ENVIRONMENTAL RESTORATION PROGRAM

FINAL
NO FURTHER RESPONSE ACTION PLANNED
DECISION DOCUMENT

SITE 1 – AVIATION GASOLINE SPILL SITE

106TH RESCUE WING
NEW YORK AIR NATIONAL GUARD
FRANCIS S. GABRESKI AIRPORT
WESTHAMPTON BEACH, NEW YORK

SEPTEMBER 2005

AIR NATIONAL GUARD

PEER
CONSULTANTS, P.C.
EST. 1978

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SEPTEMBER 2005

Prepared by

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Prepared for the

Air National Guard/CEVR
Andrews Air Force Base, Maryland
Under National Guard Bureau Contract DAHA92-01-D-0004
Delivery Order 0011

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LIST OF ACRONYMS

ABB-ES	ABB–Environmental Services, Inc.
ALM	Adult Lead Methodology
ANG	Air National Guard
AVGAS	Aviation Gasoline
BEHP	bis(2-ethylhexyl)phthalate
BGS	Below Ground Surface
BTEX	Benzene, toluene, ethylbenzene, and xylenes
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
COPCs	Contaminants of Potential Concern
CRP	Community Relations Plan
DD	Decision Document
DP	Direct-Push Probe
DRO	Diesel Range Organics
EPA	Environmental Protection Agency
ERP	Environmental Restoration Program
GAB	Gabreski
GRO	Gasoline Range Organics
GW	Groundwater
HAZWRAP	Hazardous Waste Removal Actions Program
HMTC	Hazardous Materials Technical Center
HSA	Hollow Stem Auger
LIRR	Long Island Railroad
MCL	Maximum Contaminant Level
MW	Monitoring Well
NCP	National Oil and Hazardous Substances Pollution Contingency Plan
NFRAP	No Further Response Action Planned
NYS	New York State
NYSDEC	New York State Department of Environmental Conservation
106th RQW	106th Rescue Wing
PAH	Polynuclear Aromatic Hydrocarbons
PEER	PEER Consultants, P.C.
PID	Photoionization Detector
POL	Petroleum Oil and Lubricants
PW	Direct-Push Groundwater
QA/QC	Quality Assurance/Quality Control
RI	Remedial Investigation
RAG	Risk Assessment Guidance
RSCO	Recommended Soil Cleanup Objective
SARA	Superfund Amendments and Reauthorization Act
S1	Site 1
SB	Soil Boring
SCDHS	Suffolk County Department of Health Services
SI	Site Investigation

LIST OF ACRONYMS (CONTINUED)

SS	Surface (or Shallow) Soil
TAGM	Technical Assistance Guidance Memorandum
TAL	Target Analyte List
TD	Total Depth
TOGS	Technical and Operational Guidance Series
TPH	Total Petroleum Hydrocarbons
TRW	Technical Review Workgroup
ULBC	Upper Limit of Background Concentrations

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DECLARATION

Site Name and Location:

Environmental Restoration Program
Site 1 – Aviation Gasoline Spill Site
106th Rescue Wing
New York Air National Guard
Francis S. Gabreski Airport
Westhampton Beach, New York

Statement of Basis and Purpose:

This Decision Document (DD) presents the selected remedial action for Site 1 – Aviation Gasoline (AVGAS) Spill Site, at the 106th Rescue Wing, New York Air National Guard, Francis S. Gabreski Airport, Westhampton Beach, New York. This decision is based on the results of a 1994 Site Investigation (SI), and a Remedial Investigation (RI) conducted from 2000 to 2001 under the Environmental Restoration Program (ERP), with the cooperation and support of the New York Department of Environmental Conservation (NYSDEC), the New York State Department of Health, and the Suffolk County Department of Health Services (SCDHS).

Description of the Selected Remedy:

Site 1 has been selected for No Further Response Action Planned (NFRAP) based upon the findings of field investigations and evaluation of scientific data. At Site 1, the 1994 SI found no detections of petroleum-related volatile or semivolatile organics. However, the 1994 SI identified lead and chromium as contaminants of potential concern (COPCs) in surface soil and groundwater, respectively. Lead did not exceed the average concentration of lead in soils from rural areas in the eastern United States. Chromium was attributed to the sampling methodology.

Subsequently, the 2000 – 2001 RI found no evidence of AVGAS contaminants at this site. COPCs were not identified in subsurface soil or groundwater during the RI. However, COPCs were identified in surface soil, including: arsenic, cadmium, polynuclear aromatic hydrocarbons (PAHs), and lead. Risks associated with lead in soil were assessed using the EPA Technical Review Workgroup (TRW) Adult Lead Methodology (ALM), which indicated that lead risks were acceptable at Site 1. A baseline risk assessment of arsenic, cadmium, and PAHs in soil was conducted for Site 1. As part of the risk assessment, arsenic, cadmium, and PAHs were eliminated as COPCs since complete exposure pathways were not identified for on-site or off-site receptors.

Therefore, based on the current conditions at Site 1, it has been determined that contaminant levels at the site pose no significant risk or threat to public health or the environment. No Further Response Action Planned under the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA), as amended by the Superfund Amendments and Reauthorization Act of 1986, is required at this site.

Declaration Statement:

This Category III DD has been prepared in accordance with the June 1995 U.S. Air Force NFRAP Guide. According to the June 1995 U.S. Air Force NFRAP Guide, a Category III NFRAP decision is appropriate for a geographically contiguous area or parcel of real property where environmental evidence demonstrates that hazardous substances or petroleum products or their derivatives have been stored, released, or disposed of, but are present in quantities that require no response action to protect human health and the environment. This DD presents the selected action for Site 1 developed in accordance with CERCLA, as amended, and to the extent practicable, the National Oil and Hazardous Substances Pollution Contingency Plan (NCP). It also satisfies the requirements of the National Environmental Policy Act that apply to CERCLA response actions. It has been determined that the selected remedy of no further action is protective of human health and the environment, attains federal and state requirements that are applicable or relevant and appropriate, and is cost effective. The statutory preference for further treatment is not applicable because contaminant levels at the site have been determined to present no significant threat to human health or the environment; therefore, no further treatment is necessary.

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New York State Department of Environmental Conservation
Division of Environmental Remediation
Remedial Bureau A, 11th Floor
625 Broadway, Albany, New York 12233-7015
Phone: (518) 402-9625 • **FAX:** (518) 402-9022
Website: www.dec.state.ny.us

Erin M. Crotty
Commissioner

September 8, 2005

Mr. Lance McDaniel
Environmental Remediation Branch
Air National Guard/CEVR
3500 Fetchet Avenue
Andrews AFB, MD 20762-5157

RE: Suffolk County Air National Guard Gabreski Airport
Draft Final No Further Response Action Planned Decision Documents
Sites 1, 2, 5, 10, 11, and 12

Dear Mr. McDaniel:

The New York State Department of Environmental Conservation and the New York State Department of Health have reviewed the Site 1, 2, 5, 10, 11, and 12 draft Final No Further Response Action Planned Decision Documents (NFRAP DD) at the Suffolk County Air National Guard Base. The Sites listed above are not listed in the New York State Registry of Inactive Hazardous Waste Disposal Sites.

The State concurs with the findings of the Site 1, Site10, Site 11, and Site 12 Decision Documents, however some revisions will need to be made to the Site 2 and Site 5 documents to reflect consistency with State guidance criteria.

Separate comments will be forwarded for Sites 2 and 5 by the project manager for the site, Ms. Heather Bishop. The State will concur with the Final Site 2 and 5 NFRAP Decision Documents after additional work is completed. If you have any questions, please contact Mr. John Swartwout, of my staff, at (518) 402-9620.

Sincerely,

Chittibabu Vasudevan

Chittibabu Vasudevan, Ph.D., P.E.
Director
Remedial Bureau A

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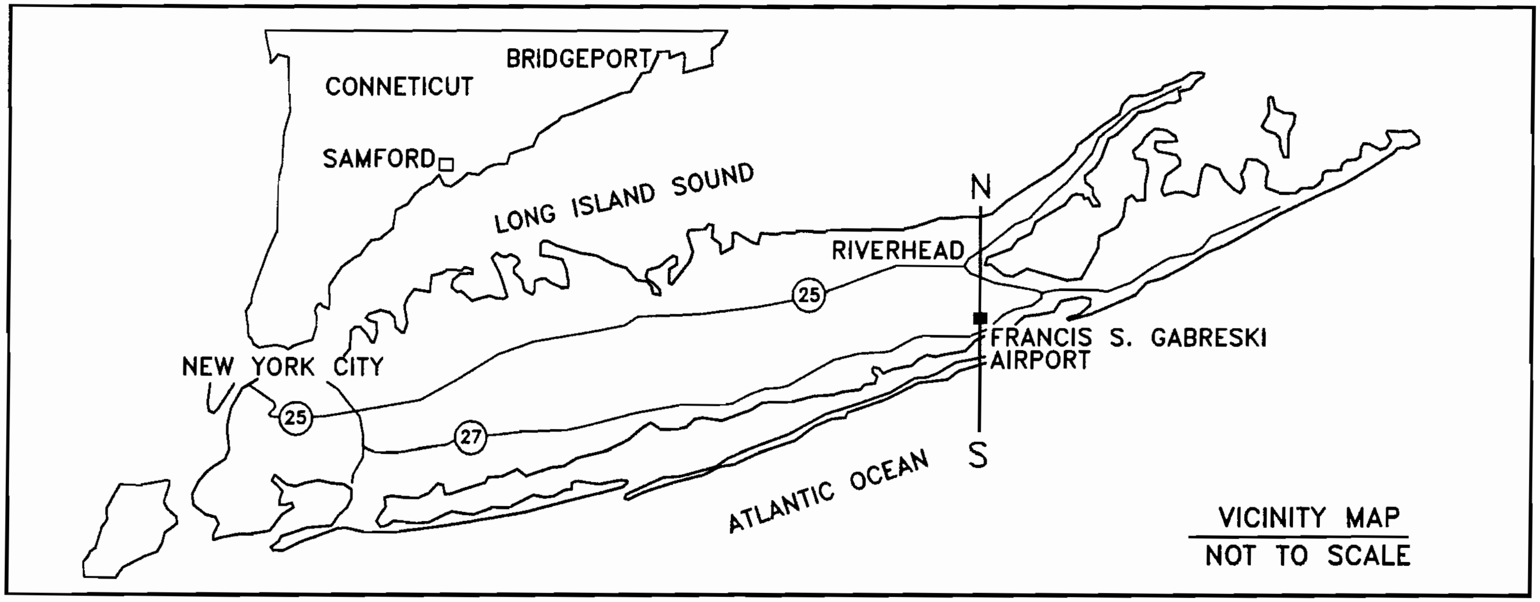
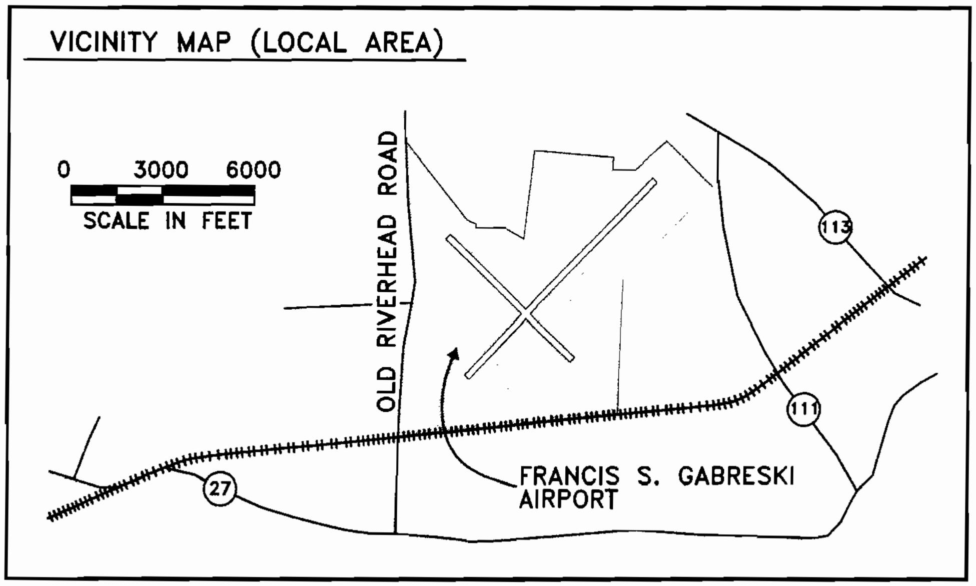
DECISION SUMMARY

1.0 INTRODUCTION

This Decision Document (DD) supports a No Further Response Action Planned (NFRAP) decision for Site 1, the Aviation Gasoline (AVGAS) Spill Site at the 106th Rescue Wing, New York Air National Guard (ANG), Francis S. Gabreski Airport, in the town of Westhampton Beach, New York. The base is located on the eastern end of Long Island in Suffolk County, New York. As shown on Figure 1.1, the Francis S. Gabreski Airport, formerly known as Suffolk County Airport, is on Old Riverhead Road, approximately 2 miles north of the Atlantic Ocean shoreline and the town of Westhampton Beach. As shown on Figure 1.2, Site 1 is located in the central portion of the base, near the intersection of Moen Street and Smith Avenue.

The purpose of this Category III DD (as specified in the June 1995 U.S. Air Force NFRAP Guide) is to summarize the existing data for the site, to evaluate the risk to human health and the environment, and to provide the ANG's rationale for making the NFRAP decision for this site. According to the June 1995 U.S. Air Force NFRAP Guide, a Category III NFRAP decision is appropriate for a geographically contiguous area or parcel of real property where environmental evidence demonstrates that hazardous substances or petroleum products or their derivatives have been stored, released, or disposed of, but are present in quantities that require no response action to protect human health and the environment.





SOURCE: PEER 2003

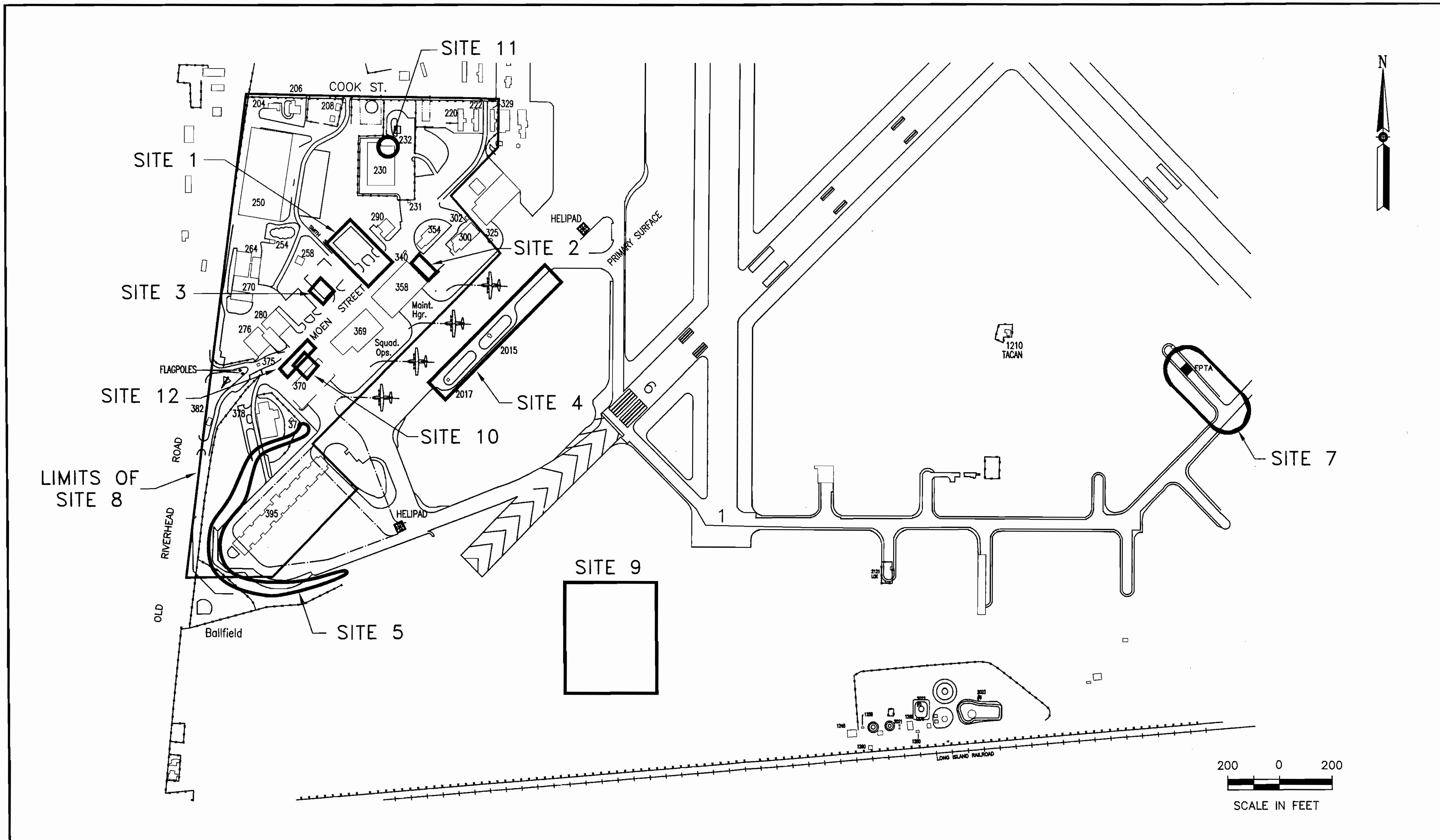
PEER

PROJ./3005-011

GAB3005/SITE 1 NFRAP/FIG 1.1

FRANCIS S. GABRESKI AIRPORT AND ANG BASE LOCATION
106th RESCUE WING, NEW YORK ANG
WESTHAMPTON BEACH, NEW YORK

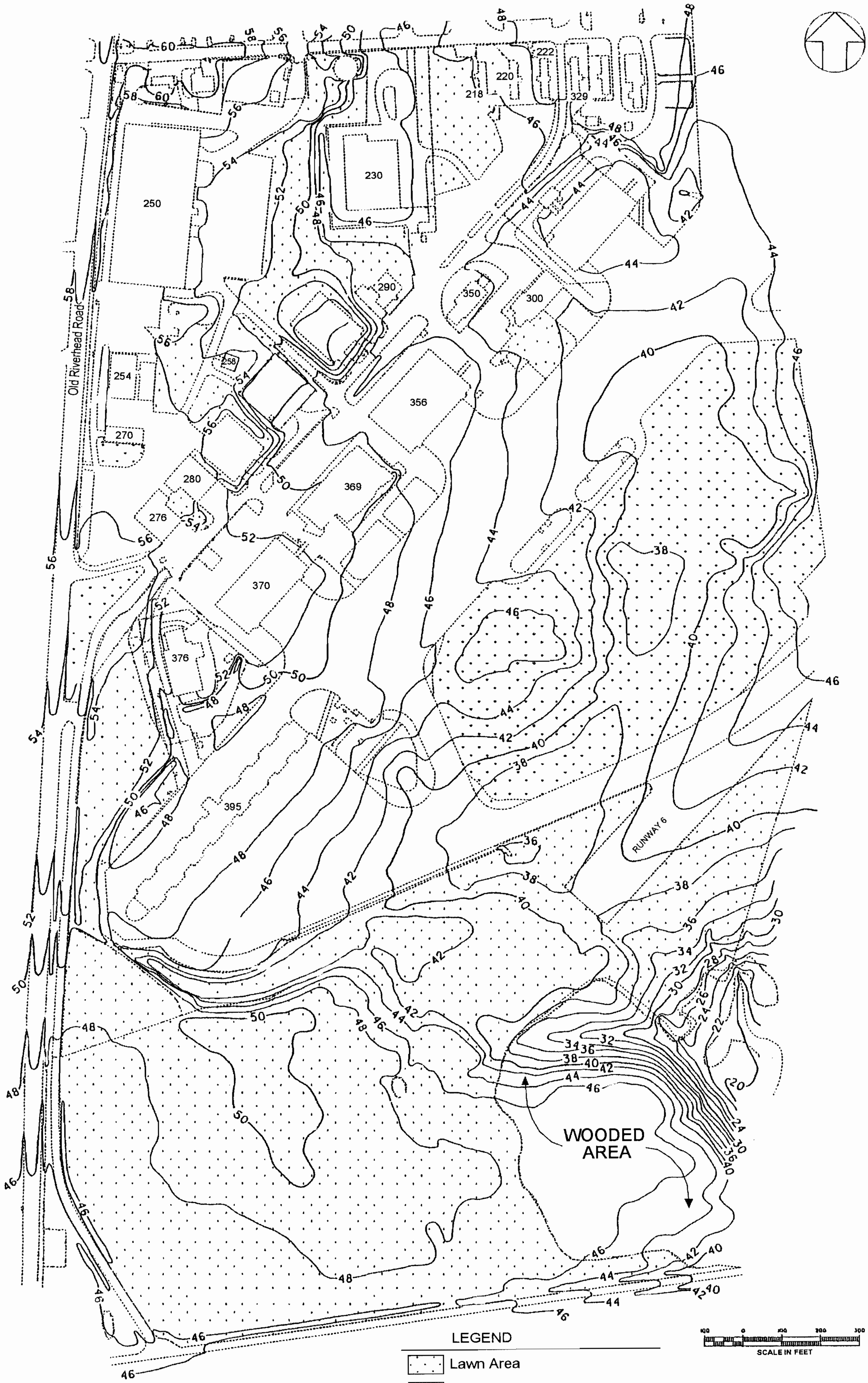
FIGURE 1.1



PEER
PROJ./003005.011
GAB3005/NFRAP/SITE1/FIG 1.2

LOCATION OF ERP SITES INCLUDING SITE 1 – AVGAS SPILL SITE
106th RESCUE WING, NEW YORK ANG
FRANCIS S. GABRESKI AIRPORT
WESTHAMPTON BEACH, NEW YORK

FIGURE 1.2



LEGEND

Lawn Area

Paved Area

Vertical Datum: NGVD 1929

Elevations in ft. Above Mean Sea Level

Source: S&W, 1999

2-Ft. Contour Intervals

PEER

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GAB3005-011/NFRAP/FIG1.3

BASEWIDE TOPOGRAPHY
106 th RESCUE WING, NEW YORK ANG
FRANCIS S. GABRESKI AIRPORT
WESTHAMPTON BEACH, NEW YORK

FIGURE 1.3

Data used to prepare this DD were summarized from the following sources:

- *Phase I Records Search, Suffolk County Air Force Base (Retired)*, by Dames & Moore, 1986;
- *Installation Restoration Program, Phase I – Records Search for 106th Aerospace Rescue and Recovery Group,* Hazardous Materials Training Center (HMTC), 1987;
- *Site Investigation Report, 106th Rescue Group,* by ABB-Environmental Services (ABB-ES), May 1997; and
- *Final Remedial Investigation Report for Sites 1, 2, 3, 4, 5, 7, 8, 9, 10, 11, and 12, 106th Rescue Wing,* by PEER Consultants, P.C. (PEER), June 2004.

A description of Site 1 and its surrounding area is provided in Section 1.1. Information on the history of Site 1, including any enforcement actions, is presented in Section 1.2. Highlights of the base's community participation efforts are presented in Section 1.3. The scope of the response action at the base is discussed in Section 1.4. A discussion of the characteristics of Site 1, including information on the physiography, geologic setting, climatology, and environmental media, the nature and extent of contamination, and receptors at the site, is presented in Section 2.0. An evaluation of the risks to human health and the environment posed by the site are presented in Section 3.0. Section 4.0 presents the selected action for Site 1 and the rationale for the selection of this action. Appendix A provides a list of the references that were used to prepare this DD.

1.1 SITE NAME, LOCATION, AND DESCRIPTION

Sections 1.1.1 through 1.1.5 present an overview of Site 1, including a description of the site; the topography of the area; and information on critical environments, adjacent land uses, and nearby populations. Sections 1.1.6 and 1.1.7 provide information on the general surface water and groundwater resources and surface and subsurface features of the area.

1.1.1 Site Description

Site 1 – AVGAS Spill Site is located on the Francis S. Gabreski ANG Base to the northeast of Smith Avenue, on both sides of Moen Street. It includes an elevated parking lot on the northwest side of Moen Street, and a parallel former drainage swale, located on the southeast side of Moen Street.

1.1.2 Topography

Francis S. Gabreski Airport is situated on a glacial outwash plain south of the Ronkonkoma terminal moraine, which formed during the Wisconsin glaciation. Relief is characteristically flat with subtle rolling terrain and steeper stream channels (ABB-ES 1997). Figure 1.3 shows the topography of the base.

Site 1 includes the elevated parking lot on the northwest side of Moen Street, where the AVGAS spill is said to have occurred. The parking lot is elevated approximately 5 ft above the surrounding area on all sides. Entry to the parking lot is on the southeast side, where two steep, narrow driveways link the lot to Moen Street.

1.1.3 Critical Environments

For the purpose of this DD, critical environments are defined to include all lands and waters that are specifically recognized or managed (by federal, state, or local government agencies or private organizations) as rare, unique, unusually sensitive, or important natural resources. These areas include permanent and seasonal habitats of federally designated endangered species, nature preserves (including federal and state parks), wilderness areas, wildlife sanctuaries, and wetlands, but they do not include parks established solely for historic preservation or recreation.
The Francis S. Gabreski Airport is located within the Long Island Pine Barrens. The Pine Barrens are characterized by open, sunlit woodlands dominated by pitch pine interspersed with

white and scarlet oak. In the immediate area of the airport, the Pine Barrens are characterized by a transition from 30 to 80 ft tall pitch pines. The Quogue Wildlife Refuge, adjacent to the east side of the airport, is characterized by dwarf pitch pines ranging from 3 to 6 ft tall. The airport is surrounded by wooded areas consisting of 25 ft pitch pines and scattered scrub oak (Dames & Moore 1986).

The following are the threatened and endangered species potentially located within a 4-mile radius of the site (ABB-ES 1997):

- Northern Harrier (*Circus cyaneus*)
- Osprey (*Pandion haliaetus*)
- Tiger Salamander (*Ambystoma tigrinum tigrinum*)
- Eastern Mud Turtle (*Kinosteron subrabrum subrubum*)

A more detailed description of the vegetation and animal life in the area is provided in the Phase I Records Search (Dames & Moore 1986).

1.1.4 Adjacent Land Uses

The Francis S. Gabreski Airport is owned by Suffolk County. The airport is bounded to the north by undeveloped land, to the east by the Quogue Wildlife Refuge, to the south by the Long Island Railroad (LIRR), and to the west by Old Riverhead Road. As of July 8, 1958, the airport occupied approximately 2500 acres of relatively flat terrain (Anthony J. Vasell, pers. comm. 2001). The *Francis S. Gabreski Airport Master Plan* reports the current area of the airport as 1,486 acres (Latino 2002). The 106th Rescue Wing (RQW) leases approximately 70 acres of runways, hangars, and maintenance/service facilities near the southwest corner of the airport. The airport surrounds the base on all sides except the west, where the base is adjacent to Old Riverhead Road. Further to the west, across Old Riverhead Road, is a mixed area of undeveloped Pine Barrens, residential areas, and small businesses. To the south, across the LIRR, is an area of mixed industrial, business, and residential properties.

1.1.5 Nearby Populations

The base has a total population of over 900 employees (during unit training assembly weekends), which includes nearly 300 full-time staff, and over 600 traditional guardsmen. The base is located about 2 miles northwest of the center of the town of Westhampton Beach, New York. The population of the Westhampton Beach area is approximately 1,900 people (PEER 2000).

1.1.6 General Surface Water and Groundwater Resources

Surface Water Resources

Surface water is not a significant resource at the base. The nearest surface water is Aspatuck Creek, which is not used for drinking water. Aspatuck Creek flows through the Quogue Wildlife Refuge, which is adjacent to the airport on the east.

Groundwater Resources

Groundwater is the only water supply source for Suffolk County. The majority of the public water supply in Westhampton Beach area is obtained from the Upper Glacial Aquifer; while the rest is obtained from the Magothy and Lloyd aquifers. Hydrogeology is discussed further in Section 2.6.

At present, Suffolk County Water Authority supplies the majority of the water in the Westhampton Beach area; the rest is supplied by several smaller companies. Suffolk County Water Authority operates 18 wells in 4 well fields within a 4-mile radius of the site, and their nearest public supply well field is located 0.61 miles southeast of Francis S. Gabreski Airport. Table 1.1 summarizes information pertaining to the public drinking water supply wells. Figure 1.4 shows the location of identified public drinking water supply wells.

Table 1.1
Public Drinking Water Supply Well Information
106th Rescue Wing, New York Air National Guard
Westhampton Beach, New York

Well Field Identification	Distance from Site (miles)	Aquifer Tapped	Well Number	Screened Interval (ft BGS)	Total Depth (ft BGS)	Population Served (Approximate)
Meeting House Road	0.6	Upper Glacial	20	55-75	78	6,500
			22	74-104	104	
			15A	31-51	53	
Quogue-Riverhead Road	1.2	Magothy	1	386-447	449	2,200
Spinny Road	1.7	Upper Glacial	1	85-115	118	190
			2	118-158	163	
Old Country Road	2.2	Upper Glacial	1	60-75	76	1,800
			2	NA	70	
			3	128-157	161	

BGS Below Ground Surface
Source: Dames & Moore 1986.

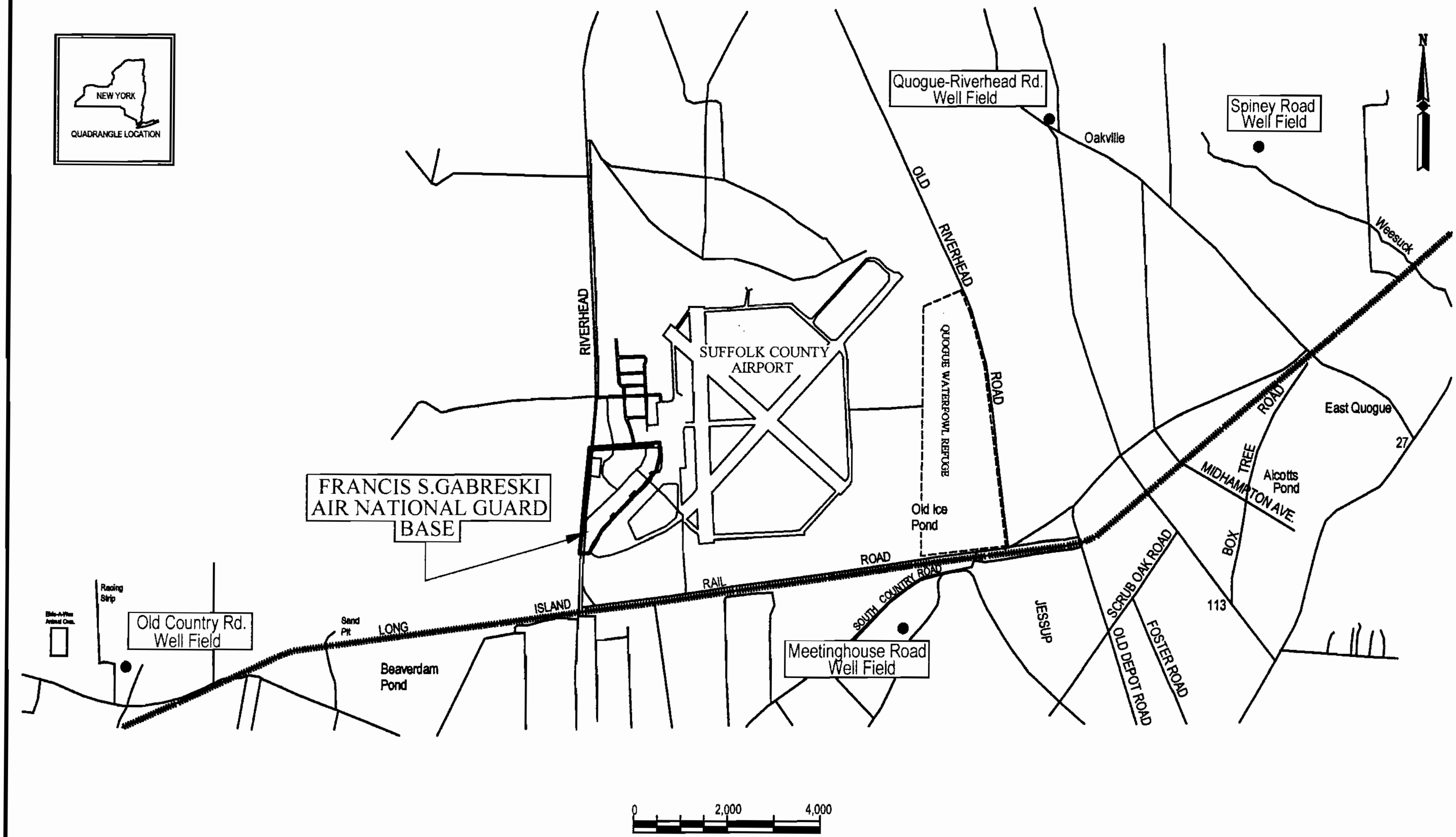
A number of domestic water wells are located within 1 mile of the base boundary, south of the airport (ABB-ES 1997). Due to concerns about groundwater contamination from Site 6, the Petroleum Oil and Lubricants (POL) Facility, most or all of the residences utilizing private water wells were provided with access to the public water supply through the Suffolk County Water Authority in the early- to mid-1980s (Anthony J. Vasell, pers. comm. 2003).

1.1.7 <u>Surface and Subsurface Features</u>

Aside from underground utilities such as water, electric and sanitary sewer, no unknown surface or subsurface features, or structures such as tanks or drums are believed to exist at Site 1.

1.2 SITE HISTORY AND ENFORCEMENT ACTIVITIES

Sections 1.2.1 and 1.2.2 present a history of Site 1. Further details concerning analytical results of soil and groundwater samples are provided in Section 2.4



SOURCE: USGS 7.5 minute series quadrangle maps for Eastport and Quogue, New York dated 1956

PEER PROJ./003005-011 GAB3005/NFRAP/SITE1/FIG 1.4	PUBLIC DRINKING WATER SUPPLY WELL LOCATIONS 106th RESCUE WING, NEW YORK ANG FRANCIS S. GABRESKI AIRPORT WESTHAMPTON BEACH, NEW YORK	FIGURE 1.4

1.2.1 Site History

Site 1 is the location of a reported release of AVGAS said to have occurred in 1965. Reportedly, a tanker truck parked in the elevated parking lot northwest of Moen Street released a maximum of 5000 gallons of AVGAS onto the parking lot. The petroleum product was reported to have accumulated in the adjacent former drainage swale, across Moen Street, where it reportedly evaporated and/or infiltrated to the subsurface. This event occurred prior to the establishment of statutory requirements for reporting petroleum spills. There was no documented recovery of the spilled fuel (ABB-ES 1997).

Site 1 was initially identified during the Phase I Records Searches by Dames & Moore (1986) and HMTC (1987). Further evaluation of this site was deemed necessary since no apparent product recovery occurred and because the area overlies a sole-source aquifer.
A Site Investigation (SI) was conducted at Site 1 in 1994 by ABB-ES (ABB-ES 1997), and a RI field investigation work was completed by PEER in 2001 (PEER 2004).

1.2.2 Regulatory Agency Involvement

There is no history of United States Environmental Protection Agency (EPA) involvement at Site 1. The New York Department of Environmental Conservation (NYSDEC) has been involved in the planning of 2000 - 2001 RI activities, review and revision of plans and reports, and approval of final documents. There have been no enforcement activities at Site 1, and there are no permits or agreements that govern response action at the site. No NYSDEC spill number has been assigned to the site. NYSDEC action levels for surface soils, unsaturated subsurface soils, saturated subsurface soils, and groundwater were used for screening purposes in both the 1994 SI and the 2000 – 2001 RI. NYSDEC action levels used included:

- NYSDEC Recommended Soil Cleanup Objectives (RSCOs), as per the NYSDEC Technical Assistance Guidance Memorandum (TAGM # 4046, NYSDEC 1994);

- Upper Limits of Background Concentrations (ULBCs), as calculated by ABB-ES, following NYSDEC guidelines set forth in the Technical and Operational Guidance Series (TOGS, NYSDEC 1991);
- New York State (NYS) Class GA Groundwater (TAGM # 4046, NYSDEC 1994), and
- Federal Maximum Contaminant Levels (MCLs), as set forth by the EPA (EPA 1995).

1.3 COMMUNITY PARTICIPATION

A Community Relations Plan (CRP) was completed for the base in April 1999. The final versions of the CRP and all other Environmental Restoration Program (ERP) documents are available for public review at the Westhampton Beach Public Library, located in the town of Westhampton Beach, New York.

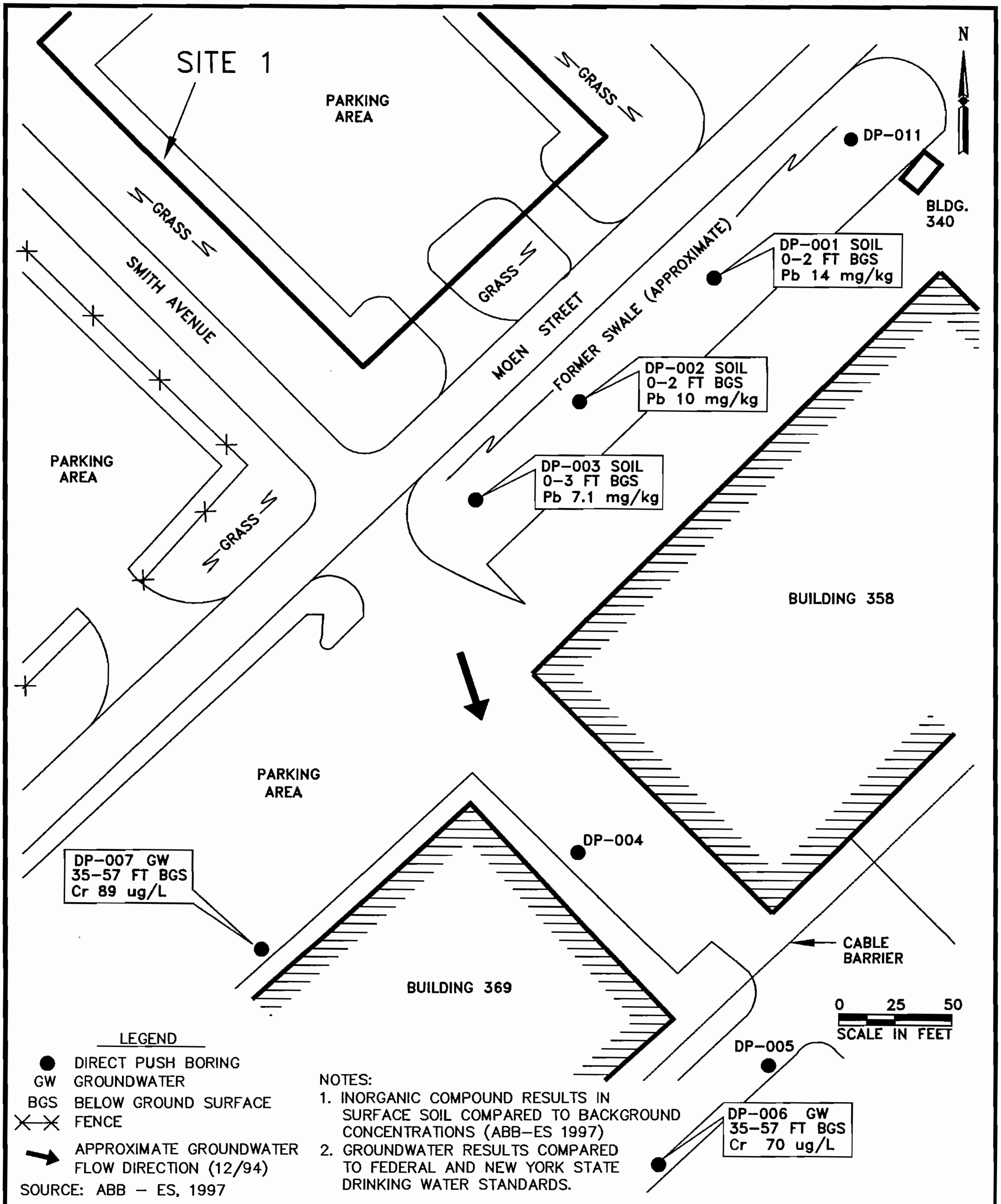
1.4 SCOPE OF RESPONSE ACTION

Section 1.4.1 describes the initial SI, completed in 1994. Section 1.4.2 describes the most recent response activity, the RI completed in 2001.

1.4.1 Site Investigation (1994)

The initial SI at Site 1 was preformed by ABB-ES from August to December, 1994 (ABB-ES 1997). In May 1997, ABB-ES submitted the *Site Investigation Report* documenting the results of their 1994 field activities. The 1994 SI activities included direct-push soil and groundwater sampling and analyses.

To investigate the suspected release of AVGAS, eight direct-push soil borings were performed during the SI, designated DP-001 through DP-007 and DP-011. The direct-push sample locations and analytical results for soil and groundwater are shown on Figure 1.5. Direct-push borings DP-001 through DP-007 were completed at depths of 31 to 37 ft below ground surface (BGS), while DP-011 was terminated at 2 ft BGS. Soil samples were collected from borings



PEER	SITE 1 – 1994 SITE INVESTIGATION DIRECT PUSH SOIL AND GROUNDWATER SAMPLING RESULTS 106th RESCUE WING, NEW YORK ANG FRANCIS S. GABRESKI AIRPORT, WESTHAMPTON BEACH, NEW YORK	FIGURE 1.5
PROJ./003005-011 GAB3005/DF NFRAP/SITE1/FIG1.5		

DP-001, DP-002, DP-003, and analyzed for volatile and semivolatile organics and lead. A surface soil sample was collected at DP-011 and analyzed for chromium and lead. Groundwater samples were collected from borings DP-002, DP-004, and DP-005, and analyzed for volatile and semivolatile organics and lead. Groundwater samples collected at DP-006 and DP-007 were analyzed for volatile and semivolatile organics and metals. All borings were screened for organic vapors using a flame-ionization detector. There were no significant detections of photoionizable organic vapors.

Lead was detected above NYSDEC action levels in surface soils in the south-central portion of the drainage swale. However, none of the concentrations exceeded typical lead values found in eastern United States soils. The highest lead concentration detected was 14 milligrams per kilograms (mg/kg), while the average concentration of lead in soils from rural areas in the eastern United States ranges from 4 to 61 mg/kg (O'Toole 1994, cited by ABB-ES 1997). Table 1.2 summarizes the surface soil samples with exceedances by lead at Site 1.

Chromium was detected in groundwater above the NYSDEC action levels, but not above the MCL of 100 micrograms per liter (µg/L). The presence of chromium was attributed to elevated sediment content in the groundwater samples due to the direct-push sample collection methodology. The results were therefore not considered representative of actual groundwater quality (ABB-ES 1997). Table 1.3 summarizes the direct-push groundwater sample results where chromium exceeded action levels at Site 1.

The 1994 SI found no detections of volatile or semivolatile organic hydrocarbons that would be indicative of petroleum-related contamination in soil or groundwater at Site 1. Chromium was detected exceeding NYSDEC action levels in groundwater, but was attributed to the sample methodology. Lead was detected exceeding NYSDEC action levels in soil, but did not exceed typical lead values found in eastern United States soils. Based upon these findings, The *Site Investigation Report* recommended no further action for Site 1.

Table 1.2
1994 Site Investigation
Surface Soil Sample Results
Lead Concentrations Exceeding Action Levels
106th Rescue Wing, New York Air National Guard
Westhampton Beach, New York

Surface Soil Sample Location	Sample Depth (ft BGS)	Action Level (mg/kg) [a]	Lead Concentration (mg/kg)
DP-001	0 – 2	4.4	14
DP-002	0 – 2	4.4	10
DP-003	0 – 3	4.4	7.1

Notes:
a) This action level was used during the 1994 SI, and was based on calculation of upper limit values of background concentrations.
Source: ABB-ES 1997.

Table 1.3
1994 Site Investigation
Direct-Push Groundwater Sample Results
Chromium Concentrations Exceeding Action Levels
106th Rescue Wing, New York Air National Guard
Westhampton Beach, New York

Direct-Push Groundwater Sample Location	Depth (ft BGS)	Action Level (μg/L) [a]	Chromium Concentration (μg/L)
DP-006	35 – 57	50	70
DP-007	35 – 57	50	89

Notes:
a) This action level was used during the 1994 SI, and was based on calculation of upper limit values of background concentrations.
Source: ABB-ES 1997.

1.4.2 Remedial Investigation (2000-2001)

The most recent response action was the performance of an RI which was conducted by PEER in 2000 and 2001. The 2000 - 2001 RI activities at Site 1 were intended to:

- Determine the presence or absence of chromium contamination in site groundwater;
- Define the nature and extent of chromium contamination in site groundwater, if detected;
- Determine the presence or absence of lead contamination in surface and subsurface soils;
- Define the nature and extent of lead contamination in soils, if detected;

- Evaluate suspected volatile organic contamination in the soil or groundwater at the site; and
- Define the nature and extent of volatile organic compound contamination in site soil or groundwater, if detected.

In order to accomplish the goals of the RI, the field investigation of Site 1 included three direct-push borings for collection of surface soil, subsurface soil and groundwater samples, and installing and sampling two new monitoring wells. The 2000 - 2001 RI samples collected at Site 1 are summarized on Table 1.4. The sample locations are depicted on Figure 1.6. Direct-push soil borings, hollow-stem auger (HSA) soil borings, and monitoring wells were installed as follows:

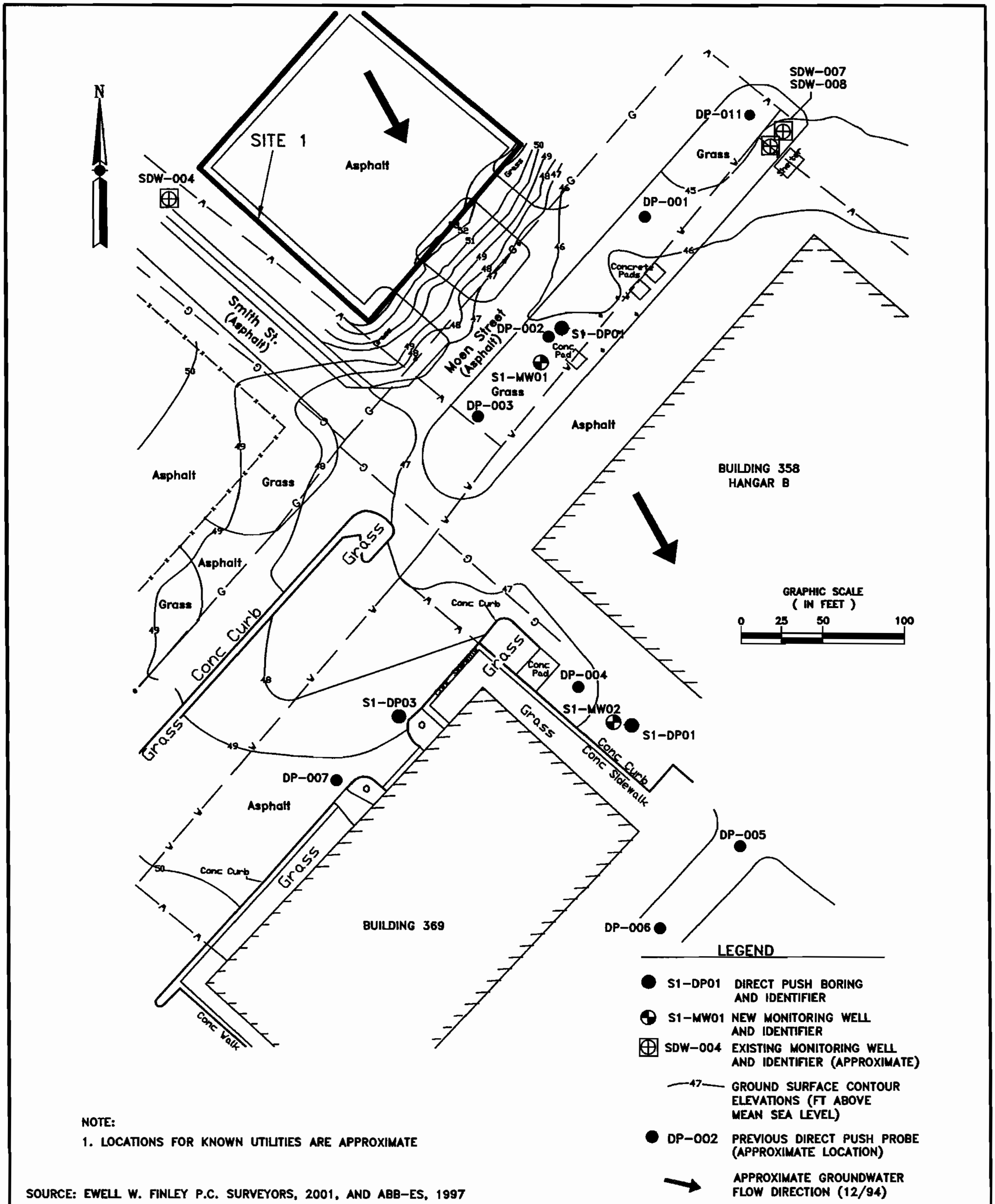
- Direct-push boring S1-DP01 was located in the approximate center of the former drainage swale where spilled AVGAS was said to have accumulated and infiltrated the subsurface. S1-DP01 was advanced to a total depth (TD) of 34 ft BGS.
- Direct-push boring S1-DP02 was located approximately 200 ft south of S1-DP01, downgradient of the former drainage swale, where a contaminant plume would be presumed to exist if spilled AVGAS had infiltrated the subsurface. S1-DP02 was advanced to a TD of 31 ft BGS.
- Direct-push boring S1-DP03 was located approximately 200 ft south-southwest of S1-DP01, downgradient of the former drainage swale, where a contaminant plume would be presumed to exist if spilled AVGAS had infiltrated the subsurface. S1-DP03 was advanced to a TD of 39 ft BGS.
- Soil boring SB1-01 was installed using the HSA drilling method in the approximate center of the former drainage swale, and sampled for soil screening and confirmatory analysis. SB1-01 was advanced to a TD of 43 ft BGS.
- Soil boring SB1-02 was installed about 200 ft south-southeast of the former drainage swale using HSA drilling, and sampled for soil screening and confirmatory analysis. SB1-02 was advanced to a TD of 42 ft BGS.

Table 1.4
2000 – 2001 Remedial Investigation
Summary of Samples Collected and Analyses Performed
106th Rescue Wing - Francis S. Gabreski Airport
Westhampton Beach, New York

Date	Sample ID	Ft BGS	Type	BTEX	VOCs	SVOC	Metals	TPH-DRO	TPH-GRO	Soil	CH_4	Alkalinity	Chloride	SO_4
11/15/00	GAB-01-DP02-01	0 to 2	Soil Probe	X	X	X	X							
11/16/00	GAB-01-DP01-SS01	0 to 0.25	Soil Surface	X	X	X	X							
11/16/00	GAB-01-DP02-02	29 to 31	Soil Probe	X	X	X	X							
11/16/00	GAB-01-DP03-01	0 to 2	Soil Probe	X	X	X	X							
11/16/00	GAB-01-DP03-02	31 to 35	Soil Probe	X	X	X	X							
11/16/00	GAB-01-DP03-03	35 to 36	Soil Probe	X	X	X	X							
11/17/00	GAB-01-DP01-02	23 to 27	Soil Probe	X	X	X	X							
11/17/00	GAB-01-DP01-03	30 to 34	Soil Probe	X	X	X	X							
11/17/00	GAB-01-PW01-01	32 to 36	GW Screening	X	X									
11/21/00	GAB-01-PW02-01	38 to 42	GW Screening	X	X	X								
11/16/00	GAB-01-PW03-01	35 to 39	GW Screening	X	X									
2/2/01	GAB-01-SB01-SS	0 to 0.25	Soil Surface		X	X	X							
2/2/01	GAB-01-SB01-01	0 to 2	Soil Split Spoon		X	X	X							
2/2/01	GAB-01-SB01-02	24 to 26	Soil Split Spoon		X	X	X							
2/2/01	GAB-01-SB01-03	32 to 36	Soil Split Spoon		X	X	X							
2/2/01	GAB-01-SB01-23	32 to 36	Soil Split Spoon		X	X	X							
2/2/01	GAB-01-SB01-ST01	4 to 6	Shelby Tube							X				
2/2/01	GAB-01-SB01-ST02	8 to 10	Shelby Tube							X				
2/3/01	GAB-01-SB02-01	0 to 2	Soil Split Spoon		X	X	X							
2/3/01	GAB-01-SB02-02	32 to 36	Soil Split Spoon		X	X	X							
2/12/01	GAB-01-S1MW01-01	27.5 to 42.5	GW Monitoring	X	X	X	X	X	X		X	X	X	X
5/30/01	GAB-01-S1MW01-02	27.5 to 42.5	GW Monitoring	X	X	X	X	X	X		X	X	X	X
2/16/01	GAB-01-S1MW02-01	28.35 to 42.35	GW Monitoring		X	X	X							
5/25/01	GAB-01-S1MW02-02	28.35 to 42.35	GW Monitoring		Y	Y	X							

Notes:

BGS	Below Ground Surface
BTEX	Benzene, Toluene, Ethylbenzene and Xylenes
VOCs	Volatile Organic Compounds
SVOCs	Semi-volatile Organic Compounds
TPH-DRO	Diesel Range Organics
TPH-GRO	Gasoline Range Organics
CH_4	Methane
SO_4	Sulfate
X	Analysis Performed
Y	Sample collected and scheduled for analysis, but inadvertently not analyzed



PEER	SITE 1 – 2000 – 2001 REMEDIAL INVESTIGATION LOCATIONS OF MONITORING WELLS AND DIRECT PUSH BORINGS 106th RESCUE WING, NEW YORK AIR NATIONAL GUARD FRANCIS S. GABRESKI AIRPORT WESTHAMPTON BEACH, NEW YORK	FIGURE 1.6
PROJ./003005-011		
GAB3005/DF NFRAP/SITE1/FIG 1.6		

- Monitoring well S1MW-01 was installed in SB1-01, with its screen set from 27.5 to 42.5 ft BGS.
- Monitoring well S1MW-02 was installed in SB1-02, with its screen set from 27.0 to 42.0 ft BGS.

The results of the 2000 - 2001 RI soil and groundwater investigations at Site 1 are presented in Sections 2.4 and 2.7, respectively.

Soil samples were collected from the direct-push borings using a 4-ft Strata Probe™ direct-push sampling device. Sample collection commenced at the surface and proceeded continuously to completion of the borings. Recovered soil was field screened for detectable organic vapors using a calibrated photoionization detector (PID). Field screening detected no significant organic vapors. Eight soil samples were collected from the three direct-push boring locations, for screening analysis of benzene, toluene, ethylbenzene, and total xylenes (BTEX), and confirmatory state-certified laboratory analysis for volatile and semivolatile organic compounds and Target Analyte List (TAL) metals. Analytical samples were collected from the shallow zone (one sample), the vadose zone between the top of saturation and the ground surface (one sample), and from the top of, or just above, the saturated zone (four samples). A surface soil sample (0 to 0.25 ft BGS) was collected at the location of S1-DP01, since it was unpaved. S1-DP02 and S1-DP03 were in paved locations, and shallow soil samples (0 to 2 ft BGS) were collected instead of surface soil samples.

Direct-push groundwater samples were collected from borings S1-DP01 and S1-DP03, and submitted for expedited screening analysis of BTEX at the on-site field laboratory, and confirmatory analysis at the state-certified off-site laboratory for volatile organic compounds. Groundwater could not be sampled at direct-push boring S1-DP02 since refusal was encountered before saturation was reached. Direct-push groundwater samples for analysis of semivolatile organics could not be obtained from S1-DP03, due to insufficient volume. Only the confirmatory groundwater sample from S1-DP02 was analyzed for semivolatile organic compounds.

The two monitoring well boreholes, designated as S1-SB01 and S1-SB02, were sampled for lithologic description, field screening, and fixed laboratory analysis of soils. The monitoring well boreholes were installed using HSA, and samples were collected using decontaminated, 2-ft steel split spoons, driven at 5-ft intervals. Additionally, Shelby tube samples were collected from well boring S1-SB01 for analysis of soil geotechnical parameters. Five soil samples were collected from the surface, shallow, vadose, and saturated intervals, at well boring S1-SB01, including one duplicate sample. Two soil samples were collected from the shallow and vadose zones at well boring S1-SB02.

New monitoring wells S1-MW01 and S1-MW02 were developed, purged, and sampled for volatile and semivolatile organic compounds, and TAL metals. Two rounds of samples were collected from each well for a total of four groundwater-monitoring samples. The second round sample from S1-MW01 was inadvertently not analyzed for volatile or semivolatile organics by the off-site laboratory. Monitoring well S1-MW01 was also sampled for bioremediation parameters during Rounds 1 and 2, including BTEX, total petroleum hydrocarbons – gasoline-range organics and diesel-range organics (TPH-GRO/DRO), methane, alkalinity, chloride, and sulfate. No previously existing monitoring wells were located at Site 1.

2.0 SUMMARY OF SITE CHARACTERISTICS

Section 2.0 provides a summary of the characteristics of Site 1, including information on the physiography, geology, hydrogeology, surface water hydrology, soil, climatology, environmental media, the nature and extent of contamination, and receptors.

2.1 PHYSIOGRAPHY

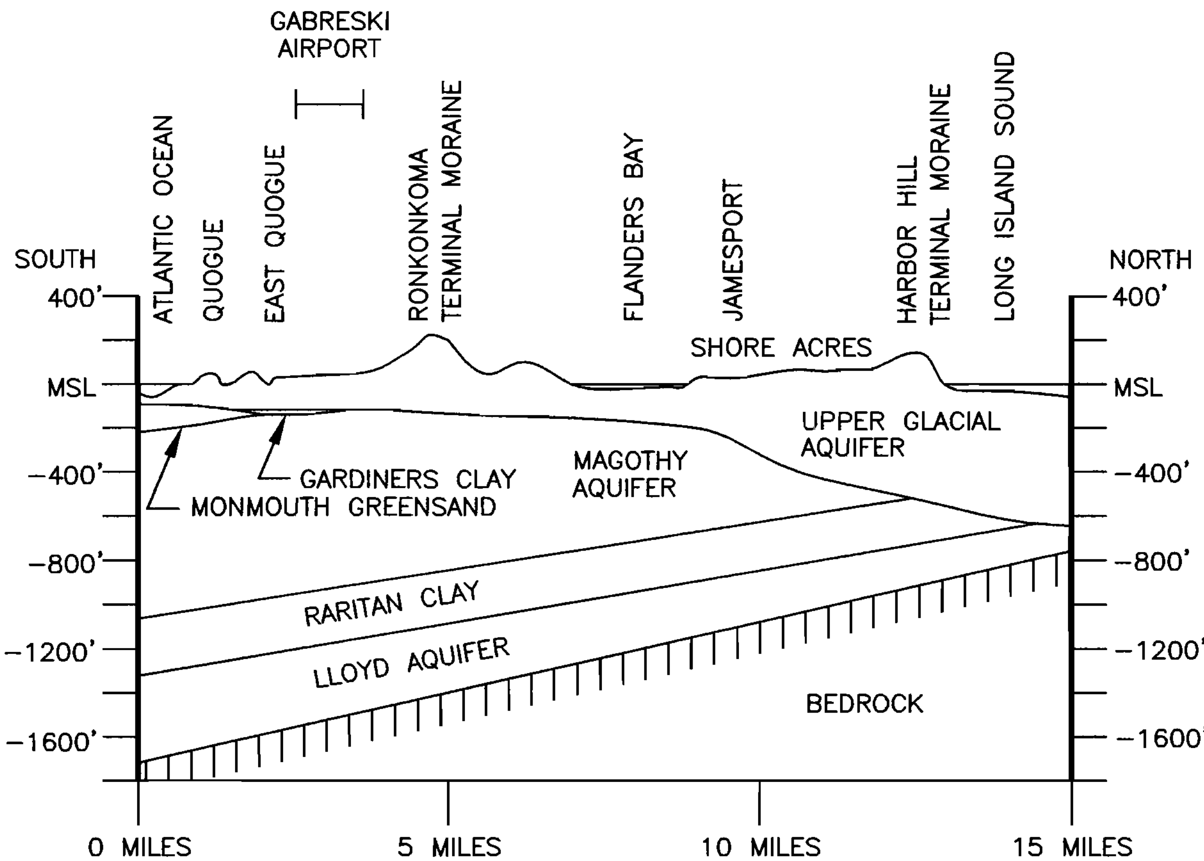
The base is located on the eastern end of Long Island. Long Island is included in the Atlantic Coastal Plain physiographic province. The island is characterized by glacial landforms related to the Wisconsin Glaciation. The island is located at the southern limit of glaciation, and exhibits a series of terminal moraines, which form low hills running from the west-southwest to the east-northeast along the spine of the island. The base is located on the gently sloping outwash plain formed south of the terminal moraines when the glacier retreated northwards, and melt water flowed southward towards the Atlantic Ocean. The melt water carried sand and gravel sediment southwards, and deposited it as a stratified outwash plain. The outwash plain slopes southward from the terminal moraine to the bays and barrier islands along the Atlantic Ocean shoreline.

2.2 GEOLOGY

Five unconsolidated formations occur at Francis S. Gabreski Airport. These units dip generally to the south, with the thicker units very widespread and underlying most of Suffolk County. Figure 2.1 depicts the regional stratigraphy using a north-south-trending cross-section of the geologic formations present. The cross-section location was shown previously in Figure 1.1.

2.2.1 Upper Glacial Deposits

The upper Pleistocene glacial deposits are of greatest importance in regards to Site 1. These deposits form the soil surface across the base, makeup the subsurface soils of interest regarding Site 1, and form the matrix for the Upper Glacial Aquifer, described below in Section 2.6.1.



SOURCE: ABB-ES 1997

SCALE: 1 IN = APPROXIMATELY 3 MILES

PEER PROJ./003005-011 GAB3005/NFRAP/SITE1/FIG2.1	REGIONAL STRATIGRAPHY AND HYDROGEOLOGY 106th RESCUE WING, NEW YORK ANG FRANCIS S. GABRESKI AIRPORT WESTHAMPTON BEACH, NEW YORK	FIGURE 2.1

These unconsolidated sediments are composed of glacial outwash deposits; lacustrine and marine deposits; and terminal, ground, and ablation-moraine till deposits. The sediments below the airport are mostly outwash deposits consisting of stratified fine to coarse sand and gravel of light- to dark-brown, tan, and yellowish-brown color. The sand consists primarily of sub- to well-rounded quartz, with trace amounts of feldspar and rare lithic fragments. The gravel is also primarily quartz, with slightly higher proportions of feldspar and lithic fragments. The sediments are framework supported, loose to dense, with little or no cement or interstitial material. Approximately 100 to 120 ft of these sediments are found below the airport and above the underlying Gardiners Clay. Till deposits known as the Ronkonkoma Terminal Moraine are expressed as hills approximately 2 miles north of the base.

2.3 SOIL CHARACTERISTICS

Descriptions of the soil associations and characteristics at Site 1 are presented in Sections 2.3.1 and 2.3.2, respectively.

2.3.1 Soil Associations

Surface soils in the vicinity of the airport belong to either the Riverhead-Plymouth-Carver Association or the Plymouth-Carver Association. These soil associations are characteristically similar, with only subtle variations between them. The former occurs over 95% of the installation, and is characterized by deep, nearly level to gently sloping, well-drained to excessively drained, moderately coarse textured and coarse-textured soils. The latter is generally rolling and hilly, with deep excessively well drained, coarse-textured soils on moraines. These glacially derived soils have characteristically low soil moisture content, unsuitable for most agricultural purposes, and support only limited types of native vegetation (Dames & Moore 1986).

2.3.2 Soil Descriptions

The soils encountered during the 2000 - 2001 RI direct-push and HSA borings conformed to the description of Riverhead-Plymouth-Carver Association glacial outwash sands and to descriptions reported in previous investigations. Sieve analyses of four Shelby tube samples collected during the 2000 - 2001 RI found sand from 76.8% to 95.4%, gravel from 1.3% to 14.6%, and fines (silt/clay) from 2.3% to 8.6%. Permeability (k) for the tested soils ranged from 1.27×10^{-1} centimeters per second (cm/sec) from 4 to 6 ft BGS at Site 1, to 1.76×10^{-2} cm/sec from 20 to 21.5 ft BGS at Site 2. Natural soil density ranged from 90.3 to 96.1 pounds per cubic ft (lbs/ft^3) dry, and from 94.8 to 103.6 lbs/ft^3 wet (PEER 2004). Overall, the soils are well-sorted medium sands, with some gravel and traces of fines. The geology of the soils encountered during the 2000 - 2001 RI is described below.

The primary stratigraphic unit of interest at the base is the Pleistocene-age Upper Glacial Sand and Gravel. This unit consists of unconsolidated sands and gravels deposited as glacial outwash during the Wisconsin glaciation. This is the only unit that outcrops locally, and makes up the entire native surface soils found at the site. The surface soils are well drained to excessively drained and moderately coarse to coarse, with low soil moisture content. The Upper Glacial sediments are well sorted, very porous, and highly permeable. These soils and sediments cause a high proportion of precipitation to infiltrate without significant runoff. The Upper Glacial unit is from 100 to 120 ft thick at the site.

The Gardiners Clay underlies the upper glacial unit in the vicinity of the Francis S. Gabreski Airport and the base. This unit is approximately 40 ft thick, and consists of clay, silt, and clayey and silty sand. Consequently, the Gardiners Clay has lower permeability than the Upper Glacial unit and the underlying Magothy formation, and forms an aquitard between these units. The Gardiners Clay was not encountered in 2000 - 2001 RI soil borings (PEER 2004).

Sand

The sands encountered were commonly medium, with some coarse and fine, and rare very fine sands. The sands were commonly well sorted, with some poorly sorted, and often contained trace to common amounts of fine to coarse gravel. Sand densities were commonly loose to very loose from the surface to about 20 to 25 ft BGS; with some medium dense sands from 25 ft to 40 ft BGS. Moisture content was low in the vadose zone, with surface soils being dry, followed by slightly moist soils from approximately 1 to 2 ft BGS, extending downward to about 2 ft above saturation. Moist soils were rarely encountered more then 2 ft above the top of saturation. The capillary zone was usually less than 2 ft in thickness. Saturation was encountered at 32 ft BGS to 33 ft BGS at Site 1. Bedding was sub-horizontal to horizontal, consistent with glacial outwash sands. Well-sorted coarse sand with traces of fine gravel was found occasionally, while fine to very fine sands were rare, and were often more moist and compact than adjacent medium sand layers (PEER 2004).

Gravel

Gravel occurred at trace to common frequency in medium to coarse, poorly to well sorted sands. Soils containing gravel were mostly gravely sands, with rare sandy gravels. Gravel was commonly fine to large in size, with rare cobbles. Gravel was usually poorly sorted, well rounded to sub-spherical, and rarely sub-angular to angular (PEER 2004).

Silt and Clay

Silts were very rare, usually occurring in the subsurface as isolated, thin layers of silty sand and clayey silty sand mixtures. Pure silts and sandy silts were extremely rare. Top soil usually contained some silt, which was limited to the upper 0.5 ft BGS. Clay was extremely rare in native soils, and only occurred as isolated, thin layers of clayey silty sand (PEER 2004).

2.4 SOIL CONTAMINATION INVESTIGATION RESULTS

The soil investigation activities conducted during the 2000 - 2001 RI at Site 1 are summarized in Section 1.4.2. The sampling locations for the 2001 - 2001 RI were shown on Figure 1.6. The findings of the soil investigation at Site 1 are discussed in the following subsections.

2.4.1 Geologic Results

The 2000 – 2001 RI soil investigation at Site 1 observed medium sands with some gravel and traces of silt, with traces of iron staining noted. No odors or stains indicative of contamination were noted. No odors, elevated PID readings, or stains other than traces of iron stain were noted. Saturation was encountered from 32 ft BGS at S1-DP01 to 33.2 ft BGS at S1-DP03. Observed groundwater elevations were consistent with the basewide groundwater elevations, hydraulic gradient, and groundwater flow direction.

2.4.2 Soil Screening Samples

During direct-push sampling, soil and groundwater screening samples were submitted for expedited turnaround time analysis of BTEX. No BTEX compounds were detected in any of the samples. The soil samples were also screened during sample collection using the PID. The soil screening results showed no indication of organic vapors.

2.4.3 Confirmatory Soil Samples

Confirmatory soil samples were collected at Site 1 from three direct-push borings, S1-DP01, S1-DP02, and S1-DP03; and two well borings, S1-SB01 and S1-SB02, and analyzed for volatile and semivolatile organic compounds, and TAL metals. Sample locations where analytes exceeded soil action levels at Site 1 are shown on Figure 2.2. The results of the volatile and semivolatile organics confirmatory soil analyses are summarized on Table 2.1.

The sample analyses showed that:

- No volatile organic compounds were detected in the soil samples other than acetone and methylene chloride, which were considered laboratory-introduced contaminants.
- Semivolatile organic compounds, including the polynuclear aromatic hydrocarbons (PAHs) benzo(a)anthracene, benzo(b)fluoranthene, benzo(a)pyrene, and chrysene, were detected at concentrations exceeding NYSDEC unsaturated soil action levels at soil boring S1-SB01 from 0 to 2 ft BGS. The PAHs benzo(k)fluoranthene and dibenzo(a,h)anthracene were also detected exceeding action levels in the 0 to 2 ft soil interval at S1-SB01, but these results were qualified by the laboratory as estimated values. Therefore, they were not considered further in the RI.
- The PAHs benzo(a)anthracene, benzo(a)pyrene, and chrysene were detected at concentrations exceeding NYSDEC unsaturated soil action levels in the surface soil sample (0 to 0.25 ft BGS interval) at soil boring S1-SB01. However, these sample results were qualified by the laboratory as estimated values, and were not considered further in the RI.
- Soil boring S1-SB01 was located at the approximate center of the former drainage swale, a location that would have received runoff from Moen Avenue and the adjacent parking lot, both paved in asphalt, a potential source of cross-contamination by PAHs.
- The semivolatile organic bis(2-ethylhexyl)phthalate (BEHP) was detected in the saturated soil sample at direct-push probe S1-DP01, but was below the NYSDEC action level.

Table 2.2 summarizes the results of the TAL metals analysis for confirmatory soil samples at Site 1. TAL metals analyses showed that:

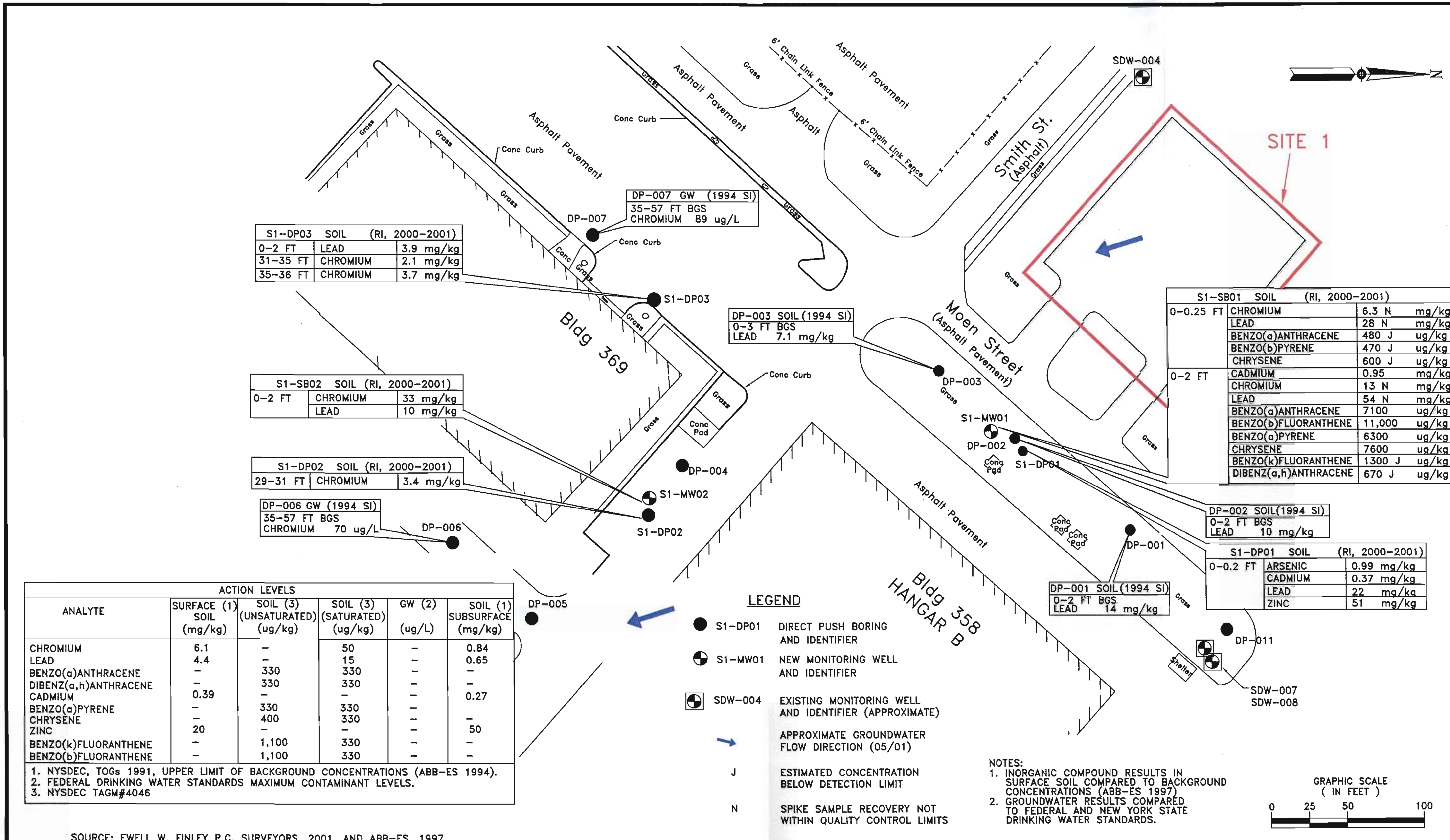
- Arsenic was detected in one surface soil sample at S1-DP01, at a concentration of 0.99 mg/kg, which is below the NYSDEC action level of 7.7 mg/kg.
- Chromium was detected in surface and shallow samples from S1-SB01, but the results were qualified by the laboratory as being outside of quality control (QC) limits.
- Chromium was detected in samples from S1-DP02, S1-DP03 and S1-SB02 at

concentrations exceeding the NYSDEC action levels. S1-DP-02 and S1-DP03 had chromium exceeding the upper limit of background concentrations (ULBC) at depths below 2 ft BGS. The ULBCs were established in the *SI Report* (ABB-ES 1997). Chromium was determined to be naturally occurring during the 2000 – 2001 RI.

- Cadmium was detected exceeding the background and ULBC action levels in the 0 to 2 ft BGS soil sample at S1-SB01, but the concentration was less than the NYSDEC RSCO of 1.0 mg/kg (TAGM #4046, NYSDEC 1994).
- Zinc was detected at 51 mg/kg in one surface soil sample (0 to 0.2 ft BGS) at S1-DP01, exceeding the NYSDEC RSCO of 20 mg/kg. However, zinc was determined to be naturally occurring during the 2000 - 2001 RI. Two other detections of zinc occurred exceeding the NYSDEC RSCO, but at estimated values outside of the laboratory QC limits. Sample results outside of QC limits were not considered further in the RI.
- Lead was detected at four locations exceeding background action levels. Lead was detected at 22 mg/kg at S1-DP01 from 0 to 0.25 ft BGS; at 3.9 mg/kg at S1-DP03 from 0 to 2 ft BGS; and at S1-SB02 at 10 mg/kg from 0 to 2 ft BGS. Lead was also detected exceeding background and UBLC action levels at S1-SB01 in samples from the 0 to 0.25 and the 0 to 2 ft BGS intervals, but results were qualified by the laboratory as outside the QA/QC limits (PEER 2004).

2.5 SURFACE WATER HYDROLOGY

The topography of the Francis S. Gabreski Airport area is such that surface water runoff flows in a southerly and southeasterly direction. The majority of precipitation at the airport percolates into the extremely well drained soil and moves in the subsurface aquifers although some may move short distances as runoff. The limited surface water run off from the base drains to Aspatuck Creek located near the southeast corner of the airport. Aspatuck Creek flows into Quantuck Bay, a tidal estuary which is separated from the Atlantic Ocean by a narrow barrier island (ABB-ES 1997).



ANALYTE	ACTION LEVELS SURFACE (1) SOIL (mg/kg)	SOIL (3) (UNSATURATED) (ug/kg)	SOIL (3) (SATURATED) (ug/kg)	GW (2) (ug/L)	SOIL (1) SUBSURFACE (mg/kg)
CHROMIUM	6.1	–	50	–	0.84
LEAD	4.4	–	15	–	0.65
BENZO(a)ANTHRACENE	–	330	330	–	–
DIBENZ(a,h)ANTHRACENE	–	330	330	–	–
CADMIUM	0.39	–	–	–	0.27
BENZO(a)PYRENE	–	330	330	–	–
CHRYSENE	–	400	330	–	–
ZINC	20	–	–	–	50
BENZO(k)FLUORANTHENE	–	1,100	330	–	–
BENZO(b)FLUORANTHENE	–	1,100	330	–	–

1. NYSDEC, TOGs 1991, UPPER LIMIT OF BACKGROUND CONCENTRATIONS (ABB-ES 1994).
2. FEDERAL DRINKING WATER STANDARDS MAXIMUM CONTAMINANT LEVELS.
3. NYSDEC TAGM#4046

NOTES:
1. INORGANIC COMPOUND RESULTS IN SURFACE SOIL COMPARED TO BACKGROUND CONCENTRATIONS (ABB-ES 1997).
2. GROUNDWATER RESULTS COMPARED TO FEDERAL AND NEW YORK STATE DRINKING WATER STANDARDS.

SOURCE: EWELL W. FINLEY P.C. SURVEYORS, 2001, AND ABB-ES, 1997

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GAB3005/DF NFRAP/SITE1/FIG2.2

SITE 1 – 2000-2001 REMEDIAL INVESTIGATION SOIL AND GROUNDWATER SAMPLE RESULTS
106th RESCUE WING, NEW YORK ANG
FRANCIS S. GABRESKI AIRPORT
WESTHAMPTON BEACH, NEW YORK

FIGURE 2.2

Table 2.1
2000-2001 Remedial Investigation
Confirmatory Soil Analytical Results - Volatile and Semivolatile Organics
106th Rescue Wing - New York Air National Guard
Westhampton Beach, New York

Parameter	Action Levels [b]		Sample Locations, Depth, Type, and Concentrations [a]						
	Saturated [c]	Unsaturated [d]	DP01-02 (23-27 ft) S	DP01-03 (30-34 ft) S	DP02-01 (0-2 ft) U	DP02-02 (29-31 ft) S	DP03-01 (0-2 ft) U	DP03-02 (31-35 ft) S	DP03-03 (35-36 ft) S
Volatile Organic Compounds (μg/kg)									
2-Butanone	3.0	300	ND	ND	ND	ND	ND	ND	ND
Toluene	15	1500	ND	ND	2 J	ND	ND	ND	ND
Total Xylenes	12	1200	ND	ND	ND	ND	ND	ND	ND
Semivolatile Organic Compounds (μg/kg)									
Acenaphthene	330	50,000	ND	ND	ND	ND	ND	ND	ND
Anthracene	700	50,000	ND	ND	ND	ND	ND	ND	ND
Benzo(a)anthracene	330	330	ND	ND	ND	ND	ND	ND	ND
Benzo(b)fluoranthene	330	1100	ND	ND	ND	ND	ND	ND	ND
Benzo(k)fluoranthene	330	1100	ND	ND	ND	ND	ND	ND	ND
Benzo(ghi)perylene	8000	50,000	ND	ND	ND	ND	ND	ND	ND
Benzo(a)pyrene	0.33	330	ND	ND	ND	ND	ND	ND	ND
Bis(2-ethylhexyl)phthalate	4350	50,000	570	ND	160 J [e]	ND	ND	ND	41 J [e]
Chrysene	400	400	ND	ND	ND	ND	ND	ND	ND
Dibenzo(a,h)anthracene	330	330	ND	ND	ND	ND	ND	ND	ND
Fluoranthene	19,000	50,000	ND	ND	ND	ND	ND	ND	ND
Ideno(1,2,3-cd)pyrene	330	3200	ND	ND	ND	ND	ND	ND	ND
Phenanthrene	2200	50,000	ND	ND	ND	ND	ND	ND	ND
Pyrene	6650	50,000	ND	ND	ND	ND	ND	ND	ND

Notes:

Notes:

(a) Location "DP0X-0X" refers to sample number collected at location DP0X, at depth specified in ft BGS; DP02-02 is the second direct-push sample collected from location DP02 at a depth of 29-31 ft BGS; SB refers to soil boring; Type: S = saturated soil; U = unsaturated soil.
(b) Recommended Soil Cleanup Objectives, NYSDEC, TAGM 4046.
(c) Soil in direct contract with groundwater.
(d) Greater than 5 ft above the water table.
(e) Concentration detected was less than 10 times the concentration in the associated laboratory method blank, and is therefore considered laboratory contamination (PEER 2004).

J Estimated value.
ND Not detected.

Table 2.1 (Continued)
2000-2001 Remedial Investigation
Confirmatory Soil Analytical Results - Volatile and Semivolatile Organics
106th Rescue Wing - New York Air National Guard
Westhampton Beach, New York

Parameter	Action Levels [b]		Sample Locations, Depth, Type, and Concentrations [a]						
	Saturated [c]	Unsaturated [d]	SB01-SS (0-0.25 ft) SS	SB01-01 (0-2 ft) U	SB01-02 (24-26 ft) U	SB01-03 (32-36 ft) S	SB01-23 (32-36 ft) S	SB02-01 (0-2 ft)- U	SB02-02 (34-36 ft) S
Volatile Organic Compounds (µg/kg)									
2-Butanone	3.0	300	ND	ND	ND	ND	3 J	2 J	ND
Toluene	15	1500	ND	2 BJ	ND	ND	ND	2 J	ND
Total Xylenes	12	1200	ND	ND	ND	ND	ND	1 J	ND
Semivolatile Organic Compounds (µg/kg)									
Acenaphthene	330	50,000	ND	410 J	ND	ND	ND	ND	ND
Anthracene	700	50,000	ND	1400 J	ND	ND	ND	ND	ND
Benzo(a)anthracene	330	330	**480 J**	**7100**	ND	ND	ND	ND	ND
Benzo(b)fluoranthene	330	1100	640 J	**11,000**	ND	ND	ND	ND	ND
Benzo(k)fluoranthene	330	1100	320 J	**1300 J**	ND	ND	ND	ND	ND
Benzo(ghi)perylene	8000	50,000	260 J	2400 J	ND	ND	ND	ND	ND
Benzo(a)pyrene	0.33	330	**470 J**	**6300**	ND	ND	ND	ND	ND
Bis(2-ethylhexyl)phthalate	4350	50,000	ND	ND	97 J [e]	680 [e]	1500 [e]	ND	ND
Chrysene	400	400	**600 J**	**7600**	ND	ND	ND	ND	ND
Dibenzo(a,h)anthracene	330	330	ND	**670 J**	ND	ND	ND	ND	ND
Fluoranthene	19,000	50,000	980 J	13,000	ND	ND	ND	210 J	ND
Ideno(1,2,3-cd)pyrene	330	3200	250 J	2800 J	ND	ND	ND	ND	ND
Phenanthrene	2200	50,000	490 J	7500	ND	ND	ND	ND	ND
Pyrene	6650	50,000	920 J	11,000	ND	ND	ND	210 J	ND

Notes:
(a) Location "DP0X-SS0X" refers to surface soil sample at direct-push location 0X, at depth specified in feet below ground surface (BGS):; SB refers to soil boring;
Type: SS = surface soil; S = saturated soil; U = unsaturated soil.
(b) Recommended Soil Cleanup Objectives, NYSDEC, TAGM 4046.
(c) Soil in direct contract with groundwater.
(d) Greater than 5 ft above the water table.
(e) Concentration detected was less than 10 times the concentration in the associated laboratory method blank, and is therefore considered laboratory contamination (PEER 2004).

B Analyte was detected in the associated blank.
J Estimated value.
ND Not detected.

Shading and bolding indicate exceedance of action levels.

Table 2.2
2000 – 2001 Remedial Investigation
Confirmatory Soil Analytical Results - Metals
106th Rescue Wing - New York Air National Guard
Westhampton Beach, New York

Parameter	Action Levels		Sample Location, Depth, and Concentration [a]							
	NYSDEC RSCO [b]	BGK [c] or ULBC [d]	DP01-SS01 (0-0.2 ft)	DP01-02 (23-27 ft)	DP01-03 (30-34 ft)	DP02-01 (0-2 ft)	DP02-02 (29-31 ft)	DP03-01 (0-2 ft)	DP03-02 (31-35 ft)	DP03-03 (35-36 ft)
Metals (mg/kg)										
Aluminum	SB	33,000	2200	270 *	330 *	260 E	340	660	350	220
Arsenic	7.5 or SB	7.7/5.5	0.99	ND	ND	ND	ND	ND	ND	ND
Barium	300 or SB	15 - 600	13	0.94 *	1.2 *	0.63	1.5	2.6	1.8	1.1
Beryllium	0.16 or SB	0 - 1.75	0.14 B	ND	ND	ND	0.05 B	0.06 B	0.06 B	ND
Cadmium	1 or SB	0.39/0.27 [d]	0.37	ND	ND	ND	ND	ND	ND	ND
Calcium	SB	130 - 35,000	480	ND	ND	56	230	390	42 B	52 B
Chromium	10 or SB	6.1/0.84 [d]	4.1	0.95 *	1.5 *	0.61	**3.4**	1.3	**2.1**	**3.7**
Cobalt	30 or SB	2.5 - 60	0.88	ND	ND	0.26 B	0.33 B	0.37 B	0.32 B	0.39 B
Copper	25 or SB	1 - 50	16	2.0	1.8	1.3	1.5	1.6	1.1	1.0
Iron	2000 or SB	2000 - 550,000	2800 E	470 E *	730 E*	360 E	880 E	1100 E	930 E	700 E
Lead	SB [e]	4.4/2.7 [d] [e]	**22**	ND *	ND *	0.87 B	2.7	**3.9**	1.3	0.75 B
Magnesium	SB	100 - 5000	350	42 *	72 *	46	110	110	72	56
Manganese	SB	50 - 5000	30	24 EN*	11 EN*	11 E	16	16	16	9.5
Mercury	0.1	0.001 - 0.2	0.04	ND	ND	ND	ND	ND	ND	ND
Nickel	13 or SB	0.5 - 25	1.7	ND	ND	0.18 B	0.58 B	0.67 B	0.46 B	0.52 B
Potassium	SB	8500 - 43,000	ND	ND	ND	ND	34 B	42 B	42 B	28 B
Sodium	SB	6000 - 8000	44 B	ND	ND	68 B	ND	34 B	37 B	40 B
Vanadium	150 or SB	1 - 300	6.0	1.1 *	1.7 *	0.86	1.8	2.8	2.3	0.90
Zinc	20 or SB	9 - 50	**51**	4.9 *	5.4 *	2.3 B	5.5	3.5	3.1	3.3

Notes:

(a) Location "DP0X-SS0X" refers to surface soil sample at direct-push location 0X, at depth specified in feet below ground surface (BGS): DP01-SS01 (0-0.25) is direct-push surface soil sample (first sample) at location DP01 at depth of 0-0.3 ft BGS.
Location "DP0X-0X" refers to sample number collected at location DP0X, at depth specified in ft BGS; DP02-02 is the second direct-push sample collected from location DP02 at a depth of 29-31 ft BGS.

(b) New York State (NYS) Recommended Soil Cleanup Objectives (RSCO), NYSDEC, TAGM, 4046.

(c) Eastern USA Background, NYSDEC, TAGM 4046.

(d) Upper limits of background concentration (ULBC) for surface/subsurface metals in soils; see Section 6.0 of the *Final RI Report* (PEER 2004).

(e) Background levels for lead vary widely. Average levels in undeveloped, rural areas may range from 4 to 61 ppm (mg/kg). Average background levels in metropolitan or suburban areas or near highways are much higher and typically range from 200 to 500 ppm (mg/kg) (TAGM 4046).

- * Analysis is not within laboratory quality control limits.
- B Value is greater than or equal to instrument detection limit, but less than quantitation limit.
- E Estimated value or not reported due to the presence of interferences.
- N Spike sample recovery is not within quality control limits.
- ND Not detected.
- SB Site background.

Shading and bolding indicate exceedance of action levels.

Table 2.2 (Continued)
2000 – 2001 Remedial Investigation
Confirmatory Soil Analytical Results - Metals
106th Rescue Wing - New York Air National Guard
Westhampton Beach, New York

Parameter	Action Levels		Sample Location, Depth, and Concentration [a]						
	NYSDEC RSCO [b]	BGK [c] or ULBC [d]	SB01-SS (0-0.25 ft)	SB01-01 (0-2 ft)	SB01-02 (24-26 ft)	SB01-03 (32-36 ft)	SB01-23 (32-36 ft)	SB02-01 (0-2 ft)	SB02-02 (34-36 ft)
Metals (mg/kg)									
Aluminum	SB	33,000	2400 E	3700 E	510 E	220 E	170 E	3600 E	270 E
Arsenic	7.5 or SB	7.7/5.5	ND	ND N	ND	ND	ND	ND	ND
Barium	300 or SB	15 - 600	13 N	18 N	2.5 N	1.2 N	ND N	9.0	1.5
Beryllium	0.16 or SB	0 - 1.75	ND	ND	ND	ND	ND	ND	ND
Cadmium	1 or SB	0.39/0.27 [d]	ND	**0.95**	ND	ND	ND	ND	ND
Calcium	SB	130 - 35,000	810 N	4000 N	ND N	ND N	ND N	3600	ND
Chromium	10 or SB	6.1/0.84 [d]	**6.3 N**	**13 N**	2.9 N	ND N	ND N	**33**	ND
Cobalt	30 or SB	2.5 - 60	ND	ND	ND N	ND	ND	ND	ND
Copper	25 or SB	1 - 50	9.6 N	14 N	ND N	ND N	ND N	9.4	ND
Iron	2000 or SB	2000 - 550,000	3500 E	6000 E	1200 E	640 E	340 E	5000 E	450
Lead	SB [e]	4.4/2.7 [d] [f]	**28 N**	**54 N**	ND N	ND N	ND N	**10**	ND
Magnesium	SB	100 - 5000	480 NE	2000 NE	120 NE	48 NE	43 NE	1500	60
Manganese	SB	50 - 5000	39 N	54 N	23 N	9.1 N	8.4 N	48	16
Mercury	0.1	0.001 - 0.2	ND	ND	ND	ND	ND	ND	ND
Nickel	13 or SB	0.5 - 25	2.6	4.0	ND	ND	ND	4.3	ND
Potassium	SB	8500 - 43,000	ND	ND	ND	ND	ND	ND	ND
Sodium	SB	6000 - 8000	ND	270	ND	ND	ND	130	120
Vanadium	150 or SB	1 - 300	7.5	14	3.2	ND	ND	11	ND
Zinc	20 or SB	9 - 50	**41 NE**	**77 NE**	2.7 NE	2.3 NE	1.6 NE	29	2.0

Notes:

(a) Location "DP0X-SS0X" refers to surface soil sample at direct-push location 0X, at depth specified in feet below ground surface (BGS): DP01-SS01 (0-0.25) is direct-push surface soil sample (first sample) at location DP01 at depth of 0-0.3 ft BGS.
Location "DP0X-0X" refers to sample number collected at location DP0X, at depth specified in ft BGS; DP02-02 is the second direct-push sample collected from location DP02 at a depth of 29-31 ft BGS.

(b) New York State (NYS) Recommended Soil Cleanup Objectives (RSCO), NYSDEC, TAGM, 4046.

(c) Eastern USA Background, NYSDEC, TAGM 4046.

(d) Upper limits of background concentration (ULBC) for surface/subsurface metals in soils; see Section 6.0 of the *Final RI Report* (PEER 2004).

(e) Background levels for lead vary widely. Average levels in undeveloped, rural areas may range from 4 to 61 ppm (mg/kg). Average background levels in metropolitan or suburban areas or near highways are much higher and typically range from 200 to 500 ppm (mg/kg) (TAGM 4046.

* Analysis is not within laboratory quality control limits.
B Value is greater than or equal to instrument detection limit, but less than quantitation limit.
E Estimated value or not reported due to the presence of interferences.
N Spike sample recovery is not within quality control limits.
ND Not detected.
SB Site background.

Shading and bolding indicate exceedance of action levels.

In the vicinity of Site 1, some run off occurs during precipitation events due to the presence of the asphalt paving. However, the surrounding lawn areas allow the majority of run off to infiltrate rapidly, while the remainder is carried off by the storm sewer system. Consequently, there is no surface water or sediment in the vicinity of Site 1. Therefore, no surface water or sediment sampling was performed at Site 1.

2.6 HYDROGEOLOGY

Three aquifers and two aquitards are present in the region around the Francis S. Gabreski Airport. Overlying the bedrock is the Lloyd Aquifer. The Lloyd Aquifer correlates to the Lloyd sand member of the Raritan formation. Overlying the Lloyd is the Raritan clay member, an aquitard which is the upper member of the Raritan formation. Overlying the Raritan clay is the Magothy aquifer, a water-bearing unit which correlates to the Magothy formation. Overlying the Magothy is the Gardiners clay, an aquitard present beneath and south of the airport. Overlying the Gardiners clay at the airport and overlying the Magothy north of the airport is the upper glacial aquifer, a predominantly sand and gravel unit deposited during the Wisconsin glaciation (Dames & Moore 1986).

The upper glacial aquifer and Gardiners Clay are of the greatest hydrogeologic interest with respect to Site 1. General characteristics of the hydrogeologic units present are summarized on Table 2.3. Since they are of the most interest, the hydrologic properties of the upper glacial aquifer and the Gardiners clay aquitard are further discussed below.

2.6.1 <u>Upper Glacial Aquifer</u>

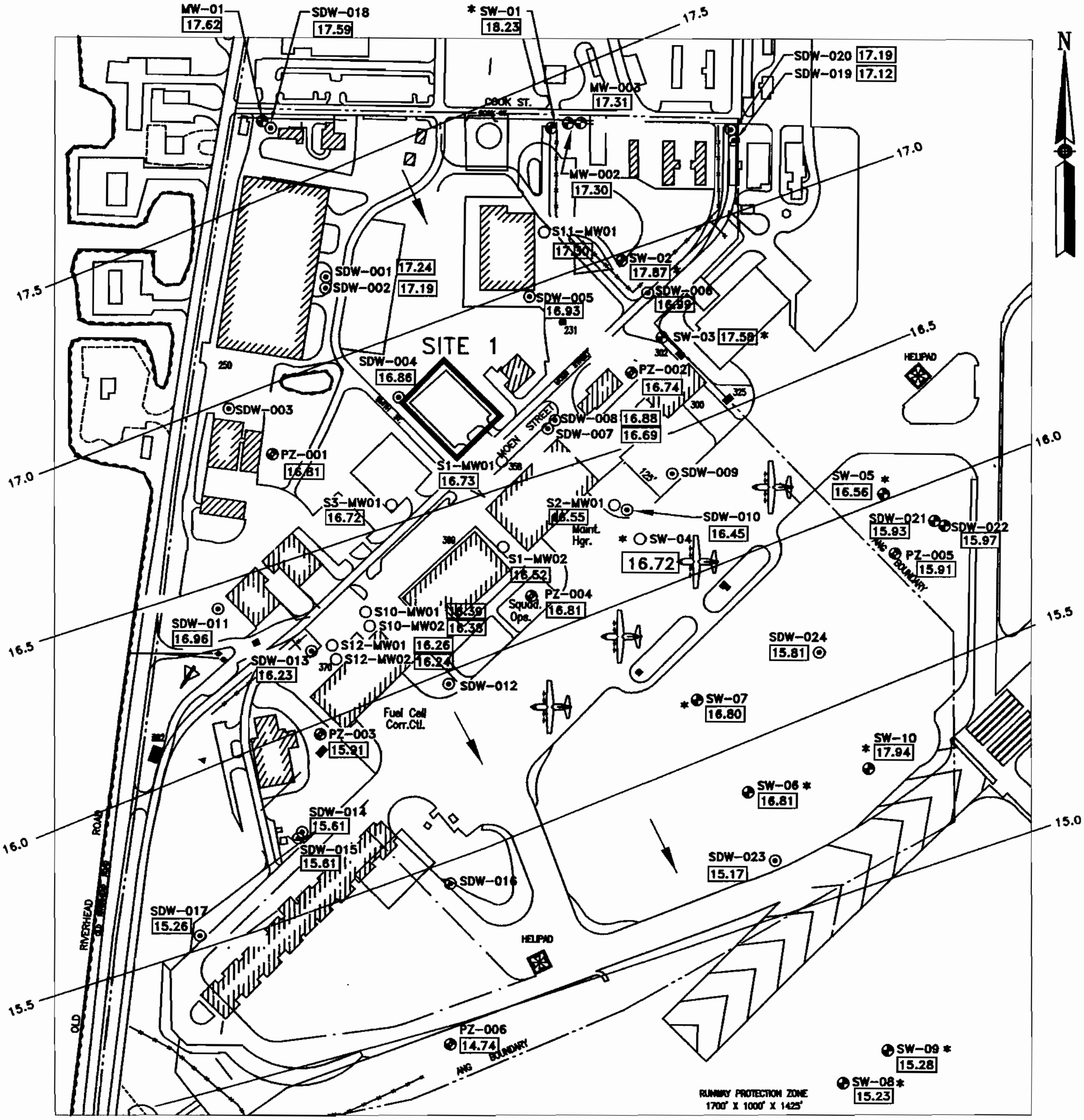
This aquifer correlates to the saturated interval of the glacial outwash deposits of the Wisconsin glaciation. This water-bearing unit is an unconfined (water table) aquifer present in the upper glacial sediments beneath the base and airport. Groundwater elevations are approximately 15 to 19 ft above the National Geodetic Vertical Datum, but may be less or more due to seasonal variations. The clean, coarse sand and gravel of this unit is very porous and highly permeable. It makes a porous soil, so that a high proportion of rainfall infiltrates where it falls, and there is virtually no surface runoff. The unit stores large quantities of water and, due to high porosity and permeability, yields large quantities of water to wells. The Upper Glacial Aquifer is the source of nearly all the groundwater pumped in central Suffolk County. There are no effective barriers to the movement of water anywhere in the unit, but there may be substantial variation in permeability over short distances. Hydraulic conductivity of the glacial deposits was estimated to be about 2000 gpd/ft^2 (9.4 x 10^{-2} cm/s), and transmissivity is approximately 200 gpd/ft (2.9 x 10^{-1} cm^2/s) (Dames & Moore 1986).

Table 2.3
Hydrogeologic Properties of Regional Aquifers
106th Rescue Wing, New York Air National Guard
Westhampton Beach, New York

Unit	Texture	Thickness (ft)	Hydraulic Conductivity (gpd/ft^2) (cm/s)	Estimated Transmissivity (gpd/ft) (cm^2/s)
Upper Glacial	Sand and gravel	120	2,000 (9.4 x 10^{-2})	200 (2.9 x 10^{-1})
Gardiners Clay	Clay and silt	40	Aquitard	Aquitard
Magothy Formations	Sand, clayey sand	930	380 (1.8 x 10^{-2})	300 (4.5 x 10^{-1})
Raritan Clay	Clay and silt	200	Aquitard	Aquitard
Lloyd Sand	Sand and gravel	400	300 (1.4 x 10^{-2})	75 (1.1 x 10^{-1})
Bedrock	Granitic gneiss	--	Aquiclude	Aquiclude

Source: Dames & Moore 1986.

The direction of groundwater movement within the Upper Glacial Aquifer at the Francis S. Gabreski Airport is toward the south-southeast. Depth to groundwater averages 35 to 40 ft BGS. Slug tests performed on base monitoring wells and piezometers, screened in the upper glacial aquifer, indicated hydraulic conductivities ranging from 1.6 x 10^{-2} to 5.2 x 10^{-2} cm/sec (Dames & Moore 1986). A potentiometric surface map for the area of the base, based on measurements recorded on May 15-16, 2001, is shown on Figure 2.3. The upward gradient of groundwater from the underlying Magothy Aquifer would cause the Upper Glacial Aquifer groundwater to flow horizontally toward surface water discharge points. Migration of contaminants downward into lower aquifers is very unlikely (Dames & Moore 1986).



LEGEND

Symbol	Description	Symbol	Description
◎	PRE-EXISTING SMALL DIAMETER WELL	→	GROUNDWATER FLOW DIRECTION
●	PRE-EXISTING WELL	12.51	GROUNDWATER ELEVATION IN FEET ABOVE MEAN SEA LEVEL
●	PRE-EXISTING PIEZOMETER	*	INDICATES GROUNDWATER ELEVATION IS CONSIDERED ANOMALOUS AND THE WELL WAS EXCLUDED IN CONSTRUCTING CONTOURS
○	NEW MONITORING WELL (RI, 2000-2001)		
15.5	POTENTIOMETRIC SURFACE CONTOUR		

0 200 400

SCALE IN FEET

SOURCE: BASE MAP AND ABB-ES, 1997

NOTE: WELL LOCATIONS APPROXIMATE

PEER

PROJ./003005-011

GAB3005/NFRAP/SITE1/FIG 2.3

BASEWIDE POTENTIOMETRIC SURFACE MAP, MAY 15-16, 2001
106th RESCUE WING, NEW YORK AIR NATIONAL GUARD
FRANCIS S. GABRESKI AIRPORT
WESTHAMPTON BEACH, NEW YORK

FIGURE 2.3

2.6.2 Gardiners Clay

This clay is poorly permeable and acts as an aquitard between the Upper Glacial Aquifer and the underlying Magothy Aquifer. The Gardiners Clay also constitutes a confining layer for the Magothy aquifer, which has a potentiometric surface above that of the Upper Glacial Aquifer. At the base, the beds of clay and sand within the Gardiners clay are an effective barrier to the movement of groundwater to and from the lower aquifers. The combination of low permeability, with the generally upward movement of water within the Magothy aquifer tends to prevent downward migration of contamination from the Upper Glacial Aquifer into the lower aquifers (Dames & Moore 1986).

2.7 GROUNDWATER CONTAMINATION INVESTIGATION RESULTS

During the SI completed in 1994, chromium was detected at a concentration below the MCL in one groundwater screening sample collected from Site 1. The 1994 SI results are summarized in Section 1.4.1. Chromium was subsequently determined to be naturally occurring during the RI, and is not considered a contaminant of potential concern (COPC).

The 2000 - 2001 RI groundwater investigation included collection of both screening and confirmatory groundwater samples, as discussed below in Sections 2.7.1 and 2.7.2. Screening and confirmatory samples were collected from direct-push borings S1-DP01, S1-DP02, and S1-DP03, and two rounds of confirmatory groundwater samples were collected from newly installed monitoring wells S1-MW01 and S1-MW02.

2.7.1 Groundwater Screening Samples

During the 2000 – 2001 RI direct-push sampling, groundwater-screening samples were collected from direct-push borings S1-DP01, S1-DP02, and S1-DP03. The samples were submitted for expedited turnaround time analysis of BTEX by the field laboratory. No BTEX compounds were detected in the samples.

2.7.2 Direct-Push Confirmatory Groundwater Samples

During the 2000 – 2001 RI, direct-push groundwater confirmatory samples were collected from direct-push borings S1-DP01, S1-DP02, and S3-DP02, and were submitted for confirmatory analysis at the state-certified laboratory. The samples from S1-DP01 and S1-DP02 were analyzed for volatile organic compounds only; while the sample from S1-DP02 was analyzed for volatile and semivolatile organic compounds. No organic compounds were detected above NYSDEC action levels in any of the samples.

2.7.3 Groundwater Monitoring Samples

Groundwater monitoring samples were collected from newly installed monitoring wells S1-MW01 and S1-MW02 during Rounds 1 and 2 and submitted for analyses for volatile organic compounds, semivolatile organic compounds, and TAL metals. Additionally, Round 1 and 2 samples were collected from S1-MW01 for analysis of bioremediation indicator parameters, including: TPH-GRO/DRO, methane, alkalinity, chloride, and sulfate.

Due to a laboratory error, the Round 2 sample from S1-MW02 was only analyzed for TAL metals. Tables 2.4 and 2.5 summarize the volatile and semivolatile organics and TAL metals results for the groundwater monitoring samples at Site 1. No volatile or semivolatile organic compounds or TAL metals were detected above the NYSDEC action levels in groundwater monitoring samples collected from Site 1. BEHP was detected in two samples, but was considered laboratory-introduced contamination based on the QA/QC analysis documented in the *Final RI Report* (PEER 2004). TPH-DRO was detected in the sample from S1-MW01 during Round 1, at a concentration of 0.23 mg/L, but was not detected during Round 2. TPH-GRO was not detected in either sample. There are no NYSDEC action levels for TPH. The bioremediation parameters did not indicate active bioremediation. The low detected concentrations of volatile and semivolatile organics, BTEX, and TPH-DRO, the non-detection of TPH-GRO, and lack of active bioremediation indicate that the magnitude of the spill may have been overestimated, that natural attenuation of the spill has proceeded near to completion, or both.

Table 2.4
2000 – 2001 Remedial Investigation
Groundwater Monitoring Analytical Results
Volatile and Semivolatile Organics, Rounds 1 and 2
106th Rescue Wing, New York Air National Guard
Westhampton Beach, New York

Parameter	Action Levels		Sample Location and Concentration [a]		
	NYS [b]	MCL [c]	S1-MW01-01	S1-MW01-02	S1-MW02-01
BTEX (µg/L)					
Toluene	5	1000	0.42	ND	NA
Remaining Analytes	--	--	ND	ND	NA
Volatile Organic Compounds (µg/L)					
Carbon Disulfide	50	--	0.7	ND	3
Toluene	5	1000	ND	ND	0.5 BJ
Remaining Analytes	--	--	ND	ND	ND
Semivolatile Organic Compounds (µg/L)					
1,4-Dichlorobenzene	4.7	75	ND	0.8 BJ	ND
1,2,4-Trichlorobenzene	50 [d]	70	ND	0.9 BJ	ND
Remaining Analytes	--	--	ND	ND	ND
TPH-GRO (µg/L)	--	--	ND	ND	NA
TPH-DRO (mg/L)	--	--	0.23	ND	NA

Notes:

(a)	"MW" refers to monitoring well; "-01" refers to Round 1 sampling, February - March 2001; "-02" refers to Round 2 sampling, May - June 2001.
(b)	New York State (NYS), Class GA Groundwater; NYSDEC TAGM #4046.
(c)	Maximum Contaminant Level (MCL), United States Environmental Protection Agency.
(d)	Compound is a Principal Organic Compound (POC). Under New York State Drinking Water Standards, a general standard of 50 µg/L applies to all POCs unless a more stringent compound specific standard has been set (ABB-ES 1994).
B	Analyte is also detected in method blank.
BTEX	Benzene, toluene, ethylbenzene, and xylenes.
J	Estimated value.
NA	Not analyzed.
ND	Not detected.
TPH-DRO	Total petroleum hydrocarbons - diesel range organics.
TPH-GRO	Total petroleum hydrocarbons - gasoline range organics.
--	No applicable action level.

2.8 CLIMATE

The average annual rainfall in the Westhampton Beach area is about 45 in. The highest average rainfall is in March, and the lowest is in October (Dames & Moore 1986).

2.9 AIR

Air sampling was not conducted at Site 1. The contaminants detected at Site 1 are non-volatile and would not be of concern since the majority of this site is covered in lawn and asphalt.

Table 2.5
2000 – 2001 Remedial Investigation
Groundwater Monitoring Analytical Results - Metals Rounds 1 and 2
106th Rescue Wing, New York Air National Guard
Westhampton Beach, New York

Parameter	Action Levels		Sample Location and Concentration [a]			
	NYSDEC [b]	MCL [c]	SDW004-01	SDW004-02	S1-MW01-01	S1-MW01-02
Metals (μg/L)						
Aluminum	--	--	3100	1600	ND	2200
Arsenic	25	50 [d]	ND	ND	ND	ND
Barium	--	--	12	11	33	49
Cadmium	10	5.0	ND	ND	ND	ND
Calcium	--	--	13,000	11,000	9400	9800
Chromium	50	100	6.1	5.5	6.5	8.7
Cobalt	--	--	ND	ND	ND	ND
Copper	--	1300 [e]	11	ND	ND	ND
Iron	--	--	4200	2500	120	3500
Lead	25	15 [e]	ND	ND	ND	ND
Magnesium	--	--	4800	3500	2900	3300
Manganese	--	--	29	56	17	91
Nickel	--	--	ND	ND	ND	ND
Potassium	--	--	1000	1600	1600	1300
Sodium	--	--	40,000	7800	37,000	53,000
Thallium	--	--	ND	ND	ND	ND
Vanadium	--	--	17	17	ND	6.3
Zinc	--	--	66	42	ND	ND

Notes:
(a) "SDW" refers to small-diameter well; "MW" refers to monitoring well; "SW" refers to Stone & Webster well "-01" refers to Round 1 sampling, February - March 2001; "-02" refers to Round 2 sampling, May - June 2001.
(b) New York State (NYS), Class GA Groundwater; NYSDEC TAGM #4046.
(c) Maximum Contaminant Level (MCL), United States Environmental Protection Agency.
(d) Federal MCL is under review.
(e) Treatment Technique action level. Federal MCL is concentration in water collected from tap.
ND Not detected.
-- No applicable action level.

2.10 RECEPTORS

Site 1 is located within the boundaries of the ANG facility, a secured government installation, within the Francis S. Gabreski Airport. Access to Site 1 is restricted. The site surface is 50% covered with asphalt. The shallow groundwater in the immediate vicinity of the site is not used for water supply; groundwater occurs at approximately 32 to 33 ft BGS; therefore, there is no potential exposure route for groundwater at Site 1. Exposure to off-site receptors via surface water runoff is considered highly unlikely due to the soil characteristics at the site. The soils at the base are highly porous and permeable, and precipitation rapidly infiltrates to the subsurface. Little to no runoff occurs, and has no potential to reach off-site receptors.

Consequently, the only exposure likely to occur in connection with Site 1 would be to construction workers or base personnel who could become exposed to impacted soil during excavation activities at the site. During excavation activities, a potential exposure pathway would be through dermal absorption of contaminants. However, routine safety procedures and good work practices as required in the Base Master Plan will provide adequate protection from exposure for construction workers; this potential exposure route is therefore considered incomplete for on-site receptors. Human receptors and exposure pathways are discussed in greater detail in Section 3.2.

Potential endpoint ecological receptors that were considered for the ecological assessment included endangered species that could potentially be found within a 4-mile radius of the base. These included the Northern Harrier, the Osprey, the Tiger Salamander, and the Eastern Mud Turtle. There are no endangered plant species within a 4-mile radius of the base. Accordingly, plant species were not considered potential end point receptors for the ecological assessment. The base does not provide habitat to any known federally protected, threatened, or endangered animal species (Dames & Moore 1986).

All of the endangered species feed and reside almost exclusively in the vicinity of surface water bodies (Macwhirter, et al., 1996 and NYSDEC 2002). Therefore, the most likely of the exposure pathway would be exposure of endangered species through impacted surface water. Surface water bodies in the vicinity of the site include Aspatuck Creek, Old Ice Pond, and North Pond. Additionally, the Quogue Waterfowl Refuge is located approximately 7,000 ft east of Site 1 and 2,000 ft east of the airport. Potential mechanisms for transport of contaminants from the site include surface water run off. Surface water may be potentially impacted by contaminated surface water runoff from Site 1.

Contamination of nearby surface water bodies due to impacted surface water runoff from the base is not likely. The only surface water body downgradient of Site 1 is Aspatuck Creek. Aspatuck Creek receives surface water runoff from the base, but infiltration rates at the base are relatively high and little surface water leaves the base as runoff. Aspatuck Creek is located several hundred feet (approximately 1,800 ft) southeast of Site 1. Additionally, Site 1 is covered with 50% asphalt with the remainder being grassy lawn. This effectively eliminates, or significantly limits erosion of impacted soils by surface runoff during high rainfall events. On this basis, it is not likely that surface water bodies in the vicinity of the base will be impacted by contaminants from the base. Therefore, since surface water bodies in the vicinity of the base are not likely to be impacted by contaminated surface runoff from the Site 1, exposure of endangered species to contaminants from the site is not expected.

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3.0 BASELINE RISK ASSESSMENT

A baseline risk assessment was conducted for Site 1 in accordance with guidelines in the EPA Risk Assessment Guidance document (EPA 1989), except for lead detected in site surface soils. The COPCs evaluated include arsenic, cadmium, PAHs, and lead. Risks associated with lead in surface soil were evaluated using the EPA Technical Review Workgroup (TRW) Adult Lead Methodology (ALM) (EPA 1999), as presented in Section 3.1. Arsenic, cadmium, and PAHs were evaluated according to standard risk assessment procedures (EPA 1989), as presented in Section 3.2.

Quantitative evaluation of risks associated with lead are not technically feasible using the standard risk assessment equations (EPA 1989). Even though the health effects of exposure to lead are well known, no toxicity factors (i.e., reference doses or cancer slope factors) are available. Therefore, the TRW ALM was employed since it provides a scientifically defensible approach for assessing risks associated with lead in soil. This methodology is currently only applicable to lead.

Three of the COPCs that were identified at Site 1, arsenic, cadmium, and lead, are classified as inorganic metals. Metals naturally occur in soil and groundwater, and tend to persist in the environment. Metals may slowly undergo speciation to a more insoluble sulfate, sulfide, or oxide compound, but do not degrade beyond the elemental state. They tend to adsorb to soils and do not readily dissolve in water. Metals may leach from soils to groundwater, but may also be retained in surface soils especially those containing large quantities of organic materials (EPA 2001a). Consequently, metals have a low potential for mobility in soils. In groundwater, metals migrate primarily by way of advection. Metals in surface soils may be transported in surface water runoff during rainfall events due to erosion and transportation of sediments.

3.1 EVALUATION OF LEAD IN SURFACE SOIL

The TRW ALM was used to evaluate potential risks to human health posed by lead in surface soils at Site 1. The decision to use the TRW ALM was based on the following factors:

- The methodology is the most current available and is recognized by the EPA.
- The approach provides a scientifically defensible approach for assessing adult lead risks associated with site-specific, non-residential exposure scenarios.
- The TRW ALM uses a simplified representation of lead biokinetics to predict blood lead concentrations in fetuses carried by women who have relatively steady patterns of site exposure to lead-contaminated soil, since they would be the highest risk population.
- The approach utilizes conservative assumptions that are applicable to circumstances in effect (non-residential use), and expected to remain in effect per the Base Master Plan (GRW Engineers, Inc., 1995), at the base and airport.
- There are no current residential facilities on the base and, according to the Base Master Plan (GRW Engineers, Inc., 1995), there are no plans for any part of the base to ever be used for residential purposes (Lt Col Jerry Webb, Base EM, personal communication, January 30, 2002).
- Future plans call for the airport to remain active indefinitely, and preclude residential use scenarios.
- Access to the sites on the base are restricted to base personnel and authorized civilians only, limiting exposure.

Equations allow calculation of fetal risks from adult exposures to specified levels of soil lead contamination, to support the EPA's goal of limiting exposure risk, which can also be applied in a "forward" manner to predict baseline risks resulting from measured concentrations. The EPA has set the blood level of concern based on the current Office of Solid Waste and Emergency Response guidance, which calls for the establishment of cleanup goals to limit childhood risk of exceeding 10 μg/dL blood lead level to 5%, also known as the 95^{th} percentile (EPA 1994).

The risk assessment methodology in the ALM is based on a lognormal probability model for blood levels in adult women exposed to lead-contaminated soils, coupled with an estimated constant of proportionality between fetal and maternal blood levels. These relationships specify that the distribution of fetal blood lead levels also follows a lognormal distribution:

$$\boldsymbol{PbB_{fetal} = Lognormal(GM, GSD)}$$

Where:

GM = Geometric Mean (or central blood lead concentration)
GSD = Geometric Standard Deviation [an estimated (dimensionless) value]

Estimation of the probability that fetal lead levels will exceed the EPA blood level of concern is a two-step process:

(1) Calculate the geometric mean (central) fetal blood lead concentration. The equation used for this purpose has the following form:

$$PbB_{fetal,GM} = R_{fetal/maternal} \times \left[PbB_{adult,0} + \frac{PbS \times BKSF \times IR_S \times AF_S \times EF_S}{AT} \right] \quad \text{(Equation 1)}$$

Where:

$PbB_{fetal,GM}$	=	Central estimate of blood lead concentrations (µg/dL) for fetuses carried by women who have site exposures to soil lead at concentration, PbS.
$R_{fetal/maternal}$	=	Constant of proportionality between fetal and maternal blood lead concentrations.
$PbB_{adult,0}$	=	Typical blood lead concentration (µg/dL) in adults (i.e., women of child-bearing age) in the absence of exposures to the site that is being assessed.
PbS	=	Soil lead concentration (µg/g) (appropriate average concentration for individual).
BKSF	=	Biokinetic slope factor relating the (quasi-steady state) increase in typical adult blood lead concentration to average daily lead uptake (µg/dL blood lead increase per µg/day lead uptake).
IR_S	=	Intake rate of soil, including both outdoor soil and the soil-derived component of indoor dust (g/day).
AF_S	=	Absolute gastrointestinal absorption fraction for ingested lead in soil and lead in dust derived from soil (dimensionless).

EF_S	=	Exposure frequency for contact with assessed soils and/or dust derived in part from these soils (days of exposure during the averaging period); may be taken as days per year for continuing, long-term exposures.
AT	=	Averaging time; the total period during which soil contact may occur, 365 days/year for continuing long-term exposures.

(2) Determine the probability that the blood lead level for a fetus carried by a woman exposed to lead at a site exceeds 10 μg/dL. This calculation uses the fetal geometric mean (GM) blood lead from Equation 1 and the geometric standard deviation (GSD) value appropriate for the risk assessment. Note that because of the assumption of proportionality between fetal and maternal blood levels, the adult GSD and the fetal GSD are equal.

The following formula allows the calculation of probability. The logarithm of a lognormal variable follows a normal probability distribution. Exceedance probabilities for the lognormal model can be determined from standard normal model statistical tables after the GM, GSD, and exceedance criterion are converted to log scale values and a "standard normal deviate" or "z-value" is calculated:

$$z = \left(\frac{\ln(10) - \ln(GM)}{\ln(GSD)} \right) \quad \text{(Equation 2)}$$

A statistical program or a normal probability table can then be used to determine the exceedance probability, p, that a standard normal variable has a value less than z. The probability that the fetal blood lead level exceeds 10 μg/dL is obtained from the expression 1-p.

To calculate the probability, p, that fetal blood lead will exceed the blood lead target of concern, the EPA TRW has provided a spreadsheet (EPA 2001b) that calculates p using the equations and assumptions presented in the ALM. Table 3.1 summarizes the default parameters used.

Using the EPA TRW spreadsheet, site-specific probabilities have been calculated using the highest detected lead concentration for Site 1 (54 mg/kg). The results of the calculation are presented in Table 3.2. Figure 3.1 presents the EPA TRW ALM spreadsheet used in the calculation for lead in surface soil at Site 1. In order to obtain reasonably conservative risk estimates, the values assigned to the parameter of $GSD_{i,adult}$ was 2.1, representing a heterogeneous population, and the value assigned to $PbB_{adult,0}$ was 2.0 μg/dL, representing the middle portion of the range. The calculated probability that $PbB_{fetal,0.95}$ will exceed the PbB_t at Site 1 is 2.1. Probabilities of 5% or less are considered acceptable levels of risk.

Table 3.1
Summary of Default Parameter Values
for the Risk Estimation Algorithm (Equations 1 through 4)
106th Rescue Wing
New York Air National Guard Base
Westhampton Beach, New York

Parameter	Unit	Value	Comment
$PbB_{fetal, 0.95, goal}$	µg/dL	10	For estimating RBRGs based on risk to the developing fetus.
$GSD_{i,adult}$	--	1.8 2.1	Value of 1.8 is recommended for a homogeneous population while 2.1 is recommended for a more heterogeneous population.
$R_{fetal/maternal}$	--	0.9	Based on Goyer (1990) and Graziano et al. (1990).
$PbB_{adult,0}$	µg/dL	1.7-2.2	Plausible range based on NHANES III phase 1 for Mexican American and non-Hispanic black, and white women of child-bearing age (Brody et al., 1994). Point estimate should be selected based on site-specific demographics.
BKSF	µg/dL per µg/day	0.4	Based on analysis of Pocock et al. (1983), and Sherlock et al. (1984) data.
IR_S	g/day	0.05	Predominantly occupational exposures to indoor soil-derived dust rather than outdoor soil; (0.05 g/day = 50 mg/day).
EF_S	day/yr	219	Based on EPA (1993) guidance for average time spent at work by both full-time and part-time workers.
AF_S	--	0.12	Based on an absorption factor for soluble lead of 0.20 and a relative bioavailability of 0.6 (soil/soluble).

Notes:
RBRGs Risk-based remediation goals.
Source: EPA 1996a.

Table 3.2
Calculation of Blood Lead Concentrations and Probability of Risk
106th Rescue Wing
New York Air National Guard Base
Westhampton Beach, New York

PbS	$PbB_{adult, central}$	$PbB_{fetal, 0.95}$	PbB_t	P
54	2.1	6.3	10 µg/L	1.9%

Notes:

PbS	Highest detected lead concentration in surface or shallow soils in µg/g, which is equivalent to mg/kg.
$PbB_{adult, central}$	Central estimate of blood lead concentrations (µg/dL) in adults (i.e., women of child-bearing age) that have site exposure to soil lead at concentrations, PbS.
$PbB_{fetal, 0.95}$	Central estimate of blood lead concentrations (µg/dL) for fetuses carried by women who have site exposures to soil lead at concentrations, PbS. Assumes GSDi is 2.1 (heterogeneous population).
PbB_t	Target blood level of concern.
P	Probability that $PbB_{fetal, 0.95}$ will exceed PbB_t; if P < 5% then the risk is acceptable.

3.2 BASELINE RISK ASSESSMENT FOR ARSENIC, CADMIUM, AND PAHs IN SURFACE SOIL

A baseline risk assessment is generally conducted in three steps. These three steps include conducting an exposure assessment, conducting a toxicity assessment, and characterizing risks. Together, the results of these three phases are used to reach conclusions about the likelihood of adverse effects. If at any stage of the process, the assessment indicates that risks are not present, then the process is considered complete.

3.2.1 Exposure Assessment

Exposure is defined as contact of an organism with a chemical agent (EPA 1988 and 1989). In order for exposure to contamination to occur, four factors must exist: (1) a source(s) of contaminants; (2) a migration pathway(s); (3) an exposure mechanism(s); and (4) receptors. Without all these factors, the exposure pathway is not complete. Exposure assessments are conducted to estimate the magnitude of actual and/or potential exposures, the frequency and duration of these exposures, and the pathways by which organisms are potentially exposed.

Figure 3.1
Site 1 - 2000 - 2001 Remedial Investigation - Risk Assessment
Adult Lead Risk Calculation Spread Sheet
U.S. EPA Technical Review Workgroup for Lead, Adult Lead Committee

[redacted]

Version date 8/14/01

Exposure Variable	PbB Equation[1] 1*	PbB Equation[1] 2**	Description of Exposure Variable	Units	Values for Non-Residential Exposure Scenario: Using Equation 1, GSDi = 1.8	Using Equation 1, GSDi = 2.1	Using Equation 2, GSDi = 1.8	Using Equation 2, GSDi = 2.1
PbS	X	X	Site 1 soil lead concentration	ug/g or ppm	54	54	54	54
$R_{fetal/maternal}$	X	X	Fetal/maternal PbB ratio	--	0.9	0.9	0.9	0.9
BKSF	X	X	Biokinetic Slope Factor	ug/dL per ug/day	0.4	0.4	0.4	0.4
GSD_i	X	X	Geometric standard deviation PbB	--	1.8	2.1	1.8	2.1
PbB_0	X	X	Baseline PbB	ug/dL	2.0	2.0	2.0	2.0
IR_S	X		Soil ingestion rate (including soil-derived indoor dust)	g/day	0.050	0.050	--	--
IR_{S+D}		X	Total ingestion rate of outdoor soil and indoor dust	g/day	--	--	0.050	0.050
W_S		X	Weighting factor; fraction of IR_{S+D} ingested as outdoor soil	--	--	--	1.0	1.0
K_{SD}		X	Mass fraction of soil in dust	--	--	--	0.7	0.7
$AF_{S,D}$	X	X	Absorption fraction (same for soil and dust)	--	0.12	0.12	0.12	0.12
$EF_{S,D}$	X	X	Exposure frequency (same for soil and dust)	days/yr	219	219	219	219
$AT_{S,D}$	X	X	Averaging time (same for soil and dust)	days/yr	365	365	365	365
PbB_{adult}			**PbB of adult worker, geometric mean**	**ug/dL**	**2.1**	**2.1**	**2.1**	**2.1**
$PbB_{fetal,0.95}$			**95th percentile PbB among fetuses of adult workers**	**ug/dL**	**4.9**	**6.3**	**4.9**	**6.3**
PbB_t			**Target PbB level of concern (e.g., 10 ug/dL)**	**ug/dL**	**10.0**	**10.0**	**10.0**	**10.0**
$P(PbB_{fetal} > PbB_t)$			**Probability that fetal PbB > PbB_t, assuming lognormal distribution**	**%**	**0.2%**	**1.2%**	**0.2%**	**1.2%**

[1] Equation 1 does not apportion exposure between soil and dust ingestion (excludes W_S, K_{SD}).
When $IR_S = IR_{S+D}$ and $W_S = 1.0$, the equations yield the same $PbB_{fetal,0.95}$.

***Equation 1, based on Eq. 1, 2 in USEPA (1996).**

PbB_{adult} =	$(PbS*BKSF*IR_{S+D}*AF_{S,D}*EF_S/AT_{S,D}) + PbB_0$
$PbB_{fetal,0.95}$ =	$PbB_{adult} * (GSD_i^{1.645} * R)$

****Equation 2, alternate approach based on Eq. 1, 2, and A-19 in USEPA (1996).**

PbB_{adult} =	$PbS*BKSF*([(IR_{S+D})*AF_S*EF_S*W_S]+[K_{SD}*(IR_{S+D})*(1-W_S)*AF_D*EF_D])/365+PbB_0$
$PbB_{fetal,0.95}$ =	$PbB_{adult} * (GSD_i^{1.645} * R)$

Source: EPA 1996b

3.2.1.1 Exposure Settings

This section describes the physical characteristics of Site 1. Additional information concerning the physical characteristics of the base and Site 1 is provided in Sections 2.0 and 3.0 of the *Final RI Report* (PEER 2004). Access to the base is restricted to base personnel and authorized guests only. The base is fenced and Site 1 is located within the base perimeter fence. The site itself is also enclosed within a gated chain link fence, and can be secured against unauthorized entry. Future plans call for the base and airport to remain active indefinitely, with no future plans for any residential usage of the property.

<u>Exposure Setting</u>

Site 1 is located at the intersection of Moen Street and Smith Avenue in the central portion of the base. Approximately 80 % of the site is covered with asphalt pavement, which is bordered with grass. Groundwater at the site is present at approximately 32 to 33 ft BGS and flows toward the southeast.

The COPCs at the site include the metals arsenic, cadmium and lead, and PAHs, which were identified in surface and shallow soils. No COPCs were detected in site groundwater. Risks associated with lead in soil were previously assessed using the TRW ALM in Section 3.1, which concluded that lead risks were acceptable at Site 1. Therefore, only risks associated with arsenic, cadmium and PAHs are discussed herein. Potential receptors to the contaminated surface soils at Site 1 include base personnel, construction personnel, and site visitors. During rainfall events, surface water bodies (e.g., Aspatuck Creek) in the vicinity may be impacted by surface runoff from the site. Surface water runoff from the site may potentially contain soil particles that have been impacted due to sorption of metals. Runoff from the base discharges into Aspatuck Creek, which may be potentially impacted by contaminated runoff from the site. Aspatuck Creek is approximately 1,800 ft southeast of the site. Potential receptors to impacted water in Aspatuck Creek are area residents.

3.2.1.2 Identification of Exposure Pathways

When identified for a potential receptor, an exposure pathway describes the mechanism(s) by which a potential receptor may be exposed to contaminants at the site, and/or the mechanism(s) by which a potential receptor may be exposed to contaminants that have been transported from the site. In this section, the pathways by which the previously discussed potential receptors may be exposed are evaluated and identified. Depending on the results of the evaluations, some of the previously identified potential receptors may be excluded from further consideration at the site.

Exposure pathways are identified based on consideration of the sources, types, and locations of contaminants at Site 1, in this case, arsenic, cadmium, and PAHs in surface soil. The likely environmental fate of the contaminants, including persistence, partitioning, and transport, and the locations of the potential receptors are evaluated. Exposure points (points of potential contact with the contaminants) and routes of exposure (e.g., ingestion, inhalation) are identified for each exposure pathway.

Exposure Pathway Evaluation

Impacted media at Site 1 is limited to surface soil which contains elevated concentrations of arsenic, cadmium, and PAHs. Potential on-site receptors were previously identified as base personnel, construction personnel, and site visitors that might be exposed to impacted surface soil. Potential off-site receptors were previously identified as area residents that might be exposed to surface water impacted by contaminated runoff from the site.

Potential exposure routes for on-site receptors include ingestion of impacted soil, dermal contact with impacted soil, and inhalation of impacted fugitive dust. Currently, the site is 50% covered with asphalt which effectively eliminates the potential for ingestion or direct contact with impacted surface soils, or inhalation of fugitive dust from the site unless construction activities that involve excavation occur at the site. Limited underground utilities are located in the area, and there are no plans for future construction activities at the site. Should construction activities that involve excavation become necessary at the site, adequate protection for construction workers would be provided by following routine safety procedures and good work practices as required for any on-base construction activity by the Base Master Plan (GRW Engineers, Inc., 1995). Since routine safety procedures and required good work practices will provide adequate protection from exposure for construction workers, this potential exposure rout is incomplete for on-site receptors.

Potential exposure routes for off-site receptors include ingestion of impacted surface water, or dermal contact with impacted surface water due to runoff from the base. Surface water runoff from the site may potentially contain soil particles that have been impacted due to sorption of metals. Infiltration rates at the base are relatively high and little surface water leaves the base as runoff. Currently, the site is mostly covered with asphalt which effectively caps the majority of surface soil at the site, and the remainder is covered with grass. However, due to its location at the intersection of two streets excavation activities are likely to occur at the site. If excavation activities occur at the site in the future, then exposed surface soils may have a higher potential for reaching downgradient surface water (Aspatuck Creek) than otherwise during rainfall events. However, it is not likely that the creek would be impacted by sediments from the site due to the distances involved (approximately 1,800 ft) and the concentrations of contaminants. Therefore, there are no complete exposure pathways identified for off-site receptors.

Elevated concentrations of lead were detected in surface soil at Site 1. Risks associated with lead in soils were evaluated using the TRW ALM in Section 3.1. The results of the evaluation indicate that potential risks associated with lead in surface soils at the base are acceptable. Three other COPCs (arsenic, cadmium, and PAHs) were identified in surface soil at Site 1. However, they were present at a low levels and exposure would only be likely during excavation activities at the site. Potential exposure to site contaminants can be minimized or eliminated by following good work practices and required safety procedures during the excavation activities. Therefore, no exposures are expected to contaminants in surface soils at the site.

3.2.2 Future Use Risk

Information on future plans indicate that it is highly unlikely that base or airport property will ever be developed for any other use. Consequently, future scenarios that include developing base property for residential or other uses were not considered.

3.3 ECOLOGICAL ASSESSMENT

The ecological assessment characterized the risks to the environment posed by the COPCs that were identified at Site 1. Contaminants were detected in surface soil at the site, but not in saturated subsurface soil. Potential ecological receptors to the COPCs were evaluated on the basis of the transport mechanisms identified for the site. Contaminated media considered consisted of surface soils. Accordingly, potential receptors and potential exposure pathways may include:

- plant species existing at the site that may be exposed to contamination in surfaces soils;
- animal species that may pass through the site and be exposed to contamination in surface soils through direct contact with surface soils;
- animal species that may pass through the site and be exposed to contamination through ingestion of plant or animal species residing in site surface soils; and
- animal species that reside or feed in the vicinity of surface water bodies impacted by surface run off from the site.

Potential endpoint receptors that were considered for the ecological assessment included endangered species that have been identified within a 4-mile radius of the base. These include the Northern Harrier, the Osprey, the Tiger Salamander, and the Eastern Mud Turtle. There are no endangered plant species within a 4-mile radius of the base. Accordingly, plant species were not to be considered as potential end point receptors for the ecological assessment. The base does not provide habitat to any known federally protected, threatened or endangered animal species (Dames & Moore 1986).

3.3.1 Evaluation of Ecological Risks

All of the endangered species feed and reside almost exclusively in the vicinity of surface water bodies (Macwhirter, et al., 1996 and NYSDEC 2002). Therefore, the most likely exposure pathway would be exposure of endangered species through impacted surface water. Surface water bodies in the vicinity of the site include Aspatuck Creek, Old Ice Pond, and North Pond. Additionally, the Quogue Waterfowl Refuge is located approximately 7,000 ft east of Site 1. Potential mechanisms for transport of contaminants from the site include surface water run off.

Surface water may be potentially impacted by contaminated surface water runoff from the site with COPCs in surface soils. Groundwater beneath the base and airport generally flows toward the southeast. Contamination of surface water via the groundwater pathway is not likely since none of the surface water bodies (including the waterfowl refuge) are located hydraulically downgradient of Site 1. Contamination of nearby surface water bodies due to impacted surface water runoff from the base is not likely either. The only surface water body downgradient of the site is Aspatuck Creek. Aspatuck Creek receives surface water runoff from the base, but infiltration rates at the base are relatively high and little surface water leaves the base as runoff. Aspatuck Creek is located several hundred feet (approximately 1,800 ft) southeast of the site. Additionally, the majority of the site is covered with asphalt and grass which effectively eliminates, or significantly limits erosion of impacted soils by surface runoff during high rainfall events. On the basis of the above discussion, it is not likely that surface water bodies in the vicinity of the base will be impacted by contaminants from the base. Therefore, since surface water bodies in the vicinity of the base are not likely to be impacted by Site 1 groundwater, or by contaminated surface runoff, exposure of endangered species to contaminants from the site is not expected.

4.0 SELECTED ACTION: NO FURTHER RESPONSE ACTION PLANNED

A NFRAP decision is proposed for Site 1 on the basis that the site poses no significant risks to human health and the environment. This decision was developed in accordance with the June 1995 U.S. Air Force NFRAP Guide; the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA), as amended by the Superfund Amendments and Reauthorization Act (SARA); and to the extent practicable, the National Oil and Hazardous Substances Pollution Contingency Plan (NCP).

According to the June 1995 U.S. Air Force NFRAP Guide, a Category III NFRAP decision is appropriate for a geographically contiguous area or parcel of real property where environmental evidence demonstrates that hazardous substances or petroleum products or their derivatives have been stored, released, or disposed of, but are present in quantities that require no response action to protect human health and the environment. Based on the results of the 2000 - 2001 RI conducted at Site 1, these criteria have been met.

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APPENDIX A

REFERENCES

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