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Hazardous Waste Remediation
NYSDEC Region 1

ENVIRONMENTAL RESTORATION PROGRAM

DRAFT-FINAL
NO FURTHER RESPONSE ACTION PLANNED
DECISION DOCUMENT

SITE 2 – FORMER HAZARDOUS WASTE STORAGE AREA

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

MAY 2004



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106TH RESCUE WING
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WESTHAMPTON BEACH, NEW YORK

MAY 2004

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Prepared for the

Air National Guard
Under National Guard Bureau Contract DAHA92-01-D-0004

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LIST OF ACRONYMS

ABB-ES	ABB–Environmental Services, Inc.
AFAA	Air Force Audit Agency
ALM	Adult Lead Methodology
ANG	Air National Guard
ANG/CEVR	Air National Guard/Civil Engineering, Environmental Restoration Branch
BEHP	Bis(2-ethylhexyl)phthalte
BGS	Below Ground Surface
BTEX	Benzene, toluene, ethylbenzene, and xylenes
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
COPC	Contaminant of Potential Concern
CRP	Community Relations Plan
DD	Decision Document
DP	Direct-Push Boring
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
NEPA	National Environmental Policy Act
NFRAP	No Further Response Action Planned
NYS	New York State
NYSDEC	New York State Department of Environmental Conservation
106th RQW	106th Rescue Wing
PCB	Polychlorinated Biphenyl
PCE	Tetrachloroethylene
PEER	PEER Consultants, P.C.
PID	Photoionization Detector
POL	Petroleum, Oils, and Lubricants
PW	Direct-Push Groundwater
QA/QC	Quality Assurance/Quality Control
RAGS	Risk Assessment Guidance for Superfund
RCRA	Resource Conservation and Recovery Act
RI	Remedial Investigation
RSCO	Recommended Soil Cleanup Objective
S2	Site 2

LIST OF ACRONYMS (CONTINUED)

SARA	Superfund Amendments and Reauthorization Act of 1986
SB	Soil Boring
SCDHS	Suffolk County Department of Health Services
SDW	Small-Diameter Well
SI	Site Investigation
SS	Surface (or Shallow) Soil
SW	Shallow Well
TAGM	Technical Assistance Guidance Memorandum
TAL	Target Analyte List
TCE	Trichloroethylene
TOGS	Technical and Operational Guidance Series
TPH	Total Petroleum Hydrocarbons
TRW	Technical Review Workgroup
ULBC	Upper Limit of Background Concentrations
UST	Underground Storage Tank

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DECLARATION

Site Name and Location:

Environmental Restoration Program
Site 2 – Former Hazardous Waste Storage Area
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 2 - Former Hazardous Waste Storage Area, at the 106th Rescue Wing (RQW), New York Air National Guard (ANG), 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 through 2001. The SI and RI were conducted under the ANG 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 2 has been selected for No Further Response Action Planned (NFRAP) based upon the findings of field investigations and evaluation of scientific data. At Site 2, the 1994 SI found no detections of volatile or semivolatile organics in subsurface soils or groundwater above the NYSDEC action levels. However, the 1994 SI identified arsenic as a contaminant of potential

concern (COPC) in surface soil. No other COPCs were identified in surface soils. Chromium was detected in groundwater during the 1994 SI, but was attributed to sampling methodology.

The 2000 – 2001 RI found no detections of arsenic in any Site 2 soil samples. Although the presence of arsenic detected during the 1994 SI was not confirmed by the 2000 – 2001 RI, arsenic was retained as a COPC. No other COPC was identified in subsurface soil or groundwater during the 2000 – 2001 RI. However, the 2000 – 2001 RI identified cadmium, lead, and mercury as COPCs in surface soil, since they exceeded NYSDEC action levels. As part of the RI, a baseline risk assessment was conducted for the COPCs arsenic, cadmium, and mercury in surface soil at Site 2. During the risk assessment process, arsenic, cadmium, and mercury were eliminated as COPCs since complete exposure pathways were not identified for on-site or off-site receptors. Risks associated with lead in soil were assessed using the Environmental Protection Agency (EPA) Technical Review Workgroup (TRW) Adult Lead Methodology (ALM), which indicated that lead risks were acceptable at Site 2. Zinc was detected in surface soil exceeding its NYSDEC action level, but was determined to be naturally occurring, and was not retained as a COPC.

During the 2000-2001 RI, chromium was detected in one monitoring well at concentrations above the NYSDEC action level. No other metals were detected above the NYSDEC action levels. Chromium was determined to be naturally occurring. 1,1,1-Trichloroethane (1,1,1-TCA) was detected in two monitoring wells during the 2000-2001 RI, but were below the Maximum Contaminant Levels (MCLs) and NYSDEC action levels.

Therefore, based on the current conditions at Site 2, it has been determined that contaminant levels at the site pose no significant risk or threat to public health or the environment. A NFRAP under the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA), as amended by the Superfund Amendments and Reauthorization Act of 1986 (SARA), 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 2 developed in accordance with CERCLA, as amended, and to the extent practicable, the National Oil and Hazardous Substances Pollution Contingency Plan or National Contingency Plan (NCP). It also satisfies the requirements of the National Environmental Policy Act (NEPA) 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.

NYSDEC CONCURRENCE LETTER

ENVIRONMENTAL RESTORATION PROGRAM

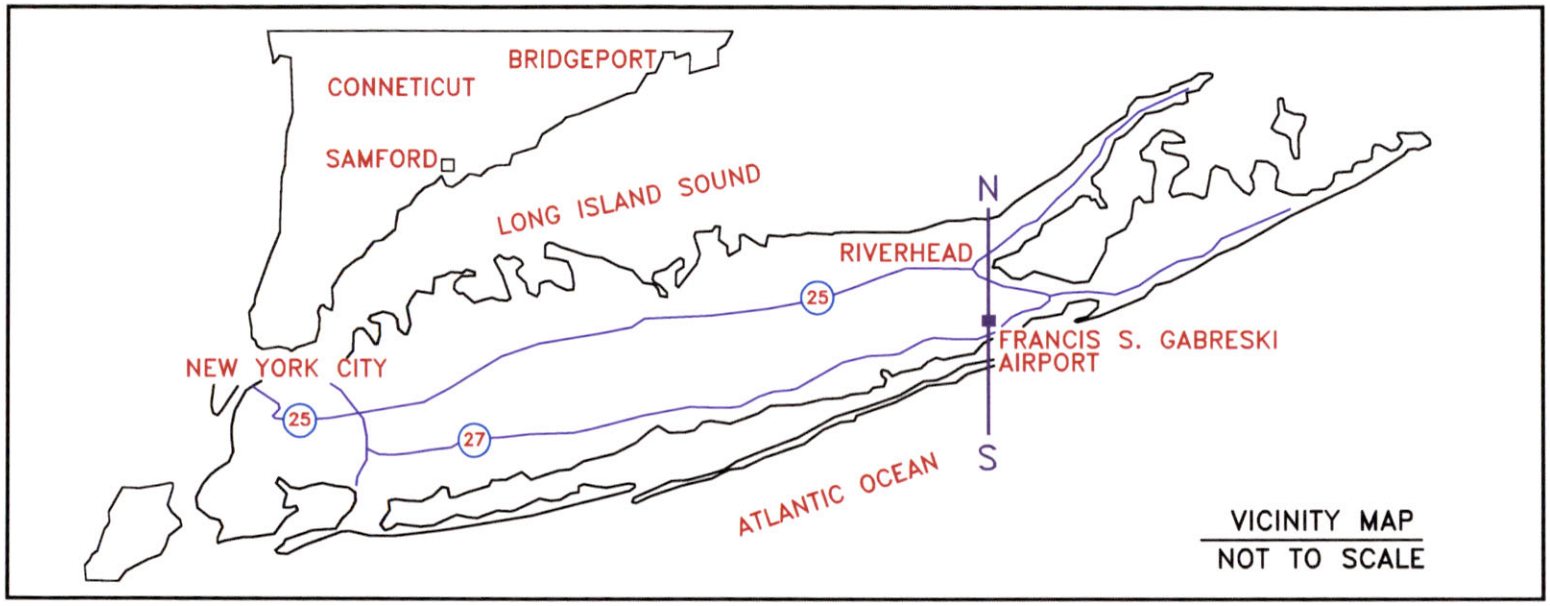
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DECISION SUMMARY

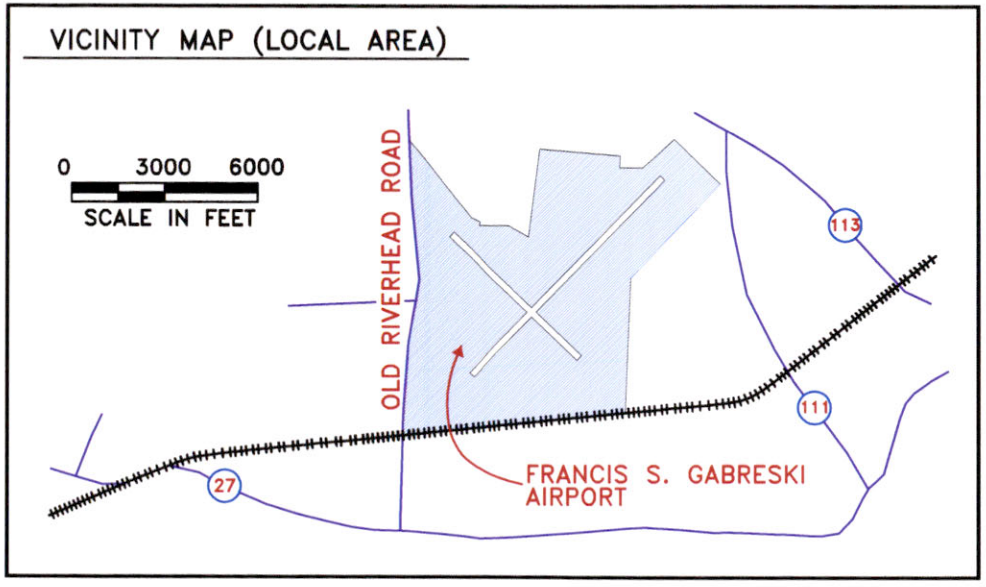
1.0 INTRODUCTION

This Decision Document (DD) supports a No Further Response Action Planned (NFRAP) decision for Site 2, the Former Hazardous Waste Storage Area at the 106th Rescue Wing (RQW), 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 2 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.

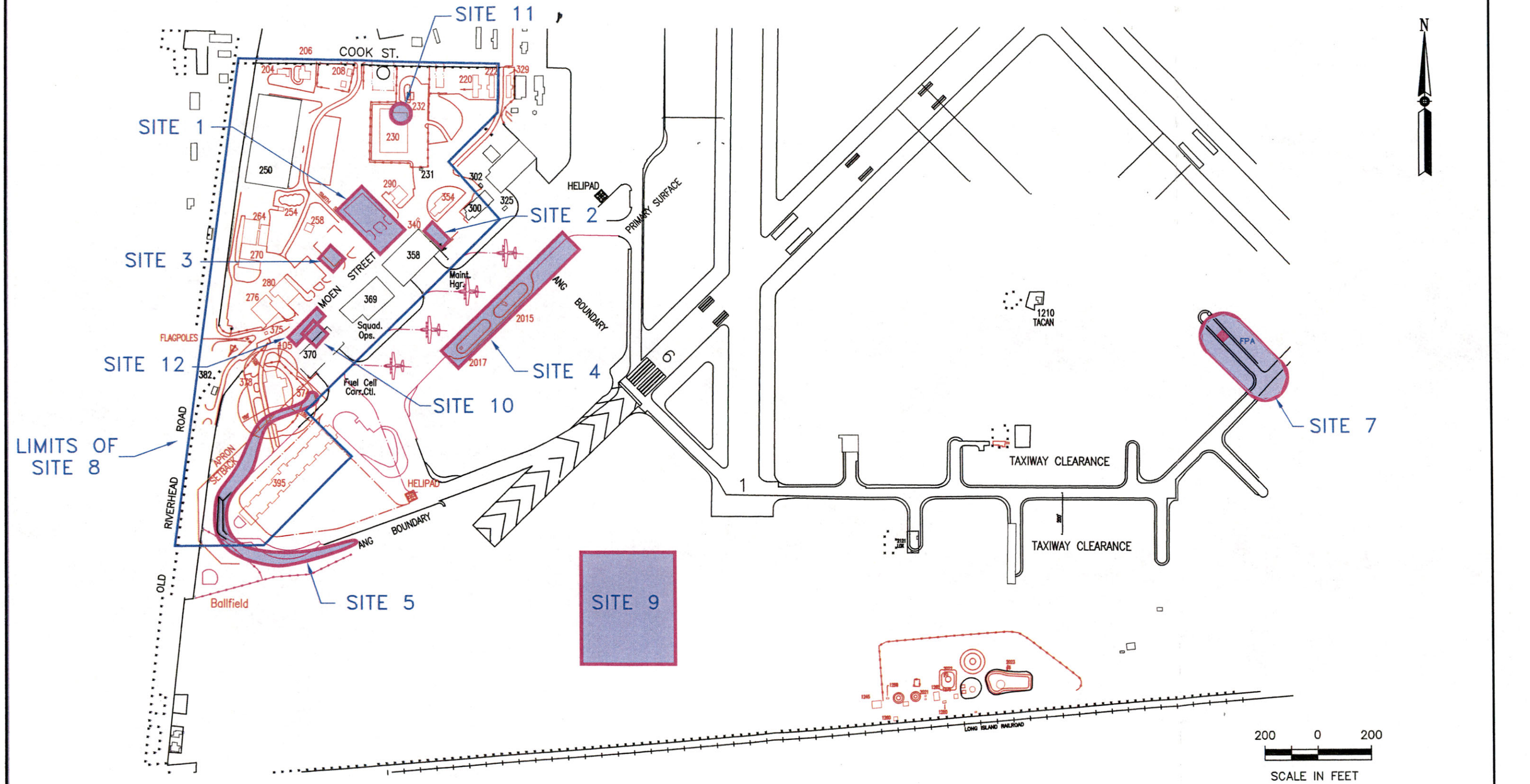






SOURCE: PEER 2003

PEER PROJ./3005-011 GAB3005/Site2 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/SITE2/FIG 1.2	LOCATION OF ERP SITES INCLUDING SITE 2 – FORMER HAZARDOUS WASTE STORAGE AREA 106th RESCUE WING, NEW YORK ANG FRANCIS S. GABRESKI AIRPORT WESTHAMPTON BEACH, NEW YORK	FIGURE 1.2

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This NFRAP DD was prepared using data from the following sources:

Phase I Records Search, Suffolk County Air Force Base (Retired), 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,* ABB-Environmental Services (ABB-ES), 1997; and
- *Draft-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), May 2002.

A description of Site 2 and its surrounding area is provided in Section 1.1. Information on the history of Site 2, including 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 2, 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 2 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 2, 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 2 – The Former Hazardous Waste Storage Area is located on the Francis S. Gabreski ANG Base adjacent to a loading ramp along the northeast wall of Building 358. The site includes grass-covered areas and areas paved with concrete and asphalt.

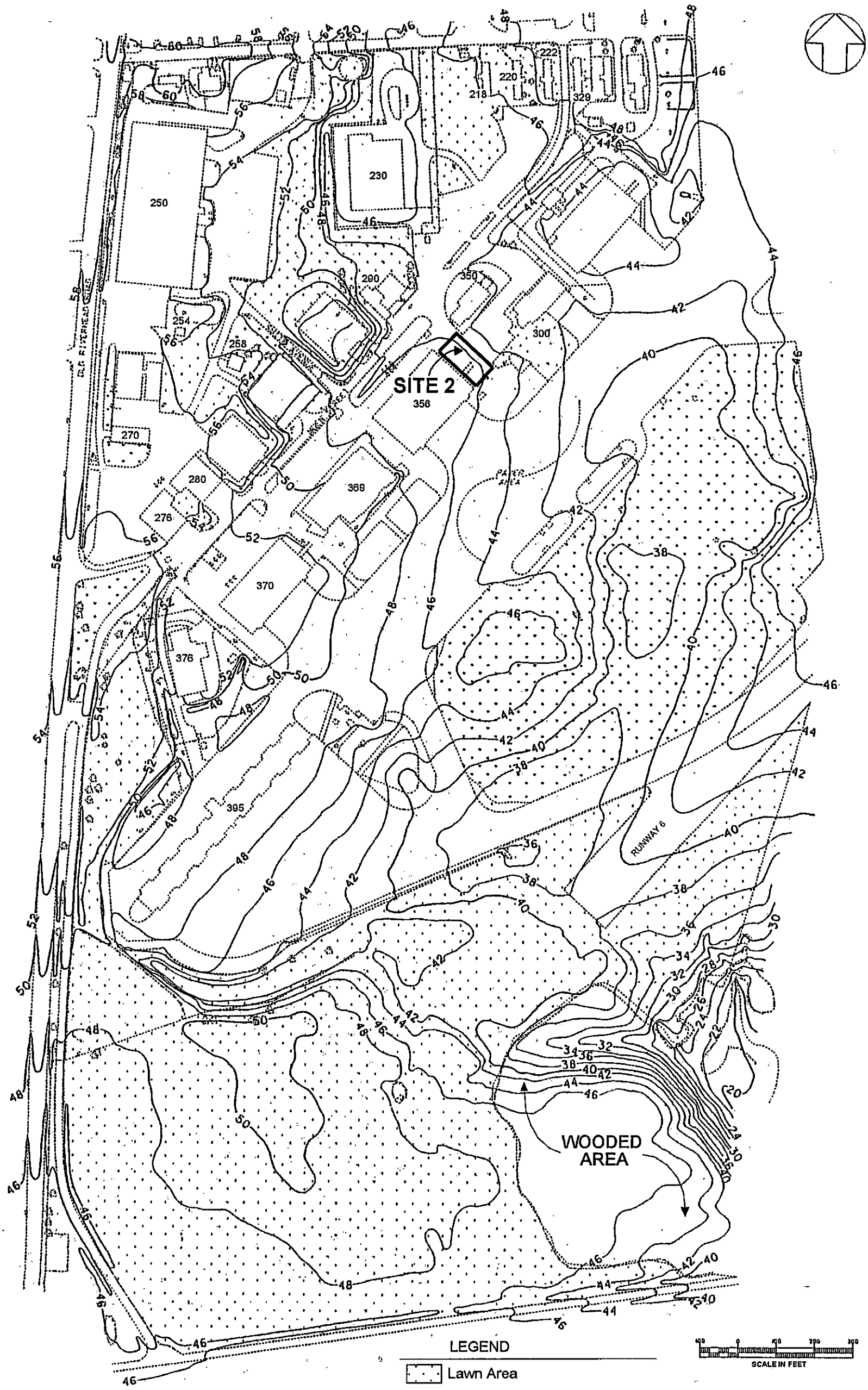
1.1.2 Topography

The Francis S. Gabreski Airport is situated on a glacial outwash plain south of the Ronkonkoma terminal moraine, which formed during the Wisconsin glaciation (ABB-ES 1997). Relief is characteristically flat with subtle rolling terrain and steeper stream channels. Figure 1.3 shows the topography of the base. Site 2 is a level area.

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, which 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 (Dames & Moore 1987). 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.



PEER PROJ./003005-011 GAB3005/NFRAP/SITE2/FIG1.3	BASEWIDE TOPOGRAPHY 106 th RESCUE WING, NEW YORK ANG FRANCIS S. GABRESKI AIRPORT WESTHAMPTON BEACH, NEW YORK	FIGURE 1.3

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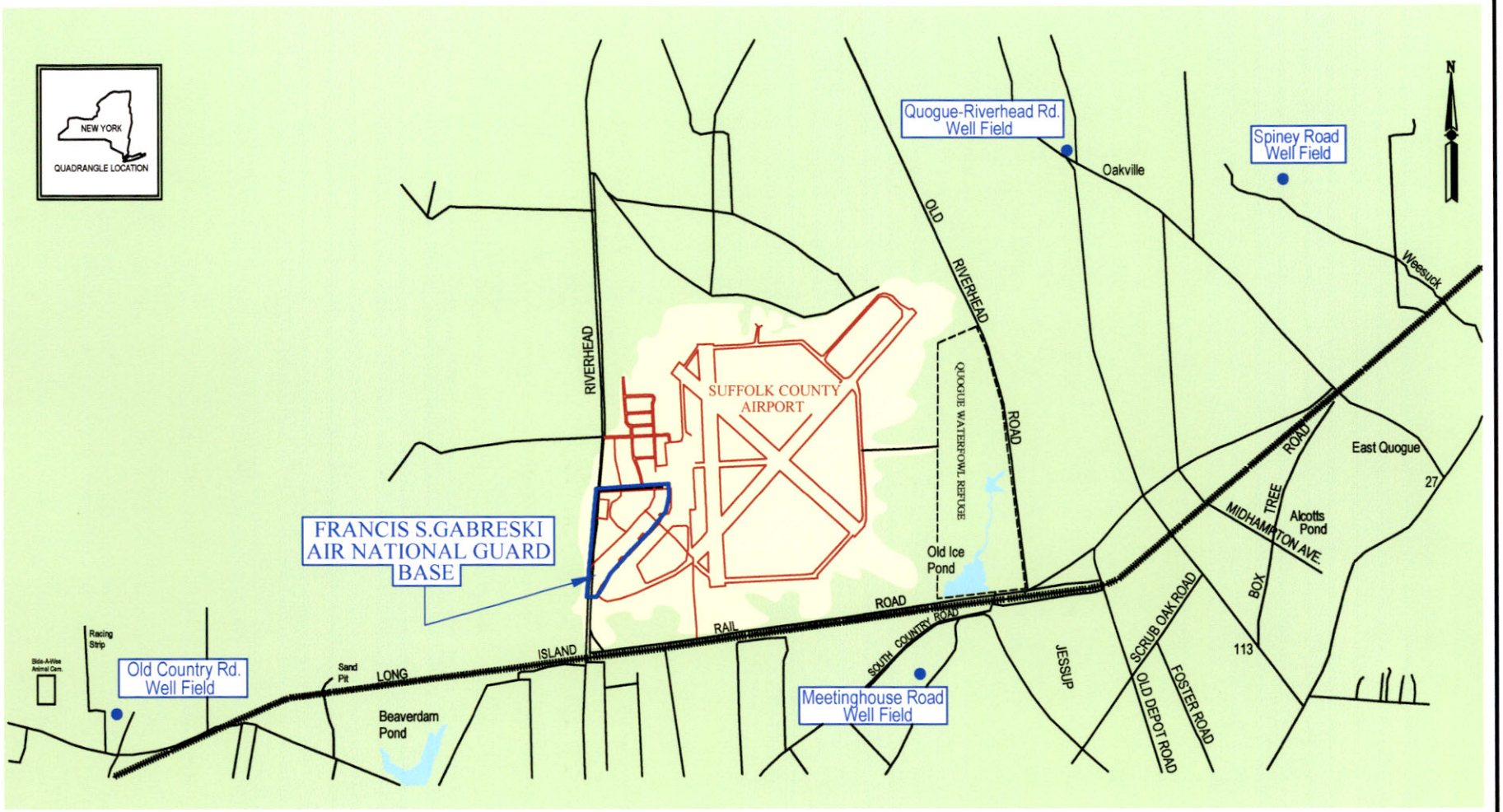
The following threatened and endangered species are potentially located within a 4-mile radius of the site (ABB-ES 1995):

- 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. As shown on Figure 1.4, 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 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 forest, residential areas, and small businesses. To the south, across the LIRR, is an area of mixed industrial, business, and residential properties.



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

PEER PROJ./003005-011 GAB3005/NFRAP/SITE2/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

1.1.5 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 adjacent Quogue Wildlife Refuge, on the east side of the airport.

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, the Suffolk County Water Authority supplies the majority of the water in the Westhampton Beach area, and the rest of the area is supplied by several smaller companies. The Suffolk County Water Authority operates 18 wells in 4 well fields within a 4-mile radius of the site. The nearest public supply well field is located 2000 ft southeast of Francis S. Gabreski Airport. Figure 1.4 also shows the location of identified public drinking water supply wells. Table 1.1 provides information pertaining to the 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	1,200
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	

Source: Dames & Moore 1986.
BGS Below Ground Surface

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, Oils 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 Surface and Subsurface Features

Underground utilities including natural gas and water are present at Site 2. Three underground storage tanks (USTs) are known to be present at Site 2. These USTs are not addressed by this NFRAP DD. The Air Force Audit Agency (AFAA) Area Audit Office, Report of Audit 51897013, April 1997, states that all USTs at the 106th RQW have been managed within environmental compliance guidelines and requirements.

1.2 SITE HISTORY AND ENFORCEMENT ACTIVITIES

Sections 1.2.1 and 1.2.2 present a history of Site 2. Further details concerning analytical results of soil and groundwater samples are provided in Section 2.4 and 2.7.

1.2.1 Site History

Site 2 was initially identified during the Phase I Records Searches by Dames & Moore (1986) and HMTC (1987). The Site 2 area was used from 1970 until 1982 to store shop solvent wastes including PD-680, and recovered fuels and oils in drums. The site was formerly an open gravel space with no containment structures, and has recently been paved with asphalt on the southeast side of the loading ramp. Asphalt paving now covers approximately 80% of the site, and the rest of the site is covered by grass. Previous investigations estimated that less than 500 gallons of liquids from minor spills would have been released at the site during its 12-year operation (HMTC 1987). No spills were reported at the site, however stained surface soils were observed during a site visit in 1986 (ABB-ES 1997).

1.2.2 Regulatory Agency Involvement

There is no history of Environmental Protection Agency (EPA) involvement at Site 2. The New York State Department of Environmental Conservation (NYSDEC) and SCDHS have been involved in the planning of response activities, review, and revision of plans and reports, and approval of final documents. There have been no enforcement activities at Site 2, 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 Remedial Investigation (RI). NYSDEC action levels include Recommended Soil Cleanup Objectives (RSCOs), Upper Limits of Background Concentrations (ULBCs), and Class GA groundwater Standards [Technical and Administrative Guidance

Memorandum (TAGM) #4046, NYSDEC 1994]. In addition, EPA Maximum Contaminant Levels (MCLs) were used for screening of groundwater contaminant levels (EPA 1997).

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.

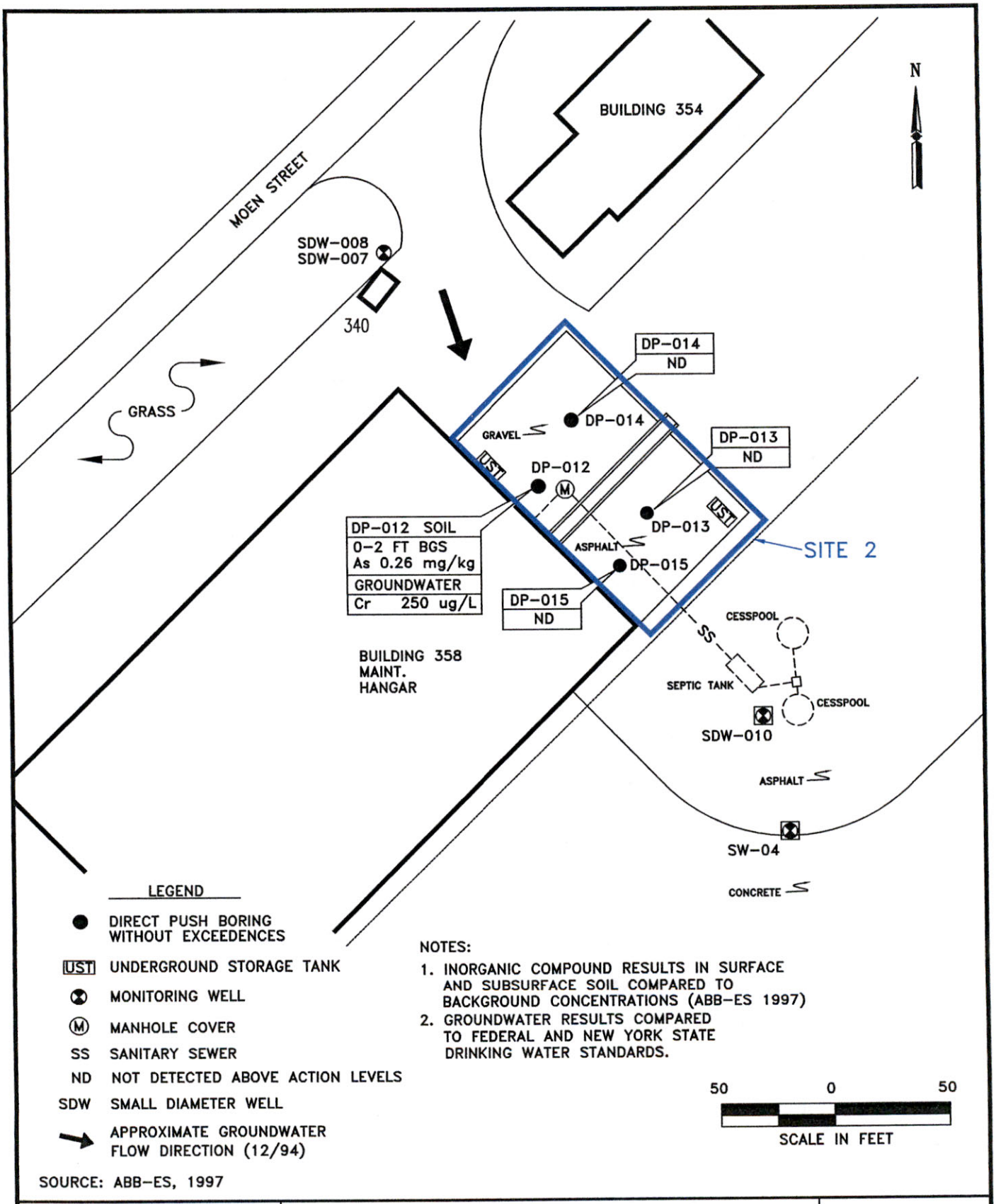
1.4 SCOPE OF RESPONSE ACTION

Section 1.4.1 describes the initial Site Investigation (SI), completed in 1994. Section 1.4.2 describes the RI completed in 2001, which is the most recent response activity.

1.4.1 Site Investigation (1994)

The initial SI at Site 2 was conducted in 1994, and the *Site Investigation Report* documenting the results was submitted in 1997 (ABB-ES 1997). SI activities included direct-push soil and groundwater sampling and analyses.

To investigate the Former Hazardous Waste Storage Area, four direct-push soil borings were performed during the SI, designated DP-012 through DP-015. The 1994 soil and groundwater sample locations and exceedances are shown on Figure 1.5. Direct-push boring DP-012 was completed at 34 ft below ground surface (BGS), while DP-013, DP-014, and DP-015 were completed at depths of 2 to 7 ft below BGS. Surface soil samples were collected from all four borings, and subsurface soil samples were also collected at DP-012 and DP-013. Soil samples from DP-012 and DP-013 were analyzed for volatile and semivolatile organics and metals, while those from DP-014 and DP-015 were analyzed for metals only. One groundwater sample was



PEER	SITE 2 - 1994 SITE INVESTIGATION DIRECT PUSH SOIL AND GROUNDWATER SAMPLING RESULTS 106th RESCUE WING, NEW YORK AIR NATIONAL GUARD FRANCIS S. GABRESKI AIRPORT WESTHAMPTON BEACH, NEW YORK	FIGURE 1.5
PROJ./003005-011		
GAB3005/DF NFRAP/SITE2/FIG1.5		

collected from boring DP-012, at a depth of 32 ft BGS, and analyzed for volatile and semivolatile organics and metals. All borings were screened for organic vapors using a flame-ionization detector. Screening results showed no detectable organic vapors.

Arsenic was detected at a concentration slightly above the NYSDEC soil action level in one surface soil sample, but was below the average concentration of arsenic in New York State (NYS) background soils (TAGM #4046, NYSDEC 1994). The concentration detected during the SI did not exceed the current NYSDEC action level for arsenic in soil. Chromium and lead were also detected above reporting limits, but were below the NYSDEC action levels. The SI Report reported no other evidence to suggest that metal-bearing solutions such as solvents or fuels were released at this site; therefore, the metals were determined to be naturally occurring constituents of the soils. Table 1.2 summarizes the analytes detected above the action levels in surface soil that were applicable during the SI (ABB-ES 1997).

Chromium was the only analyte detected above NYSDEC action levels or reporting limits in one groundwater sample collected from 32 to 34 ft BGS. Chromium was detected in groundwater at 250 micrograms per liter (µg/L), which exceeded the NYSDEC action levels and the MCL of 100 micrograms per liter (µg/L). The detection of chromium was attributed to elevated sediment concentrations in the groundwater sample due to the direct-push sample collection methodology. The exceedance by chromium was therefore considered not to be representative of actual groundwater conditions (ABB-ES 1997). Table 1.3 summarizes the direct-push groundwater sample results with exceedances by chromium at Site 2. The SI found no detections of volatile or semivolatile organic hydrocarbons that would be indicative of contamination in soil or groundwater. Based upon these findings, the *Site Investigation Report* recommended no further action for Site 2.

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

Analyte	SI Action Level (mg/kg) [a]	Current Action Level (mg/kg)	Depth (ft BGS)	Soil Sample Location	Concentration [b]
Arsenic	0.20	7.7	0 – 2	DP-012	0.26

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

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

Analyte	Action Levels		Depth (ft BGS)	Groundwater Sample Location	Concentration [c]
	NYS [a]	MCL [b]			
Chromium	50	100	32 – 34	DP-012	250

Source: ABB-ES 1997.
Notes: (a) NYS Class GA Groundwater.
(b) EPA Maximum Contaminant Level.
(c) All concentrations are µg/L

1.4.2 Remedial Investigation (2000-2001)

The most recent response action was the RI conducted by PEER in 2000 through 2001. The RI activities at Site 2 were conducted to:

- Evaluate the suspected presence of polychlorinated biphneyls (PCBs) in soil;

- Determine the presence or absence of arsenic contamination or other metals contamination in surface soils;
- Define the extent of arsenic and other metals contamination in soil, if detected;
- Determine the presence or absence of chromium contamination in site groundwater;
- Define the nature and extent of chromium contamination in site groundwater, if detected; and
- Evaluate surface soil, subsurface soils, and groundwater for any additional contaminants of concern.

The *Draft-Final RI Report* was completed in May 2002 (PEER 2002). The report documents the results of the RI, and recommended that Site 2 be closed, by issuing a NFRAP DD. During the 2000 – 2001 RI, three direct-push soil borings, S2-DP01, S2-DP02, and S2-DP03, were installed to confirm or deny the presence of arsenic above the action level in surface soils, to evaluate other potential surface and subsurface soil contaminants, and to evaluate suspected groundwater contamination. One new monitoring well (S2-MW01), was installed and sampled, and four existing monitoring wells (SDW007, SDW008, SDW010, and SW-04) were sampled. The RI samples collected at Site 2 are summarized on Table 1.4. The sample locations are depicted on Figure 1.6. The direct-push soil borings, the hollow-stem auger (HSA) soil boring, and the new monitoring well were installed as follows:

- Direct-push boring S2-DP01 was advanced slightly downgradient of former DP-012 (1994 SI), near the concrete loading dock;
- Direct-push boring S2-DP02 was advanced between the concrete loading dock and former DP-013 (1994 SI);
- Direct-push boring S2-DP03 was advanced adjacent to former DP-015 (1994 SI);
- Soil boring SB2-01 was installed downgradient approximately 60 ft west-southwest of Site 2, using hollow-stem augers, and was sampled for soil screening and confirmatory analysis; and
- Monitoring well S2MW-01 was installed in SB2-01, and screened from 24 to 39 ft BGS.

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

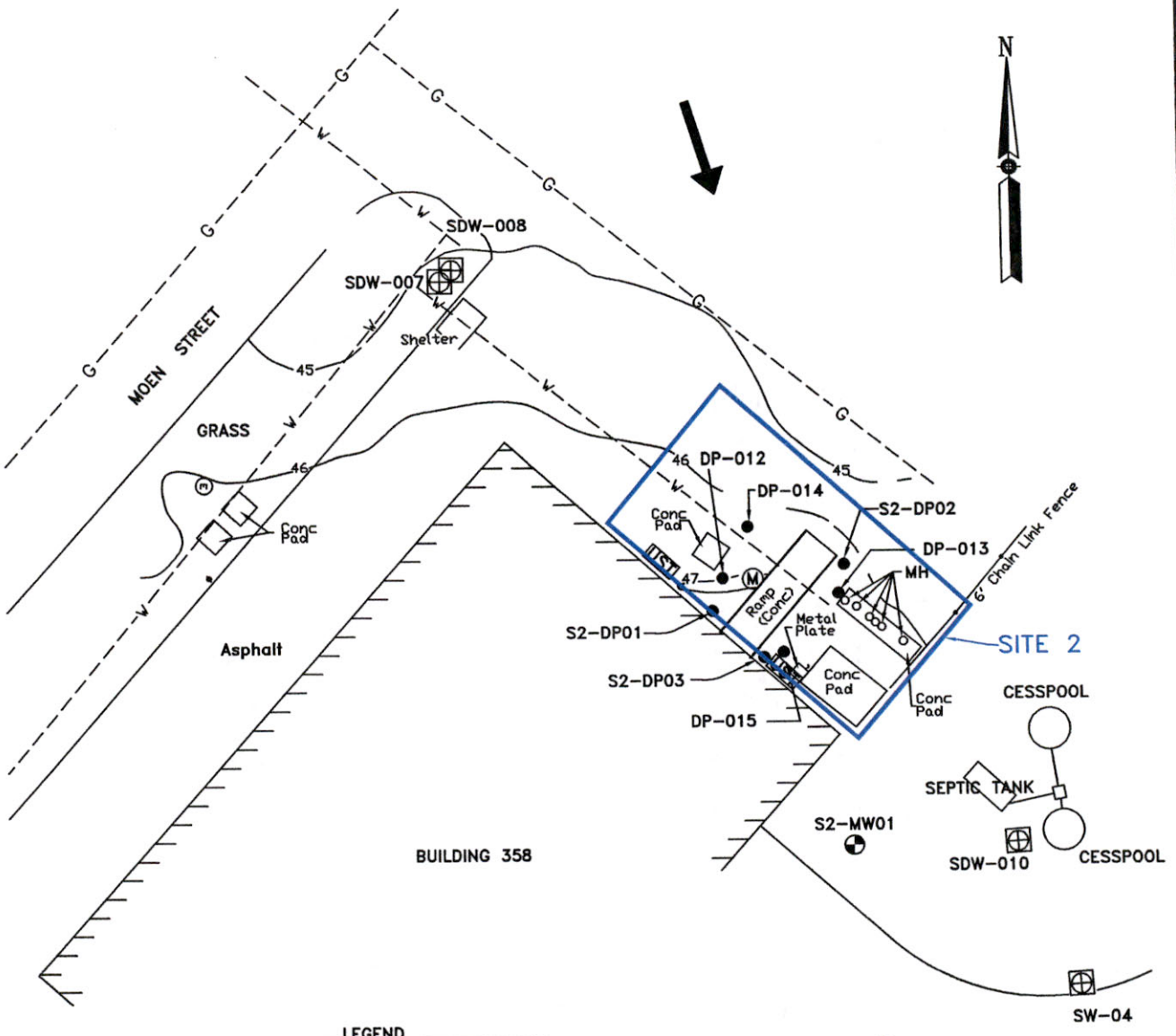
Date	Sample ID	Ft BGS	Type	BTEX	X-VOCs	VOCs	SVOCs	Metals	DRO	GRO	CH_4	Alkalinity	Chloride	SO_4
1/9/01	GAB-02-PW02-01	34 to38	GW Screening		X	X	X							
1/9/01	GAB-02-PW02-21	34 to 38	GW Screening			X	X							
1/10/01	GAB-02-PW01-01	34 to 38	GW Screening		X	X	X							
1/11/01	GAB-02-PW03-01	34 to 38	GW Screening		X	X	X							
2/6/01	GAB-02-SDW007-01	55 to 60	GW Monitoring			X	X	X						
2/8/01	GAB-02-SDW008-01	38.3	GW Monitoring			X	X	X						
2/8/01	GAB-02-SDW010-01	38.3	GW Monitoring			X	X	X						
2/12/01	GAB-02-S2MW01-01	24.7 to 39.7	GW Monitoring	X		X	X	X	X	X	X	X	X	X
2/20/01	GAB-03-SDW008-R1*	31.5 to 33.4	GW Monitoring			X	X	X						
5/21/01	GAB-02-SDW007-02	61.57	GW Monitoring			X	X	X						
5/21/01	GAB-02-SDW008-02	38.3	GW Monitoring			X	X	X						
5/21/01	GAB-02-SDW008-R2	38.3	GW Monitoring			X	X	X						
5/23/01	GAB-02-SDW010-02	38.3	GW Monitoring			X	X	X						
5/28/01	GAB-02-SW04-02	50.55	GW Monitoring			X	X	X						
5/30/01	GAB-02-S2MW01-02	24.7 to 39.7	GW Monitoring	X		X	X	X	X	X	X	X	X	X

Notes:
- BGS — Below Ground Surface
- BTEX — Benzene, Toluene, Ethylbenzene and Xylenes
- VOCs — Standard Certified Analysis for Volatile Organic Compounds
- SVOCs — Semi-volatile Organic Compounds
- DRO — Diesel Range Organics
- GRO — Gasoline Range Organics
- CH_4 — Methane
- SO_4 — Sulfate
- X — Analysis Performed
- X-VOCs — Expedited Off-Site Screening Analysis for Volatile Organics
- * — Sample GAB-03-SDW008-R1 was incorrectly assigned to Site 3 during Round 1 sampling; this sample is associated with Site 2.

Table 1.4 (Continued)
2000 – 2001 Remedial Investigation
Summary of Samples Collected and Analyses Performed
106th Rescue Wing
Francis S. Gabreski ANG Base
Westhampton Beach, New York

Date	Sample ID	Ft BGS	Type	X-VOCs	VOCs	SVOCs	Metals	PCBs	Soil
1/9/01	GAB-02-DP01-01	0 to 2	Soil Direct-push boring	X	X	X	X	X	
1/9/01	GAB-02-DP02-01	0 to 2	Soil Direct-push boring	X	X	X	X		
1/9/01	GAB-02-DP02-02	34 to 36	Soil Direct-push boring	X	X	X	X		
1/9/01	GAB-02-SS01-01	0 to 0.25	Soil Shallow	X	X	X	X	X	
1/10/01	GAB-02-DP01-02	14 to 16	Soil Direct-push boring	X	X	X	X	X	
1/10/01	GAB-02-DP01-03	32 to 36	Soil Direct-push boring	X	X	X	X	X	
1/11/01	GAB-02-DP03-01	0 to 4	Soil Direct-push boring	X	X	X	X		
1/11/01	GAB-02-DP03-02	34 to 36	Soil Direct-push boring	X	X	X	X		
2/3/01	GAB-02-SB01-ST01	20 to 21.5	Shelby Tube						X
2/3/01	GAB-02-SB01-01	0 to 2	Soil Split Spoon		X	X	X		
2/3/01	GAB-02-SB01-02	12 to 14	Soil Split Spoon		X	X	X		
2/3/01	GAB-02-SB01-03	30 to 34	Soil Split Spoon		X	X	X		

Notes:
BGS Below Ground Surface
VOCs Standard Certified Analysis for Volatile Organic Compounds
SVOCs Semi-volatile Organic Compounds
PCBs Polychlorinated Biphenyls
X-VOCs Expedited Off-Site Screening Analysis for Volatile Organics
X Analysis Performed



LEGEND

- S2-DP02 — DIRECT PUSH BORING AND IDENTIFIER
- 47 — GROUND SURFACE CONTOUR ELEVATION. (FT ABOVE MEAN SEA LEVEL)
- NEW MONITORING WELL AND IDENTIFIER
- (M) — MANHOLE COVER
- UST — UNDERGROUND STORAGE TANK
- EXISTING MONITORING WELL AND IDENTIFIER
- APPROXIMATE GROUNDWATER FLOW DIRECTION (12/94)
- PAVED AREA

GRAPHIC SCALE (IN FEET)

0 25 50 100

NOTE:

1. LOCATIONS SHOWN FOR KNOWN UTILITIES ARE APPROXIMATE

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

PEER PROJ./003005-011 GAB3005/DF NFRAP/SITE2/FIG1.6	SITE 2 - 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

Soil samples were collected from the direct-push borings using a 4-ft Strata Probe™. Sample collection commenced at the surface and proceeded continuously to completion of the borings. Field screening was performed using a photoionization detector (PID), calibrated daily. A total of 8 soil samples were collected form the direct-push borings and analyzed for:

- Expedited screening analysis of volatile organics at an off-site laboratory;
- Confirmatory standard certified laboratory analysis of volatile organics;
- Semivolatile organics; and
- Target Analyte List (TAL) metals.

Direct-push boring S2-DP01 was also sampled for PCBs, for a total of four samples. Analytical samples were collected from the surface (one sample), the shallow zone (three samples), the vadose zone (one sample), and the top or just above the saturated zone (three samples). The surface soil sample was collected at S2-DP01, which was the only unpaved location, from 0 to 2 inches BGS. The results of the RI soil investigation at Site 2 are presented in Section 2.4.

Four direct-push groundwater samples, including a duplicate, were collected from the three direct-push borings. These samples were submitted for screening analysis of volatile organics (except the duplicate), and for confirmatory fixed laboratory analysis of volatile and semivolatile organic compounds.

New monitoring well S2-MW01 was installed in a location approximately 60 ft downgradient from Site 2. The location was changed from the planned location by moving approximately 20 ft southwest, based on consideration of subsurface utilities. Monitoring well borehole S2-SB01 was installed using HSA, and was sampled for description, screening, and fixed laboratory analysis of soils. Samples were collected using decontaminated, 2-ft steel split spoons, driven at 5-ft intervals. A total of three soil samples were collected from the borehole from the shallow, vadose, and saturated zones. Sample depths are provided in Table 1.4. The well was screened from 24 to 39 ft BGS and was properly installed and developed.

New monitoring well S2-MW01 and pre-existing monitoring wells SDW007, SDW008, and SDW010 were purged and sampled during Rounds 1 and 2 for a total of 11 samples for volatile and semivolatile organic compounds, and TAL metals. S2-MW01 was also sampled for bioremediation indicator parameters during Rounds 1 and 2, including methane, alkalinity, chloride, and sulfate. Total petroleum hydrocarbons – gasoline-range organics/diesel-range organics (TPH-GRO/DRO) and benzene, toluene, ethylbenzene and xylenes (BTEX) were also analyzed in groundwater samples from S2-MW01. Existing monitoring well SDW-008 was replicated (i.e., sampled once each from the top and bottom of the wetted screened interval) during both rounds. During Round 2, the additional pre-existing monitoring well SW-04 was sampled since it was determined to be associated with Site 2. The results of the RI groundwater investigation are provided in Section 2.7.

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2.0 SUMMARY OF SITE CHARACTERISTICS

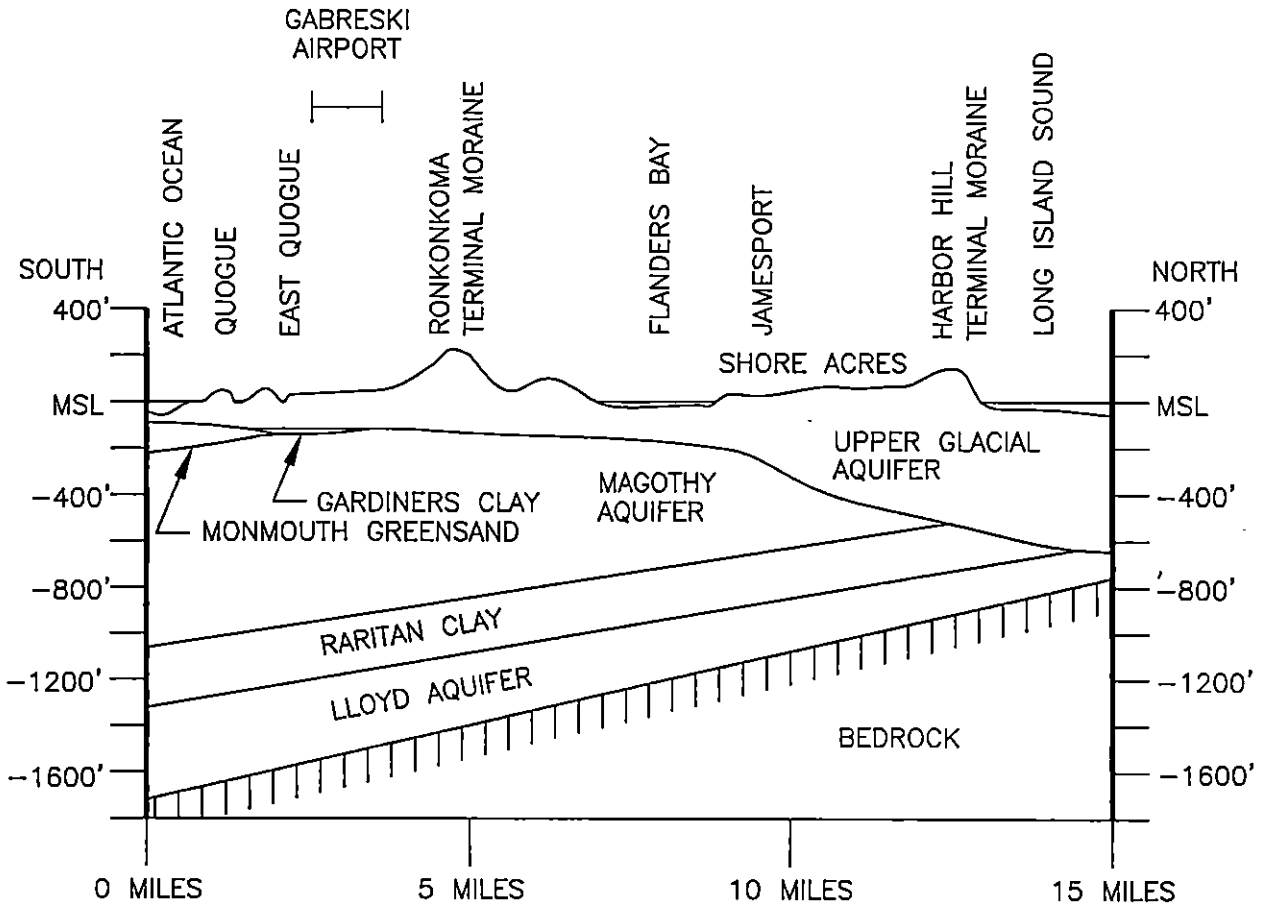
Section 2.0 provides a summary of the characteristics of Site 2, including information on the physiography, geology, hydrogeology, surface water hydrology, soil, climatology, environmental media, the nature and extent of contamination, and receptors.

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 (ABB-ES 1997).

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.



SOURCE: ABB-ES 1997

SCALE: 1 IN = APPROXIMATELY 3 MILES

PEER PROJ./003005-011 GAB3005/NFRAP/SITE2/FIG2.1	REGIONAL STRATIGRAPHY AND HYDROGEOLOGY 106th RESCUE WING, NEW YORK ANG FRANCIS S. GABRESKI AIRPORT WESTHAMPTON BEACH, NEW YORK	FIGURE 2.1

2.2.1 Upper Glacial Deposits

The upper Pleistocene glacial deposits are of greatest importance in regards to Site 2. These deposits form the soil surface across the base, makeup the subsurface soils of interest regarding Site 2, and form the matrix for the Upper Glacial Aquifer, as described below in Section 2.6.1.

The 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 (ABB-ES 1997).

2.3 SOIL CHARACTERISTICS

Descriptions of the soil associations and characteristics at Site 2 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 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 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. Overall, the soils are well-sorted medium sands, with some gravel and traces of fines. The geology of the soils encountered during the 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 (ABB-ES 1997).

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 RI soil borings.

Sand

The sands encountered were commonly medium, with some coarse and fine, and rarely 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 2. 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.

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.

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.

2.4 SOIL CONTAMINATION INVESTIGATION RESULTS

The soil investigation activities conducted during the 2000 – 2001 RI at Site 2 were summarized in Section 1.4.2. Figure 1.6 depicts the sampling locations. The findings of the soil investigation at Site 2 are discussed in the following subsection.

2.4.1 Geologic Results

The 2000 – 2001 RI soil investigation at Site 2 observed medium sands with some gravel and traces of silt. No odors or elevated photoionization detector (PID) readings were observed. A pink stain was observed in soil boring S2-SB01 at 12 to 14 ft BGS, but was not associated with odor or elevated PID readings. A grayish-green stain was observed at 15 to 16 ft BGS at direct-push boring S2-DP01, but not associated with any odor. No other staining suggestive of contamination was observed.

2.4.2 Soil Screening Samples

During direct-push sampling, soil-screening samples were submitted for expedited turnaround time analysis of volatile organic compounds. Low concentrations of the volatile organic compounds *cis*-1,2-dichloroethene, trichloroethylene (TCE), toluene, and tetrachloroethylene [perchloroethylene (PCE)] were detected in soil screening samples from S2-DP01 and S2-DP03, but did not exceed NYSDEC action levels. No other volatile organic compounds were detected in the screening samples. Table 2.1 summarizes the results of the soil screening sample analyses. The soil samples were also screened during sample collection using the PID. The soil screening results showed no detections of organic vapors.

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

Parameter	Action Levels [b]		Sample Location, Depth, Type, and Concentration [a]						
	Saturated [c]	Unsaturated [d]	DP01-01 (0-2 ft)-U	DP01-02 (18-20 ft)-U	DP01-03 (32-36 t)-S	DP02-01 (0-2 ft)-U	DP02-02 (32-36 ft)-S	DP03-01 (0-4 ft)-U	DP03-02 (34-36 ft)-S
Volatile Organics (µg/kg)									
cis-1,2-Dichloroethene	5	5	2 J	3 J	ND	ND	ND	ND	ND
Trichloroethylene	7	700	2 J	2 J	ND	ND	ND	ND	ND
Toluene	15	1500	ND	ND	ND	ND	2 J	ND	ND
Tetrachloroethylene	14	1400	2 J	ND	4 J	ND	ND	ND	ND

Notes:
J Estimated value.
ND Not detected.
(a) Location "DP0X-0X" refers to sample number collected at location DP0X, at depth specified in ft BGS; DP02-03 is the third direct-push sample collected from location DP02 at a depth of 8-12 ft BGS. Type: S = saturated; U = unsaturated.
(b) Recommended Soil Cleanup Objectives, NYSDEC, TAGM 4046.
(c) Soil in direct contact with groundwater.
(d) Greater than 5 ft above the water table.

2.4.3 Confirmatory Soil Samples

Confirmatory soil samples were collected at Site 2 from three direct-push borings, S2-DP01, S2-DP02, and S2-DP03; and HSA well boring S1-SB01, and analyzed for:

- volatile and semivolatile organics;
- PCBs, and;
- TAL metals.

The results of the volatile and semivolatile organic compound confirmatory soil analyses are summarized on Table 2.2. The presence of the volatile organics cis-1,2-dichloroethene, TCE, toluene, and PCE detected in screening soil samples analyses were not confirmed by the analyses of the confirmatory soil sample results. No volatile or semivolatile compounds or PCBs were detected above the NYSDEC action levels in the confirmatory soil samples.

Table 2.3 summarizes the results of the TAL metals analysis for confirmatory soil samples at Site 2. Soil and groundwater sample locations at Site 2 are shown on Figure 2.2. Cadmium, chromium, lead, mercury, and zinc were detected in samples collected at Site 2, as follows:

- The surface soil sample collected at S2-DP01 (SS01-01 and DP01-01) had chromium detected at 22 mg/kg, which exceeds the NYSDEC RSCO of 10 mg/kg.
- Subsurface soil samples collected at S2-DP01, S2-DP03, and S2-SB01 exceeded the subsurface ULBC for chromium. Chromium in surface and subsurface soils and groundwater is naturally occurring at the base, as was determined during the RI (PEER 2002).
- Surface sample S2-DP03-01 had a detection of chromium, but the data was not within laboratory quality assurance/quality control (QA/QC) limits, and was not considered further.

Table 2.2
2000 – 2001 Remedial Investigation
Confirmatory Soil Sample Analytical Results
Volatile and Semivolatile Organic Compounds
106th Rescue Wing
New York Air National Guard
Westhampton Beach, New York

Parameter	Action Levels [b]		Sample Location, Depth, Type, and Concentrations[a]										
	Saturated [c]	Unsaturated [d]	SS01-01 (0-0.3 ft) U	DP01-01 (0-2 ft) U	DP01-02 (18-20 ft) U	DP01-03 (32-36 ft) S	DP02-01 (0-2 ft) U	DP02-02 (32-36 ft) S	DP03-01 (0-4 ft) U	DP03-02 (34-36 ft) S	SB01-01 (0-2 ft) U	SB01-02 (12-14 ft) U	SB01-03 (30-34 ft) S
Volatile Organics (µg/kg)													
Benzene	0.6	60	ND	1 J	ND	ND	ND	ND	ND	ND	ND	ND	ND
Chloroform	3.0	300	ND	ND	ND	ND	ND	1 J	ND	ND	ND	ND	ND
Toluene	15	1500	ND	3 J	ND	ND	2 J	ND	ND	ND	2 J	ND	ND
Total Xylenes	12	1200	ND	1 J	ND	ND	2 J	ND	ND	ND	1 J	ND	ND
Semivolatile Organics (µg/kg)													
Di-n-octyl phthalate	1200	80,000	ND	ND	ND	ND	ND	ND	ND	530	ND	ND	ND
PCBs (µg/kg) [e]													
Aroclor 1260	1000 (Surface)	10,000 (Subsurface)	39 J	17 J	ND	ND	NA	NA	NA	NA	NA	NA	NA

Notes:
J Estimated value.
NA Not analyzed.
ND Not detected.
-- No applicable action level.

Shading and bolding indicate exceedance of action levels.

(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 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; DP02-03 is the third direct-push sample collected from location DP02 at a depth of 8-12 ft BGS. Type: S = saturated; U = unsaturated.
(b) Recommended Soil Cleanup Objectives, NYSDEC, TAGM 4046.
(c) Soil in direct contact with groundwater.
(d) Greater than 5 ft above the water table.
(e) Recommended Cleanup Objectives for PCBs in Surface and Subsurface Soils, NYSDEC, TAGM 4046

Table 2.3
2000 – 2001 Remedial Investigation
Confirmatory Soil Sample Analytical Results - Metals
106th Rescue Wing
New York Air National Guard
Westhampton Beach, New York

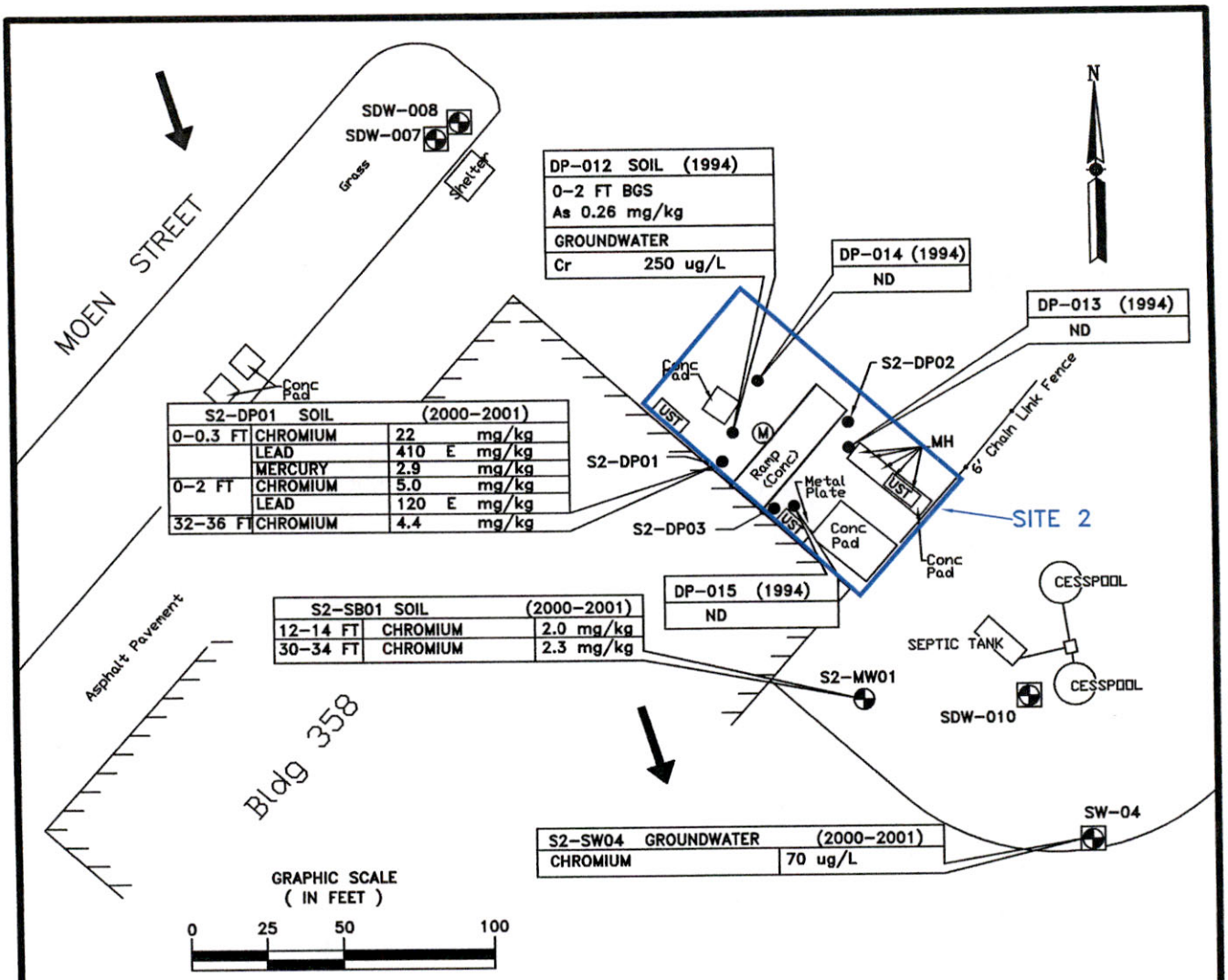
Parameter	Action Levels		Sample Concentration Location/Depth [a]										
	NYSDEC RSCO [b]	BKG [c] or ULBC [d]	SS01-01 (0-0.3 ft)	DP01-01 (0-2 ft)	DP01-02 (18-20 ft)	DP01-03 (32-36 ft)	DP02-01 (0-4 ft)	DP02-02 (32-36 ft)	DP03-01 (0-4 ft)	DP03-02 (34-36 ft)	SB01-01 (0-2 ft)	SB01-02 (12-14 ft)	SB01-03 (30-34 ft)
Metals (mg/kg)													
Aluminum	SB	33,000	2300 E	1500 E	360	280	680 E	260 E	850 N*	350 N*	490 E	300 E	320 E
Arsenic	7.5 or SB	7.7/5.5 [d]	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Barium	300	15 - 600	28	9.8	1.3	1.4	1.3	0.89	1.6	1.6	1.8	21	1.9
Cadmium	1 or SB	0.39/0.27 [d]	**4.5**	**2.5**	ND	ND	ND	ND	ND	ND	ND	ND	ND
Calcium	SB	130 - 35,000	5200 E	13,000 E	910	ND	120 E	ND E	140 *	ND *	1,300	ND	ND
Chromium	10 or SB	6.1/0.84 [d]	**22**	5.0	**2.2**	**4.4**	ND	ND	**2.4** *	ND *	ND	**2.0**	**2.3**
Copper	25 or SB	1 - 50	41	18	ND	ND	2.1	ND	ND	ND *	ND	ND	2.5
Iron	2000 or SB	2000 - 550,000	4800 E	3100 E	2100	1000	900 E	520 E	1300 E	560 E	730 E	710 E	810 E
Lead	SB [e]	4.4/0.27 [d] [e]	**410 E**	**120 E**	ND	ND	ND E	ND E	ND *	ND *	ND	ND	ND
Magnesium	SB	100 - 5000	1200 E	6800 E	550	50	69 E	51 E	68 *	150 *	110	49	64
Manganese	SB	50 - 5000	93	48	20	6.4	8.2	8.1	12 N	12 N	12	14	22
Mercury	0.1	0.001 - 0.2	**2.9**	0.099	ND	ND	ND	ND	ND	ND	ND	ND	ND
Nickel	13 or SB	0.5 - 25	6.0	2.9	ND	ND	ND	ND	ND	ND	ND	ND	ND
Sodium	SB	6000 - 8000	120	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Vanadium	150 or SB	1 - 300	13	3.9	1.9	2.1	2.7	ND	3.2	1.4	1.5	1.7	2.0
Zinc	20 or SB	9 - 50	**830 E**	**94 E**	2.7	1.8	4.6 E	1.5 E	6.2 *	2.3 *	2.7	2.1	2.0

Notes:

* Analysis is not within laboratory quality control limits.
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 Soil background.
-- No applicable action level.

Shading and bolding indicate exceedance of action levels.

(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 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; DP02-03 is the third direct-push sample collected from location DP02 at a depth of 8-12 ft BGS.
(b) RSCO = Recommended Soil Cleanup Objectives, NYSDEC, TAGM 4046.
(c) BKG = Eastern USA Background, NYSDEC, TAGM 4046 (surface/subsurface).
(d) ULBC = Upper limits of background concentration for surface/subsurface metals in soils; see the *Draft-Final RI Report* Section 6.0 (PEER 2002).
(e) Background levels for lead vary widely. Average levels in undeveloped, rural areas may range from 4 - 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).



S2-DP01 SOIL		(2000-2001)	
0-0.3 FT	CHROMIUM	22	mg/kg
	LEAD	410 E	mg/kg
	MERCURY	2.9	mg/kg
0-2 FT	CHROMIUM	5.0	mg/kg
	LEAD	120 E	mg/kg
32-36 FT	CHROMIUM	4.4	mg/kg

S2-SB01 SOIL		(2000-2001)
12-14 FT	CHROMIUM	2.0 mg/kg
30-34 FT	CHROMIUM	2.3 mg/kg

S2-SW04 GROUNDWATER	(2000-2001)
CHROMIUM	70 ug/L

LEGEND

- S2-DP02 — DIRECT PUSH PROBE AND IDENTIFIER
- NEW MONITORING WELL AND IDENTIFIER
- (M) — MANHOLE COVER
- UST — UNDERGROUND STORAGE TANK
- EXISTING MONITORING WELL AND IDENTIFIER (APPROXIMATE)
- APPROXIMATE GROUNDWATER FLOW DIRECTION (05/01)
- E — ESTIMATED VALUE OR NOT REPORTED DUE TO INTERFERENCES

ACTION LEVELS				
ANALYTE	SURFACE (1) SOIL (mg/kg)	SUBSURFACE (1) SOIL (mg/kg)	SOIL (3) (SATURATED) (ug/kg)	GROUNDWATER(2) (ug/L)
CHROMIUM	6.1	0.84	–	50
LEAD	4.4	2.7	–	15
MERCURY	0.1	0.20	–	–
METYLENE CHLORIDE	–	–	1.0	–
ACETONE	–	–	1.1	–

1. NYSDEC, TOGs 1991.
2. FEDERAL DRINKING WATER STANDARDS MAXIMUM CONTAMINANT LEVELS.
3. NYSDEC TAGM#4046

NOTES:

1. INORGANIC COMPOUND RESULTS IN SURFACE AND SUBSURFACE 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

PEER

PROJ./003005-008

GAB/DF NFRAP/SITE2/FIG 2.2

SITE 2 – 2000-2001 REMEDIAL INVESTIGATION
SOIL AND GROUNDWATER SAMPLE RESULTS
106th RESCUE WING, NEW YORK AIR NATIONAL GUARD
FRANCIS S. GABRESKI AIRPORT
WESTHAMPTON BEACH, NEW YORK

FIGURE 2.2

- Cadmium exceeded its NYSDEC RSCO of 1.0 mg/kg in surface and shallow soil samples from S2-DP01, at 4.5 and 2.5 mg/kg, respectively.
- Mercury was also detected in surface soil sample from S2-DP01 at 2.9 mg/kg, which exceeds the NYSDEC RSCO of 0.1 mg/kg.
- Lead was detected in surface and shallow soil samples from S2-DP01 at concentrations exceeding the NYSDEC RSCO, but at estimated values.
- Zinc was detected in the surface and shallow samples from S2-DP01 at concentrations exceeding the NYSDEC RSCO, but the values were reported by the laboratory as estimated values. Zinc was determined to be naturally occurring, and were not considered further in the RI (PEER 2002).

Arsenic was not detected in any of the 2000 – 2001 RI confirmatory soil samples at Site 2. Therefore, the detections of arsenic from the 1994 SI are unconfirmed.

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).

In the vicinity of Site 2, some surface water runoff occurs during precipitation events due to the presence of the asphalt paving. However, the lawn area allows a significant fraction of the surface water runoff to infiltrate rapidly, while the remainder is carried off by the storm water sewer system. Consequently, there is no surface water or sediment in the vicinity of Site 2, and no surface water or sediment sampling was performed in association with Site 2.

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 2. General characteristics of the hydrogeologic units present are summarized on Table 2.4. 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 Upper Glacial Aquifer

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

Table 2.4
Hydrologic Properties of Regional Aquifers
106th Rescue Wing
New York Air National Guard
Westhampton Beach, New York

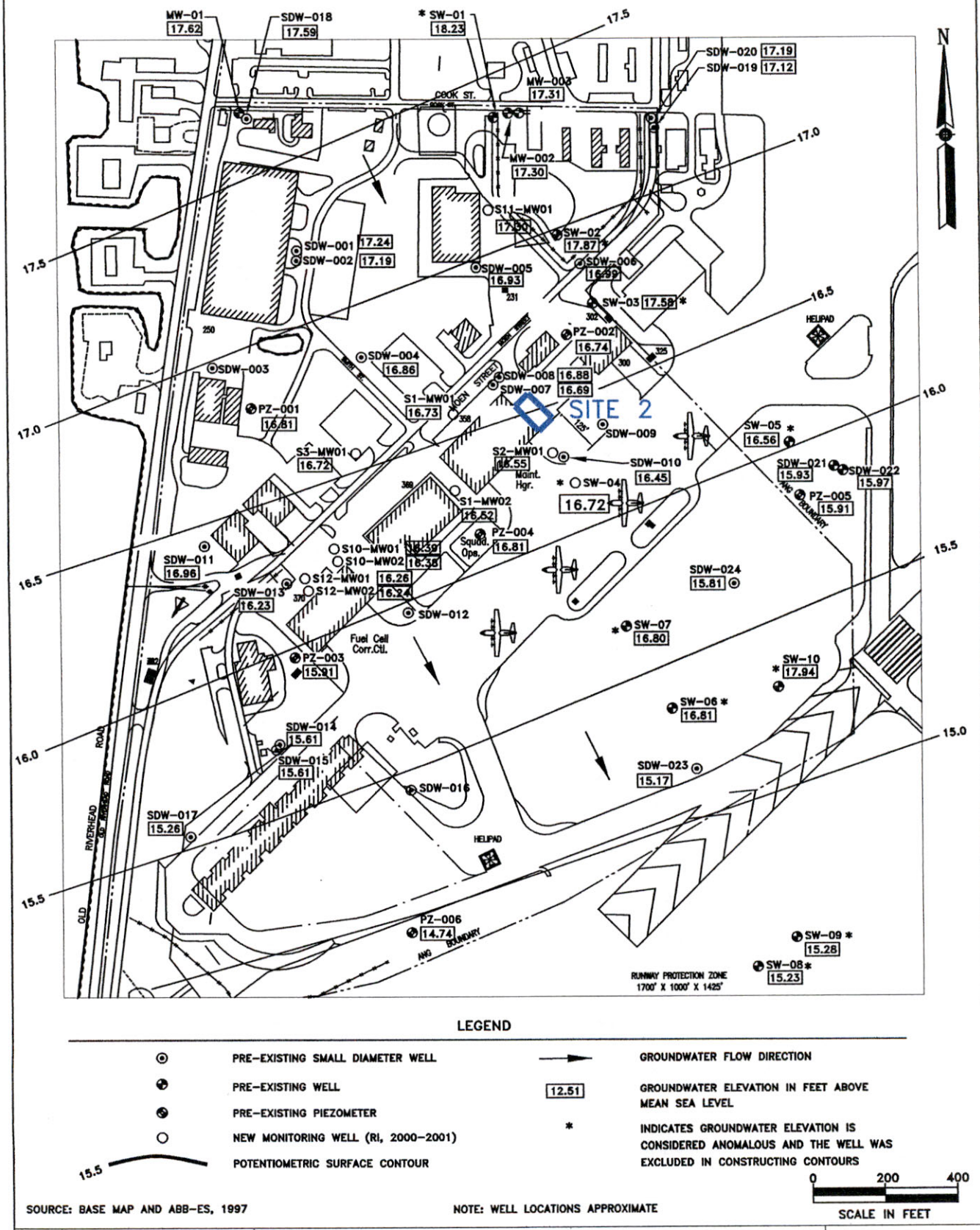
Unit	Texture	Thickness (ft)	Hydraulic Conductivity (gpd/ft^2) (cm/s)	Estimated Transmissivity (gpd/ft) (cm^2/s)
Upper Glacial	Sand and gravel	120	2,000 (9.4×10^{-2})	200 (2.9×10^{-1})
Gardiners Clay	Clay and silt	40	Aquitard	Aquitard
Magothy Formations	Sand, clayey sand	930	380 (1.8×10^{-2})	300 (4.5×10^{-1})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

Source: Dames & Moore 1986.

permeability over short distances. Hydraulic conductivity of the glacial deposits was estimated to be about 2000 gpd/ft^2 (9.4×10^{-2} cm/s) (ABB-ES 1997), and transmissivity is approximately 200 gpd/ft (2.9×10^{-1} cm^2/s) (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 1.6×10^{-2} to 5.2×10^{-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).

During the 2000 – 2001 RI soil boring activities, saturation was observed from 31 ft BGS at S2-SB01 to 33.5 ft BGS at S2-DP03. Observed groundwater elevations were consistent with the basewide groundwater elevations, hydraulic gradient, and groundwater flow direction.



LEGEND

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

0 200 400
SCALE IN FEET

SOURCE: BASE MAP AND ABB-ES, 1997

NOTE: WELL LOCATIONS APPROXIMATE

PEER

PROJ./003005-011

GAB3005/NFRAP/SITE2/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). None of the Site 2 RI soil borings penetrated to the depth of the clay.

2.7 GROUNDWATER CONTAMINATION INVESTIGATION RESULTS

During the SI completed in 1994, chromium was detected at a concentration above the NYS Class GA groundwater limit, but below the MCL, in one groundwater-screening sample collected from Site 2. The SI results were summarized in Section 1.4.1. Chromium was subsequently determined to be naturally occurring during the 2000 – 2001 RI, and is not considered a COPC (PEER 2002).

The RI groundwater investigation included collection of both screening and confirmatory ground water samples, as discussed below in Sections 2.7.1 and 2.7.2. Screening and confirmatory samples were collected from direct-push borings S2-DP01, S2-DP02, and S2-DP03, and two rounds of confirmatory groundwater samples were collected from newly installed monitoring wells S2-MW01 and S1-MW02.

2.7.1 Groundwater Screening Samples

During direct-push sampling, three groundwater-screening samples were collected from direct-push borings S2-DP01, S2-DP02, and S2-DP03, and were submitted for expedited turnaround

time analysis of volatile organics by an off-site laboratory. No volatile organics were detected in any of the groundwater screening samples.

2.7.2 Direct-Push Confirmatory Groundwater Samples

Direct-push groundwater confirmatory samples were collected from direct-push borings S2-DP01, S2-DP02, and S2-DP03, including a duplicate sample, and submitted for confirmatory analysis of volatile and semivolatile organic compounds at the state-certified laboratory. Results of the confirmatory analysis of direct-push groundwater samples are summarized on Table 2.5. No compounds were detected above the NYSDEC action levels.

2.7.3 Groundwater Monitoring Samples

Groundwater monitoring samples were collected from five monitoring wells at Site 2: SDW-007, SDW-008, SDW-010, SW-04, and newly installed monitoring well S2-MW01. Groundwater monitoring samples were analyzed for:

- volatile and semivolatile organic compounds;
- bioremediation parameters (from monitoring well S2-MW01 only) including, methane, chloride, alkalinity, and sulfate;
- TPH-GRO/DRO and BTEX (from monitoring well S2-MW01 only); and
- TAL metals.

Analytical results for Site 2 groundwater monitoring samples are summarized in Table 2.6 for organics and Table 2.7 for metals. No BTEX, volatile, or semivolatile organic compounds were detected above the NYSDEC action levels. The semivolatile organic bis(2-ethylhexyl)phthalate (BEHP) was detected at an estimated concentration of 6 J µg/L, which is the MCL. BEHP was determined to be a laboratory-introduced contaminant, as discussed in Appendix J of the *Draft-Final RI Report* (PEER 2002). TPH-GRO was not detected. TPH-DRO was detected in monitoring well S2-MW01 during Round 1 at a concentration of 0.6 mg/L, but was not

Table 2.5
2000 – 2001 Remedial Investigation
Confirmatory Direct-Push Groundwater Analytical Results
Volatile and Semivolatile Organic Compounds-Rounds 1 and 2
106th Rescue Wing
New York Air National Guard
Westhampton Beach, New York

Parameter	Action Levels		Concentration at Sample Location [a]			
	NYS [b]	MCL [c]	PW01-01 (34-38 ft)	PW02-01 (34-38 ft)	PW02-21 (Dup) (34-38 ft)	PW03-01 (35-39 ft)
Volatile Organic Compounds (µg/L)						
2-Butanone	50	--	ND	ND	ND	6
Carbon Disulfide	50	--	0.4 J	0.3 J	0.4 J	0.2 J
Tetrachloroethene	5	5	ND	0.3 J	ND	0.4 J
Toluene	5	1000	0.3 J	0.6 J	0.5 J	ND
1,1,1-Trichloroethane	5	200	ND	ND	ND	2
TPH-GRO (µg/L)	--	--	NA	NA	NA	NA
TPH-DRO (mg/L)	--	--	NA	NA	NA	NA
Semivolatile Organic Compounds (µg/L)						
All Analytes	--	--	ND	ND	ND	ND

Notes:

B	Analyte is also found in associated blank.
Dup	Duplicate sample.
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.

(a) Location "PW0X-0X" refers to sample number collected at location PW0X, at depth specified in ft BGS; PW01-01 is the first direct-push sample collected from location PW01 at a depth of 34-38 ft BGS.
(b) NYS = New York State, Class GA Groundwater; NYSDEC TAGM 4046.
(c) MCL = Maximum Contaminant Level, United States Environmental Protection Agency.
(d) Guidance values.
(e) Compound is an Unspecified Organic Contaminant. Under New York Drinking Water Standards, a general standard of 50 µg/L applies.

Table 2.6
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]	SDW007-01	SDW007-02	SDW008-01	SDW008-R1	SDW008-02	SDW008-R2	SDW010-01	SDW010-02	SW04-02	S2MW01-01	S2MW01-02
BTEX (µg/L)													
m/p-Xylenes	5	10,000	NA	NA	NA	NA	NA	NA	NA	NA	NA	0.47	ND
Volatile Organic Compounds (µg/L)													
Carbon Disulfide	50	--	14	ND	2	4	ND	ND	0.4	ND	ND	0.9 J	5.0
Chloroform	7	80	5	0.6 J	ND	ND	ND	ND	ND	ND	ND	ND	ND
Tetrachloroethene	5	5	ND	ND	ND	ND	ND	ND	0.8 J	0.5 J	ND	ND	ND
Toluene	5	1000	ND	0.7 J	0.5 J	0.6 BJ	ND	ND	0.2 J	ND	ND	ND	ND
1,1,1-Trichloroethane	5	200	ND	ND	ND	ND	ND	ND	ND	ND	1.0	2	ND
Trichloroethene	5	5	ND	ND	ND	ND	ND	ND	0.2 J	ND	ND	ND	ND
Total Xylenes	5	10,000	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.3 J	ND
Semivolatile Organic Compounds (µg/L)													
BEHP	50	6	ND	ND	ND	ND	ND	ND	ND	ND	ND	6 J	ND
1,4-Dichlorobenzene	4.7	75	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	4 BJ
Diethyl Phthalate	50 [d]	--	2.0 J	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Di-n-octyl phthalate	50 [d]	--	ND	ND	ND	ND	ND	2 J	ND	ND	ND	ND	ND
1,2,4-TCB	50 [e]	70	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	4 BJ
TPH-GRO (µg/L)	--	--	NA	NA	NA	NA	NA	NA	NA	NA	NA	ND	ND
TPH-DRO (mg/L)	--	--	NA	NA	NA	NA	NA	NA	NA	NA	NA	0.60	ND

Notes:

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.
1,2,4-TCB	1,2,4-Trichlorobenzene
BEHP	bis(2-ethylhexyl)phthalate

(a) "SDW" refers to small-diameter well; "SW" refers to Stone & Webster well; "MW" refers to monitoring well; "-01" refers to Round 1 sampling, February - March 2001; "-02" refers to Round 2 sampling, May - June 2001; "R" refers to replicate sample collected at top of well screen.

(b) New York State (NYS), Class GA Groundwater; NYSDEC TAGM 4046.

(c) Maximum Contaminant Level (MCL), United States Environmental Protection Agency.

(d) Guidance value.

(e) Compound is a Principal Organic Compound (POC). Under New York State Drinking Water Standards, a general standard of 5 µg/L applies to all POCs unless a more stringent compound specific standard has been set (ABB-ES 1994).

Table 2.7
2000 – 2001 Remedial Investigation
Groundwater Monitoring Analytical Results - Metals
106th Rescue Wing - New York Air National Guard
Westhampton Beach, New York

Parameter	Action Levels		Sample Location and Concentration [a]										
	NYS [b]	MCL [c]	SDW007-01	SDW007-02	SDW008-01	SDW008-R1	SDW008-02	SDW008-R2	SDW010-01	SDW010-02	SW04-02	S2MW01-01	S2MW01-02
Metals (µg/L)													
Aluminum	--	--	3600	740	6900	3000	1800	1500	1400	1000	2700	2400	1600
Arsenic	25	50 [d]	ND	ND	ND	ND	ND	ND	ND	ND	7.6	ND	ND
Barium	--	--	170 E	77	34	49	27	27	9.1	7.5	35 E	67	61
Cadmium	10	5.0	ND	ND	ND	ND	ND	ND	1.5	1.0	ND	ND	ND
Calcium	--	--	18,000 E	7200	17,000	21,000	15,000	15,000	17,000	18,000	33,000	19,000	24,000
Chromium	50	100	9.3	2.3	14	6.4	5.0	4.5	3.9	5.1	70	7.2	5.0
Cobalt	--	--	ND	ND	ND	ND	ND	ND	ND	ND	ND	7.5	5.7
Copper	--	1300 [e]	8.1	ND	8.6	ND	ND	ND	ND	ND	ND	6.2	ND
Iron	--	--	5000 E	1100	9700 E	4700	3300	2900	1200 E	1400	3300 E	5000	2900
Lead	25	15 [e]	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Magnesium	--	--	3400	1300	5700	6000	3800	3800	2900	3300	5800	4500	5100
Manganese	--	--	730 E	240	260 E	110	83	84	20 E	12	270	110	73
Nickel	--	--	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Potassium	--	--	16,000	10,000	3100	2800	1800	2000	1900	1300	2900	1600	1800
Sodium	--	--	46,000	67,000	33,000	91,000 N	ND	ND	32,000	31,000	40,000	24,000	33,000
Thallium	--	--	ND	ND	ND	ND	38,000	39,000	ND	ND	ND	5.2	ND
Vanadium	--	--	12	ND	18	9.2	5.5	ND	ND	ND	6.9	9.4	5.2
Zinc	--	--	66	75	64	ND	55	92	55	42	28	48	ND

Notes:
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.
-- No applicable action level.
Shading and bolding indicates exceedance of action level.

(a) "SDW" refers to small-diameter well; "MW" refers to monitoring well; "SW" refers to Stone & Webster well; "R" refers to replicate sample collected at the top of the well screen; "-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.

detected in Round 2. NYSDEC action levels have not been established for TPH. The results of the bioremediation parameter samples were not indicative of active bioremediation.

Chromium was detected in SW-04 at a concentration of 70 µg/L, which is above the NYSDEC action level of 50 µg/L, but below the MCL of 100 µg/L. No other metals were detected above the NYSDEC action levels. Chromium is naturally occurring, as determined during the RI (PEER 2002).

1,1,1-Trichloroethane (1,1,1-TCA) was detected in monitoring wells SW-04 and S2-MW01 at 1.0 and 2.0 µg/L, respectively. These concentrations did not exceed the MCL of 5 µg/L or the NYSDEC action level 200 µg/L.

2.8 CLIMATE

The average annual rainfall in the Westhampton Beach area is about 45 inches. The highest average rainfall is in March, and the lowest is in October.

2.9 AIR

Air sampling was not conducted at Site 2. The contaminants detected at Site 2 are not of concern since the majority of this site is covered in lawn and asphalt.

2.10 RECEPTORS

Site 2 is located within the boundaries of the ANG facility, a secured government installation. The Francis S. Gabreski Airport is also a secure facility, and access to Site 2 is restricted. The site surface is 80% 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 2. 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 surface water runoff occurs, and has no potential to reach off site receptors.

Consequently, the only exposure likely to occur in connection with Site 2 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 2 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 2.

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 2 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 2. Additionally, Site 2 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 2, 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 2 in accordance with guidelines in the EPA Risk Assessment Guidance document (EPA 1989a and b), except for lead detected in site surface soils. The COPCs evaluated include the metals arsenic, cadmium, lead, and mercury. 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 mercury were evaluated according to standard risk assessment procedures (EPA 1989a), as presented in Section 3.2. Although arsenic detected during the 1994 SI was unconfirmed by the 2000 – 2001 RI, arsenic is retained as a COPC as a precaution.

Quantitative evaluation of risks associated with lead are not technically feasible using the standard risk assessment equations (EPA 1989b). 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.

All four of the COPCs that were identified at Site 2, arsenic, cadmium, mercury, 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 2. 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 Environmental Manager pers. comm. January 30, 2002).
- Future plans call for the airport to remain active indefinitely, and preclude residential use scenarios.
- Access to the base is 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 95th percentile (EPA 1994b).

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:

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

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:

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

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 2 (2.6 mg/kg). The results of the calculation are presented in Table 3.2. Figure 3.1 presents the EPA TRW ALM spread sheet used in the calculation for lead in surface soil at Site 2. In order to obtain reasonably conservative risk

Table 3.1
Summary of Default Parameter Values for the
Risk Estimation Algorithm (Equations 1 through 4)
Technical Review Workgroup
Adult Lead Methodology

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).

Source: EPA 1996b.

RBRGs Risk-based remediation goals.

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
410	2.6	6.1	10 µg/L	2.5 %

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.

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 2 is 2.5 %. Probabilities of 5% or less are considered acceptable levels of risk.

3.2 BASELINE RISK ASSESSMENT FOR ARSENIC, CADMIUM, AND MERCURY 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.

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

Version date 8/14/01

Exposure Variable	PbB Equation[1] 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 2 soil lead concentration	ug/g or ppm	410	410	410	410
$R_{fetal/maternal}$	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	2.6	2.6	2.6	2.6
$PbB_{fetal,\ 0.95}$			95th percentile PbB among fetuses of adult workers	ug/dL	6.1	7.9	6.1	7.9
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	%	0.7%	2.5%	0.7%	2.5%

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

3.2.1 Exposure Assessment

Exposure is defined as contact of an organism with a chemical agent (EPA 1989b). 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.

3.2.2 Exposure Settings

This section generally describes the physical characteristics of Site 2, as investigated during this RI. Additional information concerning the physical characteristics of the base and Site 2 is provided in Sections 2.0 and 3.0 of the *Draft-Final RI Report* (PEER 2002). Access to the base is restricted to base personnel and authorized guests only. The base is fenced and Site 2 is located within the base perimeter fence. Future plans call for the base and airport to remain active indefinitely, with no future plans for any residential usage of the property.

Exposure Setting

Site 2, a former hazardous waste storage area, is located on the northeast side of Building 358 in the south-central portion of the base. Approximately 80% of the site is covered with asphalt pavement, which borders an area covered with grass. Groundwater at the site is present at approximately 27 ft to 32 ft BGS and flows toward the southeast.

The COPCs at the site (metals) were identified in surface soils. No COPCs were detected in subsurface soils or site groundwater. The metals of potential concern include arsenic, cadmium, mercury, and lead. 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 2, while arsenic,

cadmium, and mercury will be assessed in the following sections. Potential receptors to the contaminated surface soils at the site include base personnel, construction personnel, and site visitors. During rainfall events, surface water bodies (e.g., ponds, creeks) 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 adsorption 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 1,500 ft southeast of the site. Potential receptors to impacted water in Aspatuck Creek are area residents. Groundwater beneath the site has not been adversely impacted by metals as of the 2000 – 2001 RI.

3.2.3 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 2, in this case, arsenic, cadmium, and mercury 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 2 is limited to surface soil which contains concentrations of arsenic, cadmium, and mercury. 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 80% 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 adsorption 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. In the unlikely event 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 1,500 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 2. 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 mercury, were identified in surface soil at Site 2. 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.

3.2.4 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 2. 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;

- 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 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 2. 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 2. 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 2 groundwater, or by contaminated surface runoff, exposure of endangered species to contaminants from the site is not expected.

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4.0 SELECTED ACTION: NO FURTHER RESPONSE ACTION PLANNED

A NFRAP decision is proposed for Site 2 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; CERCLA, as amended by the Superfund Amendments and Reauthorization Act; and to the extent practicable, the National Oil and Hazardous Substances Pollution Contingency Plan.

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 RI conducted at Site 2, these criteria have been met.

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APPENDIX A

REFERENCES

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