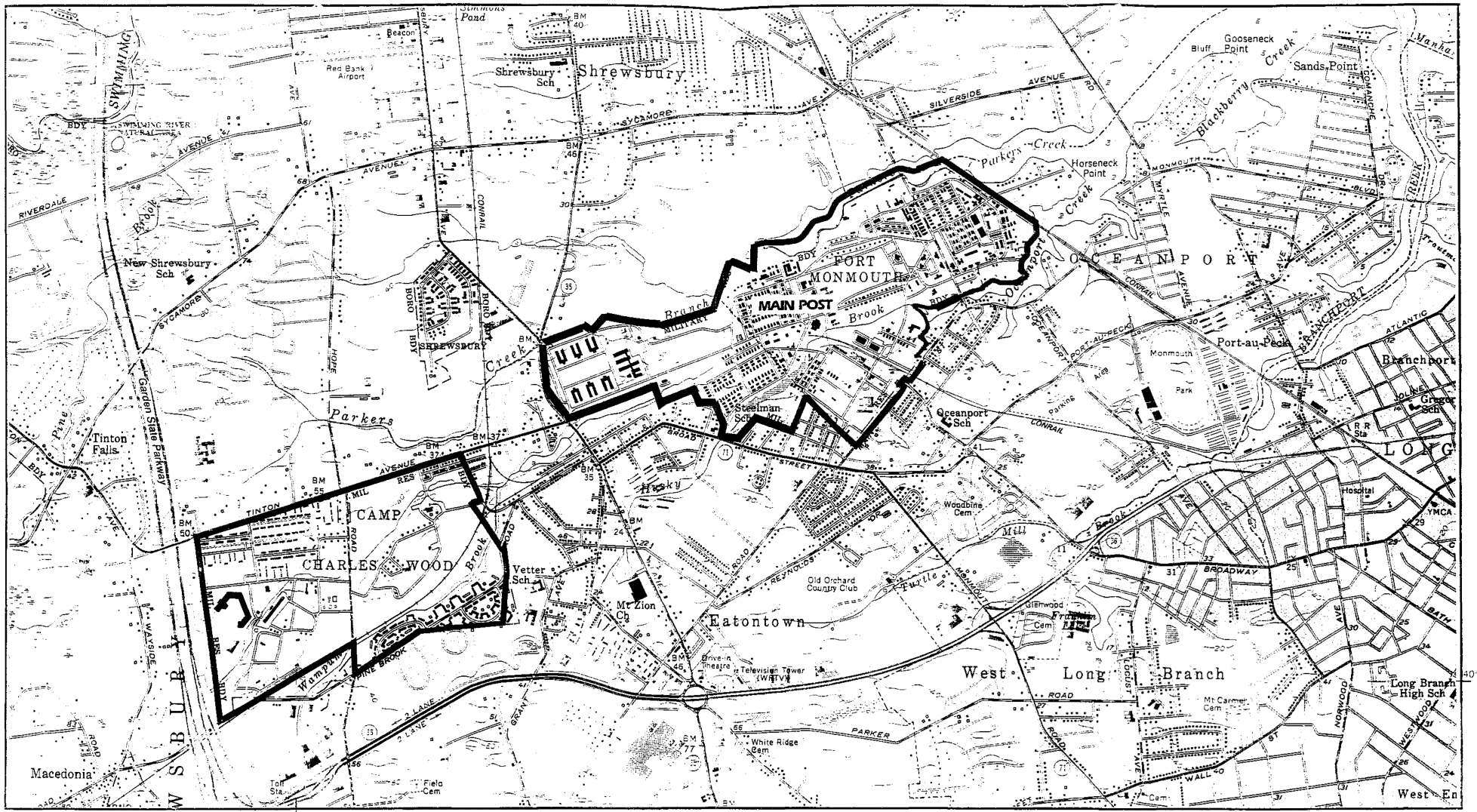
0 5000

SCALE IN FEET

2017-0593 12/15/93

Fort Monmouth, Main Post

FIGURE 5-1
MAIN POST BACKGROUND SAMPLE LOCATIONS



Contour Interval: 20 Feet

Source: USGS Long Branch, New Jersey Quadrangle (1981)

0 1000 2000 3000 4000

SCALE IN FEET

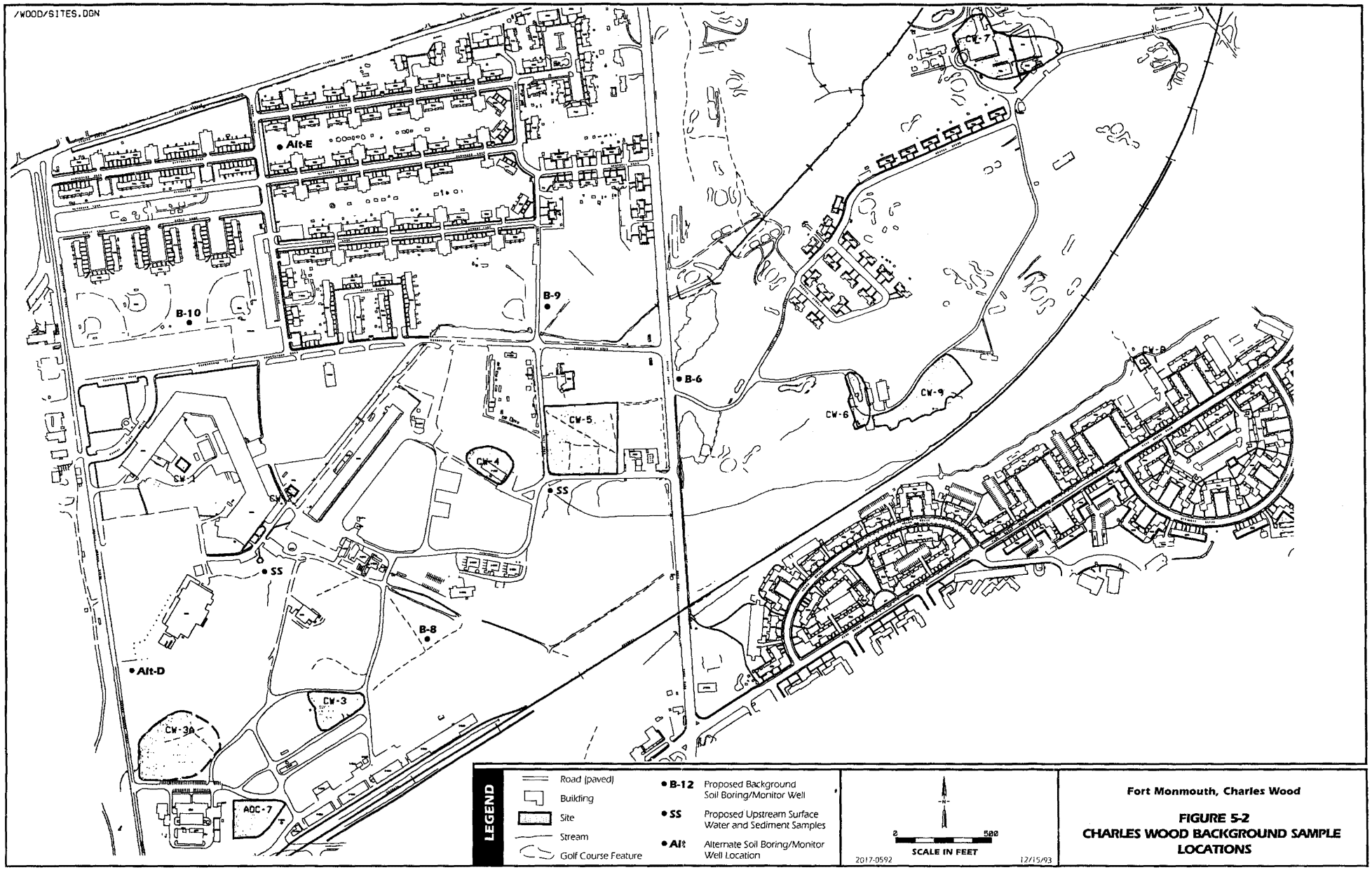
QUADRANGLE LOCATION

2017-0593 2/19/93

Fort Monmouth, Main Post and Charles Wood

FIGURE 1.1-1

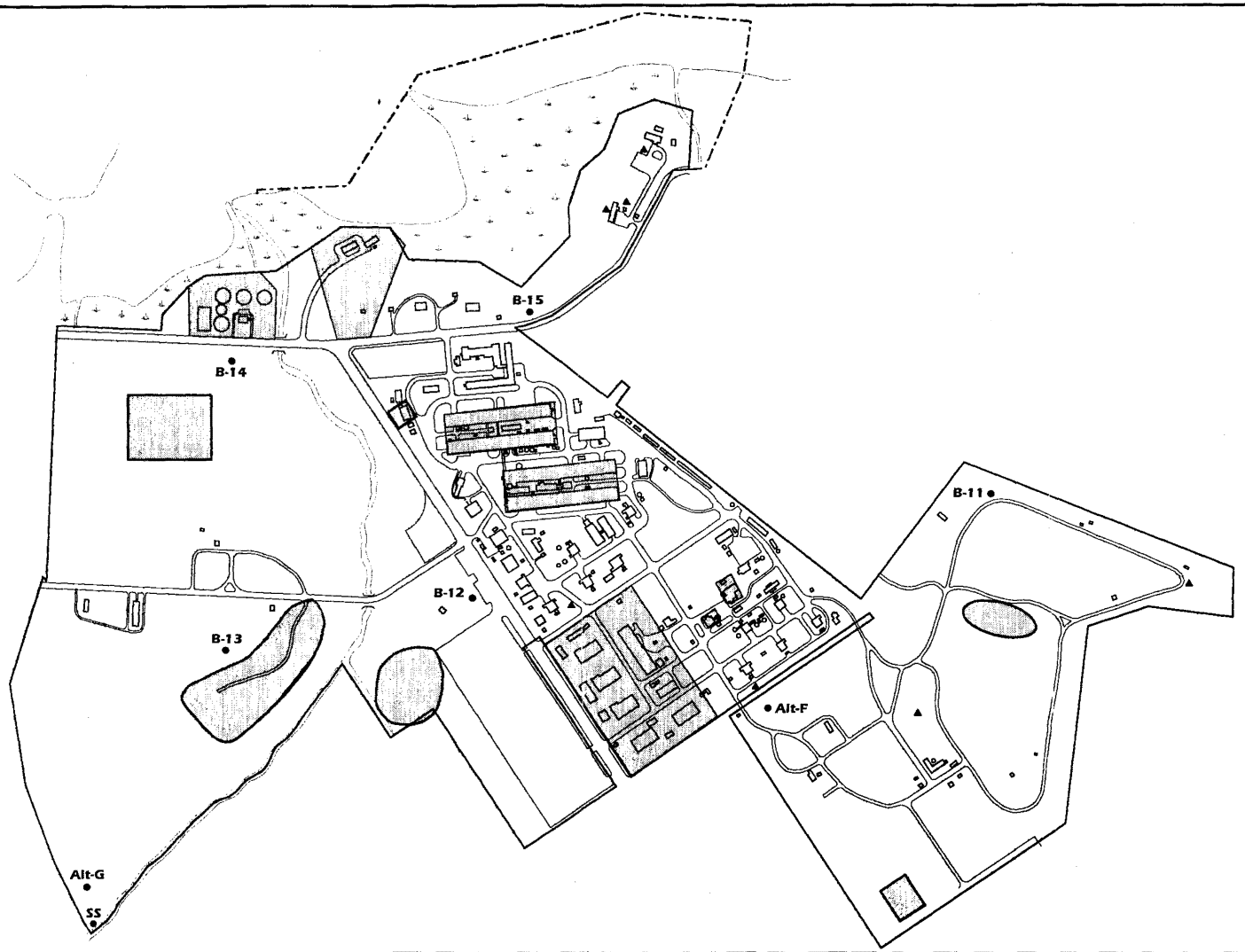
LOCATION OF MAIN POST AND CHARLES WOOD MONMOUTH COUNTY, NEW JERSEY



Fort Monmouth, Charles Wood

FIGURE 5-2
CHARLES WOOD BACKGROUND SAMPLE LOCATIONS

/USR3/FORT/EVANS/EVANSITE.DGN



LEGEND

- Road (paved)
- Building
- Base Boundary
- Site
- Brook
- Marshy Area
- Tower
- **B-12** Proposed Background Soil Boring/Monitor Well
- **SS** Proposed Upstream Surface Water and Sediment Samples
- **Alt** Alternate Soil Boring/Monitor Well Location

0 500
SCALE IN FEET

2017-0591 12/15/93

Fort Monmouth, Evans Area

FIGURE 5-3
EVANS AREA BACKGROUND SAMPLE LOCATIONS

Section 6

SECTION 6

FIELD INVESTIGATION PROCEDURES

Consistent with the site-specific recommendations presented in Section 4 and summarized in Section 5, the following subsections discuss proposed investigation procedures (i.e., sampling, geophysics, and well installation), projected sample numbers, and quality assurance/quality control (QA/QC) samples. The actual number of samples, including QA/QC samples, collected may vary, depending on field conditions encountered and the actual duration of field activities. To facilitate the recalculation of the number of QA/QC samples, NJDEPE rules are summarized below:

- Aqueous Matrix (groundwater and surface water)
  - One duplicate per 20 samples for each parameter is required.
  - One field rinse blank per day for each parameter is required.
  - One trip blank for each day that volatile organic analyte (VOA) samples are collected is required.
  - One matrix spike (MS), matrix spike duplicate (MSD) (2 samples) is required per 20 samples for each parameter.
- Nonaqueous Matrix (soils and sediments)
  - One duplicate per 20 samples for each parameter is required.
  - One field rinse blank (VOA only) is required for each day VOA samples are collected.
  - One MS, MSD sample is required per 20 samples per parameter.

6.1 GEOPHYSICS

6.1.1 General

As discussed in Section 4, three geophysical methods (magnetics, GPR, and electromagnetic terrain conductivity [EM-31]) will be used to survey selected landfills (M-3, M-12, M-14,

CW-3A, and possibly at EA-13A and EA-13B). The purpose of the geophysical investigation is to delineate the extent of buried material.

6.1.2 Field Procedures

The following procedures apply to the magnetic, EM-31, and GPR geophysical surveys:

- A surveyed ground reference grid on 25-ft centers will be established at each landfill; each grid will be referenced to site landmarks.

- A GEM GSM-19 Overhauser Memory Magnetometer or equivalent will be used for the magnetic survey. A Geonics Ltd. Noncontacting Terrain Conductivity Meter (EM-31D) will be used for the electromagnetic measurements. A Geophysical Survey Systems, Inc. (GSSI) SIR System 10 with 300 and 500 Megahertz antennas or equivalent will be used to conduct the GPR survey.

- Each instrument will be assembled, checked, and calibrated each day according to the manufacturer's specifications. This will be done prior to the first set of base station readings or, in the case of GPR, calibration traverses, each day.

- A base station will be selected and staked near each landfill in an area believed to be free of buried metal, overhead wires, and buried utilities.

  - Base station readings for the EM-31 survey will be taken at least three times each survey day.

  - Base station readings for the magnetic survey will be taken once an hour.

  - A swing sensor test, in which the magnetometer is rotated to 90°, 180°, 270°, and then back to 0°, will be conducted three times each day at the base station to identify whether any directional bias exists in the instrument.

  - A series of sequential readings will be taken three times each day at the base station to test the repeatability of magnetic measurements.

- Separate surveys will be conducted. Magnetic and electromagnetic measurements will be taken every 10 ft along traverses spaced 10 ft apart. Magnetic measurements will include both the total field intensity and vertical magnetic gradient. Electromagnetic (EM-31) measurements will include both

in-phase and quadrature measurements. GPR traverses will be 20 ft apart along the edges of the landfill areas and 10 ft apart in areas where additional detail is needed.

- One traverse will be repeated each day for each method used that day to ensure reproducibility.

- All measurements will be recorded electronically.

- For magnetic and EM-31 surveys, all base station measurements and values measured at the beginning and end of each traverse will be manually recorded in the field notebook to check that data are stored correctly. The time each measurement is taken will also be recorded. For GPR surveys, the line designation and beginning and ending coordinates of every traverse will be recorded in the field notebook.

- Cultural features such as fences, stone walls, buildings, utilities, and metal surface debris will be documented in the field notebook as the survey progresses.

- After field measurements are completed each day, data will be transferred to a field computer. QC checks will be done to ensure that data taken each day are acceptable. As an alternative to downloading GPR data from tape to disk, a new tape may be used each day to record GPR data.

- Once the GEM GSM-19 sensors are aligned, the sensor unit will not be disassembled until the entire survey is completed.

6.2 SEDIMENT SAMPLING

6.2.1 General

Consistent with site-specific recommendations presented in Section 4, sediment samples will be collected at background locations (see Section 5) and near specific outfalls at sites AOC-3, the pre-1941 STP, CW-5, EA-1, and EA-3. Table 6-1 summarizes the sediment sampling to be performed in the outfalls. Sediment samples will be collected from quiet or stillwater areas. Where access from the bank is not available, sampling personnel will enter the stream and approach the sampling location from a downstream point to minimize bottom sediment disturbances. If the sediment is disturbed, a new site will be selected for sampling upstream of the disturbed area. Alternatively, sampling may be performed from a boat or raft that has been grounded by the low tide.

Table 6-1

Sediment Sampling Summary

Parameter	Bottle		Preservative	Investigative Samples	QA/QC Samples[b]			Total Samples
					Field		Lab	
	Size	Type[a]			DUPFB		MS, MSD	
TCL VOA	125 mL	Tall, G	4 °C	11	1	1	1,1	15
TCL BNA	500 mL	Wide mouth, AG	4 °C	11	1	0	1,1	14
TAL Metals, CN	500 mL	Wide mouth, G	4 °C	12[c]	1	0	1,(1)	15

[a]Abbreviations for type of sample bottle:
AG = Amber-Glass Bottle
G = Glass Bottle

[b]Abbreviations for type of QA/QC Sample:
FB = Field Blank
DUP = Duplicate
MS = Matrix Spike
MSD = Matrix Spike Duplicate
( ) = Matrix Duplicate*

[c]One sample to be collected for TAL metals only

Notes: Additional field blanks will be required if sediment sampling extends over a period longer than originally scheduled.
Field blanks are aqueous. All field blanks will be stored and transported to the laboratory at 4 °C.

*A matrix duplicate is a second aliquot of a sample that is treated the same as the original sample in order to determine the precision of the method.

This latter method is recommended to provide a stable platform for sediment coring in Parkers Creek.

6.2.2 Field Sampling Procedures

The following procedures apply to all sediment sampling:

- A designated sampling point will be located, staked, and numbered prior to the sampling event, after consultation with the NJDEPE. Sampling will begin with the sampling point farthest downstream of the site and proceed upstream.

- The sampling station number, date, time weather conditions, and type of sample will be recorded in the logbook along with other pertinent information, such as stream/channel characteristics (i.e., depth and width of channel, flowing or stagnant, etc.) and characteristics of the water (i.e., color, turbidity, multiphase layering, etc.).

- Sampling containers will be labeled with ink. Labeling information will include sample number, date, and time.

- Because potential sediment contamination may have occurred in the past, a corer (e.g., KB corer, multiple-tube corer, Wildco hand corer, or Vibracorer) or other device that eliminates sample washing and allows collection of layered sediments must be used to collect the sample. The type of corer to be used will be determined when the sampling locations are selected.

- Each sample will be described according to texture, color, grain-size distribution, and staining. An HNu or OVM and visual examination of the core will be used to identify the interval for analytical sampling.

- Sediment will be divided among the required sample bottles. If a single core does not provide sufficient material, a composite sample will be formed from multiple cores by mixing the sediment in a stainless steel bowl (except for VOCs). The sample should be well mixed (homogenized in a stainless steel receptacle) to ensure that each container receives a representative sample.

- The sample fraction for volatile organics will be obtained directly from the sample before mixing.

- Field-rinse blanks for VOAs will be collected by rinsing a decontaminated corer (or optional trowel for Laurel Gulley Brook) with blank water prepared

by the laboratory (according to the NJDEPE Field Sampling Procedures Manual [1992]) and collected in clean VOA vials.

- Sample containers will be placed in a cooler immediately after collection.
- Gloves will be changed between stations. Contaminated clothing will be rinsed to the extent possible and placed in plastic bags. The coring device, trowel, and stainless steel bowl will be decontaminated between stations.
- At the end of daily sampling, appropriate chain-of-custody (COC) records and other required labeling and shipping documents will be completed. Samples must be shipped to the laboratory each day; they may not be held on-site.
- Required field and other QA/QC samples will be included.

6.3 SURFACE WATER SAMPLING

6.3.1 General

Surface water samples will be collected near Landfills M-2, M-3, and M-12/14 and at a location upstream from each of these two landfills and at background locations at CWA and EA. Table 6-2 summarizes surface water parameters.

6.3.2 Field Sampling Procedures

Sample collection will consist of the following steps:

- Collect surface water samples beginning with the point farthest downstream and proceeding sequentially to the point farthest upstream. If stream depth permits, samples should be collected in the same receptacles that they are to be stored in. Tilt the bottle into the direction of water flow and allow it to fill to the shoulder of the receptacle. For volatiles, the bottle can be either completely submerged or topped off using the cap. Turn the bottle upside-down and gently tap the side of it to make certain no air bubbles are present. A "clean" glass jar (cleaned in accordance with NJDEPE requirements) can be used to fill bottles if stream depth prohibits collection in the designated sample receptacle.
- The sampling station number, data, time, weather conditions, and type of sample will be recorded in the logbook along with other pertinent information, such as stream characteristic (i.e., depth of stream, flowing or

Table 6-2

Surface Water Sampling Summary

Parameter[a]	Bottle[b]		Preservative	Investigative Samples	QA/QC Samples[c,d]				Total Samples
					Field			Lab	
	Size	Type			DUP	FB[e]	TB	MS, MSD	
TCL VOA	40 mL (2 req)	SV	4 °C (no bubbles or headspace)	12	1	1[e]	1	1,1	17
TCL BNA	950 mL (2 req)	AG	4 °C	12	1	1[e]	0	1,1	16
TAL Metals, Unfiltered	1 L	P	HNO_3 to pH<2, 4 °C	12	1	1[e]	0	1,(1)	16
TAL Metals, Filtered	1 L	P	HNO_3 to pH<2, 4 °C	12	1	1[e]	0	1,(1)	16
TAL CN	1 L	P	NaOH to pH>12, 4 °C	6	1	1[e]	0	1,(1)	16

[a]Field measured parameters will include specific conductance and pH.

[b]Abbreviations for type of sample bottle: AG = Amber-glass bottle
SV = Teflon septem vial
P = Polyethylene bottle

[c]Abbreviations for type of QC sample: FB = Field blank
DUP = Duplicate
TB = Trip blank
MS = Matrix spike
MSD = Matrix spike duplicate
( ) = Matrix duplicate

[d]Number of QA/QC samples can be reduced if sampling is done on same day as groundwater sampling.
[e]Field blanks will be collected if a glass collection device (i.e., Pyrex cup) is used. No field blank will be necessary if all samples are collected directly into the sample bottles.

stagnant, etc.), characteristics of the water (i.e., color, turbidity, multiphase layering, etc.), and type.

- Label each bottle with the designated sample number and note the sampling time and the volume of preservative used in the field book. Use waterproof ink for labeling.

- Each sampling location will have been staked and numbered before the sampling event, in consultation with the NJDEPE.

- Change gloves between stations.

- A filtered TAL metal field blank is required. (Both filtered and unfiltered samples will be collected for metals analyses.) Sample filtering will be done within 2 hours of sample collection using a peristaltic pump and a QED Systems, Inc. Sample Pro in-line filter (0.45 μ filter) with Tygon tubing to transfer the sample from the unpreserved sample collection bottle to the preserved sample bottle.

- If glass beakers (or Pyrex measuring cups) are used for sample collection, a field blank will be required for each parameter.

- Complete necessary paperwork, pack, and ship the samples at end of each day. Samples may not be held on-site overnight.

6.4 SURFACE SOIL SAMPLING

6.4.1 General

As discussed in Section 4, surface soil samples will be collected at M-15, M-16, CW-4, CW-9, and EA-1 to evaluate soil contamination. These samples are included in Table 6-3, Soil Sampling Summary. Site-specific sampling requirements are presented in Section 4.

6.4.2 Field Sampling Procedures

The following procedures apply to surface soil sampling:

- Prior to sampling, sample locations will be stacked and referenced to site landmarks. Locations will be biased to areas with stained soils or stressed vegetation.

Table 6-3

Soil Sampling Summary[a]

	Bottle[b]		Preservative	Investigative Samples	QA/QC[c]				Total Samples
	Size	Type			DUP[f]	FB[g]	TB[h]	MS, MSD[i]	
TCL VOA	120 mL	SV	4 °C	152	8	16	16	8,8	208
TCL BNA Pest/PCBs	500 mL	Wide-mouth AG	4 °C	134[d]	7	--	--	7,7	155
TAL Metals CN	250 mL	Wide-mouth G	4 °C	136[e]	7	--	--	7,7	157
TPH	250 mL	Wide-mouth AG	4 °C	24	2	--	--	2,2	30

[a]Includes both surface soil samples and samples from soil borings.
[b]Abbreviations for Type of Bottle.
AG = Amber Glass Bottle
SV = Teflon Septum Vial
G = Glass Bottle
[c]Abbreviations for type of QA/QC sample:
FB = Field Blank
DUP = Duplicate
TB = Trip Blank
MS = Matrix Spike
MSD = Matrix Spike Duplicate.
[d]Two samples will only be analyzed for pesticides; 3 samples will only be analyzed for BNAs.
[e]Only 62 of the samples will be analyzed for cyanide.
[f]One duplicate is required per 20 samples for each parameter.
[g]One field rinse blank (VOA only) is required per 10 samples.
[h]One trip blank (VOA only) is required per 10 samples.
[i]One MS, MSD (2 samples) is required per 20 samples for each parameter.

- First, the vegetation will be carefully removed. Then, a decontaminated stainless steel trowel will be used to collect soil and place it in a decontaminated stainless steel bowl. The first two to four scoops will be monitored with an HNu or OVM.

- Samples for VOA will be collected from approximately 6 inches bgs and transferred directly from the trowel to the VOA sample container.

- After collecting the VOA sample for other analyses, the soil will be homogenized in the stainless steel bowl with the stainless steel trowel.

- Sample containers will be labeled with ink. Label information will include sample number, date, and time.

- Each sample will be described according to texture, color, moisture content, grain size distribution, and staining. All data will be recorded in a bound field logbook.

- Sample containers will be placed in a cooler for preservation at 4 °C immediately after collection.

- Gloves will be changed between stations.

- At the end of daily sampling, appropriate COC records and other required labeling and shipping documents will be completed.

- All samples will be shipped to the laboratory each day; samples may not be held on-site.

6.5 PCB TRANSFORMER SITE SAMPLING

6.5.1 General

Two sampling procedures will be used to determine if PCB contamination exists at any of the former sites of PCB class transformers. The two procedures are soil sampling and concrete chip sampling. Soil sampling will be used under the former location of pole-mounted transformers and on each side of a pad-mounted transformer (see Figure 6-1). The concrete chip sample will be taken if stains exist on the concrete pad or vault floor. Table 6-4 summarizes PCB transformer sampling.

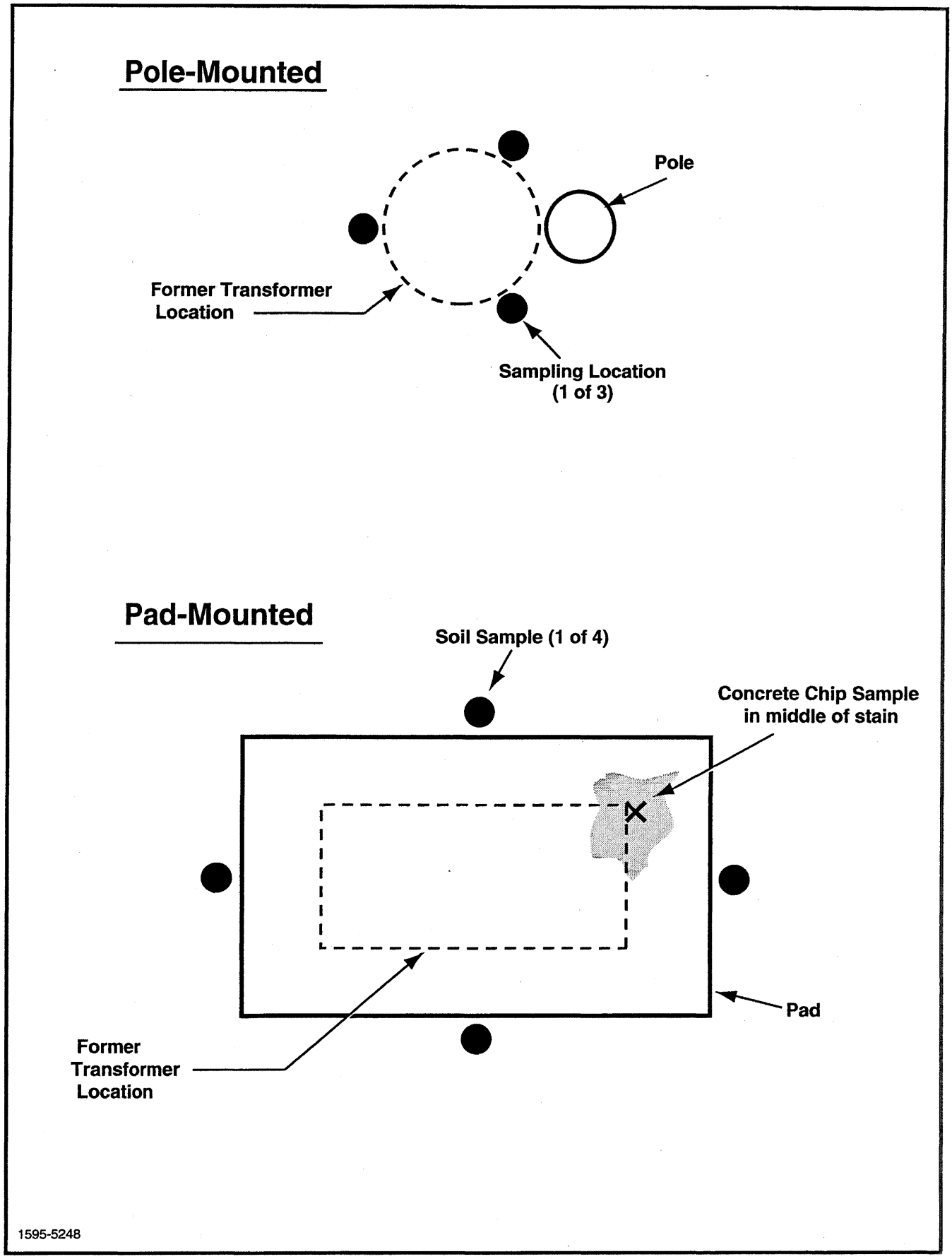


FIGURE 6-1 TRANSFORMER SITE SAMPLING SCHEME

Table 6-4

PCB Transformer Site Sampling Summary

Matrix	Bottle		Preservative	Investigative Samples	QA/QC[a]		Total Samples
	Size	Type			DUP[b]	MS, MSD[c]	
Soil	250 mL	Wide-mouth AG	4 °C	17	1	1,1	20
Chip Sample	250 mL	Wide-mouth AG	4 °C	9	1	1,1	12

Notes:

AG = Amber Glass

[a]Abbreviations for type of QC sample: DUP = Duplicate; MS = Matrix Spike; MSD = Matrix Spike Duplicate.
[b]One duplicate is required per 20 samples for each matrix.
[c]One MS, MSD (2 samples) is required per 20 samples for each matrix.

6.5.2 Sample Collection Procedures

6.5.2.1 Soil Samples

A composite of three samples will be taken in the soil underneath a pole-mounted unit. The location of the three samples is approximately as indicated on Figure 6-1. Four discrete soil samples will be taken in the middle of each side of a concrete pad (see Figure 6-1). If the pad is surrounded by an impermeable cover, then the soil will be sampled at a drainage point that may be determined by pouring water on the cover and observing its flow.

The soil sample from 0 to 6 inches will be collected with a stainless steel scoop and placed in a mixing bowl. Stones and vegetation will be removed and the remaining soil will be mixed. The sample will be placed in a glass bottle with a Teflon-lined cap. A clean pair of disposable sample gloves will be worn by the sampler during collection of each separate sample.

6.5.2.2 Concrete Chip Sample

A concrete chip sample will be taken in the middle of each stain on the concrete of a pad or vault. A maximum of three chip samples will be taken per pad or vault.

An electronic chipping hammer will be used to chip the concrete to a depth of up to ½ inch and to pulverize the concrete for analysis. Chips must be as fine as possible to facilitate laboratory extraction and analysis. A clean pair of disposable sample gloves will be worn by the sampler during collection of each discrete sample.

6.5.3 Field Procedures

The sample location, matrix, and number will be recorded on a sample log form. The form will contain a sample numbering protocol that will be used to identify these parameters. The sample numbers will also be entered onto a Custody Transfer Record to be submitted to the laboratory with the samples. The laboratory will report the results with these sample

identification numbers. A custody seal will be placed on each cooler used for shipment of the samples to the laboratory. The following forms should be used for tracking and custody transfer purposes:

- PCB Core Sample Log
- PCB Wipe Sample Log
- Custody Transfer Record/Lab Work Requests

Note that PCB samples require special hazardous shipping procedures. Several carriers have rules that make cost-effective shipping difficult. Check with the carrier before beginning sampling.

6.6 SOIL BORINGS

6.6.1 General

Soil borings will be completed at Sites M-16, M-18, AOC-3, CW-1, CW-2, CW-5, CW-6, AOC-7, EA-1, EA-2, and EA-3 using hollow-stem-auger drilling techniques to collect soil samples for laboratory analysis. Soil borings must be completed by a New Jersey-licensed and OSHA-certified driller under the supervision of a qualified geologist. Necessary NJDEPE permits will be obtained by the driller prior to commencement of drilling. Soil borings will be assigned consecutive numbers, as follows: Main Post beginning with 1001, Charles Wood beginning with 3001, and Evans Area beginning with 5001. This plan will minimize potential sample mix-up in the field and at the laboratory. Table 6-3 summarizes soil samples to be collected, including surface soil samples.

6.6.2 Field Procedures

The following procedures will apply:

- The borings will be advanced using 4-inch ID hollow-stem augers. Note that borings for monitor well installation require 8-inch ID hollow-stem augers (see Subsection 6.7.2).

- Split spoon sampling (ASTM 1586-067, 1974) will be performed continuously.
- The drilling and all downhole tools and equipment will be decontaminated by steam-cleaning between holes.
- Upon completion of the lithologic sampling, each of the soil borings will be tremie-backfilled with a bentonite/cement slurry (dry mixture of 3 to 4% bentonite to each 94-lb bag of cement).
- Soil samples for laboratory analysis will be collected from either (in descending importance) intervals with high HNu or OVM readings, visible staining, or intervals specified in Section 4.
- Samples will be placed directly in sample containers, then placed on ice.
- Detailed information (including, at a minimum, lithologic intervals; blow counts; color; moisture content; texture [in percent of each fraction]; sorting; plasticity; strength; nature of upper contact; field instrument readings; staining; and whether the material is fill, natural, or landfill debris) will be logged for each discrete lithology. These data should be delivered in both hard-copy (logs) and an electronic format suitable for input into an Intergraph-compatible geographic information system (GIS).
- At the end of each day, complete necessary paperwork (COC, etc.), pack, and ship samples. Samples may not be held on-site overnight.
- All soil boring locations will be surveyed by a New Jersey-licensed surveyor and referenced to New Jersey State Plane coordinates.

6.7 GROUNDWATER MONITOR WELL INSTALLATION

6.7.1 General

Monitor wells or piezometers will be installed in selected soil borings and at locations identified in Section 4. All drilling, monitor well installation, piezometer installation, and well development will be done by a New Jersey-licensed and OSHA-certified well driller under the supervision of a qualified geologist. NJDEPE well permits will be obtained prior to the commencement of drilling. Monitor wells and piezometers will be tagged with the well permit number and site ID well number. Site ID well numbers should be assigned consecutively, as follows: Main Post beginning with 2001, Charles Wood beginning with 4001, and Evans Area beginning with 6001. This plan will minimize potential sample mix-up

(caused, for example, by multiple MW-1s) in the field and at the laboratory. Table 6-4 summarizes groundwater sampling, assuming that 47 wells will be sampled in a 6-day period. If additional wells are installed or if sampling extends over more than 6 days, additional QA/QC samples may be required.

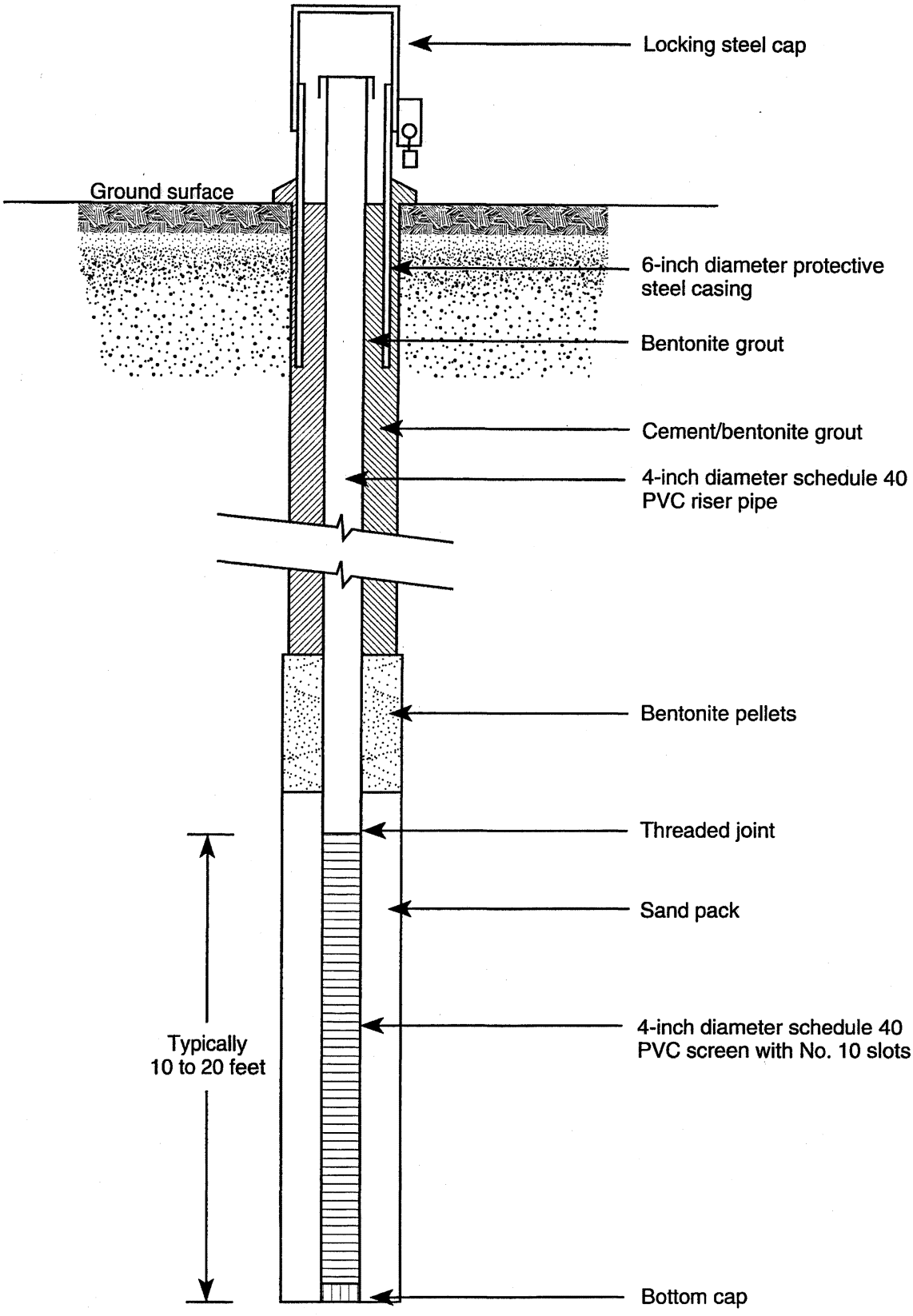
6.7.2 Well Installation and Development Procedures

Shallow overburden wells (Figure 6-2) will be installed according to the following procedure:

- Monitor wells will be installed using 8-inch ID hollow stem augers, and with 4-inch diameter Schedule 40 PVC casing and screen. Split spoon samples (ASTM 1586) will be collected continuously. The 10- to 20-ft screen section will be machine-bridged with 0.01-inch slot. A PVC cap will be set at the bottom of the well screen, and the joints of all screens and risers will be threaded. No solvents will be used as jointing compounds.

- Wells will be installed across water-producing (sand and gravel) zones at appropriate depths. Once the desired depth is reached with the augers, the decontaminated well screen and riser pipe will be placed inside the augers. During well construction, the screen and risers must be held in tension to ensure that the well hangs plumb in the hole. As the augers are gradually removed from the borehole, the annular space around the screen will be filled with a clean uniform sand pack to approximately 2 ft above the top of the screen. When plumbing the hole indicates that the sand pack is at the desired level, a 3- to 4-ft-thick bentonite slurry seal will be emplaced on the sand pack by pumping through a tremie pipe to the top of the sand pack. The bentonite slurry will be mixed at a ratio of 1.5 lb of granular bentonite per 1 gallon of water. After the bentonite seal is set, the remaining annular space will be grouted with a Portland cement/bentonite mixture to ground surface. Grouting material will consist of 2 to 4% bentonite per 94-lb bag of cement with 6.5 to 7.8 gallons of water. The well will be grouted by pumping the grout mixture through a tremie pipe from the top of the bentonite seal to ground surface. A 5-ft long, 6-inch ID protective steel casing with a locking casing and a lockable cap will then be installed 3 ft into the grout seal at each well. The well permit number will be securely attached to the protective casing.

- In undeveloped areas, cuttings, drilling fluids, and development fluids may be placed on the ground if there are no HNu or OVA readings above background. If elevated levels are found, cuttings and development water will be placed in drums. In landscaped or developed areas, cuttings and development fluids will be removed to a location designated by the DEH.



Fort Monmouth

FIGURE 6-2
OVERBURDEN MONITOR WELL CONSTRUCTION

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- Completed monitor wells will be developed using a submersible pump to ensure that each will provide representative aquifer samples. Development of each well will continue for a minimum of 1 hour or until discharge is relatively clear and free of sand (or for a maximum of 2 hours). The pump will initially be set at the bottom of the well, then moved towards the top of the screen to ensure water is drawn through all portions of the screen. If development water is turbid, a surge block may be required to minimize future turbidity and siltation.

- All downhole tools and equipment will be steam-cleaned before use at each well or piezometer location.

- Detailed information (including, at a minimum, lithologic intervals; blow counts; color; texture [in percent of each fraction]; sorting; moisture content; plasticity; strength; nature of upper contact; field instrument readings; staining; and whether the material is fill, natural, or landfill debris) will be logged for each discrete lithology. These data should be delivered in both hard-copy and an electronic format suitable for input to an Intergraph-compatible GIS database.

- Piezometer installation will be similar to well installation except that 2-inch ID PVC screen and riser will be used and piezometers will not be developed.

- All monitor wells and piezometers will be surveyed by a New Jersey-licensed surveyor. Locations will be referenced to New Jersey State Plane coordinates, and elevations of the ground surface and top of the ground surface and top of casing will be reported in feet above msl.

6.8 FIELD ANALYTICAL PROCEDURES

The temperature, pH, and specific conductance of all liquid samples (groundwater and surface water if collected) will be measured using a YSI Model 3560 meter (or equivalent). Measurements will be performed on a sample volume separate from those collected for chemical analysis. The calibration of the meter will be checked at the beginning of each day. The probes and sample cell will be rinsed with deionized water before and after each use. These readings will be recorded in the field logbook or on field sampling forms.

6.9 GROUNDWATER SAMPLING

6.9.1 General

The following groundwater sampling techniques comply with the NJDEPE *Field Sampling Procedures Manual* (May 1992) and will be followed to ensure that water samples are representative of the environment they are intended to characterize. Ensuring that the samples are representative is the first step in a QA/QC program to provide reliable sample analytical data.

All groundwater sampling will be conducted after the installed and developed monitor wells have been allowed to equilibrate for at least 2 weeks. A second round of groundwater sampling will be conducted 4 to 8 weeks after the first round to confirm first-round results. Groundwater samples (collected during each round) will be analyzed for the parameters listed in Table 6-5. Site-specific parameters were listed in the appropriate subsections of Section 4 and in Table 5-3.

Both total (unfiltered) and soluble (filtered) TAL metals samples will be collected for analysis. Groundwater samples collected from overburden almost always contain suspended sediment (sand, silt, and/or clay). Acid preservation of unfiltered samples strips metals from suspended sediment and places them into solution, resulting in samples that have artificially high concentrations of metals compared to actual concentrations in the aquifer. Filtered samples (filtering is done before acid preservation) are more representative of metals concentrations that may be available for transport in a contaminant plume as only dissolved metals are transported any significant distance in overburden aquifers.

Tidal monitoring (see Subsection 6.12) will be conducted at Landfills 2, 8, 12, and 14 for a minimum 72-hour period preceding groundwater sampling.

Each well will be purged until pH, conductivity, temperature, and turbidity measurements stabilize and three to five well volumes are purged.

Table 6-5

Groundwater Sampling Summary[a]

Parameter	Bottle[b]		Preservative	Investigative Samples	QA/QC Samples[c]				Total Samples
					Field			Lab	
	Size	Type			DUP[e]	FB[f]	TB[g]	MS, MSD[h]	
TCL VOA	40 mL (2 req)	SV	4 °C (no headspace)	62	4	8	8	4,4	90
TCL BNA	(950 mL) (2 req)	AG	4 °C	62	4	8	-	4,4	82
TAL Metals, Unfiltered	1L	P	HNO_3 to pH<2, 4 °C	62	4	8	-	4,(4)	82
TAL Metals, Filtered	1L	P	HNO_3 to pH<2, 4 °C	62	4	8	-	4,(4)	82
TAL CN	1L	P	NaOH to pH>12, 4 °C	43	3	6	-	3,(3)	58
TPH	125 mL	AG, SV	H_2SO_4 to pH<2, 4 °C	3	1	1	-	1(1)	7
SO_4	500 mL	P	4 °C	6	1	2	-	1(1)	11
NH_3-N	500 mL	P	H_2SO_4 to pH<2, 4 °C	4	1	1	-	1(1)	10

[a]Field-measured parameters will include specific conductance and pH.
[b]Abbreviations for type of sample bottle: AG = Amber-Glass Bottle; SV = Teflon Septum Vial; P = Polyethylene Bottle
[c]Abbreviations for type of QC sample: FB = Field Blank; DUP = Duplicate; TB = Trip Blank; MS = Matrix Spike; MSD = Matrix Spike Duplicate; ( ) = Matrix Duplicate.
[e]One per 20 samples per parameter.
[f]One per day per parameter.
[g]One per day (VOA only)
[h]One of each per 20 samples per parameter.

Note: Additional QA/QC samples will be required if sampling of monitor wells extends over a longer period than forecast (6 days), or if there are additional wells installed.

6.9.2 Field Sampling Procedures

Monitor well sampling will follow these procedures:

- Unlock the security cap on the protective casing. Remove the well cap slowly while using an organic vapor detector (Hnu, OVA, or OVM) to monitor the area near the cap for volatile emissions. Wear disposable gloves when handling decontaminated sampling equipment during sampling operations. Change gloves between each sample location.

- Measure and record in the field notebook the diameter, construction material, and condition of the protective casing; total depth of well (DOW) from the top of casing or surveyor's mark (if present); and depth to water (DTW) from the top of casing. Measure DTW using an electric water-level probe.

- Calculate the volume of standing water in the well to be purged by subtracting DTW from DOW (DOW - DTW). This represents linear feet (LF) of water in the well. Calculate the volume of standing water present in the well casing by multiplying LF by gallons per LF of the appropriate casing diameter.

Casing Diameter	Gallons/LF
2 inches	0.1632
4 inches	0.6528
6 inches	1.4688
8 inches	2.6112

- Purge water from all wells, unless otherwise directed by the DEH, will be placed in drums or tanks. Water from these wells will be monitored using an HNu or OVM. If no elevated readings were found during drilling, well development, and initial purging to a bucket, the DEH may allow water to be returned to the ground or to the sanitary sewer.

- Purge the well by pumping with a stainless steel submersible pump (Grundfos) with dedicated polyethylene tubing or by bailing with a Teflon bailer with a stainless steel leader. If discharge is allowed to return to the ground, route the discharge away from the well recharge area. Remove three to five times and the calculated volume of standing water in the well. Monitor the discharge with an HNu or OVM. The pump should initially be placed near the water-level surface and moved down the well as the water level declines. If the water recharges slowly (less than 1 gpm), bail the well to near dryness and sample as soon as there is sufficient recovery, within 24 hours of purging.

- For each casing volume of water purged from a well, collect a groundwater sample for field testing of pH, temperature, and specific conductance (see Subsection 6.8).

- After conductivity stabilizes and three to five well volumes have been purged, sample the well within 2 hours using a laboratory-cleaned, dedicated Teflon bailer with a Teflon-coated, stainless steel lead wire.

- Transfer the volatile fraction sample into 40-mL, laboratory-prepared septum vials. Overfill each vial in an effort to eliminate void space in the vial. A convex meniscus should be present at the top of the vial before securing the Teflon-lined caps on the containers. Invert the vial after the cap has been secured. Observe whether any bubbles are present after lightly tapping the side of the vial. If bubbles are observed, remove the cap, overfill the vial, as described above, and reseal. Repeat this step for each vial until a single-phase sample with no bubbles has been obtained.

- Complete the sampling for the other parameters. Do not overfill bottles containing preservatives. Both total TAL metals (unfiltered) and soluble TAL metals (filtered) samples will be collected.

- The soluble TAL metals samples will be collected into an unpreserved plastic bottle. Sample filtering will be done within 2 hours of sample collection using a peristaltic pump with Tygon tubing and a QED Systems, Inc. Sample Pro in-line filter (0.45 μ) to transfer the sample from the unpreserved sample bottle to the preserved sample bottle.

- Place the containers on ice.

- Replace the well cap and secure.

- Be sure bottles are properly labeled, place in a Ziplock plastic bag, record all pertinent information in the site logbook, and complete the sample request/ COC form. Samples will be sent to the laboratory every day.

6.10 SURVEYING OF MONITOR WELLS AND STAFF GAUGES

The location and elevation of the top of the innermost casing of all new monitor wells, piezometers, and staff gauges or Stilling wells (for tidal monitoring) will be surveyed by a New Jersey-licensed surveyor. The horizontal coordinates will be measured to within ±1 ft using State Plane coordinates. The elevation will be surveyed to within ±0.01 ft and reported in feet above msl.

6.11 GROUNDWATER ELEVATION MEASUREMENTS

Discrete water elevation measurements in monitor wells will be made to ±0.01 ft using a hand-held electrical water-level indicator, such as Model 51453 (or equivalent) manufactured by the Slope Indicator Company. For each well, the distance between the water level in the well and the top of the innermost casing (depth to water) will be measured. These measurements will be recorded in the field notebook. Water elevations in the wells will be calculated by subtracting the depth to water from the surveyed elevation determined for the top of the innermost casing for each well.

6.12 TIDAL MONITORING

6.12.1 General

Tidal monitoring will be conducted in three areas: Landfill 2, Landfill 8, and in the Landfill 12 and 14 areas, after monitor wells and staff gauges (or Stilling wells) have been installed and surveyed. Tidal monitoring will be conducted in monitor wells and at staff gauges (or Stilling wells) for a minimum 72-hour period preceding collection of groundwater samples from Landfills 2, 8, 12, and 14.

6.12.2 Field Procedures

The following procedures apply to tidal monitoring:

- In preparation for tidal monitoring, at least two surface water staff gauges (or Stilling wells) will be installed and surveyed (by a New Jersey-licensed surveyor) at each landfill (2, 8, and 12/14) prior to the monitoring period.
    - If visual observation will be used, standard graduated staff gauges that allow for the full range of tidal fluctuations are adequate; however, conductivity will not be monitored at these points. Surface water points that always have at least 2 to 3 inches of water, even at low tide, should be selected. The measurement point and stream bottom elevations must be surveyed by a New Jersey-licensed surveyor. Surface water elevation measurements must be made at least once per

hour for the 72-hour period. Note that a boat may be required for measurements except at low tide.

- If electronic data collection is to be used, it is recommended that either 0.01- or 0.006-slot 4-inch ID steel or schedule 80 PVC well screen be installed at least 3 to 4 ft into sediments (this allows for scour, which may occur around well screens). Stick-up should be sufficient to allow for the full range of tidal fluctuations and allow space to keep a Long-Term Monitor (LTM) dry. A locking cap is recommended, and the Stilling well should be anchored using several guy wires or attached and surrounded by a weighted drum with sufficient holes cut in the side to transmit rapid changes in water level without delay. Surface water points that always have at least 2 to 3 inches of water, even at low tide, should be selected. The measuring point and stream bottom must be surveyed by a New Jersey-licensed surveyor.

- Groundwater and surface water elevation measurements must be collected at least once an hour over the 72-hour monitoring period. It is preferable that measurements be collected every 15 minutes over the monitoring period.

- An in situ LTM 3100 or equivalent should be used to allow data to be recorded digitally. Both conductivity and water levels will be measured using this instrument. Conductivity measurements will indicate whether the water is fresh, brackish, or saline.

- Transducers and conductivity probes should be set at least 5 to 8 ft below the water surface in monitor wells and as close to the bottom as possible at surface water points (the transducer and conductivity probe must remain submerged at low tide).

- The LTM will be set up to receive data according to instructions presented in the manufacturer's operating manual. All LTMs should be synchronized before beginning to collect data. The file name for each test, initial water levels, date, time, etc. will be recorded in the field notebook. Data will be collected at least once in each 15-minute period.

- After 6 to 8 hours of data collection, data should be downloaded to a computer to ensure that data collection is proceeding properly.

- At the conclusion of each test, the exact time and water level at each monitoring point will be recorded in the field notebook to verify the automatic data collected.

- Data will be downloaded to a computer at the conclusion of the monitoring period.

- Note that a boat may be required to collect measurements if done manually or to install and remove transducers or LTMs at surface water monitoring points.

- Analog data-recording devices, such as strip chart recorders, are not recommended because of the volume of data required for effective tidal monitoring.

6.13 DECONTAMINATION PROCEDURES

Nondedicated sampling equipment will be decontaminated before use according to the following steps:

- Wash in tap water with nonphosphate detergent.
- Rinse with tap water.
- Rinse with distilled/deionized water.
- Rinse with 10% nitric acid solution.*
- Rinse with distilled/deionized water.
- Rinse with pesticide-grade acetone.
- Air-dry totally.
- Rinse with distilled/deionized water.

*Only if sample is to be analyzed for metals.

Sampling equipment that has been subjected to these procedures will be wrapped in aluminum foil. Custody seals will be affixed to the foil for identification.

Well bailers will be dedicated equipment subject to laboratory cleaning procedures before use in the field. Well bailers will be decontaminated in the field before they are returned to the laboratory.

Field measurement equipment, such as water-level indicators, should be cleaned in the following manner:

- Wipe with paper towel to remove visual contamination.
- Rinse with distilled/deionized water.

Submersible pumps will be decontaminated using the following procedure:

- Alconox and water wash (internal and external).
- Potable water rinse (external and internal by purging 20 gallons through the pump).
- Deionized water rinse (external).

The drilling rigs and materials should arrive on-site in a clean condition. Prior to the start of the drilling, all drill rods, bits, tool spaces, and tools will be steam-cleaned at an area near the leachate collection pond prepared for this purpose. The equipment, including well casings, will be inspected to ensure that all residues such as machine oils have been removed. Similar decontamination procedures will be implemented between each borehole to prevent cross-contamination.

If use of nitric acid is necessary, wastewater from the nitric acid rinse will be neutralized with baking soda before it is containerized with other decontamination fluids.

6.14 RADIATION SCREENING

Because of the slight possibility that radioactive materials may have been discharged through the sewers to Sites EA-1 and EA-2, soil samples collected from these sites will be screened for radioactivity in the field. The purpose of the screening is to ensure the safety of field personnel and prevent shipment of samples that exceed laboratory limits for radionuclides.

Gamma radiation is emitted from most common radioactive materials, including cobalt-60, cesium-137, and uranium, three radioactive materials that have been identified as being used at the Evans Area. The NaI detector is a very sensitive instrument for measuring gamma radiation. It will be used to screen soil samples during drilling activities at Sites EA-1 and EA-2.

The following preparation should be performed:

- Visually inspect the equipment, including the connector cable, for breakage.
- Check the battery charge. If necessary, replace the batteries.
- Confirm that the instrument has been calibrated within 1 year.

The screening should be performed as follows:

- Turn on the instrument.
- Take several readings in an uncontaminated area and average them. This is the background exposure rate in microR/hr.
- Hold the instrument approximately 6 inches to 1 ft from drilling soil samples. Allow the instrument to integrate the count rate for at least 10 seconds.
- Record the result in the field log.
- If the reading is greater than 3 times background, then proceed with caution. If the reading is greater than 1 milliR/hr, then drilling should be discontinued. Samples should be collected in a 500 mL glass bottle for possible radiological analysis, as directed by the Army's Project Officer.

Section 7

SECTION 7
LABORATORY SERVICES

7.1 LABORATORY CERTIFICATIONS

The laboratory to be used to perform the analyses presented in Sections 4 and 5 should have current USACE certification for the parameters to be analyzed and must be approved by USACE to work on the site. Although the State of New Jersey does not have a formal Hazardous Waste Certification Program, the laboratory will be allowed to analyze waste samples if the laboratory is certified by New Jersey for those parameters in the Wastewater Program and if the methods of analysis are comparable. In addition, the laboratory should be able to demonstrate the ability to perform Contract Laboratory Program (CLP) level organics and inorganics analytical work. Because the samples have the potential for low level radioactivity, the laboratory must have an NRC license to receive, screen, and perform chemical analyses on low level radioactive samples.

7.2 ANALYTICAL METHODOLOGIES

Samples to be collected will be analyzed for the following parameters:

- Groundwater — TCL+30, TAL metals+CN, TPH, sulfate, ammonia, chloride
- Sediment — TCL+30, TAL metals+CN
- Soils — TCL+30, TAL metals+CN, TPH, PCBs
- Concrete Chips — PCBs
- Surface Water — TCL+30, TAL metals+CN, sulfate, ammonia, chloride

The compounds on the TCL and TAL are listed in Tables 7-1 and 7-2. In addition, a library search will be conducted for GC/MS to identify Tentatively Identified Compounds (TICs) per CLP protocols.

Table 7-1

Target Compound List (TCL)

	Semivolatiles	Semivolatiles	Volatiles
α-BHC	Phenol	2,4-Dinitrophenol	Chloromethane
β-BHC	bis(2-Chloroethyl) ether	4-Nitrophenol	Bromomethane
δ-BHC	2-Chlorophenol	Dibenzofuran	Vinyl chloride
γ-BHC (Lindane)	1,3-Dichlorobenzene	2,4-Dinorotoluene	Chloroethane
Heptachlor	1,4-Dichlorobenzene	Diethylphthalate	Methylene chloride
Aldrin	1,2-Dichlorobenzene	4-Chlorophenyl-phenyl ether	Acetone
Heptachlor epoxide	2-Methylphenol	Fluorene	Carbon disulfide
Endosultan I	2,2′-oxybis (1-Chloropropane)#	4-Nitroaniline	1,1-Dichloroethene
Dieldrin	4-Methylphenol	4,6-Dinitro-2-methylphenol	1,1-Dichloroethane
4,4′-DDE	N-Nitroso-di-n-propylamine	N-nitrosodiphenylamine	1,2-Dichloroethene (total)
Edrin	Hexachloroethane	4-Bromophenyl-phenylether	Chloroform
Endosulfan II	Nitrobenzene	Hexachlorobenzene	1,2-Dichloroethane
4,4′-DDD	Isophorone	Pentachlorophenol	2-Butanone
Endosulfan sulfate	2-Nitrophenol	Phenanthrene	1,1,1-Trichloroethane
4,4′-DDT	2,4-Dimethylphenol	Anthracene	Carbon tetrachloride
Methaxychlor	bis(2-Chloroethoxy) methane	Carbazole	Bromodichloromethane
Endrin ketone	2,4-Dichlorophenol	Di-n-butylphthalate	1,2-Dichloropropane
Endrin aldehyde	1,2,4-Trichlorobenzene	Fluoranthene	cis-1,3-Dichloropropene
α-Chlordane	Naphthalene	Pyrene	Trichloroethene
γ-Chlordane	4-Chloroaniline	Butylbenzylphthalate	Dibromochloromethane
Toxaphene	Hexachlorobutadiene	3,3′-Dichlorobenzidine	1,1,2-Trichloroethane
Aroclor-1016	4-Chloro-3-methylphenol	Benzo(a)anthracene	Benzene
Aroclor-1221	2-Methylnaphthalene	Chrysene	trans-1,3-Dichloropropene
Aroclor-1232	Hexachlorocyclopentadiene	bis(2-Ethyinexyl)phthalate	Bromoform
Aroclor-1242	2,4,6-Trichlorophenol	Di-n-octylphthalate	4-Methyl-1-pentanone
Aroclor-1248	2,4,5-Trichlorophenol	Benzo(b)fluoranthene	2-Hexanone
Aroclor-1254	2-Chloronaphthalene	Benzo(k)fluoranthene	Tetrachloroethene
Aroclor-1260	2-Nitroaniline	Benzo(a)pyrene	Toluene
	Dimethylphthalate	Indeno(1,2,3-cd)pyrene	1,1,2,2-Tetrachloroethane
	Acenaphthylene	Dibenz(a,h)anthracene	Chlorobenzene
	2,6-Dinitrotoluene	Benzo(g,h,i)perylene	Ethyl benzene
	3-Nitroaniline		Styrene
	Acenaphthene		Xylenes (total)

Table 7-2

Inorganic Target Analyte List (TAL)

Aluminum	Magnesium
Antimony	Manganese
Arsenic	Mercury
Barium	Nickel
Beryllium	Potassium
Cadmium	Selenium
Calcium	Silver
Chromium	Sodium
Cobalt	Thallium
Copper	Vanadium
Iron	Zinc
Lead	Cyanide

Analytical methodologies will follow the most recent revision of the EPA CLP Statement of Work "Organics Analysis, Multi-Media, Multi-Concentration," and "Inorganics Analysis, Multi-Media, Multi-Concentration" for TCL/TAL analyses. Detection limits will be according to CLP protocols. Other analytical methods will be in accordance with Table 7-3.

Hold time (from verified time of sample receipt [VTSR]) and sample preservation will be according to Tables 7-4 and 7-5.

7.3 QUALITY ASSURANCE/QUALITY CONTROL

The laboratory will have a documented Quality Assurance Program Plan (QAPP) that contains the elements of EPA QAMS-005/80:

1.0 Title Page
2.0 Table of Contents
3.0 Project Description
4.0 Project Organization and Responsibility
5.0 QA Objectives for PARCC
6.0 Sampling Procedures
7.0 Sample Custody
8.0 Calibration Procedures and Frequency
9.0 Analytical Procedures
10.0 Data Reduction, Validation, and Reporting
11.0 Internal Quality Control Checks
12.0 Performance and Systems Audits
13.0 Preventative Maintenance Procedures
14.0 Specific Routine Procedures to Assess Data PARCC
15.0 Corrective Action
16.0 Quality Assurance Reports to Management

These elements will be addressed in more detail in the site-specific Chemical Data Acquisition Plan (CDAP).

Laboratory data deliverables will conform to Appendix A of "Technical Requirements for Site Remediation" NJAC 7:26E. Because the data is for a preliminary site assessment, to determine if contamination exists, CLP II deliverables are recommended for this project.

Table 7-3

Non-CLP Methods

Matrix Parameter	Water	Soil, Sediment, Concrete Chips
TPH	IR:EPA 418.1	IR:EPA 418.1/SW846 9071
Sulfate	IC:EPA 300 Series	N/A
Ammonia	ISE:EPA 350.3	N/A
Chloride	IC:EPA 300 Series	N/A
PCB only	N/A	GC:SW846 8080

N/A = Not applicable.

Table 7-4

Water Sample Preservation and Holding Time

Parameter	Preservation	Holding Time from VTSR (days)
VOA	No Headspace HCl to pH<2, 4 °C	10
Semi VOA	4 °C	5 to extract, 40 to analyze
Pest/PCB	4 °C	5 to extract, 40 to analyze
Metals	HNO_3 to pH<2, 4 °C	180 (Hg 28)
Cyanide	NaOH to pH>12, 4 °C	14
TPH	H_2SO_4 to pH<2, 4 °C	7
Sulfate	4 °C	28
Ammonia	H_2SO_4 to pH<2, 4 °C	28
Chloride	4 °C	28

Table 7-5

Soil Sample Preservation and Holding Time

Parameter	Preservation	Holding Time from VTSR (days)
VOA	4 °C	10
Semi VOA	4 °C	10 to extract, 40 to analyze
Pest/PCB	4 °C	10 to extract, 40 to analyze
Metals	4 °C	180 (Hg 26)
Cyanide	4 °C	14
TPH	4 °C	28
Sulfate Chloride Ammonia	4 °C	28

7.4 CHAIN-OF-CUSTODY PROCEDURES

COC procedures will be addressed in the laboratory QAPP and, more specifically, in the CDAP. At a minimum, the chain-of-custody will document:

- Project name.
- Volumes and quantities of bottles in shipment.
- Signature of person responsible for packing the samples.
- Sampling location, date, and time of collection.
- Signatures of people involved in the transfer of samples.

The COC procedures will document sample receiving, sample shipping, tracking throughout the laboratory, sample storage, and finally, sample disposition.

Section 8

SECTION 8

HEALTH AND SAFETY PROGRAM

The contractor who performs the recommended site investigations will be required to have a Health and Safety Program that meets all federal, state, and U.S. Army safety requirements and provides for safe conduct of operations at Fort Monmouth. The contractor will be responsible for the health and safety of its personnel, including subcontractors. Health and Safety Guidance (HSG) is provided in Appendix D. The HSG addresses site-specific health and safety considerations and requirements for proposed site investigation activities at Fort Monmouth.

Appendix A

APPENDIX A

ANALYTICAL DATA SUMMARIES

This table was prepared primarily from handwritten NJDEPE reporting forms, and not from the original laboratory reports.

It should be noted that these groundwater and surface water samples were collected in tidally influenced areas. Because all of the samples were most likely not collected at exactly the same tidal stage and because the solubility of metals is affected by salinity, the metals concentrations reported in this table are variable.

FORT MONMOUTH GROUNDWATER AND SURFACE WATER ANALYTICAL RESULTS

LOCATION ID	DATE SAMPLED	ARSENIC DISSOLVED mg/L	BARIUM DISSOLVED mg/L	BIOCHEMICAL OXYGEN DEMAND mg/L	CADMIUM DISSOLVED mg/L	CHLORIDE mg/L	HEXAVALENT CHROMIUM DISSOLVED ug/L	CHEMICAL OXYGEN DEMAND mg/L	TOTAL COLIFORM N/100 ml	COLOR pt-co
MW-1	04-Feb-86	0.0015	--	--	--	14	--	--	NS	10
MW-1	29-May-86	NS	NS	1	NS	9	NS	19	NS	--
MW-1	18-Jul-86	NS	NS	--	NS	9	NS	13.5	NS	--
MW-1	14-Oct-86	--	--	1.2	--	3	--	--	NS	--
MW-1	29-Jan-87	--	--	2.6	--	2	0.075	--	NS	5
MW-1	21-Apr-87	NS	NS	1	NS	10	NS	--	NS	10
MW-1	07-Oct-87	--	--	--	--	300	--	--	200	3
MW-1	18-Apr-88	--	--	--	--	867	--	10	NS	5
MW-1	19-Apr-89	NS	NS	7.9	NS	17	NS	53	NS	5
MW-1	24-Oct-89	--	--	--	--	140	--	--	--	10
MW-1	26-Apr-90	NS	NS	--	NS	98	NS	--	NS	60
MW-1	30-Oct-90	0.019	--	9.5	--	35	--	5	0	90
MW-1	30-Apr-91	NS	NS	2.8	NS	30.2	NS	20.9	NS	80
MW-1	23-Oct-91	--	0.03	3.95	--	755.1	--	--	200 B	70
MW-1	13-Apr-92	NS	NS	--	NS		NS	--	NS	5
MW-1	29-Oct-92	--	--	4.3	0.0003	99.4	--	750	200 B	25
MW-1	07-Apr-93	NS	NS	--	NS	210	NS	31	NS	25
MW-2	04-Feb-86	0.0013	--	1.9	--	60	--	--	NS	20
MW-2	29-May-86	NS	NS	17	NS	2099	NS	30	NS	40
MW-2	18-Jul-86	NS	NS	27	NS	3400	NS	267	NS	15
MW-2	14-Oct-86	--	1.1	10.4	--	12.5	--	28.5	NS	30
MW-2	29-Jan-87	--	--	9.2	--	1700	0.08	350	NS	800
MW-2	21-Apr-87	NS	NS	9.8	NS	185	NS	60	NS	5
MW-2	07-Oct-87	--	0.97	3.2	0.01	3200	0.06	300	10	225
MW-2	18-Apr-88	--	--	5	--	26	--	51	NS	10-15
MW-2	20-Oct-88	--	0.56	--	--	4000	--	130	--	220
MW-2	19-Apr-89	NS	NS	21	NS	750	NS	290	NS	100
MW-2	24-Oct-89	--	--	--	--	340	--	52	48	20
MW-2	26-Apr-90	NS	NS	4.9	NS	25	NS	66	NS	60
MW-2	30-Oct-90	0.015	--	--	--	93.3	--	31	17	150
MW-2	30-Apr-91	NS	NS	7.7	NS	--	NS	31	NS	25
MW-2	23-Oct-91	--	0.18	3.7	--	553.7	--	150	200 B	70
MW-2	13-Apr-92	NS	NS	5.6	NS	340	NS	46	NS	15
MW-2	29-Oct-92	--	0.36	5.18	--	38.5	--	175	200 B	15

FORT MONMOUTH GROUNDWATER AND SURFACE WATER ANALYTICAL RESULTS

LOCATION ID	DATE SAMPLED	ARSENIC DISSOLVED mg/L	BARIUM DISSOLVED mg/L	BIOCHEMICAL OXYGEN DEMAND mg/L	CADMIUM DISSOLVED mg/L	CHLORIDE mg/L	HEXAVALENT CHROMIUM DISSOLVED ug/L	CHEMICAL OXYGEN DEMAND mg/L	TOTAL COLIFORM N/100 ml	COLOR pt-co
MW-2	07-Apr-93	NS	NS	6.5	NS	310	NS	73	NS	15
MW-3	04-Feb-86	0.0013	0.11	5.1	--	200	--	55	NS	90
MW-3 Dup. 1	04-Feb-86	--	0.11	5.1	--	200	--	55	NS	90
MW-3 Dup. 2	04-Feb-86	--	0.13	6.1	--	194	--	55	NS	90
MW-3	29-May-86	NS	NS	18	NS	150	NS	132	NS	25
MW-3	18-Jul-86	NS	NS	3.4	NS	340	NS	60	NS	10
MW-3	14-Oct-86	--	0.13	5.8	--	245	--	95	NS	25
MW-3	29-Jan-87	--	--	11.6	--	30	0.08	63	NS	30
MW-3	21-Apr-87	NS	NS	15	NS	60	NS	45	NS	40
MW-3	07-Oct-87	0.01	--	--	--	20	--	25	180	100
MW-3	18-Apr-88	--	--	3	--	11	--	23	NS	20
MW-3	20-Oct-88	--	--	57	--	89	--	100	TNTC	160
MW-3	19-Apr-89	NS	NS	18	NS	25	NS	--	NS	600
MW-3	24-Oct-89	--	--	--	--	30	--	--	20	30
MW-3	26-Apr-90	NS	NS	6.3	NS	35	NS	--	NS	200
MW-3	30-Oct-90	--	--	30	--	52.4	--	43	11	150
MW-3	30-Apr-91	NS	NS	7.3	NS	--	NS	63.3	NS	40
MW-3	23-Oct-91	--	0.12	7.7	--	654.4	--	25	200 B	50
MW-3	13-Apr-92	NS	NS	6.4	NS	490	NS	52	NS	15
MW-3	29-Oct-92	--	0.18	6	--	38.8	--	200	200 B	50
MW-3	07-Apr-93	NS	NS	10	NS	430	NS	73	NS	15
MW-4	04-Feb-86	0.0039	0.77	220	--	1520	--	474	NS	550
MW-4	29-May-86	NS	NS	3.3	NS	65	NS	98	NS	15
MW-4	18-Jul-86	NS	NS	7	NS	205	NS	68	NS	25
MW-4	14-Oct-86	--	0.29	4.4	--	225	--	37	NS	10
MW-4	29-Jan-87	--	--	6.8	--	27	--	240	NS	40
MW-4	21-Apr-87	NS	NS	27	NS	180	NS	260	NS	100
MW-4	07-Oct-87	0.01	--	1.6	--	26	--	35	27	125
MW-4	18-Apr-88	0.018	0.58	8	--	1150	--	321	NS	750
MW-4	20-Oct-88	--	0.082	13	--	1200	--	280	0	700
MW-4	19-Apr-89	NS	NS	14	NS	7	NS	--	NS	20
MW-4	24-Oct-89	--	0.66	7	--	840	--	200	12	40
MW-4	26-Apr-90	NS	NS	8.3	NS	830	NS	240	NS	1500
MW-4	30-Oct-90	--	1.15	11.8	--	1002	--	240	0	1150

FORT MONMOUTH GROUNDWATER AND SURFACE WATER ANALYTICAL RESULTS

LOCATION ID	DATE SAMPLED	ARSENIC DISSOLVED mg/L	BARIUM DISSOLVED mg/L	BIOCHEMICAL OXYGEN DEMAND mg/L	CADMIUM DISSOLVED mg/L	CHLORIDE mg/L	HEXAVALENT CHROMIUM DISSOLVED ug/L	CHEMICAL OXYGEN DEMAND mg/L	TOTAL COLIFORM N/100 ml	COLOR pt-co
MW-4	30-Apr-91	NS	NS	18.6	NS	150	NS	284	NS	75
MW-4	23-Oct-91	--	0.41	17.55	--	956.4	--	--	200 B	40
MW-4	13-Apr-92	NS	NS	14	NS	940	NS	460	NS	70
MW-4	29-Oct-92	--	0.4	5.4	0.0003	33.7	--	250	200 B	50
MW-4	07-Apr-93	NS	NS	44	NS	2000	NS	640	NS	70
SS-1	04-Feb-86	--	--	2.4	--	98	--	--	NS	25
SS-1	29-May-86	NS	NS	2.4	NS	46	NS	36	NS	5
SS-1	18-Jul-86	NS	NS	2.8	NS	48	NS	10	NS	5
SS-1	14-Oct-86	--	--	2.6	--	65	--	9	NS	5
SS-1	29-Jan-87	--	--	3	--	43	--	11	NS	15
SS-1	21-Apr-87	NS	NS	15	NS	64	NS	25	NS	25
SS-1	07-Oct-87	--	--	--	--	70/60	--	--	19000	5
SS-1	18-Apr-88	0.01	--	2	--	47	--	12	NS	5
SS-1	20-Oct-88	--	--	4.3	--	44	--	--	60	60
SS-1	19-Apr-89	NS	NS	--	NS	46	NS	--	NS	5
SS-1	24-Oct-89	--	--	--	--	56	--	--	TNTC	40
SS-1	26-Apr-90	NS	NS	--	NS	560	NS	--	NS	60
SS-1	30-Oct-90	--	--	27	--	41.8	--	7	500	82
SS-1	30-Apr-91	NS	NS	5.2	NS	41	NS	29.4	NS	80
SS-1	23-Oct-91	--	0.1	7.3	--	53.4	--	--	200 B	20
SS-1	13-Apr-92	NS	NS	--	NS	51	NS	--	NS	5
SS-1	29-Oct-92	--	--	4.38	--	234.3	--	500	200 B	15
SS-1	07-Apr-93	NS	NS	--	NS	58	NS	41	NS	10
SS-2	04-Feb-86	--	--	2	--	100	--	--	NS	20
SS-2	29-May-86	NS	NS	1	NS	46	NS	26	NS	5
SS-2	18-Jul-86	NS	NS	--	NS	48	NS	15	NS	10
SS-2	14-Oct-86	--	--	2.4	--	60	--	17	NS	5
SS-2	29-Jan-87	--	--	1.2	--	63	--	4.5	NS	7
SS-2	21-Apr-87	NS	NS	9	NS	54	NS	25	NS	25
SS-2	07-Oct-87	--	--	--	--	45	--	15	20000	5
SS-2	18-Apr-88	0.01	--	2	--	46	--	12	NS	0
SS-2	20-Oct-88	--	--	5.6	--	53	--	--	84	55
SS-2	19-Apr-89	NS	NS	--	NS	50	NS	--	NS	5
SS-2	24-Oct-89	--	--	5.1	--	53	--	--	TNTC	30

FORT MONMOUTH GROUNDWATER AND SURFACE WATER ANALYTICAL RESULTS

LOCATION ID	DATE SAMPLED	ARSENIC DISSOLVED mg/L	BARIUM DISSOLVED mg/L	BIOCHEMICAL OXYGEN DEMAND mg/L	CADMIUM DISSOLVED mg/L	CHLORIDE mg/L	HEXAVALENT CHROMIUM DISSOLVED ug/L	CHEMICAL OXYGEN DEMAND mg/L	TOTAL COLIFORM N/100 ml	COLOR pt-co
SS-2	26-Apr-90	NS	NS	5.7	NS	50	NS	--	NS	60
SS-2	30-Oct-90	--	--	10.5	--	41.9	--	12	280	88
SS-2	30-Apr-91	NS	NS	4.9	NS	30.2	NS	44.6	NS	80
SS-2	23-Oct-91	--	0.06	3.8	--	1138	--	25	200 B	10
SS-2	13-Apr-92	NS	NS	4.3	NS	51	NS	--	NS	10
SS-2	29-Oct-92	--	--	6.03	--	466	--	1500	200 B	50
SS-2	07-Apr-93	NS	NS	4.3	NS	58	NS	41	NS	10
SS-3	04-Feb-86	--	--	2	--	119	--	--	NS	15
SS-3	29-May-86	NS	NS	--	NS	33	NS	10	NS	10
SS-3	18-Jul-86	NS	NS	--	NS	25	NS	19	NS	10
SS-3	14-Oct-86	--	--	9.4	--	33	--	22	NS	15
SS-3	29-Jan-87	--	--	--	--	40	--	6	NS	8
SS-3	21-Apr-87	NS	NS	7.5	NS	52	NS	30	NS	15
SS-3	07-Oct-87	--	--	5.6	--	19	--	20	7000	10
SS-3	18-Apr-88	0.012	--	--	--	55	--	5	NS	15
SS-3	20-Oct-88	--	--	7.5	--	64	--	--	96	80
SS-3	19-Apr-89	NS	NS	--	NS	46	NS	--	NS	30
SS-3	24-Oct-89	--	--	--	--	32	--	--	280	20
SS-3	26-Apr-90	NS	NS	--	NS	45	NS	--	NS	60
SS-3	30-Oct-90	--	--	44.5	--	34.4	--	--	1600	38
SS-3	30-Apr-91	NS	NS	4.4	NS	40.3	NS	46.3	NS	30
SS-3	23-Oct-91	--	0.04	6.95	--	1087	--	25	200 B	10
SS-3	13-Apr-92	NS	NS	4.8	NS	47	NS	--	NS	10
SS-3	29-Oct-92	--	--	6.73	--	3237	--	1500	200 B	20
SS-3	07-Apr-93	NS	NS	11	NS	56	NS	31	NS	15
SS-4	04-Feb-86	--	--	1.2	--	215	--	2	NS	20
SS-4	29-May-86	NS	NS	--	NS	310	NS	33	NS	20
SS-4	18-Jul-86	NS	NS	1.4	NS	400	NS	38	NS	10
SS-4	14-Oct-86	--	--	3.6	--	3.6	--	17	NS	15
SS-4	29-Jan-87	--	--	--	--	120	--	31	NS	10
SS-4	21-Apr-87	NS	NS	7.5	NS	45	NS	21	NS	20
SS-4	07-Oct-87	--	--	--	--	200	--	9	10000	15
SS-4	18-Apr-88	0.005	--	--	--	90	--	10	NS	10
SS-4	20-Oct-88	--	--	11	--	450	--	--	100	80

FORT MONMOUTH GROUNDWATER AND SURFACE WATER ANALYTICAL RESULTS

LOCATION ID	DATE SAMPLED	ARSENIC DISSOLVED mg/L	BARIUM DISSOLVED mg/L	BIOCHEMICAL OXYGEN DEMAND mg/L	CADMIUM DISSOLVED mg/L	CHLORIDE mg/L	HEXAVALENT CHROMIUM DISSOLVED ug/L	CHEMICAL OXYGEN DEMAND mg/L	TOTAL COLIFORM N/100 ml	COLOR pt-co
SS-4	19-Apr-89	NS	NS	--	NS	47	NS	--	NS	20
SS-4	24-Oct-89	--	--	--	--	65	--	--	440	20
SS-4	26-Apr-90	NS	NS	--	NS	70	NS	--	NS	60
SS-4	30-Oct-90	--	--	3	--	86.6	--	5	50	88
SS-4	30-Apr-91	NS	NS	5.5	NS	55.4	NS	27.6	NS	20
SS-4	23-Oct-91	--	0.04	5.4	--	1037	--	--	200 B	15
SS-4	13-Apr-92	NS	NS	--	NS	62	NS	--	NS	5
SS-4	29-Oct-92	--	--	8.65	--	9665	--	15000	200 B	25
SS-4	07-Apr-93	NS	NS	4.6	NS	2200	NS	84	NS	--
SS-5	04-Feb-86	--	--	--	--	95	--	--	NS	20
SS-5	29-May-86	NS	NS	8.5	NS	117	NS	113	NS	10
SS-5	18-Jul-86	NS	NS	--	NS	125	NS	18	NS	5
SS-5	14-Oct-86	--	0.05	3	--	80	--	10	NS	5
SS-5	29-Jan-87	--	--	--	--	130	--	33	NS	5
SS-5	21-Apr-87	NS	NS	12	NS	50	NS	30	NS	10
SS-5	07-Oct-87	--	--	--	--	1800	--	12	22000	5
SS-5	18-Apr-88	--	--	--	--	55	--	10	NS	5
SS-5	20-Oct-88	--	--	5.5	--	150	--	--	130	60
SS-5	19-Apr-89	NS	NS	--	NS	50	NS	--	NS	5
SS-5	24-Oct-89	--	--	--	--	56	--	--	TNTC	30
SS-5	26-Apr-90	NS	NS	--	NS	50	NS	--	NS	60
SS-5	30-Oct-90	--	--	9.5	--	51.8	--	17	300	80
SS-5	30-Apr-91	NS	NS	4.8	NS	30.2	NS	29.4	NS	40
SS-5	23-Oct-91	--	0.05	5.95	--	2175	--	25	200 B	10
SS-5	13-Apr-92	NS	NS	24	NS	65	NS	--	NS	10
SS-5	29-Oct-92	--	--	6.18	0.0002	4012	--	750	200 B	15
SS-5	07-Apr-93	NS	NS	5.3	NS	360	NS	31	NS	--
SS-6	04-Feb-86	--	--	--	--	104	--	--	NS	25
SS-6	29-May-86	NS	NS	2.6	NS	153	NS	23	NS	10
SS-6	18-Jul-86	NS	NS	1.8	NS	295	NS	34	NS	5
SS-6	14-Oct-86	--	--	3	--	118	--	--	NS	NA
SS-6	29-Jan-87	--	--	--	0.19	127	--	17	NS	7
SS-6	21-Apr-87	NS	NS	12	NS	60	NS	20	NS	15
SS-6	07-Oct-87	--	--	--	--	2000	--	16	20000	5

FORT MONMOUTH GROUNDWATER AND SURFACE WATER ANALYTICAL RESULTS

LOCATION ID	DATE SAMPLED	ARSENIC DISSOLVED mg/L	BARIUM DISSOLVED mg/L	BIOCHEMICAL OXYGEN DEMAND mg/L	CADMIUM DISSOLVED mg/L	CHLORIDE mg/L	HEXAVALENT CHROMIUM DISSOLVED ug/L	CHEMICAL OXYGEN DEMAND mg/L	TOTAL COLIFORM N/100 ml	COLOR pt-co
SS-6	18-Apr-88	--	--	--	--	67	--	7	NS	5-10
SS-6	20-Oct-88	--	--	7.6	--	590	--	--	200	60
SS-6	19-Apr-89	NS	NS	--	NS	54	NS	--	NS	5
SS-6	24-Oct-89	--	--	--	--	59	--	--	480	40
SS-6	26-Apr-90	NS	NS	--	NS	85	NS	--	NS	60
SS-6	30-Oct-90	--	--	16	--	320	--	18	900	88
SS-6	30-Apr-91	NS	NS	3.2	NS	40.3	NS	29.4	NS	80
SS-6	23-Oct-91	--	0.05	6.7	--	3171	--	--	200 B	15
SS-6	13-Apr-92	NS	NS	4.8	NS	52	NS	--	NS	10
SS-6	29-Oct-92	--	--	5.6	0.0005	166.1	--	1250	200 B	15
SS-6	07-Apr-93	NS	NS	--	NS	220	NS	20	NS	--
SS-7	04-Feb-86	--	--	--	--	111	--	2	NS	15
SS-7	29-May-86	NS	NS	2.1	NS	1200	NS	30	NS	15
SS-7	18-Jul-86	NS	NS	--	NS	6748	NS	228	NS	5
SS-7	14-Oct-86	--	--	3.2	--	670	--	23	NS	10
SS-7	29-Jan-87	--	--	--	--	2950	--	32	NS	5
SS-7	21-Apr-87	NS	NS	12	NS	50	NS	23	NS	15
SS-7	07-Oct-87	--	--	--	--	27000	--	150	13000	7
SS-7	18-Apr-88	0.013	--	--	--	1860	--	36	NS	5
SS-7	20-Oct-88	--	--	8.8	--	2800	--	67	200	60
SS-7	19-Apr-89	NS	NS	--	NS	910	NS	--	NS	5
SS-7	24-Oct-89	--	--	--	--	75	--	--	290	40
SS-7	26-Apr-90	NS	NS	--	NS	720	NS	--	NS	60
SS-7	30-Oct-90	--	--	2.8	0.02	1997	--	407	300	70
SS-7	30-Apr-91	NS	NS	3.9	NS	65.4	NS	31	NS	20
SS-7	23-Oct-91	--	0.04	3.5	--	2165	--	75	200 B	15
SS-7	13-Apr-92	NS	NS	--	NS	650	NS	--	NS	5
SS-7	29-Oct-92	--	--	6.53	0.0018	3695	--	150	200 B	15
SS-7	07-Apr-93	NS	NS	4.6	NS	210	NS	20	NS	15
SS-8	04-Feb-86	--	--	--	--	67	--	--	NS	25
SS-8	29-May-86	NS	NS	1.4	NS	1183	NS	48	NS	5
SS-8	18-Jul-86	NS	NS	--	NS	600	NS	26	NS	10
SS-8	14-Oct-86	--	--	2.8	--	215	--	20	NS	10
SS-8	29-Jan-87	--	--	--	--	107	--	--	NS	12

FORT MONMOUTH GROUNDWATER AND SURFACE WATER ANALYTICAL RESULTS

LOCATION ID	DATE SAMPLED	ARSENIC DISSOLVED mg/L	BARIUM DISSOLVED mg/L	BIOCHEMICAL OXYGEN DEMAND mg/L	CADMIUM DISSOLVED mg/L	CHLORIDE mg/L	HEXAVALENT CHROMIUM DISSOLVED ug/L	CHEMICAL OXYGEN DEMAND mg/L	TOTAL COLIFORM N/100 ml	COLOR pt-co
SS-8	21-Apr-87	NS	NS	1.4	NS	20	NS	20	NS	10
SS-8	07-Oct-87	--	--	4	--	310	--	20	9000	5/5
SS-8	18-Apr-88	--	--	--	--	377	--	17	NS	5
SS-8	20-Oct-88	--	--	4.4	--	1000	--	--	110	25
SS-8	19-Apr-89	NS	NS	--	NS	100	NS	--	NS	40
SS-8	24-Oct-89	--	--	4.7	--	180	--	--	100	40
SS-8	26-Apr-90	NS	NS	--	NS	180	NS	--	NS	60
SS-8	30-Oct-90	0.009	--	6.8	0.01	388	--	14	500	65
SS-8	30-Apr-91	NS	NS	5.3	NS	95.6	NS	31	NS	30
SS-8	23-Oct-91	--	0.05	5.55	--	654.4	--	50	200 B	20
SS-8	13-Apr-92	NS	NS	22	NS	200	NS	--	NS	10
SS-8	29-Oct-92	--	--	6.83	0.0005	883.4	--	1000	200 B	NA
SS-8	07-Apr-93	NS	NS	--	NS	290	NS	20	NS	20
SS-9	04-Feb-86	--	--	--	--	100	--	--	NS	20
SS-9	29-May-86	NS	NS	1.2	NS	912	NS	90	NS	10
SS-9	18-Jul-86	NS	NS	1.6	NS	1125	NS	23	NS	--
SS-9	14-Oct-86	--	--	3.6	--	400	--	13	NS	10
SS-9	29-Jan-87	--	--	4.2	--	77	--	--	NS	15
SS-9	21-Apr-87	NS	NS	1.1	NS	50	NS	20	NS	10
SS-9	07-Oct-87	--	--	1.2	--	290	--	8	7000	5
SS-9	18-Apr-88	--	--	--	--	653	--	20	NS	5
SS-9	20-Oct-88	--	--	6.5	--	950	--	--	180	30
SS-9	19-Apr-89	NS	NS	--	NS	100	NS	--	NS	20
SS-9	24-Oct-89	--	--	--	0.019	170	--	52	110	40
SS-9	26-Apr-90	NS	NS	--	NS	700	NS	--	NS	60
SS-9	30-Oct-90	0.01	--	2.1	0.01	413	--	37	140	58
SS-9	30-Apr-91	NS	NS	4.1	NS	550	NS	29.4	NS	25
SS-9	23-Oct-91	--	--	8	--	553.7	--	100	200 B	20
SS-9	13-Apr-92	NS	NS	19	NS	170	NS	--	NS	10
SS-9	29-Oct-92	--	--	7.33	0.0002	646.9	--	1250	200 B	30
SS-9	07-Apr-93	NS	NS	4.4	NS	610	NS	51	NS	20
SS-10	04-Feb-86	--	--	1.8	--	146	--	43	NS	30
SS-10	29-May-86	NS	NS	6.4	NS	23	NS	22	NS	--
SS-10	18-Jul-86	NS	NS	--	NS	27	NS	6	NS	--

FORT MONMOUTH GROUNDWATER AND SURFACE WATER ANALYTICAL RESULTS

LOCATION ID	DATE SAMPLED	ARSENIC DISSOLVED mg/L	BARIUM DISSOLVED mg/L	BIOCHEMICAL OXYGEN DEMAND mg/L	CADMIUM DISSOLVED mg/L	CHLORIDE mg/L	HEXAVALENT CHROMIUM DISSOLVED ug/L	CHEMICAL OXYGEN DEMAND mg/L	TOTAL COLIFORM N/100 ml	COLOR pt-co
SS-10	14-Oct-86	--	--	4.2	--	30	--	15	NS	10
SS-10	29-Jan-87	--	--	--	--	17	--	--	NS	13
SS-10	21-Apr-87	NS	NS	20	NS	30	NS	30	NS	10
SS-10	07-Oct-87	--	--	6.4	--	90	--	13	7000	5
SS-10	18-Apr-88	--	--	2	--	28	--	3	NS	5
SS-10	20-Oct-88	--	--	14	--	19	--	--	190	40
SS-10	19-Apr-89	NS	NS	--	NS	31	NS	--	NS	20
SS-10	24-Oct-89	--	--	--	--	26	--	--	500	30
SS-10	26-Apr-90	NS	NS	--	NS	60	NS	--	NS	40
SS-10	30-Oct-90	--	--	7.3	--	30.6	--	2	500	25
SS-10	30-Apr-91	NS	NS	4.2	NS	25.2	NS	37.8	NS	20
SS-10	23-Oct-91	--	0.05	3.8	--	453.1	--	--	200 B	25
SS-10	13-Apr-92	NS	NS	--	NS	28	NS	--	NS	5
SS-10	29-Oct-92	--	--	5.3	0.0003	100.7	--	--	200 B	15
SS-10	07-Apr-93	NS	NS	--	NS	96	NS	--	NS	10

NS – Not Sampled
-- – Not Detected
? – Data could not be read
B – Detected in blank
J – Estimated concentration, below detection limit
70/60 – Sample, duplicate
TNTC – Too numerous to count

FORT MONMOUTH GROUNDWATER AND SURFACE WATER ANALYTICAL RESULTS

LOCATION ID	DATE SAMPLED	COPPER DISSOLVED mg/L	CYANIDE TOTAL mg/L	FLUORIDE DISSOLVED mg/L	HARDNESS mg/L	IRON DISSOLVED mg/L	LEAD DISSOLVED mg/L	MANGANESE DISSOLVED mg/L	MERCURY DISSOLVED mg/L
MW-1	04-Feb-86	0.02	0.016	--	56	0.04	--	--	--
MW-1	29-May-86	--	NS	NS	NS	--	--	NS	NS
MW-1	18-Jul-86	--	NS	NS	NS	0.05	0.02	NS	NS
MW-1	14-Oct-86	--	NS	0.1	6	0.03	--	--	--
MW-1	29-Jan-87	--	0.11	--	32	0.15	0.02	--	--
MW-1	21-Apr-87	0.03	NS	NS	NS	1	--	NS	NS
MW-1	07-Oct-87	0.05	--	--	316	0.05	--	0.02	--
MW-1	18-Apr-88	--	--	0.16	767	0.3	--	0.07	--
MW-1	19-Apr-89	--	NS	NS	NS	7.1	--	NS	NS
MW-1	24-Oct-89	--	--	0.017	48	9.8	0.0059	0.027	--
MW-1	26-Apr-90	--	NS	NS	NS	16	--	NS	NS
MW-1	30-Oct-90	--	--	--	6.8	0.62	--	--	NS
MW-1	30-Apr-91	0.04	NS	NS	NS	24.9	0.075	NS	NS
MW-1	23-Oct-91	--	--	--	12	1.68	0.006	0.02	--
MW-1	13-Apr-92	--	NS	NS	NS	--	--	NS	NS
MW-1	29-Oct-92	--	--	0.5	16.5	0.31	--	--	--
MW-1	07-Apr-93	--	NS	NS	NS	--	--	NS	NS
MW-2	04-Feb-86	0.02	0.019	0.77	672	0.02	--	0.05	--
MW-2	29-May-86	--	NS	NS	NS	0.06	--	NS	NS
MW-2	18-Jul-86	0.02	NS	NS	NS	25.5	0.05	NS	NS
MW-2	14-Oct-86	0.03	NS	0.22	688	0.7	0.05	0.09	--
MW-2	29-Jan-87	0.02	0.11	0.11	96	7.2	0.08	0.17	--
MW-2	21-Apr-87	0.06	NS	NS	NS	15	--	NS	NS
MW-2	07-Oct-87	--	--	0.11	820	59	--	0.11	--
MW-2	18-Apr-88	--	--	0.51	1230	2.2	--	0.75	--
MW-2	20-Oct-88	--	--	0.68	2100	27	--	0.91	--
MW-2	19-Apr-89	--	NS	NS	NS	58	--	NS	NS
MW-2	24-Oct-89	--	--	0.67	620	31	0.045	0.68	0.00042
MW-2	26-Apr-90	0.039	NS	NS	NS	50	--	NS	NS
MW-2	30-Oct-90	0.1	--	0.595	914	8.6	0.07	0.68	NS
MW-2	30-Apr-91	0.06	NS	NS	NS	12.2	0.67	NS	NS
MW-2	23-Oct-91	--	--	--	344.7	23	0.007	0.7	--
MW-2	13-Apr-92	--	NS	NS	NS	3.4	--	NS	NS
MW-2	29-Oct-92	--	--	0.41	97.5	9.63	--	1	--

FORT MONMOUTH GROUNDWATER AND SURFACE WATER ANALYTICAL RESULTS

LOCATION ID	DATE SAMPLED	COPPER DISSOLVED mg/L	CYANIDE TOTAL mg/L	FLUORIDE DISSOLVED mg/L	HARDNESS mg/L	IRON DISSOLVED mg/L	LEAD DISSOLVED mg/L	MANGANESE DISSOLVED mg/L	MERCURY DISSOLVED mg/L
MW-2	07-Apr-93	--	NS	NS	NS	4.9	--	NS	NS
MW-3	04-Feb-86	--	0.04	0.51	672	0.2	--	0.77	--
MW-3 Dup. 1	04-Feb-86	--	0.034	0.51	672	0.2	--	0.77	--
MW-3 Dup. 2	04-Feb-86	--	0.045	0.51	664	0.22	--	0.78	--
MW-3	29-May-86	--	NS	NS	NS	0.02	0.03	NS	NS
MW-3	18-Jul-86	0.02	NS	NS	NS	8.83	0.04	NS	NS
MW-3	14-Oct-86	0.02	NS	1.7	572	0.16	0.06	1.68	--
MW-3	29-Jan-87	--	0.14	0.75	444	6.4	0.04	0.52	--
MW-3	21-Apr-87	0.03	NS	NS	NS	8.4	--	NS	NS
MW-3	07-Oct-87	--	--	0.6	792	14	--	0.5	--
MW-3	18-Apr-88	--	--	0.71	798	--	--	0.22	--
MW-3	20-Oct-88	--	--	0.59	880	10	0.0056	0.92	--
MW-3	19-Apr-89	--	NS	NS	NS	7.7	0.0052	NS	NS
MW-3	24-Oct-89	--	--	0.21	200	4.8	0.016	0.34	--
MW-3	26-Apr-90	--	NS	NS	NS	5.7	--	NS	NS
MW-3	30-Oct-90	--	--	0.426	561	6.7	--	0.7	NS
MW-3	30-Apr-91	--	NS	NS	NS	6.66	0.026	NS	NS
MW-3	23-Oct-91	--	--	--	339.1	22.2	0.14	0.67	--
MW-3	13-Apr-92	--	NS	NS	NS	12	0.027	NS	NS
MW-3	29-Oct-92	--	--	--	815	7.6	--	1.09	--
MW-3	07-Apr-93	--	NS	NS	NS	6.4	--	NS	NS
MW-4	04-Feb-86	--	0.013	0.14	808	3.3	--	0.13	--
MW-4	29-May-86	--	NS	NS	NS	--	--	NS	NS
MW-4	18-Jul-86	--	NS	NS	NS	7.53	0.04	NS	NS
MW-4	14-Oct-86	0.03	NS	0.88	156	0.09	0.06	0.41	--
MW-4	29-Jan-87	--	0.09	0.9	620	1.7	0.04	0.44	--
MW-4	21-Apr-87	0.03	NS	NS	NS	46	--	NS	NS
MW-4	07-Oct-87	--	--	0.31	596	5.9	--	0.47	--
MW-4	18-Apr-88	--	--	--	861	3.6	--	0.14	0.001
MW-4	20-Oct-88	--	--	0.057	870	63	0.025	0.17	0.0014
MW-4	19-Apr-89	0.087	NS	NS	NS	29	0.16	NS	NS
MW-4	24-Oct-89	--	--	0.05	660	56	0.014	0.2	0.0007
MW-4	26-Apr-90	--	NS	NS	NS	45	0.013	NS	NS
MW-4	30-Oct-90	--	--	--	999	40.2	--	0.15	NS

FORT MONMOUTH GROUNDWATER AND SURFACE WATER ANALYTICAL RESULTS

LOCATION ID	DATE SAMPLED	COPPER DISSOLVED mg/L	CYANIDE TOTAL mg/L	FLUORIDE DISSOLVED mg/L	HARDNESS mg/L	IRON DISSOLVED mg/L	LEAD DISSOLVED mg/L	MANGANESE DISSOLVED mg/L	MERCURY DISSOLVED mg/L
MW-4	30-Apr-91	--	NS	NS	NS	74.3	0.061	NS	NS
MW-4	23-Oct-91	--	--	--	327.1	148.6	0.21	0.82	0.0005
MW-4	13-Apr-92	--	NS	NS	NS	57	--	NS	NS
MW-4	29-Oct-92	--	--	0.31	17.5	46.4	--	0.19	--
MW-4	07-Apr-93	--	NS	NS	NS	74	--	NS	NS
SS-1	04-Feb-86	--	0.029	0.1	44	0.13	--	0.08	--
SS-1	29-May-86	--	NS	NS	NS	0.05	--	NS	NS
SS-1	18-Jul-86	--	NS	NS	NS	1.14	--	NS	NS
SS-1	14-Oct-86	0.02	--	0.17	128	0.12	--	0.02	--
SS-1	29-Jan-87	--	0.068	--	68	0.38	--	0.07	--
SS-1	21-Apr-87	0.04	NS	NS	NS	3.6	--	NS	NS
SS-1	07-Oct-87	--	--	--	72	2	--	0.08	--
SS-1	18-Apr-88	--	--	0.11	90	2.4	--	0.1	--
SS-1	20-Oct-88	--	--	0.1	82	1.7	--	0.081	--
SS-1	19-Apr-89	--	NS	NS	NS	1.6	--	NS	NS
SS-1	24-Oct-89	--	--	0.068	62	2.9	--	0.11	--
SS-1	26-Apr-90	--	NS	NS	NS	2.1	--	NS	NS
SS-1	30-Oct-90	--	--	0.122	70	2.24	--	0.1	NS
SS-1	30-Apr-91	--	NS	NS	NS	3.78	0.013	NS	NS
SS-1	23-Oct-91	--	--	--	62.8	1.19	--	0.08	--
SS-1	13-Apr-92	--	NS	NS	NS	0.48	--	NS	NS
SS-1	29-Oct-92	--	--	0.17	19	0.12	--	0.11	--
SS-1	07-Apr-93	--	NS	NS	NS	0.22	--	NS	NS
SS-2	04-Feb-86	0.03	0.014	0.13	148	0.02	--	0.08	--
SS-2	29-May-86	--	NS	NS	NS	0.05	--	NS	NS
SS-2	18-Jul-86	--	NS	NS	NS	1.4	--	NS	NS
SS-2	14-Oct-86	--	--	0.28	144	0.16	--	0.02	--
SS-2	29-Jan-87	--	0.052	--	72	0.38	0.04	0.07	--
SS-2	21-Apr-87	0.03	NS	NS	NS	2.4	--	NS	NS
SS-2	07-Oct-87	--	--	--	64	1.8	--	0.06	--
SS-2	18-Apr-88	--	--	0.1	94	2.5	--	0.1	--
SS-2	20-Oct-88	--	--	0.11	82	1.6	--	0.072	--
SS-2	19-Apr-89	--	NS	NS	NS	2.2	--	NS	NS
SS-2	24-Oct-89	--	--	0.068	60	2.7	--	0.11	--

FORT MONMOUTH GROUNDWATER AND SURFACE WATER ANALYTICAL RESULTS

LOCATION ID	DATE SAMPLED	COPPER DISSOLVED mg/L	CYANIDE TOTAL mg/L	FLUORIDE DISSOLVED mg/L	HARDNESS mg/L	IRON DISSOLVED mg/L	LEAD DISSOLVED mg/L	MANGANESE DISSOLVED mg/L	MERCURY DISSOLVED mg/L
SS-2	26-Apr-90	--	NS	NS	NS	2.2	--	NS	NS
SS-2	30-Oct-90	--	--	0.127	70	2.8	--	0.1	NS
SS-2	30-Apr-91	--	NS	NS	NS	3.71	0.011	NS	NS
SS-2	23-Oct-91	--	--	--	76.2	2.35	--	0.08	--
SS-2	13-Apr-92	--	NS	NS	NS	0.46	--	NS	NS
SS-2	29-Oct-92	--	--	0.22	242	0.35	--	0.08	--
SS-2	07-Apr-93	--	NS	NS	NS	0.41	--	NS	NS
SS-3	04-Feb-86	0.03	0.023	0.45	132	0.22	--	0.08	--
SS-3	29-May-86	--	NS	NS	NS	0.03	--	NS	NS
SS-3	18-Jul-86	0.02	NS	NS	NS	0.73	--	NS	NS
SS-3	14-Oct-86	--	--	0.26	NS	0.44	--	--	--
SS-3	29-Jan-87	--	0.19	0.31	92	0.26	0.02	0.07	--
SS-3	21-Apr-87	0.03	NS	NS	NS	2	--	NS	NS
SS-3	07-Oct-87	--	--	0.68	64	3.4	--	0.04	--
SS-3	18-Apr-88	--	--	0.26	112	2.1	--	0.1	--
SS-3	20-Oct-88	--	--	0.42	120	1.8	--	0.09	--
SS-3	19-Apr-89	--	NS	NS	NS	1.6	--	NS	NS
SS-3	24-Oct-89	--	--	0.17	76	1.5	--	0.072	--
SS-3	26-Apr-90	--	NS	NS	NS	1	--	NS	NS
SS-3	30-Oct-90	--	--	0.288	105	1.3	--	0.06	NS
SS-3	30-Apr-91	--	NS	NS	NS	1.86	0.005	NS	NS
SS-3	23-Oct-91	--	--	--	102.6	2.22	--	0.07	--
SS-3	13-Apr-92	--	NS	NS	NS	0.54	0.0076	NS	NS
SS-3	29-Oct-92	--	--	0.7	535	0.1	--	0.09	--
SS-3	07-Apr-93	--	NS	NS	NS	0.14	--	NS	NS
SS-4	04-Feb-86	--	0.032	--	160	0.08	--	0.07	--
SS-4	29-May-86	--	NS	NS	NS	--	--	NS	NS
SS-4	18-Jul-86	0.09	NS	NS	NS	0.74	0.04	NS	NS
SS-4	14-Oct-86	0.02	--	0.28	160	0.23	--	--	--
SS-4	29-Jan-87	--	0.11	0.23	104	0.48	0.03	0.08	--
SS-4	21-Apr-87	0.02	NS	NS	NS	2.2	--	NS	NS
SS-4	07-Oct-87	--	--	0.47	124	6.9	--	0.06	--
SS-4	18-Apr-88	--	--	0.26	135	5.9	--	0.13	--
SS-4	20-Oct-88	--	--	0.13	220	6	0.009	0.09	--

LOCATION ID	DATE SAMPLED	COPPER DISSOLVED mg/L	CYANIDE TOTAL mg/L	FLUORIDE DISSOLVED mg/L	HARDNESS mg/L	IRON DISSOLVED mg/L	LEAD DISSOLVED mg/L	MANGANESE DISSOLVED mg/L	MERCURY DISSOLVED mg/L
SS-4	19-Apr-89	--	NS	NS	NS	1.7	--	NS	NS
SS-4	24-Oct-89	--	--	0.078	68	3.4	0.0055	0.12	--
SS-4	26-Apr-90	--	NS	NS	NS	2	--	NS	NS
SS-4	30-Oct-90	--	--	0.127	85	2.5	--	0.1	NS
SS-4	30-Apr-91	--	NS	NS	NS	3.68	0.007	NS	NS
SS-4	23-Oct-91	--	--	--	183	1.67	--	0.09	--
SS-4	13-Apr-92	--	NS	NS	NS	0.77	--	NS	NS
SS-4	29-Oct-92	0.07	--	0.4	2810	--	--	0.08	--
SS-4	07-Apr-93	--	NS	NS	NS	--	--	NS	NS
SS-5	04-Feb-86	--	0.018	0.1	120	0.06	--	0.09	--
SS-5	29-May-86	--	NS	NS	NS	0.05	--	NS	NS
SS-5	18-Jul-86	--	NS	NS	NS	0.54	0.02	NS	NS
SS-5	14-Oct-86	--	--	0.49	124	0.14	--	--	--
SS-5	29-Jan-87	--	0.13	0.1	120	0.35	0.02	0.07	--
SS-5	21-Apr-87	0.03	NS	NS	NS	2.9	--	NS	NS
SS-5	07-Oct-87	--	0.019	0.22	412	1.4	--	0.06	--
SS-5	18-Apr-88	--	--	0.11	79	2.1	--	0.11	--
SS-5	20-Oct-88	--	--	0.12	110	2	--	0.081	--
SS-5	19-Apr-89	--	NS	NS	NS	1.6	--	NS	NS
SS-5	24-Oct-89	--	--	0.068	62	3.2	--	0.11	--
SS-5	26-Apr-90	--	NS	NS	NS	2.2	--	NS	NS
SS-5	30-Oct-90	--	--	0.117	74	2.7	--	0.1	NS
SS-5	30-Apr-91	--	NS	NS	NS	4.17	0.008	NS	NS
SS-5	23-Oct-91	--	--	--	194	1.09	--	0.07	--
SS-5	13-Apr-92	--	NS	NS	NS	0.38	--	NS	NS
SS-5	29-Oct-92	--	--	0.29	970	0.06	--	0.11	--
SS-5	07-Apr-93	--	NS	NS	NS	--	--	NS	NS
SS-6	04-Feb-86	--	0.018	0.13	136	0.07	--	0.09	--
SS-6	29-May-86	--	NS	NS	NS	0.02	--	NS	NS
SS-6	18-Jul-86	0.02	NS	NS	NS	0.5	0.07	NS	NS
SS-6	14-Oct-86	--	--	0.22	112	0.22	--	0.03	--
SS-6	29-Jan-87	--	0.12	--	100	0.34	0.03	0.06	--
SS-6	21-Apr-87	0.03	NS	NS	NS	2.3	--	NS	NS
SS-6	07-Oct-87	--	0.011	0.29	412	1.4	--	0.07	--

FORT MONMOUTH GROUNDWATER AND SURFACE WATER ANALYTICAL RESULTS

LOCATION ID	DATE SAMPLED	COPPER DISSOLVED mg/L	CYANIDE TOTAL mg/L	FLUORIDE DISSOLVED mg/L	HARDNESS mg/L	IRON DISSOLVED mg/L	LEAD DISSOLVED mg/L	MANGANESE DISSOLVED mg/L	MERCURY DISSOLVED mg/L
SS-6	18-Apr-88	--	--	0.1	76	2.9	--	0.11	--
SS-6	20-Oct-88	--	--	0.14	220	1.9	--	0.11	--
SS-6	19-Apr-89	--	NS	NS	NS	1.6	--	NS	NS
SS-6	24-Oct-89	--	--	0.067	60	3.1	--	0.12	--
SS-6	26-Apr-90	--	NS	NS	NS	3.4	--	NS	NS
SS-6	30-Oct-90	--	--	0.135	160	2.5	--	0.1	NS
SS-6	30-Apr-91	--	NS	NS	NS	3.96	0.013	NS	NS
SS-6	23-Oct-91	--	--	--	90.1	1.26	--	0.08	--
SS-6	13-Apr-92	--	NS	NS	NS	0.28	--	NS	NS
SS-6	29-Oct-92	--	--	0.29	500	0.07	--	0.1	--
SS-6	07-Apr-93	--	NS	NS	NS	0.24	--	NS	NS
SS-7	04-Feb-86	--	0.02	0.2	148	0.47	--	0.08	--
SS-7	29-May-86	--	NS	NS	NS	0.02	--	NS	NS
SS-7	18-Jul-86	0.02	NS	NS	NS	0.65	0.09	NS	NS
SS-7	14-Oct-86	0.03	--	0.49	384	0.06	0.02	0.03	--
SS-7	29-Jan-87	--	0.13	0.47	444	0.23	0.04	0.06	--
SS-7	21-Apr-87	0.05	NS	NS	NS	2.2	--	NS	NS
SS-7	07-Oct-87	0.03	--	0.55	1616	3.1	--	0.2	--
SS-7	18-Apr-88	--	--	0.26	641	2.4	--	0.12	--
SS-7	20-Oct-88	--	--	0.33	1200	2.5	--	0.16	--
SS-7	19-Apr-89	--	NS	NS	NS	2	--	NS	NS
SS-7	24-Oct-89	--	--	1	120	2.8	--	0.12	--
SS-7	26-Apr-90	--	NS	NS	NS	1.8	--	NS	NS
SS-7	30-Oct-90	--	--	0.262	824	1.9	--	0.12	NS
SS-7	30-Apr-91	0.05	NS	NS	NS	3.21	0.013	NS	NS
SS-7	23-Oct-91	--	--	0.11	116.74	1.44	--	0.08	--
SS-7	13-Apr-92	--	NS	NS	NS	0.42	--	NS	NS
SS-7	29-Oct-92	--	--	0.42	134	1.56	--	0.1	--
SS-7	07-Apr-93	--	NS	NS	NS	0.15	--	NS	NS
SS-8	04-Feb-86	0.04	0.017	0.2	128	0.15	--	0.07	--
SS-8	29-May-86	--	NS	NS	NS	0.02	--	NS	NS
SS-8	18-Jul-86	--	NS	NS	NS	0.44	--	NS	NS
SS-8	14-Oct-86	0.02	--	0.6	156	0.12	--	--	--
SS-8	29-Jan-87	0.03	0.13	0.31	104	0.38	0.02	0.07	--

FORT MONMOUTH GROUNDWATER AND SURFACE WATER ANALYTICAL RESULTS

LOCATION ID	DATE SAMPLED	COPPER DISSOLVED mg/L	CYANIDE TOTAL mg/L	FLUORIDE DISSOLVED mg/L	HARDNESS mg/L	IRON DISSOLVED mg/L	LEAD DISSOLVED mg/L	MANGANESE DISSOLVED mg/L	MERCURY DISSOLVED mg/L
SS-8	21-Apr-87	0.04	NS	NS	NS	1.7	--	NS	NS
SS-8	07-Oct-87	--	--	0.17	136	1.2	--	0.04	--
SS-8	18-Apr-88	--	--	0.27	242	1.6	--	0.09	--
SS-8	20-Oct-88	--	--	0.33	420	1	--	0.063	--
SS-8	19-Apr-89	--	NS	NS	NS	1.4	--	NS	NS
SS-8	24-Oct-89	--	--	1	100	1.6	--	0.076	--
SS-8	26-Apr-90	--	NS	NS	NS	1.9	--	NS	NS
SS-8	30-Oct-90	--	--	0.148	211	1.6	--	0.07	NS
SS-8	30-Apr-91	--	NS	NS	NS	2.57	--	NS	NS
SS-8	23-Oct-91	--	--	--	174.6	1.73	--	0.06	--
SS-8	13-Apr-92	--	NS	NS	NS	0.22	--	NS	NS
SS-8	29-Oct-92	--	--	0.24	340	0.47	--	0.09	--
SS-8	07-Apr-93	--	NS	NS	NS	0.34	--	NS	NS
SS-9	04-Feb-86	0.03	0.029	0.2	120	--	--	0.04	--
SS-9	29-May-86	--	NS	NS	NS	0.04	--	NS	NS
SS-9	18-Jul-86	--	NS	NS	NS	0.39	--	NS	NS
SS-9	14-Oct-86	0.02	0.037	10	368	0.06	--	0.02	--
SS-9	29-Jan-87	--	0.19	0.13	100	0.5	0.02	0.07	--
SS-9	21-Apr-87	0.03	NS	NS	NS	1.9	--	NS	NS
SS-9	07-Oct-87	--	--	0.11	128	1.1	--	0.04	--
SS-9	18-Apr-88	--	--	0.27	266	2.1	--	0.08	--
SS-9	20-Oct-88	--	--	0.33	340	0.86	--	0.053	--
SS-9	19-Apr-89	--	NS	NS	NS	1.4	0.0069	NS	NS
SS-9	24-Oct-89	--	--	0.099	130	1.7	0.0058	0.31	0.00033
SS-9	26-Apr-90	--	NS	NS	NS	1.9	0.014	NS	NS
SS-9	30-Oct-90	--	--	0.15	207	1.5	--	0.06	NS
SS-9	30-Apr-91	0.03	NS	NS	NS	3.18	0.01	NS	NS
SS-9	23-Oct-91	--	--	0.13	334	1.76	0.013	0.07	--
SS-9	13-Apr-92	--	NS	NS	NS	0.18	--	NS	NS
SS-9	29-Oct-92	--	--	0.21	275	0.42	--	0.1	--
SS-9	07-Apr-93	--	NS	NS	NS	0.14	--	NS	NS
SS-10	04-Feb-86	0.03	0.019	0.13	132	0.13	--	0.05	--
SS-10	29-May-86	--	NS	NS	NS	0.03	--	NS	NS
SS-10	18-Jul-86	0.03	NS	NS	NS	0.25	--	NS	NS

FORT MONMOUTH GROUNDWATER AND SURFACE WATER ANALYTICAL RESULTS

LOCATION ID	DATE SAMPLED	COPPER DISSOLVED mg/L	CYANIDE TOTAL mg/L	FLUORIDE DISSOLVED mg/L	HARDNESS mg/L	IRON DISSOLVED mg/L	LEAD DISSOLVED mg/L	MANGANESE DISSOLVED mg/L	MERCURY DISSOLVED mg/L
SS-10	14-Oct-86	--	--	1.9	208	0.04	--	0.02	--
SS-10	29-Jan-87	0.03	0.14	0.13	96	0.24	0.02	0.05	--
SS-10	21-Apr-87	0.03	NS	NS	NS	0.8	--	NS	NS
SS-10	07-Oct-87	--	--	0.29	80/80	1.1	--	0.04	--
SS-10	18-Apr-88	--	--	0.21	74	0.7	--	0.07	--
SS-10	20-Oct-88	--	--	0.36	64	0.72	--	0.044	--
SS-10	19-Apr-89	--	NS	NS	NS	0.98	0.0069	NS	NS
SS-10	24-Oct-89	--	--	0.16	68	1	--	0.062	0.00024
SS-10	26-Apr-90	--	NS	NS	NS	0.64	--	NS	NS
SS-10	30-Oct-90	--	--	0.171	83	0.62	--	0.05	NS
SS-10	30-Apr-91	0.03	NS	NS	NS	1.15	0.012	NS	NS
SS-10	23-Oct-91	--	--	--	77.6	0.87	--	0.03	--
SS-10	13-Apr-92	--	NS	NS	NS	0.14	--	NS	NS
SS-10	29-Oct-92	--	--	0.2	80	0.09	--	0.05	--
SS-10	07-Apr-93	--	NS	NS	NS	0.2	--	NS	NS

NS – Not Sampled
-- – Not Detected
? – Data could not be read
B – Detected in blank
J – Estimated concentration, below detection limit
70/60 – Sample, duplicate
TNTC – Too numerous to count

FORT MONMOUTH GROUNDWATER AND SURFACE WATER ANALYTICAL RESULTS

LOCATION ID	DATE SAMPLED	METHYLENE BLUE ACTIVE SUBSTANCES mg/L	AMMONIA mg/L	NITRATE mg/L	ODOR T.O.N.	pH	PHENOLS ug/L	SELENIUM DISSOLVED mg/L	SILVER DISSOLVED mg/L	SODIUM DISSOLVED mg/L	SULFATE mg/L
MW-1	04-Feb-86	--	--	1.5	1	4.9	--	--	--	18	36
MW-1	29-May-86	--	--	2.7	NA	5	--	NS	NS	4.55	24
MW-1	18-Jul-86	--	--	1	--	5	--	NS	NS	6.?	NA
MW-1	14-Oct-86	--	--	1.9	0	NA	--	--	--	4.6	34
MW-1	29-Jan-87	0.06	--	0.31	--	5.7	--	--	--	16	26
MW-1	21-Apr-87	--	0.15	1.65	--	5.35	--	NS	NS	3.4	25
MW-1	07-Oct-87	0.22	--	0.39	NS	4.35	--	--	--	18	7
MW-1	18-Apr-88	NS	--	NS	NS	4	NS	--	--	340	--
MW-1	19-Apr-89	--	--	4	NS	5.7	--	NS	NS	16	35
MW-1	24-Oct-89	--	--	2.5	NS	6.1	--	--	--	76	11
MW-1	26-Apr-90	--	--	2.8	NS	5	--	NS	NS	59	28
MW-1	30-Oct-90	--	--	5.76	NS	4.77	26.7	--	--	48.7	50.5
MW-1	30-Apr-91	--	--	0.5	NS	5.79	--	NS	NS	20.41	3
MW-1	23-Oct-91	--	0.13	1.04	NS	5.39	--	--	--	59.4	406
MW-1	13-Apr-92	--	--	2	NS	5.58	--	NS	NS	53	24
MW-1	29-Oct-92	--	0.6	1.85	NS	5.35	--	--	--	64.4	2140
MW-1	07-Apr-93	--	--	3	NS	4.1	0.24	NS	NS	52	50
MW-2	04-Feb-86	--	0.2	1.3	1	6.65	--	--	--	32.5	477
MW-2	29-May-86	0.25	98.1	0.65	6	6.25	--	NS	NS	27.8	--
MW-2	18-Jul-86	0.3	102	1.9	6	6.45	--	NS	NS	484	1
MW-2	14-Oct-86	--	NA	0.12	NA	NA	--	--	--	19	--
MW-2	29-Jan-87	0.36	121	0.38	8	6.4	--	--	--	617	--
MW-2	21-Apr-87	--	0.35	0.13	1	6.65	--	NS	NS	8.7	252
MW-2	07-Oct-87	0.26	90	0.49	NS	6.25	0.11	--	--	670	--
MW-2	18-Apr-88	NS	4.7	NS	NS	6.6	NS	--	--	30	185
MW-2	20-Oct-88	0.025	4	--	NS	6.3	--	--	0.021	37	87
MW-2	19-Apr-89	0.11	90	--	NS	6.1	--	NS	NS	650	4.4
MW-2	24-Oct-89	0.05	--	--	NS	6.1	--	--	--	130	110
MW-2	26-Apr-90	--	--	--	NS	6.2	--	NS	NS	16	74
MW-2	30-Oct-90	--	0.133	0.1	NS	6.69	--	--	--	54.9	550
MW-2	30-Apr-91	--	--	--	NS	6.67	--	NS	NS	6.32	101.9
MW-2	23-Oct-91	--	1.67	1.29	NS	6.65	--	--	--	156.5	500
MW-2	13-Apr-92	0.077	--	0.088	NS	6.8	--	NS	NS	300	310
MW-2	29-Oct-92	--	10.5	--	NS	7.7	--	--	--	335	67.7

FORT MONMOUTH GROUNDWATER AND SURFACE WATER ANALYTICAL RESULTS

LOCATION ID	DATE SAMPLED	METHYLENE BLUE ACTIVE SUBSTANCES mg/L	AMMONIA mg/L	NITRATE mg/L	ODOR T.O.N.	pH	PHENOLS ug/L	SELENIUM DISSOLVED mg/L	SILVER DISSOLVED mg/L	SODIUM DISSOLVED mg/L	SULFATE mg/L
MW-2	07-Apr-93	0.08	4.1	22	NS	6.84	0.31	NS	NS	140	94
MW-3	04-Feb-86	0.23	5.4	1.5	4	6.7	--	--	--	57.5	235
MW-3 Dup. 1	04-Feb-86	0.23	5.2	1.3	4	6.7	--	--	--	57.5	229
MW-3 Dup. 2	04-Feb-86	0.23	5.6	1.7	4	6.65	--	--	--	57	240
MW-3	29-May-86	0.31	8.8	0.22	17	6.65	--	NS	NS	13.8	190
MW-3	18-Jul-86	0.41	3.2	1.6	--	6.85	--	NS	NS	187	26
MW-3	14-Oct-86	0.1	8.8	0.23	3	NA	--	--	--	15.9	19
MW-3	29-Jan-87	0.22	4.2	0.15	1	7.35	--	--	--	26	145
MW-3	21-Apr-87	0.17	4.6	0.16	8	6.7	--	NS	NS	32	238
MW-3	07-Oct-87	0.14	--	0.21	NS	6.5	0.4	--	--	13	154
MW-3	18-Apr-88	NS	0.5	NS	NS	6.6	NS	0.007	--	15.2	215
MW-3	20-Oct-88	0.14	14	--	NS	6.5	--	--	0.012	77	1.4
MW-3	19-Apr-89	0.05	5.5	--	NS	6.3	--	NS	NS	14	220
MW-3	24-Oct-89	--	--	--	NS	6.2	--	--	--	14	26
MW-3	26-Apr-90	--	--	--	NS	6.4	--	NS	NS	19	110
MW-3	30-Oct-90	0.033	3.44	--	NS	6.39	44.7	--	--	26.2	74.2
MW-3	30-Apr-91	--	0.85	--	NS	6.24	--	NS	NS	4.87	104.7
MW-3	23-Oct-91	--	9.57	0.92	NS	6.74	1.92	--	--	66.2	468.6
MW-3	13-Apr-92	0.16	7.8	0.9	NS	6.82	--	NS	NS	160	100
MW-3	29-Oct-92	--	29.3	0.9	NS	6.95	--	--	--	168	22.4
MW-3	07-Apr-93	0.098	21	23	NS	6.74	0.43	NS	NS	140	23
MW-4	04-Feb-86	--	28	3.9	12	6.65	0.031	--	--	329	3.3
MW-4	29-May-86	0.28	1.7	0.22	2	6.55	0.1	NS	NS	13.6	100
MW-4	18-Jul-86	0.41	9.8	1.6	2	6.85	--	NS	NS	108	134
MW-4	14-Oct-86	--	3.3	0.22	3	NA	--	--	--	15.6	264
MW-4	29-Jan-87	0.2	0.6	9.7	1.4	7.65	--	--	--	9.5	215
MW-4	21-Apr-87	0.315	108	0.2	10	6.35	--	NS	NS	11	30.6
MW-4	07-Oct-87	0.17	0.2	0.18	NS	6.45	5.3	--	--	22	30
MW-4	18-Apr-88	NS	102.4	NS	NS	6.3	NS	--	--	476	1
MW-4	20-Oct-88	0.12	110	--	NS	6	--	--	0.012	640	35
MW-4	19-Apr-89	--	2.8	--	NS	6.4	--	NS	NS	6	310
MW-4	24-Oct-89	0.14	80	--	NS	5.5	--	--	--	430	72
MW-4	26-Apr-90	--	80	--	NS	6.4	--	NS	NS	450	28
MW-4	30-Oct-90	0.105	91.2	0.562	NS	6.21	54.4	0.036	--	470.1	--

FORT MONMOUTH GROUNDWATER AND SURFACE WATER ANALYTICAL RESULTS

LOCATION ID	DATE SAMPLED	METHYLENE BLUE ACTIVE SUBSTANCES mg/L	AMMONIA mg/L	NITRATE mg/L	ODOR T.O.N.	pH	PHENOLS ug/L	SELENIUM DISSOLVED mg/L	SILVER DISSOLVED mg/L	SODIUM DISSOLVED mg/L	SULFATE mg/L
MW-4	30-Apr-91	--	78.3	2	NS	6.36	--	NS	NS	489.5	2.7
MW-4	23-Oct-91	--	5.53	3.57	NS	6.37	--	--	--	466	624.2
MW-4	13-Apr-92	0.13	100	0.052	NS	6.42	--	NS	NS	560	33
MW-4	29-Oct-92	--	0.7	3.8	NS	6.35	--	--	--	466.3	46.6
MW-4	07-Apr-93	0.12	100	36	NS	6.44	0.54	NS	NS	370	65
SS-1	04-Feb-86	0.48	--	2.7	9	6.75	0.004	--	--	47	28
SS-1	29-May-86	0.32	--	0.39	1.4	6.95	--	NS	NS	5.54	23
SS-1	18-Jul-86	0.06	0.5	0.46	--	7.35	--	NS	NS	24	22
SS-1	14-Oct-86	--	--	0.61	0	NA	--	--	--	4.53	19
SS-1	29-Jan-87	0.17	0.9	1.35	--	7.25	--	--	--	30	29
SS-1	21-Apr-87	--	0.2	0.31	--	6.85	--	NS	NS	24	24
SS-1	07-Oct-87	0.12	--	0.62	NS	7.05	NA	--	--	23	19
SS-1	18-Apr-88	NS	0.2	NS	NS	6.8	NS	--	--	23.8	23.3
SS-1	20-Oct-88	--	--	--	NS	6.9	--	--	--	19	29
SS-1	19-Apr-89	--	--	--	NS	6.4	--	NS	NS	18	40
SS-1	24-Oct-89	--	--	--	NS	6	--	--	--	32	24
SS-1	26-Apr-90	--	--	--	NS	6.2	--	NS	NS	21	28
SS-1	30-Oct-90	--	0.334	0.835	NS	6.61	--	--	--	21.8	30
SS-1	30-Apr-91	--	0.19	--	NS	6.34	--	NS	NS	19.26	13.9
SS-1	23-Oct-91	--	0.83	1.57	NS	6.89	--	--	--	21.6	38.8
SS-1	13-Apr-92	0.053	1.4	0.55	NS	7.11	--	NS	NS	26	36
SS-1	29-Oct-92	--	0.8	--	NS	7.15	--	--	--	97.5	64.7
SS-1	07-Apr-93	--	--	2.3	NS	6.88	0.24	NS	NS	25	32
SS-2	04-Feb-86	--	--	3	1	6.65	--	--	--	47.5	31
SS-2	29-May-86	--	0.2	--	1.4	6.95	--	NS	NS	7.31	37
SS-2	18-Jul-86	0.11	0.4	0.31	--	7.15	--	NS	NS	24.5	20
SS-2	14-Oct-86	--	0.3	0.51	0	NA	--	--	--	8.13	12
SS-2	29-Jan-87	0.11	1	0.8	--	6.9	--	--	--	31	33
SS-2	21-Apr-87	--	0.4	0.63	--	6.75	--	NS	NS	18	15
SS-2	07-Oct-87	0.12	0.6	0.47	NS	7.1	0.17	--	--	22	20
SS-2	18-Apr-88	NS	0.2	NS	NS	7	NS	--	--	23.8	14.4
SS-2	20-Oct-88	--	--	--	NS	6.8	--	--	--	21	22
SS-2	19-Apr-89	--	--	--	NS	6.4	--	NS	NS	18	41
SS-2	24-Oct-89	--	--	--	NS	6.1	--	--	--	30	27

FORT MONMOUTH GROUNDWATER AND SURFACE WATER ANALYTICAL RESULTS

LOCATION ID	DATE SAMPLED	METHYLENE BLUE ACTIVE SUBSTANCES mg/L	AMMONIA mg/L	NITRATE mg/L	ODOR T.O.N.	pH	PHENOLS ug/L	SELENIUM DISSOLVED mg/L	SILVER DISSOLVED mg/L	SODIUM DISSOLVED mg/L	SULFATE mg/L
SS-2	26-Apr-90	--	--	--	NS	5.9	--	NS	NS	22	22
SS-2	30-Oct-90	--	0.383	0.865	NS	6.72	--	--	--	21.6	30.8
SS-2	30-Apr-91	--	0.24	--	NS	6.57	--	NS	NS	20.62	35.9
SS-2	23-Oct-91	--	--	1.33	NS	6.94	2.85	--	--	47.8	34.6
SS-2	13-Apr-92	0.12	1.3	0.62	NS	6.52	--	NS	NS	26	40
SS-2	29-Oct-92	--	1.1	--	NS	7.35	--	--	--	235.5	91.9
SS-2	07-Apr-93	0.028	--	2.7	NS	6.88	0.3	NS	NS	23	25
SS-3	04-Feb-86	--	--	2.5	1	6.8	--	--	--	54	25
SS-3	29-May-86	--	--	0.38	2	7.3	--	NS	NS	13.3	20
SS-3	18-Jul-86	0.25	--	0.3	--	7.45	--	NS	NS	13	19
SS-3	14-Oct-86	0.1	0.2	0.5	0	NA	--	--	--	5.23	12
SS-3	29-Jan-87	0.1	0.17	0.95	--	7.35	--	--	--	19	29
SS-3	21-Apr-87	--	0.15	0.72	--	7.05	--	NS	NS	16	23
SS-3	07-Oct-87	0.1	--	0.3	NS	7.15	0.21	--	--	7.9	14
SS-3	18-Apr-88	NS	--	NS	NS	7.3	NS	--	--	17.8	--
SS-3	20-Oct-88	--	--	--	NS	7.1	--	--	--	27	29
SS-3	19-Apr-89	--	--	--	NS	6.8	--	NS	NS	16	35
SS-3	24-Oct-89	--	--	--	NS	6.3	--	--	--	14	24
SS-3	26-Apr-90	--	--	--	NS	5.9	--	NS	NS	16	31
SS-3	30-Oct-90	--	--	0.5	NS	7.01	--	--	--	14.8	27.8
SS-3	30-Apr-91	--	--	--	NS	6.95	--	NS	NS	18.21	27.2
SS-3	23-Oct-91	--	--	2.01	NS	6.96	--	--	--	47.8	92
SS-3	13-Apr-92	0.063	--	0.18	NS	7.26	--	NS	NS	20	34
SS-3	29-Oct-92	--	0.4	5.3	NS	7.15	--	--	--	662.5	37.5
SS-3	07-Apr-93	--	--	3.5	NS	6.96	0.23	NS	NS	24	25
SS-4	04-Feb-86	0.28	--	2.4	1	6.6	--	--	--	73.8	31
SS-4	29-May-86	--	--	0.38	NA	7.2	--	NS	NS	18.8	35
SS-4	18-Jul-86	0.2	1.4	0.43	1	7	--	NS	NS	259	168
SS-4	14-Oct-86	--	--	0.52	0	NA	--	--	--	8.77	16
SS-4	29-Jan-87	0.21	0.6	1.35	--	7.25	--	--	--	71	38
SS-4	21-Apr-87	0.205	0.35	0.63	--	7.15	--	NS	NS	18	25
SS-4	07-Oct-87	0.13	--	0.36	NS	6.95	0.35	--	--	83	34
SS-4	18-Apr-88	NS	0.5	NS	NS	6.8	NS	--	--	52	28.8
SS-4	20-Oct-88	--	--	--	NS	6.7	--	--	--	250	62

LOCATION ID	DATE SAMPLED	METHYLENE BLUE ACTIVE SUBSTANCES mg/L	AMMONIA mg/L	NITRATE mg/L	ODOR T.O.N.	pH	PHENOLS ug/L	SELENIUM DISSOLVED mg/L	SILVER DISSOLVED mg/L	SODIUM DISSOLVED mg/L	SULFATE mg/L
SS-4	19-Apr-89	--	--	--	NS	6.8	--	NS	NS	16	35
SS-4	24-Oct-89	--	--	--	NS	6.2	--	--	--	32	27
SS-4	26-Apr-90	--	--	--	NS	5.8	--	NS	NS	31	26
SS-4	30-Oct-90	--	0.348	0.88	NS	6.79	--	--	--	44.2	38
SS-4	30-Apr-91	--	0.2	--	NS	6.83	--	NS	NS	25	35.4
SS-4	23-Oct-91	--	0.23	2.99	NS	6.87	--	--	--	510	114.8
SS-4	13-Apr-92	0.043	--	0.6	NS	6.51	--	NS	NS	32	36
SS-4	29-Oct-92	--	1	27.2	NS	7.55	--	--	--	5352	158.3
SS-4	07-Apr-93	--	--	18	NS	6.92	0.13	NS	NS	440	93
SS-5	04-Feb-86	--	--	2.2	1	6.5	--	--	--	51.7	28
SS-5	29-May-86	--	--	0.38	NA	7.1	--	NS	NS	18.1	29
SS-5	18-Jul-86	--	--	0.11	1	7.15	--	NS	NS	166	83
SS-5	14-Oct-86	0.12	--	0.73	0	NA	--	--	--	9.13	22
SS-5	29-Jan-87	0.22	0.5	1.25	1	7.2	--	--	--	62	40
SS-5	21-Apr-87	--	0.1	0.59	--	6.9	--	NS	NS	22	26
SS-5	07-Oct-87	0.07	0.6	0.54	NS	6.85	0.21	--	--	470	140
SS-5	18-Apr-88	NS	0.2	NS	NS	6.9	NS	--	--	31.4	4.5
SS-5	20-Oct-88	--	--	--	NS	6.7	--	--	--	71	31
SS-5	19-Apr-89	--	1.3	--	NS	6.3	--	NS	NS	18	39
SS-5	24-Oct-89	--	--	--	NS	6	--	--	--	33	28
SS-5	26-Apr-90	--	--	--	NS	5.5	--	NS	NS	23	20
SS-5	30-Oct-90	--	0.367	0.765	NS	6.71	--	--	--	28.3	32.5
SS-5	30-Apr-91	--	0.23	--	NS	6.8	--	NS	NS	20.42	26.8
SS-5	23-Oct-91	--	0.58	5.86	NS	7.05	--	--	--	2470	99.7
SS-5	13-Apr-92	0.049	--	0.61	NS	7.01	--	NS	NS	31	40
SS-5	29-Oct-92	--	0.6	15	NS	7.15	--	--	--	1646	526
SS-5	07-Apr-93	--	--	5.9	NS	6.87	0.17	NS	NS	120	47
SS-6	04-Feb-86	--	--	2.1	1.4	6.6	--	--	--	51.4	30
SS-6	29-May-86	--	--	0.5	1.4	6.9	--	NS	NS	17.3	32
SS-6	18-Jul-86	--	0.8	0.12	1	6.95	--	NS	NS	172	158
SS-6	14-Oct-86	--	0.1	0.71	0	NA	--	--	--	9.82	25
SS-6	29-Jan-87	0.11	0.9	1.2	--	6.55	--	--	--	55	39
SS-6	21-Apr-87	--	0.3	1.5	--	6.85	--	NS	NS	15	27
SS-6	07-Oct-87	0.1	--	0.33	NS	7.05	NA	--	--	470	149

FORT MONMOUTH GROUNDWATER AND SURFACE WATER ANALYTICAL RESULTS

LOCATION ID	DATE SAMPLED	METHYLENE BLUE ACTIVE SUBSTANCES mg/L	AMMONIA mg/L	NITRATE mg/L	ODOR T.O.N.	pH	PHENOLS ug/L	SELENIUM DISSOLVED mg/L	SILVER DISSOLVED mg/L	SODIUM DISSOLVED mg/L	SULFATE mg/L
SS-6	18-Apr-88	NS	0.2	NS	NS	6.5	NS	--	--	36.2	24.1
SS-6	20-Oct-88	--	--	--	NS	6.5	--	--	--	260	67
SS-6	19-Apr-89	--	1.5	--	NS	6.2	--	NS	NS	19	40
SS-6	24-Oct-89	--	--	--	NS	6.1	--	--	--	33	27
SS-6	26-Apr-90	--	--	--	NS	5.6	--	NS	NS	28	30
SS-6	30-Oct-90	--	0.458	0.77	NS	6.63	--	--	--	155	66
SS-6	30-Apr-91	--	0.23	--	NS	6.77	--	NS	NS	20.92	32.6
SS-6	23-Oct-91	--	0.64	4.51	NS	7.08	1.11	--	--	1478	248.5
SS-6	13-Apr-92	0.063	--	0.65	NS	7.06	--	NS	NS	27	40
SS-6	29-Oct-92	--	1	9.4	NS	7.15	--	--	--	1187	1674
SS-6	07-Apr-93	0.032	--	4.1	NS	6.82	0.15	NS	NS	68	36
SS-7	04-Feb-86	--	--	1.8	2	6.7	--	--	--	58.6	29
SS-7	29-May-86	--	0.6	0.36	2	6.85	--	NS	NS	24.9	128
SS-7	18-Jul-86	0.06	1.2	0.34	--	7.2	--	NS	NS	232	710
SS-7	14-Oct-86	--	--	0.68	0	NA	--	--	--	19.9	119
SS-7	29-Jan-87	0.12	0.4	0.75	--	7.25	--	--	--	453	195
SS-7	21-Apr-87	--	0.35	0.61	--	6.85	--	NS	NS	28	29
SS-7	07-Oct-87	0.08	--	0.39	NS	6.95	0.1	--	--	2100	690
SS-7	18-Apr-88	NS	0.3	NS	NS	6.8	NS	--	--	892	276
SS-7	20-Oct-88	0.025	--	--	NS	6.4	--	--	0.012	1600	400
SS-7	19-Apr-89	--	4.2	--	NS	6.5	--	NS	NS	610	150
SS-7	24-Oct-89	0.06	--	--	NS	6.1	--	--	--	41	27
SS-7	26-Apr-90	--	--	--	NS	5.9	--	NS	NS	480	140
SS-7	30-Oct-90	--	0.366	7.92	NS	6.67	--	0.07	--	1134	295
SS-7	30-Apr-91	--	0.23	--	NS	6.87	--	NS	NS	37	37
SS-7	23-Oct-91	--	0.53	4.11	NS	7.07	1.34	--	--	1120	294.9
SS-7	13-Apr-92	0.087	--	0.38	NS	7	--	NS	NS	360	130
SS-7	29-Oct-92	--	0.6	13.4	NS	7.35	--	--	--	1929	677
SS-7	07-Apr-93	--	--	5.3	NS	6.85	0.19	NS	NS	66	34
SS-8	04-Feb-86	--	--	0.59	4	6.55	--	--	--	45.2	26
SS-8	29-May-86	--	--	0.53	NA	6.75	--	NS	NS	23.1	115
SS-8	18-Jul-86	0.1	0.3	1.2	--	7.1	--	NS	NS	189	99
SS-8	14-Oct-86	--	--	0.68	NA	NA	--	--	--	17.5	36
SS-8	29-Jan-87	0.12	0.35	1.7	--	7.45	--	--	--	61	31

LOCATION ID	DATE SAMPLED	METHYLENE BLUE ACTIVE SUBSTANCES mg/L	AMMONIA mg/L	NITRATE mg/L	ODOR T.O.N.	pH	PHENOLS ug/L	SELENIUM DISSOLVED mg/L	SILVER DISSOLVED mg/L	SODIUM DISSOLVED mg/L	SULFATE mg/L
SS-8	21-Apr-87	--	0.15	1.1	--	6.8	--	NS	NS	13	22
SS-8	07-Oct-87	0.11	--	0.51	NS	7.1	0.1	--	--	93	43
SS-8	18-Apr-88	NS	0.2	NS	NS	7	NS	--	--	208	62.8
SS-8	20-Oct-88	0.04	--	--	NS	6.6	--	--	--	640	110
SS-8	19-Apr-89	--	1.1	--	NS	6.5	--	NS	NS	61	25
SS-8	24-Oct-89	--	--	--	NS	6.2	--	--	--	100	38
SS-8	26-Apr-90	--	--	1.2	NS	5.6	--	NS	NS	75	10
SS-8	30-Oct-90	--	0.222	1.32	NS	6.6	--	--	--	199	67.5
SS-8	30-Apr-91	--	0.16	--	NS	6.8	--	NS	NS	62.67	39
SS-8	23-Oct-91	--	0.42	2.14	NS	6.76	--	--	--	266	109
SS-8	13-Apr-92	0.036	--	0.99	NS	7.02	--	NS	NS	100	44
SS-8	29-Oct-92	--	2	2.4	NS	7.05	--	--	--	385.5	143.4
SS-8	07-Apr-93	--	--	7.1	NS	6.84	--	NS	NS	100	43
SS-9	04-Feb-86	--	--	0.41	1	6.65	--	--	--	55.1	31
SS-9	29-May-86	--	0.4	0.54	1.4	0.54	--	NS	NS	22.4	58
SS-9	18-Jul-86	0.01	0.4	0.78	--	7.05	0.1	NS	NS	237	108
SS-9	14-Oct-86	--	--	0.81	0	NA	--	--	--	16.2	64
SS-9	29-Jan-87	0.17	0.3	1.1	--	7.25	--	--	--	70	34
SS-9	21-Apr-87	--	0.25	1.4	--	6.65	--	NS	NS	29	28
SS-9	07-Oct-87	0.08	--	0.6	NS	7.05	0.14	--	--	130	41
SS-9	18-Apr-88	NS	0.2	NS	NS	6.9	NS	--	--	364	105
SS-9	20-Oct-88	0.025	1.4	--	NS	6.7	--	--	--	520	110
SS-9	19-Apr-89	--	--	--	NS	6.4	--	NS	NS	57	32
SS-9	24-Oct-89	--	--	1.2	NS	6.1	--	--	--	100	35
SS-9	26-Apr-90	--	--	1.1	NS	5.9	--	NS	NS	340	16
SS-9	30-Oct-90	0.036	0.225	1.22	NS	6.69	--	--	--	223	69.8
SS-9	30-Apr-91	--	0.12	0.4	NS	6.77	--	NS	NS	133.86	62.2
SS-9	23-Oct-91	--	0.38	2.16	NS	6.75	--	--	--	218	93.5
SS-9	13-Apr-92	0.036	--	1	NS	6.99	--	NS	NS	80	46
SS-9	29-Oct-92	--	3.2	2.4	NS	7.1	--	--	--	508.5	113
SS-9	07-Apr-93	--	--	14	NS	6.73	0.17	NS	NS	230	65
SS-10	04-Feb-86	0.12	0.3	0.4	4	6.7	0.41	--	--	72	21
SS-10	29-May-86	--	0.2	1.08	1.4	7.1	--	NS	NS	25	75
SS-10	18-Jul-86	--	--	0.83	--	7.5	--	NS	NS	17	89

FORT MONMOUTH GROUNDWATER AND SURFACE WATER ANALYTICAL RESULTS

LOCATION ID	DATE SAMPLED	METHYLENE BLUE ACTIVE SUBSTANCES mg/L	AMMONIA mg/L	NITRATE mg/L	ODOR T.O.N.	pH	PHENOLS ug/L	SELENIUM DISSOLVED mg/L	SILVER DISSOLVED mg/L	SODIUM DISSOLVED mg/L	SULFATE mg/L
SS-10	14-Oct-86	0.05	--	0.68	0	NA	--	--	--	8.07	12
SS-10	29-Jan-87	0.08	0.2	1.85	--	7.15	--	--	--	11	27
SS-10	21-Apr-87	--	0.2	1.3	--	6.8	--	NS	NS	12	23
SS-10	07-Oct-87	0.14	--	0.27	NS	7.1	0.19	--	--	23	54
SS-10	18-Apr-88	NS	--	NS	NS	6.8	NS	--	--	11.8	21.6
SS-10	20-Oct-88	0.04	--	--	NS	7.3	--	--	--	13	22
SS-10	19-Apr-89	--	--	1.4	NS	6.6	--	NS	NS	11	20
SS-10	24-Oct-89	--	--	--	NS	6.2	--	--	--	12	20
SS-10	26-Apr-90	--	--	1.2	NS	5.9	--	NS	NS	12	10
SS-10	30-Oct-90	--	--	1.75	NS	7.11	--	--	--	15.7	21.2
SS-10	30-Apr-91	--	--	0.6	NS	6.99	--	NS	NS	12.461	25.5
SS-10	23-Oct-91	--	0.15	1.8	NS	7.23	--	--	--	14.5	31.3
SS-10	13-Apr-92	--	--	1.5	NS	7.18	--	NS	NS	16	23
SS-10	29-Oct-92	--	0.3	7.2	NS	7.55	--	--	--	11	28.8
SS-10	07-Apr-93	--	--	4.6	NS	6.89	0.34	NS	NS	15	19

NS – Not Sampled
-- – Not Detected
? – Data could not be read
B – Detected in blank
J – Estimated concentration, below detection limit
70/60 – Sample, duplicate
TNTC – Too numerous to count

FORT MONMOUTH GROUNDWATER AND SURFACE WATER ANALYTICAL RESULTS

LOCATION ID	DATE SAMPLED	TOTAL DISSOLVED SOLIDS PPM	TOTAL SUSPENDED SOLIDS PPM	TOTAL ORGANIC CARBON PPM	TURBIDITY NTU	ZINC DISSOLVED mg/L	METHYLENE CHLORIDE ug/L	ACETONE ug/L	CHLORO-FORM ug/L	TRI-CHLORO-ETHENE ug/L
MW-1	04-Feb-86	83	NS	6.4	14	0.02	--	NS	--	--
MW-1	29-May-86	128	NS	2.9	NS	--	NS	NS	NS	NS
MW-1	18-Jul-86	1.?	NS	NA	NS	0.1?	NS	NS	NS	NS
MW-1	14-Oct-86	77	NS	4	10	0.04	NS	NS	NS	NS
MW-1	29-Jan-87	61	NS	7	42	0.01	--	NS	--	--
MW-1	21-Apr-87	63	NS	9.5	NS	0.03	NS	NS	NS	NS
MW-1	07-Oct-87	598	NS	3.3	1.5	0.08	--	NS	--	--
MW-1	18-Apr-88	NS	1260	NS	10.5	0.13	6.2	NS	--	--
MW-1	19-Apr-89	100	NS	5.8	NS	0.76	NS	NS	NS	NS
MW-1	24-Oct-89	310	NS	2.4	20	0.055	3 JB	4 JB	--	--
MW-1	26-Apr-90	240	NS	1.3	NS	0.052	NS	NS	NS	NS
MW-1	30-Oct-90	216	NS	4.186	61	0.02	--	NS	--	--
MW-1	30-Apr-91	70	NS	--	NS	10.89	NS	NS	NS	NS
MW-1	23-Oct-91	386	NS	4.1	30	--	--	NS	--	--
MW-1	13-Apr-92	190	NS	--	NS	--	NS	NS	NS	NS
MW-1	29-Oct-92	1157	NS	10.2	3	--	--	400	--	--
MW-1	07-Apr-93	350	NS	2	NS	--	NS	NS	NS	NS
MW-2	04-Feb-86	1090	NS	9.5	25	0.16	--	NS	--	--
MW-2	29-May-86	2648	NS	65	NS	0.02	NS	NS	NS	NS
MW-2	18-Jul-86	2806	NS	51	NS	0.89	NS	NS	NS	NS
MW-2	14-Oct-86	2638	NS	43	575	0.08	NS	NS	NS	NS
MW-2	29-Jan-87	2940	NS	78	220	0.03	--	NS	--	--
MW-2	21-Apr-87	760	NS	35	NS	0.24	NS	NS	NS	NS
MW-2	07-Oct-87	3854	NS	57	50	0.06	--	NS	--	--
MW-2	18-Apr-88	NS	1110	NS	21	--	6.4	NS	--	--
MW-2	20-Oct-88	6300	NS	11	68	0.35	3 JB	NS	--	--
MW-2	19-Apr-89	2500	NS	45	NS	0.039	NS	NS	NS	NS
MW-2	24-Oct-89	1300	NS	12	65	0.44	--	9 JB	--	--
MW-2	26-Apr-90	1000	NS	15	NS	0.6	NS	NS	NS	NS
MW-2	30-Oct-90	1270	NS	31.38	28	0.65	--	NS	--	--
MW-2	30-Apr-91	530	NS	8	NS	10.85	NS	NS	NS	NS
MW-2	23-Oct-91	893	NS	18.4	3	0.32	--	NS	--	--
MW-2	13-Apr-92	1600	NS	12	NS	0.097	NS	NS	NS	NS
MW-2	29-Oct-92	2206	NS	67.4	30	--	9 B	--	--	--

FORT MONMOUTH GROUNDWATER AND SURFACE WATER ANALYTICAL RESULTS

LOCATION ID	DATE SAMPLED	TOTAL DISSOLVED SOLIDS PPM	TOTAL SUSPENDED SOLIDS PPM	TOTAL ORGANIC CARBON PPM	TURBIDITY NTU	ZINC DISSOLVED mg/L	METHYLENE CHLORIDE ug/L	ACETONE ug/L	CHLORO-FORM ug/L	TRI-CHLORO-ETHENE ug/L
MW-2	07-Apr-93	1200	NS	15	NS	0.064	NS	NS	NS	NS
MW-3	04-Feb-86	1254	NS	18	95	0.02	--	NS	--	--
MW-3 Dup. 1	04-Feb-86	1250	NS	18	95	0.02	NS	NS	NS	--
MW-3 Dup. 2	04-Feb-86	1260	NS	17	98	0.02	NS	NS	NS	--
MW-3	29-May-86	1846	NS	36	NS	--	NS	NS	NS	NS
MW-3	18-Jul-86	1551	NS	20	NS	0.34	NS	NS	NS	NS
MW-3	14-Oct-86	1502	NS	19	130	0.02	NS	NS	NS	NS
MW-3	29-Jan-87	929	NS	18	82	0.07	--	NS	--	--
MW-3	21-Apr-87	1112	NS	46	NS	0.03	NS	NS	NS	NS
MW-3	07-Oct-87	798	NS	24	20	0.05	--	NS	--	--
MW-3	18-Apr-88	NS	738	NS	132	0.08	6.3	NS	--	--
MW-3	20-Oct-88	1400	NS	37	27	0.05	3 JB	NS	--	--
MW-3	19-Apr-89	880	NS	13	NS	0.8	NS	NS	NS	NS
MW-3	24-Oct-89	320	NS	10	73	0.55	3 JB	8 JB	--	--
MW-3	26-Apr-90	960	NS	15	NS	0.27	NS	NS	NS	NS
MW-3	30-Oct-90	807	NS	30.78	29	0.27	--	NS	--	--
MW-3	30-Apr-91	240	NS	40	NS	12.46	NS	NS	NS	NS
MW-3	23-Oct-91	2421	NS	18.7	9.5	0.57	--	NS	--	--
MW-3	13-Apr-92	2000	NS	13	NS	--	NS	NS	NS	NS
MW-3	29-Oct-92	890	NS	42.3	5	--	7 B	--	--	--
MW-3	07-Apr-93	1100	NS	17	NS	--	NS	NS	NS	NS
MW-4	04-Feb-86	2710	NS	65	230	0.04	--	NS	--	--
MW-4	29-May-86	941	NS	24.7	NS	--	NS	NS	NS	NS
MW-4	18-Jul-86	1771	NS	21	NS	0.16	NS	NS	NS	NS
MW-4	14-Oct-86	1163	NS	14	270	0.1	NS	NS	NS	NS
MW-4	29-Jan-87	762	NS	38	160	0.43	--	NS	--	--
MW-4	21-Apr-87	2693	NS	148	NS	1.8	NS	NS	NS	NS
MW-4	07-Oct-87	670	NS	22	25	0.05	5	NS	--	--
MW-4	18-Apr-88	NS	2700	NS	240	0.06	6.7	NS	--	--
MW-4	20-Oct-88	2700	NS	57	130	0.23	3 JB	NS	--	--
MW-4	19-Apr-89	800	NS	17	NS	1	NS	NS	NS	NS
MW-4	24-Oct-89	2100	NS	49	150	0.086	--	--	--	--
MW-4	26-Apr-90	2500	NS	50	NS	0.047	NS	NS	NS	NS
MW-4	30-Oct-90	2232	NS	126.7	>100	0.13	--	NS	--	--

LOCATION ID	DATE SAMPLED	TOTAL DISSOLVED SOLIDS PPM	TOTAL SUSPENDED SOLIDS PPM	TOTAL ORGANIC CARBON PPM	TURBIDITY NTU	ZINC DISSOLVED mg/L	METHYLENE CHLORIDE ug/L	ACETONE ug/L	CHLORO-FORM ug/L	TRI-CHLORO-ETHENE ug/L
MW-4	30-Apr-91	1984	NS	113	NS	10.38	NS	NS	NS	NS
MW-4	23-Oct-91	2245	NS	254	60	4.6	--	NS	--	--
MW-4	13-Apr-92	2400	NS	51	NS	0.033	NS	NS	NS	NS
MW-4	29-Oct-92	2174	NS	107	11	--	10 B	260	--	--
MW-4	07-Apr-93	2000	NS	52	NS	0.11	NS	NS	NS	NS
SS-1	04-Feb-86	250	NS	4.7	14	0.04	--	NS	--	--
SS-1	29-May-86	197	NS	14.7	NS	0.11	NS	NS	NS	NS
SS-1	18-Jul-86	210	NS	9.4	NS	0.06	NS	NS	NS	NS
SS-1	14-Oct-86	151	NS	5.6	19	0.13	NS	NS	NS	NS
SS-1	29-Jan-87	222	NS	8	17	0.05	--	NS	--	--
SS-1	21-Apr-87	182	NS	16	NS	0.05	NS	NS	NS	NS
SS-1	07-Oct-87	183	NS	8.2	8	0.04	5.3	NS	--	--
SS-1	18-Apr-88	NS	166	NS	8.4	--	6.7	NS	--	9
SS-1	20-Oct-88	210	NS	3.8	7	0.035	3 JB	NS	--	--
SS-1	19-Apr-89	150	NS	4.2	NS	0.064	NS	NS	NS	NS
SS-1	24-Oct-89	210	NS	4.3	15	0.14	2 JB	--	--	--
SS-1	26-Apr-90	350	NS	3.9	NS	0.026	NS	NS	NS	NS
SS-1	30-Oct-90	185	NS	3.802	26	0.02	--	NS	--	1 J
SS-1	30-Apr-91	16	NS	23	NS	14.45	NS	NS	NS	NS
SS-1	23-Oct-91	2776	NS	19.3	5	0.03	--	NS	--	--
SS-1	13-Apr-92	210	NS	3	NS	0.024	NS	NS	NS	NS
SS-1	29-Oct-92	619	NS	13.7	3	--	9 B	--	--	--
SS-1	07-Apr-93	260	NS	3	NS	--	NS	NS	NS	NS
SS-2	04-Feb-86	248	NS	8.2	15	0.03	--	NS	--	--
SS-2	29-May-86	186	NS	13.6	NS	0.02	NS	NS	NS	NS
SS-2	18-Jul-86	211	NS	9.4	NS	0.05	NS	NS	NS	NS
SS-2	14-Oct-86	156	NS	5.1	17	0.05	NS	NS	NS	NS
SS-2	29-Jan-87	220	NS	8	18	0.08	--	NS	--	--
SS-2	21-Apr-87	170	NS	12	NS	0.05	NS	NS	NS	NS
SS-2	07-Oct-87	165	NS	7.4	7	0.05	5.5	NS	--	--
SS-2	18-Apr-88	NS	172	NS	9.4	0.03	7.3	NS	--	--
SS-2	20-Oct-88	220	NS	3.6	8	0.028	4 JB	NS	--	2 J
SS-2	19-Apr-89	120	NS	4.4	NS	0.05	NS	NS	NS	NS
SS-2	24-Oct-89	220	NS	4.1	15	0.052	2 JB	8 JB	--	--

FORT MONMOUTH GROUNDWATER AND SURFACE WATER ANALYTICAL RESULTS

LOCATION ID	DATE SAMPLED	TOTAL DISSOLVED SOLIDS PPM	TOTAL SUSPENDED SOLIDS PPM	TOTAL ORGANIC CARBON PPM	TURBIDITY NTU	ZINC DISSOLVED mg/L	METHYLENE CHLORIDE ug/L	ACETONE ug/L	CHLORO-FORM ug/L	TRI-CHLORO-ETHENE ug/L
SS-2	26-Apr-90	200	NS	3.5	NS	0.032	NS	NS	NS	NS
SS-2	30-Oct-90	187	NS	5.03	27	0.03	--	NS	--	1 J
SS-2	30-Apr-91	64	NS	15	NS	15.28	NS	NS	NS	NS
SS-2	23-Oct-91	233	NS	13.1	2	0.04	--	NS	--	--
SS-2	13-Apr-92	230	NS	2.7	NS	0.031	NS	NS	NS	NS
SS-2	29-Oct-92	494	NS	10.7	3	--	3 JB	--	--	2 J
SS-2	07-Apr-93	250	NS	3	NS	--	NS	NS	NS	NS
SS-3	04-Feb-86	296	NS	7.3	12	0.04	--	NS	--	--
SS-3	29-May-86	201	NS	12.8	NS	0.03	NS	NS	NS	NS
SS-3	18-Jul-86	203	NS	8.5	NS	0.07	NS	NS	NS	NS
SS-3	14-Oct-86	109	NS	6.2	21	0.08	NS	NS	NS	NS
SS-3	29-Jan-87	250	NS	8	10	0.05	--	NS	--	--
SS-3	21-Apr-87	144	NS	11	NS	0.15	NS	NS	NS	NS
SS-3	07-Oct-87	117	NS	7.4	12	0.03	7.2	NS	--	--
SS-3	18-Apr-88	NS	189	NS	24	0.03	7.3	NS	--	--
SS-3	20-Oct-88	280	NS	3.9	15	0.032	3 JB	NS	--	6
SS-3	19-Apr-89	170	NS	3.9	NS	0.011	NS	NS	NS	NS
SS-3	24-Oct-89	200	NS	3.2	7	0.022	--	9 JB	--	--
SS-3	26-Apr-90	180	NS	3.1	NS	0.029	NS	NS	NS	NS
SS-3	30-Oct-90	206	NS	2.673	10	0.01	--	NS	--	--
SS-3	30-Apr-91	74	NS	19	NS	7.12	NS	NS	NS	NS
SS-3	23-Oct-91	876	NS	12.4	1.5	--	6	NS	--	--
SS-3	13-Apr-92	230	NS	1.4	NS	0.065	NS	NS	NS	NS
SS-3	29-Oct-92	2741	NS	11	3.5	--	15 B	--	--	2 J
SS-3	07-Apr-93	250	NS	2	NS	--	NS	NS	NS	NS
SS-4	04-Feb-86	427	NS	8.2	14	0.03	--	NS	--	--
SS-4	29-May-86	669	NS	12.2	NS	0.19	NS	NS	NS	NS
SS-4	18-Jul-86	3044	NS	1.02	NS	0.31	NS	NS	NS	NS
SS-4	14-Oct-86	175	NS	5.9	16	0.06	NS	NS	NS	NS
SS-4	29-Jan-87	337	NS	10	14	0.09	--	NS	--	--
SS-4	21-Apr-87	173	NS	18	NS	1.3	NS	NS	NS	NS
SS-4	07-Oct-87	165	NS	7.4	22	0.05	NS	NS	NS	NS
SS-4	18-Apr-88	NS	249	NS	22	0.05	7	NS	--	--
SS-4	20-Oct-88	900	NS	4	10	0.088	9 B	NS	--	--

LOCATION ID	DATE SAMPLED	TOTAL DISSOLVED SOLIDS PPM	TOTAL SUSPENDED SOLIDS PPM	TOTAL ORGANIC CARBON PPM	TURBIDITY NTU	ZINC DISSOLVED mg/L	METHYLENE CHLORIDE ug/L	ACETONE ug/L	CHLORO-FORM ug/L	TRI-CHLORO-ETHENE ug/L
SS-4	19-Apr-89	150	NS	3.7	NS	--	NS	NS	NS	NS
SS-4	24-Oct-89	240	NS	4.1	16	0.058	--	12 B	--	--
SS-4	26-Apr-90	240	NS	3.5	NS	0.034	NS	NS	NS	NS
SS-4	30-Oct-90	262	NS	3.315	26	0.02	--	NS	--	--
SS-4	30-Apr-91	68	NS	25	NS	10.2	NS	NS	NS	NS
SS-4	23-Oct-91	189	NS	16.4	1.5	0.04	--	NS	--	--
SS-4	13-Apr-92	240	NS	2.5	NS	0.038	NS	NS	NS	NS
SS-4	29-Oct-92	17629	NS	8.1	3	--	--	--	--	--
SS-4	07-Apr-93	1600	NS	3	NS	--	NS	NS	NS	NS
SS-5	04-Feb-86	270	NS	4.7	13	0.04	--	NS	--	--
SS-5	29-May-86	325	NS	15.9	NS	0.04	NS	NS	NS	NS
SS-5	18-Jul-86	1079	NS	9.4	NS	0.08	NS	NS	NS	NS
SS-5	14-Oct-86	204	NS	4.5	15	0.13	NS	NS	NS	NS
SS-5	29-Jan-87	325	NS	9	13	0.07	--	NS	--	--
SS-5	21-Apr-87	180	NS	13	NS	44	NS	NS	NS	NS
SS-5	07-Oct-87	1813	NS	6.6	5.25	0.03	9.2	NS	--	--
SS-5	18-Apr-88	NS	203	NS	9.1	0.03	7.3	NS	--	--
SS-5	20-Oct-88	390	NS	4.2	8	0.028	2 JB	NS	--	--
SS-5	19-Apr-89	160	NS	4.6	NS	0.057	NS	NS	NS	NS
SS-5	24-Oct-89	200	NS	4.3	13	0.047	--	10 B	--	--
SS-5	26-Apr-90	200	NS	3.4	NS	0.031	NS	NS	NS	NS
SS-5	30-Oct-90	217	NS	3.459	27	0.02	--	NS	--	--
SS-5	30-Apr-91	106	NS	14	NS	8.27	NS	NS	NS	NS
SS-5	23-Oct-91	1012	NS	14.5	5.5	0.04	--	NS	--	--
SS-5	13-Apr-92	240	NS	2.6	NS	0.024	NS	NS	NS	NS
SS-5	29-Oct-92	6223	NS	8.1	7	--	4 JB	--	--	--
SS-5	07-Apr-93	470	NS	3	NS	--	NS	NS	NS	NS
SS-6	04-Feb-86	269	NS	9.8	15	0.04	--	NS	--	--
SS-6	29-May-86	396	NS	16.6	NS	0.02	NS	NS	NS	NS
SS-6	18-Jul-86	2193	NS	8.5	NS	0.07	NS	NS	NS	NS
SS-6	14-Oct-86	247	NS	5.1	14	0.06	NS	NS	NS	NS
SS-6	29-Jan-87	344	NS	8	13	0.08	--	NS	--	--
SS-6	21-Apr-87	153	NS	13	NS	0.04	NS	NS	NS	NS
SS-6	07-Oct-87	1828	NS	7.4	5	0.02	--	NS	--	--

FORT MONMOUTH GROUNDWATER AND SURFACE WATER ANALYTICAL RESULTS

LOCATION ID	DATE SAMPLED	TOTAL DISSOLVED SOLIDS PPM	TOTAL SUSPENDED SOLIDS PPM	TOTAL ORGANIC CARBON PPM	TURBIDITY NTU	ZINC DISSOLVED mg/L	METHYLENE CHLORIDE ug/L	ACETONE ug/L	CHLORO-FORM ug/L	TRI-CHLORO-ETHENE ug/L
SS-6	18-Apr-88	NS	219	NS	10.6	0.03	6.4	NS	--	--
SS-6	20-Oct-88	1000	NS	3.9	9	0.035	6 B	NS	--	--
SS-6	19-Apr-89	190	NS	4.7	NS	0.05	NS	NS	NS	NS
SS-6	24-Oct-89	230	NS	4.5	15	0.077	--	8 JB	--	--
SS-6	26-Apr-90	230	NS	3.8	NS	0.035	NS	NS	NS	NS
SS-6	30-Oct-90	668	NS	3.4	24	0.025	--	NS	--	--
SS-6	30-Apr-91	56	NS	10	NS	16.85	NS	NS	NS	NS
SS-6	23-Oct-91	4400	NS	2.5	2	0.03	--	NS	--	--
SS-6	13-Apr-92	230	NS	2.6	NS	--	NS	NS	NS	NS
SS-6	29-Oct-92	4869	NS	10.5	3	--	7 B	--	--	--
SS-6	07-Apr-93	320	NS	3	NS	--	NS	NS	NS	NS
SS-7	04-Feb-86	308	NS	7.7	15	0.05	--	NS	--	--
SS-7	29-May-86	2064	NS	12.3	NS	0.05	NS	NS	NS	NS
SS-7	18-Jul-86	7124	NS	9.4	NS	0.08	NS	NS	NS	NS
SS-7	14-Oct-86	1341	NS	5.7	16	0.03	NS	NS	NS	NS
SS-7	29-Jan-87	2401	NS	9	10	0.05	--	NS	--	--
SS-7	21-Apr-87	205	NS	17	NS	0.09	NS	NS	NS	NS
SS-7	07-Oct-87	7921	NS	7.4	5	0.11	--	NS	--	--
SS-7	18-Apr-88	NS	3980	NS	27	0.06	6.3	NS	--	2.2
SS-7	20-Oct-88	5200	NS	2.8	11	0.041	5 B	NS	--	--
SS-7	19-Apr-89	1700	NS	3.2	NS	0.025	NS	NS	NS	NS
SS-7	24-Oct-89	270	NS	4.8	15	0.047	--	--	--	--
SS-7	26-Apr-90	1900	NS	3.5	NS	0.03	NS	NS	NS	NS
SS-7	30-Oct-90	4428	NS	7.87	21	0.027	1.5 J	NS	--	--
SS-7	30-Apr-91	90	NS	14	NS	15.86	NS	NS	NS	NS
SS-7	23-Oct-91	3748	NS	10.2	1	--	--	NS	--	--
SS-7	13-Apr-92	1300	NS	2.4	NS	0.023	NS	NS	NS	NS
SS-7	29-Oct-92	6662	NS	7.5	2.5	--	--	--	--	--
SS-7	07-Apr-93	300	NS	3	NS	--	NS	NS	NS	NS
SS-8	04-Feb-86	241	NS	6.4	10	0.05	--	NS	--	--
SS-8	29-May-86	2786	NS	11.9	NS	0.02	NS	NS	NS	NS
SS-8	18-Jul-86	3204	NS	8	NS	0.16	NS	NS	NS	NS
SS-8	14-Oct-86	1341	NS	5.7	16	0.1	NS	NS	NS	NS
SS-8	29-Jan-87	325	NS	9	12	0.07	--	NS	--	--

FORT MONMOUTH GROUNDWATER AND SURFACE WATER ANALYTICAL RESULTS

LOCATION ID	DATE SAMPLED	TOTAL DISSOLVED SOLIDS PPM	TOTAL SUSPENDED SOLIDS PPM	TOTAL ORGANIC CARBON PPM	TURBIDITY NTU	ZINC DISSOLVED mg/L	METHYLENE CHLORIDE ug/L	ACETONE ug/L	CHLORO-FORM ug/L	TRI-CHLORO-ETHENE ug/L
SS-8	21-Apr-87	126	NS	13	NS	0.07	NS	NS	NS	NS
SS-8	07-Oct-87	527	NS	5.7	4.25	0.03	12	NS	--	--
SS-8	18-Apr-88	NS	698	NS	8.3	0.04	6.4	NS	--	--
SS-8	20-Oct-88	2200	NS	3.8	5	0.041	5 B	NS	--	2 J
SS-8	19-Apr-89	260	NS	5.5	NS	0.021	NS	NS	NS	NS
SS-8	24-Oct-89	430	NS	4.8	11	0.043	--	4 JB	--	2 J
SS-8	26-Apr-90	420	NS	3.5	NS	0.043	NS	NS	NS	NS
SS-8	30-Oct-90	751	NS	3.242	7.5	0.02	1.2 J	NS	--	--
SS-8	30-Apr-91	214	NS	--	NS	3.64	NS	NS	NS	NS
SS-8	23-Oct-91	1377	NS	1.4	2	--	--	NS	--	--
SS-8	13-Apr-92	460	NS	2.2	NS	0.041	NS	NS	NS	NS
SS-8	29-Oct-92	1796	NS	11.4	5.5	--	--	--	--	--
SS-8	07-Apr-93	440	NS	2.7	NS	--	NS	NS	NS	NS
SS-9	04-Feb-86	296	NS	9.1	17	0.04	--	NS	--	--
SS-9	29-May-86	1537	NS	8.7	NS	0.05	NS	NS	NS	NS
SS-9	18-Jul-86	6567	NS	9.4	NS	0.04	NS	NS	NS	NS
SS-9	14-Oct-86	631	NS	5.1	13	0.1	NS	NS	NS	NS
SS-9	29-Jan-87	376	NS	8	12	0.07	--	NS	--	--
SS-9	21-Apr-87	175	NS	14	NS	0.07	NS	NS	NS	NS
SS-9	07-Oct-87	544	NS	5.7	4	0.03	--	NS	--	--
SS-9	18-Apr-88	NS	1220	NS	12.6	0.06	6.3	NS	--	12
SS-9	20-Oct-88	1700	NS	3.9	5	0.035	5 B	NS	--	--
SS-9	19-Apr-89	280	NS	6.1	NS	0.011	NS	NS	NS	NS
SS-9	24-Oct-89	410	NS	4.3	10	0.13	2 J	10 B	--	--
SS-9	26-Apr-90	1300	NS	3.3	NS	0.036	NS	NS	NS	NS
SS-9	30-Oct-90	808	NS	4.509	6.8	0.02	--	NS	--	--
SS-9	30-Apr-91	380	NS	10	NS	8.77	NS	NS	NS	NS
SS-9	23-Oct-91	1069	NS	20.8	3	--	--	NS	--	--
SS-9	13-Apr-92	420	NS	2.2	NS	0.022	NS	NS	NS	NS
SS-9	29-Oct-92	1317	NS	18.1	3.5	0.03	--	--	--	--
SS-9	07-Apr-93	900	NS	3	NS	--	NS	NS	NS	NS
SS-10	04-Feb-86	357	NS	13	27	0.06	--	NS	--	--
SS-10	29-May-86	215	NS	146.3	NS	0.06	NS	NS	NS	NS
SS-10	18-Jul-86	163	NS	6.8	NS	0.18	NS	NS	NS	NS

FORT MONMOUTH GROUNDWATER AND SURFACE WATER ANALYTICAL RESULTS

LOCATION ID	DATE SAMPLED	TOTAL DISSOLVED SOLIDS PPM	TOTAL SUSPENDED SOLIDS PPM	TOTAL ORGANIC CARBON PPM	TURBIDITY NTU	ZINC DISSOLVED mg/L	METHYLENE CHLORIDE ug/L	ACETONE ug/L	CHLORO-FORM ug/L	TRI-CHLORO-ETHENE ug/L
SS-10	14-Oct-86	82	NS	5.1	18	0.02	NS	NS	NS	NS
SS-10	29-Jan-87	190	NS	9	11	0.1	--	NS	--	--
SS-10	21-Apr-87	154	NS	17	NS	0.05	NS	NS	NS	NS
SS-10	07-Oct-87	171	NS	5.7	4.25	0.05	--	NS	--	9.1
SS-10	18-Apr-88	NS	140	NS	2.3	0.04	6.5	NS	--	--
SS-10	20-Oct-88	140	NS	4.6	5	0.038	4 JB	NS	--	2 J
SS-10	19-Apr-89	140	NS	4.6	NS	0.021	NS	NS	NS	NS
SS-10	24-Oct-89	120	NS	6.4	4.7	0.088	--	6 JB	1 J	7
SS-10	26-Apr-90	170	NS	2.2	NS	0.041	NS	NS	NS	NS
SS-10	30-Oct-90	138	NS	2.071	4	0.037	--	NS	--	5.3
SS-10	30-Apr-91	128	NS	17	NS	11.99	NS	NS	NS	NS
SS-10	23-Oct-91	245	NS	8.3	30	0.04	--	NS	--	--
SS-10	13-Apr-92	160	NS	--	NS	0.034	NS	NS	NS	NS
SS-10	29-Oct-92	117	NS	7.7	6	0.04	--	--	--	29
SS-10	07-Apr-93	160	NS	2	NS	--	NS	NS	NS	NS

NS – Not Sampled
-- – Not Detected
? – Data could not be read
B – Detected in blank
J – Estimated concentration, below detection limit
70/60 – Sample, duplicate
TNTC – Too numerous to count

FORT MONMOUTH GROUNDWATER AND SURFACE WATER ANALYTICAL RESULTS

LOCATION ID	DATE SAMPLED	1,1,2,2-TETRA-CHLORO-ETHANE ug/L	TETRA-CHLORO-ETHENE ug/L	1,1,1-TRI-CHLORO-ETHANE ug/L	TRANS-1,2-DICHLORO-ETHENE ug/L	1,1-DICHLORO-ETHANE ug/L	BENZENE ug/L	CHLORO-BENZENE ug/L	TOLUENE ug/L
MW-1	04-Feb-86	--	--	--	--	--	--	--	--
MW-1	29-May-86	NS	NS	NS	NS	NS	NS	NS	NS
MW-1	18-Jul-86	NS	NS	NS	NS	NS	NS	NS	NS
MW-1	14-Oct-86	NS	NS	NS	NS	NS	NS	NS	NS
MW-1	29-Jan-87	--	--	--	NS	--	--	--	--
MW-1	21-Apr-87	NS	NS	NS	NS	NS	NS	NS	NS
MW-1	07-Oct-87	--	--	--	NS	--	--	--	--
MW-1	18-Apr-88	--	--	--	NS	--	--	--	--
MW-1	19-Apr-89	NS	NS	NS	NS	NS	NS	NS	NS
MW-1	24-Oct-89	--	--	--	--	--	--	--	--
MW-1	26-Apr-90	NS	NS	NS	NS	NS	NS	NS	NS
MW-1	30-Oct-90	--	--	--	--	--	--	--	--
MW-1	30-Apr-91	NS	NS	NS	NS	NS	NS	NS	NS
MW-1	23-Oct-91	--	--	--	--	--	--	--	--
MW-1	13-Apr-92	NS	NS	NS	NS	NS	NS	NS	NS
MW-1	29-Oct-92	--	--	--	--	--	--	--	--
MW-1	07-Apr-93	NS	NS	NS	NS	NS	NS	NS	NS
MW-2	04-Feb-86	--	--	--	--	--	--	--	--
MW-2	29-May-86	NS	NS	NS	NS	NS	NS	NS	NS
MW-2	18-Jul-86	NS	NS	NS	NS	NS	NS	NS	NS
MW-2	14-Oct-86	NS	NS	NS	NS	NS	NS	NS	NS
MW-2	29-Jan-87	--	--	--	NS	--	9.6	--	11
MW-2	21-Apr-87	NS	NS	NS	NS	NS	NS	NS	NS
MW-2	07-Oct-87	--	--	--	NS	--	--	20	--
MW-2	18-Apr-88	--	--	--	NS	--	--	--	--
MW-2	20-Oct-88	--	--	--	--	--	--	--	--
MW-2	19-Apr-89	NS	NS	NS	NS	NS	NS	NS	NS
MW-2	24-Oct-89	--	--	--	--	--	--	--	--
MW-2	26-Apr-90	NS	NS	NS	NS	NS	NS	NS	NS
MW-2	30-Oct-90	--	--	--	--	--	--	--	1 J
MW-2	30-Apr-91	NS	NS	NS	NS	NS	NS	NS	NS
MW-2	23-Oct-91	--	--	--	--	--	--	--	--
MW-2	13-Apr-92	NS	NS	NS	NS	NS	NS	NS	NS
MW-2	29-Oct-92	--	--	--	--	--	--	--	--

FORT MONMOUTH GROUNDWATER AND SURFACE WATER ANALYTICAL RESULTS

LOCATION ID	DATE SAMPLED	1,1,2,2-TETRA-CHLORO-ETHANE ug/L	TETRA-CHLORO-ETHENE ug/L	1,1,1-TRI-CHLORO-ETHANE ug/L	TRANS-1,2-DICHLORO-ETHENE ug/L	1,1-DICHLORO-ETHANE ug/L	BENZENE ug/L	CHLORO-BENZENE ug/L	TOLUENE ug/L
MW-2	07-Apr-93	NS	NS	NS	NS	NS	NS	NS	NS
MW-3	04-Feb-86	--	--	--	--	--	--	--	--
MW-3 Dup. 1	04-Feb-86	NS	NS	NS	NS	NS	NS	NS	NS
MW-3 Dup. 2	04-Feb-86	NS	NS	NS	NS	NS	NS	NS	NS
MW-3	29-May-86	NS	NS	NS	NS	NS	NS	NS	NS
MW-3	18-Jul-86	NS	NS	NS	NS	NS	NS	NS	NS
MW-3	14-Oct-86	NS	NS	NS	NS	NS	NS	NS	NS
MW-3	29-Jan-87	--	--	--	NS	--	--	--	--
MW-3	21-Apr-87	NS	NS	NS	NS	NS	NS	NS	NS
MW-3	07-Oct-87	--	--	--	NS	--	--	--	--
MW-3	18-Apr-88	--	--	--	NS	--	5	27	--
MW-3	20-Oct-88	--	--	--	--	--	--	3 J	2 J
MW-3	19-Apr-89	NS	NS	NS	NS	NS	NS	NS	NS
MW-3	24-Oct-89	--	--	--	--	--	--	--	--
MW-3	26-Apr-90	NS	NS	NS	NS	NS	NS	NS	NS
MW-3	30-Oct-90	--	--	--	--	--	--	--	--
MW-3	30-Apr-91	NS	NS	NS	NS	NS	NS	NS	NS
MW-3	23-Oct-91	--	--	--	--	--	--	--	--
MW-3	13-Apr-92	NS	NS	NS	NS	NS	NS	NS	NS
MW-3	29-Oct-92	--	--	--	--	--	--	--	--
MW-3	07-Apr-93	NS	NS	NS	NS	NS	NS	NS	NS
MW-4	04-Feb-86	--	--	--	--	--	--	--	--
MW-4	29-May-86	NS	NS	NS	NS	NS	NS	NS	NS
MW-4	18-Jul-86	NS	NS	NS	NS	NS	NS	NS	NS
MW-4	14-Oct-86	NS	NS	NS	NS	NS	NS	NS	NS
MW-4	29-Jan-87	--	--	--	NS	--	--	--	--
MW-4	21-Apr-87	NS	NS	NS	NS	NS	NS	NS	NS
MW-4	07-Oct-87	--	--	--	NS	--	--	--	--
MW-4	18-Apr-88	--	--	--	NS	--	--	--	--
MW-4	20-Oct-88	--	--	--	--	--	5	36	--
MW-4	19-Apr-89	NS	NS	NS	NS	NS	NS	NS	NS
MW-4	24-Oct-89	--	--	--	--	--	5	39	2 J
MW-4	26-Apr-90	NS	NS	NS	NS	NS	NS	NS	NS
MW-4	30-Oct-90	--	--	--	--	--	4.3 J	35	1 J

LOCATION ID	DATE SAMPLED	1,1,2,2-TETRA-CHLORO-ETHANE ug/L	TETRA-CHLORO-ETHENE ug/L	1,1,1-TRI-CHLORO-ETHANE ug/L	TRANS-1,2-DICHLORO-ETHENE ug/L	1,1-DICHLORO-ETHANE ug/L	BENZENE ug/L	CHLORO-BENZENE ug/L	TOLUENE ug/L
MW-4	30-Apr-91	NS	NS	NS	NS	NS	NS	NS	NS
MW-4	23-Oct-91	--	--	--	--	--	5	30	--
MW-4	13-Apr-92	NS	NS	NS	NS	NS	NS	NS	NS
MW-4	29-Oct-92	--	--	--	--	--	5 J	35	--
MW-4	07-Apr-93	NS	NS	NS	NS	NS	NS	NS	NS
SS-1	04-Feb-86	--	--	--	--	--	--	--	--
SS-1	29-May-86	NS	NS	NS	NS	NS	NS	NS	NS
SS-1	18-Jul-86	NS	NS	NS	NS	NS	NS	NS	NS
SS-1	14-Oct-86	NS	NS	NS	NS	NS	NS	NS	NS
SS-1	29-Jan-87	--	--	--	NS	--	--	--	--
SS-1	21-Apr-87	NS	NS	NS	NS	NS	NS	NS	NS
SS-1	07-Oct-87	--	--	--	NS	--	--	--	--
SS-1	18-Apr-88	--	--	--	16	--	--	--	--
SS-1	20-Oct-88	--	--	--	--	--	--	--	--
SS-1	19-Apr-89	NS	NS	NS	NS	NS	NS	NS	NS
SS-1	24-Oct-89	--	3 J	--	--	--	--	--	--
SS-1	26-Apr-90	NS	NS	NS	NS	NS	NS	NS	NS
SS-1	30-Oct-90	--	6.6	--	--	--	--	--	--
SS-1	30-Apr-91	NS	NS	NS	NS	NS	NS	NS	NS
SS-1	23-Oct-91	--	6	--	--	--	--	--	--
SS-1	13-Apr-92	NS	NS	NS	NS	NS	NS	NS	NS
SS-1	29-Oct-92	--	--	--	--	--	--	--	--
SS-1	07-Apr-93	NS	NS	NS	NS	NS	NS	NS	NS
SS-2	04-Feb-86	--	--	--	--	--	--	--	--
SS-2	29-May-86	NS	NS	NS	NS	NS	NS	NS	NS
SS-2	18-Jul-86	NS	NS	NS	NS	NS	NS	NS	NS
SS-2	14-Oct-86	NS	NS	NS	NS	NS	NS	NS	NS
SS-2	29-Jan-87	--	--	--	NS	--	--	--	--
SS-2	21-Apr-87	NS	NS	NS	NS	NS	NS	NS	NS
SS-2	07-Oct-87	--	--	--	NS	--	--	--	--
SS-2	18-Apr-88	--	--	--	--	--	--	--	--
SS-2	20-Oct-88	--	--	--	--	--	--	--	--
SS-2	19-Apr-89	NS	NS	NS	NS	NS	NS	NS	NS
SS-2	24-Oct-89	--	3 J	--	--	--	--	--	--

LOCATION ID	DATE SAMPLED	1,1,2,2-TETRA-CHLORO-ETHANE ug/L	TETRA-CHLORO-ETHENE ug/L	1,1,1-TRI-CHLORO-ETHANE ug/L	TRANS-1,2-DICHLORO-ETHENE ug/L	1,1-DICHLORO-ETHANE ug/L	BENZENE ug/L	CHLORO-BENZENE ug/L	TOLUENE ug/L
SS-2	26-Apr-90	NS	NS	NS	NS	NS	NS	NS	NS
SS-2	30-Oct-90	--	6.9	--	--	--	--	--	--
SS-2	30-Apr-91	NS	NS	NS	NS	NS	NS	NS	NS
SS-2	23-Oct-91	--	6	--	--	--	--	--	--
SS-2	13-Apr-92	NS	NS	NS	NS	NS	NS	NS	NS
SS-2	29-Oct-92	--	6	--	--	--	--	--	--
SS-2	07-Apr-93	NS	NS	NS	NS	NS	NS	NS	NS
SS-3	04-Feb-86	--	--	--	--	--	--	--	--
SS-3	29-May-86	NS	NS	NS	NS	NS	NS	NS	NS
SS-3	18-Jul-86	NS	NS	NS	NS	NS	NS	NS	NS
SS-3	14-Oct-86	NS	NS	NS	NS	NS	NS	NS	NS
SS-3	29-Jan-87	--	--	--	NS	--	--	--	--
SS-3	21-Apr-87	NS	NS	NS	NS	NS	NS	NS	NS
SS-3	07-Oct-87	--	--	--	NS	--	--	--	--
SS-3	18-Apr-88	--	--	--	--	--	--	--	--
SS-3	20-Oct-88	--	--	--	--	--	--	--	--
SS-3	19-Apr-89	NS	NS	NS	NS	NS	NS	NS	NS
SS-3	24-Oct-89	--	--	--	--	--	--	--	--
SS-3	26-Apr-90	NS	NS	NS	NS	NS	NS	NS	NS
SS-3	30-Oct-90	--	--	--	--	--	--	--	--
SS-3	30-Apr-91	NS	NS	NS	NS	NS	NS	NS	NS
SS-3	23-Oct-91	--	--	--	--	--	--	--	--
SS-3	13-Apr-92	NS	NS	NS	NS	NS	NS	NS	NS
SS-3	29-Oct-92	--	6	--	--	--	--	--	--
SS-3	07-Apr-93	NS	NS	NS	NS	NS	NS	NS	NS
SS-4	04-Feb-86	--	--	--	--	--	--	--	--
SS-4	29-May-86	NS	NS	NS	NS	NS	NS	NS	NS
SS-4	18-Jul-86	NS	NS	NS	NS	NS	NS	NS	NS
SS-4	14-Oct-86	NS	NS	NS	NS	NS	NS	NS	NS
SS-4	29-Jan-87	--	--	--	NS	--	--	--	--
SS-4	21-Apr-87	NS	NS	NS	NS	NS	NS	NS	NS
SS-4	07-Oct-87	NS	NS	NS	NS	NS	NS	NS	NS
SS-4	18-Apr-88	--	--	--	--	--	--	--	--
SS-4	20-Oct-88	--	--	10	--	--	--	--	--

FORT MONMOUTH GROUNDWATER AND SURFACE WATER ANALYTICAL RESULTS

LOCATION ID	DATE SAMPLED	1,1,2,2-TETRA-CHLORO-ETHANE ug/L	TETRA-CHLORO-ETHENE ug/L	1,1,1-TRI-CHLORO-ETHANE ug/L	TRANS-1,2-DICHLORO-ETHENE ug/L	1,1-DICHLORO-ETHANE ug/L	BENZENE ug/L	CHLORO-BENZENE ug/L	TOLUENE ug/L
SS-4	19-Apr-89	NS	NS	NS	NS	NS	NS	NS	NS
SS-4	24-Oct-89	--	3 J	--	--	--	--	--	--
SS-4	26-Apr-90	NS	NS	NS	NS	NS	NS	NS	NS
SS-4	30-Oct-90	--	5.3	--	--	--	--	--	--
SS-4	30-Apr-91	NS	NS	NS	NS	NS	NS	NS	NS
SS-4	23-Oct-91	--	--	--	--	--	--	--	--
SS-4	13-Apr-92	NS	NS	NS	NS	NS	NS	NS	NS
SS-4	29-Oct-92	--	--	--	--	--	--	--	--
SS-4	07-Apr-93	NS	NS	NS	NS	NS	NS	NS	NS
SS-5	04-Feb-86	--	--	--	--	--	--	--	--
SS-5	29-May-86	NS	NS	NS	NS	NS	NS	NS	NS
SS-5	18-Jul-86	NS	NS	NS	NS	NS	NS	NS	NS
SS-5	14-Oct-86	NS	NS	NS	NS	NS	NS	NS	NS
SS-5	29-Jan-87	--	--	--	NS	--	--	--	--
SS-5	21-Apr-87	NS	NS	NS	NS	NS	NS	NS	NS
SS-5	07-Oct-87	--	--	--	NS	--	--	--	--
SS-5	18-Apr-88	--	--	--	--	--	--	--	--
SS-5	20-Oct-88	--	--	7	--	--	--	--	--
SS-5	19-Apr-89	NS	NS	NS	NS	NS	NS	NS	NS
SS-5	24-Oct-89	--	3 J	--	--	--	--	--	--
SS-5	26-Apr-90	NS	NS	NS	NS	NS	NS	NS	NS
SS-5	30-Oct-90	--	5.3	--	--	--	--	--	--
SS-5	30-Apr-91	NS	NS	NS	NS	NS	NS	NS	NS
SS-5	23-Oct-91	--	--	--	--	--	--	--	--
SS-5	13-Apr-92	NS	NS	NS	NS	NS	NS	NS	NS
SS-5	29-Oct-92	--	3 J	--	--	--	--	--	--
SS-5	07-Apr-93	NS	NS	NS	NS	NS	NS	NS	NS
SS-6	04-Feb-86	--	--	--	--	--	--	--	--
SS-6	29-May-86	NS	NS	NS	NS	NS	NS	NS	NS
SS-6	18-Jul-86	NS	NS	NS	NS	NS	NS	NS	NS
SS-6	14-Oct-86	NS	NS	NS	NS	NS	NS	NS	NS
SS-6	29-Jan-87	--	--	--	NS	--	--	--	--
SS-6	21-Apr-87	NS	NS	NS	NS	NS	NS	NS	NS
SS-6	07-Oct-87	--	5.3	--	NS	--	--	--	--

FORT MONMOUTH GROUNDWATER AND SURFACE WATER ANALYTICAL RESULTS

LOCATION ID	DATE SAMPLED	1,1,2,2-TETRA-CHLORO-ETHANE ug/L	TETRA-CHLORO-ETHENE ug/L	1,1,1-TRI-CHLORO-ETHANE ug/L	TRANS-1,2-DICHLORO-ETHENE ug/L	1,1-DICHLORO-ETHANE ug/L	BENZENE ug/L	CHLORO-BENZENE ug/L	TOLUENE ug/L
SS-6	18-Apr-88	--	4.2	--	--	--	--	--	--
SS-6	20-Oct-88	--	--	12	--	--	--	--	--
SS-6	19-Apr-89	NS	NS	NS	NS	NS	NS	NS	NS
SS-6	24-Oct-89	--	3 J	--	--	--	--	--	--
SS-6	26-Apr-90	NS	NS	NS	NS	NS	NS	NS	NS
SS-6	30-Oct-90	--	5.9	--	--	--	--	--	--
SS-6	30-Apr-91	NS	NS	NS	NS	NS	NS	NS	NS
SS-6	23-Oct-91	--	--	--	--	--	--	--	--
SS-6	13-Apr-92	NS	NS	NS	NS	NS	NS	NS	NS
SS-6	29-Oct-92	--	3 J	--	--	--	--	--	--
SS-6	07-Apr-93	NS	NS	NS	NS	NS	NS	NS	NS
SS-7	04-Feb-86	--	--	--	--	--	--	--	--
SS-7	29-May-86	NS	NS	NS	NS	NS	NS	NS	NS
SS-7	18-Jul-86	NS	NS	NS	NS	NS	NS	NS	NS
SS-7	14-Oct-86	NS	NS	NS	NS	NS	NS	NS	NS
SS-7	29-Jan-87	--	--	--	NS	--	--	--	--
SS-7	21-Apr-87	NS	NS	NS	NS	NS	NS	NS	NS
SS-7	07-Oct-87	--	--	--	NS	--	--	--	--
SS-7	18-Apr-88	--	--	--	2.7	--	--	--	--
SS-7	20-Oct-88	--	--	10	--	--	--	--	--
SS-7	19-Apr-89	NS	NS	NS	NS	NS	NS	NS	NS
SS-7	24-Oct-89	--	2 J	--	--	--	--	--	--
SS-7	26-Apr-90	NS	NS	NS	NS	NS	NS	NS	NS
SS-7	30-Oct-90	--	2.8 J	--	--	--	--	--	--
SS-7	30-Apr-91	NS	NS	NS	NS	NS	NS	NS	NS
SS-7	23-Oct-91	--	--	--	--	--	--	--	--
SS-7	13-Apr-92	NS	NS	NS	NS	NS	NS	NS	NS
SS-7	29-Oct-92	--	3 J	--	--	--	--	--	--
SS-7	07-Apr-93	NS	NS	NS	NS	NS	NS	NS	NS
SS-8	04-Feb-86	--	--	--	--	--	--	--	--
SS-8	29-May-86	NS	NS	NS	NS	NS	NS	NS	NS
SS-8	18-Jul-86	NS	NS	NS	NS	NS	NS	NS	NS
SS-8	14-Oct-86	NS	NS	NS	NS	NS	NS	NS	NS
SS-8	29-Jan-87	--	--	--	NS	--	--	--	--

LOCATION ID	DATE SAMPLED	1,1,2,2-TETRA-CHLORO-ETHANE ug/L	TETRA-CHLORO-ETHENE ug/L	1,1,1-TRI-CHLORO-ETHANE ug/L	TRANS-1,2-DICHLORO-ETHENE ug/L	1,1-DICHLORO-ETHANE ug/L	BENZENE ug/L	CHLORO-BENZENE ug/L	TOLUENE ug/L
SS-8	21-Apr-87	NS	NS	NS	NS	NS	NS	NS	NS
SS-8	07-Oct-87	--	--	--	NS	--	--	--	--
SS-8	18-Apr-88	--	--	--	2.1	--	--	--	--
SS-8	20-Oct-88	--	--	9	--	--	--	--	--
SS-8	19-Apr-89	NS	NS	NS	NS	NS	NS	NS	NS
SS-8	24-Oct-89	--	--	--	7	--	--	--	--
SS-8	26-Apr-90	NS	NS	NS	NS	NS	NS	NS	NS
SS-8	30-Oct-90	--	--	--	--	--	--	--	--
SS-8	30-Apr-91	NS	NS	NS	NS	NS	NS	NS	NS
SS-8	23-Oct-91	--	--	--	--	--	--	--	--
SS-8	13-Apr-92	NS	NS	NS	NS	NS	NS	NS	NS
SS-8	29-Oct-92	--	--	--	--	--	--	--	--
SS-8	07-Apr-93	NS	NS	NS	NS	NS	NS	NS	NS
SS-9	04-Feb-86	--	--	--	--	--	--	--	--
SS-9	29-May-86	NS	NS	NS	NS	NS	NS	NS	NS
SS-9	18-Jul-86	NS	NS	NS	NS	NS	NS	NS	NS
SS-9	14-Oct-86	NS	NS	NS	NS	NS	NS	NS	NS
SS-9	29-Jan-87	--	--	--	NS	--	--	--	--
SS-9	21-Apr-87	NS	NS	NS	NS	NS	NS	NS	NS
SS-9	07-Oct-87	--	--	--	NS	--	--	--	--
SS-9	18-Apr-88	--	--	--	17	--	--	--	--
SS-9	20-Oct-88	--	--	10	--	--	--	--	--
SS-9	19-Apr-89	NS	NS	NS	NS	NS	NS	NS	NS
SS-9	24-Oct-89	--	--	--	8	--	--	--	--
SS-9	26-Apr-90	NS	NS	NS	NS	NS	NS	NS	NS
SS-9	30-Oct-90	--	--	--	2.5 J	--	--	--	--
SS-9	30-Apr-91	NS	NS	NS	NS	NS	NS	NS	NS
SS-9	23-Oct-91	--	--	--	--	--	--	--	--
SS-9	13-Apr-92	NS	NS	NS	NS	NS	NS	NS	NS
SS-9	29-Oct-92	--	--	--	--	--	--	--	--
SS-9	07-Apr-93	NS	NS	NS	NS	NS	NS	NS	NS
SS-10	04-Feb-86	--	--	--	--	--	--	--	--
SS-10	29-May-86	NS	NS	NS	NS	NS	NS	NS	NS
SS-10	18-Jul-86	NS	NS	NS	NS	NS	NS	NS	NS

FORT MONMOUTH GROUNDWATER AND SURFACE WATER ANALYTICAL RESULTS

LOCATION ID	DATE SAMPLED	1,1,2,2–TETRA–CHLORO–ETHANE ug/L	TETRA–CHLORO–ETHENE ug/L	1,1,1–TRI–CHLORO–ETHANE ug/L	TRANS–1,2–DICHLORO–ETHENE ug/L	1,1–DICHLORO–ETHANE ug/L	BENZENE ug/L	CHLORO–BENZENE ug/L	TOLUENE ug/L
SS–10	14–Oct–86	NS	NS	NS	NS	NS	NS	NS	NS
SS–10	29–Jan–87	––	––	––	NS	––	––	––	––
SS–10	21–Apr–87	NS	NS	NS	NS	NS	NS	NS	NS
SS–10	07–Oct–87	––	––	––	NS	17	––	––	––
SS–10	18–Apr–88	––	––	––	––	––	––	––	––
SS–10	20–Oct–88	––	––	5	––	––	––	––	––
SS–10	19–Apr–89	NS	NS	NS	NS	NS	NS	NS	NS
SS–10	24–Oct–89	––	––	––	27	––	––	––	1 J
SS–10	26–Apr–90	NS	NS	NS	NS	NS	NS	NS	NS
SS–10	30–Oct–90	––	––	––	22	––	––	––	––
SS–10	30–Apr–91	NS	NS	NS	NS	NS	NS	NS	NS
SS–10	23–Oct–91	––	––	––	20	––	––	––	––
SS–10	13–Apr–92	NS	NS	NS	NS	NS	NS	NS	NS
SS–10	29–Oct–92	––	––	––	––	––	––	––	––
SS–10	07–Apr–93	NS	NS	NS	NS	NS	NS	NS	NS

NS – Not Sampled
–– – Not Detected
? – Data could not be read
B – Detected in blank
J – Estimated concentration, below detection limit
70/60 – Sample, duplicate
TNTC – Too numerous to count

LOCATION ID	DATE SAMPLED	ETHYL-BENZENE ug/L	TOTAL XYLENES ug/L	TOTAL DICHLORO-BENZENES ug/L	1,3-DICHLORO-BENZENE ug/L	1,4-DICHLORO-BENZENE ug/L	1,2-DICHLORO-BENZENE ug/L	FREON ug/L	DIETHYL ETHER ug/L	m + p-XYLENES ug/L
MW-1	04-Feb-86	--	--	NS	--	NS	NS	NS	NS	NS
MW-1	29-May-86	NS	NS	NS	NS	NS	NS	NS	NS	NS
MW-1	18-Jul-86	NS	NS	NS	NS	NS	NS	NS	NS	NS
MW-1	14-Oct-86	NS	NS	NS	NS	NS	NS	NS	NS	NS
MW-1	29-Jan-87	--	NS	NS	--	NS	NS	NS	NS	NS
MW-1	21-Apr-87	NS	NS	NS	NS	NS	NS	NS	NS	NS
MW-1	07-Oct-87	--	NS	NS	--	NS	NS	NS	NS	NS
MW-1	18-Apr-88	--	NS	NS	NS	NS	NS	NS	NS	NS
MW-1	19-Apr-89	NS	NS	NS	NS	NS	NS	NS	NS	NS
MW-1	24-Oct-89	--	--	--	NS	NS	NS	NS	NS	NS
MW-1	26-Apr-90	NS	NS	NS	NS	NS	NS	NS	NS	NS
MW-1	30-Oct-90	--	--	NS	--	--	NS	NS	NS	NS
MW-1	30-Apr-91	NS	NS	NS	NS	NS	NS	NS	NS	NS
MW-1	23-Oct-91	--	NS	NS	--	--	NS	NS	NS	NS
MW-1	13-Apr-92	NS	NS	NS	NS	NS	NS	NS	NS	NS
MW-1	29-Oct-92	--	NS	NS	--	--	--	2 JB	--	--
MW-1	07-Apr-93	NS	NS	NS	NS	NS	NS	NS	NS	NS
MW-2	04-Feb-86	--	--	NS	--	NS	NS	NS	NS	NS
MW-2	29-May-86	NS	NS	NS	NS	NS	NS	NS	NS	NS
MW-2	18-Jul-86	NS	NS	NS	NS	NS	NS	NS	NS	NS
MW-2	14-Oct-86	NS	NS	NS	NS	NS	NS	NS	NS	NS
MW-2	29-Jan-87	23	NS	NS	--	NS	NS	NS	NS	NS
MW-2	21-Apr-87	NS	NS	NS	NS	NS	NS	NS	NS	NS
MW-2	07-Oct-87	--	NS	NS	--	NS	NS	NS	NS	NS
MW-2	18-Apr-88	--	NS	NS	NS	NS	NS	NS	NS	NS
MW-2	20-Oct-88	--	--	--	NS	NS	NS	NS	NS	NS
MW-2	19-Apr-89	NS	NS	NS	NS	NS	NS	NS	NS	NS
MW-2	24-Oct-89	--	--	--	NS	NS	NS	NS	NS	NS
MW-2	26-Apr-90	NS	NS	NS	NS	NS	NS	NS	NS	NS
MW-2	30-Oct-90	--	--	NS	--	--	NS	NS	NS	NS
MW-2	30-Apr-91	NS	NS	NS	NS	NS	NS	NS	NS	NS
MW-2	23-Oct-91	--	NS	NS	--	--	NS	NS	NS	NS
MW-2	13-Apr-92	NS	NS	NS	NS	NS	NS	NS	NS	NS
MW-2	29-Oct-92	--	NS	NS	--	--	--	27	--	--

FORT MONMOUTH GROUNDWATER AND SURFACE WATER ANALYTICAL RESULTS

LOCATION ID	DATE SAMPLED	ETHYL-BENZENE ug/L	TOTAL XYLENES ug/L	TOTAL DICHLORO-BENZENES ug/L	1,3-DICHLORO-BENZENE ug/L	1,4-DICHLORO-BENZENE ug/L	1,2-DICHLORO-BENZENE ug/L	FREON ug/L	DIETHYL ETHER ug/L	m + p-XYLENES ug/L
MW-2	07-Apr-93	NS	NS	NS	NS	NS	NS	NS	NS	NS
MW-3	04-Feb-86	--	--	NS	--	NS	NS	NS	NS	NS
MW-3 Dup. 1	04-Feb-86	NS	NS	NS	--	NS	NS	NS	NS	NS
MW-3 Dup. 2	04-Feb-86	NS	NS	NS	--	NS	NS	NS	NS	NS
MW-3	29-May-86	NS	NS	NS	NS	NS	NS	NS	NS	NS
MW-3	18-Jul-86	NS	NS	NS	NS	NS	NS	NS	NS	NS
MW-3	14-Oct-86	NS	NS	NS	NS	NS	NS	NS	NS	NS
MW-3	29-Jan-87	--	NS	NS	--	NS	NS	NS	NS	NS
MW-3	21-Apr-87	NS	NS	NS	NS	NS	NS	NS	NS	NS
MW-3	07-Oct-87	--	NS	NS	--	NS	NS	NS	NS	NS
MW-3	18-Apr-88	--	NS	NS	NS	NS	NS	NS	NS	NS
MW-3	20-Oct-88	--	--	--	NS	NS	NS	NS	NS	NS
MW-3	19-Apr-89	NS	NS	NS	NS	NS	NS	NS	NS	NS
MW-3	24-Oct-89	--	--	--	NS	NS	NS	NS	NS	NS
MW-3	26-Apr-90	NS	NS	NS	NS	NS	NS	NS	NS	NS
MW-3	30-Oct-90	--	--	NS	--	--	NS	NS	NS	NS
MW-3	30-Apr-91	NS	NS	NS	NS	NS	NS	NS	NS	NS
MW-3	23-Oct-91	--	NS	NS	--	--	NS	NS	NS	NS
MW-3	13-Apr-92	NS	NS	NS	NS	NS	NS	NS	NS	NS
MW-3	29-Oct-92	--	NS	NS	--	1 J	--	4 JB	21 J	--
MW-3	07-Apr-93	NS	NS	NS	NS	NS	NS	NS	NS	NS
MW-4	04-Feb-86	--	--	NS	--	NS	NS	NS	NS	NS
MW-4	29-May-86	NS	NS	NS	NS	NS	NS	NS	NS	NS
MW-4	18-Jul-86	NS	NS	NS	NS	NS	NS	NS	NS	NS
MW-4	14-Oct-86	NS	NS	NS	NS	NS	NS	NS	NS	NS
MW-4	29-Jan-87	--	NS	NS	60	NS	NS	NS	NS	NS
MW-4	21-Apr-87	NS	NS	NS	NS	NS	NS	NS	NS	NS
MW-4	07-Oct-87	--	NS	NS	--	NS	NS	NS	NS	NS
MW-4	18-Apr-88	--	NS	NS	NS	NS	NS	NS	NS	NS
MW-4	20-Oct-88	2 J	25	35	NS	NS	NS	NS	NS	NS
MW-4	19-Apr-89	NS	NS	NS	NS	NS	NS	NS	NS	NS
MW-4	24-Oct-89	9	90	--	NS	NS	NS	NS	NS	NS
MW-4	26-Apr-90	NS	NS	NS	NS	NS	NS	NS	NS	NS
MW-4	30-Oct-90	2.9 J	13	NS	--	35	NS	NS	NS	NS

FORT MONMOUTH GROUNDWATER AND SURFACE WATER ANALYTICAL RESULTS

LOCATION ID	DATE SAMPLED	ETHYL-BENZENE ug/L	TOTAL XYLENES ug/L	TOTAL DICHLORO-BENZENES ug/L	1,3-DICHLORO-BENZENE ug/L	1,4-DICHLORO-BENZENE ug/L	1,2-DICHLORO-BENZENE ug/L	FREON ug/L	DIETHYL ETHER ug/L	m + p-XYLENES ug/L
MW-4	30-Apr-91	NS	NS	NS	NS	NS	NS	NS	NS	NS
MW-4	23-Oct-91	--	NS	NS	--	41	NS	NS	NS	NS
MW-4	13-Apr-92	NS	NS	NS	NS	NS	NS	NS	NS	NS
MW-4	29-Oct-92	--	NS	NS	2 J	25	5 J	34	41 J	8
MW-4	07-Apr-93	NS	NS	NS	NS	NS	NS	NS	NS	NS
SS-1	04-Feb-86	--	--	NS	--	NS	NS	NS	NS	NS
SS-1	29-May-86	NS	NS	NS	NS	NS	NS	NS	NS	NS
SS-1	18-Jul-86	NS	NS	NS	NS	NS	NS	NS	NS	NS
SS-1	14-Oct-86	NS	NS	NS	NS	NS	NS	NS	NS	NS
SS-1	29-Jan-87	--	NS	NS	--	NS	NS	NS	NS	NS
SS-1	21-Apr-87	NS	NS	NS	NS	NS	NS	NS	NS	NS
SS-1	07-Oct-87	--	NS	NS	--	NS	NS	NS	NS	NS
SS-1	18-Apr-88	--	NS	NS	NS	NS	NS	NS	NS	NS
SS-1	20-Oct-88	--	--	--	NS	NS	NS	NS	NS	NS
SS-1	19-Apr-89	NS	NS	NS	NS	NS	NS	NS	NS	NS
SS-1	24-Oct-89	--	--	--	NS	NS	NS	NS	NS	NS
SS-1	26-Apr-90	NS	NS	NS	NS	NS	NS	NS	NS	NS
SS-1	30-Oct-90	--	--	NS	--	--	NS	NS	NS	NS
SS-1	30-Apr-91	NS	NS	NS	NS	NS	NS	NS	NS	NS
SS-1	23-Oct-91	--	NS	NS	--	--	NS	NS	NS	NS
SS-1	13-Apr-92	NS	NS	NS	NS	NS	NS	NS	NS	NS
SS-1	29-Oct-92	--	NS	NS	--	--	--	5 B	--	--
SS-1	07-Apr-93	NS	NS	NS	NS	NS	NS	NS	NS	NS
SS-2	04-Feb-86	--	--	NS	--	NS	NS	NS	NS	NS
SS-2	29-May-86	NS	NS	NS	NS	NS	NS	NS	NS	NS
SS-2	18-Jul-86	NS	NS	NS	NS	NS	NS	NS	NS	NS
SS-2	14-Oct-86	NS	NS	NS	NS	NS	NS	NS	NS	NS
SS-2	29-Jan-87	--	NS	NS	--	NS	NS	NS	NS	NS
SS-2	21-Apr-87	NS	NS	NS	NS	NS	NS	NS	NS	NS
SS-2	07-Oct-87	--	NS	NS	--	NS	NS	NS	NS	NS
SS-2	18-Apr-88	--	NS	NS	NS	NS	NS	NS	NS	NS
SS-2	20-Oct-88	--	--	--	NS	NS	NS	NS	NS	NS
SS-2	19-Apr-89	NS	NS	NS	NS	NS	NS	NS	NS	NS
SS-2	24-Oct-89	--	--	--	NS	NS	NS	NS	NS	NS

LOCATION ID	DATE SAMPLED	ETHYL-BENZENE ug/L	TOTAL XYLENES ug/L	TOTAL DICHLORO-BENZENES ug/L	1,3-DICHLORO-BENZENE ug/L	1,4-DICHLORO-BENZENE ug/L	1,2-DICHLORO-BENZENE ug/L	FREON ug/L	DIETHYL ETHER ug/L	m + p-XYLENES ug/L
SS-2	26-Apr-90	NS	NS	NS	NS	NS	NS	NS	NS	NS
SS-2	30-Oct-90	--	--	NS	--	--	NS	NS	NS	NS
SS-2	30-Apr-91	NS	NS	NS	NS	NS	NS	NS	NS	NS
SS-2	23-Oct-91	--	NS	NS	--	--	NS	NS	NS	NS
SS-2	13-Apr-92	NS	NS	NS	NS	NS	NS	NS	NS	NS
SS-2	29-Oct-92	--	NS	NS	--	--	--	2 J	--	--
SS-2	07-Apr-93	NS	NS	NS	NS	NS	NS	NS	NS	NS
SS-3	04-Feb-86	--	--	NS	--	NS	NS	NS	NS	NS
SS-3	29-May-86	NS	NS	NS	NS	NS	NS	NS	NS	NS
SS-3	18-Jul-86	NS	NS	NS	NS	NS	NS	NS	NS	NS
SS-3	14-Oct-86	NS	NS	NS	NS	NS	NS	NS	NS	NS
SS-3	29-Jan-87	--	NS	NS	--	NS	NS	NS	NS	NS
SS-3	21-Apr-87	NS	NS	NS	NS	NS	NS	NS	NS	NS
SS-3	07-Oct-87	--	NS	NS	--	NS	NS	NS	NS	NS
SS-3	18-Apr-88	--	NS	NS	NS	NS	NS	NS	NS	NS
SS-3	20-Oct-88	--	--	--	NS	NS	NS	NS	NS	NS
SS-3	19-Apr-89	NS	NS	NS	NS	NS	NS	NS	NS	NS
SS-3	24-Oct-89	--	--	--	NS	NS	NS	NS	NS	NS
SS-3	26-Apr-90	NS	NS	NS	NS	NS	NS	NS	NS	NS
SS-3	30-Oct-90	--	--	NS	--	--	NS	NS	NS	NS
SS-3	30-Apr-91	NS	NS	NS	NS	NS	NS	NS	NS	NS
SS-3	23-Oct-91	--	NS	NS	--	--	NS	NS	NS	NS
SS-3	13-Apr-92	NS	NS	NS	NS	NS	NS	NS	NS	NS
SS-3	29-Oct-92	--	NS	NS	--	--	--	11 B	--	--
SS-3	07-Apr-93	NS	NS	NS	NS	NS	NS	NS	NS	NS
SS-4	04-Feb-86	--	--	NS	--	NS	NS	NS	NS	NS
SS-4	29-May-86	NS	NS	NS	NS	NS	NS	NS	NS	NS
SS-4	18-Jul-86	NS	NS	NS	NS	NS	NS	NS	NS	NS
SS-4	14-Oct-86	NS	NS	NS	NS	NS	NS	NS	NS	NS
SS-4	29-Jan-87	--	NS	NS	--	NS	NS	NS	NS	NS
SS-4	21-Apr-87	NS	NS	NS	NS	NS	NS	NS	NS	NS
SS-4	07-Oct-87	NS	NS	NS	NS	NS	NS	NS	NS	NS
SS-4	18-Apr-88	--	NS	NS	NS	NS	NS	NS	NS	NS
SS-4	20-Oct-88	--	--	--	NS	NS	NS	NS	NS	NS

LOCATION ID	DATE SAMPLED	ETHYL-BENZENE ug/L	TOTAL XYLENES ug/L	TOTAL DICHLORO-BENZENES ug/L	1,3-DICHLORO-BENZENE ug/L	1,4-DICHLORO-BENZENE ug/L	1,2-DICHLORO-BENZENE ug/L	FREON ug/L	DIETHYL ETHER ug/L	m + p-XYLENES ug/L
SS-4	19-Apr-89	NS	NS	NS	NS	NS	NS	NS	NS	NS
SS-4	24-Oct-89	--	--	--	NS	NS	NS	NS	NS	NS
SS-4	26-Apr-90	NS	NS	NS	NS	NS	NS	NS	NS	NS
SS-4	30-Oct-90	--	--	NS	--	--	NS	NS	NS	NS
SS-4	30-Apr-91	NS	NS	NS	NS	NS	NS	NS	NS	NS
SS-4	23-Oct-91	--	NS	NS	--	--	NS	NS	NS	NS
SS-4	13-Apr-92	NS	NS	NS	NS	NS	NS	NS	NS	NS
SS-4	29-Oct-92	--	NS	NS	--	--	--	2 J	--	--
SS-4	07-Apr-93	NS	NS	NS	NS	NS	NS	NS	NS	NS
SS-5	04-Feb-86	--	--	NS	--	NS	NS	NS	NS	NS
SS-5	29-May-86	NS	NS	NS	NS	NS	NS	NS	NS	NS
SS-5	18-Jul-86	NS	NS	NS	NS	NS	NS	NS	NS	NS
SS-5	14-Oct-86	NS	NS	NS	NS	NS	NS	NS	NS	NS
SS-5	29-Jan-87	--	NS	NS	--	NS	NS	NS	NS	NS
SS-5	21-Apr-87	NS	NS	NS	NS	NS	NS	NS	NS	NS
SS-5	07-Oct-87	--	NS	NS	--	NS	NS	NS	NS	NS
SS-5	18-Apr-88	--	NS	NS	NS	NS	NS	NS	NS	NS
SS-5	20-Oct-88	--	--	--	NS	NS	NS	NS	NS	NS
SS-5	19-Apr-89	NS	NS	NS	NS	NS	NS	NS	NS	NS
SS-5	24-Oct-89	--	--	--	NS	NS	NS	NS	NS	NS
SS-5	26-Apr-90	NS	NS	NS	NS	NS	NS	NS	NS	NS
SS-5	30-Oct-90	--	--	NS	--	--	NS	NS	NS	NS
SS-5	30-Apr-91	NS	NS	NS	NS	NS	NS	NS	NS	NS
SS-5	23-Oct-91	--	NS	NS	--	--	NS	NS	NS	NS
SS-5	13-Apr-92	NS	NS	NS	NS	NS	NS	NS	NS	NS
SS-5	29-Oct-92	--	NS	NS	--	--	--	--	--	--
SS-5	07-Apr-93	NS	NS	NS	NS	NS	NS	NS	NS	NS
SS-6	04-Feb-86	--	--	NS	--	NS	NS	NS	NS	NS
SS-6	29-May-86	NS	NS	NS	NS	NS	NS	NS	NS	NS
SS-6	18-Jul-86	NS	NS	NS	NS	NS	NS	NS	NS	NS
SS-6	14-Oct-86	NS	NS	NS	NS	NS	NS	NS	NS	NS
SS-6	29-Jan-87	--	NS	NS	--	NS	NS	NS	NS	NS
SS-6	21-Apr-87	NS	NS	NS	NS	NS	NS	NS	NS	NS
SS-6	07-Oct-87	--	NS	NS	--	NS	NS	NS	NS	NS

LOCATION ID	DATE SAMPLED	ETHYL-BENZENE ug/L	TOTAL XYLENES ug/L	TOTAL DICHLORO-BENZENES ug/L	1,3-DICHLORO-BENZENE ug/L	1,4-DICHLORO-BENZENE ug/L	1,2-DICHLORO-BENZENE ug/L	FREON ug/L	DIETHYL ETHER ug/L	m + p-XYLENES ug/L
SS-6	18-Apr-88	--	NS	NS	NS	NS	NS	NS	NS	NS
SS-6	20-Oct-88	--	--	--	NS	NS	NS	NS	NS	NS
SS-6	19-Apr-89	NS	NS	NS	NS	NS	NS	NS	NS	NS
SS-6	24-Oct-89	--	--	--	NS	NS	NS	NS	NS	NS
SS-6	26-Apr-90	NS	NS	NS	NS	NS	NS	NS	NS	NS
SS-6	30-Oct-90	--	--	NS	--	--	NS	NS	NS	NS
SS-6	30-Apr-91	NS	NS	NS	NS	NS	NS	NS	NS	NS
SS-6	23-Oct-91	--	NS	NS	--	--	NS	NS	NS	NS
SS-6	13-Apr-92	NS	NS	NS	NS	NS	NS	NS	NS	NS
SS-6	29-Oct-92	--	NS	NS	--	--	--	68	--	--
SS-6	07-Apr-93	NS	NS	NS	NS	NS	NS	NS	NS	NS
SS-7	04-Feb-86	--	--	NS	--	NS	NS	NS	NS	NS
SS-7	29-May-86	NS	NS	NS	NS	NS	NS	NS	NS	NS
SS-7	18-Jul-86	NS	NS	NS	NS	NS	NS	NS	NS	NS
SS-7	14-Oct-86	NS	NS	NS	NS	NS	NS	NS	NS	NS
SS-7	29-Jan-87	--	NS	NS	--	NS	NS	NS	NS	NS
SS-7	21-Apr-87	NS	NS	NS	NS	NS	NS	NS	NS	NS
SS-7	07-Oct-87	--	NS	NS	--	NS	NS	NS	NS	NS
SS-7	18-Apr-88	--	NS	NS	NS	NS	NS	NS	NS	NS
SS-7	20-Oct-88	--	--	--	NS	NS	NS	NS	NS	NS
SS-7	19-Apr-89	NS	NS	NS	NS	NS	NS	NS	NS	NS
SS-7	24-Oct-89	--	--	--	NS	NS	NS	NS	NS	NS
SS-7	26-Apr-90	NS	NS	NS	NS	NS	NS	NS	NS	NS
SS-7	30-Oct-90	--	--	NS	--	--	NS	NS	NS	NS
SS-7	30-Apr-91	NS	NS	NS	NS	NS	NS	NS	NS	NS
SS-7	23-Oct-91	--	NS	NS	--	--	NS	NS	NS	NS
SS-7	13-Apr-92	NS	NS	NS	NS	NS	NS	NS	NS	NS
SS-7	29-Oct-92	--	NS	NS	--	--	--	3 J	--	--
SS-7	07-Apr-93	NS	NS	NS	NS	NS	NS	NS	NS	NS
SS-8	04-Feb-86	--	--	NS	--	NS	NS	NS	NS	NS
SS-8	29-May-86	NS	NS	NS	NS	NS	NS	NS	NS	NS
SS-8	18-Jul-86	NS	NS	NS	NS	NS	NS	NS	NS	NS
SS-8	14-Oct-86	NS	NS	NS	NS	NS	NS	NS	NS	NS
SS-8	29-Jan-87	--	NS	NS	--	NS	NS	NS	NS	NS

LOCATION ID	DATE SAMPLED	ETHYL-BENZENE ug/L	TOTAL XYLENES ug/L	TOTAL DICHLORO-BENZENES ug/L	1,3-DICHLORO-BENZENE ug/L	1,4-DICHLORO-BENZENE ug/L	1,2-DICHLORO-BENZENE ug/L	FREON ug/L	DIETHYL ETHER ug/L	m + p-XYLENES ug/L
SS-8	21-Apr-87	NS	NS	NS	NS	NS	NS	NS	NS	NS
SS-8	07-Oct-87	--	NS	NS	--	NS	NS	NS	NS	NS
SS-8	18-Apr-88	--	NS	NS	NS	NS	NS	NS	NS	NS
SS-8	20-Oct-88	--	--	--	NS	NS	NS	NS	NS	NS
SS-8	19-Apr-89	NS	NS	NS	NS	NS	NS	NS	NS	NS
SS-8	24-Oct-89	--	--	--	NS	NS	NS	NS	NS	NS
SS-8	26-Apr-90	NS	NS	NS	NS	NS	NS	NS	NS	NS
SS-8	30-Oct-90	--	--	NS	--	--	NS	NS	NS	NS
SS-8	30-Apr-91	NS	NS	NS	NS	NS	NS	NS	NS	NS
SS-8	23-Oct-91	--	NS	NS	--	--	NS	NS	NS	NS
SS-8	13-Apr-92	NS	NS	NS	NS	NS	NS	NS	NS	NS
SS-8	29-Oct-92	--	NS	NS	--	--	--	15	--	--
SS-8	07-Apr-93	NS	NS	NS	NS	NS	NS	NS	NS	NS
SS-9	04-Feb-86	--	--	NS	--	NS	NS	NS	NS	NS
SS-9	29-May-86	NS	NS	NS	NS	NS	NS	NS	NS	NS
SS-9	18-Jul-86	NS	NS	NS	NS	NS	NS	NS	NS	NS
SS-9	14-Oct-86	NS	NS	NS	NS	NS	NS	NS	NS	NS
SS-9	29-Jan-87	--	NS	NS	--	NS	NS	NS	NS	NS
SS-9	21-Apr-87	NS	NS	NS	NS	NS	NS	NS	NS	NS
SS-9	07-Oct-87	--	NS	NS	--	NS	NS	NS	NS	NS
SS-9	18-Apr-88	--	NS	NS	NS	NS	NS	NS	NS	NS
SS-9	20-Oct-88	--	--	--	NS	NS	NS	NS	NS	NS
SS-9	19-Apr-89	NS	NS	NS	NS	NS	NS	NS	NS	NS
SS-9	24-Oct-89	--	--	--	NS	NS	NS	NS	NS	NS
SS-9	26-Apr-90	NS	NS	NS	NS	NS	NS	NS	NS	NS
SS-9	30-Oct-90	--	--	NS	--	--	NS	NS	NS	NS
SS-9	30-Apr-91	NS	NS	NS	NS	NS	NS	NS	NS	NS
SS-9	23-Oct-91	--	NS	NS	--	--	NS	NS	NS	NS
SS-9	13-Apr-92	NS	NS	NS	NS	NS	NS	NS	NS	NS
SS-9	29-Oct-92	--	NS	NS	--	--	--	2 J	--	--
SS-9	07-Apr-93	NS	NS	NS	NS	NS	NS	NS	NS	NS
SS-10	04-Feb-86	--	--	NS	--	NS	NS	NS	NS	NS
SS-10	29-May-86	NS	NS	NS	NS	NS	NS	NS	NS	NS
SS-10	18-Jul-86	NS	NS	NS	NS	NS	NS	NS	NS	NS

FORT MONMOUTH GROUNDWATER AND SURFACE WATER ANALYTICAL RESULTS

LOCATION ID	DATE SAMPLED	ETHYL-BENZENE ug/L	TOTAL XYLENES ug/L	TOTAL DICHLORO-BENZENES ug/L	1,3-DICHLORO-BENZENE ug/L	1,4-DICHLORO-BENZENE ug/L	1,2-DICHLORO-BENZENE ug/L	FREON ug/L	DIETHYL ETHER ug/L	m + p-XYLENES ug/L
SS-10	14-Oct-86	NS	NS	NS	NS	NS	NS	NS	NS	NS
SS-10	29-Jan-87	--	NS	NS	--	NS	NS	NS	NS	NS
SS-10	21-Apr-87	NS	NS	NS	NS	NS	NS	NS	NS	NS
SS-10	07-Oct-87	--	NS	NS	--	NS	NS	NS	NS	NS
SS-10	18-Apr-88	--	NS	NS	NS	NS	NS	NS	NS	NS
SS-10	20-Oct-88	--	--	--	NS	NS	NS	NS	NS	NS
SS-10	19-Apr-89	NS	NS	NS	NS	NS	NS	NS	NS	NS
SS-10	24-Oct-89	--	--	--	NS	NS	NS	NS	NS	NS
SS-10	26-Apr-90	NS	NS	NS	NS	NS	NS	NS	NS	NS
SS-10	30-Oct-90	--	--	NS	--	--	NS	NS	NS	NS
SS-10	30-Apr-91	NS	NS	NS	NS	NS	NS	NS	NS	NS
SS-10	23-Oct-91	--	NS	NS	--	--	NS	NS	NS	NS
SS-10	13-Apr-92	NS	NS	NS	NS	NS	NS	NS	NS	NS
SS-10	29-Oct-92	--	NS	NS	--	--	--	10 B	--	--
SS-10	07-Apr-93	NS	NS	NS	NS	NS	NS	NS	NS	NS

NS – Not Sampled
-- – Not Detected
? – Data could not be read
B – Detected in blank
J – Estimated concentration, below detection limit
70/60 – Sample, duplicate
TNTC – Too numerous to count

LANDFILL 12 LEACHATE SAMPLING ANALYTICAL RESULTS

SAMPLE ID	DATE	METHYLENE CHLORIDE (ug/L)	2-BUTANONE (ug/L)	CIS-1,3-DICHLORO-PROPENE (ug/L)	M & P XYLENES (ug/L)	METHYL TERT-BUTYL ETHER (ug/L)	DIETHYL ETHER (ug/L)	DI-N-BUTYL-PHTHALATE (ug/L)
SITE A	13-Aug-92	15	--	--	--	--	--	5 JB
SITE B	13-Aug-92	12	6	1 J	2 J	2 J	11 J	22 B

LANDFILL 12 LEACHATE SAMPLING ANALYTICAL RESULTS

SAMPLE ID	BERYLLIUM (mg/L)	CADMIUM (mg/L)	CHROMIUM (mg/L)	COPPER (mg/L)	LEAD (mg/L)	ZINC (mg/L)
SITE A	0.001	0.0011	0.013	--	0.047	0.08
SITE B	--	0.0006	0.005	0.06	0.032	--

BUILDING T-65 PESTICIDE ANALYTICAL RESULTS

LOCATION ID	TYPE	DEPTH INCHES	CHLORDANE (UG/KG)	CHLORDANE (UG/CU M)	ALDRIN (UG/CU M)	DDT (UG/CU M)	DIAZINON (UG/CU M)	MALATHION (UG/CU M)	DURSBAN (UG/CU M)
1	AIR	NA	NA	4	--	--	NS	NS	NS
4	AIR	NA	NA	16	NS	NS	--	--	--
7	SOIL		170000	NA	NA	NA	NA	NA	NA
BH-1A	SOIL	6-12	--	NA	NA	NA	NA	NA	NA
BH-1B	SOIL	48-54	--	NA	NA	NA	NA	NA	NA
BH-2A	SOIL	6-12	--	NA	NA	NA	NA	NA	NA
BH-2B	SOIL	48-54	--	NA	NA	NA	NA	NA	NA
BH-3A	SOIL	6-12	--	NA	NA	NA	NA	NA	NA
BH-3B	SOIL	60-66	--	NA	NA	NA	NA	NA	NA
BH-4A	SOIL	6-12	--	NA	NA	NA	NA	NA	NA
BH-4B	SOIL	48-54	--	NA	NA	NA	NA	NA	NA
BH-5A	SOIL	6-12	--	NA	NA	NA	NA	NA	NA
BH-5B	SOIL	48-54	--	NA	NA	NA	NA	NA	NA
BH-6A	SOIL	6-12	1400	NA	NA	NA	NA	NA	NA
BH-6B	SOIL	41-47	--	NA	NA	NA	NA	NA	NA
BH-7A	SOIL	6-12	--	NA	NA	NA	NA	NA	NA
BH-7B	SOIL	41-47	--	NA	NA	NA	NA	NA	NA
BH-8A	SOIL	6-12	47000	NA	NA	NA	NA	NA	NA
BH-8B	SOIL	38-44	--	NA	NA	NA	NA	NA	NA

NOTES:
Sample 7 was diluted 200,000 times, there was no surrogate recovery.
NA - Not Applicable
NS - Not Sampled

BUILDING T-65 GROUNDWATER ANALYTICAL RESULTS

SAMPLE ID	DATE	METHYLENE CHLORIDE (ug/L)	2-METHYL NAPTHALENE (ug/L)	ACE-NAPTHENE (ug/L)	DIBENZO-FURAN (ug/L)	FLUORENE (ug/L)	PHEN-ANTHRENE (ug/L)	PYRENE (ug/L)
T-65	26-Oct-92	8	110	22 J	--	44	76	6 J
T-65	10-Dec-92	22	380	--	22	54	95	14 J

BUILDING T-65 GROUNDWATER ANALYTICAL RESULTS

SAMPLE ID	DI-N-BUTYL-PHTHALATE (ug/L)	CHLORDANE (ug/L)	LEAD (mg/L)
T-65	4 JB	NS	--
T-65	--	--	NS

CHARLES WOOD LIME PITS ANALYTICAL RESULTS

SAMPLE ID	SAMPLE TYPE	CHLORO-FORM ug/L	TETRA-CHLORO-ETHENE ug/L	TRI-CHLORO-ETHENE ug/L	VINYL CHLORIDE ug/L	TOLUENE ug/L	ETHYL-BENZENE ug/L	1,4-DICHLORO-BENZENE ug/L	1,3-DICHLORO-BENZENE ug/L	1,2-DICHLORO-BENZENE ug/L
DRUM A	LEACHATE	10 J	40 J	85293	--	1627	NA	NA	NA	NA
DRUM B	LEACHATE	--	--	212	1218	6018	NA	NA	NA	NA
EPL 9217	AQUEOUS	--	3 J	34480	--	--	NA	NA	NA	NA
V5047	SLUDGE	--	--	--	550.5	2625.5	62	506	393	230.5

CHARLES WOOD LIME PITS ANALYTICAL RESULTS

SAMPLE ID	SAMPLE TYPE	m & p– XYLENES ug/L	o–XYLENE ug/L	2–METHYL– PHENOL ug/L	3&4–METHYL– PHENOL ug/L	2,4– DIMETHYL– PHENOL ug/L	1,4– DICHLORO– BENZENE ug/L	1,3– DICHLORO– BENZENE ug/L	1,2– DICHLORO– BENZENE ug/L
DRUM A	LEACHATE	NA	NA	--	--	NA	--	NA	NA
DRUM B	LEACHATE	NA	NA	385	426	NA	171	NA	NA
EPL 9217	AQUEOUS	NA	NA	--	--	NA	--	NA	NA
V5047	SLUDGE	178.5	52.5	--	--	12.5 J	--	14.6 J	104.8

CHARLES WOOD LIME PITS ANALYTICAL RESULTS

SAMPLE ID	SAMPLE TYPE	1,2,4– TRICHLORO– BENZENE ug/L	BIS(2– ETHYLHEXYL) PHTHALATE ug/L	ARSENIC mg/L	BARIUM mg/L	CADMIUM mg/L	CHROMIUM mg/L	LEAD mg/L	SILVER mg/L
DRUM A	LEACHATE	NA	NA	--	0.12 B	--	0.02 B	--	--
DRUM B	LEACHATE	NA	NA	0.15 B	0.65	0.01 B	0.11	--	0.03 B
EPL 9217	AQUEOUS	NA	NA	--	0.33	--	2.56	0.65	--
V5047	SLUDGE	151.4	56.1	--	1.08	--	--	0.04	--

CHARLES WOOD LIME PITS ANALYTICAL RESULTS

SAMPLE ID	SAMPLE TYPE	TOX ug/L AS Cl–
DRUM A	LEACHATE	48000
DRUM B	LEACHATE	790
EPL 9217	AQUEOUS	NA
V5047	SLUDGE	NA

EVANS AREA GULLY BROOK PP METALS ANALYTICAL SUMMARY

LOCATION ID	TYPE	CHROMIUM (MG/KG)	LEAD (MG/KG)	ZINC (MG/KG)	MERCURY (MG/KG)
GB–01	SOIL	1.4	3.3	3.8	--
GB–02	SOIL	--	2.8	2.3	0.05
GB–03	SOIL	--	4.2	1.8	--

Appendix B

APPENDIX B

PESTICIDE INVENTORY

PESTICIDE INVENTORY

FOR

FORT MONMOUTH

TO INCLUDE

GOLF COURSE (CHARLES WOOD AREA)

DIRECTORATE OF ENGINEERING AND HOUSING (DEH)
FORT MONMOUTH, NEW JERSEY 07703-5108

APPENDIX G

DIRECTORATE OF ENGINEERING AND HOUSING
FORT MONMOUTH, NEW JERSEY 07703-5108

PESTICIDE INVENTORY

October 1991

INSECTICIDES (Page 1 of 3)

PRODUCE NAME	ACTIVE INGREDIENT	% A.I	FOURMULATION	EPA REG NO.	MANUFACTURER	SIGNAL WORD
Dursban TC	Chlorphyrifos	42.8	EC	464-562	Dow Chemical	WARNING
Dursban LO	Chlorphyrifos	41.5	ED	464-571	Dow Chemical	WARNING
Dursban 50W	Chlorphyrifos	50.0	EC	464-590	Dow Chemical	WARNING
Dragnet FT	Permethrin	36.8	EC	279-3062	FMC	CAUTION
Diazinon 2D	Diazinon	2.0	Dust	10370-43	PRENTOX	CAUTION
Demon EC	Cypermethrin	25.3	EC	10182-105	ICI	WARNING
Demon EC	Cypermethrin	35.6	W.P.	10182-100	ICI	WARNING
Ficam D	Bendiocarb	1.0	Dust	45639-3	NOR-AN	WARNING
Ficam +	Bendiocarb-Pyrethrins Piperonyl Butoxide Tech	29.45 3.06 7.66	W.P.	45639-66	NOR-AN	WARNING
It Works	Boric Acid	52	Bait	51707-1	IT WORKS	CAUTION
Kill-master	Chlorphrifos	1	EC	26693-1	POSITIVE FORMULATORS	CAUTION

Pesticide Inventory, October 1991 Insecticices (Page 2 of 3)

PRODUCE NAME	ACTIVE INGREDIENT	% A.I	FOURMU-LATION	EPA REG NO.	MANUFAC-TURER	SIGNAL WORD
Max Force	Hydrame-thylnon	1.65	Bait	1730-67	AMERICAN CYANAMID	CAUTION
Micro-Gen BP 100	Pyrethrins Piperonyl Butoxide Tech, MGK 264	1	Aerosol	11540-9	MICRO-GE	CAUTION
Micro-Gen BP 300	Pyrethrins Piperonyl-Butoxide Techn N-Octyl Bicyclo-heptene Dicarboli-mide	3 6 10	Aerosol	11540-1	MICRO-GEN	CAUTION
Safrotin EC	Prope-tamphos	50	EC	2724-314-50809	ZOECON	WARNING
Safrotin Roach +	Prope-tamphos Hydroprene	59.7 7.2	EC	2727-355 50809	ZOECON	WARNING
Sevin 5G	Carbaryl	5	Granular	10370-152 550	UNION CARBIDE	CAUTION
Sevin SL	Carbaryl 4L	4.2	EC	264-335	UNION CARBIDE	CAUTION
Tempo 2EC	Cyfluthrin	24.3	EC	3125-372	MOBAY	CAUTION
Baygon 2% Bait	Propoxur	2	Bait	3125-121-2A	MOBAY	CAUTION

Pesticide Inventory, October 1991 Insecticices (Page 2 of 3)

PRODUCE NAME	ACTIVE INGREDIENT	% A.I	FOURMU-LATION	EPA REG NO.	MANUFAC-TURER	SIGNAL WORD
Blue Diamond Roach Bait	Boric Acid	33.3	Bait	54452-2	BLUE DIAMOND	CAUTION
Precor 1 EC	Methoprene	1	EC	2724-352-50809	ZOECON CORP	CAUTION
PT 110 Resmethrin	Resmethrin	1	Aerosol ZB	499-160-	WHITMIRE	WARNING
PT 120 Sumithrin	Sumithrin	.96	Aerosol	499-241	WHITMIRE	WARNING
PT 230 Tri-Die	Pyre-thrins- Piperonyl Butoxide, Tech Silica Gel Petroleum Distillate	 3.3 4.5.7	Aerosol	499-223-AA	WHITMIRE	WARNING
PT 270 Dursban	Chlor-pyrifos	.5	Aerosol	499-147-ZB	WHITMORE	WARNING
PT 280 Orthene	Acephast	1	Aerosol	499-230	WHITMORE	CAUTION
Flee	Permethrin	36.8	EC	279-3092	FMC	CAUTION
Flytek	Methomy 1	1	Bait	2724-274-50809	ZOECON CORP.	CAUTION

DIRECTORATE OF ENGINEERING AND HOUSING
FORT MONMOUTH, NEW JERSEY 07703-5108

PESTICIDE INVENTORY

October 1991

RODENTICIDES

PRODUCE NAME	ACTIVE INGREDIENT	% A.I	FOURMU-LATION	EPA REG NO.	MANUFAC-TURER	SIGNAL WORD
Contrac Meal & Pellet	Bromodialone	.005	Bait	12455-WI-1	BELL LABS	CAUTION
Gopha-Rid	Zinc Phosphide	2.0	Bait	12455-30	BELL LABS	CAUTION
Tracking Powder	Zinc Phosphide	10	Powder	7173-11.3	CHEMPAR	WARNING
Top Gun	Chloro-phac Inono-2-3-Indanoioas	.005	Bait	56-56-62114	PCO PRODUCTS	CAUTION
Phostoxin	Aluminum Phosphide	55	Fumigant	40285-1	DEGESH	DANGER
Vengence	Brometha-lin	.01	Bait	876-450	GOLD CREST	CAUTION

DIRECTORATE OF ENGINEERING AND HOUSING
FORT MONMOUTH, NEW JERSEY 07703-5108

PESTICIDE INVENTORY

October 1991

BIRD CONTROL

PRODUCE NAME	ACTIVE INGREDIENT	% A.I	FOURMU-LATION	EPA REG NO.	MANUFAC-TURER	SIGNAL WORD
4 The Birds	Polybutene	80	Repellent	8254-1-56	J.T. EATON	CAUTION
Avitrol Whole Corn	4 Amino-	.5	Bait	11649-7	AVITROL	CAUTION
Ves-Phone 1 Stroke	Sodium-Thbnylphen	11.1	EC	1043-MO-1	BESTAL LAB	CAUTION

DIRECTORATE OF ENGINEERING AND HOUSING
FORT MONMOUTH, NEW JERSEY 07703-5108

PESTICIDE INVENTORY

October 1991

HERBICIDES

PRODUCE NAME	ACTIVE INGREDIENT	% A.I	FOURMU-LATION	EPA REG NO.	MANUFAC-TURER	SIGNAL WORD
Balan	Benefin	2.5	Granular	1159-20	ELANCO PRODUCT	CAUTION
Weed-E-Rad 360	Disodiam Methanear-sonate (DSMA)	21.6	EC	2853-47-	VICHEM	CAUTION
Grub Stopper	Dimethyl (2.2.2. - Tricholor-1-Hydroxy-Ethyl Phosphon-ate)	6.2	Granular	44215-145-1159	SEACOAST LAB	CAUTION
Round Up	Glphosate	41	EC	524-308-AA	MONSANTO	WARNING

DIRECTORATE OF ENGINEERING AND HOUSING
FORT MONMOUTH, NEW JERSEY 07703-5108

PESTICIDE INVENTORY

October 1991

GOLF COURSE (Page 1 of 2)

PRODUCE NAME	ACTIVE INGREDIENT	% A.I	FOURMU-LATION	EPA REG NO.	MANUFAC-TURER	SIGNAL WORD
Deconil 2787	Chloro-thalonil	40.4	Emulsion	50534-9	FERMETA ASC	WARNING
Bayleton	(4-Chloro-phenoxy)-3,3 Dimethyl-(IH)1-24 Triazol-1-YL)2-Butanone	25	Emulsion	3125-318	MOBAY	CAUTION
Rubigan	Fenarimol	11.6	Emulsion	1471-134	ELANCO PRODUCTS	CAUTION
Balan 2.5	N-butyl METHYL-2.6-Dinitro-P-Toluidine	2.5	Granular		ELANCO PRODUCTS	CAUTION
Chipco 26019	Iprodione:3-3(3.5-dichlorodhenyl) N-Cl-Methylethyl 2-4-Dioxo-1 Lmidazolidi-necarboyamide	23.3	Emulsion	264.480	RHONE-POULENL	CAUTION
Sevin #5 Aqua	Carbaryl	6.3	Emulsion	264.349	MILLER	CAUTION
Tri-Stop	Dicamba-MCPP 24-D	51.85	Emulsion	10404-43 1159	SEA COAST LABS	DANGER
Grub Stopper	Dimethyl (2.2.2-Trichlord-1-Hydroxy-Ethyl Phosphonate	6.2	Granular	44215-1159	TWIN LIGHT	CAUTION

Pesticide Inventory, October 1991 Golf Course (Page 2 of 3)

PRODUCE NAME	ACTIVE INGREDIENT	% A.I	FOURMU-LATION	EPA REG NO.	MANUFAC-TURER	SIGNAL WORD
Roundup	Isopylaminr salt of glyphosate	41	EC	524-308-AA	MONSANTO	WARNING

Appendix C

APPENDIX C

CHARLES WOOD ACID NEUTRALIZATION PIT CLEANOUT HAZARDOUS WASTE MANIFESTS

South C. olina Department of H(lth and Environmental Control

Bureau of Solid & Hazardous Waste Mg
2600 Bull Street, Columbia, S ; 29201
Phone: (803) 734-5200
Emergency & Holidays: (803)253-648

PLEASE PRINT or TYPE (Form designed for use on elite (12-pitch) typewriter) Form Approved. OMB No. 2050-0039 Expires 9

UNIFORM HAZARDOUS WASTE MANIFEST

1. Generator's U.S. EPA ID No. N J 2 2 1 0 0 2 0 9 7 8 — Manifest Document No. 0 0 0 3
2. Page 1 of 1
Information in the shaded areas i required by Federal law, but is by Stat

GENERATOR

3. Generator's Name and Mailing Address
ATTN: Joseph Fallon
US Army Communications-Electronics Command, Charles Wood Area
Ft. Monmouth, NJ 07703
4. Generator's Phone (908) 532-6223

A. State Manifest Document Number: N/A
B. State Generator's ID: N/A

5. Transporter 1 Company Name: Merola Enterprises, Inc.
6. U.S. EPA ID Number: N J D 9 8 6 6 0 9 9 4 9
C. State Transporter's ID: NJDEP57277
D. Transporter's Phone: (201) 589-160

7. Transporter 2 Company Name
8. U.S. EPA ID Number
E. State Transporter's ID: N/A
F. Transporter's Phone: N/A

9. Designated Facility Name and Site Address
LaidLaw Environmental Services of South Carolina, Inc.
Route 1, Box 255
Pinewood, SC 29125
10. U.S. EPA ID Number: S C D 0 7 0 3 7 5 9 8 5
G. State Facility's ID: N/A
H. Facility's Phone: (803) 452-5003

11. U.S. DOT Description (including Proper Shipping Name, Hazard Class, and ID Number)	12. Containers No.	Type	13. Total Quantity	14. Unit Wt/Vol	I. Waste Num
a. Hazardous Waste Liquid, NOS ORM-E, NA 9189	0 6 2	D M	4 6 4 0 0	P	D 0 1 4 / D 0 1 4
b.					
c.					
d.					

J. Additional Descriptions for Materials Listed Above
a. P W - 0 5 5 7 9 - 5 1 0 1
b.
c.
d.

K. Handling Codes for Wastes Listed Above
a. T

15. Special Handing Instructions and Additional Information
Work Order No. 169244
Trailer Tag No. T579 DA
Emergency No. 1-908-544-2222

Public reporting burden for this collection of information is es average 37 minutes for generators, 15 minutes for transporte minutes for treatment storage and disposal facilities. This inc for reviewing instructions, gathering data, and completing and the form. Send comments regarding the burden estimate, suggestions for reducing this burden, to Chief, Informati Branch PM-223, U.S. Environmental Protection Agency, 401 Washington, D.C. 20460, and to the Office of Information and F Affairs, Office of Management and Budget, Washington, D.C.

16 GENERATOR'S CERTIFICATION: I hereby declare that the contents of this consignment are fully and accurately described above by proper shipping name and are cl packed, marked, and labeled, and are in all respects in proper condition for transport by highway according to applicable international and national government regulati the laws of the State of South Carolina.

If I am a large quantity generator, I certify that I have a program in place to reduce the volume and toxicity of waste generated to the degree I have determined to be econo practicable and that I have selected the practicable method of treatment, storage, or disposal currently available to me which minimizes the present and future threat to health and the environment; OR, if I am a small quantity generator, I have made a good faith effort to minimize my waste generation and select the best waste management that is available to me and that I can afford.

Printed/Typed Name: Joseph M. Fallon
Signature: Joseph M. Fallon
Month 0 3 Day 1 2

TRANSPORTER

17. Transporter 1 Acknowledgement of Receipt of Materials
Printed/Typed Name: J. DiGRECO
Signature:
Month 0 3 Day 1 2

18. Transporter 2 Acknowledgement of Receipt of Materials
Printed/Typed Name:
Signature:
Month Day

FACILITY

19. Discrepancy Indication Space
a 45320 lbs. c
b lbs. d

20. Facility Owner or Operator: Certification of receipt of hazardous materials covered by this manifest except as noted in Item 19
Printed/Typed Name: Ann Springfield
Signature:
Month 0 3 Day 2

South Carolina Department of Health and Environmental Control

Bureau of Solid & Hazardous Waste Mgt.
2600 Bull Street, Columbia, SC 29201
Phone: (803) 734-5200
Emergency & Holidays: (803)253-6488

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UNIFORM HAZARDOUS WASTE MANIFEST

1. Generator's U.S. EPA ID No. N J 2 2 1 0 0 2 0 9 7 8 — Manifest Document No. 0 0 0 0 3
2. Page 1 of 1
Information in the shaded areas is r required by Federal law, but is by State la

GENERATOR

3. Generator's Name and Mailing Address
ATTN: Joseph Fallon
US Army Communications-Electronics Command, Charles Wood Area
Ft. Monmouth, NJ 07703
4. Generator's Phone (908) 532-6223

A. State Manifest Document Number: N/A
B. State Generator's ID: N/A

5. Transporter 1 Company Name: Merola Enterprises, Inc.
6. U.S. EPA ID Number: N J D 9 8 6 6 0 9 9 4 9
C. State Transporter's ID: NJDEP57277
D. Transporter's Phone: (201) 589-1600

7. Transporter 2 Company Name:
8. U.S. EPA ID Number:
E. State Transporter's ID: N/A
F. Transporter's Phone: N/A

9. Designated Facility Name and Site Address
LaidLaw Environmental Services of South Carolina, Inc.
Route 1, Box 255
Pinewood, SC 29125
10. U.S. EPA ID Number: S C D 0 7 0 3 7 5 9 8 5
G. State Facility's ID: N/A
H. Facility's Phone: (803) 452-5003

11. U.S. DOT Description (including Proper Shipping Name, Hazard Class, and ID Number)	12. Containers No.	Type	13. Total Quantity	14. Unit Wt/Vol	I. Waste Number
a. Hazardous Waste Liquid, NOS ORM-E, NA 9189	0 6 2	D M	4 6 4 0 0	P	D 0 4 0 / D 0 4 3
b.					
c.					
d.					

J. Additional Descriptions for Materials Listed Above
a. P W - 0 5 5 7 9 - 5 1 0 1
b.
c.
d.

K. Handling Codes for Wastes Listed Above
a. T

15. Special Handling Instructions and Additional Information
Work Order No. 169244
Trailer Tag No. T579 DA
Emergency No. 1-908-544-2222

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Printed/Typed Name	Signature	Month	Day	Y
Joseph M. Fallon	Joseph M. Fallon	0 3	1 9	9

TRANSPORTER

17. Transporter 1 Acknowledgement of Receipt of Materials

Printed/Typed Name	Signature	Month	Day	Y
JOHN GRECO		0 3	1 9	9

18. Transporter 2 Acknowledgement of Receipt of Materials

Printed/Typed Name	Signature	Month	Day	Y

FACILITY

19. Discrepancy Indication Space
a. lbs. c. lbs.
b. lbs. d. lbs.

20. Facility Owner or Operator: Certification of receipt of hazardous materials covered by this manifest except as noted in Item 19

Printed/Typed Name	Signature	Month	Day	Y

LAIDLAW ENVIRONMENTAL SERVICES

Customer Notification And Certification

FORM A

Only Statements with Original Signatures will be Accepted

Generator Name/Location: US Army Communications-Electronics Command; Ft. Monmouth, NJ

EPA I.D. Number: NJ 2210020978

Waste Profile or ARF Designation: PW 05579-5101/Wo No. 169244

Manifest Number: NJ2210020978 00003

EPA Hazardous Waste Number(s): D040, D043

Waste Analysis Attached? YES ____ NO X On file at facility. X

Unrestricted Waste Notification (Category1)

If you generate a hazardous waste that is **not** a land disposal restricted waste (the waste has no applicable treatment standards), mark the statement below.

☒ I notify that I am familiar with the waste through analysis and testing or through knowledge of the waste to support this notification that the waste is not restricted as specified in 40 CFR 268, Subpart D and all applicable prohibitions set forth in 40 CFR 268.32 or RCRA Section 3004(d).

Restricted Waste Notification (Category 2)

If you generate a hazardous waste that is restricted from land disposal (the waste has applicable treatment standards), mark the statement below. **Note:** All appropriate standards must be accounted for. A waste may pass one or more standards and require treatment or be varianced for others. In this case, all applicable categories must be checked.

☐ I notify that I am familiar with the waste through analysis and testing or through knowledge of the waste to support this notification that the waste is subject to the treatment standards specified in 40 CFR 268, Subpart D. Waste must be treated to the appropriate regulatory treatment standard, by the appropriate regulatory treatment method; qualifies for a variance as described by Category 3 below; or meets the standard as described under Category 4 below.

☐ For hazardous debris, the waste contains the following contaminants subject to treatment (check all that apply):____ § 268.45(b)(1)-Toxicity characteristic debris; ____ § 268.45(b)(2)-Debris contaminated with listed waste; ____ § 268.45(b)(3)-Cyanide reactive debris. This hazardous debris is subject to the alternative treatment standards of 40 CFR 268.45.

Corresponding Treatment Standard(s) ____

Restricted Waste Variance Notification (Category 3)

If you generate a waste which does not require treatment prior to land disposal because of a variance (including a case-by-case extension under 40 CFR 268.5, a nationwide variance under 40 CFR 268 Subpart C, a no migration petition under 40 CFR 268.6, or other applicable variance), mark the statement below and list the appropriate variance in the space provided.

(3a) Restricted Waste Variance Notification

☐ I notify pursuant to 40 CFR 268.7(a)(3) that I am familiar with the waste through analysis and testing or through knowledge of the waste to support this notification that this waste is subject to a national capacity variance under 40 CFR 268 Subpart C, or a case-by-case extension under 40 CFR 268.5, or an exemption under 40 CFR 268.6.
Applicable Variance (List the variance and give the date the waste is subject to prohibitions)

(3b) Hazardous Debris Extension Notification

☐ For the hazardous debris waste stream accompanying this notification, I notify that I have made the necessary submittals to my operating record, or files maintained pursuant to 40 CFR 268.7(a)(5), as described in the May 15, 1992 Federal Register (57 FR 20769), and therefore this hazardous debris shipment qualifies for the one-year generic case-by-case extension.

Applicable Variance (Give the date the waste is subject to prohibitions)

Restricted Waste Certification (Category 4)

If you generate a hazardous waste that is restricted from land disposal (the waste has applicable treatment standards), and the waste meets the standards as generated, mark the statement below. **Note:** All appropriate standards must be accounted for. A waste may pass one or more standards and require treatment or be varianced for others. In this case, all applicable categories must be checked.

☐ I certify under penalty of law that I personally examined and am familiar with the waste through analysis and testing or through knowledge of the waste to support this certification that the waste complies with the treatment standards specified in 40 CFR 268, Subpart D and all applicable prohibitions set forth in 40 CFR 268.32 or RCRA Section 3004(d). I believe that the information I submitted is true, accurate, and complete. I am aware that there are significant penalties for submitting a false certification including the possibility of fine and imprisonment.
Applicable Standards Passed (List the appropriate standard(s) for constituents not requiring treatment)

SIGNATURE: Joseph M. Fallon DATE: 03/19/93

PRINT NAME: Joseph M. Fallon TITLE: Environmental Asst

South Carolina Department of Health and Environmental Control

Bureau of Solid & Hazardous Waste Mgt.
2600 Bull Street, Columbia, SC 29201
Phone: (803) 734-5200
Emergency & Holidays: (803)253-6488

PLEASE PRINT or TYPE (Form designed for use on elite [12-pitch] typewriter) Form Approved. OMB No. 2050-0039 Expires 9-3

UNIFORM HAZARDOUS WASTE MANIFEST

1. Generator's U.S. EPA ID No. N J 2 2 1 0 0 2 0 9 7 8 — Manifest Document No. 0 0 0 0 1 2
2. Page 1 of 1
Information in the shaded areas is required by Federal law, but is by State

GENERATOR

3. Generator's Name and Mailing Address
ATTN: Joseph Fallon
US Army Communications-Electronics Command, Charles Wood Area
Ft. Monmouth, NJ 07703
4. Generator's Phone (908) 532-6223

A. State Manifest Document Number: N/A
B. State Generator's ID: N/A

5. Transporter 1 Company Name: Merola Enterprises, Inc.
6. U.S. EPA ID Number: N J D 9 8 6 6 0 9 9 4 9
C. State Transporter's ID: NJDEP57277
D. Transporter's Phone: (201) 589-1600

7. Transporter 2 Company Name:
8. U.S. EPA ID Number:
E. State Transporter's ID: N/A
F. Transporter's Phone: N/A

9. Designated Facility Name and Site Address
LaidLaw Environmental Services of South Carolina, Inc.
Route 1, Box 255
Pinewood, SC 29125
10. U.S. EPA ID Number: S C D 0 7 0 3 7 5 9 8 5
G. State Facility's ID: N/A
H. Facility's Phone: (803) 452-5003

11. U.S. DOT Description (including Proper Shipping Name, Hazard Class, and ID Number)	12. Containers No.	Type	13. Total Quantity	Wt/Vol	I. Waste Numbe
a. Hazardous Waste Liquid, NOS ORM-E, NA 9189	063	DM	4640	P	D 0 4 0
					D 0 4 3
b.					
c.					
d.					

J. Additional Descriptions for Materials Listed Above
a. PW - 0 5 5 7 9 - 5 1 0 1
b.
c.
d.

K. Handling Codes for Wastes Listed Above
a. T

15. Special Handling Instructions and Additional Information
Work Order No. 169243
Trailer Tag No. T6445
Emergency No. 1-908-544-2222

Public reporting burden for this collection of information is estim... average 37 minutes for generators, 15 minutes for transporters, ... minutes for treatment storage and disposal facilities. This include... for reviewing instructions, gathering data, and completing and rev... the form. Send comments regarding the burden estimate, inc... suggestions for reducing this burden, to Chief, Information ... Branch PM-223, U.S. Environmental Protection Agency, 401 M S... Washington, D.C. 20460, and to the Office of Information and Reg... Affairs, Office of Management and Budget, Washington, D.C. 20...

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If I am a large quantity generator, I certify that I have a program in place to reduce the volume and toxicity of waste generated to the degree I have determined to be economi... practicable and that I have selected the practicable method of treatment, storage, or disposal currently available to me which minimizes the present and future threat to hu... health and the environment; OR, if I am a small quantity generator, I have made a good faith effort to minimize my waste generation and select the best waste management me... that is available to me and that I can afford.

Printed/Typed Name: Joseph M. Fallon — Signature: Joseph M. Fallon — Month 03 Day 18

TRANSPORTER

17. Transporter 1 Acknowledgement of Receipt of Materials
Printed/Typed Name: KENNY HILL — Signature: [signature] — Month 03 Day 18

18. Transporter 2 Acknowledgement of Receipt of Materials
Printed/Typed Name: — Signature: — Month — Day

FACILITY

19. Discrepancy Indication Space
a. 4680 lbs. c.
b. lbs. d.

20. Facility Owner or Operator: Certification of receipt of hazardous materials covered by this manifest except as noted in Item ...
Printed/Typed Name: Ann Springfield — Signature: [signature] — Month 03 Day 19

South Carolina Department of Health and Environmental Control

Bureau of Solid & Hazardous Waste Mgt.
2600 Bull Street, Columbia, SC 29201
Phone: (803) 734-5200
Emergency & Holidays: (803)253-6488

PLEASE PRINT or TYPE (Form designed for use on elite [12-pitch] typewriter) Form Approved. OMB No. 2050-0039 Expires 9-30

UNIFORM HAZARDOUS WASTE MANIFEST

1. Generator's U.S. EPA ID No. N J 2 2 1 0 0 2 0 9 7 8 — Manifest Document No. 0 0 0 0 2
2. Page 1 of 1
Information in the shaded areas is r required by Federal law, but is by State la

3. Generator's Name and Mailing Address
ATTN: Joseph Fallon
US Army Communications-Electronics Command, Charles Wood Area
Ft. Monmouth, NJ 07703
4. Generator's Phone (908) 532-6223

A. State Manifest Document Number: N/A
B. State Generator's ID: N/A

5. Transporter 1 Company Name: Merola Enterprises, Inc.
6. U.S. EPA ID Number: N J D 9 8 6 6 0 9 9 4 9
C. State Transporter's ID: NJDEP57277
D. Transporter's Phone: (201) 589-1600

7. Transporter 2 Company Name:
8. U.S. EPA ID Number:
E. State Transporter's ID: N/A
F. Transporter's Phone: N/A

9. Designated Facility Name and Site Address
LaidLaw Environmental Services of South Carolina, Inc.
Route 1, Box 255
Pinewood, SC 29125
10. U.S. EPA ID Number: S C D 0 7 0 3 7 5 9 8 5
G. State Facility's ID: N/A
H. Facility's Phone: (803) 452-5003

11. U.S. DOT Description (including Proper Shipping Name, Hazard Class, and ID Number)	12. Containers No.	Type	13. Total Quantity	14. Unit Wt/Vol	I. Waste Number
a. Hazardous Waste Liquid, NOS ORM-E, NA 9189	063	DM	4640	P	D014 D013
b.					
c.					
d.					

J. Additional Descriptions for Materials Listed Above
a. PW - 055791 - 5101
b.
c.
d.

K. Handling Codes for Wastes Listed Above
a. T

15. Special Handling Instructions and Additional Information
Work Order No. 169243
Trailer Tag No. 7644 SC
Emergency No. 1-908-544-2222

Public reporting burden for this collection of information is estimat average 37 minutes for generators, 15 minutes for transporters, an minutes for treatment storage and disposal facilities. This includes for reviewing instructions, gathering data, and completing and revie the form. Send comments regarding the burden estimate, inclu suggestions for reducing this burden, to Chief, Information P Branch PM-223, U.S. Environmental Protection Agency, 401 M St Washington, D.C. 20460, and to the Office of Information and Regul Affairs, Office of Management and Budget, Washington, D.C. 2050

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Printed/Typed Name	Signature	Month	Day	Y
Joseph M. Fallon	Joseph M. Fallon	03	18	9

TRANSPORTER

17. Transporter 1 Acknowledgement of Receipt of Materials

Printed/Typed Name	Signature	Month	Day	Y
KENNY HILL	Kenny Hill	03	18	93

18. Transporter 2 Acknowledgement of Receipt of Materials

Printed/Typed Name	Signature	Month	Day	Y

FACILITY

19. Discrepancy Indication Space
a. ____ lbs. c. ____
b. ____ lbs. d. ____

20. Facility Owner or Operator: Certification of receipt of hazardous materials covered by this manifest except as noted in Item 19.

Printed/Typed Name	Signature	Month	Day	Y

EARTH CAN
ENVIRONMENTAL SERVICES

Customer Notification And Certification

FORM A

Only Statements with Original Signatures will be Accepted

Generator Name/Location: US Army Communications-Electronics Command; Ft. Monmouth, NJ

EPA I.D. Number: NJ 2210020978

Waste Profile or ARF Designation: PW 05579-5101/Wo No. 169243

Manifest Number: NJ2210020978 00002

EPA Hazardous Waste Number(s): D040, D043

Waste Analysis Attached? YES ___ NO X On file at facility. X

Unrestricted Waste Notification (Category1)

If you generate a hazardous waste that is not a land disposal restricted waste (the waste has no applicable treatment standards), mark the statement below.

☒ I notify that I am familiar with the waste through analysis and testing or through knowledge of the waste to support this notification that the waste is not restricted as specified in 40 CFR 268, Subpart D and all applicable prohibitions set forth in 40 CFR 268.32 or RCRA Section 3004(d).

Restricted Waste Notification (Category 2)

If you generate a hazardous waste that is restricted from land disposal (the waste has applicable treatment standards), mark the statement below. Note: All appropriate standards must be accounted for. A waste may pass one or more standards and require treatment or be varianced for others. In this case, all applicable categories must be checked.

☐ I notify that I am familiar with the waste through analysis and testing or through knowledge of the waste to support this notification that the waste is subject to the treatment standards specified in 40 CFR 268, Subpart D. Waste must be treated to the appropriate regulatory treatment standard, by the appropriate regulatory treatment method; qualifies for a variance as described by Category 3 below; or meets the standard as described under Category 4 below.

☐ For hazardous debris, the waste contains the following contaminants subject to treatment (check all that apply):___ § 268.45(b)(1)-Toxicity characteristic debris; ___ § 268.45(b)(2)-Debris contaminated with listed waste; ___ § 268.45(b)(3)-Cyanide reactive debris. This hazardous debris is subject to the alternative treatment standards of 40 CFR 268.45.

Corresponding Treatment Standard(s) _____

Restricted Waste Variance Notification (Category 3)

If you generate a waste which does not require treatment prior to land disposal because of a variance (including a case-by-case extension under 40 CFR 268.5, a nationwide variance under 40 CFR 268 Subpart C, a no migration petition under 40 CFR 268.6, or other applicable variance), mark the statement below and list the appropriate variance in the space provided.

(3a) Restricted Waste Variance Notification

☐ I notify pursuant to 40 CFR 268.7(a)(3) that I am familiar with the waste through analysis and testing or through knowledge of the waste to support this notification that this waste is subject to a national capacity variance under 40 CFR 268 Subpart C, or a case-by-case extension under 40 CFR 268.5, or an exemption under 40 CFR 268.6.
Applicable Variance (List the variance and give the date the waste is subject to prohibitions)

(3b) Hazardous Debris Extension Notification

☐ For the hazardous debris waste stream accompanying this notification, I notify that I have made the necessary submittals to my operating record, or files maintained pursuant to 40 CFR 268.7(a)(5), as described in the May 15, 1992 Federal Register (57 FR 20769), and therefore this hazardous debris shipment qualifies for the one-year generic case-by-case extension.

Applicable Variance (Give the date the waste is subject to prohibitions)

Restricted Waste Certification (Category 4)

If you generate a hazardous waste that is restricted from land disposal (the waste has applicable treatment standards), and the waste meets the standards as generated, mark the statement below. Note: All appropriate standards must be accounted for. A waste may pass one or more standards and require treatment or be varianced for others. In this case, all applicable categories must be checked.

☐ I certify under penalty of law that I personally examined and am familiar with the waste through analysis and testing or through knowledge of the waste to support this certification that the waste complies with the treatment standards specified in 40 CFR 268, Subpart D and all applicable prohibitions set forth in 40 CFR 268.32 or RCRA Section 3004(d). I believe that the information I submitted is true, accurate, and complete. I am aware that there are significant penalties for submitting a false certification including the possibility of fine and imprisonment.
Applicable Standards Passed (List the appropriate standard(s) for constituents not requiring treatment)

SIGNATURE: Joseph M. Fallon DATE: 03/18/93

PRINT NAME: Joseph M. Fallon TITLE: Environmentalist

revised: 8/92

South Carolina Department of Health and Environmental Control

Bureau of Solid & Hazardous Waste Mgt.
2600 Bull Street, Columbia, SC 29201
Phone: (803) 734-5200
Emergency & Holidays: (803)253-6488

PLEASE PRINT or TYPE (Form designed for use on elite [12-pitch] typewriter) Form Approved: OMB No. 2050-0039 Expires 9-30-

UNIFORM HAZARDOUS WASTE MANIFEST

1. Generator's U.S. EPA ID No. N J 2 2 1 0 0 2 0 9 7 8 — Manifest Document No. 0 0 0 0 1
2. Page 1 of 1
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GENERATOR

3. Generator's Name and Mailing Address
ATTN: Joseph Fallon
US Army Communications-Electronics Command, Charles Wood Area
Ft. Monmouth, NJ 07703
4. Generator's Phone (908) 532-6223

A. State Manifest Document Number: N/A
B. State Generator's ID: N/A

5. Transporter 1 Company Name: Merola Enterprises, Inc.
6. U.S. EPA ID Number: N J D 9 8 6 6 0 9 9 4 9
C. State Transporter's ID: NJDEP57277
D. Transporter's Phone: (201) 589-1600

7. Transporter 2 Company Name:
8. U.S. EPA ID Number:
E. State Transporter's ID: N/A
F. Transporter's Phone: N/A

9. Designated Facility Name and Site Address
LaidLaw Environmental Services of South Carolina, Inc.
Route 1, Box 255
Pinewood, SC 29125
10. U.S. EPA ID Number: S C D 0 7 0 3 7 5 9 8 5
G. State Facility's ID: N/A
H. Facility's Phone: (803) 452-5003

11. U.S. DOT Description (including Proper Shipping Name, Hazard Class, and ID Number)	12. Containers No.	Type	13. Total Quantity	14. Unit Wt/Vol	I. Waste Number
a. Hazardous Waste Liquid, NOS ORM-E, NA 9189	058	DM	4 6 4 0 0	P	D 0 4 0 / D 0 4 3
b.					
c.					
d.					

J. Additional Descriptions for Materials Listed Above
a. PW - 0 5 5 7 9 - 5 1 0 1
b.
c.
d.

K. Handling Codes for Wastes Listed Above
a. T

15. Special Handling Instructions and Additional Information
Work Order No. 169242
Trailer Tag No. T644-SE NJ
Emergency No.

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Printed/Typed Name: J.R. STIRCH 10 — Signature: [signature] — Month 10 Day 31 Year 89

TRANSPORTER

17. Transporter 1 Acknowledgement of Receipt of Materials
Printed/Typed Name: Daniel V. Rooney — Signature: [signature] — Month 10 Day 31 Year 89

18. Transporter 2 Acknowledgement of Receipt of Materials
Printed/Typed Name: — Signature: — Month — Day — Year

FACILITY

19. Discrepancy Indication Space
a. lbs. c.
b. lbs. d.

20. Facility Owner or Operator: Certification of receipt of hazardous materials covered by this manifest except as noted in Item 19.
Printed/Typed Name: — Signature: — Month — Day — Year

EAD&A ENVIRONMENTAL SERVICES

Customer Notification And Certification

FORM A

Only Statements with Original Signatures will be Accepted

Generator Name/Location: US Army Communications-Electronics Command; Ft. Monmouth, NJ

EPA I.D. Number: NJ 2210020978

Waste Profile or ARF Designation: PW 05579-5101/Wo No. 169242

Manifest Number: NJ2210020978 00001

EPA Hazardous Waste Number(s): D040, D043

Waste Analysis Attached? YES ____ NO X On file at facility. X

Unrestricted Waste Notification (Category1)

If you generate a hazardous waste that is not a land disposal restricted waste (the waste has no applicable treatment standards), mark the statement below.

☒ I notify that I am familiar with the waste through analysis and testing or through knowledge of the waste to support this notification that the waste is not restricted as specified in 40 CFR 268, Subpart D and all applicable prohibitions set forth in 40 CFR 268.32 or RCRA Section 3004(d).

Restricted Waste Notification (Category 2)

If you generate a hazardous waste that is restricted from land disposal (the waste has applicable treatment standards), mark the statement below. Note: All appropriate standards must be accounted for. A waste may pass one or more standards and require treatment or be varianced for others. In this case, all applicable categories must be checked.

☐ I notify that I am familiar with the waste through analysis and testing or through knowledge of the waste to support this notification that the waste is subject to the treatment standards specified in 40 CFR 268, Subpart D. Waste must be treated to the appropriate regulatory treatment standard, by the appropriate regulatory treatment method; qualifies for a variance as described by Category 3 below; or meets the standard as described under Category 4 below.

☐ For hazardous debris, the waste contains the following contaminants subject to treatment (check all that apply):____ § 268.45(b)(1)-Toxicity characteristic debris; ____ § 268.45(b)(2)-Debris contaminated with listed waste; ____ § 263.45(b)(3)-Cyanide reactive debris. This hazardous debris is subject to the alternative treatment standards of 40 CFR 268.45.

Corresponding Treatment Standard(s) 1/

Restricted Waste Variance Notification (Category 3)

If you generate a waste which does not require treatment prior to land disposal because of a variance (including a case-by-case extension under 40 CFR 268.5, a nationwide variance under 40 CFR 268 Subpart C, a no migration petition under 40 CFR 268.6, or other applicable variance), mark the statement below and list the appropriate variance in the space provided.

(3a) Restricted Waste Variance Notification

☐ I notify pursuant to 40 CFR 268.7(a)(3) that I am familiar with the waste through analysis and testing or through knowledge of the waste to support this notification that this waste is subject to a national capacity variance under 40 CFR 268 Subpart C, or a case-by-case extension under 40 CFR 268.5, or an exemption under 40 CFR 268.6.
Applicable Variance (List the variance and give the date the waste is subject to prohibitions)

(3b) Hazardous Debris Extension Notification

☐ For the hazardous debris waste stream accompanying this notification, I notify that I have made the necessary submittals to my operating record, or files maintained pursuant to 40 CFR 268.7(a)(5), as described in the May 15, 1992 Federal Register (57 FR 20769), and therefore this hazardous debris shipment qualifies for the one-year generic case-by-case extension.
Applicable Variance (Give the date the waste is subject to prohibitions)

Restricted Waste Certification (Category 4)

If you generate a hazardous waste that is restricted from land disposal (the waste has applicable treatment standards), and the waste meets the standards as generated, mark the statement below. Note: All appropriate standards must be accounted for. A waste may pass one or more standards and require treatment or be varianced for others. In this case, all applicable categories must be checked.

☐ I certify under penalty of law that I personally examined and am familiar with the waste through analysis and testing or through knowledge of the waste to support this certification that the waste complies with the treatment standards specified in 40 CFR 268, Subpart D and all applicable prohibitions set forth in 40 CFR 268.32 or RCRA Section 3004(d). I believe that the information I submitted is true, accurate, and complete. I am aware that there are significant penalties for submitting a false certification including the possibility of fine and imprisonment.
Applicable Standards Passed (List the appropriate standard(s) for constituents not requiring treatment)

SIGNATURE: [signature] DATE: 3/10/93

PRINT NAME: FRANCIS G RUST TITLE: Warehouse Supervisor

revised: 8/92

Appendix D

APPENDIX D

HEALTH AND SAFETY GUIDANCE

EXPLANATIONS OF CODES USED IN NATURAL HERITAGE REPORTS

FEDERAL STATUS CODES

The following U.S. Fish and Wildlife Service categories and their definitions of endangered and threatened plants and animals have been modified from the U.S. Fish and Wildlife Service (F.R. Vol. 50 No. 188; Vol. 55, No. 35; F.R. 50 CFR 17.11 and 17.12). Federal Status codes reported for species follow the most recent listing.

LE Taxa formally listed as endangered.

LT Taxa formally listed as threatened.

PE Taxa already proposed to be formally listed as endangered.

PT Taxa already proposed to be formally listed as threatened.

C1 Taxa for which the Service currently has on file substantial information on biological vulnerability and threat(s) to support the appropriateness of proposing to list them as endangered or threatened species.

C1* Taxa which may be possibly extinct (although persuasive documentation of extinction has not been made--compare to 3A status).

C2 Taxa for which information now in possession of the Service indicates that proposing to list them as endangered or threatened species is possibly appropriate, but for which substantial data on biological vulnerability and threat(s) are not currently known or on file to support the immediate preparation of rules.

C3 Taxa that are no longer being considered for listing as threatened or endangered species. Such taxa are further coded to indicate three subcategories, depending on the reason(s) for removal from consideration.

3A Taxa for which the Service has persuasive evidence of extinction.

3B Names that, on the basis of current taxonomic understanding, do not represent taxa meeting the Act's definition of "species".

3C Taxa that have proven to be more abundant or widespread than was previously believed

and/or those that are not subject to any identifiable threat.

S/A Similarity of appearance species.

STATE STATUS CODES

Two animal lists provide state status codes after the Endangered and Nongame Species Conservation Act of 1973 (NSSA 23:2A-13 et. seq.): the list of endangered species (N.J.A.C. 7:25-4.13) and the list defining status of indigenous, nongame wildlife species of New Jersey (N.J.A.C. 7:25-4.17(a)). The status of animal species is determined by the Nongame and Endangered Species Program (ENSP). The state status codes and definitions provided reflect the most recent lists that were revised in the New Jersey Register, Monday, June 3, 1991.

D Declining species-a species which has exhibited a continued decline in population numbers over the years.

E Endangered species-an endangered species is one whose prospects for survival within the state are in immediate danger due to one or many factors - a loss of habitat, over exploitation, predation, competition, disease. An endangered species requires immediate assistance or extinction will probably follow.

EX Extirpated species-a species that formerly occurred in New Jersey, but is not now known to exist within the state.

I Introduced species-a species not native to New Jersey that could not have established itself here without the assistance of man.

INC Increasing species-a species whose population has exhibited a significant increase, beyond the normal range of its life cycle, over a long term period.

T Threatened species-a species that may become endangered if conditions surrounding the species begin to or continue to deteriorate.

P Peripheral species-a species whose occurrence in New Jersey is at the extreme edge of its present natural range.

S Stable species-a species whose population is not undergoing any long-term increase/decrease within its natural cycle.

U Undetermined species-a species about which there is not enough information available to determine the status.

Status for animals separated by a slash(/) indicate a duel status. First status refers to the state breeding population, and the second status refers to the migratory or winter population.

Plant taxa listed as endangered are from New Jersey's official Endangered Plant Species List N.J.S.A. 131B-15.151 et seq.

E Native New Jersey plant species whose survival in the State or nation is in jeopardy.

REGIONAL STATUS CODES FOR PLANTS

LP Indicates taxa listed by the Pinelands Commission as endangered or threatened within their legal jurisdiction. Not all species currently tracked by the Pinelands Commission are tracked by the Natural Heritage Program. A complete list of endangered and threatened Pineland species is included in the New Jersey Pinelands Comprehensive Management Plan.

EXPLANATION OF GLOBAL AND STATE ELEMENT RANKS

The Nature Conservancy has developed a ranking system for use in identifying elements (rare species and natural communities) of natural diversity most endangered with extinction. Each element is ranked according to its global, national, and state (or subnational in other countries) rarity. These ranks are used to prioritize conservation work so that the most endangered elements receive attention first. Definitions for element ranks are after The Nature Conservancy (1982: Chapter 4, 4.1-1 through 4.4.1.3-3).

GLOBAL ELEMENT RANKS

G1 Critically imperiled globally because of extreme rarity (5 or fewer occurrences or very few remaining individuals or acres) or because of some factor(s) making it especially vulnerable to extinction.

G2 Imperiled globally because of rarity (6 to 20 occurrences or few remaining individuals or acres) or because of some factor(s) making it very vulnerable to extinction throughout its range.

G3 Either very rare and local throughout its range or found locally (even abundantly at some of its locations) in a restricted range (e.g., a single western state, a physiographic region in the East) or because of other factors making it vulnerable to extinction throughout it's range; with the number of occurrences in the range of 21 to 100.

G4 Apparently secure globally; although it may be quite rare in parts of its range, especially at the periphery.

G5 Demonstrably secure globally; although it may be quite rare in parts of its range, especially at the periphery.

GH Of historical occurrence throughout its range i.e., formerly part of the established biota, with the expectation that it may be rediscovered.

GU Possibly in peril range-wide but status uncertain; more information needed.

GX Believed to be extinct throughout range (e.g., passenger pigeon) with virtually no likelihood that it will be rediscovered.

G? Species has not yet been ranked.

STATE ELEMENT RANKS

S1 Critically imperiled in New Jersey because of extreme rarity (5 or fewer occurrences or very few remaining individuals or acres). Elements so ranked are often restricted to very specialized conditions or habitats and/or restricted to an extremely small geographical

area of the state. Also included are elements which were formerly more abundant, but because of habitat destruction or some other critical factor of its biology, they have been demonstrably reduced in abundance. In essence, these are elements for which, even with intensive searching, sizable additional occurrences are unlikely to be discovered.

S2 Imperiled in New Jersey because of rarity (6 to 20 occurrences). Historically many of these elements may have been more frequent but are now known from very few extant occurrences, primarily because of habitat destruction. Diligent searching may yield additional occurrences.

S3 Rare in state with 21 to 100 occurrences (plant species in this category have only 21 to 50 occurrences). Includes elements which are widely distributed in the state but with small populations/acreage or elements with restricted distribution, but locally abundant. Not yet imperiled in state but may soon be if current trends continue. Searching often yields additional occurrences.

S4 Apparently secure in state, with many occurrences.

S5 Demonstrably secure in state and essentially ineradicable under present conditions.

SA Accidental in state, including species (usually birds or butterflies) recorded once or twice or only at very great intervals, hundreds or even thousands of miles outside their usual range; a few of these species may even have bred on the one or two occasions they were recorded; examples include european strays or western birds on the East Coast and visa-versa.

SE Elements that are clearly exotic in New Jersey including those taxa not native to North America (introduced taxa) or taxa deliberately or accidentally introduced into the State from other parts of North America (adventive taxa). Taxa ranked SE are not a conservation priority (viable introduced occurrences of G1 or G2 elements may be exceptions).

SH Elements of historical occurrence in New Jersey. Despite some searching of historical occurrences and/or potential habitat, no extant occurrences are known. Since not all of the historical occurrences have been field surveyed, and unsearched potential habitat remains, historically ranked taxa are considered possibly extant, and remain a conservation priority for continued field work.

SN Regularly occurring, usually migratory and typically nonbreeding species for which no significant or effective habitat conservation measures can be taken in the state; this category includes migratory birds, bats, sea turtles, and cetaceans which do not breed in the state but pass through twice a year or may remain in the winter (or, in a few cases, the summer); included also are certain lepidoptera which regularly migrate to a state where they reproduce, but then completely die out every year with no return migration. Species in this category are so widely and unreliably distributed during migration or in winter that no small set of sites could be set aside with the hope of significantly furthering their conservation. Other nonbreeding, high globally-ranked species (such as the bald eagle, whooping crane or some seal species) which regularly spend some portion of the year at definite localities (and therefore have a valid conservation need in the state) are not ranked SN but rather S1, S2, etc.

SR Elements reported from New Jersey, but without persuasive documentation which would provide a basis for either accepting or rejecting the report. In some instances documentation may exist, but as of yet, its source or location has not been determined.

SRF Elements erroneously reported from New Jersey, but this error persists in the literature.

SU Elements believed to be in peril but the degree of rarity uncertain. Also included are rare taxa of uncertain taxonomical standing. More information is needed to resolve rank.

SX Elements that have been determined or are presumed to be extirpated from New Jersey. All historical occurrences have been searched and a reasonable search of potential habitat has been completed. Extirpated taxa are not a current conservation priority.

SXC Elements presumed extirpated from New Jersey, but native populations collected from the wild exist in cultivation.

T Element ranks containing a "T" indicate that the infraspecific taxon is being ranked differently than the full species. For example *Stachys palustris* var. *homotricha* is ranked "G5T? SH" meaning the full species is globally secure but the global rarity of the var. *homotricha* has not been determined; in New Jersey the variety is ranked historic.

Q Elements containing a "Q" in the global portion of its rank indicates that the taxon is of questionable, or uncertain taxonomical standing, e.g., some authors regard it as a full species, while others treat it at the subspecific level.

.1 Elements documented from a single location.

Note: To express uncertainty, the most likely rank is assigned and a question mark added (e.g., G2?). A range is indicated by combining two ranks (e.g., G1G2, S1S3).

IDENTIFICATION CODES

These codes refer to whether the identification of the species or community has been checked by a reliable individual and is indicative of significant habitat.

Y	Identification has been verified and is indicative of significant habitat.
BLANK	Identification has not been verified but there is no reason to believe it is not indicative of significant habitat.
?	Either it has not been determined if the record is indicative of significant habitat or the identification of the species or community may be confusing or disputed.

Revised September 1991

5\21\87

NEW JERSEY NATURAL HERITAGE PROGRAM
POTENTIAL THREATENED AND ENDANGERED VERTEBRATE SPECIES
IN MONMOUTH COUNTY

AMERICAN BITTERN	FEDERAL STATUS:	COUNTY
BOTAURUS LENTIGINOSUS	STATE STATUS: LT	OCCURRENCE: ?

HABITAT COMMENTS
Fresh water bogs, swamps, wet fields, cattail and bulrush marshes, brackish and saltwater marshes and meadows.

BALD EAGLE	FEDERAL STATUS: LELT	COUNTY
HALIAEETUS LEUCOCEPHALUS	STATE STATUS: LE	OCCURRENCE: T*

HABITAT COMMENTS
Primarily near seacoasts, rivers, and large lakes.

BARRED OWL	FEDERAL STATUS:	COUNTY
STRIX VARIA	STATE STATUS: LT	OCCURRENCE: Y

HABITAT COMMENTS
Dense woodland and forest (conif. or hardwood), swamps, wooded river valleys, cabbage palm-live oak hammocks, especially where bordering streams, marshes, and meadows.

BLACK RAIL	FEDERAL STATUS:	COUNTY
LATERALLUS JAMAICENSIS	STATE STATUS: LT	OCCURRENCE: B

HABITAT COMMENTS
Salt, brackish, and freshwater marshes, wet meadows, and grassy swamps.

BLACK SKIMMER	FEDERAL STATUS:	COUNTY
RYNCHOPS NIGER	STATE STATUS: LE	OCCURRENCE: B

HABITAT COMMENTS
Primarily coastal waters, including bays, estuaries, lagoons and mudflats in migration and winter.

BOBOLINK	FEDERAL STATUS:	COUNTY
DOLICHONYX ORYZIVORUS	STATE STATUS: LT	OCCURRENCE: B

HABITAT COMMENTS
Tall grass areas, flooded meadows, prairie, deep cultivated grains, alfalfa and clover fields. In migration and winter also in rice fields, marshes, and open woody areas.

BOG TURTLE CLEMMYS MUHLENBERGII	FEDERAL STATUS: C2 STATE STATUS: LE	COUNTY OCCURRENCE: Y

HABITAT COMMENTS
Slow, shallow rivulets of sphagnum bogs, swamps, and marshy meadows; sea level to 1200 m in Appalachians. Commonly basks on tussocks in morning in spring and early summer. Hibernates in subterreanean rivulet or seepage area.

COOPER'S HAWK ACCIPITER COOPERII	FEDERAL STATUS: STATE STATUS: LE	COUNTY OCCURRENCE: W*

HABITAT COMMENTS
Primarily mature forest, either broadleaf or coniferous, mostly the former; also open woodland and forest edge.

GRASSHOPPER SPARROW AMMODRAMUS SAVANNARUM	FEDERAL STATUS: STATE STATUS: LT	COUNTY OCCURRENCE: B

HABITAT COMMENTS
Prairie, old fields, open grasslands, cultivated fields, savanna.

GREAT BLUE HERON ARDEA HERODIAS	FEDERAL STATUS: STATE STATUS: LT	COUNTY OCCURRENCE: N*

HABITAT COMMENTS
Freshwater and brackish marshes, along lakes, rivers, bays, lagoons, ocean beaches, mangroves, fields, and meadows.

LEAST TERN STERNA ANTILLARUM	FEDERAL STATUS: STATE STATUS: LE	COUNTY OCCURRENCE: B

HABITAT COMMENTS
Seacoasts, beaches, bays, estuaries, lagoons, lakes, and rivers.

LOGGERHEAD SHRIKE LANIUS LUDOVICIANUS MIGRANS	FEDERAL STATUS: C2 STATE STATUS: LE	COUNTY OCCURRENCE: W

HABITAT COMMENTS
"Open country with scattered trees and shrubs, savanna, desert scrub and, occasionally, open woodland, often found on poles, wires or fenceposts (Tropical to Temperate zones)".

MERLIN	FEDERAL STATUS:	COUNTY
FALCO COLUMBARIUS	STATE STATUS: LT	OCCURRENCE: W

HABITAT COMMENTS
During the breeding season inhabits coniferous or deciduous open woodlands, wooded prairies. At other times of the year found in a wide variety of habitats including: marshes and deserts, seacoasts, open woodlands, fields, etc.

MUD SALAMANDER	FEDERAL STATUS:	COUNTY
PSEUDOTRITON MONTANUS	STATE STATUS: LT	OCCURRENCE: ?

HABITAT COMMENTS
Muddy springs, slow floodplain streams, and swamps along slow streams. Nonlarval forms usually found beneath logs and rocks, in decaying vegetation, and in muddy stream-bank burrows. Occasionally disperses from wet muddy areas.

NORTHERN HARRIER	FEDERAL STATUS:	COUNTY
CIRCUS CYANEUS	STATE STATUS: LE	OCCURRENCE: Y

HABITAT COMMENTS
Marshes, meadows, grasslands, and cultivated fields. Perches on ground or on stumps or posts.

OSPREY	FEDERAL STATUS:	COUNTY
PANDION HALIAETUS	STATE STATUS: LT	OCCURRENCE: B

HABITAT COMMENTS
Primarily along rivers, lakes, and seacoasts, occurring widely in migration, often crossing land between bodies of water.

PIED-BILLED GREBE	FEDERAL STATUS:	COUNTY
PODILYMBUS PODICEPS	STATE STATUS: LE	OCCURRENCE: Y

HABITAT COMMENTS
Lakes, ponds, sluggish streams, and marshes; in migration and in winter also in brackish bays and estuaries.

PINE BARRENS TREEFROG	FEDERAL STATUS: C2	COUNTY
HYLA ANDERSONII	STATE STATUS: LE	OCCURRENCE: Y

HABITAT COMMENTS
Swamps, ponds, cranberry bogs, and other wetland habitat. Post-breeding habitat the surrounding woodlands.

PINE SNAKE PITUOPHIS MELANOLEUCUS	FEDERAL STATUS: STATE STATUS: LT	COUNTY OCCURRENCE: Y

HABITAT COMMENTS
Lowlands to mountains; desert, prairie, brushland, woodland, open coniferous forest, farmland, marshes. Terrestrial, fossorial, and arboreal. Underground in cold weather.

PIPING PLOVER CHARADRIUS MELODUS	FEDERAL STATUS: LELT STATE STATUS: LE	COUNTY OCCURRENCE: B

HABITAT COMMENTS
Sandy beaches, especially where scattered grass tufts are present, sparsely vegetated shores and islands of shallow lakes, ponds, and impoundments. In migration and winter also mudflats, flooded fields.

RED-SHOULDERED HAWK BUTEO LINEATUS	FEDERAL STATUS: STATE STATUS: LT	COUNTY OCCURRENCE: Y

HABITAT COMMENTS
Moist and riverine forest, and in e. N. Am. in wooded swamps, foraging in forest edge and open woodland.

ROSEATE TERN STERNA DOUGALLII	FEDERAL STATUS: PEPT STATE STATUS: LE	COUNTY OCCURRENCE: B

HABITAT COMMENTS
Seacoasts, bays, estuaries.

SAVANNAH SPARROW PASSERCULUS SANDWICHENSIS	FEDERAL STATUS: STATE STATUS: LT	COUNTY OCCURRENCE: Y

HABITAT COMMENTS
"Open areas, especially grasslands, tundra, meadows, bogs, farmlands, grassy areas with scattered bushes, and marshes, including salt marshes in the BELDINGI and ROSTRATUS groups (Subtropical and Temperate zones)".

SHORT-EARED OWL ASIO FLAMMEUS	FEDERAL STATUS: STATE STATUS: LE/S	COUNTY OCCURRENCE: W*

HABITAT COMMENTS
Open country, including prairie, meadows, tundra, moorlands, marshes, savanna, dunes, fields, and open woodland. Roosts by day on ground or on low open perches.

TIMBER RATTLESNAKE CROTALUS HORRIDUS	FEDERAL STATUS: STATE STATUS: LE	COUNTY OCCURRENCE: Y

HABITAT COMMENTS
Wooded rocky hillsides in north; swampy areas, canebrake thickets, and floodplains in south. Near streams in late summer in some areas (B83DEG01NA). Often hibernates in burrows and crevices of rock outcroppings.

UPLAND SANDPIPER BARTRAMIA LONGICAUDA	FEDERAL STATUS: STATE STATUS: LE	COUNTY OCCURRENCE: B

HABITAT COMMENTS
Grasslands, especially prairies, dry meadows, pastures, and (in Alaska) scattered woodlands at timberline; very rarely in migration along shores and mudflats.

VESPER SPARROW POOECETES GRAMINEUS	FEDERAL STATUS: STATE STATUS: LE	COUNTY OCCURRENCE: Y

HABITAT COMMENTS
"Plains, prairie, dry shrublands, savanna, weedy pastures, fields, sagebrush, arid scrub and woodland clearings".

WOOD TURTLE CLEMMYS INSCULPTA	FEDERAL STATUS: STATE STATUS: LT	COUNTY OCCURRENCE: Y

HABITAT COMMENTS
Vicinity of streams and rivers. In streams and in wooded areas and fields adjacent to streams in summer. In streams in spring and fall. Hibernates in banks or bottoms of streams in winter.

DEFINITION OF ACRONYMS

FEDERAL STATUS

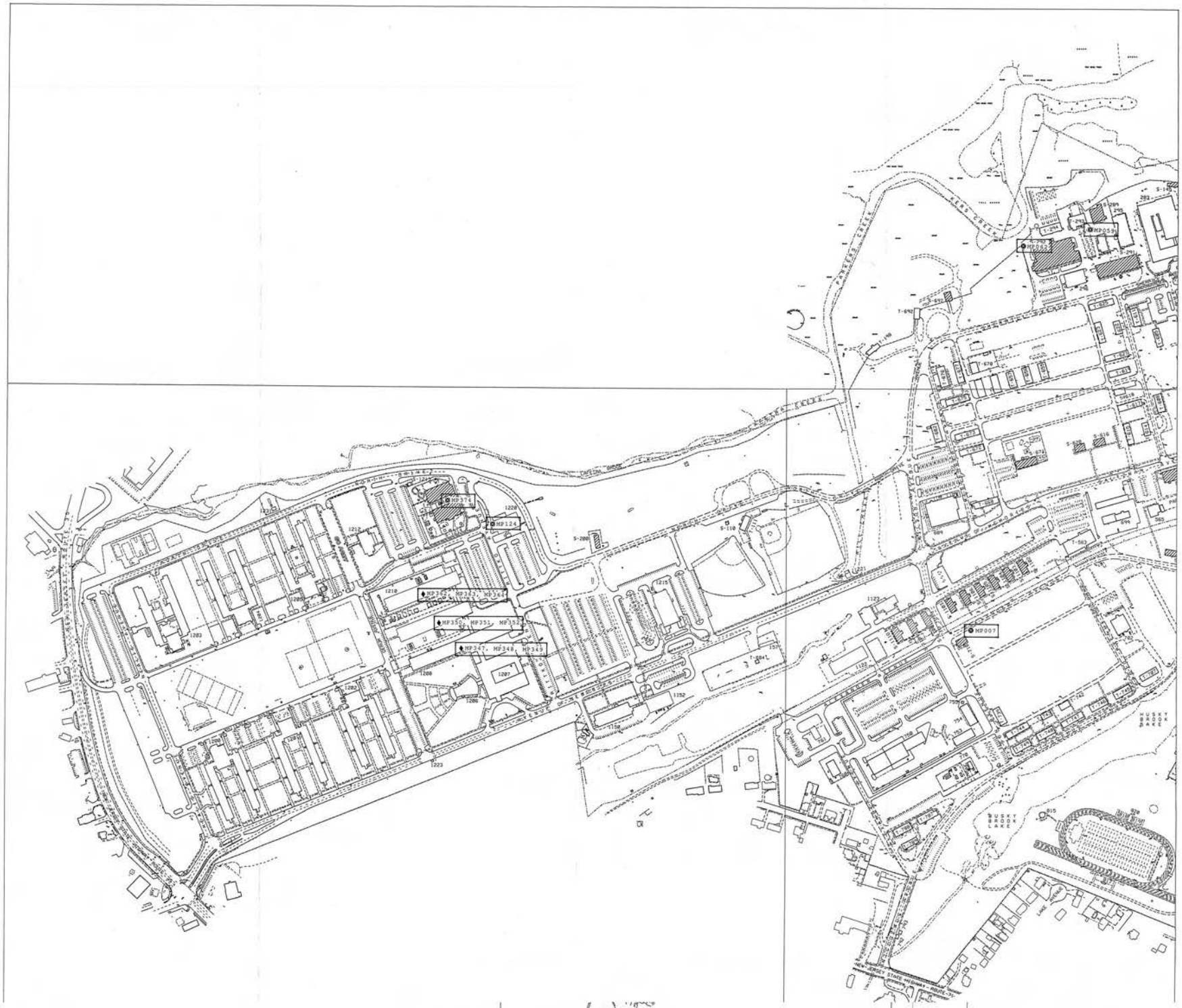
LE=listed endangered.
LT=listed threatened.
PE=proposed endangered.
PT=proposed threatened.
C2=candidate for listing.

STATE STATUS

LE=listed as endangered. (short-eared owl winter pop. listed as stable:S)
LT=listed as threatened.

COUNTY OCCURRENCE

Y=present year-round, breeds.
N=present year-round, not recorded breeding.
B=present during the summer, breeds.
W=present during the winter.
T=present as a transient.
?=present status undetermined.
*=indicates that the county is within the species known breeding range.


MP374
MP124
MP362, MP363, MP364
MP350, MP351, MP352
MP347, MP348, MP349
MP059
MP007
PARKER CREEK
HUSKY BROOK LAKE
LAKE SHENNECOSSETT
LEGEND
Road (paved)
Road/Trails (unpaved)
Creek/Brook/Lake
Fence
Building
Marshy Area
Base Boundary
MP007 Transformer code
Pole Mounted
Pad Mounted
Vault
0
1000
SCALE IN FEET
Fort Monmouth, Main Post
Western Section
PLATE 1
PCB TRANSFORMER LOCATIONS
/FORT/MAIN/MAINEDGE.DGN


PARKERS CREEK
LEGEND
SCALE IN FEET
Fort Monmouth, Main Post
Eastern Section
PLATE 2
PCB TRANSFORMER LOCATIONS