INSTALLATION RESTORATION PROGRAM

PRELIMINARY ASSESSMENT

177th Fighter Interceptor Group
New Jersey Air National Guard

Atlantic City International Airport

Atlantic City, New Jersey

November 1989

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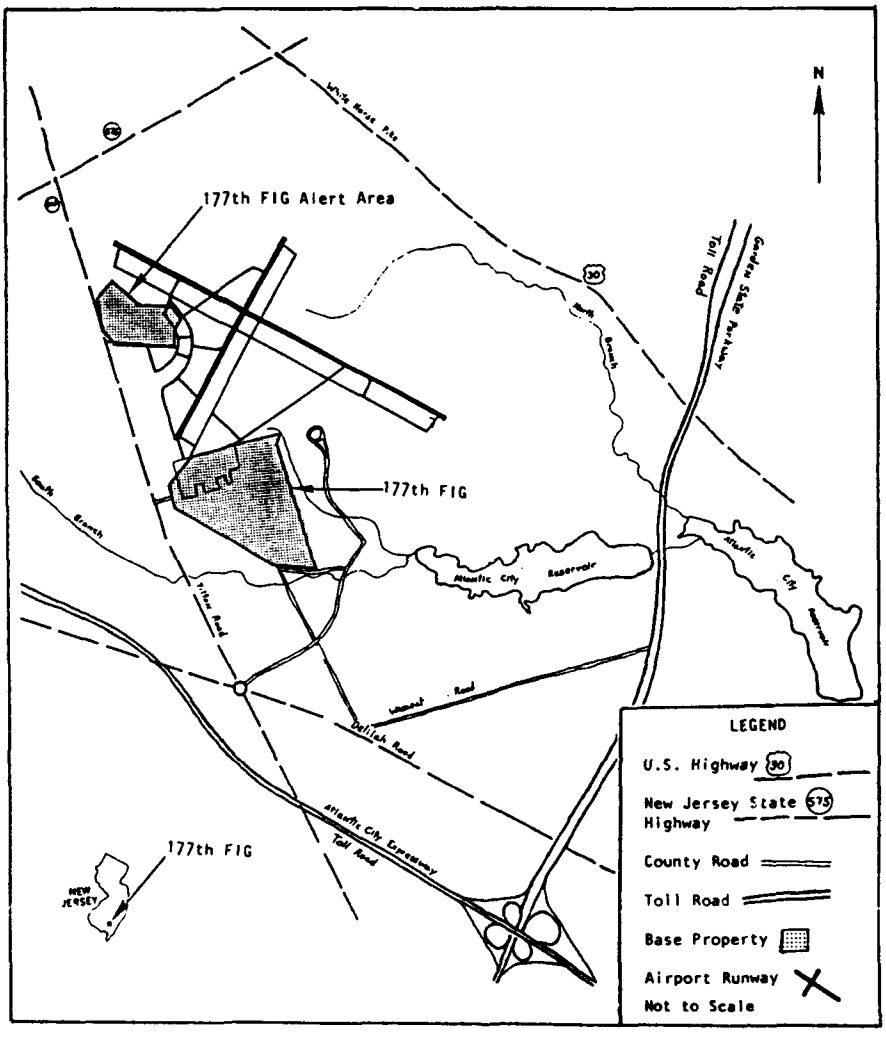

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INSTALLATION RESTORATION PROGRAM
PRELIMINARY ASSESSMENT

177TH FIGHTER INTERCEPTOR GROUP
NEW JERSEY AIR NATIONAL GUARD
ATLANTIC CITY INTERNATIONAL AIRPORT
ATLANTIC CITY, NEW JERSEY

November 1989

Prepared for

National Guard Bureau
Andrews Air Force Base, Maryland 20331-6008

Prepared by

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ACRONYM LIST

AFOEHL	Air Force Occupational and Environmental Health Laboratory
AGE	Aerospace Ground Equipment
AMSL	Above Mean Sea Level
ANG	Air National Guard
ANGSC	Air National Guard Support Center
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act of 1980, also called "Superfund"
CFR	Code of Federal Regulations
DD	Decision Document
DEQPPM	Defense Environmental Quality Program Policy Memorandum
DERP	Defense Environmental Restoration Program
DoD	Department of Defense
DoE	Department of Energy
DPDO	Defense Property Disposal Office
DRMO	Defense Reutilization and Marketing Office
EO	Executive Order
EPA	Environmental Protection Agency
FAA	Federal Aviation Administration
FIG	Fighter Interceptor Group
FS	Feasibility Study
FTA	Fire Training Area
HARM	Hazard Assessment Rating Methodology
HAS	Hazard Assessment Score
HRS	Hazard Ranking System
IRP	Installation Restoration Program
NCP	National Contingency Plan
NGB	National Guard Bureau
NPDES	National Pollutant Discharge Elimination System
NPL	National Priorities List
PA	Preliminary Assessment
P.E.	Professional Engineer
PCB	Polychlorinated Biphenyl
POL	Petroleum-Oil-Lubricant
RA	Remedial Action
RCRA	Resource Conservation and Recovery Act of 1976
RD	Remedial Design
SARA	Superfund Amendments and Reauthorization Act of 1986
SCS	Soil Conservation Service
SPCC	Spill Prevention, Control, and Countermeasures
TFG	Tactical Fighter Group
TFS	Tactical Fighter Squadron
USAF	United States Air Force
USC	United States Code
USDA	United States Department of Agriculture
USGS	United States Geological Survey
UST	Underground Storage Tank

EXECUTIVE SUMMARY

A. INTRODUCTION

Science & Technology, Inc. (SciTek) was retained to conduct the Installation Restoration Program Preliminary Assessment (PA) of the 177th Fighter Interceptor Group (FIG), New Jersey Air National Guard (ANG), located at Atlantic City International Airport, Atlantic City, New Jersey [hereinafter referred to as the Base].

The PA included the following activities:

- an on-site visit, including interviews with 21 Base personnel (former and active), interviews with 3 retirees from the Atlantic City Naval Air Station, which once occupied Base land, and field surveys by SciTek representatives during March 6-10, 1989;
- acquisition and analysis of information on past hazardous materials use, waste generation, and waste disposal at the Base;
- acquisition and analysis of available geological, hydrological, meteorological, and environmental data from federal, state, and local agencies; and
- the identification and assessment of sites on the Base that may have been contaminated with hazardous material/hazardous waste.

B. MAJOR FINDINGS

The ANG has utilized hazardous material and generated small amounts of wastes in mission-oriented operations and maintenance at the Base since 1958.

Operations that have involved the use and disposal of hazardous materials include aircraft maintenance, aerospace ground equipment maintenance, vehicle maintenance, and petroleum-oil-lubricant (POL) management and distribution. The hazardous materials disposed of through these operations

include varying quantities of waste POL products, paints, thinners, strippers, and solvents.

C. CONCLUSIONS

A potential for contaminant migration exists at the following six sites:

Site No. 1 - Tanker Defueling Area

Site No. 2 - Aircraft Defueling Area(s)

Site No. 3 - Old Aircraft Wash Rack

Site No. 4 - Transformer Storage Area

Site No. 5 - Liquid Waste Holding Area Behind Building 65

Site No. 6 - Drum Burials at Blast Pad in Alert Area

D. RECOMMENDATIONS

Further investigation at all six sites is recommended.

I. INTRODUCTION

A. Background

The 177th Fighter Interceptor Group (FIG) is located at the Atlantic City International Airport, Atlantic City, New Jersey. The 177th FIG has been active at Atlantic City International Airport since 1958, and over the years, a variety of military aircraft have been assigned to and serviced at the Base. Both the past and current operations have involved the use of potentially hazardous materials and the disposal of wastes. Because of the use of these materials and the disposal of resultant wastes, the National Guard Bureau (NGB) has implemented the Installation Restoration Program (IRP). The IRP is a comprehensive program designed to:

- Identify and fully evaluate suspected problems associated with past hazardous waste disposal and/or spill sites on Department of Defense (DoD) installations, and

- Control hazards to human health, welfare, and the environment that may have resulted from these past practices.

During June 1980, DoD issued a Defense Environmental Quality Program Policy Memorandum (DEQPPM 80-6) requiring identification of past hazardous waste disposal sites on DoD installations. The policy was issued in response to the Resource Conservation and Recovery Act (RCRA) of 1976 and in anticipation of the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) of 1980 (Public Law 96-510), commonly known as "Superfund." In August 1981, the President delegated certain authority specified under CERCLA to the Secretary of Defense via Executive Order (EO 12316). As a result of EO 12316, DoD revised the IRP by issuing DEQPPM 81-5, on December 11, 1981, which reissued and amplified all previous directives and memoranda.

Although the DoD IRP and the EPA Superfund programs were essentially the same, differences in the definition of program phases and lines of authority resulted in some confusion between DoD and state/ federal regulatory agencies. These difficulties were rectified via passage of the Superfund Amendments and Reauthorization Act (SARA, PL-99-499) of 1986. On January 23, 1987, Presidential Executive Order EO 12580 was issued. EO 12580 effectively revoked EO 12316 and implemented the changes promulgated by SARA.

The most important changes affected by SARA included the following:

- Section 120 of SARA provides that federal facilities, including those in DoD, are subject to all provisions of CERCLA/SARA concerning site assessment, evaluation under the National Contingency Plan (NCP) [40CFR300], listing on the National Priorities List (NPL), and removal/ remedial actions. DoD must therefore comply with all the procedural and substantive requirements (guidelines, rules, regulations, and criteria) promulgated by the EPA under Superfund authority.

- Section 211 of SARA also provides continuing statutory authority for DoD to conduct its IRP as part of the Defense Environmental Restoration Program (DERP). This was accomplished by adding chapter 160, sections 2701-2707 to Title 10 United States Code (10 USC 160).

- SARA also stipulated that terminology used to describe or otherwise identify actions carried out under the IRP shall be substantially the same as the terminology of the regulations and guidelines issued by the EPA under their Superfund authority.

As a result of SARA, the operational activities of the IRP are currently defined and described as follows:

Preliminary Assessment

A records search designed to identify and evaluate past disposal and/or spill sites which might pose a potential and/or actual hazard to public health, welfare, or the environment.

Site Investigation/Remedial Investigation/ Feasibility Study

The Site Investigation consists of field activities designed to confirm the presence or absence of contamination at the potential sites identified in the Preliminary Assessment (PA). The Remedial Investigation consists of field activities designed to quantify and identify the potential contaminant, the extent of the contaminant plume, and the pathways of contaminant migration.

If applicable, a public health evaluation is performed to analyze the collected data. Field tests are required which may necessitate the installation of monitoring wells or the collection and analysis of water, soil and/or sediment samples. Careful documentation and quality control procedures, in accordance with CERCLA/SARA guidelines, ensure the validity of data. Hydrogeologic studies are conducted to determine the underlying strata, groundwater flow rates, and direction of contaminant migration. The findings from these studies result in the selection of one or more of the following options:

- **No Further Action** - Investigations do not indicate harmful levels of contamination and do not pose a significant threat to human health or the environment. The site does not warrant further IRP action and a Decision Document (DD) will be prepared to close out the site.

- **Long-Term Monitoring** - Evaluations do not detect sufficient contamination to justify costly remedial actions. Long-term monitoring may be recommended to detect the possibility of future problems.

- **Feasibility Study** - Investigation confirms the presence of contamination that may pose a threat to human health and/or the environment, and some sort of remedial action is indicated. The Feasibility Study (FS) is therefore designed and developed to identify and select the most appropriate remedial action. The FS may include individual sites, groups of sites, or all sites on an installation. Remedial alternatives are chosen according to engineering and cost feasibility, state/federal regulatory requirements, public health effects, and environmental impacts. The end result of the FS is the selection of the most appropriate remedial action by the ANG with concurrence by state and/or federal regulatory agencies.

Remedial Design/Remedial Action - The Remedial Design (RD) involves formulation and approval of the engineering designs required to implement the selected remedial action. The Remedial Action (RA) is the actual implementation of the remedial alternative. It refers to the accomplishment of measures to eliminate the hazard or, at a minimum, reduce it to an acceptable limit. Covering a landfill with an impermeable cap, pumping and treating contaminated groundwater, installing a new water distribution system, and in situ biodegradation of contaminated soils are examples of remedial measures that might be selected. In some cases, after the remedial actions have been completed, a long-term monitoring system may be installed as a precautionary measure to detect any contaminant migration or to document the efficiency of remediation.

Research and Development - Research and Development (R&D) activities are not always

applicable for an IRP site but may be necessary if there is a requirement for additional research and development of control measures. R&D tasks may be initiated for sites that cannot be characterized or controlled through the application of currently available, proven technology. It can also, in some instances, be used for sites deemed suitable for evaluating new technologies.

Intermediate Action Alternatives - At any point, it may be determined that a former waste disposal site poses an immediate threat to public health or the environment, thus necessitating prompt removal of the contaminant. Immediate action, such as limiting access to the site, capping or removing contaminated soils and/or providing an alternate water supply may suffice as effective control measures. Sites requiring immediate removal action maintain IRP status in order to determine the need for additional remedial planning or long-term monitoring. Removal measures or other appropriate remedial actions may be implemented during any phase of an IRP project.

B. Purpose

The purpose of this IRP PA Records Search is to identify and evaluate suspected problems associated with past waste handling procedures, disposal sites, and spill sites on the Base property.

The potential for migration of hazardous contaminants was evaluated by visiting the Base, reviewing existing environmental data, analyzing Base records concerning the use and generation of hazardous materials, and conducting interviews with present and past Base personnel who had knowledge of past waste disposal techniques and handling methods. Pertinent information collected and analyzed as part of the PA included a records search of the history of the Base; the local geological, hydrological, and meteorological conditions that might influence migration of contaminants;

and ecological settings that indicate environmentally sensitive conditions.

C. Scope

The scope was limited to the identification of sites at or under primary control of the Base and evaluation of potential receptors. The PA included:

- o an on-site visit during March 6-10, 1989;
- o acquisition of records and information on hazardous materials use and waste handling practices;
- o acquisition of available geological, hydrological, meteorological, land use and zoning, critical habitat, and related data from federal and New Jersey state agencies;
- o a review and analysis of all information obtained; and
- o preparation of a summary report to include recommendations for further action.

The subcontractor effort was conducted by the following Science & Technology, Inc. (SciTek) personnel: Mr. Tracy C. Brown, Environmental Analyst; Mr. Jack D. Wheat, Hydrogeologist; and Mr. Ray S. Clark, Civil/Environmental Engineer. Resumes of Search Team members are included in Appendix A. Mr. Lee Banicki of the National Guard Bureau (NGB) is project officer for this Base and participated in the overall assessment during the week of the site visit.

The point of contact at the Base was Major Stephen J. Bittner, P.E., Base Civil Engineer.

D. Methodology

Figure I.1 depicts a flow chart of the records search methodology.

The PA began with a site visit to the Base to identify all operations that may have utilized hazardous materials or may have generated hazardous waste. Twenty-one past and present Base employees familiar with the various operating procedures were interviewed. In addition, three retired personnel from the Atlantic City Naval Air Station, which once occupied Base land, were interviewed. These interviews were conducted to determine those areas where waste materials (hazardous or nonhazardous) were used, spilled, stored, disposed of, or released into the environment. The interviewee's knowledge and experience with Base operations averaged 25 years and ranged from 2 to 35 years. Records contained in the Base files were collected and reviewed to supplement the information obtained from interviews.

Detailed geological, hydrological, meteorological, and environmental data for the area of study were obtained from the appropriate federal and state agencies. A listing of federal and state agency contacts is included as Appendix B.

After a detailed analysis of all the information obtained, it was concluded that six sites are potentially contaminated with hazardous material/hazardous waste. Under the IRP program, when sufficient information is available, sites are numerically scored using the Air Force Hazard Assessment Rating Methodology (HARM). A description of HARM is presented in Appendix C.

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Preliminary Assessment Methodology Flow Chart

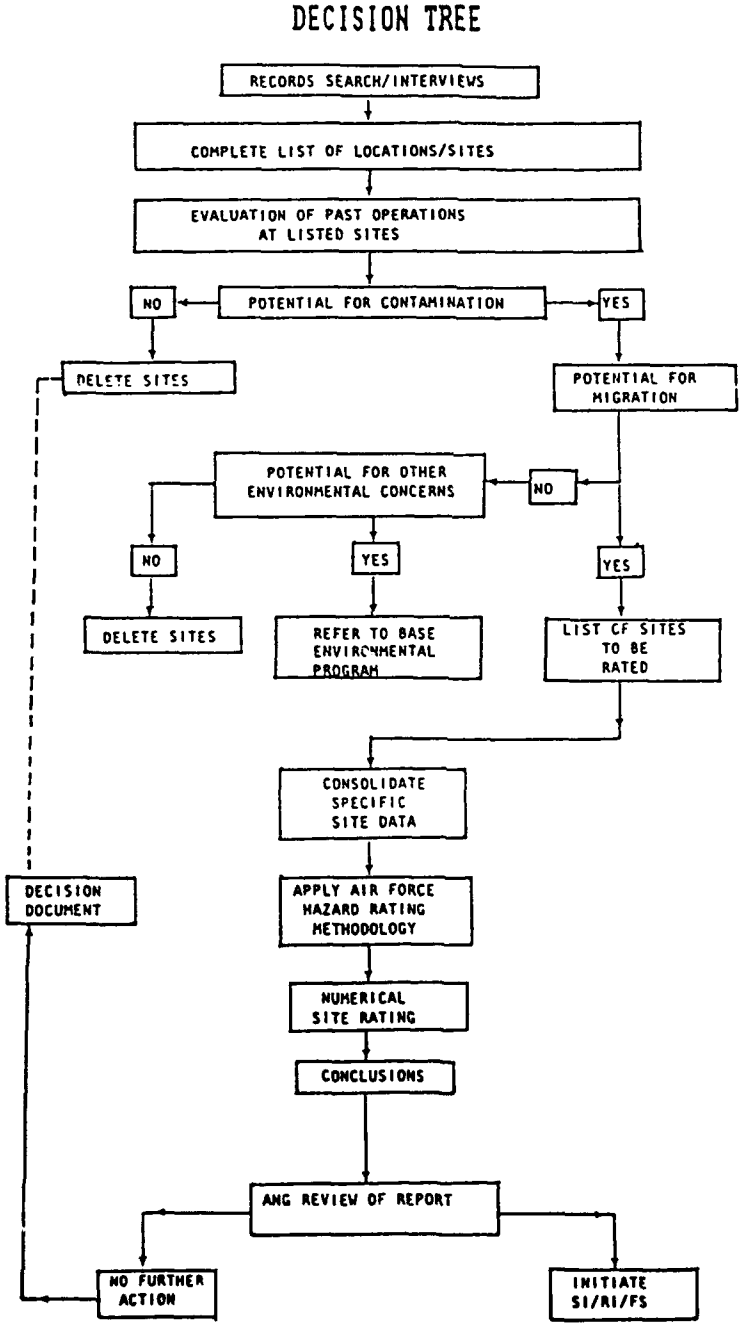

Figure I.1.

II. INSTALLATION DESCRIPTION

A. Location

The Base is located within Pleasantville, New Jersey in Egg Harbor Township. It lies approximately ten miles west-northwest of Atlantic City and is directly adjacent to the Atlantic City International Airport and the Federal Aviation Administration Technical Center. Major routes to the Base include Tilton Road, Pomona Road, and Delilah Road.

The Base, which consists of two separate areas (Main Base and Alert Area), occupies approximately 280 acres just east of Tilton Road. The Base population exceeds 1000 persons on Unit Training Assembly weekends. Figure II.1 illustrates the location and boundaries of the Base.

B. Organization and History

The 177th Fighter Interceptor Group (FIG) began in 1917 at Langley Field, Virginia as the 119th Aero Squadron. In 1928 it moved to Newark, New Jersey as the 119th Observation Squadron. The unit continued as the 119th until 1943 when it became the 490th Fighter Squadron. The 490th was reactivated as a fighter squadron in the 108th Fighter Interceptor Wing at Newark.

On August 5, 1958, the 119th moved to the former Atlantic City Naval Air Station, now known as the Federal Aviation Administration Technical Center. In 1959 the unit received its first swept wing jet, the F-84F "Thunderstreak." In 1962 the 119th was reassigned to the 177th Tactical Fighter Group (TFG) flying the F-86H "Sabre." Two years later the unit made a transition to the F-100 "Super Sabre."

In May 1968, the 177th Tactical Fighter Group (TFG)/199th Tactical Fighter Squadron (TFS) was assigned to the 113th Tactical Fighter Wing, Myrtle Beach, South Carolina. The 177th TFG/199th TFS was separated from active duty and returned to Atlantic City in June 1969 and

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Source: U.S.G.S. 7.5 Minute Series, Pleasantville, 1972.

Location Map of the 177th Fighter Interceptor Group (FIG)

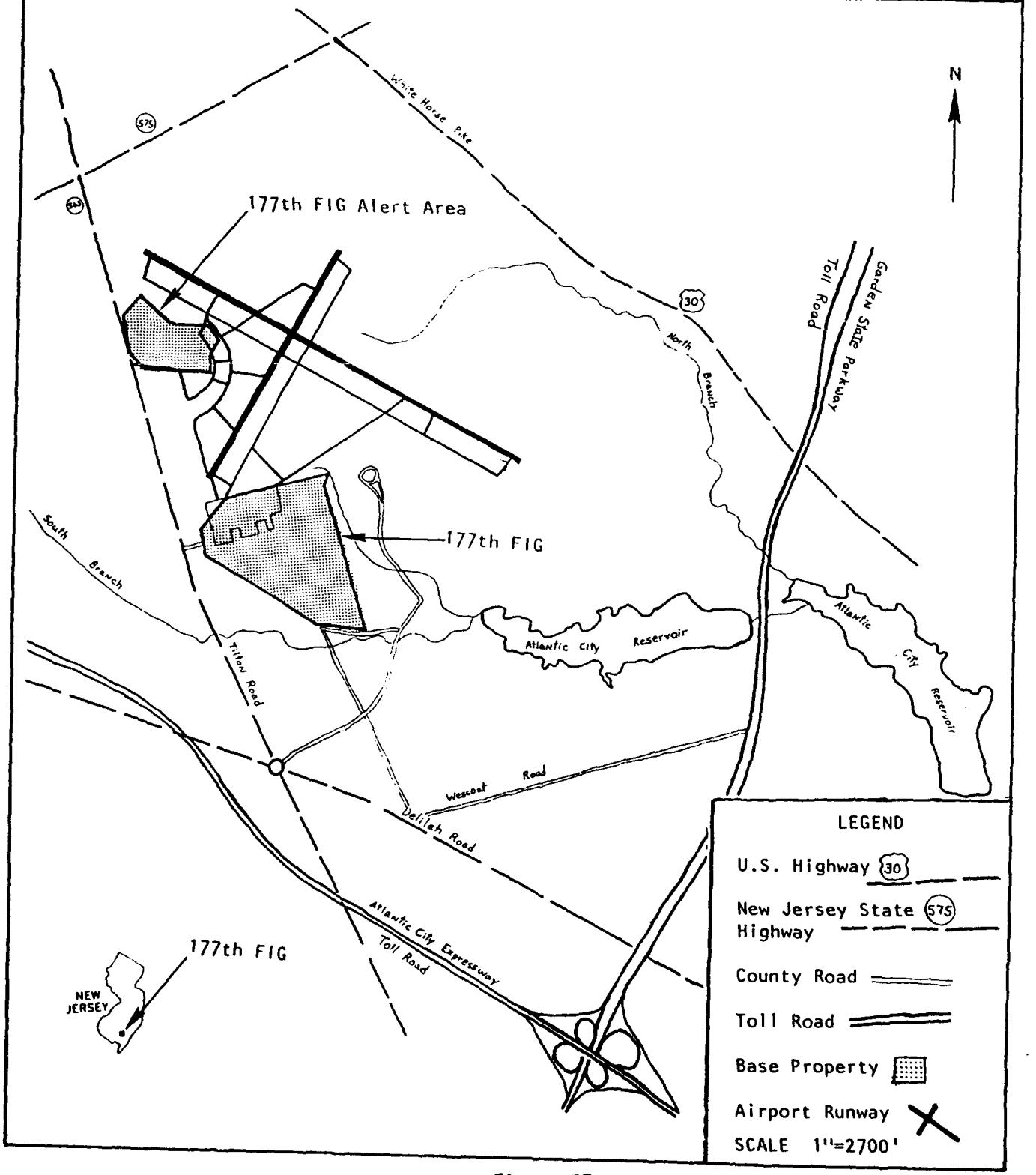

Figure II.1

made the transition to the F-105 "Thunderchief."

In 1972 the 177th TFG was reorganized as the 177th FIG. In 1973 the unit made a transition to the F-106 "Delta Dart." The 177th FIG would remain operational in this aircraft for the next 15 years. In June 1988, the 177th FIG received its present aircraft, the F-16 "Fighting Falcon."

Changes in aircraft and mission are responsible for many operational changes including changes in quantities, types, and methods of disposal of hazardous materials. An aircraft conversion is often accompanied by variations in routine maintenance. Changing the engine oil, testing the engine, lubricating the plane, and washing the aircraft are just a few maintenance operations that could change.

Operational changes also occur because of changes in policies, standards, personnel, technology, etc. Oil/water separators have greatly reduced the amount of liquid wastes released into the environment. Also, the awareness of hazardous materials has further reduced environmental impacts, as has the introduction of substances such as biodegradable compounds. The majority of hazardous wastes are now collected and disposed of through contractors and the Defense Reutilization and Marketing Office (DRMO).

III. ENVIRONMENTAL SETTING

A. Meteorology

The following climatological data were obtained from the Climatic Atlas of the U.S. and Weather of U.S. Cities:

The climate of Atlantic City is principally temperate in character; however, the moderating influence of the Atlantic Ocean is apparent throughout the year. The weather tends to remain comparatively mild late into the fall, and warming is retarded in the spring. The record mean temperature (1944-1983) is 53.0°F. Temperatures of 90°F or higher normally are recorded about 16 times per year at the airport, whereas temperatures of 32°F or below are recorded an average of 18 days per year.

Precipitation is moderate and well distributed throughout the year. Thunderstorms are mostly warm season phenomena. Snowfall averages about 15 inches annually and does not remain on the ground long. The 1-year, 24-hour rainfall is approximately 3.0 inches (47 FR 31235, July 16, 1982, Figure 8). The mean annual precipitation (1944-1983) is 41.23 inches. The mean annual lake evaporation (1946-1955) is approximately 36 inches. According to the method outlined in the Federal Register (47 FR 31224, July 16, 1982), the net precipitation value obtained is 5.23 inches.

B. Geology

The Base is located in Atlantic County, New Jersey within the Coastal Plain Physiographic Province. The Coastal Plain Province of New Jersey extends from Raritan Bay in the northeast to Delaware Bay in the southwest and from the Fall Line in the west to the Atlantic Ocean in the east. The Coastal Plain Province extends from Florida to Newfoundland. The New Jersey Coastal Plain covers an area of 4,200 square miles. This area is estimated to encompass 60 percent of the State of New Jersey. The areal distribution of the Coastal

Plain Province in relation to the Base is illustrated in Figure III.1 (Zapecza 1984: 2).

Surface topography throughout the Coastal Plain is relatively flat. This topography has been slightly modified by the erosion of surface streams. Elevations throughout the Coastal Plain range from sea level to a maximum of 400 feet above mean sea level (AMSL). The land surface of the Coastal Plain slopes from the Fall Line to the southeast at a rate of 10-15 feet/mile (Lewis and Kummel 1940: 20-21).

The land surface at the Base and in its immediate vicinity is relatively flat. This land surface has a gentle slope that ranges from 0 to 3%. Natural topography surrounding the Base has been modified by construction activities associated with the Atlantic City International Airport and FAA facilities. Surface elevations in the immediate vicinity of the Base range from 10-70 feet AMSL. (Gehl and Hankins 1986: 3).

The outcropping and subsurface stratigraphy of the New Jersey Coastal Plain have been described in geological literature as a wedge of unconsolidated sediments (Zapecza 1984: 6). This sedimentary sequence was unconformably deposited upon a southeast dipping, Paleozoic age crystalline basement complex (Richards et al, n.d.). The structure of this basement complex is illustrated in Figure III.2.

Graben faults in the basement complex created depositional basins in which Triassic age sedimentary rocks were deposited (Lewis and Kummel, 1940). These Triassic sedimentary rocks underlie the previously described Coastal Plain sediments within isolated areas of the New Jersey Coastal Plain.

Unconsolidated sediments of the Coastal Plain dip regionally to the southeast at a rate of 10-60 feet/mile. Regional dip is relatively gentle at the surface. However, it becomes more acute deeper in the subsurface. Coastal

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Source: Zapecza, 1984.

Areal Distribution of the New Jersey Coastal Plain

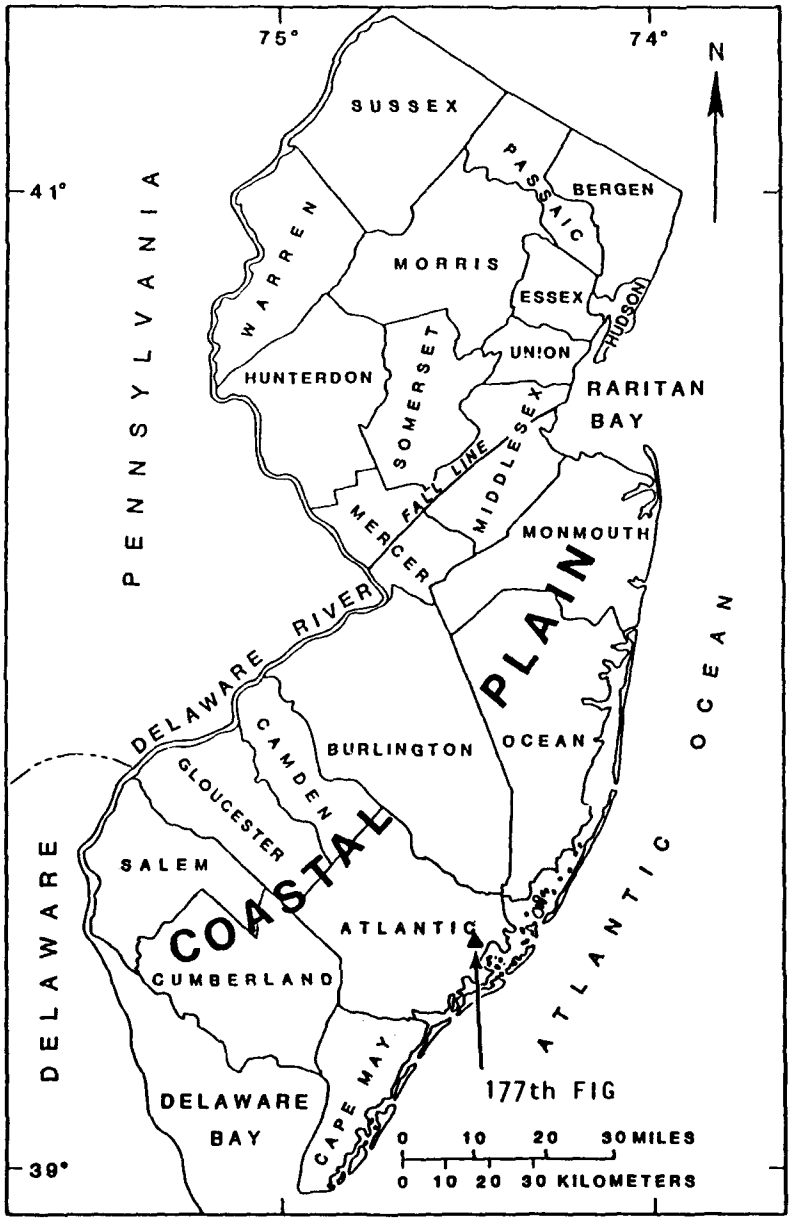

Figure III.1

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Structure Contours of the Basement Complex Underlying the New Jersey Coastal Plain

Source: Richards, Olmsted, Ruhle, No Date.

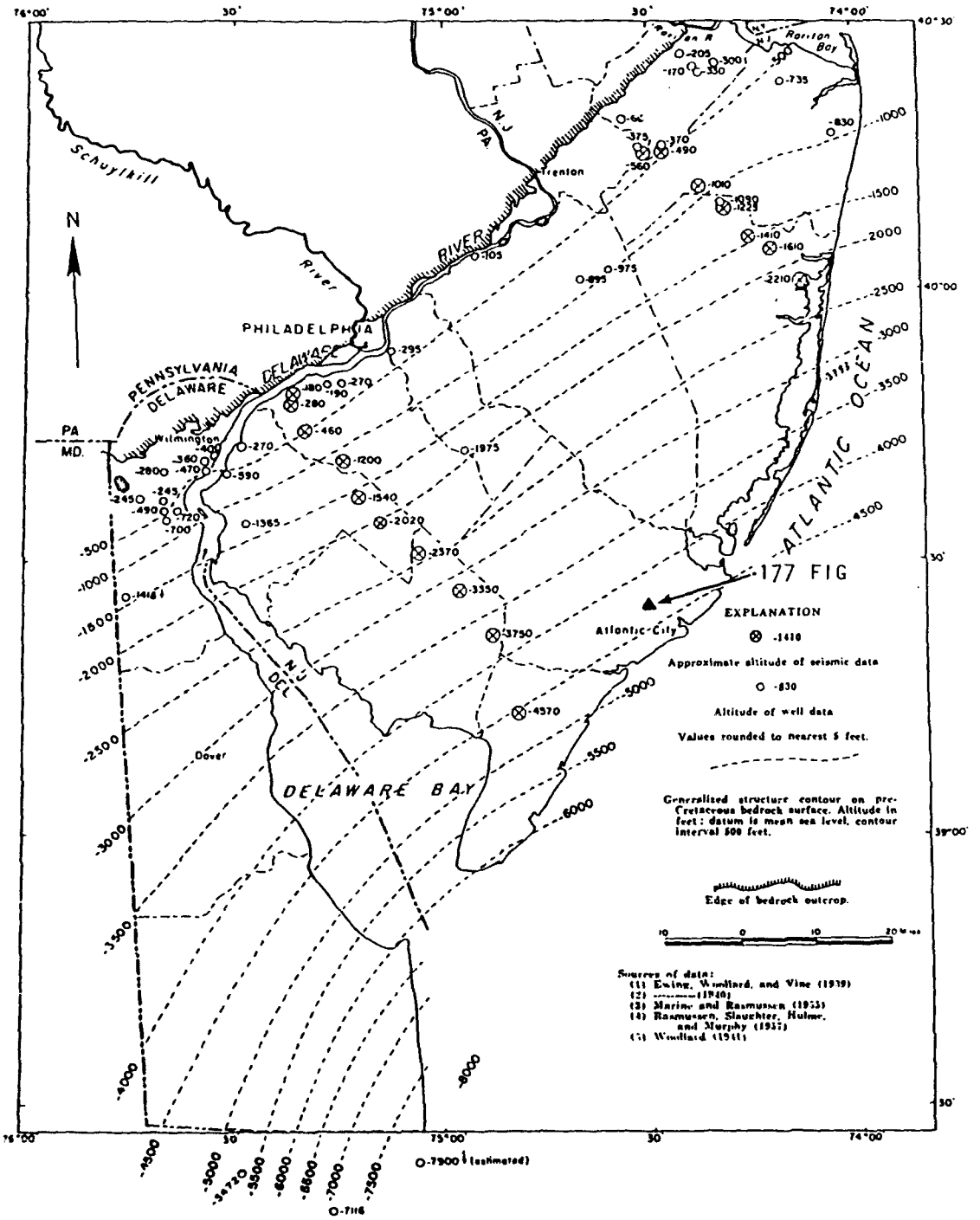

Figure III.2

Plain sediments crop out along a northeast-southwest belt that parallels the Fall Line (Lewis and Kummel, 1940).

As previously mentioned, surface and subsurface formations of the Coastal Plain province are a wedge-shaped sequence of unconsolidated and semiconsolidated sediments. The western limit of this sequence is the Fall Line, where formations crop out and/or pinch out. Individual formations thicken down and dip to the southeast. As a result, the entire Coastal Plain sequence thickens downdip. The thickness of Coastal Plain sediments throughout New Jersey ranges from 0 feet at the Fall Line to 6500 feet in Cape May County (Zepecza 1984: 6). The thickness of Coastal Plain sediments at the Base and at the FAA facility has been estimated to be 4000 feet. (Gehl and Hankins, 1986).

The Coastal Plain stratigraphy is lithologically an alternating sequence of unconsolidated and semiconsolidated sands, clays, and silts. Formations within this sequence range in age from Cretaceous to Holocene. The stratigraphy of the New Jersey Coastal Plain; including the formation stratigraphic sequence, formation age, and individual formation lithology; is illustrated in Table III.1. Lateral facies changes result in formation lithologic variations from one type locality to another. Lithologically, each of the Coastal Plain formations exhibit some degree of variability (Richards et al, n.d.). This variability includes localized layers of clay, sand lenses, etc.

Formations within the Coastal Plain stratigraphic sequence, illustrated in Table III.1, were deposited in nonmarine beach and marine shelf environments. The lower Cretaceous age Potomac Group and the Raritan Formation were deposited in a nonmarine deltaic complex. Sand-filled channels and sand-shale facies occur at various stratigraphic intervals.

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Source: Zapecza, 1984.

Stratigraphy of 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 underlying 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			
Tertiary	Miocene	Pensauken Formation	Sand, quartz, light-colored, heterogeneous, clayey, pebbly.	Kirkwood-Cohansey aquifer system	A major aquifer system. Ground-water occurs generally under water-table conditions. In Cape May County the Cohansey Sand is under artesian conditions.
		Bridgeton Formation			
		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 water-bearing zone 2	
				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, fined-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	Yields small quantities of water in and near its outcrop area.
		Red Bank Sand			
		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 Fm. 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 system: 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. In the Dela. River Valley three aquifers are recognized. In the deeper subsurface, units below the upper aquifer are undifferentiated.
		Raritan Formation	Sand, quartz, light-gray, fine- to coarse-grained, pebbly, arkosic, red, white, and variegated clay.	conf bd / middle aquifer / conf bd	
	Lower Cretaceous	Potomac Group	Alternating clay, silt, sand, and gravel.	lower aquifer	
Pre- Cretaceous		Bedrock	Precambrian and lower Paleozoic crystalline rocks, metamorphic schist and gneiss; locally Triassic basalt, sandstone and shale.	Bedrock confining bed	No wells obtain water from these consolidated rocks, except along Fall Line.

Table III.1

The overlying Upper Cretaceous and Tertiary age formations were deposited in beach and near-shore marine depositional environments. (Zapecza 1984: 8). In ascending stratigraphic sequence, these formations include the Cretaceous age Magothy, Merchantville, Woodbury, Englishtown, Marshalltown, Wenonah, Mount Laurel, Navesink, Red Bank, and Tilton; the Paleocene age Hornerstown, and Vincentown; the Eocene age Manasquan, Shark River, and Piney Point; and the Miocene age Kirkwood, Cohansey, Beacon Hill, Bridgeton, and Pensauken.

This formation sequence was deposited by the transgression and regression of seas. High lithologic concentrations of glauconite associated with fine-grained sediments are indicative of transgressive sediments that were deposited in the mid to outer continental shelf during major incursions of the sea. Coastal Plain formations that were deposited in this environment include the Cretaceous age Merchantville, Marshalltown, and Navesink; the Paleocene age Hornerstown; and the Eocene age Manasquan. Coarse-grained sediments were deposited on the inner shelf, near shore, and beach environments during marine regression. (Zapecza, 1984).

Subsurface stratigraphic information about the Miocene age Cohansey and Kirkwood formations has been obtained in the vicinity of the Base, the FAA facility, and Atlantic City by the drilling of potable water wells, monitoring wells, and by soil borings. Because these wells reach total depth in the Kirkwood formation, stratigraphic information about deeper Eocene, Paleocene, and Cretaceous age formations is unavailable.

Recent environmental and geological studies compiled by environmental consulting firms subcontracting for the FAA have concluded that the surface stratigraphy underlying the soil overburden at the Base and the FAA property is the Miocene age Cohansey formation. This conclusion was derived from soil borings,

monitoring wells, geophysical logs, and sample logs (Gehl and Hankins 1986: 3-2).

The thickness of the Cohansey at the Base and the FAA facility is approximately 150 feet (Roy F. Weston, Inc., 1984). Analyses of numerous samples collected from soil borings and monitoring wells indicate that the Cohansey is lithologically composed of sand and gravel layers separated by thinner layers of clay (Gehl and Hankins 1986: 3-3 - 3-4). A stratigraphic cross-section illustrating this sequence is shown on Figure III.3.

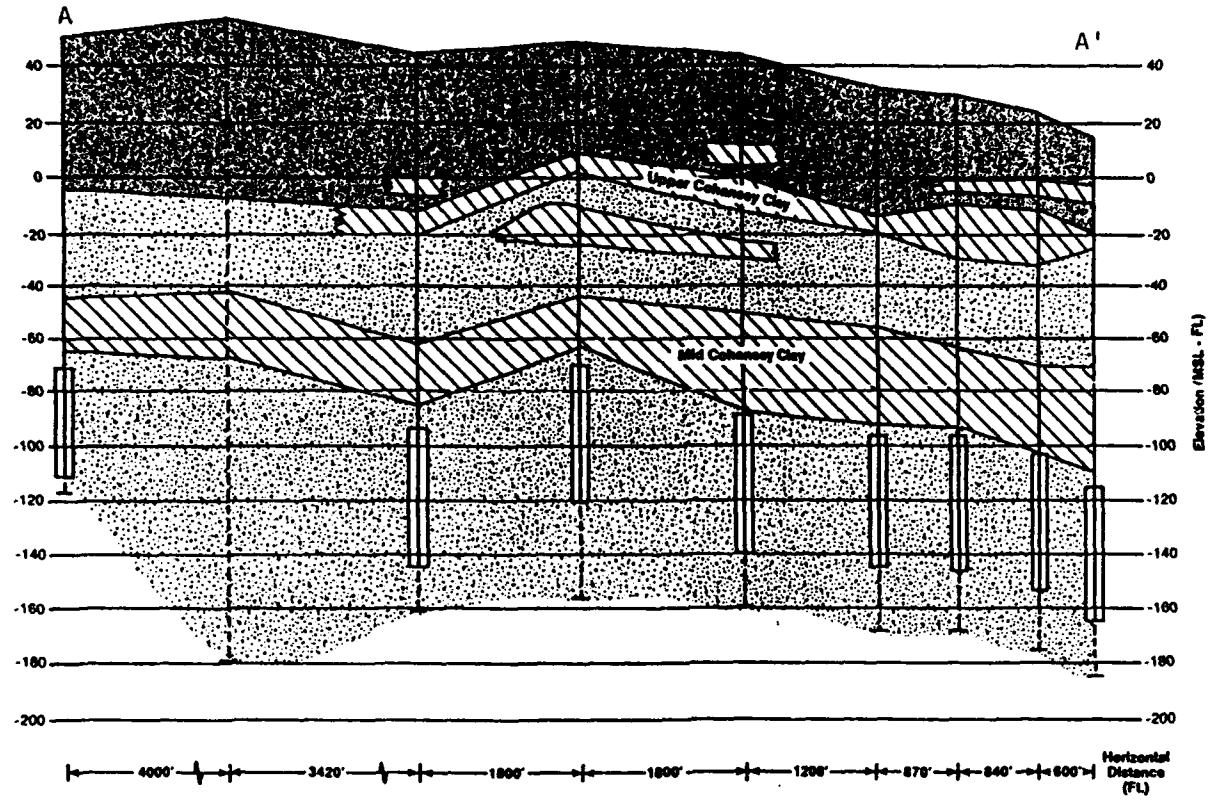
Sand layers within the Cohansey Formation are designated the Lower Cohansey Sand, Middle Cohansey Sand, and Upper Cohansey Sand. Clay layers within the Cohansey Formation are designated Lower Cohansey Clay and Upper Cohansey Clay. (Gehl and Hankins 1986: 3-2). The Lower Cohansey Clay is encountered at depths of 80 to 90 feet and ranges in thickness from 20 to 55 feet (Gehl and Hankins 1986: 3-4). This interval has been observed to be continuous across the Base and FAA Facility. The Upper Cohansey Clay is encountered at depths ranging from 25 to 65 feet, is normally about 10 feet in depth, and is not continuous across the Base and FAA facility (Gehl and Hankins 1984: 3-2). Both the Upper and Lower Cohansey Clay layers may contain discontinuous layers of sand and silt. Likewise, discontinuous lenses of clay may occur within the Upper, Middle, and Lower Cohansey Sand and Gravel layers.

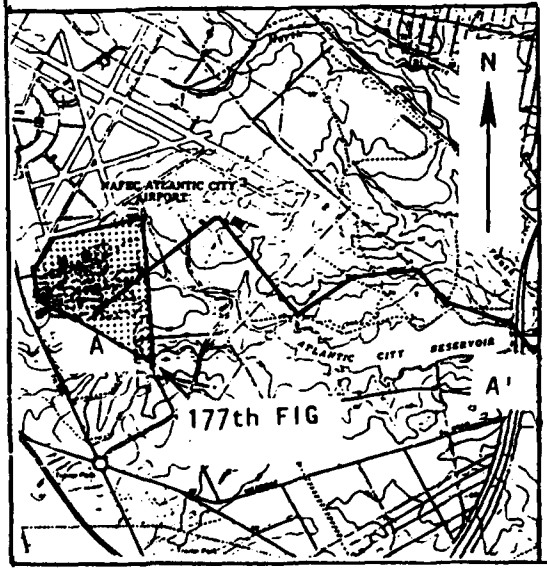
The underlying Kirkwood Formation is composed of medium to coarse-grained sand layers and thick sections of clay (May, 1985). Lateral facies changes, including sand and clay lenses and updip pinch-out of sand and/or clay intervals, is common from one locality to another. The thickness of the Kirkwood Formation in the vicinity of the FAA facility and Atlantic City is probably in excess of 700 feet (Richards et al n.d.: 32).

SciTek

Source: Weston, 1984.

Stratigraphic Cross Section for the Cohansey Formation in the Vicinity of the Base





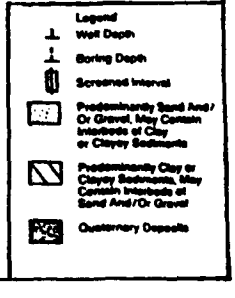


Figure III.3

C. Soils

Correspondence with the United States Department of Agriculture (USDA), Soil Conservation Service (SCS) indicates that soils within the boundaries of the Main Base and the Alert Area belong to the Downer Series, Hammonton Series, and Sassafras soil series (Johnson, 1978). Also, a portion of the Main Base complex is underlain by fill land (FL), soils transported from adjoining areas during the construction of the Base and FAA facilities.

The Downer, Hammonton, and Sassafras series soil types at the Base and Alert Area are the Downer loamy sand (DoA), the Hammonton loamy sand (HaA), and the Sassafras sandy loam (SaB). The areal distribution of these soil types, as well as fill land at the Main Base and the Alert Area is illustrated in Figure III.4. These soils are composed of sandy loam, loamy sand, and sand. Permeabilities, as tested by the SCS to a depth of 60 inches, range from moderate to high. Additional information about these soils; including vertical soil profile, soil texture, and permeability; is included in Table III.2 (Johnson, 1978).

The seasonal high water table for the Downer series, which covers the majority of the Base, is 5 feet below the land surface. The Hammonton series seasonal high water table ranges from 1.5 to 5.0 feet below the land surface. The seasonal high water table for soils in the Sassafras series is greater than 5 feet below the land surface. These seasonal high water tables occur from October to January, the months with the highest precipitation. During other months of the year, the water table drops to depths greater than 5 feet below land surface (Johnson, 1978).

Soil borings were drilled at the Base and the FAA facility during the construction of facilities and environmental investigations subcontracted by the FAA. Vertical soil profiles and soil types for some of these borings are included in Appendix G. The

SciTek

Source: Johnson, 1978.

Soils Map Illustrating Soil Series at the Base

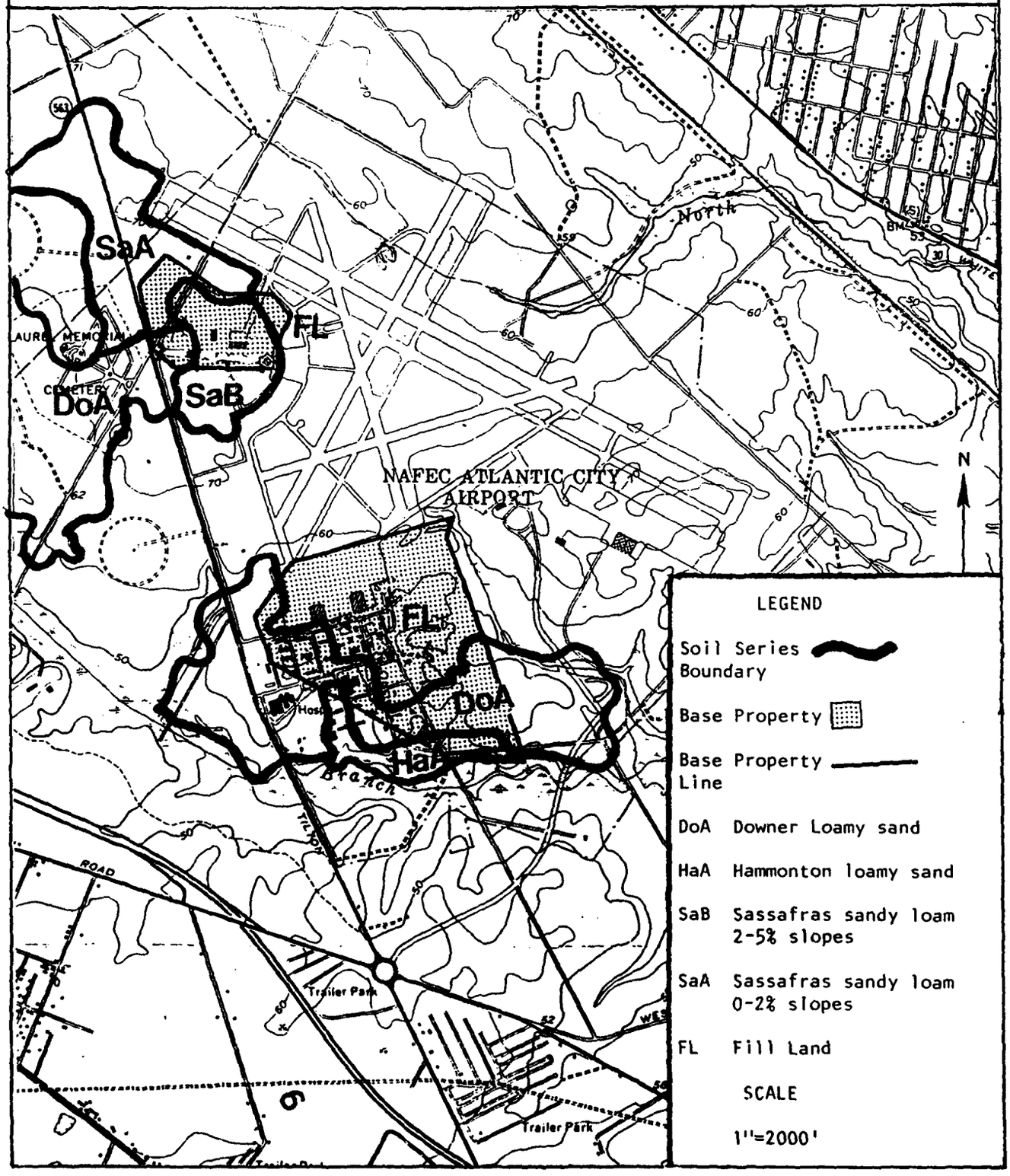


Figure III.4

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Soil Properties for Soil Series at the Base

Source: Johnson, 1978.

SOIL SERIES	SOIL TYPE	SYMBOL	VERTICAL SOIL PROFILE Depth	Texture	PERMEABILITY Depth	Permeability in/hr
Downer	Downer Loamy Sand	DoA	0-17" 17"-33" 33"-60"	Loamy sand Sandy loam Loamy sand and sand	0-17" 17"-33" 33"-60"	0.6-6.0 0.6-6.0 2.0- >6.0
Hammonton	Hammonton Loamy Sand	HaA	0-18" 18"-36" 36"-60"	Loamy sand Sandy Loam Sand	0-18" 18"-36" 36"-60"	2.0-6.0 0.6-6.0 2.0->6.0
Fill Land	Fill Land	FL	0-60"	Sand and gravelly sand	Unknown	
Sassafras	Sassafras Sandy Loam	SaA-SaB	0-18" 18"-38" 38"-60"	Sandy loam Sandy clay loam, sandy loam Loamy sand, gravelly sand	0-18" 18"-38" 38"-60"	0.6-2.0 0.6-2.0 >6.0

Table III.2

shallow water table in these borings was penetrated at depths ranging from 3 to 20 feet below land surface (Roy F. Weston, Inc., 1984).

D. Hydrogeology

1. Surface Runoff

Surface runoff within the Main Base complex and the Alert Area is collected in a series of man-made ditches, storm sewers, and drainage swales. Surface runoff from the Main Base is discharged through three storm drain outfalls (Figure III.5). The majority of surface water collected within the Main Base complex is discharged in a storm drain outfall at the Base's southern boundary. A second storm drain outfall discharges a small portion of the Base surface water into a drainage ditch southeast of the aircraft parking apron. A third storm drain outfall, located west of Tilton Road, discharges a portion of the Base surface water and a portion of the surface water collected from the Alert Area.

Surface runoff at the Alert Area, which is collected in a series of storm drains, exits the Alert Area at two locations, one at the Alert Area's southern boundary and another at its northern boundary (Figure III.6). The storm drain at the southern boundary joins the storm drain system of the Main Base Complex and discharges at the previously mentioned storm drain outfall west of Tilton Road. The storm drain that crosses the northern boundary joins the storm drain system of the FAA. This FAA storm drain system trends northeast and discharges into the North Branch of Absecon Creek.

The surface runoff collected in the previously described surface drainage routes, storm drains, and storm drain outfalls at the Main Base complex discharges into the South Branch of

SciTek

Source: Foster Wheeler USA Corp., 1986.

Surface Runoff and Storm Drain Routes for Surface Water at the Base

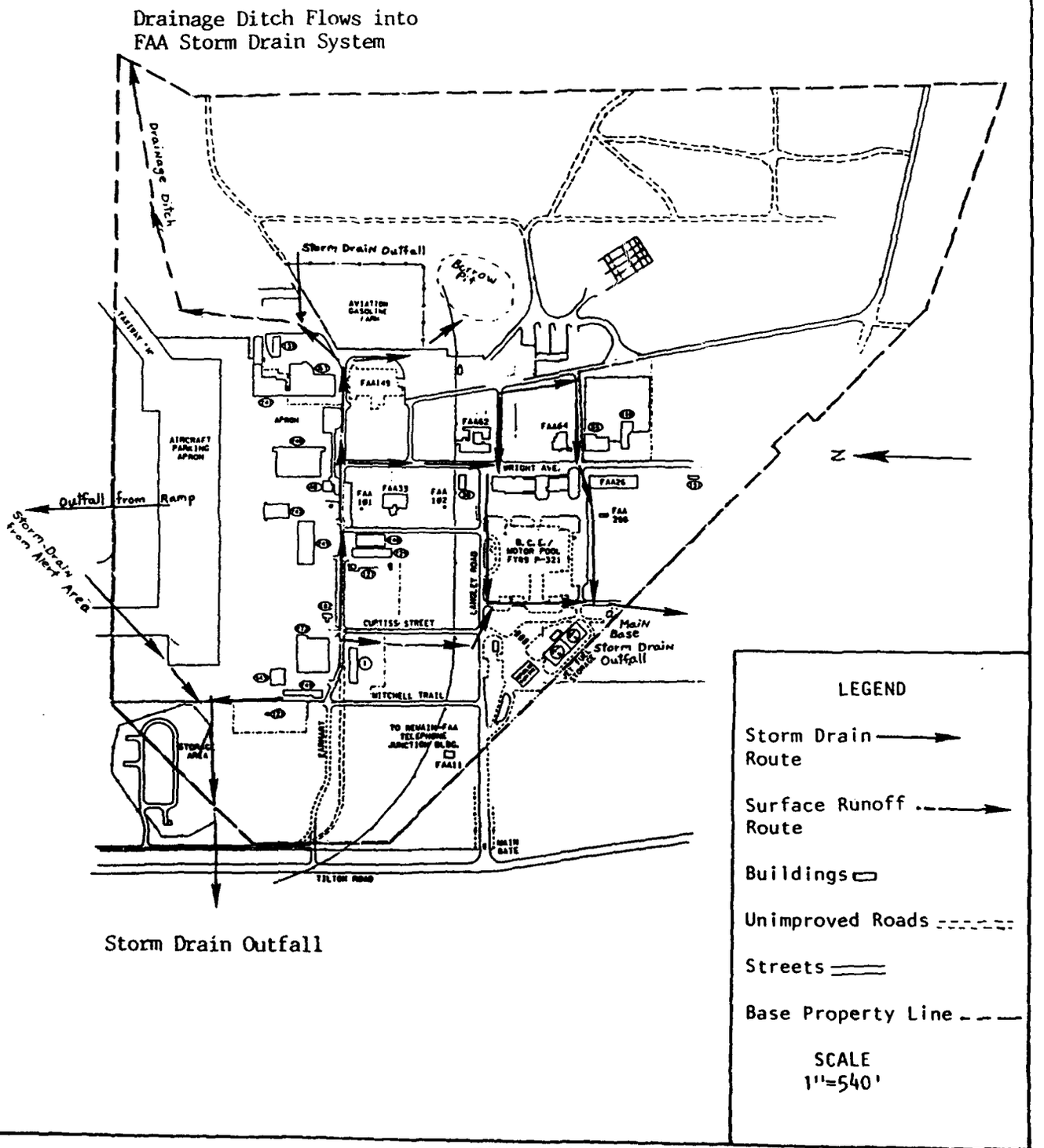

Figure III.5

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Surface Runoff and Storm Drainage Routes at the Alert Area

Source: Foster Wheeler USA Corp., 1986.

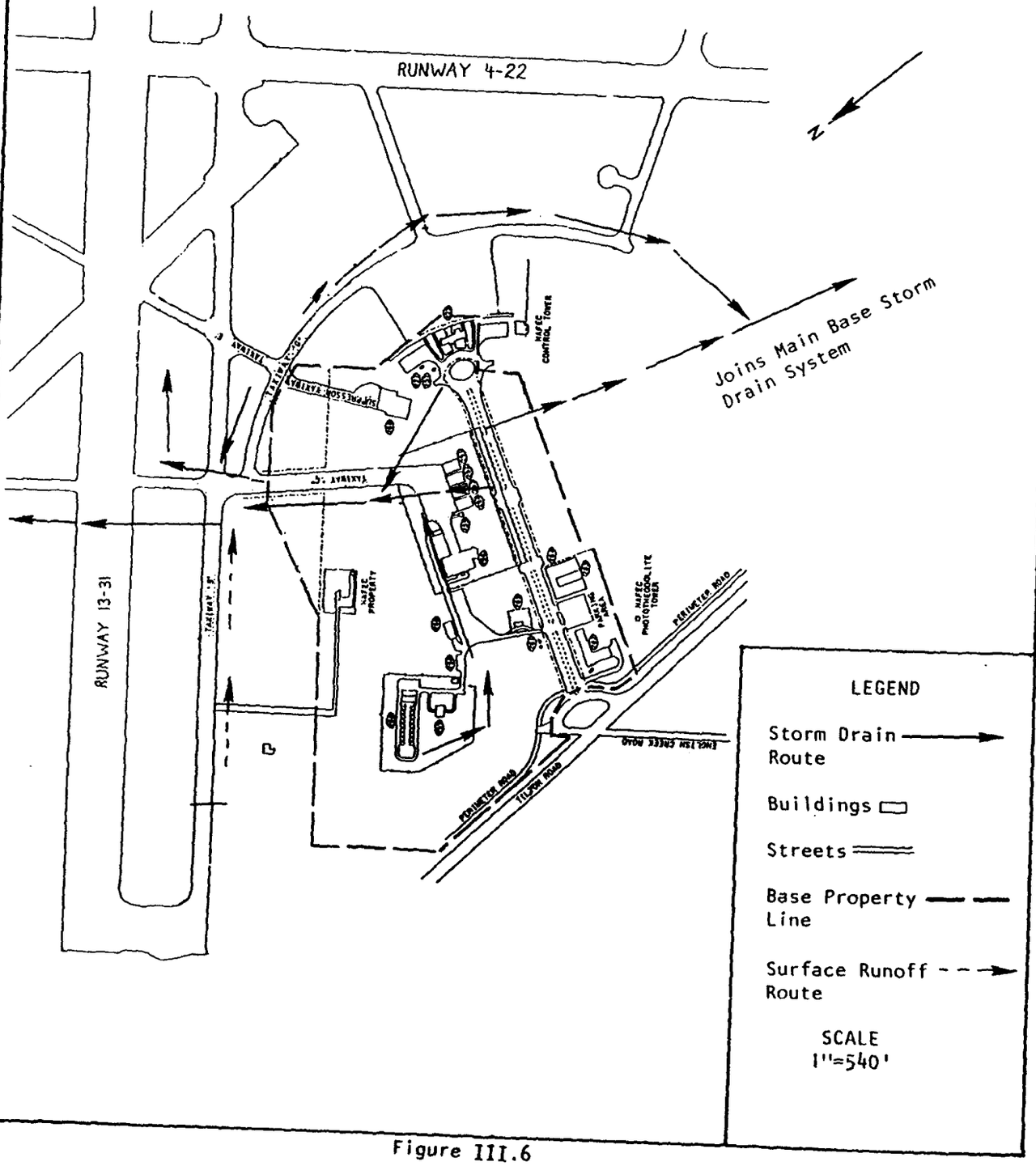

Figure III.6

Absecon Creek (Figure III.7) Also, a portion of the surface runoff collected in storm drains at the Alert Area discharges into the South Branch of Absecon Creek at the storm drain outfall west of Tilton Road. As previously mentioned, a portion of the surface runoff collected in the Alert Area's storm drain flows northeast into the North Branch of Absecon Creek. The North and South Branches of Absecon Creek converge approximately 2 miles east of the Main Base complex. The North and South Branches of Absecon Creek have been impounded by the Atlantic City Reservoir at the previously described north and south branch confluence. Therefore surface runoff from the Main Base, Alert Area, and the FAA facility flows into the Atlantic City Reservoir. Absecon Creek flows east downstream from the Atlantic City Reservoir, into Absecon Bay, and into the Atlantic Ocean.

2. **Groundwater**

The principle source of groundwater at the Base and the FAA facility is the Miocene age Cohansey formation. The underlying Kirkwood formation is tapped for groundwater at Atlantic City and along the coastal barrier islands approximately 7 miles southeast of the Base (May, 1985). Correspondence with hydrogeologists employed by the State of New Jersey, Division of Water Resources, indicated that deeper Eocene, Paleocene, and Cretaceous age aquifers that are tapped as a potable water source in various areas of New Jersey are not used as a groundwater source in the vicinity of the Base. These aquifers are not tapped for a drinking water source because of high saline content and poor water quality.

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Surface Runoff for Surface Water That Exits the Base

Source: 177th FIG Civil Engineering

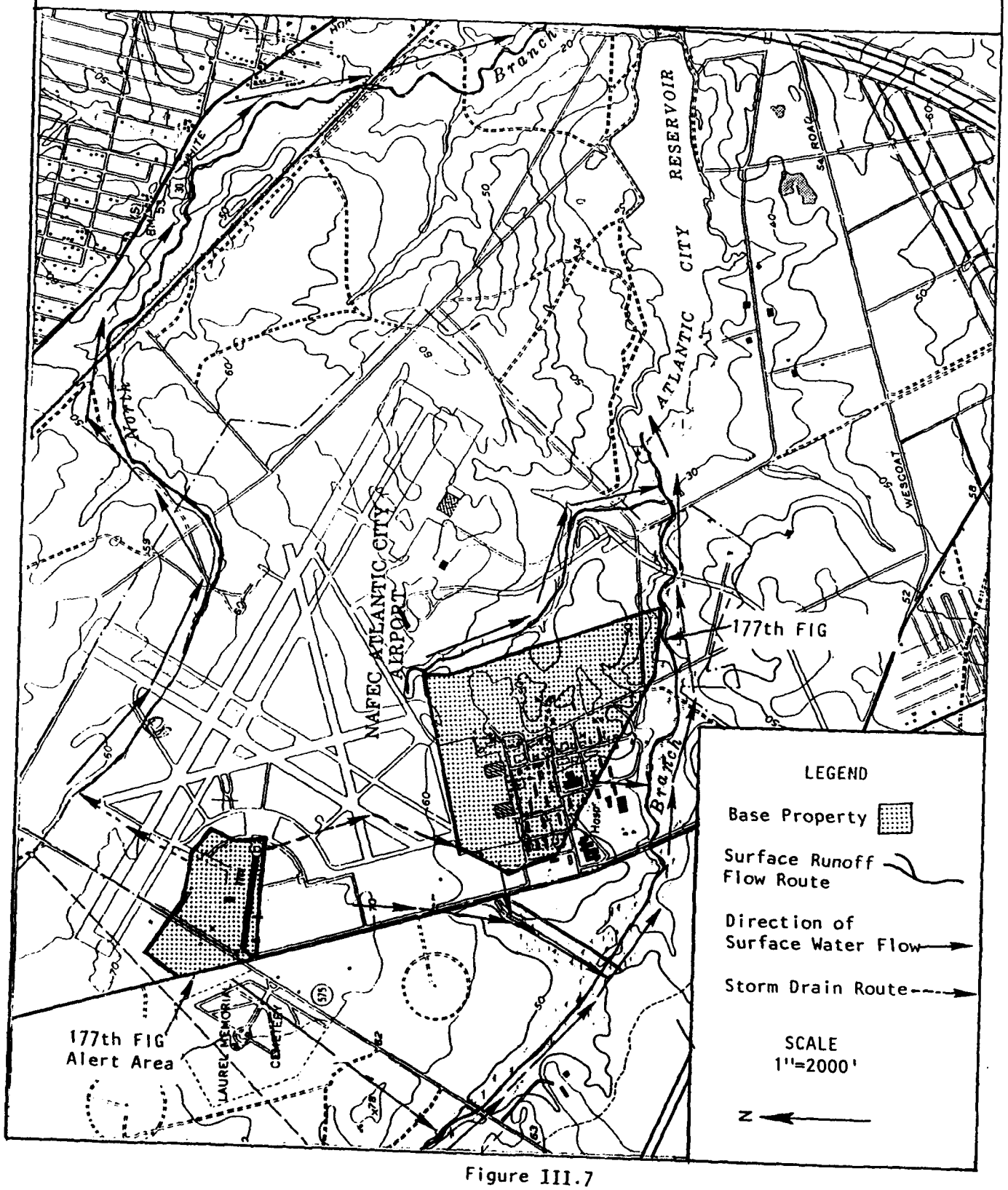

Figure III.7

Regionally, the Kirkwood and Cohansey aquifers are hydrologically connected. These aquifers underlie an area in New Jersey of 3000 square miles southeast of the outcrop of the Kirkwood formation (Zapecza, 1984). Throughout this area, no consistent, confining clay is present to act as an aquiclude to prevent aquifer recharge by the vertical percolation of surface water. Thick lenticular clay layers that occur in local and semiregional areas result in semiconfined aquifer conditions.

The entire geologic sequence that produces groundwater along the Atlantic Coast in the vicinity of the Base is illustrated in Figure III.8. The Atlantic City 800-foot Sand is a major groundwater aquifer located along the coastal barrier islands and barrier beaches. The Atlantic City 800-foot Sand aquifer is separated from the Kirkwood - Cohansey aquifer system by a thick, overlying clay. This overlying clay pinches out updip (Figure III.9). Presently, there is insufficient geological data to determine if the Atlantic City 800-foot Sand extends updip northwest of the pinchout of the confining clay. If the Atlantic City 800-foot Sand extended up dip past the pinchout of the overlying and confining clay, it would become a portion of the Kirkwood-Cohansey aquifer system (Zapecza, 1984).

The Atlantic City 800-foot Sand produces ground water from a thick section of coarse-grained quartz sand and gravel. This sand and gravel, which thickens downdip toward the southeast, reaches a maximum thickness of 200 feet in Cape May County (Zapecza, 1984). The thickness of the Atlantic City 800-foot Sand in the Atlantic City area is approximately 150 feet.

The Atlantic City 800-foot Sand aquifer is recharged updip and to the northwest of the Atlantic City area where the Kirkwood

SciTek

Zapecza, 1984.

Stratigraphic Cross Section for Ground Water Aquifers Along the Southeastern Coast of New Jersey That are in Close Proximity to the Base

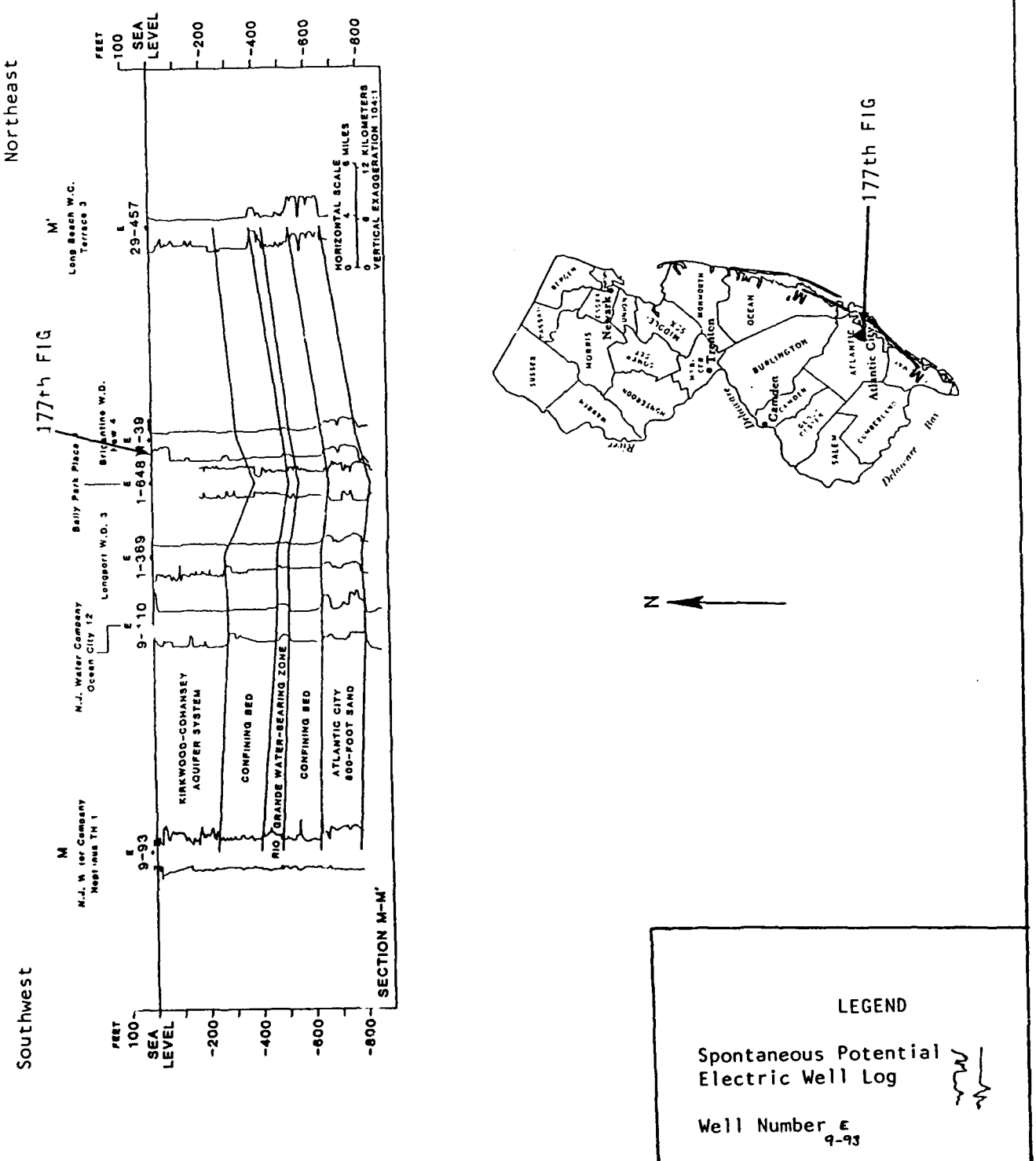

Figure III.8

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Soutce: Zapecza, 1984.

Areal Distribution of the Confining Clay Overlying the Atlantic City 800 Foot Sand Aquifer

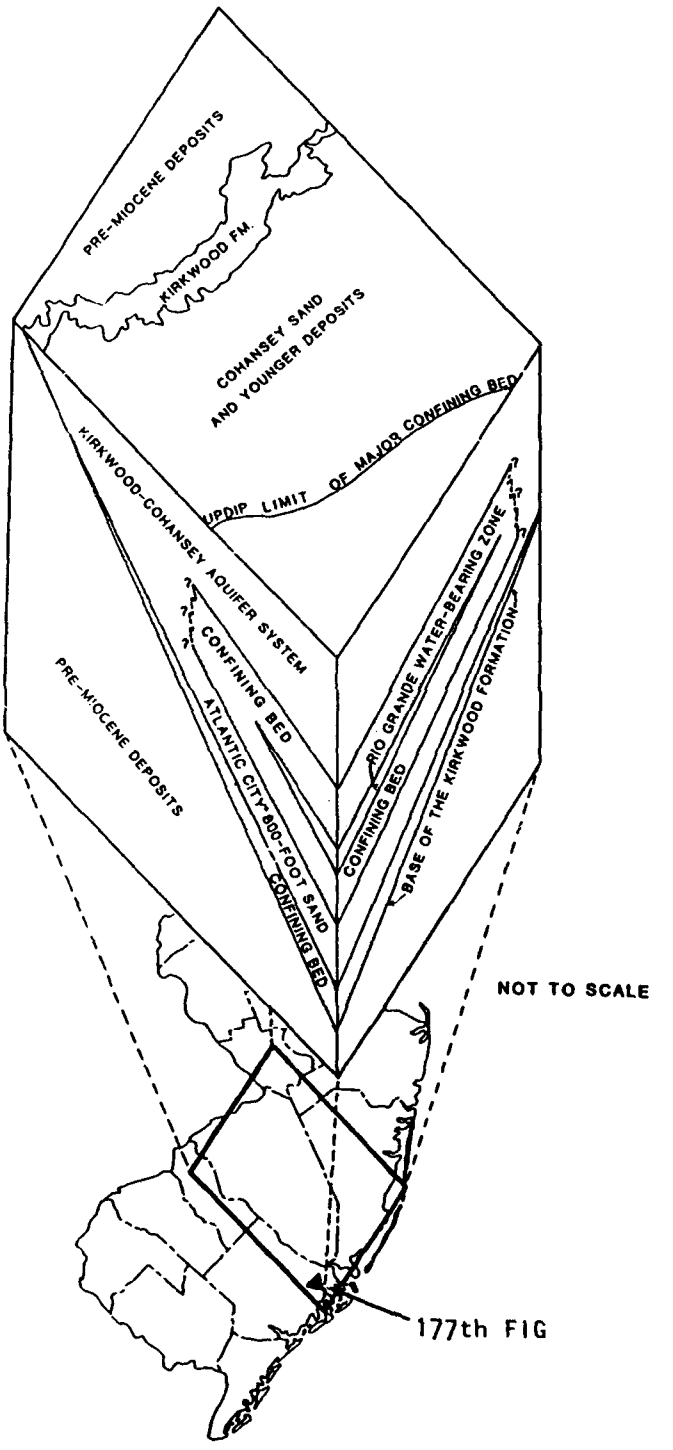

Figure III.9.

and Cohansey aquifers are a hydrologically connected water table aquifer. Also, this recharge occurs updip from the pinchout of the overlying, confining clay. Groundwater that occurs in the Atlantic City 800-foot Sand discharges into the Atlantic Ocean.

The principal groundwater source at the Base, the FAA facility, and in their immediate vicinity is the Miocene age Cohansey aquifer. As previously mentioned, the Cohansey and Kirkwood aquifers are regionally classified as a single water table aquifer that is hydrologically connected to the shallow water table (Zapecza, 1984). However, environmental, geological, and hydrological investigations at the FAA facility show that semiconfined hydrological conditions exist at the FAA Technical Center and in its immediate vicinity.

During these investigations, numerous borings and monitoring wells were drilled for the purpose of obtaining geological and hydrological information. These borings and monitoring wells, which were drilled to a maximum depth of 150 feet, penetrated three sections of sand and gravel that were separated by thinner clay layers (Gehl and Hankins, 1986). This stratigraphic sequence is illustrated in Figure III.10. The Lower Cohansey Sand and Upper Cohansey Sand are lithologically composed of fine to medium-grained quartz sand with occasional gravel layers. Sample analyses and geophysical logs indicate that the Lower, Middle, and Upper Cohansey Sands and the Lower Cohansey Clay are continuous across the FAA facility and the adjacent vicinity. However, the Upper Cohansey Clay is discontinuous and pinches out from one location to another (Roy F. Weston, Inc., 1984).

SciTek

Source: Gehl, Hawkins, 1986

Columnar Stratigraphic Section for the Cohansey Formation at the Base

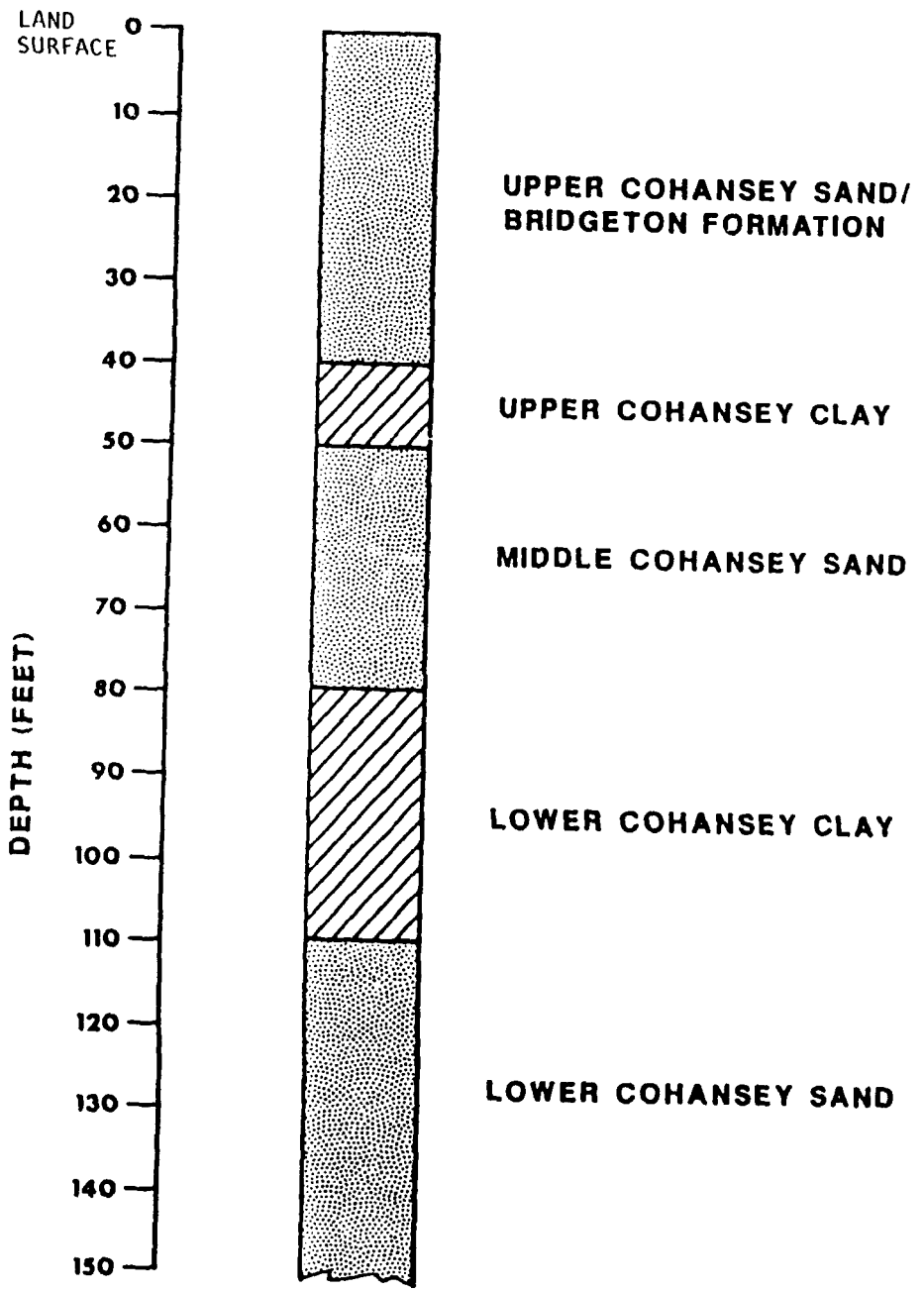

Figure III.10

Soil borings and monitoring wells drilled at the FAA facility penetrated the shallow water table at depths ranging from 3 to 23 feet below land surface (Gehl and Hankins, 1986). This shallow water table occurs in the unconfined sand of the Upper Cohansey. Isolated layers of clay or clay-silt resulted in localized, perched water tables. In general, groundwater flow in the Upper Cohansey Sand or shallow water table will follow the surface topographic landscape (Gehl and Hankins, 1986). The shallow groundwater that underlies the Base will probably flow to the south - southeast and discharge into the South Branch of Absecon Creek.

During the investigations at the FAA facility, hydrological tests were conducted at some of the deeper monitoring wells to obtain hydrological information about the Lower Cohansey Sand. The Lower Cohansey Sand in the vicinity of the Base and the FAA facility is penetrated at a depth of 150 feet below land surface. The Lower Cohansey Sand's transmissivity (T) and hydraulic conductivity (K) were obtained by pump tests. The average transmissivity was 49,200 gallons per day per foot (gpd/ft). This transmissivity yields a hydraulic conductivity of 1-7 X 10^{-3} feet per second (ft/sec) (Roy F. Weston, Inc., 1984). These pump tests indicated that pumping the Lower Cohansey aquifer had little effect upon water levels in the shallow water table.

In addition, hydrological tests were conducted throughout the FAA facility to evaluate the hydrological properties of the shallow water table aquifer. These hydrological tests included the aquifer velocity, gradient, hydraulic conductivity, and porosity. The results of these tests, which were conducted at five sampling locations, are included in Table III.3 (Roy F. Weston, Inc., 1984: 7-5).

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Source: Roy F. Weston, 1984.

Hydrological Properties of the Cohansey Water Table Aquifer at the Base and FAA Facility

FLOW DIRECTION	VELOCITY[1] (Ft./yr.)	GRADIENT	HYDRAULIC COND. (Ft./sec.)	AVERAGE POROSITY
SOUTHWEST	90	7.0×10^{-3}	1.22×10^{-4}	30
NORTH	64	7.1×10^{-4}	1.00×10^{-3}	35
SOUTHEAST	117	1.3×10^{-3}	1.00×10^{-3}	35
SOUTHEAST (see sec. 7-4)	47	8.7×10^{-3}	6.78×10^{-5}	40
NORTHEAST	30	3.8×10^{-3}	1.0×10^{-4} *	40

* = The hydraulic conductivity for Site 20A was estimated from comparisons of geologic logs and conductivities from Sites 27 and 29.

[1] = The velocities and gradients given are estimated velocities and gradients under natural, non-pumping conditions.

Table III.3

The entire Cohansey aquifer is regionally recharged by the percolation of surface water into the water table aquifer. Regionally, the shallow water table aquifer is hydrologically connected to deeper groundwater intervals in the Cohansey formation. As previously mentioned, semi-confined aquifer conditions exist at the Base and FAA facility. The Middle Cohansey Clay acts as an aquiclude preventing hydrological communication between the shallow water table and the Lower Cohansey aquifer. However, this Middle Cohansey Clay is not present over a large regional area. Therefore, the Cohansey aquifer is recharged updip and off-site by the percolation of surface water in an area where the Middle Cohansey is pinched-out and not present. Groundwater within the Lower Cohansey aquifer migrates downgradient to the east and discharges into the Atlantic Ocean.

Correspondence with the State of New Jersey, Department of Water Allocations, indicated that groundwater is a major source of potable water on the Base and FAA facility and in their immediate vicinity. As illustrated in Figure III.11, numerous potable water wells have been drilled in the immediate vicinity of the Base. Research of well records available at the State of New Jersey, Department of Water Allocations, indicates that each of these wells produces groundwater from the Cohansey aquifer. These wells tap both the Lower Cohansey Sand and the Middle Cohansey Sand. The Middle Cohansey Sand is penetrated at depths ranging from 80 to 90 feet below land surface. This interval is primarily tapped for domestic consumption. The yield for potable water wells which tap the Middle Cohansey Sand ranges from 10-200 gallons per minute (gpm). The yield for individual wells is affected by pump size, formation permeability, and sand thickness.

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Potable Water Wells at the Base and Immediate Vicinity

Source: U.S.G.S. 7.5 Minute Quad. Pleasantville, Photorevised 1972.

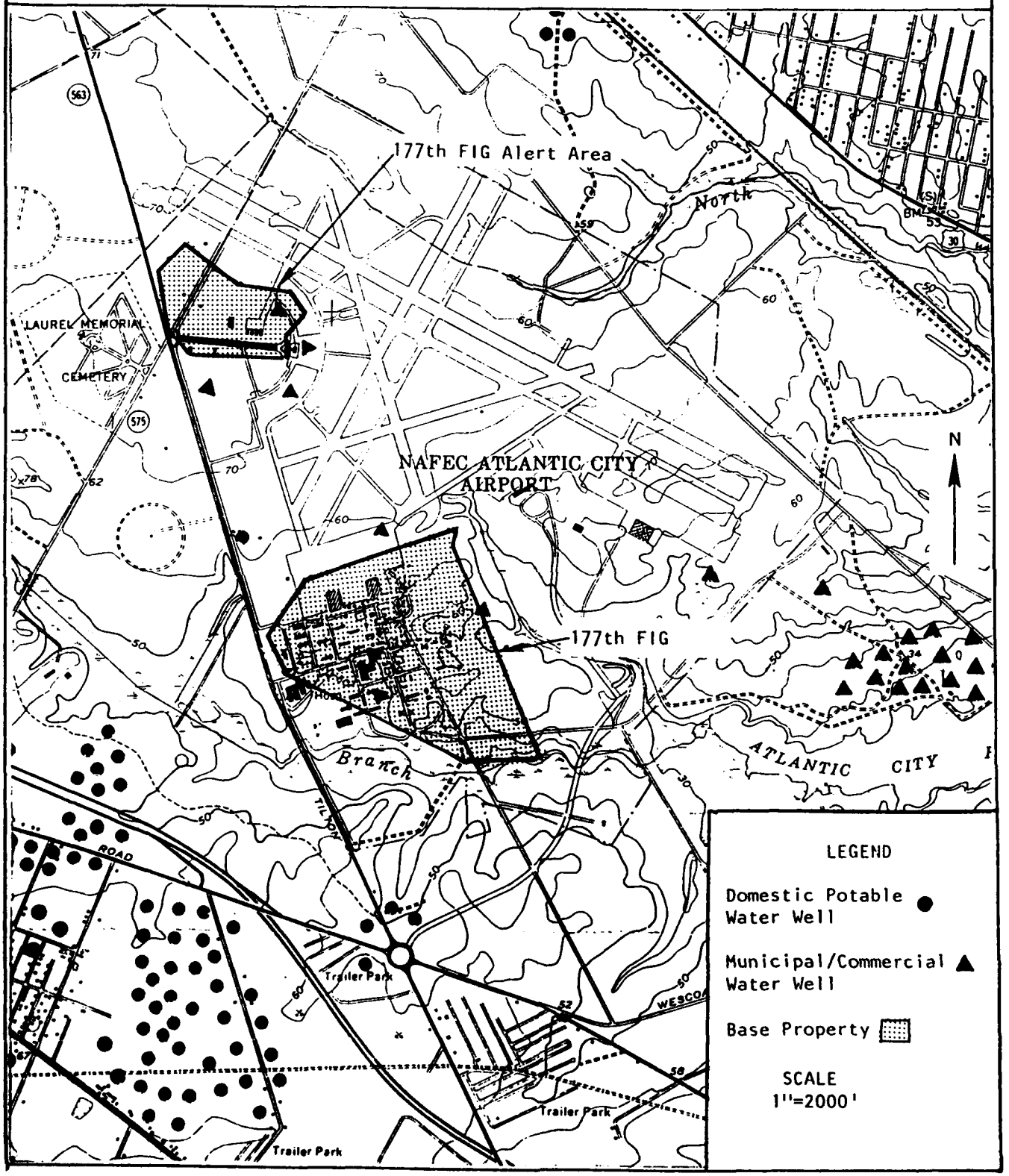

Figure III.11

The Lower Cohansey Sand is penetrated at depths of 150 to 200 feet below the land surface. This interval is tapped primarily as a source of municipal and commercial potable water. Within the immediate vicinity of the Base, the Lower Cohansey is tapped by the Atlantic City Water Well Field, located approximately 2 miles southeast of the Base, and the FAA Technical Center. The yield for water wells that tap into the Lower Cohansey Sand ranges from 1500 - 2000 gpm.

The potable water supply for the Base is purchased from the FAA. The FAA obtains its potable water from water wells that tap the Lower Cohansey Sand. Potable water that is sold to the Base is pumped from three wells on the Main Base. Each of these wells is approximately 150 feet deep and taps the Lower Cohansey Sand.

Groundwater samples have been collected from the Cohansey-Kirkwood aquifer system and analyzed for water quality. These samples were analytically tested for concentrations of dissolved solids, hardness, iron, nitrate, and sulfate. Numerous samples were analyzed to determine a range in concentration for each of these constituents. The range in concentrations for these constituents is illustrated in Table III.4.

The Cohansey and Kirkwood groundwater is naturally acidic with a pH of 5.2. Its alkalinity is medium with a concentration of 3 milligrams per Liter (mg/l) (Ayers and Pustay, 1988).

The shallow, unconfined water table aquifers, which concentrate in the soil overburden and the Upper Cohansey Sand, are the most susceptible to groundwater contamination from surface pollutants. This groundwater contamination has potential to occur because the shallow water table aquifer is recharged by the vertical migration of surface water

SciTek

Source: Ayers, Pustay, 1986.

Water Quality of the Cohansey Aquifer

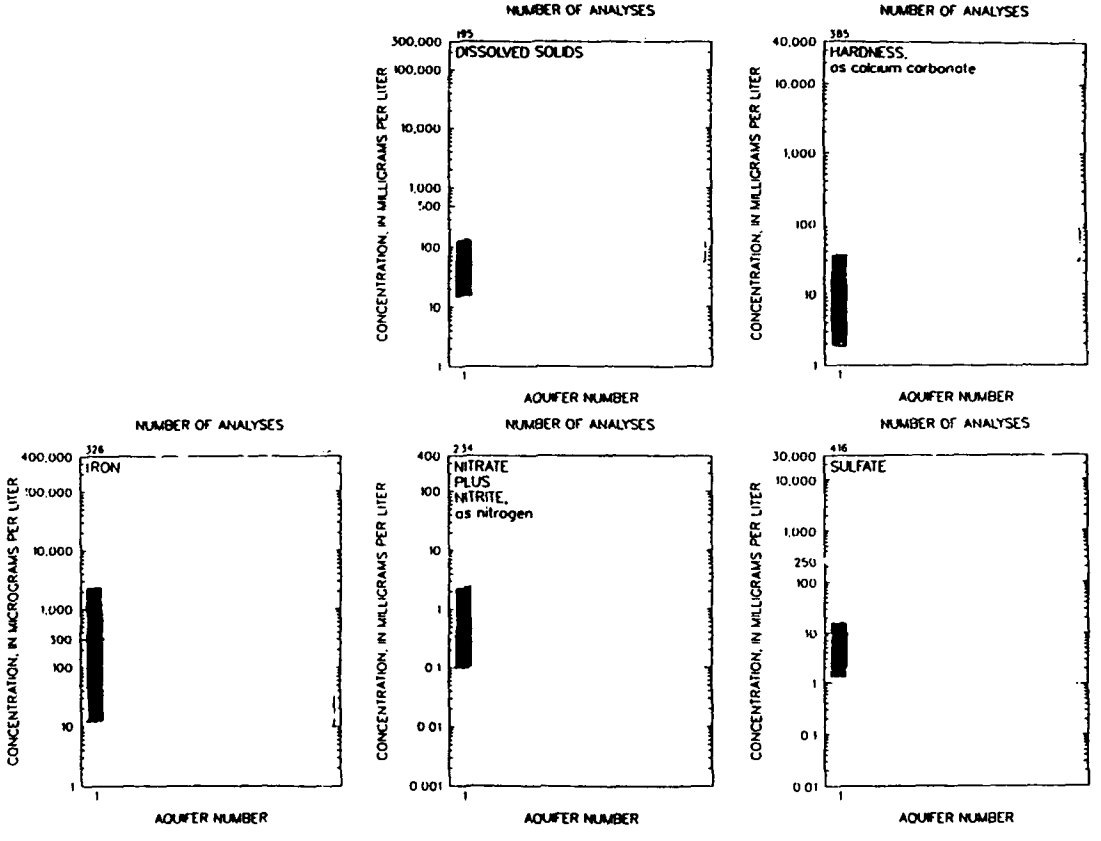

Table III.4

derived from seasonal precipitation. Also, the highly permeable soils at the Base create an available pathway for the migration of potentially contaminated surface water. Pump tests of the Lower Cohansey aquifer indicated that this aquifer is not hydrologically connected to the shallow water table and therefore is not at risk to become contaminated by contaminants released upon the land surface. However, the Lower Cohansey aquifer has potential to become contaminated in areas downgradient from the Base and FAA facility where the Lower Cohansey Clay has been pinched out. In these areas, the entire Cohansey aquifer is hydrologically connected to the shallow water table.

IV. SITE EVALUATION

A. Activity Review

The review of Base records and interviews identified specific operations in which the majority of hazardous materials and/or hazardous wastes are used, stored, processed, and disposed. Table IV.1 summarizes the major operations associated with each activity. If an item is not listed in the table on a best-estimate basis, that activity or operation produces negligible (less than 5 gallon/year) waste requiring disposal.

The building numbers and identifications for individual facilities throughout the Base are shown on Table IV.2. Data on all underground storage tanks are shown in Appendix E. Table E.1 contains information concerning underground fuel storage tanks. Information about oil/water (o/w) separators and waste oil tanks is presented in Table E.2. Table E.3 contains information on miscellaneous underground tanks at the Base. These tank locations are shown on maps in Appendix E.

The potable water supply is provided by a well field located on the Main Base. These wells provide potable water for the Federal Aviation Administration (FAA) as well. The Atlantic County Division of Public Health samples and performs analyses of the water supply quarterly. There are also wells located in the Alert Area which provide water to facilities in the Alert Area.

Sanitary waste from the Main Base is piped to a nearby sewage treatment plant owned and operated by the FAA. Sanitary waste from the Alert Area is disposed of in septic tanks.

B. Disposal/Spill Site Information, Evaluation, and Hazard Assessment

Twenty-one current Base personnel and three retirees from the Atlantic City Naval Air Station were formally interviewed to identify

Table IV.1

Hazardous Material/Hazardous Waste Disposal Summary
New Jersey Air National Guard

Bldg. No.	Activities/ Maintenance Operations	Possible Hazardous Material	Estimated Quantity Generated (gal/yr)	Waste Disposition 1960	1970	1980	1988	1989
242	Aircraft Maintenance	Trichloroethane	20	UNK	CONT	NLU		NLU
		Carbon Cleaner	40	CONT			DRMO	DRMO
	Maintenance Dock	JP-4	2000	FTA		CONT	DRMO	DRMO
		Varsol	1200	CONT			NLU	NLU
	Fuel Systems	PD-680	200	UNK	CONT		DRMO	DRMO
		Wheel Bearing Stripper	300	CONT			DRMO	DRMO
	Corrosion Control	PD-680	50	FTA		CONT	DRMO	DRMO
		Thinners	65	FTA		CONT	DRMO	DRMO
		Paint Strippers	25	CONT			DRMO	DRMO
		Lacquer	25	CONT			DRMO	DRMO
		Polyurethane Paint	60	FTA		CONT	DRMO	DRMO
		Dry Cleaning Solvent	1155	UNK	CONT		DRMO	DRMO
		Cleaning Compound	330	NU			DRMO	DRMO
		Methyl Ethyl Ketone	55	UNK	CONT		DRMO	DRMO
246	Maintenance Dock	Synthetic Turbine Oil	400	FTA		CONT	DRMO	DRMO
		Hydraulic Oil	10	CONT			DRMO	DRMO
441	Composite Maintenance	Cleaning Compound	800	NU			SAN	SAN
		Synthetic Turbine Oil	360	FTA		CONT	DRMO	DRMO
	Aircraft Hangar	Hydraulic Oil	3	REC				REC
441	Engine Shop	PD-680	200	FTA	REC			REC
		Trichloroethane	2	PROC				PROC
		Methyl Ethyl Ketone	1	PROC				PROC
		Hydraulic Oil	3	REC				REC
		Cleaning Compound	100	STDR	SAN			SAN
		Monomethyl Hydrazine	55	NU		PROC		PROC
	Non Destructive Inspection	Methyl Ethyl Ketone	2	PROC				PROC
		Methyl Isobutyl Ketone	25	PROC		NLU		NLU
		Penetrant	10	STDR	SAN			SAN
		Emulsifier	50	STDR	SAN		DRMO	DRMO
		Developer	1	PROC				PROC
		Kerosene	5	FTA	CONT		DRMO	DRMO
		Trichloroethane	20	FTA	PROC			PROC

Table IV.1 (continued)

Hazardous Material/Hazardous Waste Disposal Summary
New Jersey Air National Guard

Bldg. No.	Activities/ Maintenance Operations	Possible Hazardous Material	Estimated Quantity Generated (gal/yr)	Waste Disposition 1960	1970	1980	1988	1989
248	Aerospace Ground Equipment	Engine Oil	500	FTA		CONT	DRMO	DRMO
		Hydraulic Oil	900	CONT			DRMO	DRMO
		Paint Strippers/Thinners	20	CONT			DRMO	DRMO
		Turbine Oil	75	CONT			DRMO	DRMO
		Gasoline	100	FTA		CONT	DRMO	DRMO
		Battery Acid	50	NSAN				NSAN
		Lubricating Oil	10	FTA		CONT	DRMO	DRMO
		Trichloroethylene	4	FTA	NLU			NLU
		Varsol	500	CONT			DRMO	DRMO
65	Vehicle Maintenance	Engine Oil	1200	CONT			DRMO	DRMO
		PD-680	170	STDR	CONT		DRMO	DRMO
		Sulfuric Acid	60	NSAN				NSAN
		JP-4	2500	GRND		REC		REC
		Ethylene Glycol	250	SAN			DRMO	DRMO
		Transmission Fluid	20	CONT			DRMO	DRMO
		Paint Thinner	15	GRND	CONT		DRMO	DRMO
		Brake Fluid	4	CONT				CONT
		Diesel Fuel	10	CONT			DRMO	DRMO
		Varsol	200	STDR	SAN		DRMO	DRMO
		Methyl Ethyl Ketone	10	GRND	CONT		DRMO	DRMO
	Weapons Maintenance	Rifle Bore Cleaner	1	CONT				CONT
		Trichloroethylene	10	CONT				CONT
		PD-680	50	FTA		CONT		CONT
		Toluene	2	CONT		NLU		
		Brake Fluid	1	FTA	CONT		DRMO	DRMO
35	Battery Shop	Sulfuric Acid	180	NSAN		BNP		BNP
		Inhibisol	15	SAN		BNP		BNP

Table IV.1 (continued)

Hazardous Material/Hazardous Waste Disposal Summary
New Jersey Air National Guard

Acronyms

BNP - Building no longer present.
CONT - Disposed of by contractor.
DRMO - Disposed of through Defense Reutilization and Marketing Office.
FTA - Disposed of at Fire Training Area.
GRND - Disposed of on the ground.
NLU - No longer used.
NSAN - Neutralized and disposed of in drains leading to sanitary sewer system.
NU - Material is not used at this time.
PROC - Material used in process (i.e. evaporation)
REC - Material is recycled.
SAN - Disposed of in drain leading to sanitary sewer system.
STDR - Disposed of in drain leading to storm sewer system.
UNK - Disposal method is unknown.

TABLE IV.2

BUILDING NUMBER AND IDENTIFICATION LIST

BUILDING NUMBER	BUILDING IDENTIFICATION
30	EXCHANGE SALES STORE
36	SHOP AIRCRAFT GENERAL PURPOSE
40	STEAM FACILITY BUILDING
52	MOBILITY WAREHOUSE
65	VEHICLE MAINTENANCE SHOP
99	HAZARD STORAGE BASE
116	BASE ENGINEERING MAINTENANCE SHOP
121	BULK STORAGE BASE
127	BASE ENGINEERING MAINTENANCE SHOP
137	AUDIO VISUAL/RECRUIT/DISASTER PREPAREDNESS
138	APRON
182	BASE ENGINEERING MAINTENANCE SHOP
225	FIRE STATION
227	SHED, SUPPLY & EQUIPMENT BASE
229	SHOP, AIRCRAFT GENERAL PURPOSE
237	WATER FIRE PUMP STATION
238	FENCE, SECURITY
240	SHOP, ENGINE INSPECTION & REPAIR
241	SQUADRON OPERATIONS
242	FUEL CELL MAINTENANCE FACILITY
246	MAINTENANCE DOCK
248	SHOP AEROSPACE GROUND EQUIPMENT STORAGE FACILITY
249	MUNITIONS SYSTEM RELEASE
251	AIRCRAFT SHELTER
252	AIRCRAFT SHELTER
253	AIRCRAFT SHELTER
254	AIRCRAFT SHELTER
255	HEATING FACILITY BUILDING
256	CONSOLE AIRCRAFT MAINTENANCE
258	EXPLOSIVE ORDNANCE DETACHMENT
259	SHOP 20MM MUNITIONS
260	STORAGE, MU-CUB MAGAZINE
261	BUILDING WATER SUPPLY
262	SEC POL/TRANS DORM
263	SHOP BASE CIVIL ENGINEERING STORAGE FACILITY
264	HAZARDOUS STORAGE, BASE
265	STORAGE, LIQUID OXYGEN
266	SHOP, MISSILE ASSEMBLY
268	PAD, POWER CHECK WITH SUPPRESSOR
272	WAREHOUSE, SUPPLY & EQUIPMENT BASE
343	COVERED STORAGE, AEROSPACE GROUND EQUIPMENT
400	GROUP OPERATIONS/DINING HALL CLINIC
401	MAIN ENTRANCE - GATE NO. 1
440	AVIONICS
441	COMPOSITE A/C MAINTENANCE HANGAR
442	HUSH HOUSE

and locate potential sites that may have been contaminated as a result of past Base operations. Informal discussions pertinent to site identification were also held with Mr. Robert Heitsenrether, an environmental officer at the adjacent FAA Technical Center. Six potentially contaminated sites were identified through these interviews and discussions. The site identifications were followed-up by visual examinations in the field.

Each of these sites was rated by application of the United States Air Force (USAF) HARM (Appendix C), and since the potential for contaminant migration exists at these sites, each is recommended for further investigation under the IRP guidelines. Copies of completed HARM forms and an explanation of the factor rating criteria used for site scoring are contained in Appendix D. Locations for the six rated sites are provided on Figures IV.1 and IV.2.

The potential exists for contaminant migration at each of the six rated sites. Contaminants that may have been released at these sites have potential to be transported by groundwater and surface water migration. The seasonal high water table, which is three to twenty-three feet below ground surface, has the highest risk for groundwater contamination. If the shallow groundwater becomes contaminated by a hazardous substance release, then the deeper aquifers may also be contaminated by groundwater migration. Released contaminants that are exposed on the ground surface have the potential to be transported by surface water migration into the North and South Branches of Doughty's Mill Stream (Absecon Creek). Approximately 2-3 miles downstream from the Base, these bodies of surface water are dammed to form the Atlantic City Reservoir, a principal source of potable water for the residents of Pleasantville and the rest of the Atlantic City area. The upper reservoir is only one half mile northeast of the Base. The following subsections provide detailed descriptions of the six potential sites.

SciTek

Potential Sites on the Main Base

Source: Foster Wheeler USA Corp., 1986.

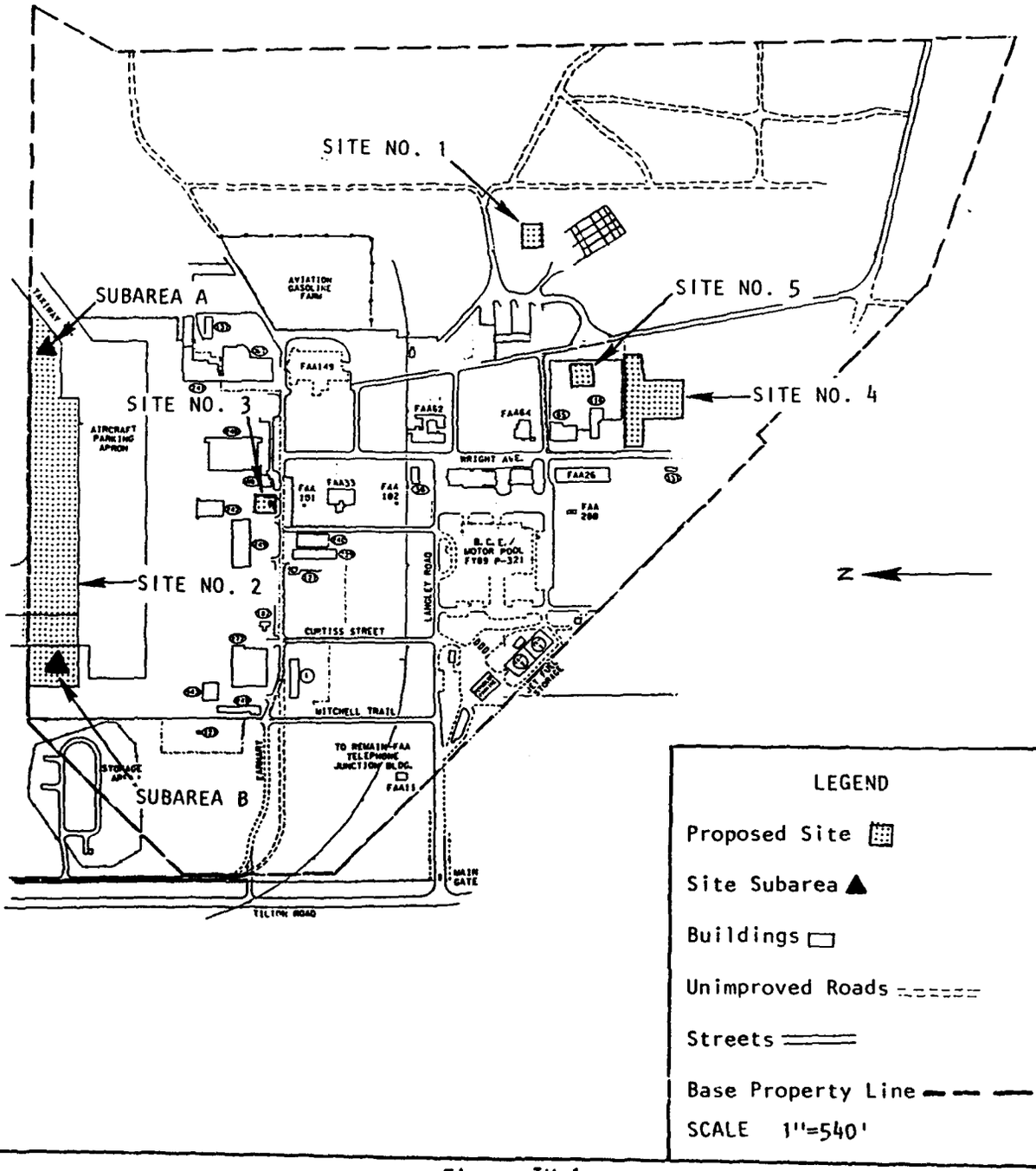

Figure IV.1.

SciTek

Source: Foster Wheeler USA Corp., 1986.

Potential Site at the Blast Pad
Near the Alert Area

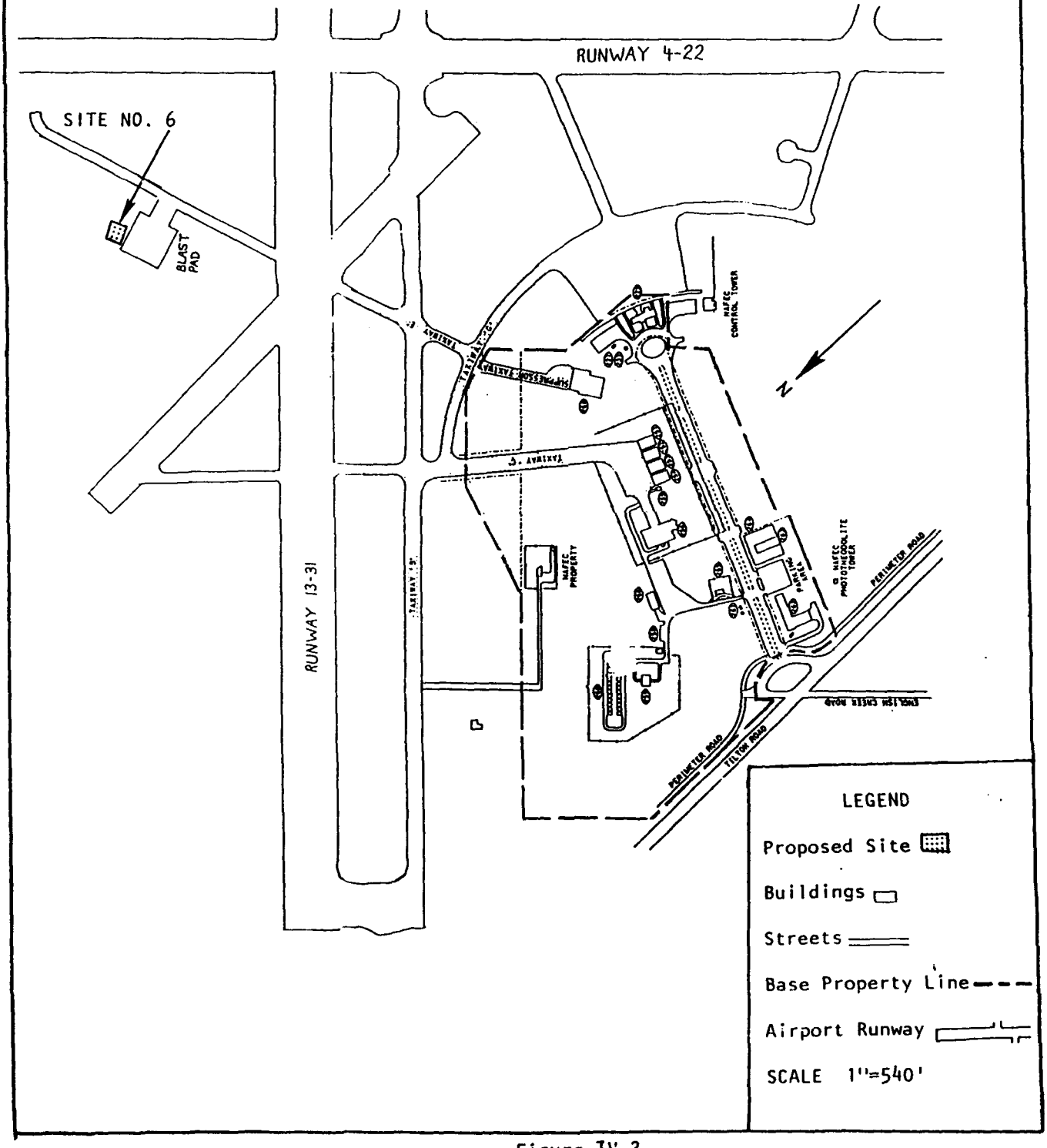

Figure IV.2

Site No. 1, Tanker Defueling Area (HAS-79)

Site No. 1 is a former JP-4 disposal area on the east side of the Main Base. The precise areal extent of this site is unknown, but it was located on the west bank of the drainage ditch that runs between the current small arms range and the now empty concrete coal bins. Figure IV.1 shows the approximate location of this site.

According to interviewees, JP-4 in tank trucks was drained directly onto the ground surface in this area. Because the ground surface sloped downwards to the drainage ditch, any fuel that did not soak into the ground ran into it. Such releases were prompted by the need to empty the trucks prior to repairing malfunctioning pumps or leaking tanks. Leaking tank trucks were often parked at this site while awaiting repair.

During the 1960s and until the 1980s, one tank truck's contents was drained approximately every three months. At that time, the Base used tank trucks with 2000-3000 gallon and 5000 gallon capacities. At the time of drainage, these tank trucks probably contained varying but relatively small quantities of JP-4 (50 - 200 gallons). However, one interviewee reported that some trucks were nearly full at the time of drainage. Another interviewee estimated that 500 - 1000 gallons of JP-4 per year was drained at this site by Base personnel. Dead grass had been observed in the area during the past.

Interviewees reported the draining of FAA tank trucks at this site during the same period. The contents of these tank trucks were 115/145 AVGAS. The quantity of fuel released by the FAA at this site is unknown, but interviewees were of the opinion that the FAA used this site more frequently than did the Base.

Given a 20+ year period of use by the Base and the draining of at least 500 gallons per year, more than 10,000 gallons of JP-4 may have contaminated the soil and/or shallow

groundwater at this site. Frequent dumping of AVGAS by the FAA would substantially increase the estimated quantity of hazardous material spilled at this site. For these reasons, a Hazard Assessment Score (HAS) was calculated for the site.

Site No. 2, Aircraft Defueling Areas (HAS-73)

This site consists of a 1300 foot long by 250 foot wide, rectangular strip of soil adjacent to the north perimeter of the concrete flight apron. Since a portion of the original apron has been removed, it should be noted that this strip begins about 120 ft. north of the current concrete apron. Within this strip of soil are two subareas designated as Subareas A and B (Figure IV.1). These subareas are emphasized in this site description because JP-4 is reported to have been defueled from aircraft onto the soil at these locations.

In flight line operations from 1965-1975, aircraft were normally defueled into tank trucks or bowsers. As a rule, all of this fuel could not be pumped from the aircraft. So, any residual fuel was regularly discharged to the soil in the subareas. There are also reports of JP-4 spills and dumping along the flightline near these areas. For example, between 1974 and 1976, more than 400 gallons of JP-4 were discharged into a section of grassy soil near Subarea B.

The precise quantity of JP-4 released at this site is unknown. However, based on interviewee reports of regular, intentional fuel dumping and incidental spills in this area over a number of years, a moderate quantity (more than 20 55-gallon drums) of JP-4 may have been released at this site and may have contaminated the soil and groundwater. Consequently, a HAS was calculated for the site.

Site No. 3, Old Aircraft Wash Rack (HAS-73)

This site is located on Earhart Drive immediately east of Building 36. An aircraft wash rack was in service at this location from 1942 - 1974. Throughout this period, it was the major focal point of aircraft cleaning for the Atlantic City Naval Air Station (1942 - 1958) and the Base (1958 - 1974). It was also an accumulation point and holding area for various oils and other hazardous materials. The site consists of the wash rack and the area immediately surrounding it (Figure IV.1).

A Naval Air Station retiree recalled the dumping of hydraulic oil and other oil at the wash rack. Some of this waste oil from Naval operations was poured down the wash rack drain and into the storm sewer system.

Holding tanks and drums containing waste hydraulic oil and other oils were present at the wash rack during the 1960s. They frequently leaked and/or overflowed leaving a heavily stained ground surface.

Detergents, gunk, Varsol, and perhaps other solvents were regularly used to clean aircraft. The Navy used hydraulic oil to polish aircraft at this rack, and the Base used 8 quarts of varsol or JP-4 per plane for warm weather cleaning during the 1970s. Cleaning of each aircraft was required every 15 - 30 days during warm weather. Since there was no rinse collection tank for the rack, these materials were regularly discharged to the storm sewer system.

Given thirty years of heavy wash rack use, the storage of waste oils and possibly solvents and JP-4 there, frequent use of these materials, and a long history of visually evident leaks and spills, a moderate quantity (more than 20 55-gallon drums) of hazardous materials may have migrated into the soil and shallow groundwater from this site. Consequently, a HAS was assessed for it.

Site No. 4, Transformer Storage Area(s) (HAS-69)

This site consists of the Atlantic City Naval Air Station's lumber yard, located approximately 100 feet south of Building 116 and an abandoned storage yard located immediately south of the lumber yard (Figure IV.1). These areas, identified and located by retired Naval/FAA personnel, have been classified as a single site because of their close proximity and the perception of a past functional relationship between them.

During the 1960s and 1970s, transformers were stored in the lumber yard. While in storage, these transformers rested on pallets.

The storage yard was in use from the 1960s until about 1985. During this time, it functioned as a storage facility for out-of-service transformers and other materials. Many of the transformers stored here were leaking dielectric fluid (possibly containing PCBs) when they were removed from service during the 1970s.

Paints, paint thinners, degreasing agents, and liquid materials packed in drums were also held in this storage yard. A number of the drums in this area had shown evidence of leaking.

During the period when this site was used, power demands changed frequently in response to various, often short-term activities. To meet these demands, transformers were constantly shifted back and forth between this site and service locations. One interviewee reported the storage of more than 20 transformers of various sizes in this area at one time.

Small quantities of highly toxic PCBs and other hazardous materials may have migrated into the soil and shallow groundwater from both subareas. Given this possibility, a HAS was assessed for the site.

Site No. 5, Liquid Waste Holding Area Behind Building 65 (HAS-73)

Site No. 5 is a waste oil/solvent holding area located within the fence behind Buildings 65 and 116 (Figure IV.1). The total storage area is approximately 30 feet square.

Building 65 became the Base's vehicle maintenance center in 1958. Since that time, waste engine oil, waste solvents such as Varsol, and waste penetrant have been stored at this site, primarily in drums. In the past, spilled material and rainwater-induced overflow from drums have stained a section of soil measuring approximately 10 feet square. Excavations for emplacing a concrete pad at the site cross-sectioned a portion of the stained area revealing oil permeation to a depth of at least 8 - 10 inches. In addition, relatively small quantities of JP-4 were defueled from tank trucks into the soil at this site.

A relatively small quantity of waste oil and solvents from this site have contaminated the soil and may have contaminated groundwater. The same may be true of JP-4. Consequently, a HAS was calculated for this site.

Site No. 6, Drum Burials at Blast Pad in Alert Area (HAS-64)

A blast pad is located in the Alert Area on FAA property outside the Base boundaries (Figure IV.2), but this pad is used almost exclusively by the Base. At least one partially buried 55 gallon drum has been located in soil around the blast pad. This drum contains an unknown liquid material.

Whether or not this drum is leaking hazardous materials is unknown. However, given the presence of a buried drum, indeterminate drum contents, and the possibility of more buried drums at this site, there is a potential for soil and groundwater contamination. For the purpose of calculating a HAS, a small quantity

of hazardous material is assumed to have leaked from the drums.

C. Critical Habitats/Endangered or Threatened Species

The New Jersey Natural Heritage Program maintains the New Jersey Natural Heritage Database, which stores information on rare plant and animal species and natural communities that have been identified in various areas of the state. This database contains information on nine rare floral and faunal species that are possibly on or within one mile of the Base. The identification of a member or members of these species within this area has been verified and is indicative of significant habitat. A tabulation of these species, their listing statuses (e.g., endangered, threatened, etc.), and additional key information is provided on Table IV.3.

In addition to this information, the New Jersey Natural Heritage Program has records of *Melanerpes erythrocephalus* (Red-headed Woodpecker) occurrences just outside of the one mile study radius designated for this study by the HARM. A rookery for *Ardea herodias* (Great Blue Heron) may also occur just outside of the study boundary. Both of these occurrences are within 1-2 miles of the Base boundaries.

A large number of additional threatened and endangered vertebrate species may potentially be found in Atlantic County, New Jersey. If suitable habitats for these species occur within a one mile radius of the Base, representatives of these species may also be present. However, positive identification of these critical habitats and any rare species that depend upon them would require extensive biological/ecological field investigations that are beyond the scope of this records search. An additional listing of potential threatened and endangered vertebrate species in Atlantic County, listing status, and information on habitats is provided in Appendix I. This list also includes additional information on some

TABLE IV.3

POSSIBLY ON, OR WITHIN ONE MILE, OF 177TH FIGHTER INTERCEPTOR GROUP IN ATLANTIC COUNTY

RARE SPECIES AND NATURAL COMMUNITIES PRESENTLY RECORDED IN THE NEW JERSEY NATURAL HERITAGE DATABASE

NAME	COMMON NAME	FEDERAL STATUS	STATE STATUS	GRANK	SRANK	DATE OBSERVED	IDENTIFICATION	LOCATION
AMMODRAMUS SAVANNARUM	GRASSHOPPER SPARROW		LT	G4	S3	1987-SUMMR	Y	ATLANTIC CITY AIRPORT, EGG HARBOR TWP.
BARTRAMIA LONGICAUDA	UPLAND SANDPIPER		LE	G5	S1	1987-06-??	Y	NAFEC, ATLANTIC COUNTY,
CALAMOVILFA BREVIPILIS	PINE BARREN REEDGRASS	C2	LP	G3	S3	1938-07-27	Y	ATLANTIC CITY AIRPORT. HEAD OF ABSECON CREEK CA. 2 MI E. OF MCKEE CITY.
GENTIANA AUTUMNALIS	PINE BARREN GENTIAN	3C	LP	G3	S3	1938-09-04	Y	HEAD OF ABSECON CREEK CA. 2 MI. E. OF MCKEE CITY.
GNAPHALIUM HELLERI	HELLER'S EVERLASTING			G4G5	SH	1937-01-31	Y	CA. 1 MI. S. OF POMONA.
POOECETES GRAMINEUS	VESPER SPARROW		LE	G5	S2	1980-??-??	Y	NAFEC, ATLANTIC CO.
RHYNCHOSPORA PALLIDA	PALE BEAK RUSH			G2G3	S3	1938-07-27	Y	HEAD OF ABSECON CREEK CA. 2 MI. E. OF MCKEE CITY.
ARDEA HERODIAS	GREAT BLUE HERON		LT	G5	S2	1984-??-??	Y	POMONA, JUST NORTH OF JIM LEEDS ROAD AND WEST OF RT. 575, GALLOWAY TWP.
MELANERPES ERYTHROCEPHALUS	RED-HEADED WOODPECKER		LT	G5	S3	1976-SUMMR		POMONA, GALLOWAY TWP.

NOTE: The meanings of the alphabetic and alphanumeric symbols shown on this table are too extensive and involved to attach directly to the table. For this reason and because of publication restrictions imposed by the New Jersey Natural Heritage Program, this information is presented in Appendix I.

vertebrate species that have been identified within one mile of the Base.

Portions of the North and South Branches of Absecon Creek, all of a small, unnamed tributary of the South Branch of Absecon Creek, and the southern portion of the Atlantic City Reservoir are located within one mile of the Base boundaries. Tiner (1984) has identified and classified wetland areas along each of these surface water bodies.

The most extensive and classificatorily diverse wetlands are located along the South Branch of Abescon Creek and in the area where it empties into the Atlantic City Reservoir. This stream and its accompanying wetland areas closely parallel the south boundary of the Main Base. A portion of these wetlands may be located within the Base perimeter at the extreme southeast corner of the Main Base.

Wetland classifications for these areas follow the wetland definition and classification system (Cowardin et al, 1979) used by the U.S. Fish and Wildlife Service. These classifications are largely based on water regimes and plant communities. Using this system, the numerically predominant wetland types in the South Branch of Absecon Creek/Atlantic City Reservoir are PFO1 [Palustrine (P), Forested Wetland (FO), Broad-leaved Deciduous (1)] and PFO1/4 [Palustrine (P), Forested Wetland (FO), Broad-leaved Deciduous (1)/Needle-leaved Evergreen (4)] (Tiner, 1984).

Downstream from the Atlantic City Reservoir, Absecon Creek flows east into the major wetlands along the coast. Brigantine National Wildlife Refuge is situated 5.75 miles northeast of the Base in this major wetland area.

From Naval Air Station days until the present time, most of the surface water runoff from the Base has discharged into the South Branch of Absecon Creek and its unnamed tributary. From here it flowed into the Atlantic City

Reservoir, the main body of Absecon Creek, and into the Atlantic Ocean. Similarly, the shallow groundwater at the Base drains to these streams and recharges them. Given these two pathways, there has been and continues to be a potential for contaminant migration into these streams and transport to points downstream. This presents the possibility of transported hazardous material impacts on adjacent wetland habitats and any endangered/threatened species (e.g. *Ardea herodias*) that may depend upon them.

D. Other Pertinent Facts

- The Spill Prevention, Control, and Countermeasures Plan is coordinated by the Base Civil Engineer.
- Trash and non-hazardous solid waste are disposed of by an outside contractor.
- Number 2 Fuel Oil is the primary heating fuel at the Base.
- The Base has investigated the presence of polychlorinated biphenyls (PCBs). Transformer oils and cooling oil from an F-106 magnetron were tested. No detectable PCBs were found in the samples tested.
- All oil/water (o/w) separators are connected to the sanitary sewer system. The waste oil holding tanks for the o/w separators are pumped by a contractor as needed.
- Information on environmental monitoring is presented in Appendix F.
- The Base property was a former location for the Atlantic City Naval Air Station (1942 - 1958).
- Pest management services are provided by a contractor. Pesticides used at the Base are shown in Appendix H.

- Within the Main Base boundaries, FAA contractors (TRC Environmental Consultants and Roy F. Weston, Inc.) are currently involved in performing Remedial Investigations/Feasibility Studies (RI/FS) at five previously identified sites that are known to be or are suspected of being contaminated by hazardous materials. These areas; designated as Sites 41, E, G, H, and L; are located and discussed in Hankin et al (1988 a and b).

- Rinse from the current wash rack in Building 242 was collected in an UST from about 1974 until 1988. In 1988 this tank was filled with concrete. The rinse now passes through an o/w separator and into the sanitary sewer system.

V. CONCLUSIONS

Information obtained through interviews with Base personnel and Naval retirees, reviews of records, and field observations were used to identify possible spill/disposal sites on the Base property. A total of six potential sites where contaminants may exist were identified.

The following six potential sites exhibit the potential for contaminant migration through surface water and/or shallow groundwater:

Site No. 1 - Tanker Defueling Area (HAS - 79)
Site No. 2 - Aircraft Defueling Area (HAS - 73)
Site No. 3 - Old Aircraft Wash Rack (HAS - 73)
Site No. 4 - Transformer Storage Area(s) (HAS - 69)
Site No. 5 - Liquid Waste Holding Area Behind Building 65 (HAS - 73)
Site No. 6 - Drum Burials at Blast Pad in Alert Area (HAS - 64)

VI. RECOMMENDATIONS

The Preliminary Assessment identified six potential sites where contaminants may exist. As a result, additional work under the Installation Restoration Program (IRP) is recommended.

GLOSSARY OF TERMS

AQUICLUDE - A saturated geologic unit incapable of transmitting significant quantities of water under ordinary hydraulic gradient. (FC)*

AQUIFER - Stratum or zone below the surface of the earth capable of producing water as from a well. (DGT)*

COASTAL PLAIN - Any plain which has its margin on the shore of a large body of water, particularly the sea, and generally represents a strip of recently emerged sea bottom. (DGT)*

CONTAMINANT - Includes, but is not limited to any element, substance, compound, or mixture, including disease-causing agents, which after release into the environment and upon exposure, ingestion, inhalation, or assimilation into any organism, either directly from the environment or indirectly by ingestion through food chains, will or may reasonably be anticipated to cause death, disease, behavioral abnormalities, cancer, genetic mutation, physiological malfunctions (including malfunctions in reproduction), or physical deformations in such organisms or their offsprings, except that the term "contaminant" shall not include petroleum, including crude oil or any fraction thereof which is not otherwise specifically listed or designated as a hazardous substance under:

(a) any substance designated pursuant to Section 311(b)(2)(A) of the Federal Water Pollution Control Act,

(b) any element, compound, mixture, solution, or substance designated pursuant to Section 102 of this Act,

(c) any hazardous waste having the characteristics identified under or listed pursuant to Section 3001 of the Solid Waste Disposal Act (but not including any waste the regulation of which under the Solid Waste Disposal Act has been suspended by Act of Congress).

(d) any toxic pollutant listed under Section 307(a) of the Federal Water Pollution Control Act,

(e) any hazardous air pollutant listed under Section 112 of the Clean Air Act, and

(f) any imminently hazardous chemical substance or mixture with respect to which the Administrator has taken action pursuant to Section 7 of the Toxic Substance Control Act and shall not include natural gas of pipeline quality or mixtures of natural gas and such synthetic gas.

NOTE: Petroleum products are covered in other regulations. Wastes from petroleum products do not become RCRA hazardous wastes unless they fall under any of the USEPA guidelines for identifying Hazardous wastes:

(1) Listed hazardous wastes from certain specific and non-specific sources.

(2) Listed acutely hazardous wastes.

(3) Listed wastes that contain materials and products based on the criteria for toxicity.

(4) Wastes that meet any of four characteristics of hazardous waste - i.e. ignitability, reactivity, corrosivity, and extraction procedure toxicity (EP toxicity). (SARA)*

CONTAMINATION - The existence of biological, radiological, chemical, or other substances which have been identified as or may present a hazard to health or may render some portion of the environment unsuitable for use.

CRETACEOUS - The third and latest of the periods included in the Mesozoic Era, also the system of strata deposited in the Cretaceous Period. (DGT)*

CRITICAL HABITAT - For a threatened or endangered species, the geographical area occupied by a species on which are found those physical or biological features that are essential to the conservation of the species and which may require special management considerations or protection. Also, specific areas outside the geographical area occupied by the species at the time it is listed (Section 4 of the Endangered Species Act), upon determination by the Secretary of the Interior that such areas are essential for the conservation of the species. (ESA)*

CRYSTALLINE BASEMENT COMPLEX - A series of crystalline rocks, generally with complex structure, beneath the dominantly sedimentary rocks. In many places, they are igneous and metamorphic rocks of either Early of Late Precambrian, but in some places may be much younger, as Paleozoic, Mesozoic, or even Cenozoic. (DGT)*

DELTAIC COMPLEX - A sequence of sedimentary rocks that were deposited in a system of terrestrial river deltas; characteristic sedimentary structures include lenticular river channels, bars, etc.

DOWNGRADIENT - The downslope flow of groundwater.

ENDANGERED SPECIES - Any species which is in danger of extinction throughout all or a significant portion of its range other than a species of the Class Insecta as determined by the Secretary of the Interior to constitute a pest whose protection under the Endangered Species Act would present an overwhelming and overriding risk to man. (ESA)*

EOCENE - Second epoch of the Tertiary Period; Paleocene below and Oligocene above; also the series of strata deposited during that epoch. (DGT)*

FACIES - General appearance or nature of one part of a rock body as contrasted with other parts. (DGT)*

FALL LINE - Line of demarcation that separates the flat Coastal Plain Physiographic Province from adjacent upland provinces.

FORMATION - The primary unit of formal mapping or description. Most formations possess certain distinctive or combinations of distinctive lithic features. Boundaries are not based on time criteria. Formations may be combined into groups or subdivided into members. (DGT)*

GLAUCONITE - A green mineral, closely related to the micas and essentially a hydrous potassium iron silicate. Commonly occurs in sedimentary rocks of marine origin. Also used as a name for a rock of high glauconite content. (DGT)*

GRABEN FAULT - A fracture or fracture zone involving relative displacement of the sides parallel to the fracture line and downthrust blocks.

GROUNDWATER - That part of the subsurface water which is the zone of saturation. (DGT)*

HAZARD ASSESSMENT RATING METHODOLOGY (HARM) - A system adopted and used by the United States Air Force to develop and maintain a priority listing of potentially contaminated sites on installations and facilities for remedial action based on potential hazard to public health and environmental impacts. (DEQPPM)*

HAZARD ASSESSMENT SCORE (HAS)- The score yielded by using the Hazard Assessment Rating Methodology.

HAZARDOUS WASTE - A solid waste, or combination of solid wastes, which because of its quantity, concentration, or physical, chemical, or infectious characteristics may -

(a) cause, or significantly contribute to an increase in mortality or an increase in serious irreversible, or incapacitating reversible, illness; or

(b) pose a substantial present or potential hazard to human health or the environment when improperly treated, stored, transported, or disposed of, or otherwise managed. (RCRA)*

HOLOCENE - Recent; that period of time (an epoch) since the last ice age (Wisconsin in America; Wurm in Europe); also the series of strata deposited during that epoch. (DGT)*

HYDRAULIC CONDUCTIVITY - Ratio of flow velocity to driving force for viscous flow under saturated conditions of a specified liquid in a porous medium. (DGT)*

INSTALLATION RESTORATION PROGRAM (IRP) - The DoD program for identifying the location of and releases of hazardous materials from past disposal sites and minimizing their associated hazards to public health.

LENTICULAR - Shaped approximately like a double convex lens. When a mass of rock thins out from the center to a thin edge all around, it is said to be lenticular in form. (DGT)*

LITHOLOGY - The physical character of a rock, generally as determined megascopically or with the aid of a low-power magnifier. (DGT)*

LOAM - A soil composed of a mixture of clay, silt, and organic matter. (DGT)*

MIGRATION - Contaminant movement through pathways such as soil, air, surface water, and groundwater.

MIOCENE - The fourth of the five epochs into which the Tertiary Period is divided. Also the series of strata deposited during that epoch. (DGT)*

NATURAL AREA - Designated areas with critical habitat or endangered species protected from human exploitation by federal or state laws.

NET PRECIPITATION - Total precipitation minus evaporation. (FR)*

OVERBURDEN - Material of any nature, consolidated or unconsolidated, that overlies a deposit. (DGT)*

PALEOCENE - Oldest of six epochs of the Cenozoic; also the series of rock strata deposited during that epoch. (DGT)*

PALEOZOIC - One of the eras of geologic time - that between the Precambrian and Mesozoic - comprising the Cambrian, Ordovician, Silurian, Devonian, Carboniferous (Mississippian and Pennsylvanian), and Permian systems. Also the erathem of rocks deposited during the Paleozoic Era. (DGT)*

PERMEABILITY - Capacity of a rock, soil, or unconsolidated sediment to transmit a fluid over a given period of time.

PHYSIOGRAPHIC PROVINCE - A region of similar structure and climate that has had a unified geomorphic history. (DGT)*

REGRESSION - Gradual contraction of a shallow sea resulting in the emergence of land as when sea level falls or land rises. (DGT)*

SAND-FILLED CHANNEL - A lenticular-shaped sedimentary structure composed of unconsolidated sand and/or lithified sandstone. Such structures represent the terrestrial routes of ancient streams.

SAND LENS - A sand body having the general form of a convex lens. (DGT)*

SEDIMENTARY - Descriptive term for rock formed of sediment, especially: (1) Clastic rocks, as conglomerate, sandstone, and shales, formed of fragments of other rock transported from their sources and deposited in water. (2) Rocks formed by precipitation from solution, as rock salt and gypsum, or from secretions of organisms, as most limestone. (DGT)*

STRATIGRAPHY - The arrangement of rocks in layers or strata.

SURFACE WATER - Water exposed on ground surface, i.e., lakes, streams, rivers, etc.

SWALE - A slight, marshy depression in generally level land. (DGT)*

TERTIARY - The older of the two geologic periods comprising the Cenozoic Era; also the system of strata deposited during that period. (DGT)*

THREATENED SPECIES - Any species which is likely to become an endangered species within the foreseeable future throughout all or a significant portion of its range. (ESA)*.

TOXICITY - A relative property of a chemical agent and refers to a harmful effect on some biologic mechanism and the condition under which this effect occurs.

TRIASSIC - The earliest of the three periods of the Mesozoic; also the system of strata deposited during that period. (DGT)*

TRANSGRESSION - Gradual expansion of a shallow sea resulting in the progressive submergence of land, as when sea level rises or land subsides. (DGT)*

TRANSMISSIVITY - The transmission capability of the entire thickness of an aquifer. (D)*

UPGRADIENT - A hydraulically upslope direction.

WATER TABLE - The surface on which the fluid pressure in the pores of a porous medium is exactly atmospheric. The location of this surface is revealed by the level at which water stands in a shallow opening along its length and penetrating the surficial deposits just deeply enough to encounter standing water in the bottom. (FC)*

WATER TABLE AQUIFER - An aquifer in which the water table forms the upper boundary. These unconfined aquifers occur near the ground surface. (FC)*

WETLAND - Land transitional between terrestrial and aquatic systems where the water table is usually at or near the surface or the land is covered by shallow water. For purposes of this classification, wetlands must have one or more of the following three attributes: (1) at least periodically, the land supports predominantly hydrophytes, (2) the substrate is predominantly undrained hydric soil, and (3) the substrate is nonsoil and is saturated with water or covered by shallow water at some time during the growing season of each year. (C)*

WILDERNESS AREAS - Large tracts of public land maintained essentially in its natural state and protected against introduction of intrusive artifacts (as roads and buildings). (W)*

Source Codes:

C	-	Cowardin et al, 1979.
D	-	Driscoll, 1986.
DEQPPM	-	Defense Environmental Quality Program Policy Memorandum, 1980.
DGT	-	Dictionary of Geological Terms, 1976.
ESA	-	Endangered Species Act, 1973.
FC	-	Freeze and Cherry, 1979.
FR	-	Federal Register (July 16) 1982: 31224.
RCRA	-	Resource Conservation and Recovery Act, 1976.
SARA	-	Superfund Amendments and Reauthorization Act, 1986.
W	-	Websters Ninth Collegiate Dictionary, 1985.

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Appendix A

Resumes of Search Team Members

TRACY CHARLES BROWN
Environmental Analyst

QUALIFICATIONS

Environmental Compliance, Regulatory Analysis, Environmental Investigation/Remediation, and Assessment/Mitigation of Adverse Environmental Impacts

Under the U.S. Department of Defense, Installation Restoration Program (IRP) and the U.S. Department of Energy, Hazardous Waste Remedial Actions Program (DOE-HAZWRAP) [Martin Marietta Energy Systems, Inc.], participated in a Preliminary Assessment (PA) aimed at identifying hazardous waste disposal sites at the Oklahoma Air National Guard Base at Will Rogers World Airport in Oklahoma City, Oklahoma.

Substantially revised and amended the Spill Prevention, Control, and Countermeasures (SPCC) Plan for the Y-12 nuclear weapons plant (U.S. Department of Energy/Martin Marietta Energy Systems, Inc.). Led the research, regulatory analysis and compliance, planning, organizational, and writing aspects of the project and coordinated these with the concurrent engineering inspection and certification activities of a subcontractor.

Performed a variety of environmental impact assessment and mitigation activities focusing on cultural and historic resources.

Research and Information Skills

Demonstrated strong scientific investigation, research, and development skills on federally funded projects. Adept at collecting information and data through field observations, surveys, and library resources; keeping detailed, three-dimensional records; compiling data; and focusing on details. Proficient at research design; foreseeing and solving research-related problems; comparing, analyzing, and synthesizing information; and attaining objectives.

Communications and Advising Skills

Experienced writer/editor. Authored a combined total of nearly thirty environmental documents, training manuals, scientific reports, and journal articles. Expert at advising, gathering information through interviews, and consulting with specialists.

Knowledge Areas

Familiar with federal regulations under the Clean Water Act, the Resource Conservation and Recovery Act (RCRA), and the Toxic Substances Control Act (TSCA). Geology (thirty-two course hours including Environmental Geology and Geomorphology), general biology, human skeletal biology, and archaeology/anthropology (environmental impact assessments; cultural resource management; field surveying, sampling, and excavation strategies; mapping; using topographic maps, USDA Soil surveys, and aerial photographs).

EDUCATION

M.A., University of Tennessee, Knoxville, 1982.

B.A., University of Tennessee, Knoxville, 1976 (with Highest Honors).

Austin Peay State University, 1971-1973.

PUBLICATIONS AND PROFESSIONAL PAPERS

Complete list available upon request.

REFERENCES

Available upon request.

JACK DENTON WHEAT
Geologist/Hydrogeologist

EDUCATION

B.S. Geology - Tennessee Technological University

Seminar - Types of radioactive nuclides and the transmitters of radioactive contaminants.

Seminar - RCRA/CERCLA treatment alternatives for hazardous waste.

EXPERIENCE

Geologist/Hydrogeologist, Science & Technology, Inc., 1988 - Present

Performed Preliminary Assessments (PA) for the Department of Defense Installation Restoration Program (IRP). Reviewed and evaluated the geology and hydrogeology of Air National Guard bases to determine the susceptibility of principal groundwater aquifers to contamination from surface pollutants. Analyzed RCRA regulations to determine their relationship to the Department of Defense Hazard Assessment Rating Methodology (HARM). Prepared maps and major sections of text for the final PA reports.

Assisted with revising the Spill Prevention, Control, and Countermeasures (SPCC) Plan for the Y-12 nuclear weapons plant in Oak Ridge, Tennessee.

Geological Assistant, Robert Stansfield Consulting Geologist, 1987

Installed monitoring wells at EPA Superfund sites and private company facilities. Followed OSHA health and safety standards and EPA standards for postdrilling decontamination of site equipment during monitoring well construction.

Field Hydrogeologist, Oak Ridge National Laboratory (ORNL), February 1987 - May 1987

Logged soil cuttings in the field and collected soil samples at specified intervals for soil borings at SWSA 6 and along the proposed DOE - Bethel Valley LLW pipeline route. Installed monitoring wells at SWSA 6 and selected LLW borings to evaluate potential ground water contamination. Supervised on-site drilling procedures and personnel safety requirements. Compiled individual LLW boring reports, which included soil sample descriptions, zones of groundwater saturation, and monitoring well schematic logs. For the ORNL Environmental Sciences Division, developed a work plan evaluating the groundwater conduction potential of pipe trench back fill.

Consulting Petroleum Geologist, 1980 - 1986

Logged samples of well cuttings collected during exploration drilling of oil and natural gas wells. Supervised on-site drilling procedures that included the cementing of surface casing to prevent the contamination of groundwater aquifers, and the construction of lined retaining pits as a remediation measure for potential oil spills and/or to prevent the release of drilling fluids into the environment. Compiled exploration drillsite reports that included sample descriptions, descriptions of penetrated oil or gas payzones and the potential of these payzones to produce commercial oil or natural gas. Compiled geologic reports for selected areas. These reports covered general geology, formation stratigraphy, potential payzones for oil or natural gas, and geologic maps including structure contours and isopachs. Drafted maps showing previously drilled or permitted locations. Analyzed geophysical logs to evaluate oil and natural gas payzones.

Geologist, Petroleum Development Corporation, 1977 - 1980

Logged samples of well cuttings collected during exploration drilling of oil and natural gas wells. Supervised installation and cementing of surface casing. Prepared geologic maps to select areas for oil and natural gas exploration. Drafted maps showing previously drilled or permitted locations. Analyzed geophysical logs to evaluate oil and natural gas payzones.

GEOLOGICAL REGISTRATION

Licensed professional geologist, State Of North Carolina.

RAY S. CLARK
Civil/Environmental Engineer

EDUCATION

Graduate Courses (Environmental Engineering), The University of Tennessee , Knoxville, Tennessee.

B. S. Degree (Civil Engineering/Environmental Engineering Emphasis), The University of Tennessee, Knoxville, Tennessee.

RCRA/CERCLA Seminar - Treatment Alternatives for Hazardous Waste.

EXPERIENCE

Civil/Environmental Engineer, Science & Technology, Inc., Oak Ridge, Tennessee, 1988 - Present.

Working under the U.S. Department of Defense, Installation Restoration Program (IRP) and the U.S. Department of Energy, Hazardous Waste Remedial Actions Program (HAZWRAP) [Martin Marietta Energy Systems, Inc.], participated in Preliminary Assessment (PA) record searches aimed at identifying hazardous waste disposal sites on Air National Guard Bases. Reviewed base civil engineering, environmental, and historical documents relevant to hazardous waste generation, storage, treatment, and disposal; PCB - contaminated items; environmental incidents; and the chemical eradication of pests. Surveyed and inventoried data on underground storage tanks and oil/water separators. Examined aerial photographs, performed field surveys, and participated in interviews with base personnel as part of a comprehensive effort to assess past, on-base hazardous waste disposal practices and to identify/document potential past hazardous waste disposal sites. Contacted local, state, and federal agencies to obtain additional data pertinent to using the United States Air Force's Hazard Assessment Rating Methodology (HARM). Rated potential hazardous waste disposal sites using the HARM. Coauthored the PA reports.

Assisted with revising the Spill Prevention, Control, and Countermeasures (SPCC) Plan for the Y-12 nuclear weapon plant (Oak Ridge), one of the nation's largest and most physically complex defense research and development facilities.

Technician, Clark Drilling Services, Knoxville, Tennessee, 1980-1988.

Installed and developed hazardous waste monitoring wells. Conducted on-site inspections of monitoring wells.

PROFESSIONAL ORGANIZATIONS

American Society of Civil Engineers

Appendix B

Outside Agency

Contact List

OUTSIDE AGENCY CONTACT LIST

Cape-Atlantic Soil Conservation District
1200 West Harding Highway
Mays Landing, New Jersey 08330
(609) 625-3144

FAA Technical Center
ATTN: ACM-440 (Robert Heitsenrether)
Atlantic City International Airport, New Jersey 08405
(609) 484-5913

Floodplain Management Section
CN 401
Trenton, New Jersey 08625
(609) 292-2296

Maps and Publications Sales Office
Bureau of Revenue
CN 402
Trenton, New Jersey 08625
(609) 530-5790

National Weather Service
FAA Technical Center
Building 301, 4th Floor
Atlantic City, New Jersey 08405
(609) 645-3442

New Jersey American Water Company
Southern Division
700 New Road
Post Office Box 405
Linwood, New Jersey 08221
(609) 927-6062

New Jersey Geological Survey
29 Arctic Parkway
CN 029
Trenton, New Jersey 08625
(609) 292-2576

OUTSIDE AGENCY CONTACT LIST (CONTINUED)

New Jersey Natural Heritage Program
Department of Environmental Protection
Division of Parks and Forestry
Office of Natural Lands Management
CN 404
501 East State Street
Trenton, New Jersey 08625
(609) 984-1339

State of New Jersey
Department of Environmental Protection
Division of Coastal Resources
CN 401
Trenton, New Jersey 08625
(609) 292-2296

State of New Jersey
Department of Environmental Protection
Division of Water Resources
CN 029
Trenton, New Jersey 08625-0029
(609) 984-7938

United States Geological Survey
Mountain View Office Park
810 Bear Tavern Road
Suite 206
West Trenton, New Jersey 08628
(609) 771-3900

Appendix C

USAF Hazard Assessment

Rating Methodology

USAF HAZARD ASSESSMENT RATING METHODOLOGY

The Department of Defense (DoD) has developed a comprehensive program to identify, evaluate, and control hazardous waste disposal practices associated with past waste disposal techniques at DoD facilities. One of the actions required under this program is to:

> Develop and maintain a priority listing of contaminated installations and facilities for remedial action based on potential hazard to public health, welfare, and environmental impacts (Reference: DEQPPM 81-5, 11 December 1981).

Accordingly, the U.S. Air Force has sought to establish a system to set priorities for taking further action at sites based upon information gathered during the Preliminary Assessment phase of the Installation Restoration Program.

PURPOSE

The purpose of the site rating model is to assign a ranking to each site where there is suspected contamination from hazardous substances. This model will assist the Air National Guard in setting priorities for follow-up site investigations.

This rating system is used only after it has been determined that (1) potential for contamination exists (hazard waste present in sufficient quantity), and (2) potential for migration exists. A site may be deleted from ranking consideration on either basis.

DESCRIPTION OF THE MODEL

Like the other hazardous waste site ranking models, the U.S. Air Force's site rating model uses a scoring system to rank sites for priority attention. However, in developing this model, the designers incorporated some special features to meet specific DoD needs.

The model uses data readily obtained during the Preliminary Assessment portion of the IRP. Scoring judgment and computations are easily made. In assessing

the hazards at a given site, the model develops a score based on the most likely routes of contamination and worst hazards at the site. Sites are given low scores only if there are clearly no hazards. This approach meshes well with the policy for evaluating and setting restrictions on excess DoD properties.

Site scores are developed using the appropriate ranking factors presented in this appendix. The site rating form and the rating factor guidelines are provided at the end of this appendix.

As with the previous model, this model considers four aspects of the hazard posed by a specific site: (1) possible receptors of the contamination, (2) the waste and its characteristics, (3) the potential pathways for contaminant migration, and (4) any effort that was made to contain the waste resulting from a spill.

The receptors category rating is based on four rating factors: (1) the potential for human exposure to the site, (2) the potential for human ingestion of contaminants should underlying aquifers be polluted, (3) the current and anticipated use of the surrounding area, and (4) the potential for adverse effects upon important biological resources and fragile natural settings. The potential for human exposure is evaluated on the basis of the total population within 1000 feet of the site, and the distance between the site and the base boundary. The potential for human ingestion of contaminants is based on the distance between the site and the nearest well, the groundwater use of the uppermost aquifer, and population served by the groundwater supply within 3 miles of the site. The uses of the surrounding area are determined by the zoning within a 1-mile radius. Determination of whether or not critical environments exist within a 1-mile radius of the site predicts the potential for adverse effects from the site upon important biological resources and fragile natural settings. Each rating factor is numerically evaluated (0-3) and increased by a multiplier. The maximum possible score is also computed. The factor score and maximum possible scores are totaled, and the receptors subscore computed as follows: receptors subscore = (100 X factor subtotal/maximum score subtotal).

The waste characteristics category is scored in three steps. First, a point rating is assigned based on an assessment of the waste quantity and the hazard (worst

case) associated with the site. The level of confidence in the information is also factored into the assessment. Next, the score is multiplied by a waste persistence factor, which acts to reduce the score if the waste is not very persistent. Finally, the score is further modified by the physical state of the waste. Liquid wastes receive the maximum score while scores for solids are reduced.

The pathways category rating is based on evidence of contaminant migration along one of three pathways: surface water migration, flooding, and groundwater migration. If evidence of contaminant migration exists, the category is given a subscore of 80 to 100 points. For indirect evidence, 80 points are assigned, and for direct evidence, 100 points are assigned. If no evidence is found, the highest score among the three possible routes is used. The three pathways are evaluated and the highest score among all four of the potential scores is used.

The scores for each of the three categories are added together and normalized to a maximum possible score of 100. Then the waste management practice category is scored. Scores for sites with no containment are not reduced. Scores for sites with limited containment can be reduced by 5 percent. If a site is contained and well-managed, its score can be reduced by 90 percent. The final site score is calculated by applying the waste management practices category factor to the sum of the score for the other three categories.

HAZARDOUS ASSESMENT RATING FORM

NAME OF SITE [redacted]

LOCATION _____

DATE OF OPERATION OR OCCURRENCE _____

OWNER/OPERATOR _____

COMMENTS/DESCRIPTION _____

SITE RATED BY Science & Technology, Inc.

I. RECEPTORS

Rating Factor	Factor Rating (0-3)	Multiplier	Factor Score	Maximum Possible Score
A. Population within 1,000 ft. of site		4		12
B. Distance to nearest well		10		30
C. Land use-zoning within 1 mile radius		3		9
D. Distance to installation boundary		6		18
E. Critical environments within 1 mile radius of site		10		30
F. Water quality of nearest surface water body		6		18
G. Groundwater use of uppermost aquifer		9		27
H. Population served by surface water supply within 3 miles downstream of site		6		18
I. Population served by groundwater supply within 3 miles of site		6		18
		Subtotals	_____	180

Receptors subscore (100 x factor score subtotal/maximum score subtotal) [redacted]

II. WASTE CHARACTERISTICS

A. Select the factor score based on the estimated quantity, the degree of hazard, and the confidence level of the information.

1. Waste quantity (S = small, M = medium, L = large) _____

2. Confidence level (C = confirmed, S = suspected) _____

3. Hazard rating (H = high, M = medium, L = low) _____

Factor Subscore A (from 20 to 100 based on factor score matrix) [redacted]

B. Apply persistence factor
Factor Subscore A x Persistence Factor = Subscore B
_____ x _____ = _____

C. Apply physical state multiplier
Subscore B x Physical State Multiplier = Waste Characteristics Subscore
_____ x _____ = [redacted]

III. PATHWAYS

Rating Factor	Factor Rating (0-3)	Multiplier	Factor Score	Maximum Possible Score

A. If there is evidence of migration of hazardous contaminants, assign maximum factor subscore of 100 points for direct evidence or 80 points for indirect evidence. If direct evidence exists then proceed to C. If no evidence or indirect evidence exists, proceed to B.

Subscore

B. Rate the migration potential for 3 potential pathways: Surface water migration, flooding, and groundwater migration. Select the highest rating, and proceed to C.

1. Surface water migration

Distance to nearest surface water		8		24
Net precipitation		6		18
Surface erosion		8		24
Surface permeability		6		18
Rainfall intensity		8		24
			Subtotals	108

Subscore (100 x factor score subtotal/maximum score subtotal)

2. Flooding

		1		3

Subscore (100 x factor score/3) 0

3. Groundwater migration

Depth to groundwater		8		24
Net precipitation		6		18
Soil permeability		8		24
Subsurface flows		8		24
Direct access to groundwater		8		24
			Subtotals	114

Subscore (100 x factor score subtotal/maximum score subtotal)

C. Highest pathway score
Enter the highest subscore value from A, B-1, B-2, or B-3 above.

Pathways Subscore

IV. WASTE MANAGEMENT PRACTICES

A. Average the three subscores for receptors, waste characteristics, and pathways.

Receptors
Waste Characteristics
Pathways

Total _____ divided by 3 = _____
Gross Total Score

B. Apply factor for waste containment from waste management practices

Gross Total Score x Waste Management Practices Factor = Final Score

_____ x _____ =

1. RECEPTORS CATEGORY

Rating Factors	Rating Scale Levels 0	1	2	3	Multiplier
A. Population within 1,000 feet (includes on-base facilities)	0	1-25	26-100	Greater than 100	4
B. Distance to nearest water well	Greater than 3 miles	1 to 3 miles	3,001 feet to 1 mile	0 to 3,000 feet	10
C. Land use/zoning (within 1-mile radius)	Completely remote (zoning not applicable)	Agricultural	Commercial or Industrial	Residential	3
D. Distance to installation boundary	Greater than 2 miles	1 to 2 miles	1,001 feet to 1 mile	0 to 1,000 feet	6
E. Critical environments (within 1-mile radius)	Not a critical environment	Natural areas	Pristine natural areas; minor wetlands; preserved areas; presence of economically important natural resources susceptible to contamination	Major habitat of an endangered or threatened species; presence of recharge area; major wetlands	10
F. Water quality/use designation of nearest surface water body	Agricultural or industrial use	Recreation, propagation and management of fish and wildlife	Shellfish propagation and harvesting	Potable water supplies	6
G. Groundwater use of uppermost aquifer	Not used, other sources readily available	Commercial industrial, or irrigation, very limited other water sources	Drinking water, municipal water available	Drinking water, no municipal water available, commercial, industrial, or irrigation; no other water source available	9
H. Population served by surface water supplies within 3 miles downstream of site	0	1-50	51-1,000	Greater than 1,000	6
I. Population served by aquifer supplies within 3 miles of site	0	1-50	51-1,000	Greater than 1,000	6

II. WASTE CHARACTERISTICS

A-1 Hazardous Waste Quantity

S = Small quantity (5 tons or 20 drums of liquid)
M = Moderate quantity (5 to 20 tons or 21 to 85 drums of liquid)
L = Large quantity (20 tons or 85 drums of liquid)

A-2 Confidence Level of Information

C = Confirmed confidence level (minimum criteria below)

- o Verbal reports from interviewer (at least 2) or written information from the records
- o Knowledge of types and quantities of wastes generated by shops and other areas on base

S = Suspected confidence level

- o No verbal reports or conflicting verbal reports and no written information from the records
- o Logic based on a knowledge of the types and quantities of hazardous wastes generated at the base, and a history of past waste disposal practices indicate that these wastes were disposed of at a site

A-3 Hazard Rating

Rating Factors	Rating Scale Levels			
	0	1	2	3
Toxicity	Sax's Level 0	Sax's Level 1	Sax's Level 2	Sax's Level 3
Ignitability	Flash point greater than 200°F	Flash point at 140°F to 200°F	Flash point at 80°F to 140°F	Flash point less than 80°F
Radioactivity	At or below background levels	1 to 3 times background levels	3 to 5 times background levels	Over 5 times background levels

Use the highest individual rating based on toxicity, ignitability, and radioactivity and determine the hazard rating.

Hazard Rating	Points
High (H)	3
Medium (M)	2
Low (L)	1

II. WASTE CHARACTERISTICS--Continued

Waste Characteristics Matrix

Point Rating	Hazardous Waste Quantity	Confidence Level of Information	Hazard Rating
100	L	C	H
	L	C	M
80	M	C	H
70	L	S	H
	S	C	H
60	M	C	M
	L	S	M
	L	C	L
50	M	S	H
	S	C	M
	S	S	H
	M	S	M
40	M	C	L
	L	S	L
	S	C	L
30	M	S	L
	S	S	M
20	S	S	L

Notes:
For a site with more than one hazardous waste, the waste quantities may be added using the following rules:

Confidence Level
- o Confirmed confidence levels (C) can be added.
- o Suspected confidence levels (S) can be added.
- o Confirmed confidence levels cannot be added with suspected confidence levels.

Waste Hazard Rating
- o Wastes with the same hazard rating can be added.
- o Wastes with different hazard ratings can only be added in a downgrade mode, e.g., MCM + SCH = LCM if the total quantity is greater than 20 tons.

Example: Several wastes may be present at a site, each having an MCM designation (60 points). By adding the quantities of each waste, the designation may change to LCM (80 points). In this case, the correct point rating for the waste is 80.

B. Persistence Multiplier for Point Rating

Persistence Criteria	Multiply Point Rating From Part A by the Following
Metals, polycyclic compounds, and halogenated hydrocarbons	1.0
Substituted and other ring compounds	0.9
Straight chain hydrocarbons	0.8
Easily biodegradable compounds	0.4

C. Physical State Multiplier

Physical state	Multiply Point Total From Parts A and B by the Following
Liquid	1.0
Sludge	0.75
Solid	0.50

III. PATHWAYS CATEGORY

A. Evidence of Contamination

Direct evidence is obtained from laboratory analyses of hazardous contaminants present above natural background levels in surface water, groundwater, or air. Evidence should confirm that the source of contamination is the site being evaluated.

Indirect evidence might be from visual observation (i.e., leachate), vegetation stress, sludge deposits, presence of taste and odors in drinking water, or reported discharges that cannot be directly confirmed as resulting from the site, but the site is greatly suspected of being a source of contamination.

B-1 Potential for Surface Water Contamination

Rating Factors	0	1	2	3	Multiplier
Distance to nearest surface water (includes drainage ditches and storm sewers)	Greater than 1 mile	2,001 feet to a mile	501 feet to 2,000 feet	0 to 500 feet	8
Net precipitation	Less than -10 inches	-10 to +5 inches	+5 to +20 inches	Greater than +20 inches	6
Surface erosion	None	Slight	Moderate	Severe	8
Surface permeability	0% to 15% clay ($>10^{-2}$ cm/sec)	15% to 30% clay (10^{-2} to 10^{-4} cm/sec)	30% to 50% clay (10^{-4} to 10^{-6} cm/sec)	Greater than 50% clay ($>10^{-6}$ cm/sec)	6
Rainfall intensity based on 1-year, 24 hour rainfall (thunderstorms)	<1.0 inch 0-5 0	1.0 to 2.0 inches 6-35 30	2.1 to 3.0 inches 36-49 60	>3.0 inches >50 100	8

B-2 Potential for Flooding

Floodplain	Beyond 100-year floodplain	In 100-year floodplain	In 10-year floodplain	Floods annually	1

B-3 Potential for Groundwater Contamination

Depth to groundwater	Greater than 500 feet	50 to 500 feet	11 to 50 feet	0 to 10 feet	8
Net precipitation	Less than -10 inches	-10 to +5 inches	+5 to +20 inches	Greater than +20 inches	6
Soil permeability	Greater than 50% clay ($>10^{-6}$ cm/sec)	30% to 50% clay (10^{-4} to 10^{-6} cm/sec)	15% to 30% clay 10^{-2} to 10^{-4} cm/sec	0% to 15% clay ($<10^{-2}$ cm/sec)	8
Subsurface flows	Bottom of site greater than 5 feet above high groundwater level	Bottom of site occasionally submerged	Bottom of site frequently submerged	Bottom of site located below mean groundwater level	8
Direct access to groundwater (through faults, fractures, faulty well casings, subsidence, fissures, etc.)	No evidence of risk	Low risk	Moderate risk	High risk	8

IV. WASTE MANAGEMENT PRACTICES CATEGORY

A. This category adjusts the total risk as determined from the receptors, pathways, and waste characteristics categories for waste management practices and engineering controls designed to reduce this risk. The total risk is determined by first averaging the receptors, pathways, and waste characteristics subscores.

B. Waste Management Practices Factor

The following multipliers are then applied to the total risk points (from A):

Waste Management Practice	Multiplier
No containment	1.0
Limited containment	0.95
Fully contained and in full compliance	0.10

Guidelines for fully contained:

Landfills:

- o Clay cap or other impermeable cover
- o Leachate collection system
- o Liners in good condition
- o Adequate monitoring wells

Spills:

- o Quick spill cleanup action taken
- o Contaminated soil removed
- o Soil and/or water samples confirm total cleanup of the spill

Surface Impoundments:

- o Liners in good condition
- o Sound dikes and adequate freeboard
- o Adequate monitoring wells

Fire Protection Training Areas:

- o Concrete surface and berms
- o Oil/water separator for pretreatment of runoff
- o Effluent from oil/water separator to treatment plant

General Note: If data are not available or known to be complete the factor ratings under items I-A through I, III-B-1, or III-B-3, then leave blank for calculation of factor score and maximum possible score.

Appendix D

Site Hazard Assessment

Rating Forms and Factor

Rating Criteria

HAZARDOUS ASSESSMENT RATING FORM

NAME OF SITE Tanker Defueling Area [illegible], Site No. 1

LOCATION East and Northeast of Building 220

DATE OF OPERATION OR OCCURRENCE 1960s until the 1980s

OWNER/OPERATOR 177th Fighter Interceptor Group

COMMENTS/DESCRIPTION

SITE RATED BY Science & Technology, Inc.

I. RECEPTORS

Rating Factor	Factor Rating (0-3)	Multiplier	Factor Score	Maximum Possible Score
A. Population within 1,000 ft. of site	3	4	12	12
B. Distance to nearest well	3	10	30	30
C. Land use-zoning within 1 mile radius	3	3	9	9
D. Distance to installation boundary	3	6	18	18
E. Critical environments within 1 mile radius of site	3	10	30	30
F. Water quality of nearest surface water body	3	6	18	18
G. Groundwater use of uppermost aquifer	0	9	0	27
H. Population served by surface water supply within 3 miles downstream of site	3	6	18	18
I. Population served by groundwater supply within 3 miles of site	3	6	18	18
		Subtotals	153	180

Receptors subscore (100 x factor score subtotal/maximum score subtotal) 85

II. WASTE CHARACTERISTICS

A. Select the factor score based on the estimated quantity, the degree of hazard, and the confidence level of the information.

1. Waste quantity (S = small, M = medium, L = large) L

2. Confidence level (C = confirmed, S = suspected) C

3. Hazard rating (H = high, M = medium, L = low) H

Factor Subscore A (from 20 to 100 based on factor score matrix) 100

B. Apply persistence factor
Factor Subscore A x Persistence Factor = Subscore B
100 x 0.9 = 90

C. Apply physical state multiplier
Subscore B x Physical State Multiplier = Waste Characteristics Subscore
90 x 1.0 = 90

III. PATHWAYS

Rating Factor	Factor Rating (0-3)	Multiplier	Factor Score	Maximum Possible Score

A. If there is evidence of migration of hazardous contaminants, assign maximum factor subscore of 100 points for direct evidence or 80 points for indirect evidence. If direct evidence exists then proceed to C. If no evidence or indirect evidence exists, proceed to B.

Subscore 0

B. Rate the migration potential for 3 potential pathways: Surface water migration, flooding, and groundwater migration. Select the highest rating, and proceed to C.

1. Surface water migration

Distance to nearest surface water	3	8	24	24
Net precipitation	2	6	12	18
Surface erosion	0	8	0	24
Surface permeability	1	6	6	18
Rainfall intensity	2	8	16	24
		Subtotals	66	108

Subscore (100 x factor score subtotal/maximum score subtotal) 61

2. Flooding

	0	1	0	3

Subscore (100 x factor score/3) 0

3. Groundwater migration

Depth to groundwater	3	8	24	24
Net precipitation	2	6	12	18
Soil permeability	1	8	8	24
Subsurface flows	1	8	8	24
Direct access to groundwater	0	8	0	24
		Subtotals	60	114

Subscore (100 x factor score subtotal/maximum score subtotal) 53

C. Highest pathway score
Enter the highest subscore value from A, B-1, B-2, or B-3 above.

Pathways Subscore 61

IV. WASTE MANAGEMENT PRACTICES

A. Average the three subscores for receptors, waste characteristics, and pathways.

Receptors	85
Waste Characteristics	90
Pathways	61

Total 236 divided by 3 = 79
Gross Total Score

B. Apply factor for waste containment from waste management practices

Gross Total Score x Waste Management Practices Factor = Final Score

79 x 1.0 = 79

HAZARDOUS ASSESSMENT RATING FORM

NAME OF SITE Aircraft Defueling Area - Site No. 2

LOCATION Area North and Along the Aircraft Apron

DATE OF OPERATION OR OCCURRENCE 1965 - 1975

OWNER/OPERATOR 177th Fighter Interceptor Group

COMMENTS/DESCRIPTION

SITE RATED BY Science & Technology, Inc.

I. RECEPTORS

Rating Factor	Factor Rating (0-3)	Multiplier	Factor Score	Maximum Possible Score
A. Population within 1,000 ft. of site	3	4	12	12
B. Distance to nearest well	3	10	30	30
C. Land use-zoning within 1 mile radius	3	3	9	9
D. Distance to installation boundary	3	6	18	18
E. Critical environments within 1 mile radius of site	3	10	30	30
F. Water quality of nearest surface water body	3	6	18	18
G. Groundwater use of uppermost aquifer	0	9	0	27
H. Population served by surface water supply within 3 miles downstream of site	3	6	18	18
I. Population served by groundwater supply within 3 miles of site	3	6	18	18
		Subtotals	153	180

Receptors subscore (100 x factor score subtotal/maximum score subtotal) 85

II. WASTE CHARACTERISTICS

A. Select the factor score based on the estimated quantity, the degree of hazard, and the confidence level of the information.

1. Waste quantity (S = small, M = medium, L = large) M
2. Confidence level (C = confirmed, S = suspected) C
3. Hazard rating (H = high, M = medium, L = low) H

Factor Subscore A (from 20 to 100 based on factor score matrix) 80

B. Apply persistence factor
Factor Subscore A x Persistence Factor = Subscore B
80 x 0.9 = 72

C. Apply physical state multiplier
Subscore B x Physical State Multiplier = Waste Characteristics Subscore
72 x 1.0 = 72

III. PATHWAYS

Rating Factor	Factor Rating (0-3)	Multiplier	Factor Score	Maximum Possible Score

A. If there is evidence of migration of hazardous contaminants, assign maximum factor subscore of 100 points for direct evidence or 80 points for indirect evidence. If direct evidence exists then proceed to C. If no evidence or indirect evidence exists, proceed to B.

Subscore 0

B. Rate the migration potential for 3 potential pathways: Surface water migration, flooding, and groundwater migration. Select the highest rating, and proceed to C.

1. Surface water migration

Distance to nearest surface water	3	8	24	24
Net precipitation	2	6	12	18
Surface erosion	0	8	0	24
Surface permeability	1	6	6	18
Rainfall intensity	2	8	16	24
		Subtotals	66	108

Subscore (100 x factor score subtotal/maximum score subtotal) 61

2. Flooding

	0	1	0	3

Subscore (100 x factor score/3) 0

3. Groundwater migration

Depth to groundwater	3	8	24	24
Net precipitation	2	6	12	18
Soil permeability	1	8	8	24
Subsurface flows	1	8	8	24
Direct access to groundwater	0	8	0	24
		Subtotals	60	114

Subscore (100 x factor score subtotal/maximum score subtotal) 53

C. Highest pathway score
Enter the highest subscore value from A, B-1, B-2, or B-3 above.

Pathways Subscore 61

IV. WASTE MANAGEMENT PRACTICES

A. Average the three subscores for receptors, waste characteristics, and pathways.

Receptors	85
Waste Characteristics	72
Pathways	61

Total 218 divided by 3 = 73
Gross Total Score

B. Apply factor for waste containment from waste management practices

Gross Total Score x Waste Management Practices Factor = Final Score

73 x 1.0 = 73

HAZARDOUS ASSESSMENT RATING FORM

NAME OF SITE Old Aircraft Wash Rack - Site No. 3

LOCATION East of Building 36

DATE OF OPERATION OR OCCURRENCE 1942 - 1974

OWNER/OPERATOR 177th Fighter Interceptor Group

COMMENTS/DESCRIPTION

SITE RATED BY Science & Technology, Inc.

I. RECEPTORS

Rating Factor	Factor Rating (0-3)	Multiplier	Factor Score	Maximum Possible Score
A. Population within 1,000 ft. of site	3	4	12	12
B. Distance to nearest well	3	10	30	30
C. Land use-zoning within 1 mile radius	3	3	9	9
D. Distance to installation boundary	3	6	18	18
E. Critical environments within 1 mile radius of site	3	10	30	30
F. Water quality of nearest surface water body	3	6	18	18
G. Groundwater use of uppermost aquifer	0	9	0	27
H. Population served by surface water supply within 3 miles downstream of site	3	6	18	18
I. Population served by groundwater supply within 3 miles of site	3	6	18	18
		Subtotals	153	180

Receptors subscore (100 x factor score subtotal/maximum score subtotal) 85

II. WASTE CHARACTERISTICS

A. Select the factor score based on the estimated quantity, the degree of hazard, and the confidence level of the information.

1. Waste quantity (S = small, M = medium, L = large) M

2. Confidence level (C = confirmed, S = suspected) C

3. Hazard rating (H = high, M = medium, L = low) H

Factor Subscore A (from 20 to 100 based on factor score matrix) 80

B. Apply persistence factor
Factor Subscore A x Persistence Factor = Subscore B
80 x 0.9 = 72

C. Apply physical state multiplier
Subscore B x Physical State Multiplier = Waste Characteristics Subscore
72 x 1.0 = 72

III. PATHWAYS

Rating Factor	Factor Rating (0-3)	Multiplier	Factor Score	Maximum Possible Score

A. If there is evidence of migration of hazardous contaminants, assign maximum factor subscore of 100 points for direct evidence or 80 points for indirect evidence. If direct evidence exists then proceed to C. If no evidence or indirect evidence exists, proceed to B.

Subscore 0

B. Rate the migration potential for 3 potential pathways: Surface water migration, flooding, and groundwater migration. Select the highest rating, and proceed to C.

1. Surface water migration

Distance to nearest surface water	3	8	24	24
Net precipitation	2	6	12	18
Surface erosion	0	8	0	24
Surface permeability	1	6	6	18
Rainfall intensity	2	8	16	24
		Subtotals	66	108

Subscore (100 x factor score subtotal/maximum score subtotal) 61

2. Flooding

	0	1	0	3

Subscore (100 x factor score/3) 0

3. Groundwater migration

Depth to groundwater	3	8	24	24
Net precipitation	2	6	12	18
Soil permeability	1	8	8	24
Subsurface flows	1	8	8	24
Direct access to groundwater	0	8	0	24
		Subtotals	60	114

Subscore (100 x factor score subtotal/maximum score subtotal) 53

C. Highest pathway score
Enter the highest subscore value from A, B-1, B-2, or B-3 above.

Pathways Subscore 61

IV. WASTE MANAGEMENT PRACTICES

A. Average the three subscores for receptors, waste characteristics, and pathways.

Receptors 85
Waste Characteristics 72
Pathways 61

Total 218 divided by 3 = 73
Gross Total Score

B. Apply factor for waste containment from waste management practices

Gross Total Score x Waste Management Practices Factor = Final Score

73 x 1.0 = 73

HAZARDOUS ASSESSMENT RATING FORM

NAME OF SITE Transformer Storage Area - Site No. 4

LOCATION South of Building 116

DATE OF OPERATION OR OCCURRENCE 1960s and 1970s

OWNER/OPERATOR 177th Fighter Interceptor Group

COMMENTS/DESCRIPTION

SITE RATED BY Science & Technology, Inc.

I. RECEPTORS

Rating Factor	Factor Rating (0-3)	Multiplier	Factor Score	Maximum Possible Score
A. Population within 1,000 ft. of site	3	4	12	12
B. Distance to nearest well	3	10	30	30
C. Land use-zoning within 1 mile radius	3	3	9	9
D. Distance to installation boundary	3	6	18	18
E. Critical environments within 1 mile radius of site	3	10	30	30
F. Water quality of nearest surface water body	3	6	18	18
G. Groundwater use of uppermost aquifer	0	9	0	27
H. Population served by surface water supply within 3 miles downstream of site	3	6	18	18
I. Population served by groundwater supply within 3 miles of site	3	6	18	18
		Subtotals	153	180

Receptors subscore (100 x factor score subtotal/maximum score subtotal) 85

II. WASTE CHARACTERISTICS

A. Select the factor score based on the estimated quantity, the degree of hazard, and the confidence level of the information.

1. Waste quantity (S = small, M = medium, L = large) M
2. Confidence level (C = confirmed, S = suspected) C
3. Hazard rating (H = high, M = medium, L = low) H

Factor Subscore A (from 20 to 100 based on factor score matrix) 60

B. Apply persistence factor
Factor Subscore A x Persistence Factor = Subscore B
60 x 1.0 = 60

C. Apply physical state multiplier
Subscore B x Physical State Multiplier = Waste Characteristics Subscore
60 x 1.0 = 60

III. PATHWAYS

Rating Factor	Factor Rating (0-3)	Multiplier	Factor Score	Maximum Possible Score

A. If there is evidence of migration of hazardous contaminants, assign maximum factor subscore of 100 points for direct evidence or 80 points for indirect evidence. If direct evidence exists then proceed to C. If no evidence or indirect evidence exists, proceed to B.

Subscore 0

B. Rate the migration potential for 3 potential pathways: Surface water migration, flooding, and groundwater migration. Select the highest rating, and proceed to C.

1. Surface water migration

Distance to nearest surface water	3	8	24	24
Net precipitation	2	6	12	18
Surface erosion	0	8	0	24
Surface permeability	1	6	6	18
Rainfall intensity	2	8	16	24
		Subtotals	66	108

Subscore (100 x factor score subtotal/maximum score subtotal) 61

2. Flooding

	0	1	0	3

Subscore (100 x factor score/3) 0

3. Groundwater migration

Depth to groundwater	3	8	24	24
Net precipitation	2	6	12	18
Soil permeability	1	8	8	24
Subsurface flows	1	8	8	24
Direct access to groundwater	0	8	0	24
		Subtotals	60	114

Subscore (100 x factor score subtotal/maximum score subtotal) 53

C. Highest pathway score
Enter the highest subscore value from A, B-1, B-2, or B-3 above.

Pathways Subscore 80

IV. WASTE MANAGEMENT PRACTICES

A. Average the three subscores for receptors, waste characteristics, and pathways.

Receptors 85
Waste Characteristics 60
Pathways 61

Total 206 divided by 3 = 69
Gross Total Score

B. Apply factor for waste containment from waste management practices

Gross Total Score x Waste Management Practices Factor = Final Score

69 x 1.0 = 69

HAZARDOUS ASSESSMENT RATING FORM

NAME OF SITE Liquid Waste Holding Area Behind Building 65 - Site No. 5

LOCATION East of Building 65 and North of Building 116

DATE OF OPERATION OR OCCURRENCE 1958 - Present

OWNER/OPERATOR 177th Fighter Interceptor Group

COMMENTS/DESCRIPTION

SITE RATED BY Science & Technology, Inc.

I. RECEPTORS

Rating Factor	Factor Rating (0-3)	Multiplier	Factor Score	Maximum Possible Score
A. Population within 1,000 ft. of site	3	4	12	12
B. Distance to nearest well	3	10	30	30
C. Land use-zoning within 1 mile radius	3	3	9	9
D. Distance to installation boundary	3	6	18	18
E. Critical environments within 1 mile radius of site	3	10	30	30
F. Water quality of nearest surface water body	3	6	18	18
G. Groundwater use of uppermost aquifer	0	9	0	27
H. Population served by surface water supply within 3 miles downstream of site	3	6	18	18
I. Population served by groundwater supply within 3 miles of site	3	6	18	18
		Subtotals	153	180

Receptors subscore (100 x factor score subtotal/maximum score subtotal) 85

II. WASTE CHARACTERISTICS

A. Select the factor score based on the estimated quantity, the degree of hazard, and the confidence level of the information.

1. Waste quantity (S = small, M = medium, L = large) M
2. Confidence level (C = confirmed, S = suspected) C
3. Hazard rating (H = high, M = medium, L = low) H

Factor Subscore A (from 20 to 100 based on factor score matrix) 60

B. Apply persistence factor
Factor Subscore A x Persistence Factor = Subscore B
60 x 0.9 = 54

C. Apply physical state multiplier
Subscore B x Physical State Multiplier = Waste Characteristics Subscore
54 x 1.0 = 54

III. PATHWAYS

Rating Factor	Factor Rating (0-3)	Multiplier	Factor Score	Maximum Possible Score

A. If there is evidence of migration of hazardous contaminants, assign maximum factor subscore of 100 points for direct evidence or 80 points for indirect evidence. If direct evidence exists then proceed to C. If no evidence or indirect evidence exists, proceed to B.

Subscore 80

B. Rate the migration potential for 3 potential pathways: Surface water migration, flooding, and groundwater migration. Select the highest rating, and proceed to C.

1. Surface water migration

Distance to nearest surface water	3	8	24	24
Net precipitation	2	6	12	18
Surface erosion	0	8	0	24
Surface permeability	1	6	6	18
Rainfall intensity	2	8	16	24
		Subtotals	66	108

Subscore (100 x factor score subtotal/maximum score subtotal) 61

2. Flooding

	0	1	0	3

Subscore (100 x factor score/3) 0

3. Groundwater migration

Depth to groundwater	3	8	24	24
Net precipitation	2	6	12	18
Soil permeability	1	8	8	24
Subsurface flows	1	8	8	24
Direct access to groundwater	0	8	0	24
		Subtotals	60	114

Subscore (100 x factor score subtotal/maximum score subtotal) 53

C. Highest pathway score
Enter the highest subscore value from A, B-1, B-2, or B-3 above.

Pathways Subscore 80

IV. WASTE MANAGEMENT PRACTICES

A. Average the three subscores for receptors, waste characteristics, and pathways.

Receptors	85
Waste Characteristics	54
Pathways	80

Total 219 divided by 3 = 73
Gross Total Score

B. Apply factor for waste containment from waste management practices

Gross Total Score x Waste Management Practices Factor = Final Score

73 x 1.0 = 73

HAZARDOUS ASSESSMENT RATING FORM

NAME OF SITE Drum Burials at Blast Pad in Alert Area - Site No. 6

LOCATION East of the Alert Area on FAA Property

DATE OF OPERATION OR OCCURRENCE Unknown

OWNER/OPERATOR 177th Fighter Interceptor Group

COMMENTS/DESCRIPTION

SITE RATED BY Science & Technology, Inc.

I. RECEPTORS

Rating Factor	Factor Rating (0-3)	Multiplier	Factor Score	Maximum Possible Score
A. Population within 1,000 ft. of site	0	4	0	12
B. Distance to nearest well	3	10	30	30
C. Land use-zoning within 1 mile radius	3	3	9	9
D. Distance to installation boundary	3	6	18	18
E. Critical environments within 1 mile radius of site	3	10	30	30
F. Water quality of nearest surface water body	3	6	18	18
G. Groundwater use of uppermost aquifer	0	9	0	27
H. Population served by surface water supply within 3 miles downstream of site	3	6	18	18
I. Population served by groundwater supply within 3 miles of site	3	6	18	18
		Subtotals	153	180

Receptors subscore (100 x factor score subtotal/maximum score subtotal) 78

II. WASTE CHARACTERISTICS

A. Select the factor score based on the estimated quantity, the degree of hazard, and the confidence level of the information.

1. Waste quantity (S = small, M = medium, L = large) S
2. Confidence level (C = confirmed, S = suspected) C
3. Hazard rating (H = high, M = medium, L = low) H

Factor Subscore A (from 20 to 100 based on factor score matrix) 60

B. Apply persistence factor
Factor Subscore A x Persistence Factor = Subscore B
60 x 0.9 = 54

C. Apply physical state multiplier
Subscore B x Physical State Multiplier = Waste Characteristics Subscore
54 x 1.0 = 54

III. PATHWAYS

Rating Factor	Factor Rating (0-3)	Multiplier	Factor Score	Maximum Possible Score

A. If there is evidence of migration of hazardous contaminants, assign maximum factor subscore of 100 points for direct evidence or 80 points for indirect evidence. If direct evidence exists then proceed to C. If no evidence or indirect evidence exists, proceed to B.

Subscore 0

B. Rate the migration potential for 3 potential pathways: Surface water migration, flooding, and g oundwater migration. Select the highest rating, and proceed to C.

1. Surface water migration

Distance to nearest surface water	3	8	24	24
Net precipitation	2	6	12	18
Surface erosion	0	8	0	24
Surface permeability	1	6	6	18
Rainfall intensity	2	8	16	24
		Subtotals	66	108

Subscore (100 x factor score subtotal/maximum score subtotal) 61

2. Flooding

	0	1	0	3

Subscore (100 x factor score/3) 0

3. Groundwater migration

Depth to groundwater	3	8	24	24
Net precipitation	2	6	12	18
Soil permeability	1	8	8	24
Subsurface flows	1	8	8	24
Direct access to groundwater	0	8	0	24
		Subtotals	60	114

Subscore (100 x factor score subtotal/maximum score subtotal) 53

C. Highest pathway score
Enter the highest subscore value from A, B-1, B-2, or B-3 above.

Pathways Subscore 80

IV. WASTE MANAGEMENT PRACTICES

A. Average the three subscores for receptors, waste characteristics, and pathways.

Receptors 78
Waste Characteristics 54
Pathways 61

Total 193 divided by 3 = 64
Gross Total Score

B. Apply factor for waste containment from waste management practices

Gross Total Score x Waste Management Practices Factor = Final Score

64 x 1.0 = 64

177th Fighter Interceptor Group

New Jersey Air National Guard

Atlantic City, New Jersey

USAF Hazard Assessment Rating Methodology Factor Rating Criteria

The following is an explanation of the HARM factor rating criteria for each of the six potential sites.

I. Receptors

A. Population within 1000 feet of site.

Site Nos. 1-5, Factor Rating 3. The Base population is nearly 1000 on weekends. A large portion of the Main Base is within 1000 feet of these sites.

Site No. 6, Factor Rating 0. No people are present at the blast pad. It is no longer in use and the area within 1000 feet is unoccupied.

B. Distance to Nearest Well.

There are three water wells in the Main Base Area: FAA 101, FAA 102, and a well approximately 200 feet west of Building 26.

Site Nos. 1-6, Factor Rating 3.

Site No. 1 is approximately 600 feet from the well west of Building 26.
Site No. 2 is approximately 800 feet from well FAA 101.
Site No. 3 is approximately 200 feet from well FAA 101.
Site No. 4 is approximately 400 feet from well west of Building 26.
Site No. 5 is approximately 450 feet from well west of Building 26.
Site No. 6 is approximately 2200 feet from well #22 (Alert Area).

C. **Land Use/Zoning (within one mile radius).**

Site Nos. 1-6, Factor Rating 3.
Residential areas are located within one mile of these sites.

D. **Distance to Installation Boundary.**

Site Nos. 1-6, Factor Rating 3.

Site No. 1 is approximately 800 feet from the Base boundary.
Site No. 2 is adjacent to the north boundary of the Main Base.
Site No. 3 is approximately 1000 feet from the Base boundary.
Site No. 4 is less than 100 feet from the Base boundary.
Site No. 5 is located approximately 600 feet from the Base boundary.
Site No. 6 is approximately 1600 feet outside the Base boundary near the Alert Area.

E. **Critical Environments (within one mile radius).**

Site Nos. 1-6, Factor Rating 3. Endangered species, threatened species, recharge areas, and wetlands have been identified within 1-mile of the Base.

F. **Water Quality/Use Designation of Nearest Surface Water Body.**

Site Nos. 1-6, Factor Rating 3. The North and South Branches of Doughty's Mill Stream feed into the Atlantic City Reservoir, a major local source of potable water.

G. **Groundwater Use of Uppermost Aquifer.**

Site Nos. 1-6, Factor Rating 0. Well records indicate that the uppermost aquifer is not used. Other water sources (i.e., deeper groundwater and surface water) are readily available.

H. **Population Served by Surface Water Supplies Within 3 Miles Downstream of Site.**

Site Nos. 1-6, Factor Rating 3. The Atlantic City Reservoir, fed by the North and South Branches of Doughty's Mill Stream, is located within three miles downstream of these sites. It is a primary source of potable water for Atlantic City and vicinity.

I. **Population served by Groundwater Supplies Within 3 Miles**

Site Nos. 1-6, Factor Rating 3. Over 1000 persons are served by groundwater supplies within three miles of the sites.

II. Waste Characteristics

Site No. 1

A-1: Hazardous Waste Quantity - Factor Rating L (Large). Interviewee reports indicated the possible dumping of large quantities (greater than 85 drums) of JP-4 at this site over a 10-15 year period.

A-2: Confidence Level - Factor Rating C (Confirmed). This site was confirmed through interviews with Base personnel.

A-3: Hazard Rating - Factor Rating H (High). JP-4 has a flashpoint well below 80°F which corresponds to a high HARM rating.

Site No. 2

A-1: Hazardous Waste Quantity - Factor Rating M (Moderate). A moderate quantity (21-85 drums) was assumed for this site because interviewees reported that small amounts of fuel were periodically drained from aircraft over a period of at least 10 years. Also, there were reports of numerous incidental fuel spills at this site.

A-2: Confidence Level - Factor Rating C (Confirmed). Base interviewees reported fuel spills and disposal occurring at this site.

A-3: Hazard Rating - Factor Rating H (High). This site has a high hazard rating due to the presence of JP-4.

Site No. 3

A-1: Hazardous Waste Quantity - Factor Rating M (Moderate). A moderate quantity (21-85 drums) of material is believed to have been released at this site because of its frequent use over a long period of time.

A-2: Confidence Level - Factor Rating C (Confirmed). Interviewees reported oil discharges, incidental spills, and frequent aircraft washings draining into the storm sewer.

A-3: Hazard Rating - Factor Rating H (High). JP-4, which reportedly was used at this site, has an ignitibility rating of 3 which corresponds to a high HARM rating.

Site No. 4

A-1: Hazardous Waste Quantity - Factor Rating S (Small). The precise amount released at this site is unknown. However, because of the size, number, and nature of transformers, it is believed that only a small quantity (less than 20 drums) of dielectric fluids were released at this site.

A-2: Confidence Level - Factor Rating C (Confirmed). Numerous Base interviewees confirmed this site as a storage area for transformers, some of which were leaking.

A-3: Hazard Rating - Factor Rating H (High). This site was given a high hazard rating because polychlorinated biphenyls (PCBs) may be present. PCBs have a high toxicity which corresponds to a high hazard rating.

Site No. 5

A-1: Hazardous Waste Quantity - Factor Rating S (Small). It is believed that only a small amount (less than 20 drums) of material has been released at this site.

A-2: Confidence Level - Factor Rating C (Confirmed). Base interviewees reported small amounts of spillage occurring at this site.

A-3: Hazard Rating - Factor Rating H (High). This site was given a high hazard rating because a number of materials have been stored at this site over the years.

Site No. 6

A-1: Hazardous Waste Quantity - Factor Rating S (Small). Although the amount released at this site is unknown, it is believed that only a small amount (less than 20 drums) of material has been released.

A-2: Confidence Level - Factor Rating C (Confirmed). The presence of at least one buried drum containing unknown material at the blast pad was confirmed.

A-3: Hazard Rating - Factor Rating H (High). Because the material is unknown, it was assumed to have a high hazard rating for the purpose of calculating a HAS.

B. Persistence Multiplier for Point Rating

Sites 1-3, 5, and 6 were assigned a persistence multiplier of 0.9 based on the presence of JP-4 and organic solvents. JP-4 and many solvents

correspond to the HARM category of "Substituted and Other Ring Compounds."

A persistence multiplier of 1.0 was assigned to Site No. 4 because of the potential presence of polychlorinated biphenyls (PCBs) in the dielectric fluid of transformers. PCBs are highly persistent and are classified under the HARM category of "Halogenated Hydrocarbons."

C. Physical State Multiplier

A physical state multiplier of 1.0 was applied to all sites because the substances released were liquids.

III. Pathways Category

A. Evidence of Contamination

Sites 1-4 and Site No. 6 were given a score of zero due to the absence of stressed vegetation or stained soil. Site No. 5 was given a score of 80 because stained soil was observed.

B.1 Potential for Surface Water Contamination

- Distance to Nearest Surface Water: Factor Rating 3. Site Nos. 1-6 are located within 500 feet of a drainage ditch or storm sewer.

- Net Precipitation: Factor Rating 2. The annual net precipitation (total precipitation minus evaporation) is 5.23 inches for sites Nos. 1-6.

- Surface Erosion: Factor Rating 1. With topographic slope at and near the Base ranging from 0 to 3%, there is slight erosion of soil at Site Nos. 1-6.

- Surface Permeability: Factor Rating 1. The surface permeability of the soil at these sites is approximately 4.2×10^{-4} to 4.2×10^{-3} cm/sec.

- o Rainfall Intensity Based on 1-Year, 24-Hour Rainfall: Factor Rating 2. The rainfall intensity in the Base area is approximately 3.0 inches.

B.2 Potential for Flooding Factor Rating 0. Site Nos. 1-6 lie beyond the 100 year flood plains of the North and South Branches of Doughty's Mill Stream.

B.3 Potential for Groundwater Contamination

- o Depth to Groundwater: Factor Rating 3. The shallow water table in the Base area is 3-23 feet below ground surface.
- o Net Precipitation: See B.1
- o Soil Permeability: Factor Rating 2. Soil permeability at these sites is 4.2×10^{-4} to 4.2×10^{-3} cm/sec.
- o Subsurface Flows: Factor Rating 1. Bottom of these sites are frequently submerged.
- o Direct Access to Groundwater: Factor Rating 0. No faults, fractures, fissures, or other direct access to groundwater are known to underlie these sites.

IV. Waste Management Practices Factor Multiplier

A multiplier of 1.0 is applied to all sites because none of these sites have any form of contaminant containment.

TABLE E-1

Underground Fuel Storage Tanks

Associated Building	Year Installed	Capacity (gallons)	Contents	Tank Construction	Status
241	1974	55	Diesel Fuel	Steel	Inactive
255	1966	275	Diesel Fuel	Steel	Inactive
248	1982	5000	Diesel Fuel	Steel, (1)	Active
253	1977	55	MOGAS	Steel	Inactive
254	1977	55	MOGAS	Steel	Inactive
256	1964	275	MOGAS	Steel	Active
248	1977	5000	MOGAS	Steel	Active
263	1964	1000	MOGAS	Steel	Inactive
65	1967	3000	MOGAS	Steel	Active
40	1953	20,000	No. 2 Fuel Oil	Steel	Active
400	1985	8000	No. 2 Fuel Oil	Steel	Active
255	1964	4000	No. 2 Fuel Oil	Steel	Active
262	1964	4000	No. 2 Fuel Oil	Steel	Active
441	1988	4000	No. 2 Fuel Oil	Steel, (2)	Active
256	1964	2500	No. 2 Fuel Oil	Steel	Active
52	unknown	550	No. 2 Fuel Oil	Steel	Active
52	unknown	1000	No. 2 Fuel Oil	Steel	Active
52	unknown	1000	No. 2 Fuel Oil	Steel	Active
116	1984	2000	No. 2 Fuel Oil	Steel, (3)	Active
182	1968	1000	No. 2 Fuel Oil	Steel	Inactive
225	1964	1000	No. 2 Fuel Oil	Steel	Active
240	1964	2000	No. 2 Fuel Oil	Steel	Inactive
242	1984	2000	No. 2 Fuel Oil	Steel, (3)	Active
248	1971	1000	No. 2 Fuel Oil	Steel	Active
258	1964	550	No. 2 Fuel Oil	Steel	Inactive
259	1964	550	No. 2 Fuel Oil	Steel	Active
263	1964	550	No. 2 Fuel Oil	Steel	Inactive
266	1973	550	No. 2 Fuel Oil	Steel, (4)	Active

NOTES:

No tanks have cathodic protection unless otherwise noted.

The Inactive tanks have not been used since 1988 and may contain some of the material indicated.

(1) This container has a paint coating on its interior surface.

(2) This container has an epoxy coating on its interior surface and a dielectric coating on its exterior surface. This container also has a sacrificial anode for cathodic protection.

(3) This container has a paint coating on its exterior surface.

(4) This container has a paint coating on both the interior and exterior container surfaces.

TABLE E-2

Oil/Water Separators and Waste Oil Holding Tanks

Associated Building	Year Installed	Capacity (gallons)	Contents	Tank Construction	Status
256	1966	275	Waste Oil	Steel	Active
242	1988	550	Waste Oil	Steel, (1)	Active
248	1971	500	Waste Oil	Steel	Active
268	1976	300	Waste Oil	Steel	Inactive
441	1988	4000	Waste Oil	Fiberglass, (2)	Active
442	1988	300	Waste Oil	Steel, (3)	Active

NOTES:

Inactive tanks have not been used since 1988 and may contain some of the material indiciated.

No tanks have cathodic protection unless otherwise noted.

(1) This container has a polyurethane coating on its interior surface and a dielectric coating on its exterior surface. This container also has an overfill alarm and a sacrificial anode for cathodic protection.

(2) This container is equipped with an overfill alarm.

(3) This container has a bitumen (asphaltic) coating on its exterior surface. It is also equipped with an overfill alarm.

TABLE E-3

Miscellaneous Underground Tanks

Associated Building	Year Installed	Capacity (gallons)	Contents	Tank Construction	Status
137	1985	550	Waste Photochemicals	Steel	Active
241	1944	500,000	Water	Concrete	Active
242	1973	12,000	1	Steel	Inactive
268	1966	15,000	Water (2)	Steel	Inactive

NOTES:

No tanks have cathodic protection.

The inactive tanks have not been used since 1988 and may contain some of the material indicated.

(1) Tank was removed from service and filled with concrete in 1988.

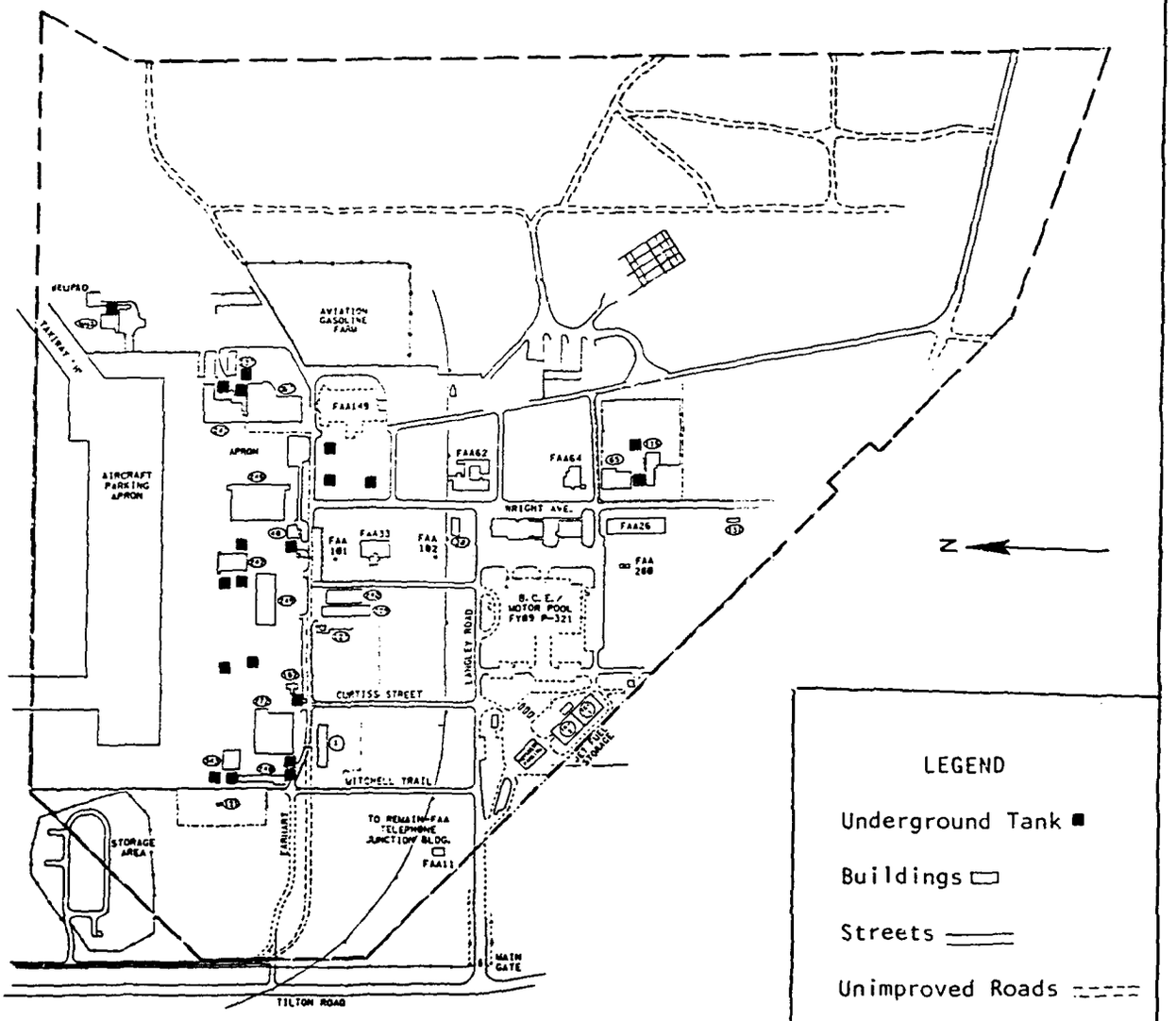
(2) Tank is used to hold water for cooling aircraft engines at the power check pad.

E-3

SciTek

Underground Tanks at the Main Base That Belong to the 177 FIG

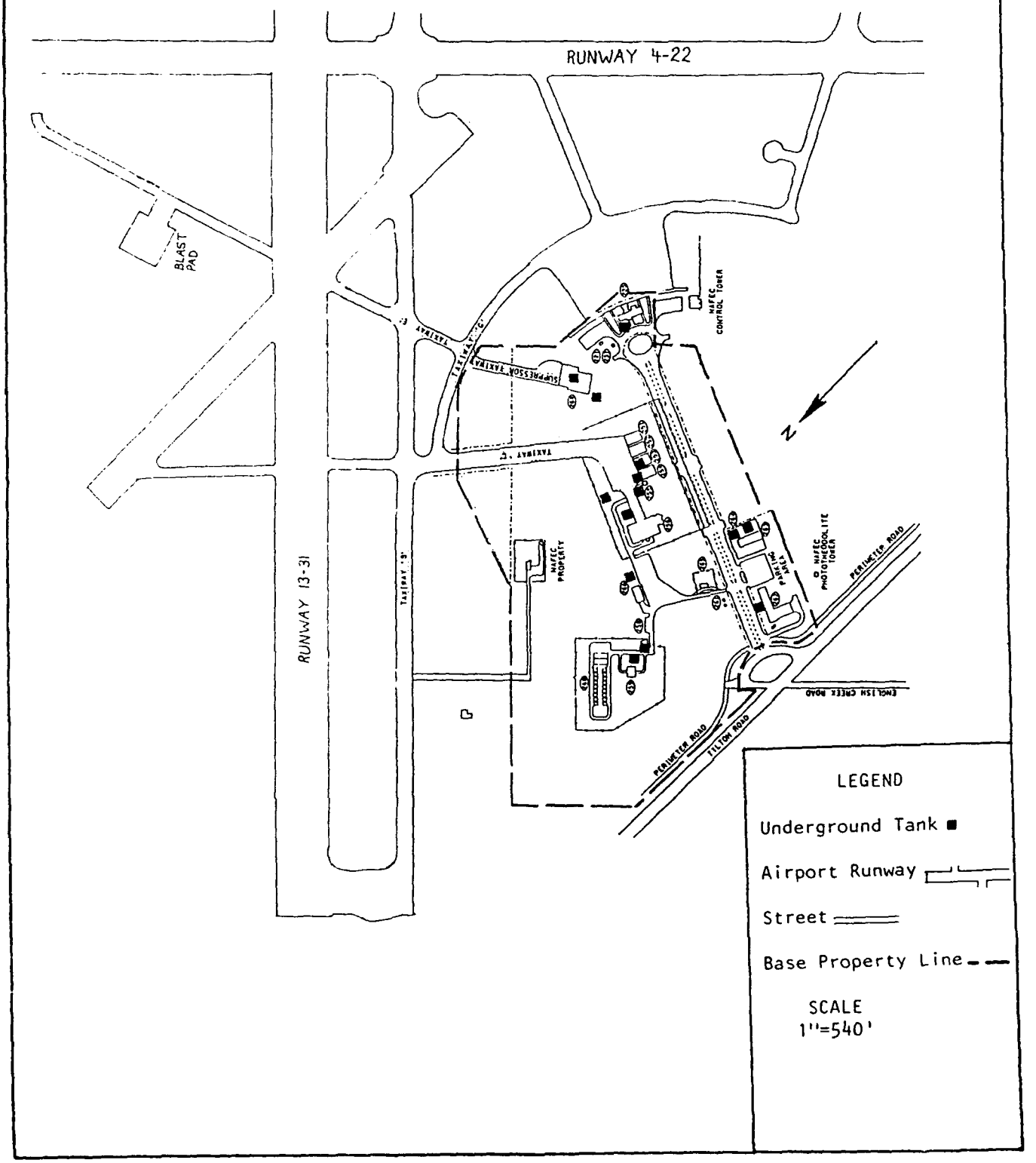
Source: Foster Wheeler USA Corp., 1986.



SciTek

Underground Tanks at the Alert Area
That Belong to the 177 FIG

Source: Foster Wheeler USA Corp., 1986.

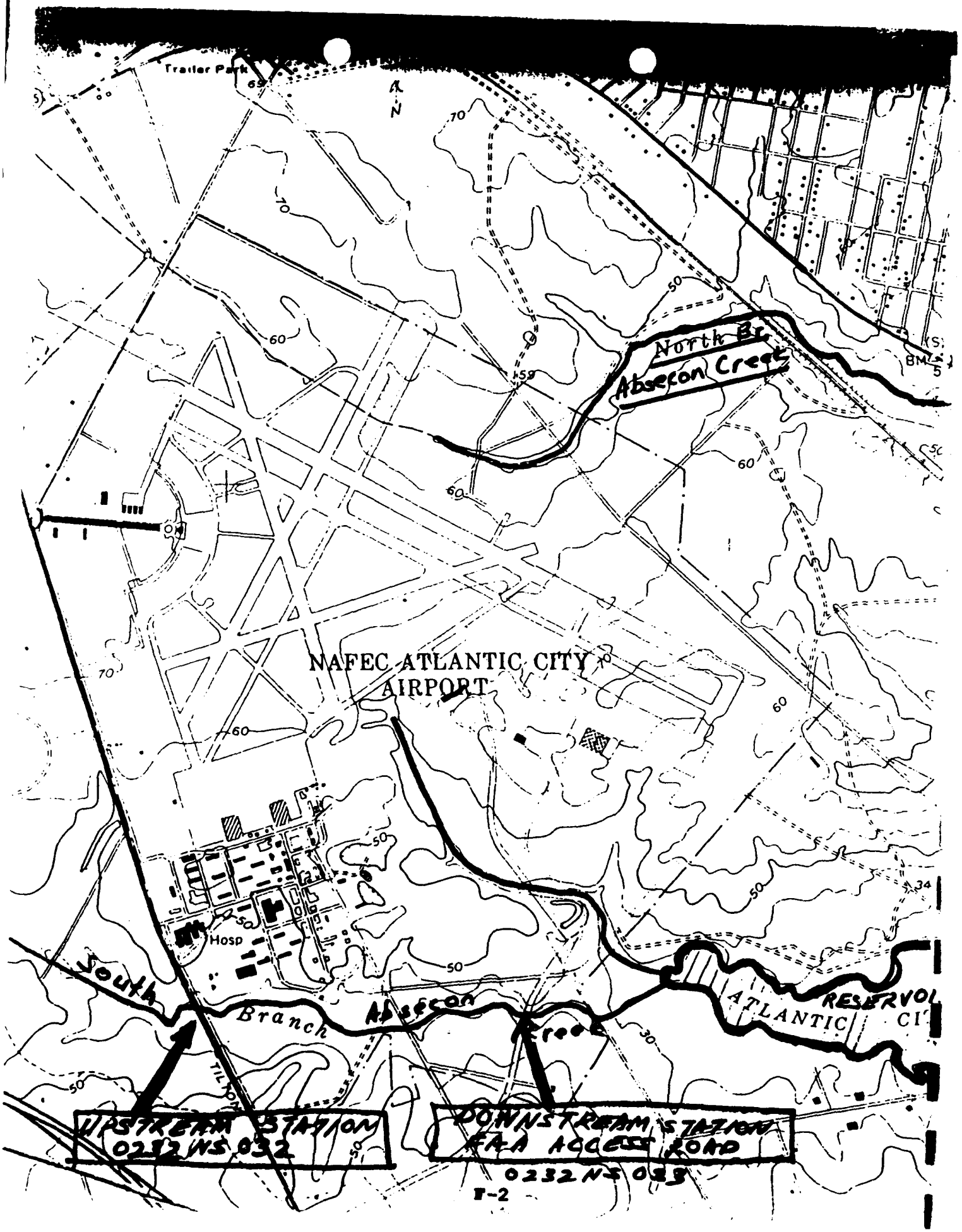


Appendix F

Environmental Monitoring

ENVIRONMENTAL MONITORING

Storm water and some of the Base's treated wastewater is discharged into Doughty's Mill Stream (South Branch Absecon Creek) just southeast of the Base. Doughty's Mill Stream continues on to the Atlantic City Reservoir. The Base has no National Pollutant Discharge Elimination System (NPDES) requirements, nor are there any requirements for other environmental monitoring. However, elective stream monitoring is preformed by the Base at two sampling locations. One of these sampling locations (0232 NS 032) is located upstream at Tilton Road while the other (0232 NS 033) is positioned downstream at the FAA Access Road. The locations of these sampling stations are shown on page F-2. Grab samples are obtained quarterly and certain parameters are evaluated as indicated on page F-3. Representative analytical data from these grab samples are shown on pages F-4 thru F-12.


Trailer Park
North Br.
Absecon Creek
NAFEC ATLANTIC CITY
AIRPORT
Hosp
South
Branch
Absecon
Creek
ATLANTIC
RESERVOI
CI
UPSTREAM STATION
0232 NS 032
DOWNSTREAM STATION
FAA ACCESS ROAD
0232 NS 028

ANGR 19-7/BS 1 Attachment 2 4 March 1989

Sampling Site Identifier

0232NS032 Upstream sampling location- Tilton Road

Latitude: N 39° 26′ 25" Longitude: W 74° 34′ 55"

0232NS033 Downstream sampling location- FAA Access Road

Latitude: N 39° 26′ 25" Longitude: W 74° 33′ 45"

Parameters to be Evaluated, Standard, Sample Type, Sample Requency, and Collecting Agency

Collecting Parameter	Standard	Sample Type	Frequency	Sampling Agency
COD	*	Grab	Quarterly	SGPB
Oil & Grease	**	Grab	Quarterly	SGPB
Ammonia	0.02	Grab	Quarterly	SGPB
Nitrate		Grab	Quarterly	SGPB
Phosphorus	0.1	Grab	Quarterly	SGPB
Cadmium	0.01	Grab	Quarterly	SGPB
Iron		Grab	Quarterly	SGPB
Lead	0.05	Grab	Quarterly	SGPB
Zinc		Grab	Quarterly	SGPB
Boron		Grab	Quarterly	SGPB
Chloride	250	Grab	Quarterly	SGPB
Suspended Solids	25	Grab	Quarterly	SGPB
Chlorine		Grab	Quarterly	SGPB
pH	6.5-8.5	Grab	Quarterly	SGPB
Temperature	None	Grab	Quarterly	SGPB

Notes:

The selection of parameters to be tested is based on part on the recommendation made by the NJ Department of Environmental Protection to McGuire AFB, NJ for their stream monitoring program.

The units of concentration for the listed standard is mg/l except for pH and temperature. pH is expressed in standard units--negative logarithm of the hydrogen ion concentration.

** None which would render the water unsuitable for the designated purposes.

SAMPLE DATE	MDL	OCT-87	JUN-87	MAR-87	NOV-86	STANDARD	16-Jun-88	05-Mar-88
COD (UPSTREAM)	10.0 MG/L		15.00		200.00		12.00	7.00
COD (DOWNSTREAM)	10.0 MG/L				200.00		10.00	
OIL & GREASE	0.3 M	NT						
AMMONIA (UPSTREAM)	0.2 MG/L				0.22			
AMMONIA (DOWNSTREAM)	0.2 MG/L				0.22			
NITRATE (UPSTREAM)	0.1 MG/L				0.22	10.00		0.20
NITRATE (DOWNSTREAM)	0.1 M	0.18			0.65	10.00	0.34	
PHOSPHOROUS(UPSTREAM)	0.1 MG/L			0.18				0.40
PHOSPHOROUS (DOWNSTREA	0.1 MG/L		0.67	0.30		0.1		
CADMIUM	10.0 UG/L							
IRON (UPSTREAM)	100.0 UG/L					100.00	100.00	100.00
IRON (DOWNSTREAM)	100.0 UG/L			111.00		100.00	172.00	112.00
LEAD	20.0 UG/L							
ZINC	50.0 UG/L							
BORON	100.0 UG/L							
CHLORIDE (UPSTREAM)	1.0 MG/L	5.00	5.00	5.00	7.00	250.00	6.00	4.00
CHLORIDE (DOWNSTREAM)	1.0 MG/L	6.00	7.00	6.00	8.00	250.00	7.00	
SUSPENDED SOLIDS (UPST	1.0 MG/L	3.00	3.00		1.00			
SUSPENDED SOLIDS (DOWN	1.0 MG/L	2.00	5.00	7.00	4.00			
ON SITE ANALYSES								

CHLORINE	MG/L	0.0	0.0	0.0	0.0
pH	S. U.	4.0	4.0	4.0	4.5
TEMPERATURE	o C	12.0	16.7	7.0	9.0

COD=CHEMICAL OXYGEN DEMAND
NT=NOT TESTED
MDL=METHOD DETECTION LIMIT

UPSTREAM=TILTON ROAD SAMPLING SITE IDENTIFIER 0232 NS 032
DOWNSTREAM=FAA ACCESS ROAD SAMPLING SITE IDENTIFIER 0232 NS 033

RB

4. LABORATORY PERFORMING ANALYSIS	5. LAB SAMPLE NUMBER	6. REQUESTOR SAMPLE NO
OEHL	081306 081310	GN 86-0099

SAMPLE COLLECTION INFORMATION

7. SITE DESCRIPTION	8. SITE LOCATION NO	9. FLOW RATE GAL/MIN	10. WEATHER	11. COLLECTION DATE/PERIOD	12. COLLECTORS NAME
25 NOV 1986		12 68			

13. SAMPLING TECHNIQUE	14. PHONE NUMBER	15. REASON FOR SAMPLE SUBMISSION
		NPDES

16. DATE RECEIVED BY LAB	17. DATE ANALYSIS COMPLETED
25 Nov. 86	12 Dec. 86

ON-SITE ANALYTICAL RESULTS

18. WATER TEMP °C	19. PH UNITS	20. [illegible] MG/L

18. RESULTS OF OTHER ON-SITE ANALYSES

ANALYSES REQUESTED AND RESULTS

081306 — PRESERVATION GROUP A (339)

PARAMETER	TOTAL	MG/L
Chemical Oxygen Demand	00340	200
Total Organic CARBON as C	00680	

081307 — PRESERVATION GROUP B (340)

PARAMETER	TOTAL	MG/L
OIL & GREASE FREON-IR Method	00560	<3

081308 — PRESERVATION GROUP C (343)

PARAMETER	TOTAL	MG/L
AMMONIA as N	00610	0.22
NITRATE as N Cd reduction method	00630	0.65
NITRITE as N	00615	
TOTAL KJELDAHL NITROGEN as N	00625	
PHOSPHORUS Ortho PO4 as P	70507	
PHOSPHORUS as P	00665	<.1

PRESERVATION GROUP D

PARAMETER	TOTAL	MG/L
CYANIDE		
CYANIDE Free, Amenable to Cl_2		

PRESERVATION GROUP E

PARAMETER	TOTAL	µG/L
PHENOLS	32730	

081309 — PRESERVATION GROUP (337)

PARAMETER	DISS	TOTAL	µG/L
ARSENIC	01000	01002	
BARIUM	01005	01007	
CADMIUM	01025	01027	<10
CHROMIUM	01030	01034	
CHROMIUM Hexavalent		01032	
COPPER	01040	01042	
IRON	01045	01045	<100
LEAD	01049	01051	<20
MANGANESE	01055	01055	
MERCURY	71890	71900	
NICKEL	01065	01067	
SELENIUM	01145	01147	
SILVER	01075	01077	
ZINC	01090	01092	<50
CALCIUM as Ca	00915	00916	MG/L
MAGNESIUM as Mg	00925	00927	MG/L
POTASSIUM	00935	00937	MG/L
SODIUM	00930	00929	MG/L

081310 — PRESERVATION GROUP (339)

PARAMETER	TOTAL	MG/L
BORON (339)	01022	<.020
BORON, Dissolved	01020	
CHLORIDE	00940	8
COLOR	00080	Units
FLUORIDE	00951	
Residue Filterable (TDS)	00515	
Residue Non Filt (SS)	00530	1.1
Residue	00500	
Residue Volatile	00505	
Specific Conductance	00095	µmhos
SULFATE as SO_4	00945	
SURFACTANTS MBAS as LAS	38260	
TURBIDITY	00076	Units

PRESERVATION GROUP J

PARAMETER

1. ORGANIZATION REQUESTING ANALYSIS

ATLANTIC CITY NAFEC
FERRELLI

CHEMIST
JJ EHJM 330 MT

REVIEWED BY

APPROVED BY

AFSC Form 3145, DEC 85 REPLACES AMC FORM 201, MAR 82, WHICH IS OBSOLETE. NON-POTABLE WATER ANALYSIS

R3

T65

2. LABORATORY PERFORMING ANALYSIS: OEHL

017851 017855

4. REQUESTOR SAMPLE NO: GW 87 0016

SAMPLE COLLECTION INFORMATION

7. SITE DESCRIPTION: 25 MAR 1537 15 21

5. DATE RECEIVED BY LAB: 25 March 87

6. DATE ANALYSIS COMPLETED: 6 April 87

8. SITE LOCATION NO

9. FLOWRATE AT SITE 00058 GAL/MIN

10. WEATHER 00041

ON-SITE ANALYTICAL RESULTS

16. WATER TEMP 00010 °C

17. PH 00400 UNITS

18. DISS O2 00300 MG/L

11. COLLECTION DATE/PERIOD

12. COLLECTOR'S NAME

19. RESULTS OF OTHER ON-SITE ANALYSES

13. SAMPLING TECHNIQUE

14. PHONE NUMBER

15. REASON FOR SAMPLE SUBMISSION

NPDES #

017851 ATION GROUP A (090)

PARAMETER	TOTAL	MG/L
Chemical Oxygen Demand	00340	<10
Total Organic CARBON as C	00680	

017852 N GROUP B

PARAMETER	TOTAL	MG/L
Oil & GREASE Freon EXTR Method	00560	

017853 ION GROUP C (93)

PARAMETER	TOTAL	MG/L
AMMONIA as N	00610	<.2
NITRATE as N Cd Reduct. Method	00620	.3
NITRITE as N	00615	
TOTAL KJELDAHL NITROGEN as N	00625	
PHOSPHORUS Ortho PO4 as P	70507	
PHOSPHORUS as P	00665	<0.1

PRESERVATION GROUP D

PARAMETER	TOTAL	MG/L
CYANIDE	00720	
CYANIDE Free, Amenable to Cl_2	00722	

PRESERVATION GROUP E

PARAMETER	TOTAL	µG/L
PHENOLS	32730	

017854 ...ES REQUESTED AND RESULTS ...ON GROUP (090)

PARAMETER	TOTAL	TOTAL	µG/L
ARSENIC	01000	01002	
BARIUM	01005	01007	
CADMIUM	01025	01027	<10
CHROMIUM	01030	01034	
CHROMIUM Hexavalent		01032	
COPPER	01040	01042	
IRON	01046	01045	111
LEAD	01049	01051	<20
MANGANESE	01056	01055	
MERCURY	71890	71900	
NICKEL	01065	01067	
SELENIUM	01145	01147	
SILVER	01075	01077	
ZINC	01090	01092	<50
CALCIUM as Ca	00915	00916	mg/l
MAGNESIUM as Mg	00925	00927	mg/l
POTASSIUM	00935	00937	mg/l
SODIUM	00930	00929	mg/l

017855 ...ON GROUP G (091)

PARAMETER	TOTAL	MG/L
BORON	01022	<200 µg/l
BORON, Dissolved	01020	µg/l
CHLORIDE	00940	6
COLOR	00080	Units
FLUORIDE	00951	
Residue Filterable (TDS)	00515	
Residue Non Filt (SS)	00530	7
Residue	00500	
Residue Volatile	00505	
Specific Conductance	00095	µmhos
SULFATE as SO_4	00945	
SURFACTANTS MBAS as LAS	38260	
TURBIDITY	00076	Units

PRESERVATION GROUP J

PARAMETER		

1. ORGANIZATION REQUESTING ANALYSIS

ATLANTIC CITY

CHEMIST JSO EHJM

REVIEWED BY

APPROVED BY

AFSC Form 3145, DEC 85 REPLACES AMD FORM 201, MAR 83, WHICH IS OBSOLETE.

NON-POTABLE WATER ANALYSIS

C

LHL

6.5

2. LABORATORY PERFORMING ANALYSIS	3. LAB SAMPLE NUMBER		4. REQUESTOR SAMPLE NO
OEHL	041168	041172	GN 870023 33 00029

SAMPLE COLLECTION INFORMATION			5. DATE RECEIVED BY LAB	6. DATE ANALYSIS COMPLETED
7. SITE DESCRIPTION			8 Jul 87	16 Jul 87
8. SITE LOCATION NO	9. FLOWRATE AT SITE 00058 GAL/MIN	10. WEATHER 00041	ON-SITE ANALYTICAL RESULTS	
			16. WATER TEMP 00010 °C	17. PH 00400 UNITS
11. COLLECTION DATE/PERIOD	12. COLLECTORS NAME		18. DISS O_2 00300 MG/L	
13. SAMPLING TECHNIQUE	14. PHONE NUMBER		19. RESULTS OF OTHER ON-SITE ANALYSES	
15. REASON FOR SAMPLE SUBMISSION NPDES #				

041168 — PRESERVATION GROUP A (190)

PARAMETER	TOTAL	MG/L
Chemical Oxygen Demand	00340	<10
Total Organic CARBON as C	00680	

041169 — PRESERVATION GROUP B (196)

PARAMETER	TOTAL	MG/L
OIL & GREASE FREON-IR Method	00560	<3

041170 — PRESERVATION GROUP C (195)

PARAMETER	TOTAL	MG/L
AMMONIA as N	00610	<.2
NITRATE as N Cd Reduct. Method	00620	<.2
NITRITE as N	00615	
TOTAL KJELDAHL NITROGEN as N	00625	
PHOSPHORUS Ortho PO4 as P	70507	
PHOSPHORUS as P	00665	.07

PRESERVATION GROUP D

PARAMETER	TOTAL	MG/L
CYANIDE	00720	
CYANIDE Free, Amenable to Cl_2	00722	

PRESERVATION GROUP E

PARAMETER	TOTAL	µG/L
PHENOLS	32730	

041171 — PRESERVATION GROUP F (195)

PARAMETER	DISS	TOTAL	µG/L
ARSENIC	01000	01002	
BARIUM	01005	01007	
CADMIUM	01025	01027	<10
CHROMIUM	01030	01034	
CHROMIUM Hexavalent		01032	
COPPER	01040	01042	
IRON	01046	01045	<100
LEAD	01049	01051	<20
MANGANESE	01056	01055	
MERCURY	71890	71900	
NICKEL	01065	01067	
SELENIUM	01145	01147	
SILVER	01075	01077	
ZINC	01090	01092	<50
CALCIUM as Ca	00915	00916	mg/l
MAGNESIUM as Mg	00925	00927	mg/l
POTASSIUM	00935	00937	mg/l
SODIUM	00930	00929	mg/l

041172 — PRESERVATION GROUP G (196)

PARAMETER	TOTAL	MG/L
BORON	01022	200. µg/l
BORON, Dissolved	01020	µg/l
CHLORIDE	00940	7.
COLOR	00080	Units
FLUORIDE	00951	
Residue Filterable (TDS)	00515	
Residue Non Filt (SS)	00530	5.
Residue	00500	
Residue Volatile	00505	
Specific Conductance	00095	µmhos
SULFATE as SO_4	00945	
SURFACTANTS MBAS as LAS	38260	
TURBIDITY	00076	Units

PRESERVATION GROUP J

PARAMETER		

1. ORGANIZATION REQUESTING ANALYSIS	CHEMIST
Atlantic City Electric	LAB JSO MAT ENJHLTP
	REVIEWED BY
	APPROVED BY

AESC Form 3145, DEC 85 REPLACES AND FORM 201, MAR 83 WHICH IS OBSOLETE NON-POTABLE WATER ANALYSIS

3. LABORATORY PERFORMING ANALYSIS: OEHL 070832 070836 — 4. REQUESTOR SAMPLE NO: GN870038 00029

SAMPLE COLLECTION INFORMATION

7. SITE DESCRIPTION:

8. SITE LOCATION NO:

9. FLOWRATE AT SITE 00059 GAL/MIN:

10. WEATHER 00041:

11. COLLECTION DATE/PERIOD:

12. COLLECTORS NAME:

13. SAMPLING TECHNIQUE:

14. PHONE NUMBER:

15. REASON FOR SAMPLE SUBMISSION:

5. DATE RECEIVED BY LAB: 23 Oct. 87

6. DATE ANALYSIS COMPLETED: 5 Nov. 87

ON-SITE ANALYTICAL RESULTS

16. WATER TEMP 00010 °C:

17. PH 00400 UNITS:

18. DISS O_2 00300 MG/L:

19. RESULTS OF OTHER ON-SITE ANALYSES:

070832 070835 070836

ANALYSIS REQUESTED AND RESULTS

PRESERVATION GROUP A (360)

PARAMETER	TOTAL	MG/L
Chemical Oxygen Demand	00340	<10
Total Organic CARBON as C	00680	

070833

PRESERVATION GROUP B (304)

PARAMETER	TOTAL	MG/L
OIL & GREASE FREON-IR Method	00560	<3

070834

PRESERVATION GROUP C (303)

PARAMETER	TOTAL	MG/L
AMMONIA as N	00610	<.2
NITRATE as N Cd Reduct. Method	00620	0.18
NITRITE as N	00615	
TOTAL KJELDAHL NITROGEN as N	00625	
PHOSPHORUS Ortho PO4 as P	70507	
PHOSPHORUS as P	00665	<.1

PRESERVATION GROUP D

PARAMETER	TOTAL	MG/L
CYANIDE	00720	
CYANIDE Free, Amenable to Cl_2	00722	

PRESERVATION GROUP E

PARAMETER	TOTAL	µG/L
PHENOLS	32730	

PRESERVATION GROUP F (305)

PARAMETER	DISS	TOTAL	µG/L
ARSENIC	01000	01002	
BARIUM	01005	01007	
CADMIUM	01025	01027	<10
CHROMIUM	01030	01034	
CHROMIUM Hexavalent		01032	
COPPER	01040	01042	
IRON	01046	01045	<100
LEAD	01049	01051	<20
MANGANESE	01056	01055	
MERCURY	71890	71900	
NICKEL	01065	01067	
SELENIUM	01145	01147	
SILVER	01075	01077	
ZINC	01090	01092	<50
CALCIUM as Ca	00915	00916	mg/l
MAGNESIUM as Mg	00925	00927	mg/l
POTASSIUM	00935	00937	mg/l
SODIUM	00930	00929	mg/l

PRESERVATION GROUP G (307)

PARAMETER	TOTAL	MG/L
BORON	01022	100 µg/l
BORON, Dissolved	01020	µg/l
CHLORIDE	00940	16
COLOR	00080	Units
FLUORIDE	00951	
Residue Filterable (TDS)	00515	
Residue Non Filt (SS)	00530	2
Residue-	00500	
Residue Volatile	00505	
Specific Conductance	00095	µmhos
SULFATE as SO_4	00945	
SURFACTANTS MBAS as LAS	38260	
TURBIDITY	00076	Units

PRESERVATION GROUP J

PARAMETER		

11. ORGANIZATION REQUESTING ANALYSIS:

ATLANTIC CITY
12 FEB 2000

CHEMIST: JSO EHTMTPP MT ANB

REVIEWED BY:

APPROVED BY:

AFSC Form 3145, DEC 85 REPLACES AMD FORM 201, MAR 83, WHICH IS OBSOLETE

NON-POTABLE WATER ANALYSIS

downstream 6

2. LABORATORY PERFORMING ANALYSIS: OEHL | 015459 | 4. REQUESTOR SAMPLE NO: GN 88 0026

SAMPLE COLLECTION INFORMATION

7. SITE DESCRIPTION: 15 MAR 1988 13 20

8. SITE LOCATION NO | 9. FLOWRATE AT SITE 00058 GAL/MIN | 10. WEATHER 00041

11. COLLECTION DATE/PERIOD | 12. COLLECTOR'S NAME

13. SAMPLING TECHNIQUE | 14. PHONE NUMBER

15. REASON FOR SAMPLE SUBMISSION: NPDES

5. DATE RECEIVED BY LAB

6. DATE ANALYSIS COMPLETED: 23 Mar 88

ON-SITE ANALYTICAL RESULTS

16. WATER TEMP 00010 °C | 17. PH 00400 UNITS | 18. DISS O_2 00300 MG/L

19. RESULTS OF OTHER ON-SITE ANALYSES

ANALYSES REQUESTED AND RESULTS

015459

PRESERVATION GROUP A

PARAMETER	TOTAL	MG/L
Chemical Oxygen Demand	00340	
Total Organic CARBON as C	00680	

PRESERVATION GROUP B

PARAMETER	TOTAL	MG/L
OIL & GREASE FREON-IR Method	00560	

PRESERVATION GROUP C

PARAMETER	TOTAL	MG/L
AMMONIA as N	00610	
NITRATE as N Cd Reduct. Method	00620	
NITRITE as N	00615	
TOTAL KJELDAHL NITROGEN as N	00625	
PHOSPHORUS Ortho PO4 as P	70507	
PHOSPHORUS as P	00665	

PRESERVATION GROUP D

PARAMETER	TOTAL	MG/L
CYANIDE	00720	
CYANIDE Free, Amenable to Cl_2	00722	

PRESERVATION GROUP E

PARAMETER	TOTAL	µG/L
PHENOLS	32730	

PRESERVATION GROUP F 083 µG/L

		TOTAL		
ARSENIC	01000	01002		
BARIUM	01005	01007		
CADMIUM	0102[illegible]	01027	<10	
CHROMIUM	01030	01034		
CHROMIUM Hexavalent		01032		
COPPER	01040	01042		
IRON	01046	01045	112	
LEAD	01049	01051	<20	
MANGANESE	01056	01055		
MERCURY	71890	71900		
NICKEL	01065	01067		
SELENIUM	01145	01147		
SILVER	01075	01077		
ZINC	01090	01092	<50	
CALCIUM as Ca	00915	00916		mg/l
MAGNESIUM as Mg	00925	00927		mg/l
POTASSIUM	00935	00937		mg/l
SODIUM	00930	00929		mg/l

PRESERVATION GROUP G

PARAMETER	TOTAL	MG/L
BORON	01022	µg/l
BORON, Dissolved	01020	µg/l
CHLORIDE	00940	
COLOR	00080	Units
FLUORIDE	00951	
Residue Filterable (TDS)	00515	
Residue Non Filt (SS)	00530	
Residue	00500	
Residue Volatile	00505	
Specific Conductance	00095	µmhos
SULFATE as SO_4	00945	
SURFACTANTS MBAS as LAS	38260	
TURBIDITY	00076	Units

PRESERVATION GROUP J

PARAMETER		

11. ORGANIZATION REQUESTING ANALYSIS: EFFLUENT

CHEMIST: EH

REVIEWED BY: Leo J. Jehl

APPROVED BY: LEO J. JEHL, JR. Chief, Metals Analysis Section USAFOEHL/SAO

AFSC Form 3145, DEC 85 REPLACES AMEN FORM 201, MAR 83, WHICH IS OBSOLETE.

NON-POTABLE WATER ANALYSIS

Rm

6.

5. LABORATORY PERFORMING ANALYSIS	015452	015455	REQUESTOR SAMPLE NO
OEHL			GN 880020

SAMPLE COLLECTION INFORMATION

7. SITE DESCRIPTION: 15 MAR 1988 13 30

8. SITE LOCATION NO

9. FLOWRATE AT SITE 00058 GAL/MIN

10. WEATHER 00041

11. COLLECTION DATE/PERIOD

12. COLLECTORS NAME

13. SAMPLING TECHNIQUE

14. PHONE NUMBER

15. REASON FOR SAMPLE SUBMISSION: NPDES #

8. DATE RECEIVED BY LAB	6. DATE ANALYSIS COMPLETED
15 March 88	30 March 88

ON-SITE ANALYTICAL RESULTS

16. WATER TEMP 00010 °C	17. PH 00400 UNITS	18. DISS O_2 00300 MG/L

19. RESULTS OF OTHER ON-SITE ANALYSES

ANALYSES REQUESTED AND RESULTS

015452 — TION GROUP A (80)

	TOTAL	MG/L
Chemical Oxygen Demand	00340	7
Total Organic CARBON as C	00680	

015453 — TION GROUP B (83)

	TOTAL	MG/L
OIL & GREASE FREON-IR Method	00560	<1.3

015454 — ATION GROUP C (84)

	TOTAL	MG/L
AMMONIA as N	00610	<0.2
NITRATE as N Cd Reduct. Method	00620	0.4
NITRITE as N	00615	
TOTAL KJELDAHL NITROGEN as N	00625	
PHOSPHORUS Ortho PO4 as P	70507	
PHOSPHORUS as P	00665	<0.1

PRESERVATION GROUP D

PARAMETER	TOTAL	MG/L
CYANIDE	00720	
CYANIDE Free, Amenable to Cl_2	00722	

PRESERVATION GROUP E

PARAMETER	TOTAL	µG/L
PHENOLS	32730	

PRESERVATION GROUP F

PARAMETER	DISS	TOTAL	µG/L
ARSENIC	01000	01002	
BARIUM	01005	01007	
CADMIUM	01025	01027	
CHROMIUM	01030	01034	
CHROMIUM Hexavalent		01032	
COPPER	01040	01042	
IRON	01046	01045	
LEAD	01049	01051	
MANGANESE	01056	01055	
MERCURY	71890	71900	
NICKEL	01065	01067	
SELENIUM	01145	01147	
SILVER	01075	01077	
ZINC	01090	01092	
CALCIUM as Ca	00915	00916	mg/l
MAGNESIUM as Mg	00925	00927	mg/l
POTASSIUM	00935	00937	mg/l
SODIUM	00930	00929	mg/l

015455 — TION GROUP G (89)

	TOTAL	MG/L
BORON	01022	<200 µg/l
BORON, Dissolved	01020	µg/l
CHLORIDE	00940	4
COLOR	00080	Units
FLUORIDE	00951	
Residue Filterable (TDS)	00515	
Residue Non Filt (SS)	00530	1
Residue	00500	
Residue Volatile	00505	
Specific Conductance	00095	µmhos
SULFATE as SO_4	00945	
SURFACTANTS MBAS as LAS	38260	
TURBIDITY	00076	Units

PRESERVATION GROUP J

PARAMETER		

1. ORGANIZATION REQUESTING ANALYSIS: IERD/UNI

Atlantic City

CHEMIST: JSO SAT 04/13

REVIEWED BY:

APPROVED BY:

AFSC Form 3145, DEC 85 REPLACES AMD FORM 201, MAR 82, WHICH IS OBSOLETE. NON-POTABLE WATER ANALYSIS

6.

2. LABORATORY PERFORMING ANALYSIS: OEHL

3. REQUESTOR SAMPLE NO: GN88CC63

SAMPLE COLLECTION INFORMATION

5. SITE DESCRIPTION

6. SITE LOCATION/NO

8. FLOWRATE (CFS) (GPM) GAL/MIN

9. MEASURE

11. COLLECTION DATE PERIOD

12. COLLECTORS NAME

13. SAMPLING TECHNIQUE

14. PERMIT NUMBER

15. REASON FOR SAMPLE SUBMISSION

NPDES #

AREA OF ANALYSIS: BC

ON-SITE ANALYTICAL RESULTS

7. MATRIX

8. FIELD pH UNITS

9. DISS O2 MG/L

12. RESULTS OF OTHER ON-SITE ANALYSES

16. ANALYSES REQUESTED AND RESULTS

PRESERVATION GROUP A

PARAMETER	TOTAL	MG/L
Chemical Oxygen Demand	00340	
Total Organic CARBON as C	00680	

PRESERVATION GROUP B

PARAMETER	TOTAL	MG/L
OIL & GREASE FREON-IR Method	00560	

PRESERVATION GROUP C

PARAMETER	TOTAL	MG/L
AMMONIA as N	00610	
NITRATE as N Cd Reduct. Method	00630	
NITRITE as N	00615	
TOTAL KJELDAHL NITROGEN as N	00625	
PHOSPHORUS Ortho PO4 as P	70507	
PHOSPHORUS as P	00665	

PRESERVATION GROUP D

PARAMETER	TOTAL	MG/L
CYANIDE	00720	
CYANIDE Free, Amenable to Cl_2	00722	

PRESERVATION GROUP E

PARAMETER	TOTAL	µG/L
PHENOLS	32730	

PRESERVATION GROUP F (182)

PARAMETER	DISS	TOTAL	MG/L
ARSENIC	01000	01002	
BARIUM	01005	01007	
CADMIUM	01025	01027	K1C
CHROMIUM	01030	01034	
CHROMIUM Hexavalent		01032	
COPPER	01040	01042	
IRON	01045	01045	172
LEAD	01049	01051	K3C
MANGANESE	01056	01055	
MERCURY	71890	71900	
NICKEL	01065	01067	
SELENIUM	01145	01147	
SILVER	01075	01077	
ZINC	01092	01092	K5C
CALCIUM as Ca	00915	00916	mg/l
MAGNESIUM as Mg	00925	00927	mg/l
POTASSIUM	00935	00937	mg/l
SODIUM	00931	00929	mg/l

PRESERVATION GROUP G

PARAMETER	TOTAL	MG/L
BORON	01022	µg/l
BORON Dissolved	01023	µg/l
CHLORIDE	00940	
COLOR	00080	Units
FLUORIDE	00951	
Residue Total Volatile (TDS)	00515	
Residue Non Filterable (TSS)	00530	
Residue	00500	
Residue Volatile	00505	
Specific Conductance	00095	µmhos
SULFATE as SO_4	00945	
SURFACTANTS MBAS as LAS	38260	
TURBIDITY	00076	Units

PRESERVATION GROUP J

PARAMETER		

17. ORGANIZATION REQUESTING ANALYSIS

ANG-B, ACY, IAP

EFFLUENT

SIGNATURE: Edward A. Hima

REVIEWED BY: Edward A. Hima
Physical Science Technician

APPROVED BY: RONALD E. FORTE, Lt, USAF
Chemist

AFSC Form 3145, DEC 85 REPLACES AMC FORM 201, MAR 83, WHICH IS OBSOLETE

NON-POTABLE WATER ANALYSIS

6.

2. LABORATORY PERFORMING ANALYSIS	3. LAB NUMBER	4. REQUESTOR SAMPLE NO
OEHL	U4U374 40377	GN880063.

SAMPLE COLLECTION INFORMATION

5. SITE DESCRIPTION	6. DATE RECEIVED BY LAB	7. DATE ANALYSIS COMPLETED
24 JUN 1988 17 00	24 June 88	11 July 88

ON-SITE ANALYTICAL RESULTS

8. SITE LOCATION NO	9. FLOWRATE AT SITE 00058 GAL/MIN	10. WEATHER CODE	16. WATER TEMP 00010 °C	17. PH 00400 UNITS	18. DISS O_2 00300 MG/L

11. COLLECTION DATE/PERIOD	12. COLLECTORS NAME	19. RESULTS OF OTHER ON-SITE ANALYSES

13. SAMPLING TECHNIQUE	14. PHONE NUMBER

15. REASON FOR SAMPLE SUBMISSION

NPDES

ANALYSES REQUESTED AND RESULTS

U4U374 PRESERVATION GROUP A (131)

PARAMETER	TOTAL	MG/L
Chemical Oxygen Demand	00340	10
Total Organic CARBON as C	00680	

U4U375 PRESERVATION GROUP B (193)

PARAMETER	TOTAL	MG/L
OIL & GREASE FREON-IR Method	00556	<3

U4U376 PRESERVATION GROUP C (129)

PARAMETER	TOTAL	MG/L
AMMONIA as N	00610	<0.2
NITRATE as N Cd Reduct. Method	00620	0.34
NITRITE as N	00615	
TOTAL KJELDAHL NITROGEN as N	00625	
PHOSPHORUS Ortho PO4 as P	70507	
PHOSPHORUS as P	00665	<0.1

PRESERVATION GROUP D

PARAMETER	TOTAL	MG/L
CYANIDE	00720	
CYANIDE Free, Amenable to Cl_2	00722	

PRESERVATION GROUP E

PARAMETER	TOTAL	µG/L
PHENOLS	32730	

PRESERVATION GROUP F

PARAMETER	DISS	TOTAL	µG/L
ARSENIC	01000	01002	
BARIUM	01005	01007	
CADMIUM	01025	01027	
CHROMIUM	01030	01034	
CHROMIUM Hexavalent		01032	
COPPER	01040	01042	
IRON	01046	01045	
LEAD	01049	01051	
MANGANESE	01056	01055	
MERCURY	71890	71900	
NICKEL	01065	01067	
SELENIUM	01145	01147	
SILVER	01075	01077	
ZINC	01090	01092	
CALCIUM as Ca	00915	00916	mg/l
MAGNESIUM as Mg	00925	00927	mg/l
POTASSIUM	00935	00937	mg/l
SODIUM	00930	00929	mg/l

U4U377 (130) ION GROUP G

PARAMETER	TOTAL	MG/L
BORON	01022	<200 µG/l
BORON, Dissolved	01020	µG/l
CHLORIDE	00940	7
COLOR	00080	Units
FLUORIDE	00951	
Residue Filterable (TDS)	00515	
Residue Non Filt (SS)	00530	<1
Residue	00500	
Residue Volatile	00505	
Specific Conductance	00095	µmhos
SULFATE as SO_4	00945	
SURFACTANTS MBAS as LAS	38260	
TURBIDITY	00076	Units

PRESERVATION GROUP J

PARAMETER		

1. ORGANIZATION REQUESTING ANALYSIS

ANGB ACY, IAP
EFFLUENT

CHEMIST
350

REVIEWED BY

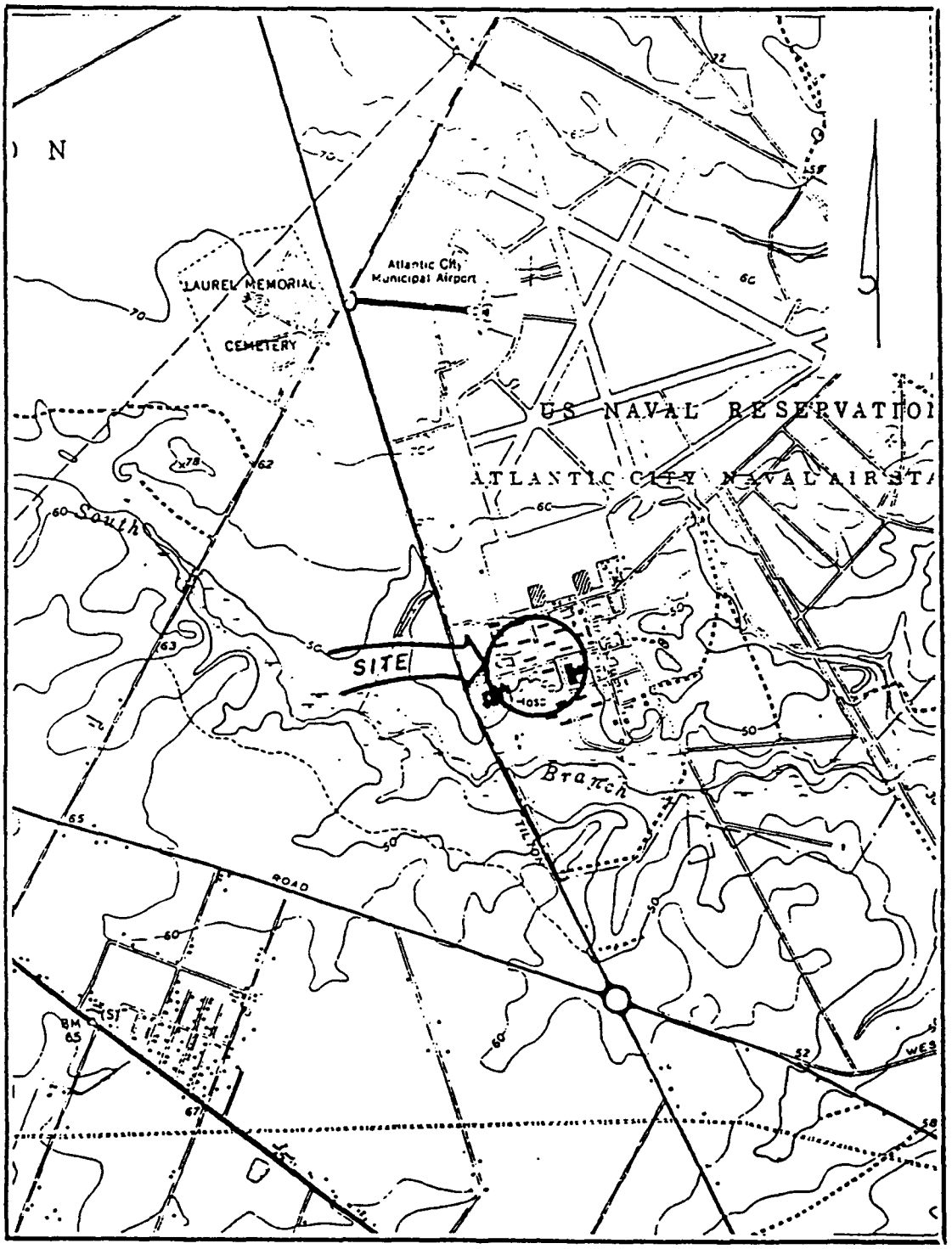
APPROVED BY

AFSC Form 3145, DEC 85 REPLACES AMD FORM 201 MAR 83 WHICH IS OBSOLETE

NON-POTABLE WATER ANALYSIS

Appendix G

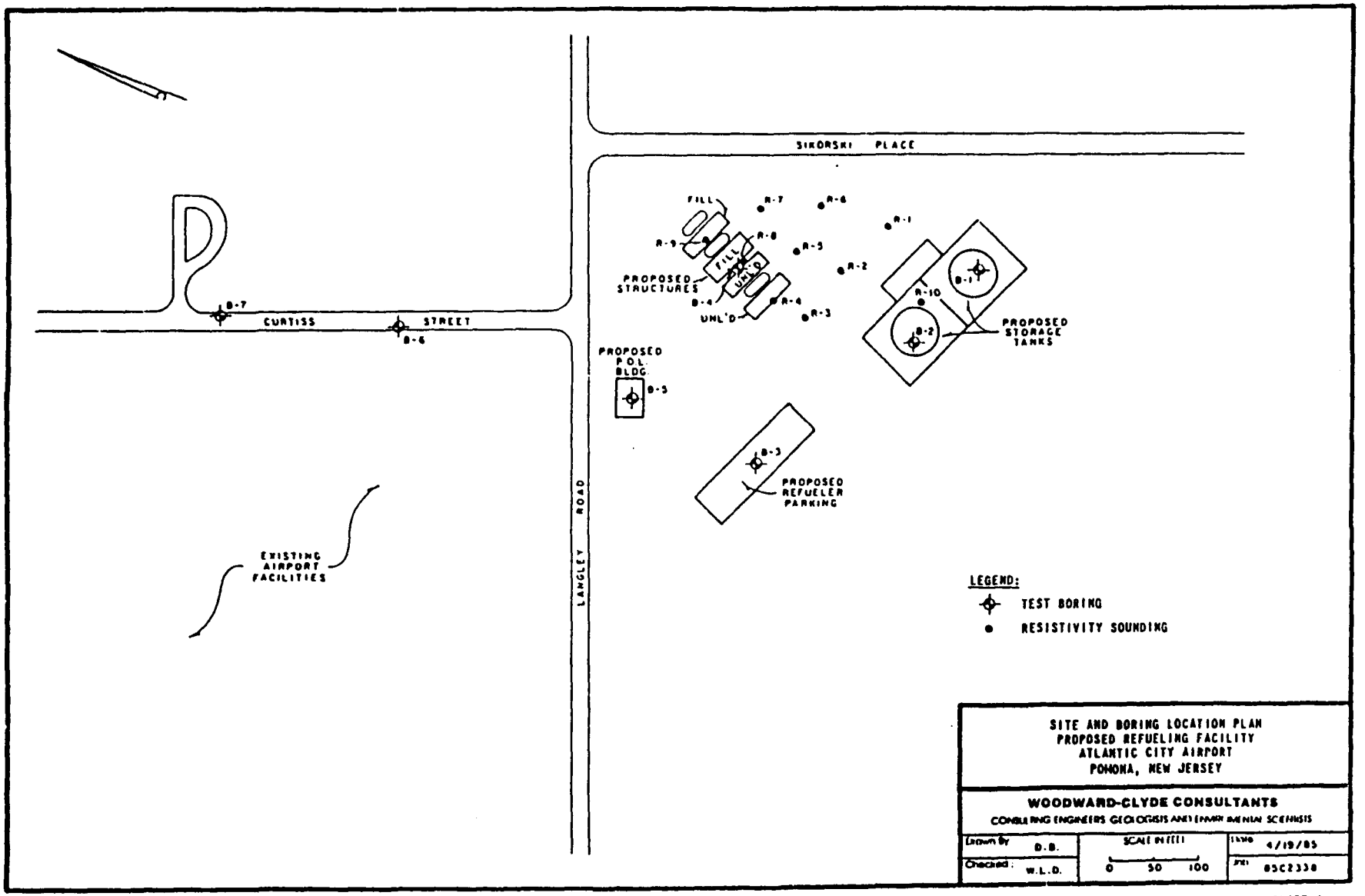
Subsurface Investigations



REGIONAL LOCATION PLAN

PLATE

G-1



SITE AND BORING LOCATION PLAN
PROPOSED REFUELING FACILITY
ATLANTIC CITY AIRPORT
POMONA, NEW JERSEY

WOODWARD-CLYDE CONSULTANTS
CONSULTING ENGINEERS GEOLOGISTS AND ENVIRONMENTAL SCIENTISTS

Drawn By: D.B.	SCALE IN FEET: 0 50 100	Date: 4/19/85
Checked: W.L.D.		Job: 85C2338

G-2

LOG of BORING No. B-1

DATE 4/16/85 SURFACE ELEVATION 48.0 LOCATION See Plate 2

DEPTH, ft.	SAMPLES	SAMPLING RESISTANCE	DESCRIPTION	ELEVATION	WATER CONTENT, %	LIQUID LIMIT, %	PLASTIC LIMIT, %	OTHER TESTS
0			Asphalt Pavement (2" surface course, 3" stone base course)	47.6				
		19	Very dense tan to gray medium to fine sand	44.0				
5		30						
		29	Dense to very dense orange-brown to tan clayey medium to fine sand, trace fine gravel					
10		16		34.0				
15		9	Stiff orange-brown to tan fine sandy silty clay	31.0				
20		63	Very dense orange-brown to gray medium to fine sand					
25		47						
30		51	-trace coarse sand and fine gravel					
35		67						
40		90						
45		74		1.5				

Completion Depth 46.5 Feet Water Depth - Feet Date 4/16/85

Project Name Air Natural Guard Refueling Facility Project Number 85C2338

Woodward-Clyde Consultants

LOG of BORING No. B-2

DATE 4/16/85 SURFACE ELEVATION 52.2 LOCATION See Plate 2

DEPTH, ft.	SAMPLES	SAMPLING RESISTANCE	DESCRIPTION	ELEVATION	WATER CONTENT, %	LIQUID LIMIT, %	PLASTIC LIMIT, %	OTHER TESTS
0								
		12			26.9			
5		13			15.0			
			6" topsoil and rootmass underlain by					
		24	medium dense to very dense tan to gray		19.0			M
10			medium to fine sandy clayey silt/silty					
		21	clayey medium to fine sand, trace coarse		18.7			
			sand and coarse to fine gravel					
15		17			20.1			
				33.2				
20		12	Stiff orange-brown and gray mottled fine		29.4	36	21	
			sandy silty clay	29.2				
25		70			18.6			
30		65						
			Very dense orange-brown, tan and gray					
35		114	medium to fine sand, trace coarse sand					
			and fine gravel					
40		119						
45		98		5.7				

Completion Depth 46.5 Feet Water Depth - Feet Date 4/16/85

Project Name Air National Guard Refueling Facility Project Number 85C2338

Woodward-Clyde Consultants

LOG of BORING No. B-3

DATE 4/16/85 SURFACE ELEVATION 55.3 LOCATION See Plate 2

DEPTH, ft.	SAMPLES	SAMPLING RESISTANCE	DESCRIPTION	ELEVATION	WATER CONTENT, %	LIQUID LIMIT, %	PLASTIC LIMIT, %	OTHER TESTS
0			2" Asphalt Pavement	55.1				
		38	Very dense brown silty coarse to fine sand and gravel (Probable Fill)	50.8				
5		34						
		37						
10		30						
			Medium dense brown becoming gray silty coarse to fine sand, trace fine gravel					
15		16						
20		12						
25		27		28.8				
30								

Completion Depth 26.5 Feet Water Depth 15.5 Feet Date 4/16/85

Project Name Air National Guard Refueling Facility Project Number 85C2338

Woodward-Clyde Consultants

LOG of BORING No. B-4

DATE 4/16/85 SURFACE ELEVATION 56.6 LOCATION See Plate 2

DEPTH, ft.	SAMPLES	SAMPLING RESISTANCE	DESCRIPTION	ELEVATION	WATER CONTENT, %	LIQUID LIMIT, %	PLASTIC LIMIT, %	OTHER TESTS
0								
		44	6" topsoil and rootmass underlain by brown silty coarse to fine sand and gravel					
5		30	(Probable Fill)	49.6				
		23	Medium dense to very dense orange-brown to tan silty coarse to fine sand					
10		16						
15		20	-with cobbles					
20		10						
25		11	Medium dense red to gray mottled silty medium to fine sand	30.6				
				30.1				
30								

Completion Depth 26.5 Feet Water Depth 21.0 Feet Date 4/16/85

Project Name Air National Guard Refueling Facility Project Number 85C2338

Woodward-Clyde Consultants

LOG of BORING No. B-5

DATE 4/16/85 SURFACE ELEVATION 59.1 LOCATION See Plate 2

DEPTH, ft.	SAMPLES	SAMPLING RESISTANCE	DESCRIPTION	ELEVATION	WATER CONTENT, %	LIQUID LIMIT, %	PLASTIC LIMIT, %	OTHER TESTS
0								
		40	8" topsoil and rootmass underlain by very dense brown silty coarse to fine sand and gravel		5.1			
5		82	(Probable Fill)	52.1	4.6			
		55			6.0			M
10		38			6.6			
			Medium dense to very dense tan becoming gray silty clayey coarse to fine sand, some fine gravel					
15		19			13.1			
20		11			18.4			
				36.1				
25		35	Very dense gray and orange-brown mottled silty medium to fine sand	32.6	26.0			
30								

Completion Depth 26.5 Feet Water Depth 20.5 Feet Date 4/16/85

Project Name Air National Guard Refueling Facility Project Number 85C2338

Woodward-Clyde Consultants

LOG of BORING No. B-6

DATE 4/16/85 SURFACE ELEVATION 57.8 LOCATION See Plate 2

DEPTH, ft.	SAMPLES	SAMPLING RESISTANCE	DESCRIPTION	ELEVATION	WATER CONTENT, %	LIQUID LIMIT, %	PLASTIC LIMIT, %	OTHER TESTS
0			Asphalt Pavement (2" surface course, 2" stone base course)	57.5				
		28	Very dense orange-brown clayey medium to fine sand	54.8				
		23						
5		35	Very stiff to hard gray, orange-brown and red mottled fine sandy clayey silt	50.8				
		52						
		39	Very dense orange-brown to gray silty medium to fine sand	47.8				
10								

Completion Depth 10.0 Feet Water Depth Dry Feet Date 4/16/85

Project Name Air National Guard Refueling Facility Project Number 85C2338

Woodward-Clyde Consultants

LOG of BORING No. B-7

DATE 4/16/85 SURFACE ELEVATION 60.7 LOCATION See Plate 2

DEPTH, ft.	SAMPLES	SAMPLING RESISTANCE	DESCRIPTION	ELEVATION	WATER CONTENT, %	LIQUID LIMIT, %	PLASTIC LIMIT, %	OTHER TESTS
0			Asphalt Pavement (2.5"surface course, 3" stone base course)	60.2				
		57	Very dense brown silty coarse to fine gravelly coarse to fine sand	58.7	6.6			
		10	Medium dense becoming loose brown silty clayey coarse to fine sand, some fine gravel		8.5			M
5		3		54.7	9.0			
		9	Stiff brown fine sandy silty clay	52.7	11.2	23	15	
		18	Dense brown silty medium to fine sand	50.7	9.9			
10								

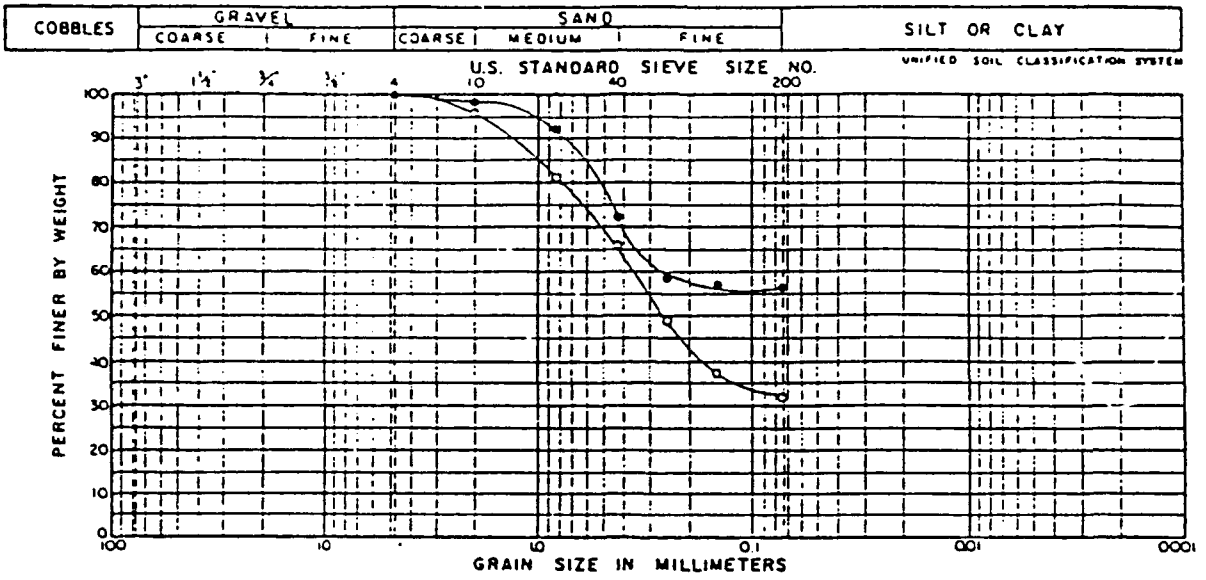
Completion Depth 10.0 Feet Water Depth Dry Feet Date 4/16/85

Project Name Air National Guard Refueling Facility Project Number 85C2338

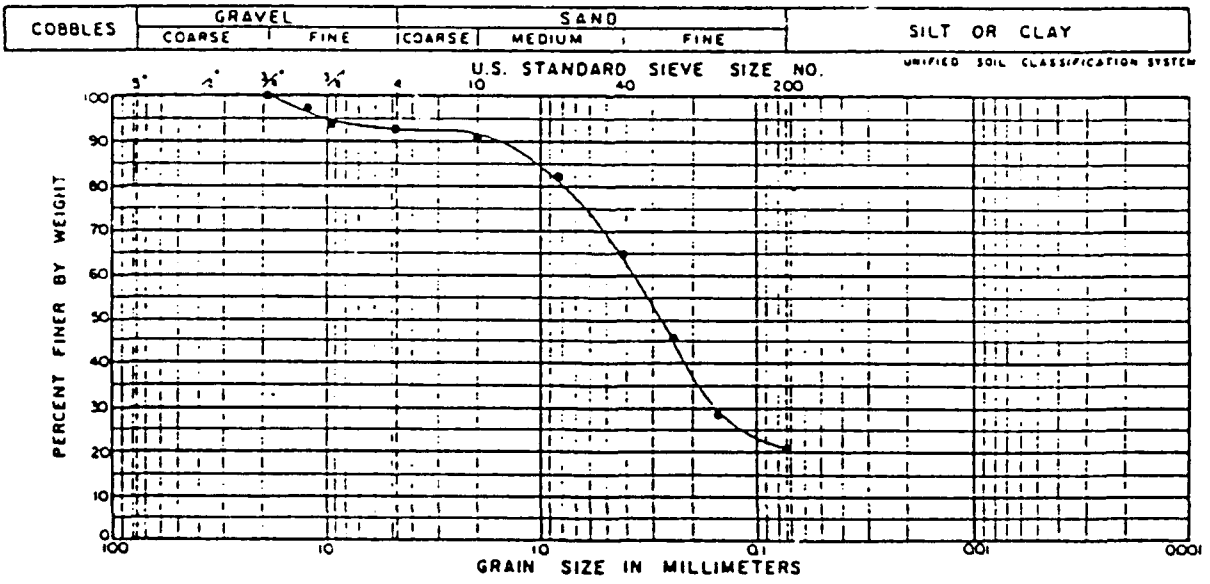
Woodward-Clyde Consultants

GRADATION CURVES

PROJECT NO.: 85C2338



BORING	SAMPLE	DEPTH	SYMBOL	CLASSIFICATION	MC	LL	PL
B-2	S-3	8.0-9.5	•	Tan medium to fine sandy clayey silt, trace coarse sand	19.0		
B-5	S-3	8.0-9.5	o	Tan silty clayey coarse to fine sand	6.0		



BORING	SAMPLE	DEPTH	SYMBOL	CLASSIFICATION	MC	LL	PL
B-7	S-2	2.0-4.0	•	Brown silty clayey coarse to fine sand, some fine gravel	8.5		

PROJECT:

Appendix H

Pest Management Program

PEST MANAGEMENT PROGRAM

Programs involving pesticides must comply with state and federal Environmental Protection Agency (EPA) regulations. The Base has a Pest Management Program by which a contractor provides necessary pest control services. This contractor has been certified to select, handle, and apply pesticides.

A variety of pesticides are used to control ants, roaches, mice, and other nuisance pests. Please refer to the following pages for pesticides used and their controls. All pesticides used on the Base have been approved by the Air National Guard. Pest control is provided on an as-needed basis. Wastes resulting from pest control services are disposed of by the contractor.

Table K-D

US AIR FORCE PEST MANAGEMENT PROGRAM REVIEW	INSTALLATION	COMMAND	DATE 10/13/92
	PERSON TO CONTACT/AUTOVON NO.		

REFER TO AFR 91-21 BEFORE COMPLETION

OBJECTIVE	1. a. Project No. b. Target Pest c. Purpose *(Specify)*	Ants, Cockroaches, Earwigs, Spiders, Crickets, Clover Mites, Fleas, Sowbugs, Ticks, Waterbugs, Silverfish
PESTICIDE	2. a. Active Ingredient(s) b. Trade Name c. Manufacturer d. EPA Registration No. e. Concentration	Baygon 70% WP - 2 - (1methylethoxy) Phenolmethyl-Carbamate 70% Mobay Chemicals Corp. EPA #3125-146-AA .5%/1.1%
APPLICATION	3. a. Form Applied *(dust, emulsion, gas, etc.)* b. Diluent	Liquid Spray
	4. a. Contract or In-house Application	
	5. a. Method *(aerial, ground, manual, etc.)*	Manual Compressed Air Spray
	6. a. Acres or Other Units to be Treated b. Number of Applications c. Number of Sites d. Specific Identity of Sites	Interior/Exterior Treatment
	7. a. Month(s) of Year b. State	Year Round
SENSITIVE AREAS	8. a. Areas to be Avoided b. Areas to be Treated with Caution *(croplands, lakes, streams, food, human exposure, endangered species, etc.)*	Open Food/Water Stores
REMARKS	9. a. Precautions to be Taken b. State and Local Coordination c. Other	No Protection Necessary
	10. Cost (if by Contract)	

US AIR FORCE PEST MANAGEMENT PROGRAM REVIEW

INSTALLATION	COMMAND	DATE

PERSON TO CONTACT/AUTOVON NO.

REFER TO AFR 91-21 BEFORE COMPLETION

OBJECTIVE	1. a. Project No. b. Target Pest c. Purpose *(Specify)*	Cockroaches, Earwigs, Crickets, Sowbugs, Millipedes, Centipedes, Booklice, Silverfish, Ants, Grain Weevils, Beetles, Boxelder Bugs, Clovermites, Carpenter Ants, Car Carpender Bees, Termites
PESTICIDE	2. a. Active Ingredient(s) b. Trade Name c. Manufacturer d. EPA Registration No. e. Concentration	Perma Dust PT240 - Boricacid 20% Whitmire Research Labs EPA# 499-220-AA
APPLICATION	3. a. Form Applied *(dust, emulsion, gas, etc.)* b. Diluent	Crack & Crevice System
	4. a. Contract or In-house Application	
	5. a. Method *(aerial, ground, manual, etc.)*	Manual Aersol Spray
	6. a. Acres or Other Units to be Treated b. Number of Applications c. Number of Sites d. Specific Identity of Sites	Interior Crack & Crevice
	7. a. Month(s) of Year b. State	Year Round
SENSITIVE AREAS	8. a. Areas to be Avoided b. Areas to be Treated with Caution *(croplands, lakes, streams, food, human exposure, endangered species, etc.)*	Only Cracks & C[illegible]vices treated all other areas avoided
REMARKS	9. a. Precautions to be Taken b. State and Local Coordination c. Other	No Protection Necessary
	10. Cost (if by Contract)	

US AIR FORCE PEST MANAGEMENT PROGRAM REVIEW	INSTALLATION	COMMAND	DATE
	PERSON TO CONTACT/AUTOVON NO.		

REFER TO AFR 91-21 BEFORE COMPLETION

OBJECTIVE	1. a. Project No. b. Target Pest c. Purpose *(Specify)*	Cockroaches, Spiders, Earwigs, Crickets, Sowbugs, Millipedes, Centipedes, Silverfish, Ants, Gants, Weevils, Beetles, Boxelder Bugs, Clover Mites, Carpenter Ants, Carpenter Bees, Termites
PESTICIDE	2. a. Active Ingredient(s) b. Trade Name c. Manufacturer d. EPA Registration No. e. Concentration	Baygon PT250 - O- isopropoxyphenyl methylcarbamute 1% Whitmire Research Labs EPA #499-157-ZA
APPLICATION	3. a. Form Applied *(dust, emulsion, gas, etc.)* b. Diluent	Crack & Crevice System
	4. a. Contract or In-house Application	
	5. a. Method *(aerial, ground, manual, etc.)*	Manual Aersol Spray
	6. a. Acres or Other Units to be Treated b. Number of Applications c. Number of Sites d. Specific Identity of Sites	Interior Crack & Crevice Areas
	7. a. Month(s) of Year b. State	Year Round
SENSITIVE AREAS	8. a. Areas to be Avoided b. Areas to be Treated with Caution *(croplands, lakes, streams, food, human exposure, endangered species, etc.)*	Only Cracks & Crevices treated all other areas avoided
REMARKS	9. a. Precautions to be Taken b. State and Local Coordination c. Other	No Protection Necessary
	10. Cost (if by Contract)	

US AIR FORCE PEST MANAGEMENT PROGRAM REVIEW

INSTALLATION	COMMAND	DATE

PERSON TO CONTACT/AUTOVON NO.

REFER TO AFR 91-21 BEFORE COMPLETION

OBJECTIVE	1. a. Project No. b. Target Pest c. Purpose *(Specify)*	Fogger for All Insects
PESTICIDE	2. a. Active Ingredient(s) b. Trade Name c. Manufacturer d. EPA Registration No. e. Concentration	Pyrethrum Pt565- Pyrethins - 500% technical Piperonyl Butoxide 1.00%, N-Octyl bicyclole, otene dicarboximide 1.00% Refined pertrleum oil 8.000% Whitmire Research Labs EPA #499-1822A
APPLICATION	3. a. Form Applied *(dust, emulsion, gas, etc.)* b. Diluent	Fogger
	4. a. Contract or In-house Application	
	5. a. Method *(aerial, ground, manual, etc.)*	Manual Aersol Spray
	6. a. Acres or Other Units to be Treated b. Number of Applications c. Number of Sites d. Specific Identity of Sites	Any Interior Area that needs Fogging
	7. a. Month(s) of Year b. State	Year Round
SENSITIVE AREAS	8. a. Areas to be Avoided b. Areas to be Treated with Caution *(croplands, lakes, streams, food, human exposure, endangered species, etc.)*	Open food/water stores
REMARKS	9. a. Precautions to be Taken b. State and Local Coordination c. Other	No Protection Necessary
	10. Cost (If by Contract)	

US AIR FORCE PEST MANAGEMENT PROGRAM REVIEW

INSTALLATION	COMMAND	DATE

PERSON TO CONTACT/AUTOVON NO.

REFER TO AFR 91-21 BEFORE COMPLETION

OBJECTIVE	1. a. Project No. b. Target Pest c. Purpose *(Specify)*	Fleas, Mosquitoes, Gants, Wasps, Cockroaches, Waterbugs, Ants, Silverfish, Spiders, Crickets, Centipedes, Millipe Fleas, Moths, Clovermites, Beetles, Weevils, Mites
PESTICIDE	2. a. Active Ingredient(s) b. Trade Name c. Manufacturer d. EPA Registration No. e. Concentration	Aerocide P73-6-10 Pyrethrins 1.00%, Piperonyl Butoxide, Techmical 2.00%, N-OctylBicyclohentence Dicarboximide 3.33% Retind Petroleum Oil 8.00% Whitmire Research Labs EPA #499-221-AA
APPLICATION	3. a. Form Applied *(dust, emulsion, gas, etc.)* b. Diluent	Fogger
	4. a. Contract or In-house Application	
	5. a. Method *(aerial, ground, manual, etc.)*	Manual Aerosol Spray
	6. a. Acres or Other Units to be Treated b. Number of Applications c. Number of Sites d. Specific Identity of Sites	Any Interior area that needs fogging
	7. a. Month(s) of Year b. State	Year Round
SENSITIVE AREAS	8. a. Areas to be Avoided b. Areas to be Treated with Caution *(croplands, lakes, streams, food, human exposure, endangered species, etc.)*	Open Food/Water Stores
REMARKS	9. a. Precautions to be Taken b. State and Local Coordination c. Other	No Protection Necessary
	10. Cost (if by Contract)	

US AIR FORCE PEST MANAGEMENT PROGRAM REVIEW

INSTALLATION	COMMAND	DATE

PERSON TO CONTACT/AUTOVON NO.

REFER TO AFR 91-21 BEFORE COMPLETION

OBJECTIVE	1. a. Project No. b. Target Pest c. Purpose *(Specify)*	Cockroaches
PESTICIDE	2. a. Active Ingredient(s) b. Trade Name c. Manufacturer d. EPA Registration No. e. Concentration	Maxforce - Tetrahydro-5,5-dimethyl-z(1H)-phyrimidinere (3-(4-(trifluoromethyl)phenyl-1-(2-(4herfluoromethyl) phenyl)-etheryl)-2-propenylidene)hydrazone 1.65% Cynmamid EPA #241-267
APPLICATION	3. a. Form Applied *(dust, emulsion, gas, etc.)* b. Diluent	Perment Placement
	4. a. Contract or In-house Application	
	5. a. Method *(aerial, ground, manual, etc.)*	
	6. a. Acres or Other Units to be Treated b. Number of Applications c. Number of Sites d. Specific Identity of Sites	Any Interior Area
	7. a. Month(s) of Year b. State	Year round
SENSITIVE AREAS	8. a. Areas to be Avoided b. Areas to be Treated with Caution *(croplands, lakes, streams, food, human exposure, endangered species, etc.)*	None
REMARKS	9. a. Precautions to be Taken b. State and Local Coordination c. Other	None
	10. Cost (if by Contract)	

US AIR FORCE PEST MANAGEMENT PROGRAM REVIEW

INSTALLATION	COMMAND	DATE

PERSON TO CONTACT/AUTOVON NO.

REFER TO AFR 91-21 BEFORE COMPLETION

OBJECTIVE	1. a. Project No. b. Target Pest c. Purpose *(Specify)*	Rats & Mice
PESTICIDE	2. a. Active Ingredient(s) b. Trade Name c. Manufacturer d. EPA Registration No. e. Concentration	Contrac 3-(3-) 4 Bromo-(1,1-biphenyl)-4-yl)-3 Hydroxyl - 1-phenylpropyl) - 4 hydroxy 2 H -1- benzopyianz-one .005% Bell Labs EPA #12455-36
APPLICATION	3. a. Form Applied *(dust, emulsion, gas, etc.)* b. Diluent	Packets placed in rodent areas
	4. a. Contract or In-house Application	
	5. a. Method *(aerial, ground, manual, etc.)*	
	6. a. Acres or Other Units to be Treated b. Number of Applications c. Number of Sites d. Specific Identity of Sites	Interior any rodent infested area
	7. a. Month(s) of Year b. State	Year Round
SENSITIVE AREAS	8. a. Areas to be Avoided b. Areas to be Treated with Caution *(croplands, lakes, streams, food, human exposure, endangered species, etc.)*	Open Food/Water.Stores - Children, Pets
REMARKS	9. a. Precautions to be Taken b. State and Local Coordination c. Other	None
	10. Cost (if by Contract)	

US AIR FORCE PEST MANAGEMENT PROGRAM REVIEW

INSTALLATION	COMMAND	DATE

PERSON TO CONTACT/AUTOVON NO.

REFER TO AFR 91-21 BEFORE COMPLETION

OBJECTIVE	1. a. Project No. b. Target Pest c. Purpose *(Specify)*	Rats & Mice
PESTICIDE	2. a. Active Ingredient(s) b. Trade Name c. Manufacturer d. EPA Registration No. e. Concentration	Talon - 3 - (3- (4 biomo-(1,1biphenyl) -4-yl)-1,2,3,4, tetrahydro 1-naphthalenyl) 4-hydiory ZH-1 benzopyran -2-one .005% ICI Americas Inc. EPA#10182-48
APPLICATION	3. a. Form Applied *(dust, emulsion, gas, etc.)* b. Diluent	Bait Packets
	4. a. Contract or In-house Application	
	5. a. Method *(aerial, ground, manual, etc.)*	Manual
	6. a. Acres or Other Units to be Treated b. Number of Applications c. Number of Sites d. Specific Identity of Sites	Any Rodent Infested Area
	7. a. Month(s) of Year b. State	Year Round
SENSITIVE AREAS	8. a. Areas to be Avoided b. Areas to be Treated with Caution *(croplands, lakes, streams, food, human exposure, endangered species, etc.)*	Open Food/Water Stores Children Pets
REMARKS	9. a. Precautions to be Taken b. State and Local Coordination c. Other	None
	10. Cost (if by Contract)	

US AIR FORCE PEST MANAGEMENT PROGRAM REVIEW	INSTALLATION	COMMAND	DATE
	PERSON TO CONTACT/AUTOVON NO.		

REFER TO AFR 91-21 BEFORE COMPLETION

OBJECTIVE	1. a. Project No. b. Target Pest c. Purpose *(Specify)*	Pests-Cockroaches, Ants, Crickets, Firebrats, Pillbugs, Sowbugs, Silverfish, Carpenter Ants, Spiders, Fleas, Beetles, Boxelder Bugs, Pantry Pest
PESTICIDE	2. a. Active Ingredient(s) b. Trade Name c. Manufacturer d. EPA Registration No. e. Concentration	Safrotin - Propetamphos ((E) - 1 - methylethyl 3 - (ethylamino) Methoxyphorphinothioyl) - 2 - Butenonte - 50% Zoecon PPM D 11273-22 E 2.5%/1 gal water 1.0%
APPLICATION	3. a. Form Applied *(dust, emulsion, gas, etc.)* b. Diluent	Liquid Spray Water
	4. a. Contract or In-house Application	
	5. a. Method *(aerial, ground, manual, etc.)*	Manual
	6. a. Acres or Other Units to be Treated b. Number of Applications c. Number of Sites d. Specific Identity of Sites	Interior Treatment by Pinstream
	7. a. Month(s) of Year b. State	Year Round
SENSITIVE AREAS	8. a. Areas to be Avoided b. Areas to be Treated with Caution *(croplands, lakes, streams, food, human exposure, endangered species, etc.)*	Open Food Stores Open Water Stores
REMARKS	9. a. Precautions to be Taken b. State and Local Coordination c. Other	No Protection Necessary
	10. Cost (if by Contract)	

US AIR FORCE PEST MANAGEMENT PROGRAM REVIEW	INSTALLATION	COMMAND	DATE
	PERSON TO CONTACT/AUTOVON NO.		

REFER TO AFR 91-21 BEFORE COMPLETION

OBJECTIVE	1. a. Project No. b. Target Pest c. Purpose *(Specify)*	Ants, Ticks, Beetles, Centipedes, CloverMites, Cockroach Crickets, Earwigs, Firebrats, Fleas, Pantry Pests, Silverfirsh, Spiders
PESTICIDE	2. a. Active Ingredient(s) b. Trade Name c. Manufacturer d. EPA Registration No. e. Concentration	Dursban ME - Chlorpyrites (O,V - diethylo - (3,5,6, Trichloro 2 - pyridyl) - 11.7% Dow Chemical .5% EPA #464-601 .25%
APPLICATION	3. a. Form Applied *(dust, emulsion, gas, etc.)* b. Diluent	Liquid Spray
	4. a. Contract or In-house Application	
	5. a. Method *(aerial, ground, manual, etc.)*	Manual Compressed Air Sprayer
	6. a. Acres or Other Units to be Treated b. Number of Applications c. Number of Sites d. Specific Identity of Sites	Interior/Exterior by Pinstream
	7. a. Month(s) of Year b. State	Year Round
SENSITIVE AREAS	8. a. Areas to be Avoided b. Areas to be Treated with Caution *(croplands, lakes, streams, food, human exposure, endangered species, etc.)*	Open Water Stores Open Food Stores
REMARKS	9. a. Precautions to be Taken b. State and Local Coordination c. Other	No Protection Necessary
	10. Cost (If by Contract)	

US AIR FORCE PEST MANAGEMENT PROGRAM REVIEW

INSTALLATION	COMMAND	DATE

PERSON TO CONTACT/AUTOVON NO.

REFER TO AFR 91-21 BEFORE COMPLETION

OBJECTIVE	1. a. Project No. b. Target Pest c. Purpose *(Specify)*	Ants, Crickets, Cockroaches, Firebrats, Silverfish, Sp: Pantry Pests, Fleas, Ticks, Beetles.
PESTICIDE	2. a. Active Ingredient(s) b. Trade Name c. Manufacturer d. EPA Registration No. e. Concentration	Dursban Lo - Chlorphritos (0,0 Diethylo 3,5,6, Trich: 2 pyerdyl phosphomethloate) 42.0% Dow Chemical EPA #464571 .25% - .5%
APPLICATION	3. a. Form Applied *(dust, emulsion, gas, etc.)* b. Diluent	Liquid Spray
	4. a. Contract or in-house Application	
	5. a. Method *(aerial, ground, manual, etc.)*	Manual Compressed Air Sprayer
	6. a. Acres or Other Units to be Treated b. Number of Applications c. Number of Sites d. Specific Identity of Sites	Interior/Exterior by pinstream
	7. a. Month(s) of Year b. State	Year Round
SENSITIVE AREAS	8. a. Areas to be Avoided b. Areas to be Treated with Caution *(croplands, lakes, streams, food, human exposure, endangered species, etc.)*	Open Food/Water Stores
REMARKS	9. a. Precautions to be Taken b. State and Local Coordination c. Other	No Protection Necessary
	10. Cost (if by Contract)	

US AIR FORCE PEST MANAGEMENT PROGRAM REVIEW	INSTALLATION	COMMAND	DATE
	PERSON TO CONTACT/AUTOVON NO.		

REFER TO AFR 91-21 BEFORE COMPLETION

OBJECTIVE	1. a. Project No. b. Target Pest c. Purpose *(Specify)*	Ants, Crickets, Silverfish, Firebrats, Cockroaches, Carpenter ants, Ticks, Fleas, Spiders, Wasps/bees, beetles, Panty Pests, Centipedes, Earwigs, Pillbugs
PESTICIDE	2. a. Active Ingredient(s) b. Trade Name c. Manufacturer d. EPA Registration No. e. Concentration	Ficam W - Bendiocarb (2, 2 Climethy 1 - 1.3 Benzodioxol 4 - yl methylcarbamate) 76% Noramchemical Company EPA #45639-1 .25% / .5%
APPLICATION	3. a. Form Applied *(dust, emulsion, gas, etc.)* b. Diluent	Liquid Spray
	4. a. Contract or In-house Application	
	5. a. Method *(aerial, ground, manual, etc.)*	Manual Compressed Air Sprayer
	6. a. Acres or Other Units to be Treated b. Number of Applications c. Number of Sites d. Specific Identity of Sites	Interior/Exterior Treatment
	7. a. Month(s) of Year b. State	Year Round
AREAS	8. a. Areas to be Avoided b. Areas to be Treated with Caution *(croplands, lakes, streams, food, human exposure, endangered species, etc.)*	Open/Food/Water Stores
	9. a. Precautions to be Taken b. State and Local Coordination c. Other	No Protection Necessary
	10. Cost (if by Contract)	

US AIR FORCE PEST MANAGEMENT PROGRAM REVIEW	INSTALLATION	COMMAND	DATE
	PERSON TO CONTACT/AUTOVON NO.		

REFER TO AFR 91-21 BEFORE COMPLETION

OBJECTIVE	1. a. Project No. b. Target Pest c. Purpose *(Specify)*	Cockroaches
PESTICIDE	2. a. Active Ingredient(s) b. Trade Name c. Manufacturer d. EPA Registration No. e. Concentration	Gencor-Hydroprene Ethyl (E,E)- 37,11, Trimethyl-Z 4-dodecudienoute - 65.5% Zoecon PPM EPA#2724-304-50809
APPLICATION	3. a. Form Applied *(dust, emulsion, gas, etc.)* b. Diluent	Liquid Spray
	4. a. Contract or In-house Application	
	5. a. Method *(aerial, ground, manual, etc.)*	Manual Compressed Air Sprayer
	6. a. Acres or Other Units to be Treated b. Number of Applications c. Number of Sites d. Specific Identity of Sites	Interior Treatment
	7. a. Month(s) of Year b. State	Year Round
SENSITIVE AREAS	8. a. Areas to be Avoided b. Areas to be Treated with Caution *(croplands, lakes, streams, food, human exposure, endangered species, etc.)*	Open Food/Water Stores
REMARKS	9. a. Precautions to be Taken b. State and Local Coordination c. Other	No Protection Necessary
	10. Cost (if by Contract)	

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US AIR FORCE PEST MANAGEMENT PROGRAM REVIEW	INSTALLATION	COMMAND	DATE
	PERSON TO CONTACT/AUTOVON NO.		

REFER TO AFR 91-21 BEFORE COMPLETION

OBJECTIVE	1. a. Project No. b. Target Pest c. Purpose *(Specify)*	Fleas
PESTICIDE	2. a. Active Ingredient(s) b. Trade Name c. Manufacturer d. EPA Registration No. e. Concentration	Precor SE (Methoprene Isopropy (E,E)-11-Methoxy-3,7,11-Trimethyl-2,4-dodecadienoate 65.7% Zoecon Corp. E.P.A.#2724-286-20954
APPLICATION	3. a. Form Applied *(dust, emulsion, gas, etc.)* b. Diluent	Liquid Spray
	4. a. Contract or In-house Application	
	5. a. Method *(aerial, ground, manual, etc.)*	Manual Compressed Aid Sprayer
	6. a. Acres or Other Units to be Treated b. Number of Applications c. Number of Sites d. Specific Identity of Sites	Interior Treatment/Exterior
	7. a. Month(s) of Year b. State	Year round
SENSITIVE AREAS	8. a. Areas to be Avoided b. Areas to be Treated with Caution *(croplands, lakes, streams, food, human exposure, endangered species, etc.)*	Open food/ Water/Electral Equ.
REMARKS	9. a. Precautions to be Taken b. State and Local Coordination c. Other 10. Cost (if by Contract)	No Protection Necessary

US AIR FORCE PEST MANAGEMENT PROGRAM REVIEW

INSTALLATION	COMMAND	DATE

PERSON TO CONTACT/AUTOVON NO.

REFER TO AFR 91-21 BEFORE COMPLETION

OBJECTIVE	1. a. Project No. b. Target Pest c. Purpose *(Specify)*	Ants, Cockroaches, Earwigs, Spiders, Crickets, Clover Mites, Fleas (outdoors), Ticks, Silverfish
PESTICIDE	2. a. Active Ingredient(s) b. Trade Name c. Manufacturer d. EPA Registration No. e. Concentration	Baygon 1.5 2-(1-methylethoxy) phenolmethylcarbanate 13.9 % Mobay Corp. E.P.A. #3125-214-ZA
APPLICATION	3. a. Form Applied *(dust, emulsion, gas, etc.)* b. Diluent	Liquid Spray
	4. a. Contract or In-house Application	
	5. a. Method *(aerial, ground, manual, etc.)*	Manual Compressed Sprayer
	6. a. Acres or Other Units to be Treated b. Number of Applications c. Number of Sites d. Specific Identity of Sites	Interior/Exterior Treatment
	7. a. Month(s) of Year b. State	Year round
SENSITIVE AREAS	8. a. Areas to be Avoided b. Areas to be Treated with Caution *(croplands, lakes, streams, food, human exposure, endangered species, etc.)*	Open Food/ Water/ Electrical/ Equ.
REMARKS	9. a. Precautions to be Taken b. State and Local Coordination c. Other	No Protection Necessary
	10. Cost (if by Contract)	

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US AIR FORCE PEST MANAGEMENT PROGRAM REVIEW

CHEMICALS USED

1. Baygon 70% WP
2. Perma Dust PT240
3. Baygon PT250
4. Pyrethrum Pt 565 - Pyrethins - 500%
5. Aerocide P73-6-10
6. Maxforce
7. Contrac
8. Talon
9. Safrotin
10. Dursban ME
11. Dursban Lo
12. Ficam W
13. Gencor - Hydroprene Ethyl
14. Precor SE
15. Baygon 1.5

Appendix I

Critical Habitats / Endangered or Threatened Species

EXPLANATION OF CODES ON NATURAL HERITAGE LIST

1. FEDERAL STATUS CODES

U.S.FISH AND WILDLIFE CATEGORIES OF ENDANGERED AND THREATENED PLANTS AND ANIMALS

The following definitions are extracted from the September 27, 1985 U.S. Fish and Wildlife Service notice in the Federal Register:

LE--Taxa formally listed as endangered.

LT--Taxa formally listed as threatened.

PE--Taxa proposed to be formally listed as endangered.

PT--Taxa proposed to be formally listed as threatened.

S --Synonyms.

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.

C2 --Taxa for which information now in possession of the Service indicates that proposing to list them as endangered or threatened species 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, usually as represented in published revisions and monographs, 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.

2. STATE STATUS CODES

These refer to State listed nongame animals and Pinelands listed plants:

D = declining
EX = extirpated
I = introduced
IN = increasing
LE = state listed as endangered
LP = plants listed by the N.J. Pinelands Commission
LT = state listed as threatened
P = peripheral
S = stable
SC = special concern
U = undetermined
U:SC = undetermined, of special concern

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.

3. EXPLANATION OF NATURAL HERITAGE PRIORITY ELEMENT RANKS

The Nature Conservancy has developed a rarity 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 it's rarity both in the state and globally. These ranks are used to prioritize conservation work so that the rarest most endangered elements receive attention first.

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; in terms of occurrences, in the range of 21 to 100.

G4 = Apparently secure globally, though it may be quite rare in parts of its range, especially at the periphery.

G5 = Demonstrably secure globally, though it may be quite rare in parts of its range, especially at the periphery.

*This ranking system is adapted from that which appears in 'The Nature Conservancy, 1988. Model Heritage Operations Manual. The Nature Conservancy. Arlington VA'.

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; need more information.

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 state 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 now through habitat destruction or some other critical factor of its biology have been demonstrably reduced in abundance. In essence, these are elements that even with intensive searching sizable additional occurrences are unlikely to be discovered.

S2 = Imperiled in state 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. Habitat destruction being the primary cause of their rarity. 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/acreages 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 = A species clearly exotic in New Jersey which includes those species not native to North America as well as any other species deliberately or accidentally introduced into the state and are therefore not a conservation priority (viable introduced occurrences of G1 or G2 elements may be exceptions).

SH = Despite some searching of both historic occurrences and suitable habitat, no extant occurrences are known. Not all historic occurrences have been checked, and unsearched potential habitat remains. Until all leads are reasonably exhausted, elements ranked SH are considered possibly extant. While the last observed dates for most elements ranked SH are 50 or more years old, elements observed much more recently are also included when the only known occurrences have been destroyed.

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 = Reported from the state, but without persuasive documentation which would provide a basis for either accepting or rejecting (e.g., misidentified specimen) the report. Some of these are very recent discoveries for which NJNHP has not yet received first-hand information; others are old, obscure reports that are hard to dismiss because the habitat is now destroyed.

SRF = Reported falsely (in error) from New Jersey but this error persisting in the literature.

SU = Believed to be in peril but status uncertain. More information is needed to rank accurately.

SX = Apparently extirpated from state. All historic occurrences checked and a thorough search of potential habitat completed. The localities for many of these elements have been destroyed or greatly altered.

SXC = Species is presumed extirpated from the state but native populations collected from wild exist in cultivation.

Note: A 'T' appearing in either the G Rank or S Rank, indicates that the infraspecific taxa is being ranked differently than the species. A 'Q' in the rank indicates That there is taxonomic uncertainty about the taxa being ranked (i.e., taxa is being accepted as full species in this list but may be treated as a subspecies taxa by others). 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).

4. IDENTIFICATION

This code refers to whether the identification of the species/community has been checked by a reliable individual and is indicative of significant habitat. Codes are as follows:

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/community may be confusing or disputed.

NEW JERSEY NATURAL HERITAGE PROGRAM
POTENTIAL THREATENED AND ENDANGERED VERTEBRATE SPECIES
IN ATLANTIC COUNTY

AMERICAN BITTERN BOTAURUS LENTIGINOSUS	FEDERAL STATUS: STATE STATUS: LT	COUNTY OCCURRENCE: Y

HABITAT COMMENTS
Fresh water bogs, swamps, wet fields, cattail and bulrush marshes, brackish and saltwater marshes and meadows.

BALD EAGLE HALIAEETUS LEUCOCEPHALUS	FEDERAL STATUS: LELT STATE STATUS: LE	COUNTY OCCURRENCE: W*

HABITAT COMMENTS
Primarily near seacoasts, rivers, and large lakes.

BARRED OWL STRIX VARIA	FEDERAL STATUS: STATE STATUS: LT	COUNTY 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 LATTERALLUS JAMAICENSIS	FEDERAL STATUS: STATE STATUS: LT	COUNTY OCCURRENCE: B

HABITAT COMMENTS
Salt, brackish, and freshwater marshes, wet meadows, and grassy swamps.

BLACK SKIMMER RYNCHOPS NIGER	FEDERAL STATUS: STATE STATUS: LE	COUNTY OCCURRENCE: B

HABITAT COMMENTS
Primarily coastal waters, including bays, estuaries, lagoons and mudflats in migration and winter.

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.

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BROOK TROUT SALVELINUS FONTINALIS	FEDERAL STATUS: STATE STATUS: LT	COUNTY OCCURRENCE: Y

HABITAT COMMENTS
Clear cool well-oxygenated streams and lakes. May move from streams into lakes or sea to avoid high temps. in summer.

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.

CORN SNAKE ELAPHE GUTTATA	FEDERAL STATUS: STATE STATUS: LE	COUNTY OCCURRENCE: Y

HABITAT COMMENTS
Rocky hillsides, meadows, along stream courses and river bottoms, canyons and arroyos, barnyards, abandoned houses and ranch buildings, near springs, in caves, wooded areas. Terrestrial, arboreal, and subterranean. Stays hidden by day.

GRASSHOPPER SPARROW AMMODRAMUS SAVANNARUM	FEDERAL STATUS: STATE STATUS: LT	COUNTY OCCURRENCE: Y

HABITAT COMMENTS
Prairie, old fields, open grasslands, cultivated fields, savanna.

GREAT BLUE HERON ARDEA HERODIAS	FEDERAL STATUS: STATE STATUS: LT	COUNTY OCCURRENCE: Y

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)."

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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.

PEREGRINE FALCON	FEDERAL STATUS: LE	COUNTY
FALCO PEREGRINUS	STATE STATUS: LE	OCCURRENCE: Y

HABITAT COMMENTS
"A variety of open situations from tundra, moorlands, steppe and seacoasts, especially where there are suitable nesting cliffs, to high mountains, more open forested regions, and even human population centers...".

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.

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PINE BARRENS TREEFROG HYLA ANDERSONII	FEDERAL STATUS: C2 STATE STATUS: LE	COUNTY OCCURRENCE: Y

HABITAT COMMENTS
Streams, ponds, cranberry bogs, and other wetland habitats. Post-breeding habitat the woodlands bordering these areas.

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-HEADED WOODPECKER MELANERPES ERYTHROCEPHALUS	FEDERAL STATUS: STATE STATUS: LT	COUNTY OCCURRENCE: Y

HABITAT COMMENTS
Open woodland, especially with beech or oak, open situations with scattered trees, parks, cultivated areas and gardens.

RED-SHOULDERED HAWK BUTEO LINEATUS	FEDERAL STATUS: STATE STATUS: LT	COUNTY OCCURRENCE: W*

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: ?

HABITAT COMMENTS
Seacoasts, bays, estuaries.

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SAVANNAH SPARROW	FEDERAL STATUS:	COUNTY
PASSERCULUS SANDWICHENSIS	STATE STATUS: LT	OCCURRENCE: W*

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)".

SEDGE WREN	FEDERAL STATUS:	COUNTY
CISTOTHORUS PLATENSIS	STATE STATUS: LE	OCCURRENCE: ?

HABITAT COMMENTS
Grasslands and savanna, especially where wet or boggy, sedge marshes, locally in dry cultivated grainfields. In migration and winter also in brushy grasslands.

SHORT-EARED OWL	FEDERAL STATUS:	COUNTY
ASIO FLAMMEUS	STATE STATUS: LE/S	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.

TIGER SALAMANDER	FEDERAL STATUS:	COUNTY
AMBYSTOMA TIGRINUM	STATE STATUS: LE	OCCURRENCE: Y

HABITAT COMMENTS
Found in virtually any habitat, providing there is a body of water nearby suitable for breeding. Terrestrial adults primarily subterranean.

TIMBER RATTLESNAKE	FEDERAL STATUS:	COUNTY
CROTALUS HORRIDUS	STATE STATUS: LE	OCCURRENCE: ?

HABITAT COMMENTS
Wooded rocky hillsides in north; swampy areas, canebrake thickets, and floodplains in south. Near streams in late summer in some areas. Often hibernates in burrows and crevices of rock outcroppings.

UPLAND SANDPIPER	FEDERAL STATUS:	COUNTY
BARTRAMIA LONGICAUDA	STATE STATUS: LE	OCCURRENCE: Y

HABITAT COMMENTS
Grasslands, especially prairies, dry meadows, pastures, and (in Alaska) scattered woodlands at timberline; very rarely in migration along shores and mudflats.

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VESPER SPARROW	FEDERAL STATUS:	COUNTY
POOECETES GRAMINEUS	STATE STATUS: LE	OCCURRENCE: Y

HABITAT COMMENTS
"Plains, prairie, dry shrublands, savanna, weedy pastures, fields, sagebrush, arid scrub and woodland clearings".

YELLOW-CROWNED NIGHT-HERON	FEDERAL STATUS:	COUNTY
NYCTICORAX VIOLACEUS	STATE STATUS: LT	OCCURRENCE: B

HABITAT COMMENTS
Marshes, swamps, lakes, lagoons, and mangroves.

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.

New Jersey Natural Heritage Program

Office of Natural Lands Management
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(609) 984-1339
CN 404, TRENTON, NEW JERSEY 08625

May 10, 1989

Tracy C. Brown
Science and Technology, Inc.
704 S. Illinois Ave., Suite C-103
Oak Ridge, Tennessee 37830

Re: 177th Fighter Interceptor Group
Base Study Site

Dear Mr. Brown:

Thank you for your data request regarding rare species information for the above referenced project site in Egg Harbor, Hamilton and Galloway Twps., Atlantic County.

The Natural Heritage Data Base has records for a number of rare species which may be found on, or within one mile of, the bases. Several grassland bird species have been documented from this area including: grasshopper sparrows, upland sandpipers and vesper sparrows. There are also records for historic occurrences of Calamovilfa brevipilis, Gentiana autumnalis, Gnaphalium helleri and Rhynchospora pallida which may have been collected within the study site. If suitable habitat is present, these species may still be extant. The attached list provides additional information about these occurrences.

In addition, there are records for red-headed woodpeckers and a great blue heron rookery which may occur just outside the study site boundary, between one and two miles from the bases. The attached list provides more information. Finally, enclosed is a list of rare vertebrates of Atlantic County together with a description of their habitats. If suitable habitat is present at the project site, these species would have potential to be present. For additional information on these or other vertebrate animals, we recommend you contact the DEP Division of Fish, Game, and Wildlife.

PLEASE SEE THE ATTACHED 'CAUTIONS AND RESTRICTIONS ON NHP DATA'.

The Natural Heritage Program grants you permission to publish this data provided that the information is published in its entirety and without alterations.

Thank you for consulting the Natural Heritage Program. The fee to cover the cost of processing this data request is $30.00. Please make payment payable to the Nature Conservancy-NJ Natural Heritage Program. We do not have an official billing invoice. Please consider this letter to be an official bill. Please feel free to contact us again regarding any future data requests.

Sincerely,

Thomas F. Breden

Thomas F. Breden
Coordinator/Ecologist

cc: JoAnn Frier-Murza
Thomas Hampton

NATURAL LANDS MANAGEMENT

CAUTIONS AND RESTRICTIONS ON NATURAL HERITAGE DATA

The quantity and quality of data collected by the Natural Heritage Program is dependent on the research and observations of many individuals and organizations. Not all of this information is the result of comprehensive or site-specific field surveys. Some natural areas in New Jersey have never been thoroughly surveyed. As a result, new locations for plant and animal species are continuously added to the data base. Since data acquisition is a dynamic, ongoing process, this Office cannot provide a definitive statement on the presence, absence, or condition of biological elements in any part of New Jersey. Information supplied by the Natural Heritage Program summarizes existing data known to the program at the time of the request regarding the biological elements or location in question. The information should never be regarded as final statements on the elements or areas being considered, nor should they be substituted for on-site surveys required for environmental assessments. The attached data is provided as one source of information to assist others in the preservation of natural diversity.

This office cannot provide a letter of interpretation or a statement addressing the classification of wetlands as defined by the Freshwater Wetlands Act. Requests for such determination should be sent to the DEP Division of Coastal Resources, Bureau of Freshwater Wetlands, CN 402, Trenton, NJ 08625.

Information provided by this database may not be published without first obtaining the written permission of the Office of Natural Lands Management. In addition, the Natural Heritage Program must be credited as an information source in any publication of data.