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NYSDEC Region 1

ENVIRONMENTAL RESTORATION PROGRAM

DRAFT-FINAL
NO FURTHER RESPONSE ACTION PLANNED
DECISION DOCUMENT

SITE 11 – TRENCH DRAIN SUMP, BUILDING 230

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

MAY 2004



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WESTHAMPTON BEACH, NEW YORK

MAY 2004

Prepared by

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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.
ALM	Adult Lead Methodology
ANG	Air National Guard
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
1,2-DCB	1,2-Dichlorobenzene
DD	Decision Document
DRO	Diesel Range Organics
EM	Environmental Manager
EPA	Environmental Protection Agency
ERP	Environmental Restoration Program
GRO	Gasoline Range Organics
HAZWRAP	Hazardous Waste Removal Actions Program
HMTC	Hazardous Materials Technical Center
HSA	Hollow-Stem Auger
IRP	Installation Restoration Program
LIRR	Long Island Railroad
MCL	Maximum Contaminant Level
MSL	Mean Sea Level
NCP	National Oil and Hazardous Substances Pollution Contingency Plan
NEPA	National Environmental Policy Act
NFRAP	No Further Response Action Planned
NYDOH	New York Department of Health
NYS	New York State
NYSDEC	New York State Department of Environmental Conservation
106th RQW	106th Rescue Wing
PAH	Polynuclear Aromatic Hydrocarbons
PCB	Polychlorinated Biphenyl
PCE	Perchloroethylene (tetrachloroethylene)
PID	Photoionization detector
PEER	PEER Consultants, P.C.
RAG	Risk Assessment Guidance
RBRG	Risk-Based Concentration Goal
RI	Remedial Investigation
RSCO	Recommended Soil Cleanup Objective
SARA	Superfund Amendments and Reauthorization Act
SI	Site Investigation
SCDHS	Suffolk County Department of Health Services
TAGM	Technical Assistance Guidance Memorandum
TAL	Target Analyte List

LIST OF ACRONYMS (CONTINUED)

TD	Total depth
TOGS	Technical and Operational Guidance Series
TPH	Total Petroleum Hydrocarbons
TRW	Technical Review Workgroup
ULBC	Upper Limit of Background Concentrations
VMS	Vehicle Maintenance Shop

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DECLARATION

Site Name and Location:

Environmental Restoration Program
Site 11 – Trench Drain Sump, Building 230
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 11 – Trench Drain Sump, Building 230, at the 106th Rescue Wing, New York Air National Guard, Francis S. Gabreski Airport, Westhampton Beach, New York. This decision is based on the results of a 1994 Site Investigation (SI), and a Remedial Investigation (RI) conducted from 1999 through 2000 under the Environmental Restoration Program (ERP), with the cooperation and support of the New York Department of Environmental Conservation (NYSDEC), the New York State Department of Health, and the Suffolk County Department of Health Services (SCDHS).

Description of the Selected Remedy:

Site 11 has been selected for No Further Response Action Planned (NFRAP) based upon the findings of field investigations and evaluation of scientific data. At Site 11, the SI found no detections of petroleum-related volatile or semivolatile organics. However, the SI identified lead and chromium as contaminants of potential concern in surface soil and groundwater, respectively. Lead did not exceed average concentration of lead in soils from rural areas in the eastern United States. Chromium was attributed to the sampling methodology. Subsequently,

the RI found only trace evidence of sump-related contaminants at this site. Contaminants of potential concern (COPCs) were not identified in subsurface soil or groundwater during the RI. However, polynuclear aromatic hydrocarbons (PAHs) and lead were identified as COPCs in shallow soil. Risk assessment of concentrations of PAHs and lead in shallow soil showed they do not pose an unacceptable risk. Risks associated with lead in soil were assessed using the EPA Technical Review Workgroup (TRW) Adult Lead Methodology (ALM), which indicated that lead risks were acceptable at Site 11. A baseline risk assessment was conducted for Site 11, during which, PAHs were eliminated as a contaminant of concern since complete exposure pathways were not identified for on-site or off-site receptors.

Therefore, based on the current conditions at Site 11, it has been determined that contaminant levels at the site pose no significant risk or threat to public health or the environment. No Further Response Action Planned under the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA), as amended by the Superfund Amendments and Reauthorization Act of 1986 (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 11 developed in accordance with CERCLA, as amended by the Superfund Amendments and Reauthorization Act (SARA), and to the extent practicable, the 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

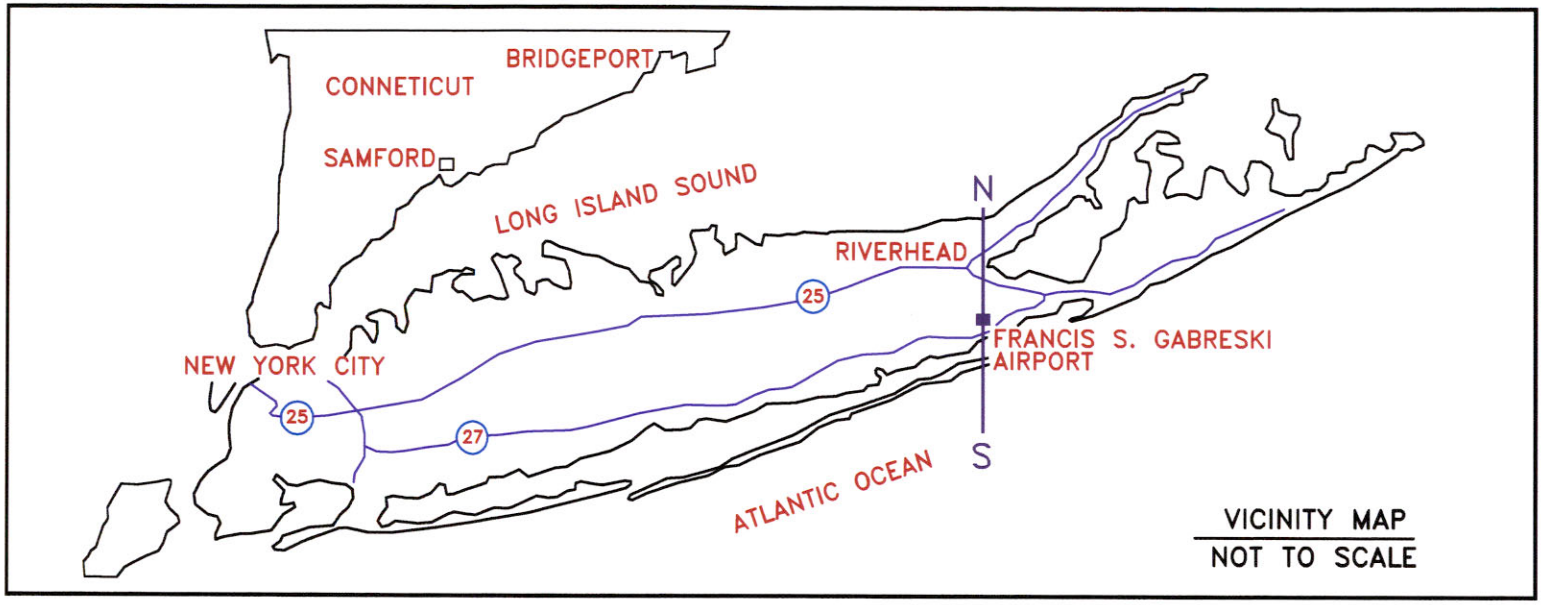
DRAFT-FINAL
NO FURTHER RESPONSE ACTION PLANNED
DECISION DOCUMENT
SITE 11 – TRENCH DRAIN SUMP, BUILDING 230
106TH RESCUE WING
NEW YORK AIR NATIONAL GUARD
FRANCIS S. GABRESKI AIRPORT
WESTHAMPTON BEACH, NEW YORK

DECISION SUMMARY

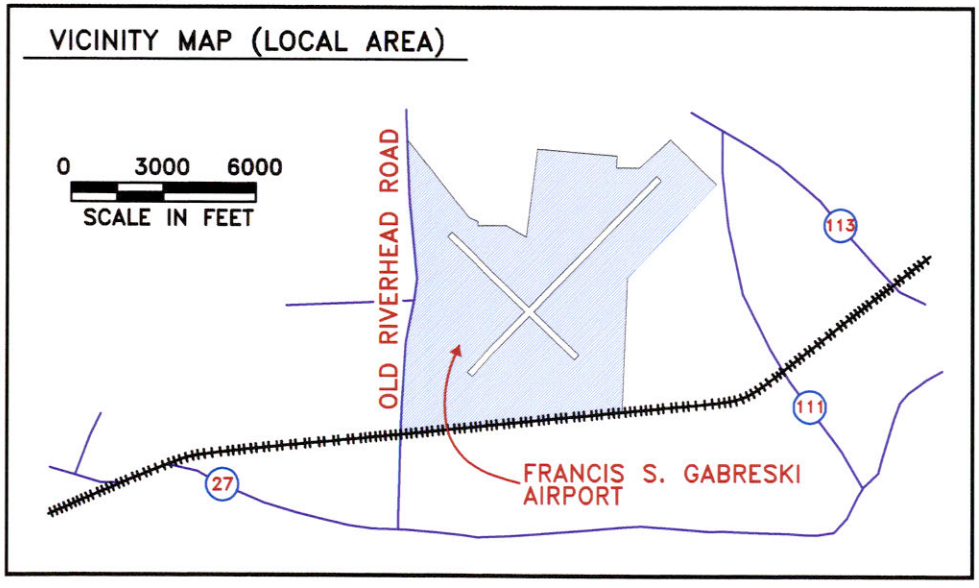
1.0 INTRODUCTION

This Decision Document (DD) supports a No Further Response Action Planned (NFRAP) decision for Site 11, the Trench Drain Sump, Building 230 at the 106th Rescue Wing (106th RQW), New York Air National Guard (ANG), Francis S. Gabreski Airport, in the town of Westhampton Beach, New York (the base). 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 11 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.

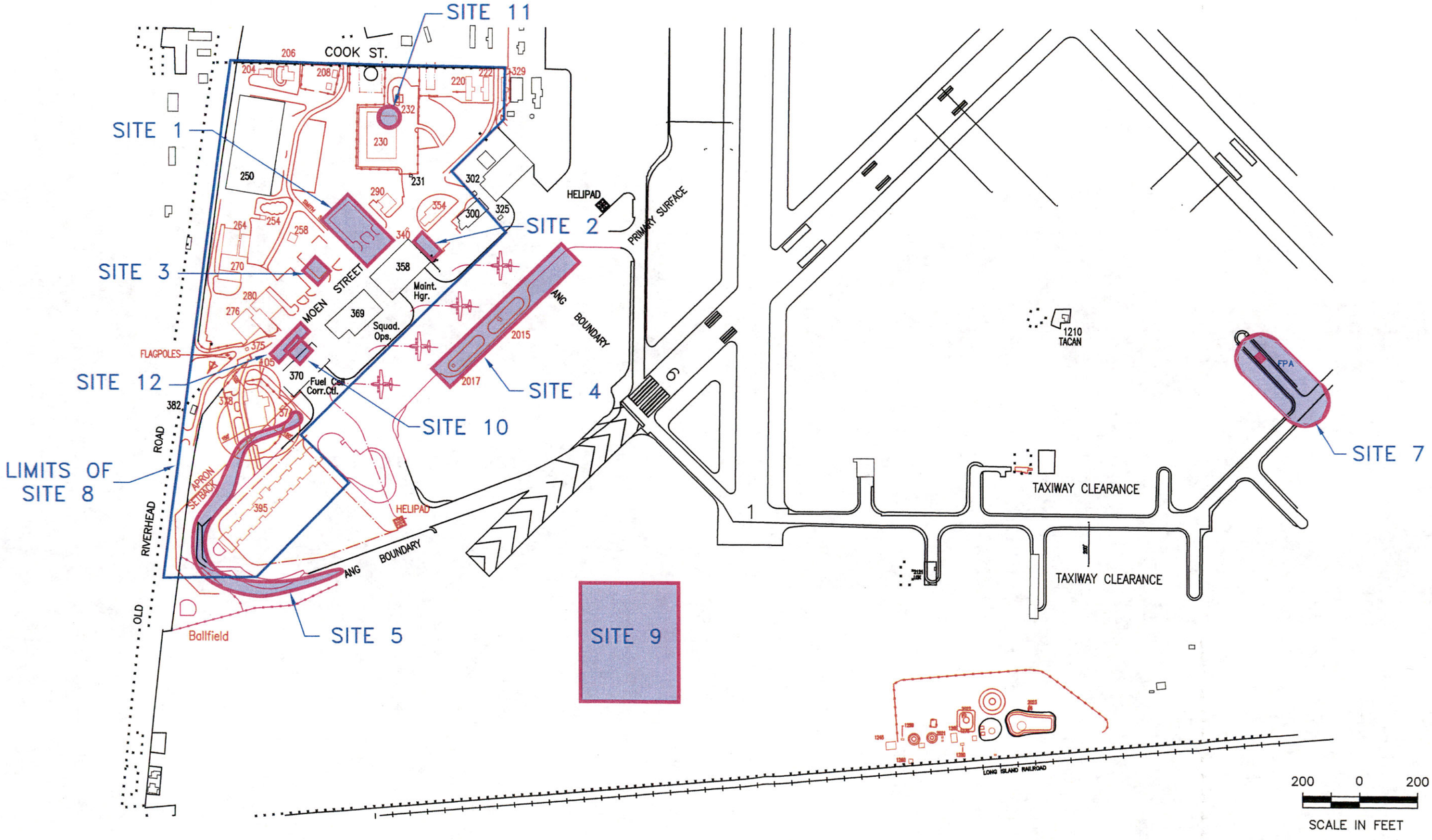






SOURCE: PEER 2003

PEER PROJ./3005-011 GAB3005/Site11 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/SITE11/FIG 1.2	LOCATIONS OF ERP SITES INCLUDING SITE 11 – TRENCH DRAIN SUMP, BUILDING 230 106th RESCUE WING, NEW YORK ANG FRANCIS S. GABRESKI AIRPORT WESTHAMPTON BEACH, NEW YORK	FIGURE 1.2

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

- *Phase I Records Search, Suffolk County Air Force Base (Retired)*, by Dames & Moore, 1986;
- *Installation Restoration Program, Phase I – Records Search for 106th Aerospace Rescue and Recovery group,* Hazardous Materials Training Center (HMTC), 1987;
- *Site Investigation Report, 106th Rescue Group,* by ABB-Environmental Services (ABB-ES), May 1997; and
- *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 11 and its surrounding area is provided in Section 1.1. Information on the history of Site 11, 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 11, 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 11 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 11, 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 11 – Trench Drain Sump, Building 230 is located on the Francis S. Gabreski ANG Base at the northeast corner of Building 230 [Vehicle Maintenance Shop (VMS)]. It includes a former trench drain sump beneath the northeast corner of Building 230. Site 11 extends beneath the concrete slab which makes up the floor of the VMS, and exterior concrete and asphalt paving.

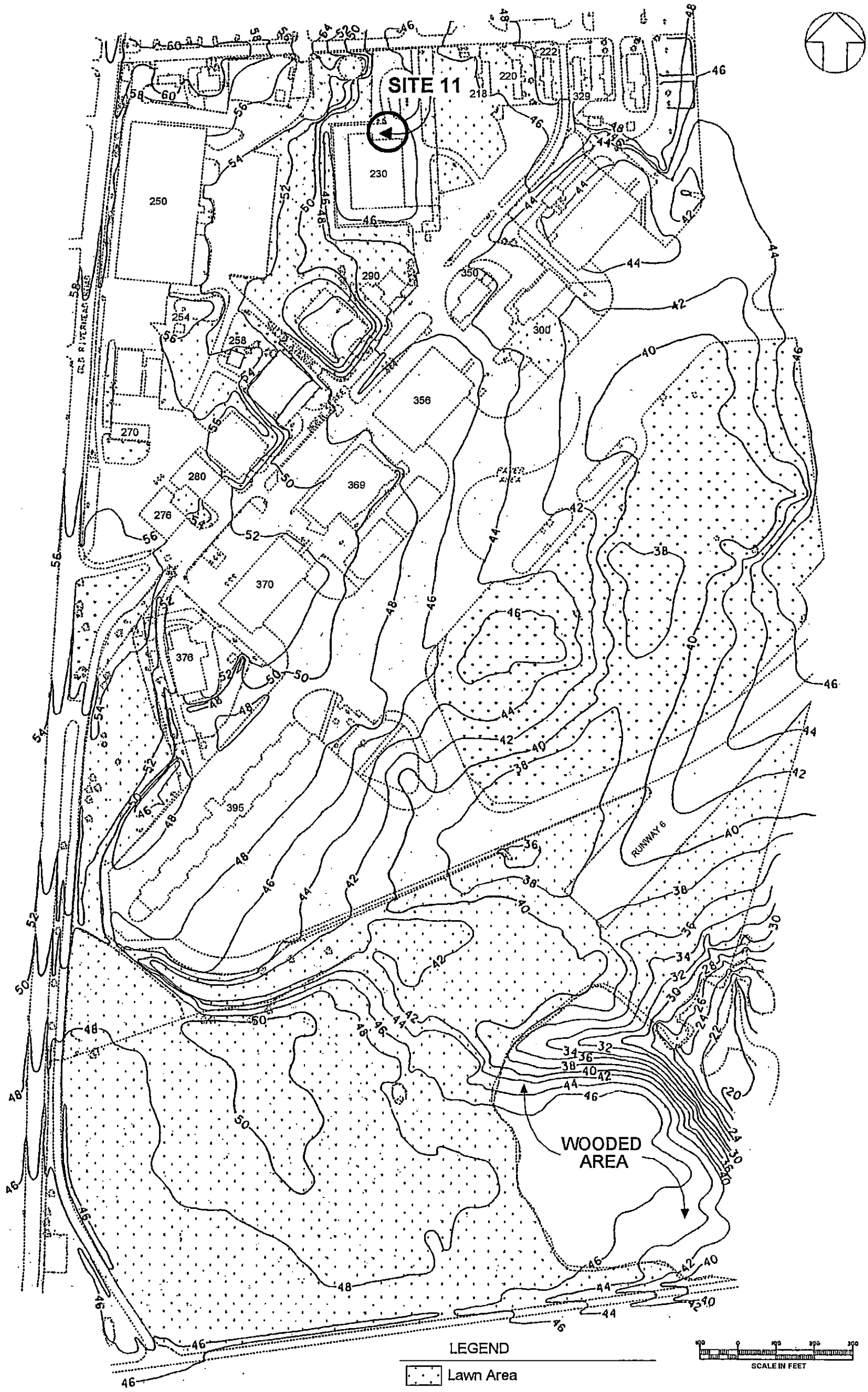
1.1.2 Topography

Francis S. Gabreski Airport is situated on a glacial outwash plain south of the Ronkonkoma terminal moraine, which formed during the Wisconsin glaciation. Relief is characteristically flat with subtle rolling terrain and steeper stream channels (ABB-ES 1997). Figure 1.3 shows the topography of the base. Site 11 is mostly flat, with slight slopes towards the west and south, away from Building 230.

1.1.3 Critical Environments

For the purpose of this DD, critical environments are defined to include all lands and waters that are specifically recognized or managed (by federal, state, or local government agencies or private organizations) as rare, unique, unusually sensitive, or important natural resources. These areas include permanent and seasonal habitats of federally designated endangered species, nature preserves (including federal and state parks), wilderness areas, wildlife sanctuaries, and wetlands, but they do not include parks established solely for historic preservation or recreation.

The Francis S. Gabreski Airport is located within the Long Island Pine Barrens. The Pine Barrens are characterized by open, sunlit woodlands dominated by pitch pine interspersed with white and scarlet oak. In the immediate area of the airport, the Pine Barrens are characterized by a transition from 30 to 80 ft tall pitch pines. The Quogue Wildlife Refuge, adjacent to the east side of the airport, is characterized by dwarf pitch pines ranging from 3 to 6 ft tall. The airport is



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GAB3005/NFRAP/Site11/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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surrounded by wooded areas consisting of 25 ft pitch pines and scattered scrub oak (Dames & Moore 1987).

The following are the Threatened and Endangered species 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. 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 Pine Barrens, residential areas, and small businesses. To the south, across the LIRR, is an area of mixed industrial, business, and residential properties.

1.1.5 Nearby Populations

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

1.1.6 General Surface Water and Groundwater Resources

Surface Water Resources

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

Groundwater Resources

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

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

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

Well Field Identification	Distance from Site (miles)	Aquifer Tapped	Well Number	Screened Interval (ft BGS)	Total Depth (ft BGS)	Population Served (Approximate)
Meeting House Road	0..6	Upper Glacial	20	55-75	78	6,500
			22	74-104	104	
			15A	31-51	53	
Quogue-Riverhead Road	1.2	Magothy	1	386-447	449	2,200
Spinny Road	1.7	Upper Glacial	1	85-115	118	190
			2	118-158	163	
Old Country Road	2.2	Upper Glacial	1	60-75	76	1,800
			2	NA	70	
			3	128-157	161	

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 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

Aside from the trench drain sump and underground utilities such as water, electric and sanitary sewer, no subsurface features, or structures such as tanks or drums, are believed to exist at Site 11.

1.2 SITE HISTORY AND ENFORCEMENT ACTIVITIES

Sections 1.2.1 and 1.2.2 present a history of Site 11. Further details concerning analytical results of soil and groundwater samples are provided in Section 2.4.

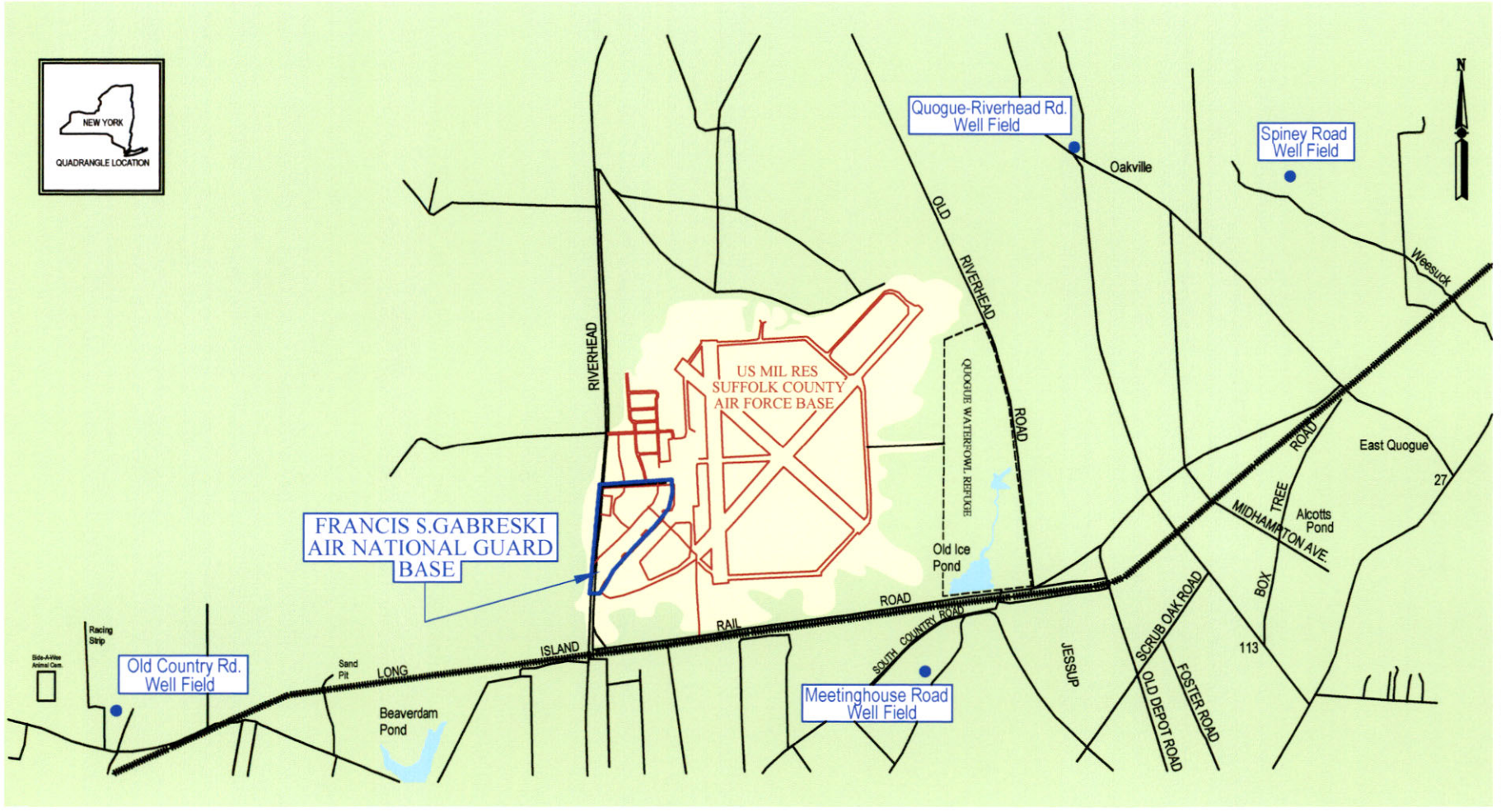
1.2.1 Site History

Site 11 was identified in 1994 during renovations at Building 230. At that time, an underground cylindrical structure was discovered, measuring approximately 2 ft in diameter and 18 ft deep, and oriented vertically. The structure, which was initially assumed to be a waste oil vessel, was discovered beneath the floor on the northeast corner of the building. An unknown quantity of oil and/or water was found to be contained in the cylindrical structure. A Site Investigation was conducted at Site 11 in 1994 by ABB-ES (ABB-ES 1997), and a Remedial Investigation (RI) was completed by PEER in 2001 (PEER 2002).

In 2000, the structure was determined to be a sump, which formerly received floor drainage from the trench drain system in the VMS. At that time, the sump was determined to be constructed of ¼-in steel pipe, with a welded steel bottom and a bolt-down steel-plate cap. Traces of an asphalt lining and minor corrosion were visible. An apparent fill pipe enters the sump at approximately 6 ft above the bottom. Following the renovations to Building 230, the 106th RQW removed residual liquids and steam-cleaned the sump. No evidence of leakage from the sump has been observed, and the sump appears sound and intact [Lt Col Jerry Webb, Base Environmental Manager (EM) pers. comm., 2000]. Because the trench drain sump received runoff that could have included hydraulic oil, volatile and semivolatile organics, total petroleum hydrocarbons – gasoline-range organics (TPH-GRO), total petroleum hydrocarbons – diesel-range organics (TPH-DRO), and polychlorinated biphenyls (PCB) soil and groundwater contamination were a concern at this site

1.2.2 Regulatory Agency Involvement

There is no history of Environmental Protection Agency (US EPA) involvement at Site 11. The New York State Department of Environmental Conservation (NYSDEC) has been involved in the planning of RI activities, review, and revision of plans and reports, and approval of final documents. There have been no enforcement activities at Site 11, and there are no permits or



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

PEER PROJ./003005-011 GAB3005/NFRAP/SITE11/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

agreements that govern response action at the site. No NYSDEC spill number has been assigned to the site.

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 most recent response activity, the RI completed in 2001.

1.4.1 Site Investigation (1994)

The initial SI at Site 11 was performed by ABB-ES from August to December, 1994 (ABB-ES 1997). In May 1997, ABB-ES submitted the *Site Investigation Report* documenting the results of their 1994 field activities. SI activities included direct-push soil and groundwater sampling and analyses.

Action levels used during the SI included:

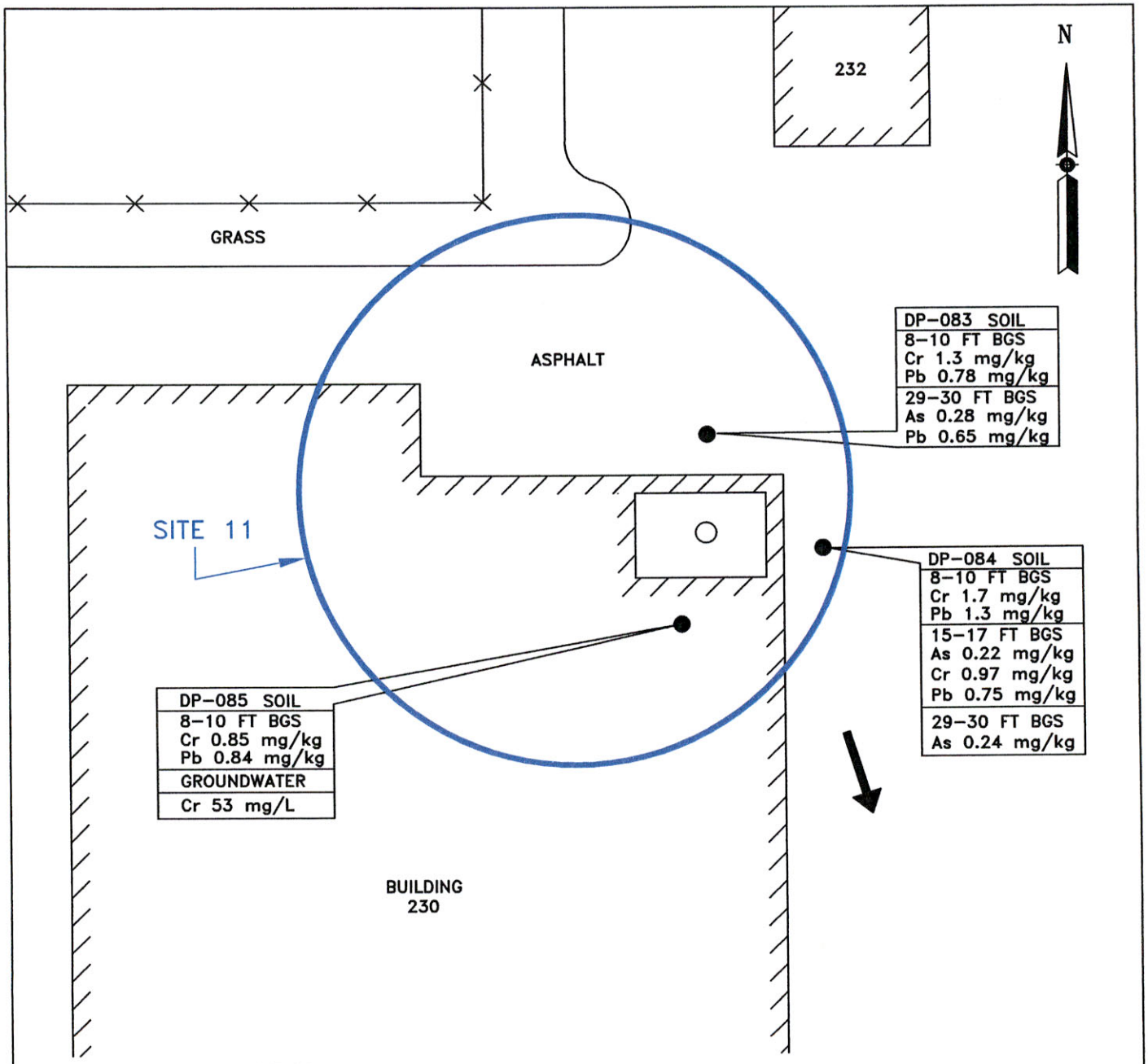
- NYSDEC Recommended Soil Cleanup Objectives (RSCOs), as per the NYSDEC Technical Assistance Guidance Memorandum (TAGM # 4046, NYSDEC 1994);
- Upper Limits of Background Concentrations (ULBCs), as calculated by ABB-ES, following NYSDEC guidelines set forth in the Technical and Operational Guidance Series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

Direct-push borings DP-083, DP-084, and DP-085 were installed during the SI at Site 11 to assess the impact of any possible release of waste oil on subsurface soils and groundwater. Direct-push borings DP-083 and DP-084 were completed at 30 ft below ground surface (BGS) and did not encounter groundwater. Direct-push boring DP-085 was driven to 35 ft BGS and encountered groundwater at 33 ft BGS. Chromium and lead were detected in subsurface soils exceeding NYSDEC action levels at all three borings, while arsenic exceeded NYSDEC action levels at borings DP-083 and DP-084. Chromium was detected exceeding the NYSDEC action levels in the direct-push groundwater sample from boring DP-085. All borings were screened for organic vapors using a flame-ionization detector. All screening results were negative for detectable organic vapors (ABB-ES 1997). The direct-push sample locations and analytical results from soil and groundwater are shown on Figure 1.5.

No volatile or semivolatile organic compounds, which are typically associated with solvent or fuel contamination, were detected in soil samples collected from this site. Lead was detected in exceedance of NYSDEC action levels in subsurface soils collected from this site. However, since the detected concentrations of lead did not exceed the range of average concentrations in the eastern United States or NYS background soils, metal was considered to be a naturally occurring constituent of the soil (ABB-ES 1997).

Chromium was detected in groundwater above the NYSDEC action levels, but not above the MCL of 100 micrograms per liter (mg/L). The presence of chromium was attributed to elevated sediment content due to the direct-push sample collection methodology. The results were therefore not considered representative of actual groundwater quality (ABB-ES 1997). Tables 1.2 and 1.3 summarize the direct-push soil and groundwater samples with exceedances of then current action levels at Site 11.

The SI found no detections of volatile or semivolatile organic hydrocarbons that would be indicative of petroleum-related contamination in soil or groundwater at Site 11. Chromium was detected exceeding NYSDEC action levels in groundwater, but was attributed to the sample



LEGEND

- DIRECT PUSH BORING
- FENCE
- WASTE OIL VESSEL
- BGS BELOW GROUND SURFACE
- APPROXIMATE GROUNDWATER FLOW DIRECTION (12/94)

NOTES:

1. SUBSURFACE SOIL RESULTS COMPARED TO BACKGROUND CONCENTRATIONS (ABB-ES 1997)
2. GROUNDWATER RESULTS COMPARED TO FEDERAL AND NEW YORK STATE DRINKING WATER STANDARDS

15 0 15
SCALE IN FEET

SOURCE: ABB-ES, 1997

PEER PROJ./003005-011 GAB/DF NFRAP/SITE11/FIG1.5	SITE 11 - 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

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

Analyte	Action Level (1)	Sample Location, Depth, and Concentration					
		DP-083		DP-084			DP-085
		8 - 10	29 – 30	8 - 10	15 – 17	29 – 30	8 – 10
Arsenic	0.20	NR	0.28	NR	0.22	0.24	NR
Chromium	0.84	1.3	NR	1.7	0.97	NR	0.85
Lead	0.65	0.78	0.65	1.3	0.75	NR	0.84

All concentrations are mg/kg
Source: ABB-ES 1997.
Notes: 1) These action levels were used during the 1994 SI, and were based on calculation of upper limit values of background concentrations.
NR Not Reported

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

Direct-Push Groundwater Sample Location	Depth (ft BGS)	Action Level (µg/L) (1)	Chromium Concentration (µg/L)
DP-085	33-35	50	53

Source: ABB-ES 1997.
Notes: 1) This Action Level was used during the 1994 SI, and was based on calculation of upper limit values of background concentrations.

methodology. Lead was detected exceeding NYSDEC action levels in soil, but did not exceed typical lead values found in eastern United States soils. Based upon these findings, the 1994 SI recommended no further action for Site 11.

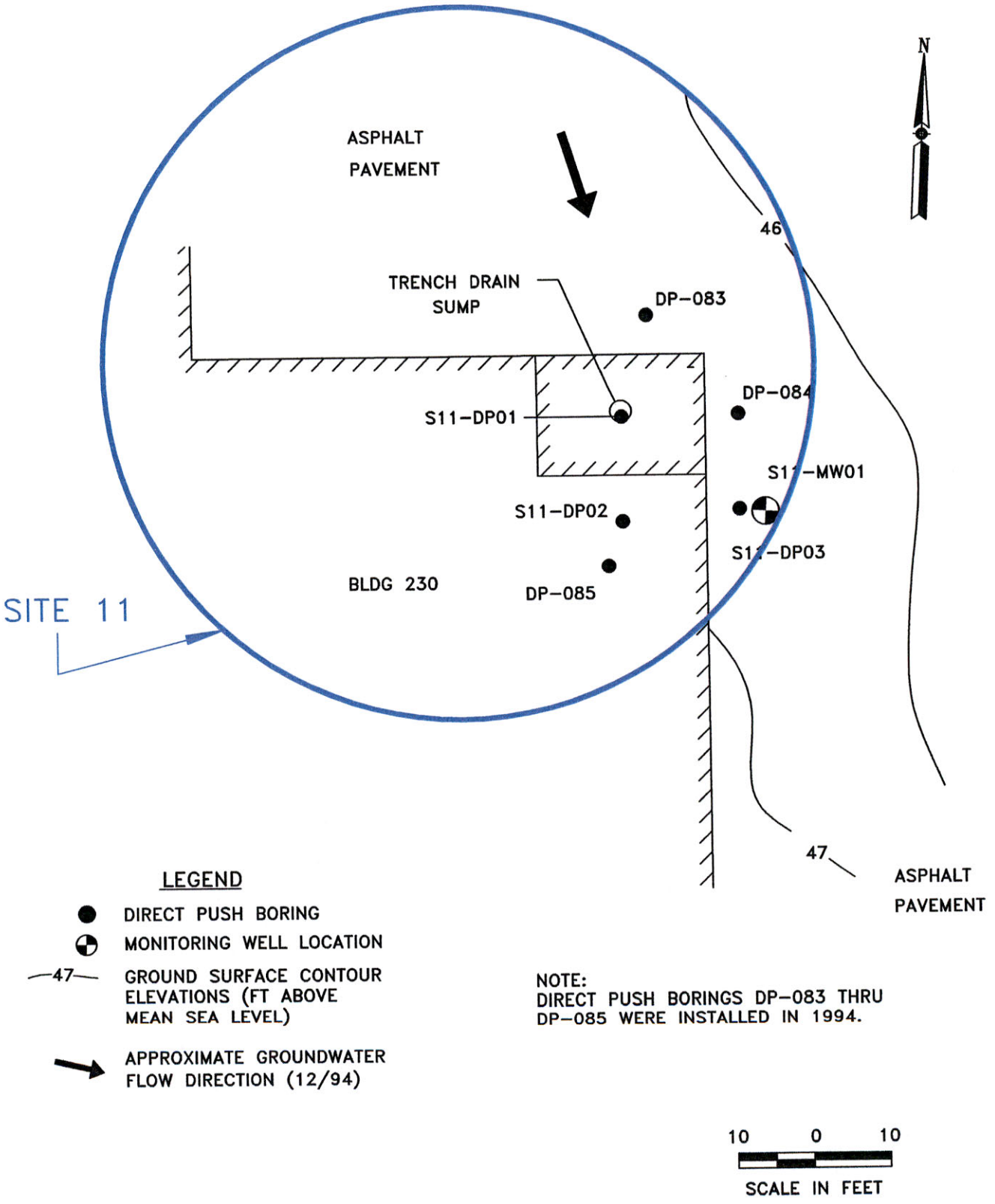
1.4.2 Remedial Investigation (2000-2001)

The most recent response action was the performance of an RI which was conducted by PEER in 2000 and 2001. The RI activities at Site 11 were intended to:

- Determine the presence or absence of arsenic, chromium, and lead contamination in subsurface soils;
- Define the extent of soil contamination by chromium, arsenic, and lead in subsurface soils, if confirmed;
- Determine the presence or absence of chromium contamination in groundwater;
- Define the nature and extent of chromium contamination in groundwater, if confirmed;
- Evaluate the suspected presence of PCBs in soil; and
- Assess shallow soil, subsurface soil, and groundwater for any additional contaminants of concern.

During the RI field investigation of Site 11, three direct-push borings were advanced and sampled for soil and groundwater. Shallow soil (0 to 2 ft BGS) was sampled, and one new monitoring well was installed and sampled. The sample locations are depicted on Figure 1.6. The RI samples collected at Site 11 are summarized on Table 1.4. Direct-push soil borings, hollow-stem auger (HSA) soil borings, and monitoring wells were installed as follows:

- Direct-push boring S11-DP01 was located inside an out-of-use room on the northeast side of Building 230, immediately downgradient (south-southeast) of the trench drain sump. The boring was advanced to a total depth (TD) of 19 ft BGS, through fill and extending into native soil.



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

PEER PROJ./003005-011 GAB/NFRAP/SITE11/FIG1.6	SITE 11 - 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

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

Date	Sample ID	Ft BGS	Type	BTEX	X-VOCs	VOCs	SVOC	Metals	PCBs	DRO	GRO	Soil	CH_4	Alkalinity	Chloride	SO_4
1/10/01	GAB-11-DP03-01	0 to 2	Soil Probe		X	X	X	X								
1/10/01	GAB-11-DP03-02	12 to 14	Soil Probe		X	X	X	X								
1/10/01	GAB-11-DP03-03	32 to 34	Soil Probe		X	X	X	X								
1/11/01	GAB-11-PW03-01	34 to 38	GW Screening		X	X	X									
1/19/01	GAB-11-DP02-01	0 to 2	Soil Probe		X	X	X	X								
1/19/01	GAB-11-DP02-02	12 to 14	Soil Probe		X	X	X	X								
1/19/01	GAB-11-DP02-03	32 to 36	Soil Probe		X	X	X	X								
1/19/01	GAB-11-DP02-21	0 to 2	Soil Probe		X	X	X	X								
1/19/01	GAB-11-PW02-01	34 to 38	GW Screening		X	X	X									
2/2/01	GAB-11-SB01-01	0 to 2	Soil Split Spoon			X	X	X								
2/2/01	GAB-11-SB01-02	8 to 10	Soil Split Spoon			X	X	X								
2/2/01	GAB-11-SB01-03	14 to 16	Soil Split Spoon			X	X	X								
2/2/01	GAB-11-SB01-04	32 to 34	Soil Split Spoon			X	X	X								
2/2/01	GAB-11-SB01-ST01	34 to 35.5	Shelby Tube									X				
2/3/01	GAB-11-DP01-01	1 to 3	Soil Split Spoon			X	X	X	X							
2/3/01	GAB-11-DP01-02	13 to 15	Soil Split Spoon			X	X	X	X	X	X					
2/3/01	GAB-11-DP01-03	17 to 19	Soil Split Spoon			X	X	X	X							
2/13/01	GAB-11-S11MW01-01	36.7 to 41.7	GW Monitoring	X		X	X	X		X	X		X	X	X	X
2/20/01	GAB-11-S11MW01-R1	31.7 to 36.7	GW Monitoring			X	X	X								
2/20/01	GAB-11-S11MW01-R1D	31.7 to 36.7	GW Monitoring			X	X	X								
5/29/01	GAB-11-S11MW01-02	26.4 to 41.4	GW Monitoring	X		X	X	X		X	X		X	X	X	X
5/29/01	GAB-11-S11MW01-R2	26.4 to 41.4	GW Monitoring			X	X	X								

Notes:
- BGS — Below Ground Surface
- BTEX — Benzene, Toluene, Ethylbenzene and Xylenes
- X-VOCs — Expedited off-site analysis for Volatile Organic Compounds
- VOCs — Volatile Organic Compounds
- SVOCs — Semi-volatile Organic Compounds
- PCBs — Polychlorinated Biphenyls
- DRO — Diesel Range Organics
- GRO — Gasoline Range Organics
- CH_4 — Methane
- SO_4 — Sulfate
- X — Analysis Performed

- Direct-push boring S11-DP02 was located inside the main bay of Building 230, approximately 20 ft downgradient of the trench drain sump (south). The boring was advanced to a TD of 32 ft BGS, extending to the top of the groundwater.
- Direct-push boring S11-DP03 was installed immediately outside of Building 230, approximately 25 ft downgradient of the trench drain sump (south-southeast). The boring was advanced to a TD of 42 ft BGS, extending into the top of the groundwater.
- Soil boring SB11-01 was installed using (HSA) drilling about 25 ft downgradient (south-southeast) of the trench drain sump, with a TD of 41.4 ft BGS, and was sampled for soil screening and confirmatory analysis.
- Monitoring well S11-MW01 was installed in SB11-01, with its screen straddling the top of the water table, from 26.4 to 41.4 ft BGS.

Soil samples were collected from direct-push borings S11-DP01 and S11-DP02 using a 4-ft Strata Probe™ for lithologic description and field photoionization detector (PID) screening. Sample collection commenced at the surface and proceeded continuously to completion of the borings. Field screening was performed using a calibrated PID. No significant organic vapors were detected during PID field screening. Analytical samples were collected from the shallow zone (four samples, including one duplicate); vadose zone (four samples); and the top of the saturated zone (two samples).

- Seven soil samples from S11-DP02 and S11-DP03, including a duplicate, were submitted for expedited turnaround screening analysis of volatile organic compounds at an off-site laboratory.
- Ten soil samples were collected from the three direct-push borings for confirmatory state-certified laboratory analysis of volatile and semivolatile organic compounds and Target Analyte List (TAL) metals.
- Three samples from soil boring S11-DP01 were analyzed for PCBs.
- Suspected petroleum-related soil contamination was encountered within the vadose zone at S11-DP01, and soil sample was analyzed for TPH-DRO/GRO.

Direct-push boring S11-DP01 was sampled continuously at 2-ft intervals by using a split-spoon driven with a tripod and drop hammer, starting at the top of the soil, after coring through the concrete floor. Since S11-DP01 was advanced by hand, the maximum depth reached was 19 ft BGS and the probe did not reach the zone of saturation. Samples from direct boring S11-DP01 were not submitted for screening analysis of volatile organic compounds.

Two direct-push groundwater samples were collected from S11-DP02 and S11-DP03, and submitted for expedited turnaround screening analysis for volatile organic compounds at an off-site laboratory. Confirmatory analysis of volatile and semivolatile organic compounds was performed at the state-certified off-site laboratory. Well boring S11-SB01 was advanced using HSA for installation of the new monitoring well, and was sampled at 2-ft intervals for description, screening, and analysis of soils. Three split-spoon soil samples were collected from the boring, and were analyzed at the off-site state certified laboratory for volatile and semivolatile organic compounds and TAL metals. The splitspoon soil samples were not submitted for expedited turnaround screening analysis. A Shelby tube sample was also collected at S11-SB01.

Monitoring well S11-MW01was installed in soil boring S11-SB01, and developed, purged, and sampled in Rounds 1 and 2 for:

- Volatile and semivolatile organic compounds,
- TAL metals, and
- Bioremediation monitoring parameters.

The Round 2 groundwater-monitoring sample was duplicated for volatile and semivolatile organics and TAL metals analyses. The bioremediation indicator parameters analyzed included:

- TPH-GRO/DRO,
- Benzene, toluene, ethylbenzene, and xylenes (BTEX),
- Methane,
- Alkalinity,

- Chloride, and
- Sulfate.

As required by the NYSDEC, 10% of the wells sampled during Round 1 were sampled twice, once each from the top and bottom of the well's screened intervals. Monitoring well S11-MW01 was selected for sampling from the top and bottom of the screened interval. A total of five groundwater samples were collected and analyzed at Site 11, as follows:

- GAB-S11MW01-01 was collected from the bottom of the screened interval during Round 1;
- GAB-S11MW01-R1 was collected from the top of the screened interval during Round 1;
- GAB-S11MW01-R1D was collected as a duplicate of the sample from the top of the screened interval during Round 1;
- GAB-S11MW01-02 was collected from the center of the screened interval during Round 2 and;
- GAB-S11MW01-R2 was collected as a duplicate of the sample from the center of the screened interval during Round 2;

The results of the RI soil investigation at Site 11 are presented in Section 2.4, and 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 11, including information on the physiography, geology, hydrogeology, surface water hydrology, soil, climatology, environmental media, the nature and extent of contamination, and receptors at the site.

2.1 PHYSIOGRAPHY

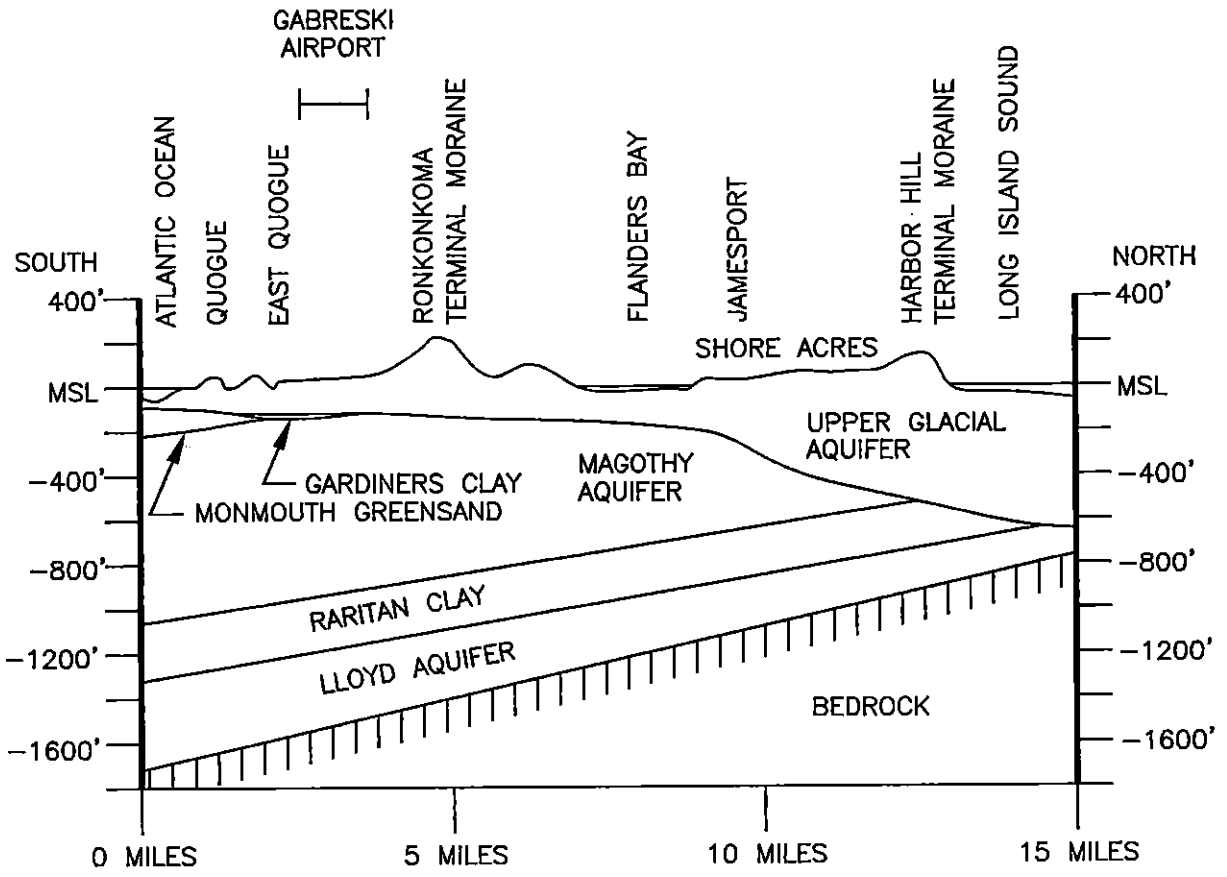
The base is located on the eastern end of Long Island. Long Island is included in the Atlantic Coastal Plain physiographic province. The island is characterized by glacial landforms related to the Wisconsin Glaciation. The island is located at the southern limit of glaciation, and exhibits a series of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

2.2 GEOLOGY

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

2.2.1 Upper Glacial Deposits

The upper Pleistocene glacial deposits are of greatest importance in regards to Site 11. These deposits form the soil surface across the base, makeup all of the subsurface soils of interest regarding Site 11, and form the matrix for the Upper Glacial Aquifer, described below in Section



SOURCE: ABB-ES 1997

SCALE: 1 IN = APPROXIMATELY 3 MILES

PEER PROJ./003005-011 GAB3005/NFRAP/SITE11/FIG2.1	REGIONAL STRATIGRAPHY AND HYDROGEOLOGY 106th RESCUE WING, NEW YORK ANG FRANCIS S. GABRESKI AIRPORT WESTHAMPTON BEACH, NEW YORK	FIGURE 2.1

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

2.3 SOIL CHARACTERISTICS

Descriptions of the soil associations and characteristics at Site 11 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 soils surrounding the site. The surface soils are well drained to excessively drained and moderately coarse to coarse, with low soil moisture content. The Upper Glacial sediments are well sorted, very porous, and highly permeable. These soils and sediments cause a high proportion of precipitation to infiltrate without significant runoff. The Upper Glacial unit is from 100 to 120 ft thick at the site.

The Gardiners Clay underlies the upper glacial unit in the vicinity of the Francis S. Gabreski Airport and the base. This unit is approximately 40 ft thick, and consists of clay, silt, and clayey and silty sand. Consequently, the Gardiners Clay has lower permeability than the Upper Glacial unit and the underlying Magothy formation, and forms an aquitard between these units. The Gardiners Clay was not encountered in 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 shallow 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 11. 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 RI at Site 11 are listed in Section 1.4. Figure 1.5 depicts the 1994 SI sampling locations, while Figure 1.6 depicts the 2000-2001 RI sampling locations. The findings of the soil investigation at Site 11 are discussed in this subsection.

2.4.1 Geologic Results

The RI soil investigation at Site 11 observed medium sands with some gravel and traces of silt, with traces of iron staining noted. Dark gray, oily-appearing stain, dark yellowish brown stain, dark brown stain, and woody fragments were noted (approximately 13 to 17 ft BGS at S11-DP01, S11-DP02, and S11-DP03). The stains at Site 11 had no distinct odor and were not associated with elevated PID readings. One direct-push boring, S11-DP01, was located inside Building 230. The boring was performed manually, using a tripod and drop hammer to drive standard 2-ft steel split spoons. Although this boring was advanced to only 19 ft, it reached native soil adjacent to the trench drain sump. The remaining borings were performed using direct-push and HSA drilling rigs.

At S11-DP01, dark yellowish-brown, slightly gravelly sandy fill was encountered to a depth of approximately 17 ft BGS. The fill material showed bands of oily-appearing dark gray stain from 13 to 15 ft BGS, associated with an indistinct odor, but with no associated elevated PID readings. The fill material also contained wooden fragments, possibly the remnants of cribbing, or a form. After native soil was reached, the soil color changed to very pale brown. Saturation was not reached.

At direct-push borings S11-DP02 and S11-DP03, similar dark yellowish-brown soil, also interpreted as fill material, was encountered to depths of 15 ft BGS and 17.5 ft BGS, respectively. Dark brown staining was noted at 13 to 15 ft BGS in S10-DP02, and dark gray staining was noted at 13.5 to 14.5 ft BGS in S11-DP03. Brown stains were noted at 8.7 and 10.7 ft BGS at S11-SB01, associated with a menthol-like odor, but with no elevated PID readings.

Perched saturation was noted at 8.6 to 9.6 ft BGS at S11-DP02. The top of the water table was encountered at 31 ft BGS at S11-SB01 and 33 ft BGS at S11-DP03. Groundwater elevations were consistent with the basewide groundwater elevations. No evidence of contamination was observed from groundwater screening and monitoring samples.

2.4.2 Soil Screening Samples

Direct-push soil-screening samples from S11-DP02 and S11-DP03 were submitted to the off-site screening laboratory for expedited turnaround screening analysis of volatile organic compounds. The soil samples were also screened during sample collection using the PID. The PID screening found no significant detection of photoionizable of organic vapors. The results of the direct-push soil screening sample analyses are summarized in Table 2.1. Volatile organic compounds detected in the soil screening samples included tetrachloroethylene (PCE) and toluene. PCE was detected in soil screening samples from S11-DP02 and S11-DP03 at concentrations up to 6 µg/kg and 48 µg/kg, respectively. The concentrations of tetrachloroethylene [perchloroethylene (PCE)] detected at S11-DP03 did not exceed NYSDEC action levels for unsaturated soil. PCE was not detected in the confirmatory soil samples. Toluene was detected at estimated values and was also detected by the confirmatory soil sample fixed-laboratory analysis, but also at estimated values. None of the estimated concentrations of toluene exceeded NYSDEC action levels.

2.4.3 Confirmatory Soil Samples

Confirmatory soil samples were collected from direct-push borings S11-DP01, S11-DP02, and S11-DP03, and well boring S11-SB01. The soil samples were analyzed for:

- volatile and semivolatile organic compounds;
- TPH-GRO/DRO (one sample only);
- PCBs (one direct push boring only); and
- TAL metals.

Table 2.1
2000 – 2001 Remedial Investigation
Soil Screening Samples 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]	DP02-01 (0-2 ft)-U	DP02-21 (0-2 ft)-U	DP02-02 (12-14 ft)-U	DP02-03 (32-34 ft)-S	DP03-01 (0-2 ft)-U	DP03-02 (12-14 ft)-U	DP03-03 (34-36 ft)-S
Volatile Organics (µg/kg)									
Toluene	15	1500	ND	ND	ND	ND	ND	8 J	2 J
Tetrachloroethylene	14	1400	4 J	6 J	ND	ND	22	48	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 32 to 34 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.

Analytical results for Site 11 confirmatory soil sample volatile and semivolatile organic compounds are summarized on Table 2.2. Acetone, bis(2-ethylhexyl)phthalate, 2-butanone, and methylene chloride were detected at low concentrations, but were considered laboratory contamination, since none of the detected concentrations exceeded 10-times the detected concentration (or detection limit) of the associate laboratory method blank samples as discussed in Appendix J of the Draft-Final RI Report (PEER 2002).

PCE, which had been detected in the soil screening samples, was not detected in the off-site laboratory analyses of the confirmatory soil samples, and was not confirmed as a contaminant of potential concern (COPC).

The polynuclear aromatic hydrocarbons (PAHs) benzo(a)anthracene and chrysene were detected exceeding NYSDEC action levels in the soil interval of 0 to 2 ft BGS from S11-DP03. The analytical results were reported as estimated values by the laboratory. Benzo(a)anthracene and chrysene were identified in the *Draft-Final RI Report* as COPCs (PEER 2003).

Table 2.3 summarizes the results of the TAL metals analysis for confirmatory soil samples at Site 11. Chromium was detected above the ULBC in subsurface soil samples from S11-DP01, S11-DP02, and S11-DP03. All of these samples were collected between 13 and 19 ft BGS, in probable fill material. The 2000-2001 RI determined that chromium can occur naturally in soils from the area at concentrations exceeding action levels. Therefore, chromium was excluded as a COPC. Lead exceeded the ULBC in the shallow soil sample from S11-DP03 and at S11-SB01 between 14 to 16 ft BGS, in probable fill soil. Lead was retained as a COPC. Figure 2.2 shows the sample locations and results of the confirmatory soil sampling at Site 11.

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

Parameter	Action Levels [b]		Sample Location, Depth, Type and Concentrations[a]						
	Saturated [c]	Unsaturated [d]	DP01-01 (1-3 ft) -U	DP01-02 (13-15 ft) -U	DP01-03 (17-19 ft) -S	DP02-01 (0-2 ft) -U	DP02-02 (12-14 ft) -U	DP02-21 (12-14 ft) -U	DP02-03 (32-36 ft) -S
Volatile Organic Compounds (µg/kg)									
Ethylbenzene	55	5500	ND	ND	ND	ND	ND	1 J	ND
Toluene	15	1500	1 J	1 J	ND	3 J	1 J	3 J	ND
Total Xylenes	12	1200	ND	ND	ND	2 J	1 J	5 J	1 J
Semivolatile Organic Compounds (µg/kg)									
Benzo(a)anthracene	330	330	ND	ND	ND	ND	ND	ND	ND
Benzo(b)fluoranthene	330	1100	ND	ND	ND	ND	ND	20 J	ND
Benzo(k)fluoranthene	330	1100	ND	ND	ND	7 J	ND	7 J	ND
Benzo(ghi)perylene	8000	50,000	ND	ND	ND	ND	ND	ND	ND
Benzo(a)pyrene	330	330	ND	ND	ND	13 J	ND	13 J	ND
Chrysene	330	400	18 J	ND	ND	ND	ND	ND	ND
Fluoranthene	19,000	50,000	23 J	ND	ND	ND	ND	ND	ND
Ideno(1,2,3-cd)pyrene	330	3200	ND	ND	ND	ND	ND	ND	ND
Phenanthrene	22,000	50,000	ND	ND	ND	ND	ND	ND	ND
Pyrene	6650	50,000	34 J	ND	ND	ND	ND	ND	ND
TPH-GRO (mg/kg)	--	--	NA	0.47 J	NA	NA	NA	NA	NA
TPH-DRO (mg/kg)	--	--	NA	ND	NA	NA	NA	NA	NA
PCBs [e] (µg/kg)	1000 (Surface)	10,000 (Subsurface)	ND	ND	ND	NA	NA	NA	NA

J Estimated value.
NA Not analyzed.
ND Not detected.
PCBs Polychlorinated biphenyls.
TPH-DRO Total petroleum hydrocarbons - diesel range organics.
TPH-GRO Total petroleum hydrocarbons - gasoline range organics.
-- No applicable Action Level.

Notes:

Shading and bolding indicate exceedance of Action Levels.

(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
(e) Recommended Cleanup Objectives for PCBs for Surface and Subsurface soils, NYSDEC, TAGM #4046.

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

Parameter	Action Levels [b]		Sample Location, Depth, Type and Concentrations[a]						
	Saturated [c]	Unsaturated [d]	DP03-01 (0-2 ft) -U	DP03-02 (12-14 ft) -U	DP03-03 (32-34 ft) -S	SB01-01 (0-2 ft) -U	SB01-02 (8-10 ft) -U	SB01-03 (14-16 ft) -U	SB01-04 (32-34 ft) -S
Volatile Organic Compounds (µg/kg)									
Ethylbenzene	55	5500	ND	ND	ND	ND	ND	ND	ND
Toluene	15	1500	ND	ND	ND	ND	ND	1 BJ	ND
Total Xylenes	12	1200	ND	ND	ND	ND	ND	ND	ND
Semivolatile Organic Compounds (µg/kg)									
Benzo(a)anthracene	330	330	420 J	ND	ND	ND	ND	ND	ND
Benzo(b)fluoranthene	330	1100	530 J	ND	ND	ND	ND	ND	ND
Benzo(k)fluoranthene	330	1100	280 J	ND	ND	ND	ND	ND	ND
Benzo(ghi)perylene	8000	50,000	180 J	ND	ND	ND	ND	ND	ND
Benzo(a)pyrene	330	330	310 J	ND	ND	ND	ND	ND	ND
Chrysene	330	400	480 J	ND	ND	ND	ND	ND	ND
Fluoranthene	19,000	50,000	740 J	ND	ND	ND	ND	ND	ND
Ideno(1,2,3-cd)pyrene	330	3200	170 J	ND	ND	ND	ND	ND	ND
Phenanthrene	22,000	50,000	410 J	ND	ND	ND	ND	ND	ND
Pyrene	6650	50,000	720 J	ND	ND	ND	ND	ND	ND
TPH-GRO (mg/kg)	--	--	NA	NA	NA	NA	NA	NA	NA
TPH-DRO (mg/kg)	--	--	NA	NA	NA	NA	NA	NA	NA
PCBs [e] (µg/kg)	1000 (Surface)	10,000 (Subsurface)	NA	NA	NA	NA	NA	NA	NA

B Analyte is also found in associated blank.
J Estimated value.
NA Not analyzed.
ND Not detected.
PCBs Polychlorinated biphenyls.
TPH-DRO organics. Total petroleum hydrocarbons - diesel range
TPH-GRO organics. Total petroleum hydrocarbons - gasoline range

-- No applicable Action Level.

Notes:

Shading and bolding indicate exceedance of Action Levels.

(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
(e) Recommended Cleanup Objectives for PCBs for Surface and Subsurface soils, NYSDEC, TAGM #4046.

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

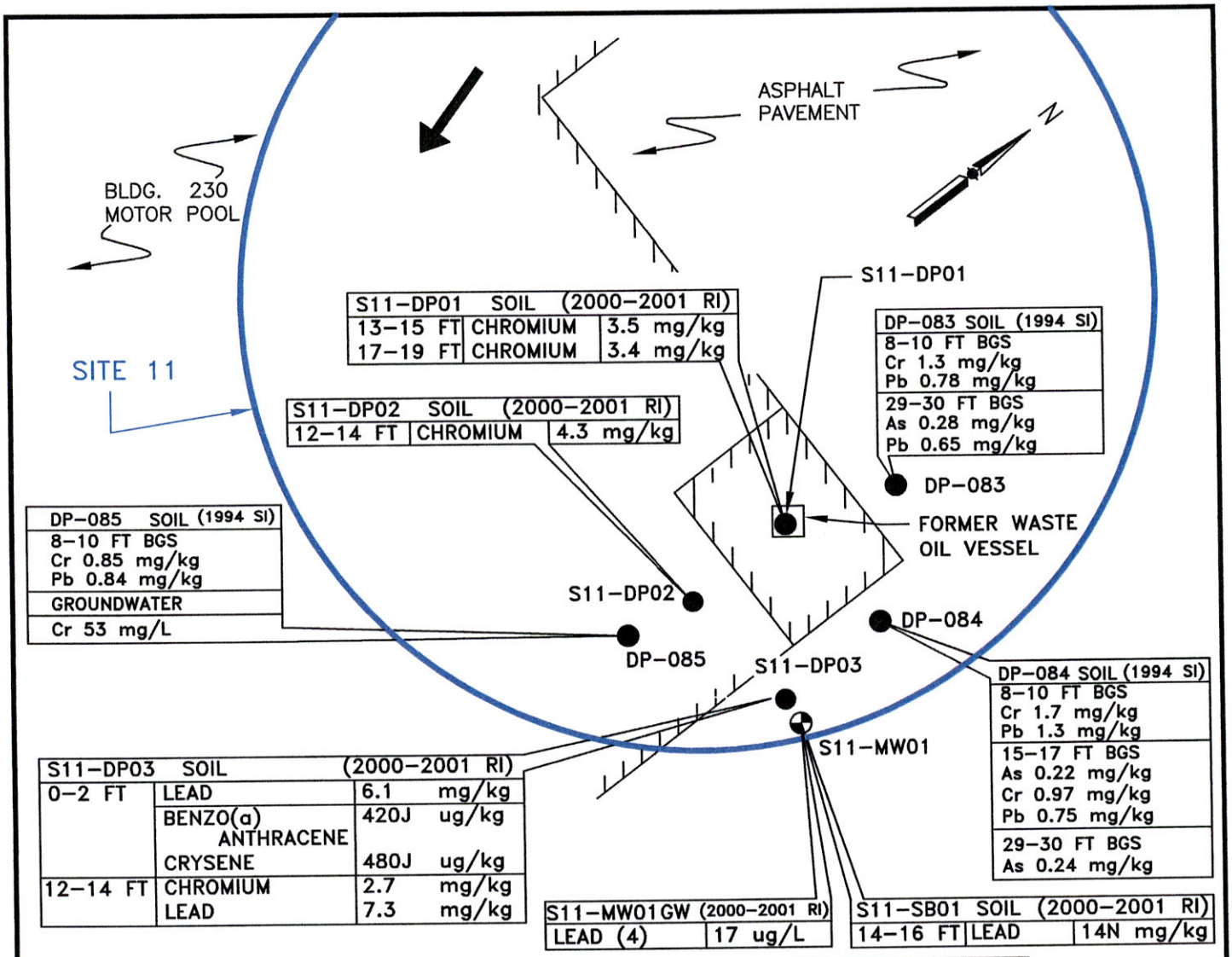
Parameter	Action Levels		Sample Location, Depth, and Concentration [a]						
	NYSDEC [b] RSCO	Background [c] or ULBC [d]	DP01-01 (1-3 ft)	DP01-02 (13-15 ft)	DP01-03 (17-19 ft)	DP02-01 (0-2 ft)	DP02-02 (12-14 ft)	DP02-21 (12-14 ft)	DP02-03 (32-36 ft)
Metals (mg/kg)									
Aluminum	SB	33,000	1600 E	1100 E	3000 E	2500	2400	2600	350
Barium	300 or SB	15 - 600	3.1	3.8	2.4	11	5.0	9.9	1.6
Calcium	SB	130 - 35,000	140	200	ND	12,000	650	10,000	ND
Chromium	10 or SB	6.1/0.84 [d]	2.3	**3.5**	**3.4**	5.5	**4.3**	4.8	ND
Copper	25 or SB	1 - 50	ND	2.3	ND	6.3	2.4	5.0	ND
Iron	2000 or SB	2000 - 550,000	1800 E	1300 E	2200 E	4500 E	2600 E	4400 E	630 E
Lead	SB [e]	4.4/2.7 [d, e]	ND	ND	ND	ND	ND	ND	ND
Magnesium	SB	100 - 5000	120	81	68	540	170	460	63
Manganese	SB	50 - 5000	15	11	6.8	47	19	47	3.6
Nickel	13 or SB	0.5 - 25	ND	ND	ND	ND	ND	ND	ND
Sodium	SB	6000 - 8000	ND	ND	ND	130	110	110	ND
Vanadium	150 or SB	1 - 300	3.3	2.2	3.7	5.8	4.9	5.7	2.5
Zinc	20 or SB	9 - 50	4.0	11	3.7	8.2	5.6	7.7	1.9

Notes:
E Estimated value or not reported due to the presence of interferences.
N Spike sample recovery is not within quality control limits.
NA Not analyzed.
ND Not detected.
SB Soil background.
Shading and bolding indicate exceedance of Action Levels.
(a) "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) New York State (NYS) Recommended Soil Cleanup Objectives, NYSDEC, and TAGM #4046.
(c) Eastern USA Background, NYSDEC, TAGM #4046.
(d) Upper limits of background concentration for metals in soils; see the *RI Report* Section 6.0 (PEER 2004).
(e) Background levels for lead vary widely. Average levels in undeveloped, rural areas may range from 4 to 61 ppm (mg/kg). Average background levels in metropolitan or suburban areas or near highways are much higher and typically range from 200 to 500 ppm (mg/kg) (TAGM 4046).

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

Parameter	Action Levels		Sample Location, Depth, and Concentration [a]						
	NYSDEC [b] RSCO	Background [c] or ULBC [d]	DP03-01 (0-2 ft)	DP03-02 (12-14 ft)	DP03-03 (32-34 ft)	SB01-01 (0-2 ft)	SB01-02 (8-10 ft)	SB01-03 (14-16 ft)	SB01-04 (32-34 ft)
Metals (mg/kg)									
Aluminum	SB	33,000	1800	2000	270	1500 E	4300 E	3400 E	250 E
Barium	300 or SB	15 - 600	5.0	6.0	ND	3.7 N	7.4 N	7.8 N	ND N
Calcium	SB	130 - 35,000	950	230	ND	250 N	190 N	320 N	ND N
Chromium	10 or SB	6.1/0.84 [d]	2.4	2.7	ND	2.9 N	5.7 N	5.9 N	ND N
Copper	25 or SB	1 - 50	3.3	2.9	ND	3.1 N	2.5 N	4.6 N	ND N
Iron	2000 or SB	2000 - 550,000	1800	1700	380	2300 E	3800 E	4100 E	490 E
Lead	SB [e]	4.4/2.7 [d, e]	6.1	7.3	ND	ND N	ND N	14 N	ND N
Magnesium	SB	100 - 5000	170	105	44	310 NE	210 N	920 E	53 NE
Manganese	SB	50 - 5000	22	24	2.4	22 N	14 N	34 N	5.4 N
Nickel	13 or SB	0.5 - 25	ND	ND	ND	ND	ND	4.0	ND
Sodium	SB	6000 - 8000	ND	ND	ND	ND	130	ND	ND
Vanadium	150 or SB	1 - 300	3.7	3.7	1.4	5.2	7.3	8.6	1.4
Zinc	20 or SB	9 - 50	6.2	91	1.8	6.1 NE	60 NE	110 NE	2.8 NE

Notes:
E Estimated value or not reported due to the presence of interferences.
N Spike sample recovery is not within quality control limits.
NA Not analyzed.
ND Not detected.
SB Soil background.
Shading and bolding indicate exceedance of Action Levels.
(a) "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) New York State (NYS) Recommended Soil Cleanup Objectives, NYSDEC, and TAGM #4046.
(c) Eastern USA Background, NYSDEC, TAGM #4046.
(d) Upper limits of background concentration for metals in soils; see the *RI Report* Section 6.0 (PEER 2004).
(e) Background levels for lead vary widely. Average levels in undeveloped, rural areas may range from 4 to 61 ppm (mg/kg). Average background levels in metropolitan or suburban areas or near highways are much higher and typically range from 200 to 500 ppm (mg/kg) (TAGM 4046).



ACTION LEVELS					
ANALYTE	SURFACE SOIL (1) (mg/kg)	SUBSURFACE SOIL (1) (mg/kg)	SOIL (2) (UNSATURATED) (ug/kg)	SOIL (2) (SATURATED) (ug/kg)	GW (3) (ug/L)
CHROMIUM	6.1	0.84	–	–	50
LEAD	4.4	2.7	–	–	15
BENZO(a)ANTHRACENE	–	–	330	330	–
CRYSENE	–	–	400	330	–

LEGEND

- ● DIRECT PUSH BORING
- ◓ MONITORING WELL
- GW GROUNDWATER
- J ESTIMATED CONCENTRATION BELOW DETECTION LIMIT
- → APPROXIMATE GROUNDWATER FLOW DIRECTION (5/01)

NOTES:
(1) NYSDEC, TOGs 1991
(2) NYSDEC, TAGM #4046
(3) NEW YORK STATE AND FEDERAL DRINKING WATER STANDARDS
(4) LEAD IS UNCONFIRMED
(5) SUBSURFACE SOIL RESULTS COMPARED TO BACKGROUND CONCENTRATIONS (ABB-ES 1997)

10 0 10
GRAPHIC SCALE

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

PEER
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GAB/NFRAP/SITE11/FIG2.2

SITE 11 – 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

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 11, some run off occurs during precipitation events due to the presence of the asphalt paving. However, the surrounding lawn areas allow the majority of run off to infiltrate rapidly, while the remainder is carried off by the storm sewer system. Consequently, there is no surface water or sediment in the vicinity of Site 11. Therefore, no surface water or sediment sampling was performed in association with Site 11.

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 11. 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.

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 x 10^{-2})	200 (2.9 x 10^{-1})
Gardiners Clay	Clay and silt	40	Aquitard	Aquitard
Magothy Formations	Sand, clayey sand	930	380 (1.8 x 10^{-2})	300 (4.5 x 10^{-1})
Raritan Clay	Clay and silt	200	Aquitard	Aquitard
Lloyd Sand	Sand and gravel	400	300 (1.4 x 10^{-2})	75 (1.1 x 10^{-1})
Bedrock	Granitic gneiss	--	Aquiclude	Aquiclude

Source: Dames & Moore 1986.

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 permeability over short distances. Hydraulic

conductivity of the glacial deposits was estimated to be about 2000 gpd/ft^2 (9.4 x 10^{-2} cm/s) (ABB-ES 1997), and transmissivity is approximately 200 gpd/ft (2.9 x 10^{-1} cm^2/s) (Dames & Moore 1987).

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

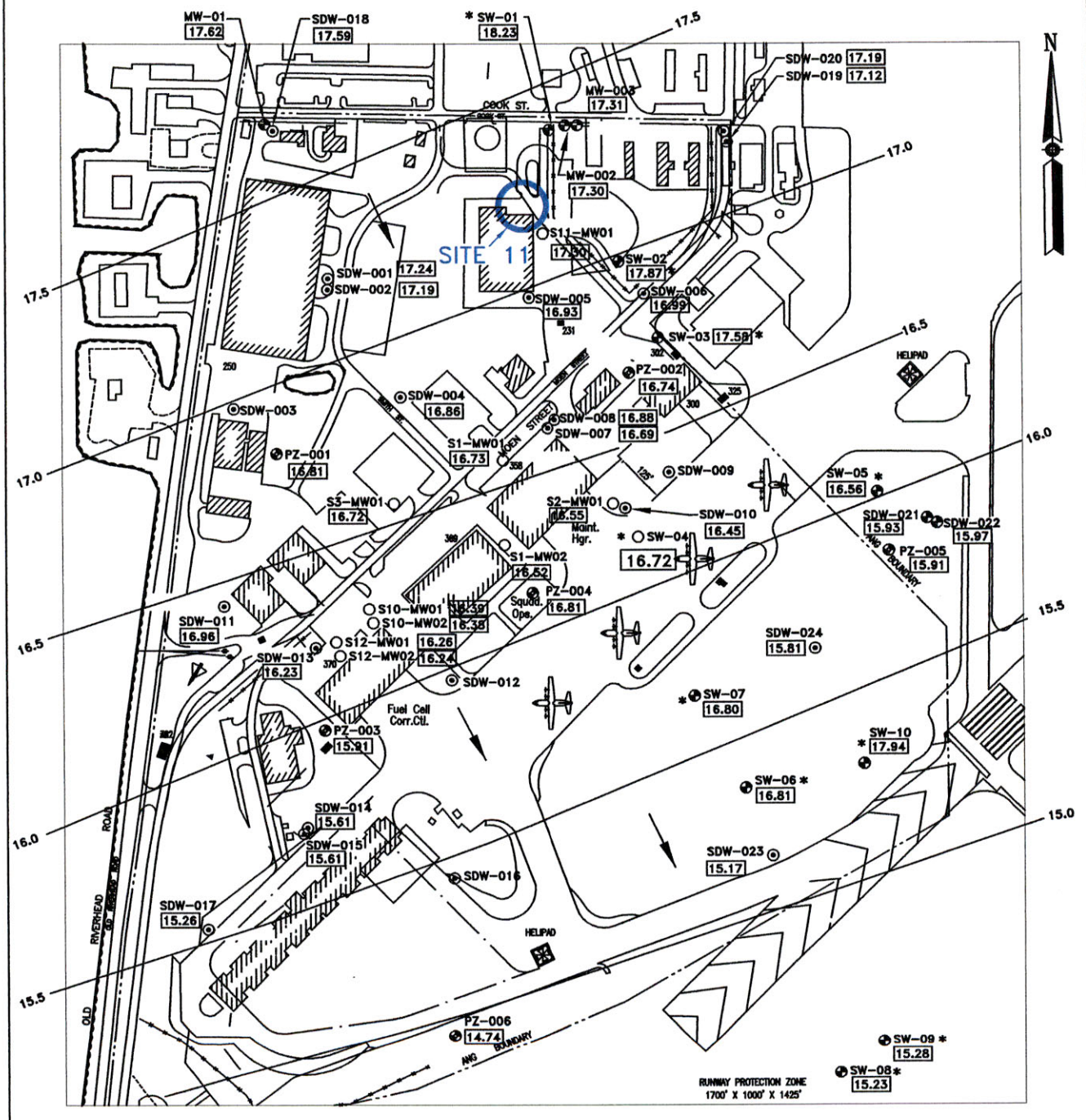
2.6.2 Gardiners Clay

This clay is poorly permeable and acts as an aquitard between the Upper Glacial Aquifer and the underlying Magothy Aquifer. The Gardiners Clay also constitutes a confining layer for the Magothy aquifer, which has a potentiometric surface above that of the Upper Glacial Aquifer.

At the base, the beds of clay and sand within the Gardiners clay are an effective barrier to the movement of groundwater to and from the lower aquifers. The combination of low permeability, with the generally upward movement of water within the Magothy aquifer tends to prevent downward migration of contamination from the Upper Glacial Aquifer into the lower aquifers (Dames & Moore 1986).

2.7 GROUNDWATER CONTAMINATION INVESTIGATION RESULTS

During the SI completed in 1994, chromium was detected at a concentration below the MCL in one groundwater-screening sample collected from Site 11. The SI results were summarized



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

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GAB3005/NFRAP/SITE11/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

above in Section 1.4.1. Chromium was subsequently determined to be naturally occurring during the RI, and is not considered a COPC.

The RI groundwater investigation included collection of both screening and confirmatory groundwater samples, as discussed below in Sections 2.7.1 and 2.7.2. Screening and confirmatory samples were collected from direct-push borings S11-DP02 and S11-DP03, and two rounds of confirmatory groundwater samples were collected from newly installed monitoring well S11-MW01.

2.7.1 Groundwater Screening Samples

During direct-push sampling, two groundwater-screening samples were collected from direct-push borings S11-DP02 and S11-DP03, and were submitted for expedited analysis of volatile organic compounds by an off-site laboratory. No volatile organic compounds were detected in either sample.

2.7.2 Direct-Push Confirmatory Groundwater Samples

Direct-push groundwater confirmatory samples were collected from borings S11-DP02 and S11-DP03 and submitted for confirmatory analysis of volatile and semivolatile organic compounds. Direct-push confirmatory sample results are summarized in Table 2.5. 1,2-Dichlorobenzene (1,2-DCB) was detected in the direct-push confirmatory groundwater sample from S11-DP02 at an estimated value of 5 J µg/L. This concentration was above the NYSDEC Action Level, but below the MCL. The detection of 1,2-DCB was not confirmed by the groundwater monitoring samples collected at Site 11, and 1,2-DCB is not considered a COPC.

Table 2.5
2000 – 2001 Remedial Investigation
Direct-Push Groundwater Confirmatory Volatile and Semivolatile Organics Analyses
New York Air National Guard
Westhampton Beach, New York

Parameter	Action Levels		Sample Location, Depth and Concentration[a]	
	NYS [b]	MCL [c]	PW02-01 (34-38 ft)	PW03-01 (34-38 ft)
Volatile Organic Compounds (µg/L)				
Carbon Disulfide	50	--	0.2 J	ND
All Remaining Analytes	--	--	ND	ND
TPH-GRO (µg/L)	--	--	NA	NA
TPH-DRO (mg/L)	--	--	NA	NA
Semivolatile Organic Compounds (µg/L)				
1,2-Dichlorobenzene	4.7	600	**5 J**	ND
1,3-Dichlorobenzene	5	600	2 J	ND
1,4-Dichlorobenzene	5	75	2 J	ND

Notes:

Shading and bolding indicate exceedance of Action Levels.

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) New York State (NYS), Class GA Groundwater; NYSDEC TAGM #4046.
(c) Maximum Contaminant Level (MCL), United States Environmental Protection Agency.

2.7.3 Groundwater Monitoring Samples

A total of five groundwater monitoring samples were collected from newly installed monitoring well S11-MW01. Samples were collected from the top and bottom of the screened interval with a duplicate during Round 1, and from the center of the screened interval. An additional duplicate sample was collected during Round 2. The samples were analyzed for:

- volatile and semivolatile organic compounds; and
- TAL metals.

Additionally, Round 1 and 2 samples were collected from S11-MW01 for analysis of bioremediation indicator parameters, including:

- BTEX
- TPH-DRO/GRO;
- Methane;
- Alkalinity;
- Chloride; and
- Sulfate

Tables 2.6 and 2.7 summarize the volatile and semivolatile organic compounds and metals results for the groundwater monitoring samples at Site 11, respectively. No volatile or semivolatile organic compounds were detected above the NYSDEC Action Levels in groundwater monitoring samples collected from Site 11. Bis(2-ethylhexyl)phthalate was detected, but was considered laboratory-introduced contamination, as discussed in the *Draft-Final RI Report*, Appendix J (PEER 2002).

Lead was detected above the MCL in the groundwater monitoring sample from the bottom of the screened interval (GAB-S11MW01-01) at S11-MW01, at a concentration of 17 µg/L during

Table 2.6
2000 – 2001 Remedial Investigation
Rounds 1 and 2 Analytical Results
Groundwater Monitoring - Volatile and Semivolatile Organics
106th Rescue Wing
New York Air National Guard
Westhampton Beach, New York

Parameter	Action Levels		Sample location and Concentration [a]				
	NYS [b]	MCL [c]	GAB-S11MW01-01	GAB-S11MW01-R1	GAB-S11MW01-R1D	GAB-S11MW01-02	GAB-S11MW01-R2
BTEX (µg/L)							
All Analytes	--	--	ND	NA	NA	ND	NA
Volatile Organic Compounds (µg/L)							
Carbon Disulfide	50	--	2	0.2 J	0.4 J	ND	ND
Toluene	5	1000	ND	0.7 BJ	0.7 BJ	ND	ND
Semivolatile Organic Compounds (µg/L)							
All Analytes	--	--	ND	ND	ND	ND	ND
TPH-GRO (µg/L)	--	--	ND	NA	NA	ND	NA
TPH-DRO (mg/L)	--	--	0.73	NA	NA	0.21 J	NA

Notes:

BTEX Benzene, toluene, ethylbenzene, and xylenes.
B Analyte is also found in the associated blank.
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) Samples were collected as follows:
- GAB-S11MW01-01-bottom of the screened interval, Round 1.
- GAB-S11MW01-R1-top of the screened interval, Round 1.
- GAB-S11MW01-R1D-duplicate from the top of the screened interval, Round 1.
- GAB-S11MW01-02-Center of the screened interval, Round 2.
- GAB-S11MW01-R2-Center of the screened interval, Round 2.

(b) New York State (NYS), Class GA Groundwater; NYSDEC TAGM #4046.
(c) Maximum Contaminant Level (MCL), United States Environmental Protection Agency.

Table 2.7
2000 – 2001 Remedial Investigation
Rounds 1 and 2 Analytical Results
Groundwater Monitoring - TAL Metals
106th Rescue Wing
New York Air National Guard
Westhampton Beach, New York

Parameter	Action Levels		Sample Concentration and Location [a]				
	NYS [b]	MCL [c]	GAB-S11MW01-01	GAB-S11MW01-R1	GAB-S1MW01-R1D	GAB-S11MW01-02	GAB-S11MW01-R2
Metals (µg/L)							
Aluminum	--	--	13,000	770	980	2100	1300
Arsenic	25	50 [d]	13	ND	ND	ND	ND
Barium	--	--	60	30	32	23 E	21 E
Cadmium	10	5.0	ND	ND	ND	ND	ND
Calcium	--	--	22,000	22,000	22,000	19,000	18,000
Chromium	50	100	22	2.8	3.8	4.4	3.6
Cobalt	--	--	6.6	ND	ND	ND	ND
Copper	--	1300 [e]	15	ND	ND	ND	ND
Iron	--	--	14,000	700	880	1900 E	1200 E
Lead	25	15 [e]	17	ND	ND	ND	ND
Magnesium	--	--	5800	4400	4500	3400	3300
Manganese	--	--	100	8.9	10	14	9.4
Nickel	--	--	10	ND	ND	ND	ND
Potassium	--	--	3300	1300	1400	1300	1500
Sodium	--	--	40,000 N	38,000 N	40,000	20,000	20,000
Thallium	--	--	ND	ND	ND	ND	ND
Vanadium	--	--	29	ND	ND	6.2	ND
Zinc	--	--	140	41	43	ND	64

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.

(a) Samples were collected as follows:
- GAB-S11MW01-01-bottom of the screened interval, Round 1.
- GAB-S11MW01-R1-top of the screened interval, Round 1.
- GAB-S11MW01-R1D-duplicate from the top of the screened interval, Round 1.
- GAB-S11MW01-02-Center of the screened interval, Round 2.
- GAB-S11MW01-R2-Center of the screened interval, Round 2.

(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.

Shading and bold indicate exceedance of action level.

Round 1, but did not exceed the NYSDEC action level. Lead was not detected in any of four other groundwater monitoring samples collected from S11-MW01, including the Round 1 from the top of the screened interval sample, the Round 1 duplicate sample from the top of the screened interval, the Round 2 sample, or the Round 2 duplicate sample. Since the Round 1 lead detection was unconfirmed, lead is not considered a COPC in groundwater at Site 11.

No BTEX compounds or TPH-GRO was detected in the samples from S11MW01 during either round. TPH-DRO was detected at 0.73 mg/L in Round 1, and at 0.21 J (estimated value) in Round 2. There are no NYSDEC action levels for TPH-GRO/DRO.

2.8 CLIMATE

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

2.9 AIR

Air sampling was not conducted at Site 11. The contaminants detected at Site 11 are non-volatile and would not be of concern since the majority of this site is covered in lawn and asphalt.

2.10 RECEPTORS

Site 11 is located within the boundaries of the 106th RQW base, a secured government installation. The base is surrounded by the Francis S. Gabreski Airport, which is also a secure facility. The site surface is 100% paved with asphalt and concrete. 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 11. Exposure to off-site receptors via surface water runoff is considered highly unlikely due to the soil characteristics at the site. The soils at the base are highly porous and permeable, and

precipitation rapidly infiltrates to the subsurface. Little to no runoff occurs, and has no potential to reach off-site receptors.

Consequently, the only exposure likely to occur in connection with Site 11 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 11 and 2,000 ft east of the airport. Potential mechanisms for transport of contaminants from the site include surface water run off.

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 11 is Aspatuck Creek, located approximately 1,900 ft south of Site 11. 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. Additionally, Site 11 is 100 % paved with asphalt and concrete. This effectively eliminates 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 11, exposure of endangered species to contaminants from the site is not expected.

3.0 BASELINE RISK ASSESSMENT

As part of the RI, a baseline risk assessment was conducted for Site 11 in accordance with guidelines in the EPA Risk Assessment Guidance (RAGs) document (EPA 1989), except for lead detected in site soils. The COPCs evaluated included lead, and the PAHs benzo(a)anthracene and chrysene. Risks associated with lead in shallow soil were evaluated using the EPA Technical Review Workgroup (TRW) Adult Lead Methodology (ALM) (EPA 1999), as presented below in Section 3.1. PAHs were evaluated according to standard risk assessment procedures (EPA 1989), as presented below in Section 3.2.

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

Lead, which was identified as a COPC at Site 11, is classified as an inorganic metal. 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 shallow soils especially those containing large quantities of organic materials (EPA 2001). Consequently, metals have a low potential for mobility in soils. In groundwater, metals migrate primarily by way of advection. Metals in shallow soils may be transported in surface water runoff during rainfall events due to erosion and transportation of sediments.

3.1 EVALUATION OF LEAD IN SHALLOW SOIL

The TRW ALM was used to evaluate potential risks to human health posed by lead in shallow soils at Site 11. The decision to use the TRW ALM was based on the following factors:

- The methodology is the most current available and is recognized by the EPA.
- The approach provides a scientifically defensible approach for assessing adult lead risks associated with site-specific, non-residential exposure scenarios.
- The TRW ALM uses a simplified representation of lead biokinetics to predict blood lead concentrations in fetuses carried by women who have relatively steady patterns of site exposure to lead-contaminated soil, since they would be the highest risk population.
- The approach utilizes conservative assumptions that are applicable to circumstances in effect (non-residential use), and expected to remain in effect per the Base Master Plan (GRW Engineers, Inc., 1995), at the base and airport.
- There are no current residential facilities on the base and, according to the Base Master Plan (GRW Engineers, Inc., 1995), there are no plans for any part of the base to ever be used for residential purposes (Lt Col Jerry Webb, Base EM, 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 1994).

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

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

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 2001) 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 11 (6.1 mg/kg). The results of the calculation are presented in Table 3.2. Figure 3.1 presents the EPA TRW ALM spreadsheet used in the calculation for lead in shallow soil at Site 11. In order to obtain a reasonably conservative risk

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

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

Source: EPA 1996.
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
6.1	2.0	6.1	10 µg/L	1.1 %

Notes:

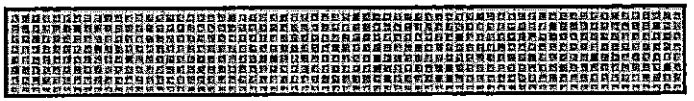
PbS	Highest detected lead concentration in shallow soils in µg/g, which is equivalent to mg/kg.
$PbB_{adult, central}$	Central estimate of blood lead concentrations (µg/dL) in adults (i.e., women of child-bearing age) that have site exposure to soil lead at concentrations, PbS.
$PbB_{fetal, 0.95}$	Central 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.

estimate, the value assigned to the parameter of $GSD_{i,adult}$ was 2.1, representing a homogeneous population, and the value assigned to $PbB_{adult,0}$ was 2.0 µg/dL, representing the middle portion of the range. The calculated probability P that $PbB_{fetal,0.95}$ will exceed the PbB_t at Site 11 is 1.1%. Probabilities of 5% or less are considered acceptable levels of risk.

3.2 BASELINE RISK ASSESSMENT FOR PAHs IN SHALLOW 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 11 Soil lead concentration	ug/g or ppm	6.1	6.1	6.1	6.1
$R_{fetal/maternal}$	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	2.0	2.0	2.0	2.0
$PbB_{fetal,0.95}$			95th percentile PbB among fetuses of adult workers	ug/dL	4.8	6.1	4.8	6.1
PbB_t			Target PbB level of concern (e.g., 10 ug/dL)	ug/dL	10.0	10.0	10.0	10.0
$P(PbB_{fetal} > PbB_t)$			Probability that fetal PbB > PbB_t, assuming lognormal distribution	%	0.2%	1.1%	0.2%	1.1%

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

3.2.1.1 Exposure Settings

This section describes the physical characteristics of Site 11. Additional information concerning the physical characteristics of the base and Site 11 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 11 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 11 is a former trench drain sump located beneath the northeast corner of Building 230 in the northern portion of the base. Groundwater at the site exists at approximately 32 ft BGS, and flows toward the southeast. The COPCs benzo(a)anthracene and chrysene were detected in shallow soils at the site. Risks associated with lead in soil were previously assessed using the TRW ALM in Section 3.1, which concluded that lead risk was acceptable at Site 11.

Potential receptors to the contaminated shallow soils at Site 11 include base personnel, construction personnel, and site visitors. Surface water runoff from the site may potentially contain soil particles that have been impacted due to sorption of metals or PAHs. Runoff from the base discharges into Aspatuck Creek, which is located approximately 1,900 ft southeast of the site, and may be potentially impacted by contaminated runoff from the site.

Groundwater beneath Site 11 was not adversely impacted by lead as of the 2000-2001 RI. PAHs in shallow soil at the site are not expected to impact site groundwater due to their very low potential for mobility.

3.2.1.2 Identification of Exposure Pathways

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

Exposure pathways are identified based on consideration of the sources, types, and locations of contaminants at Site 11, in this case, lead and PAHs in shallow 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 11 include groundwater that contains concentrations of lead, and shallow soil which contains concentrations of PAHs. The lead concentrations detected in site shallow soils were previously assessed using the TRW ALM in Section 3.1. Potential on-site receptors were previously identified as base personnel, construction personnel and site visitors that might be exposed to impacted shallow soil. Potential off-site receptors were previously identified as area residents that might be exposed to surface water impact 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. The potential for ingestion or direct contact with impacted shallow soils, or inhalation of fugitive dust from the site is very low unless excavation activities occur at the site. Building 230 is scheduled for potential construction activities in the future, and the former trench drain sump is planned for removal. During construction activities, there is some potential for exposure of on-site receptors to contaminated soil, such as construction workers. 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, or dermal contact with, impacted surface water due to runoff from the base. Surface water runoff from the site may potentially contain soil particles that have been impacted due to sorption of lead or PAHs. However, infiltration rates at the base are relatively high in unpaved areas, and little surface water leaves the base as runoff. Further, Site 11 is 100 % paved with asphalt and concrete, which effectively eliminates entrainment of impacted shallow soil in surface water runoff. There is some potential for exposure to impacted surface water runoff to occur if impacted soil is exposed during construction activities. If excavation activities occur at the site in the future, then exposed shallow soils may have a higher potential for reaching downgradient surface water (Aspatuck Creek) than otherwise during rainfall events. However, it is not likely that the creek would be impacted by sediments from the site due to the distances involved (approximately 1,800 ft) and the concentrations of contaminants. Additionally, adequate protection from surface runoff would be provided by following routine good work practices as required for any on-base construction activity by the Base Master Plan (GRW Engineers, Inc., 1995). Therefore, no potentially complete exposure routes are identified for surface water to impact off-site receptors.

There was an unconfirmed detection of lead in groundwater during the 2000 – 2001 RI. Groundwater at the site is not believed to be impacted by elevated concentrations of lead. However, as a precaution the exposure pathway for groundwater at Site 11 is evaluated as follows. Hydraulic conductivities are relatively high at the base, and the extent to which possibly contaminated groundwater at the site may impact downgradient groundwater is not known. However, the unconfirmed concentration of lead at the site exceeds action levels by less than an order of magnitude, and downgradient concentrations of lead would likely be significantly reduced through diffusion. There are no well fields hydraulically downgradient of the site, and surface water is not expected to be impacted by contaminated groundwater (groundwater at the site exists at approximately 32 ft BGS). Due to the relatively low concentration of lead at the site, the fact that it is an unconfirmed detection, and since no well fields are downgradient of the site, it is not likely that exposure to contaminated groundwater would occur. Therefore, there are no potentially complete exposure routes identified for groundwater to impact off-site receptors.

3.2.2 Future Use Risk

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

3.3 ECOLOGICAL ASSESSMENT

The ecological assessment characterized the risks to the environment posed by the COPCs that were identified at Site 11. Contaminants were detected in shallow 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 shallow soils. Accordingly, potential receptors and potential exposure pathways may include:

- plant species existing at the site that may be exposed to contamination in shallow soils;

- animal species that may pass through the site and be exposed to contamination in shallow soils through direct contact with shallow soils;
- animal species that may pass through the site and be exposed to contamination through ingestion of plant or animal species residing in site shallow 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 11. 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 shallow 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 11. 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 1,900 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 11 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 11 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 SARA; and to the extent practicable, the NCP.

According to the June 1995 U.S. Air Force NFRAP Guide, a Category III NFRAP decision is appropriate for a geographically contiguous area or parcel of real property where environmental evidence demonstrates that hazardous substances or petroleum products or their derivatives have been stored, released, or disposed of, but are present in quantities that require no response action to protect human health and the environment. Based on the results of the RI conducted at Site 11, these criteria have been met.

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APPENDIX A

REFERENCES

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