ENVIRONMENTAL RESTORATION PROGRAM

FINAL
NO FURTHER RESPONSE ACTION PLANNED
DECISION DOCUMENT

SITE 5 – SOUTHWEST STORM DRAINAGE DITCH

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

MARCH 2004

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WESTHAMPTON BEACH, NEW YORK

MARCH 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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ABB-ES	ABB–Environmental Services, Inc.
ALM	Adult Lead Methodology
ANG	Air National Guard
BGS	Below Ground Surface
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
COPC	Contaminant of Potential Concern
CRP	Community Relations Plan
CSF	Cancer Slope Factor
DD	Decision Document
EPA	Environmental Protection Agency
EPC	Exposure Point Concentration
ERP	Environmental Restoration Program
GM	Geometric Mean
GSD	Geometric Standard Deviation
HI	Hazard Index (non-cancer effects)
HMTC	Hazardous Materials Technical Center
HSA	hollow-stem auger
IRP	Installation Restoration Program
LIRR	Long Island Railroad
LOEAL	Lowest Observed Adverse Effect Level
MCL	Maximum Contaminant Level
NCP	National Oil and Hazardous Substances Pollution Contingency Plan
NEPA	National Environmental Policy Act
NFRAP	No Further Response Action Planned
NOAEL	No Observed Adverse Effect Level
NYSDEC	New York State Department of Environmental Conservation
106th RQW	106th Rescue Wing
PAHs	Polynuclear Aromatic Hydrocarbons
PEER	PEER Consultants, P.C.
POL	Petroleum, Oils, and Lubricants
RAG	Risk Assessment Guidance
RBRG	Risk-Based Remediation Goal
RfD	reference dose
RI	Remedial Investigation
SARA	Superfund Amendments and Reauthorization Act of 1986
SI	Site Investigation
S&W	Stone & Webster Environmental and Technology Services
TAGM	Technical Assistance Guidance Memorandum
TCE	Trichloroethylene
TPH	Total Petroleum Hydrocarbons
TRW	Technical Review Workgroup
ULBC	Upper Limit of Background Concentrations

DECLARATION

Site Name and Location:

Environmental Restoration Program
Site 5 – Southwest Storm Drainage Ditch
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 5 (Southwest Storm Drainage Ditch) 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), a 1998 initial Remedial Investigation (RI), and an additional Remedial Investigation (RI) conducted from 2000 through 2001 under the Environmental Restoration Program (ERP).

Description of the Selected Remedy:

Site 5 has been selected for No Further Response Action Planned (NFRAP). This selection was based on the cumulative results of three separate sampling events over a seven-year period. The data indicate that the concentrations of most of the initially identified contaminants of potential concern (COPCs) have decreased over time. COPCs that were initially detected exceeding action levels have decreased to below detection levels in surface soil and sediment. In addition, a baseline risk assessment found that the remaining COPCs do not pose an unacceptable risk to potential receptors. The following paragraphs summarize the investigatory results which support the decision for NFRAP.

The 1994 SI found that sediment within the drainage ditch was impacted by benzene, toluene, dibenzofuran, polynuclear aromatic hydrocarbons (PAHs), arsenic, cadmium, chromium, selenium, silver, and lead exceeding New York State Department of Environmental Conservation (NYSDEC) action levels. Groundwater sampled from one direct-push boring at Site 5 had a chromium concentration that exceeded NYSDEC action levels. However, the chromium exceedance was attributed to the direct-push sampling methodology. Surface water pooled at the head of the drainage ditch was found to exceed the action level for lead. However, this sample was collected from a temporary pool, and the result is considered irreproducible. Subsurface soils were impacted by chromium and lead exceeding the NYSDEC action levels.

The 1998 RI found that sediment and shallow subsurface soils still had concentrations of PAHs, arsenic and lead exceeding action levels. Therefore, PAHs, arsenic, and lead were retained as COPCs in sediment and shallow subsurface soils. Concentrations of benzene, toluene, dibenzofuran, cadmium, chromium, selenium, and silver in sediment and shallow soils, which exceeded action levels during the 1994 SI, were found to have decreased below detection limits. Since the exceedances previously detected during the 1994 SI were not confirmed by the results from the 1998 RI, benzene, toluene, dibenzofuran, cadmium, chromium, selenium, and silver in sediment and shallow soils were eliminated as COPCs.

The 1998 RI included a basewide baseline risk assessment, which included an evaluation of Site 5 for 25 contaminants using two exposure scenarios for current and future use by a maintenance worker and a construction/utility worker. The risk assessment results showed that both non-cancer and cancer risks due to exposure to COPCs at Site 5 for both scenarios were within the EPA's range for acceptable risk. In support of the 1998 RI risk assessment, risks associated with lead in soil have been further assessed herein, using the EPA Technical Review Workgroup (TRW) Adult Lead Methodology (ALM). This methodology indicates that lead risks in surface soil are acceptable at Site 5.

Background sampling of soil and groundwater conducted during the 2000-2001 RI established that chromium is naturally occurring in soil and groundwater at the base. This established that the chromium exceedance detected in groundwater during the 1994 SI was due either to the sampling methodology (as previously assumed), or to naturally occurring chromium. Therefore, chromium in both groundwater and soil was eliminated as a COPC at Site 5.

Therefore, based on the results of the 1994 SI, the 1998 RI, and the 2000-2001 RI, and current conditions at Site 5, it is determined that contaminant levels at the site pose no significant risk or threat to public health or the environment. Under the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA), as amended by the Superfund Amendments and Reauthorization Act of 1986 (SARA), a NFRAP DD is appropriate at this site.

Declaration Statement:

This Category III DD has been prepared in accordance with the June 1995 U.S. Air Force NFRAP Guide. This DD presents the selected action for Site 5 developed in accordance with CERCLA, as amended, and to the extent practicable, the National Oil and Hazardous Substances Pollution Contingency Plan (NCP). It also satisfies the requirements of the National Environmental Policy Act (NEPA) that apply to CERCLA response actions. 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. 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 CONCURRANCE LETTER

ENVIRONMENTAL RESTORATION PROGRAM

FINAL
NO FURTHER RESPONSE ACTION PLANNED
DECISION DOCUMENT

SITE 5 – SOUTHWEST STORM DRAINAGE DITCH

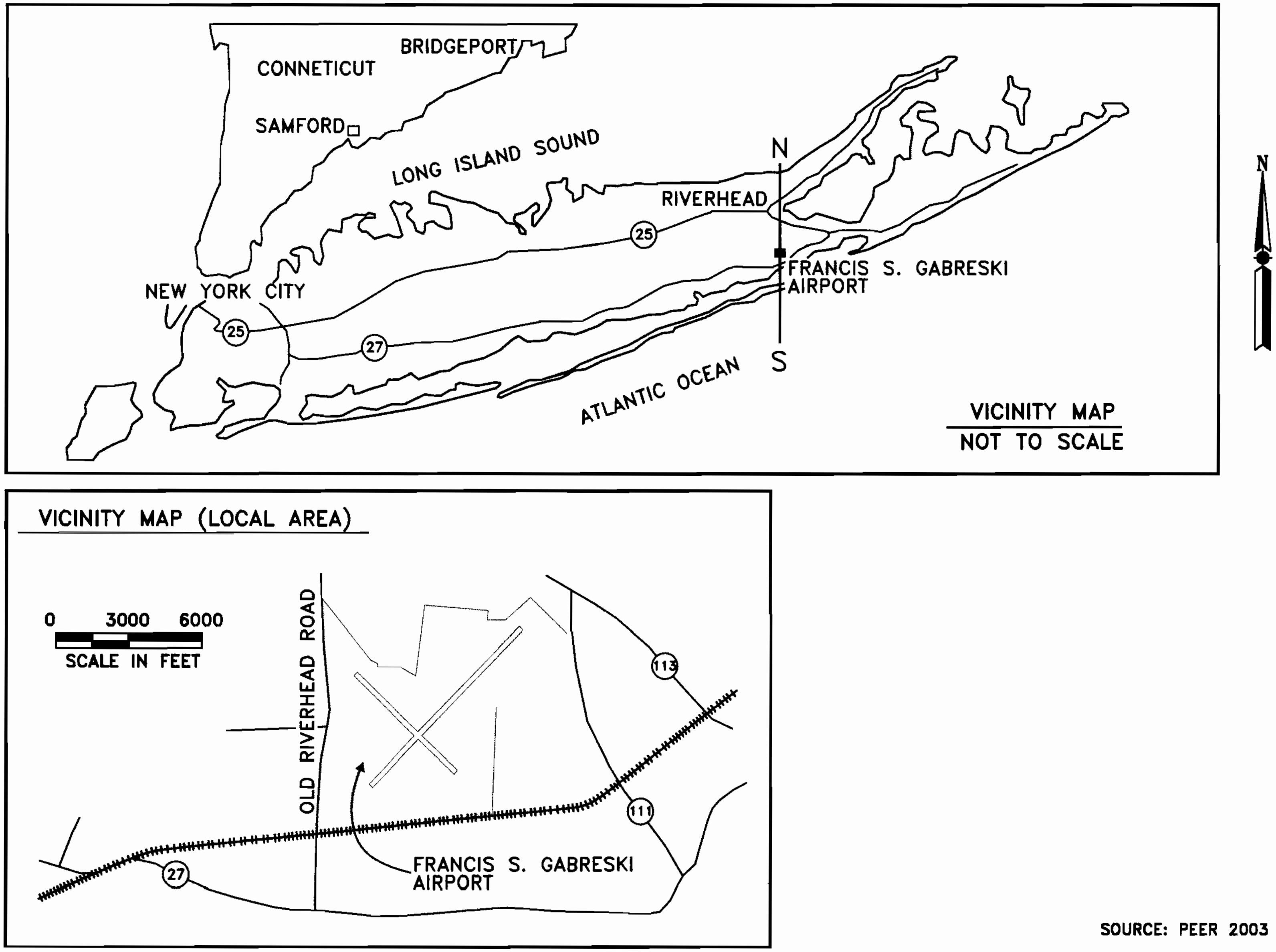
106^{TH} RESCUE WING
NEW YORK AIR NATIONAL GUARD
FRANCIS S. GABRESKI AIRPORT
WESTHAMPTON BEACH, NEW YORK

DECISION SUMMARY

1.0 INTRODUCTION

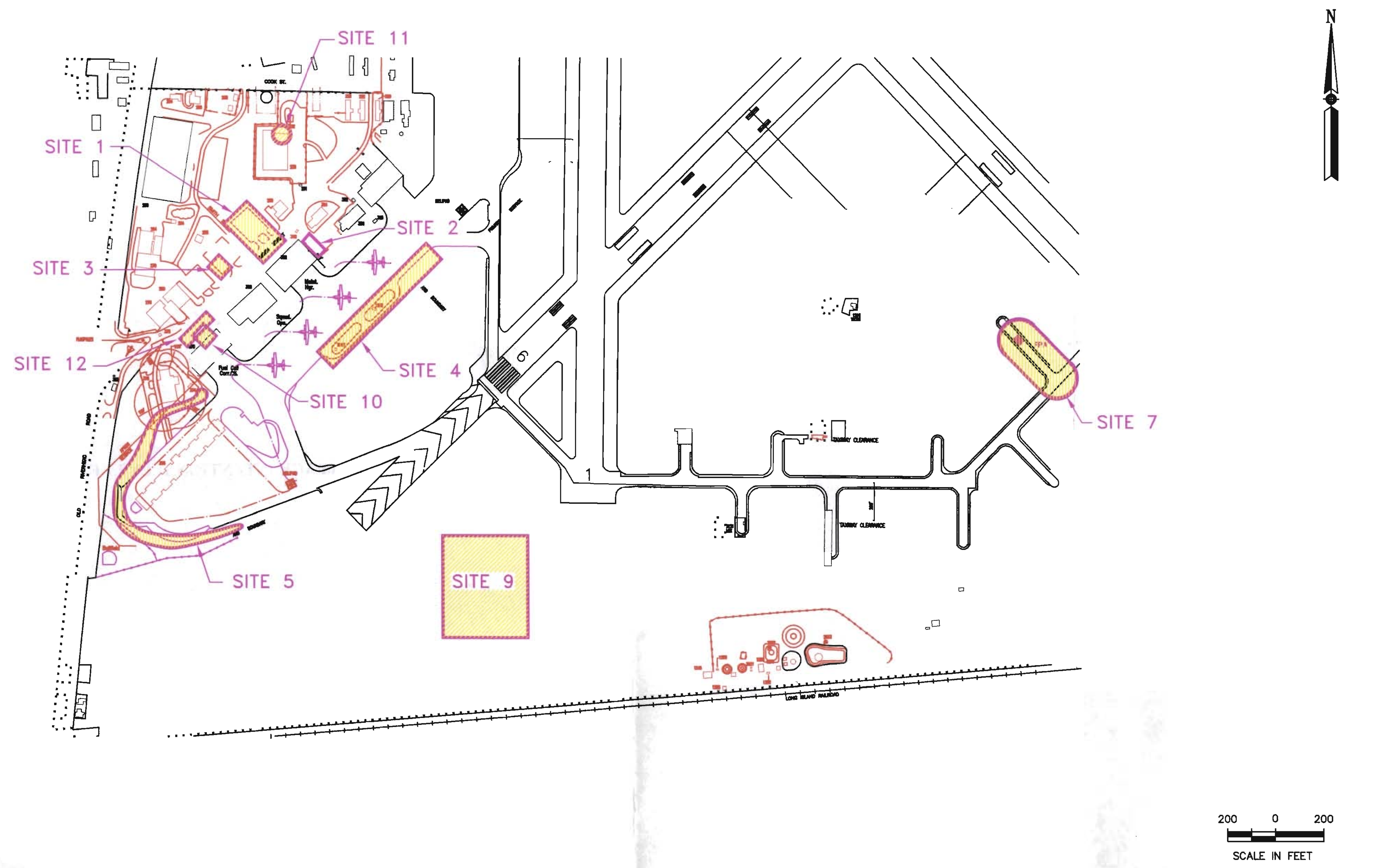
This Decision Document (DD) supports a No Further Response Action Planned (NFRAP) decision for Site 5, the Southwest Storm Drainage Ditch at the 106^{th} Rescue Wing (106^{th} RQW), New York Air National Guard (ANG), Francis S. Gabreski Airport, in the town of Westhampton Beach, New York. The base is located on the eastern end of Long Island in Suffolk County, New York. As shown on Figure 1.1, the Francis S. Gabreski Airport, formerly known as Suffolk County Airport, is on Old Riverhead Road, approximately 2 miles north of the Atlantic Ocean shoreline and just to the north of the town of Westhampton Beach. The Environmental Restoration Program (ERP) sites at Francis S. Gabreski Airport are shown on Figure 1.2. Site 5 is located in the southwestern portion of the base, near the southwestern boundary of the airport.

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	FRANCIS S. GABRESKI AIRPORT AND ANG BASE LOCATION 106th RESCUE WING, NEW YORK ANG WESTHAMPTON BEACH, NEW YORK	FIGURE 1.1
PROJ./3005-011 GAB/FINAL 5 NFRAP/FIG 1.1		



PEER
PROJ./003005-009
GAB/5NFRAP/FIG1.2

LOCATION OF ERP SITES INCLUDING SITE 5
106th RESCUE WING, NEW YORK ANG
FRANCIS S. GABRESKI AIRPORT
WESTHAMPTON BEACH, NEW YORK

FIGURE 1.2

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;
- *Revised Draft Remedial Investigation, Sites 4, 5, 8, and 9, 106th Rescue Group,* by Stone & Webster Environmental Technology & Services (S&W), January 1999, 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 5 and its surrounding area is provided in Section 1.1. Information on the history of Site 5, 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 5, 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 5 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 5, 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

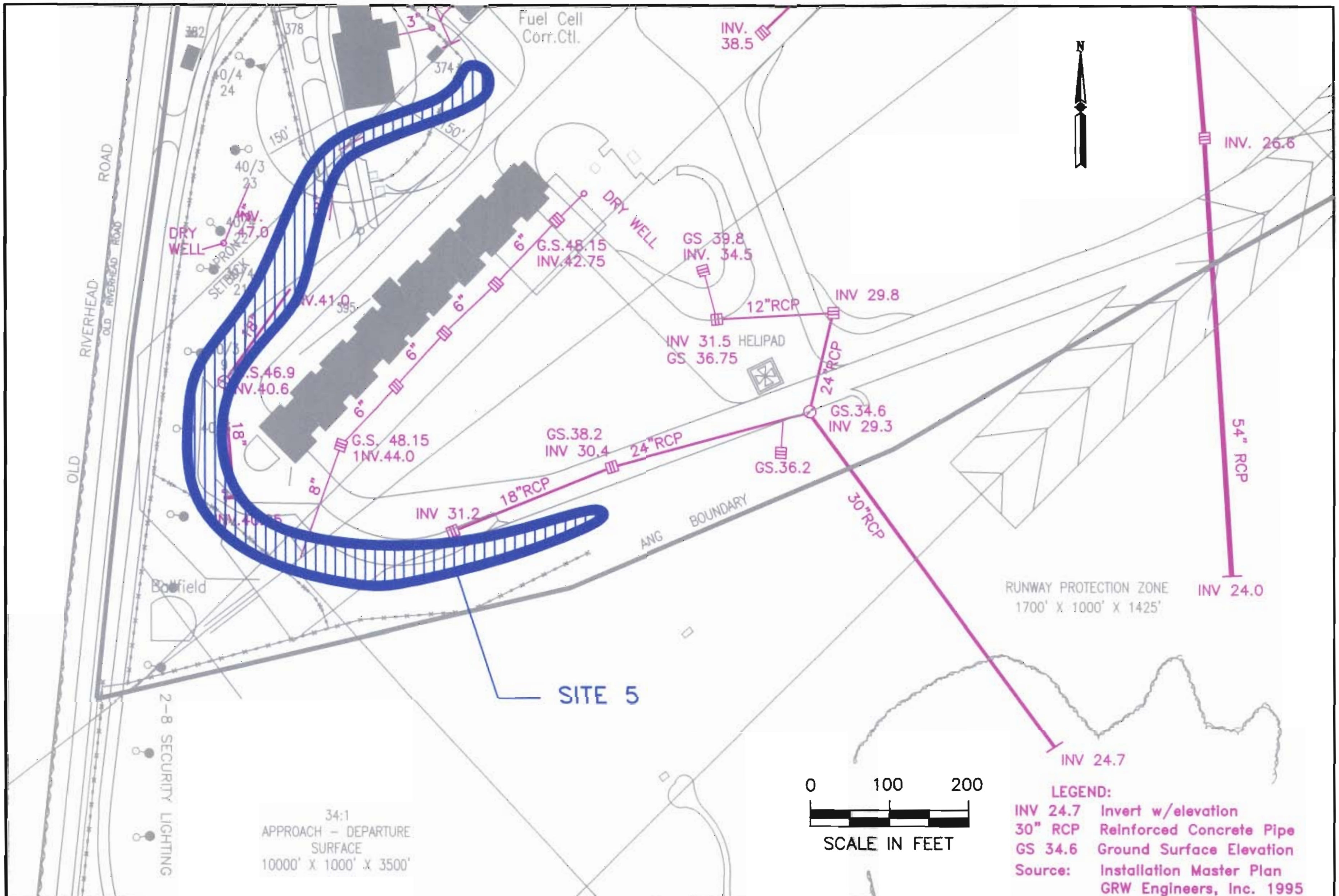
Site 5 – Southwest Storm Drainage Ditch is located on the 106th RQW, New York ANG, at the Francis S. Gabreski Airport in the southwest corner of the base. Site 5 is a storm water drainage ditch that originates as a subsurface outfall on the southwest side of Building 370. The drainage receives rainwater from roof drains and runoff from paved areas in the southwestern portion of the base. Historically, an oily sheen was observed on the water surfaces in the ditch during periods of heavy rain. Stressed vegetation was observed in localized areas along the ditch during the 1994 SI (ABB-ES 1997).

Drainage in the ditch is directed to the southwest along the ditch for about 280 ft before it goes below ground surface through a drainage culvert. The culvert resurfaces approximately 50 ft farther south and the ditch continues southwest for nearly 200 ft before drainage is again directed below ground surface through a culvert. The second culvert extends another 450 ft to the south, and then resurfaces. The ditch continues east for approximately 550 ft, where it again enters a culvert, and is directed east-northeast for approximately 1400 ft. At this point, the culvert extends southeastward approximately 1400 ft, where it discharges to a dry ravine. Figure 1.3 shows the storm drainage system which receives excess runoff from Site 5.

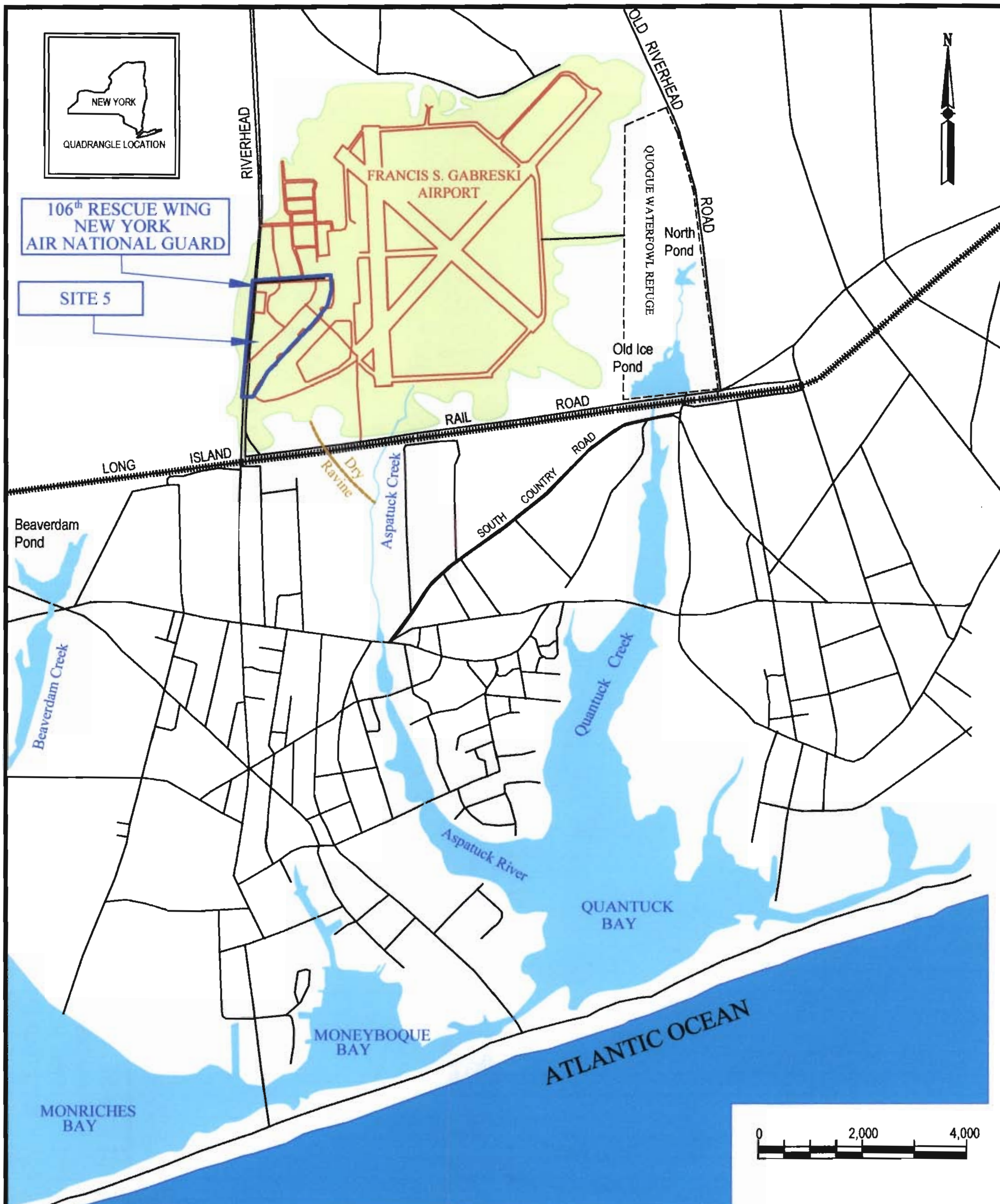
There are no wetland areas near the exposed portions of the drainage ditch. The nearest wetland area to Site 5 is the Quogue Wildlife Refuge, approximately 6500 ft to the east. Surface runoff from the storm drainage systems discharges to a dry ravine. The dry ravine discharges to Aspatuck Creek, about 1200 ft southeast of the storm drainage system. Figure 1.4 shows the surface drainages in the vicinity of the base and down gradient of Site 5.

1.1.2 Topography

As shown on Figure 1.5, 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).



PEER	BASE STORM DRAINAGE SYSTEM AT SITE 5 FRANCIS S. GABRESKI AIRPORT 106th RESCUE WING, NEW YORK ANG WESTHAMPTON BEACH, NEW YORK	FIGURE 1.3
PROJ./003005-009 GAB/FINAL 5 NFRAP/ FIG 1.3		



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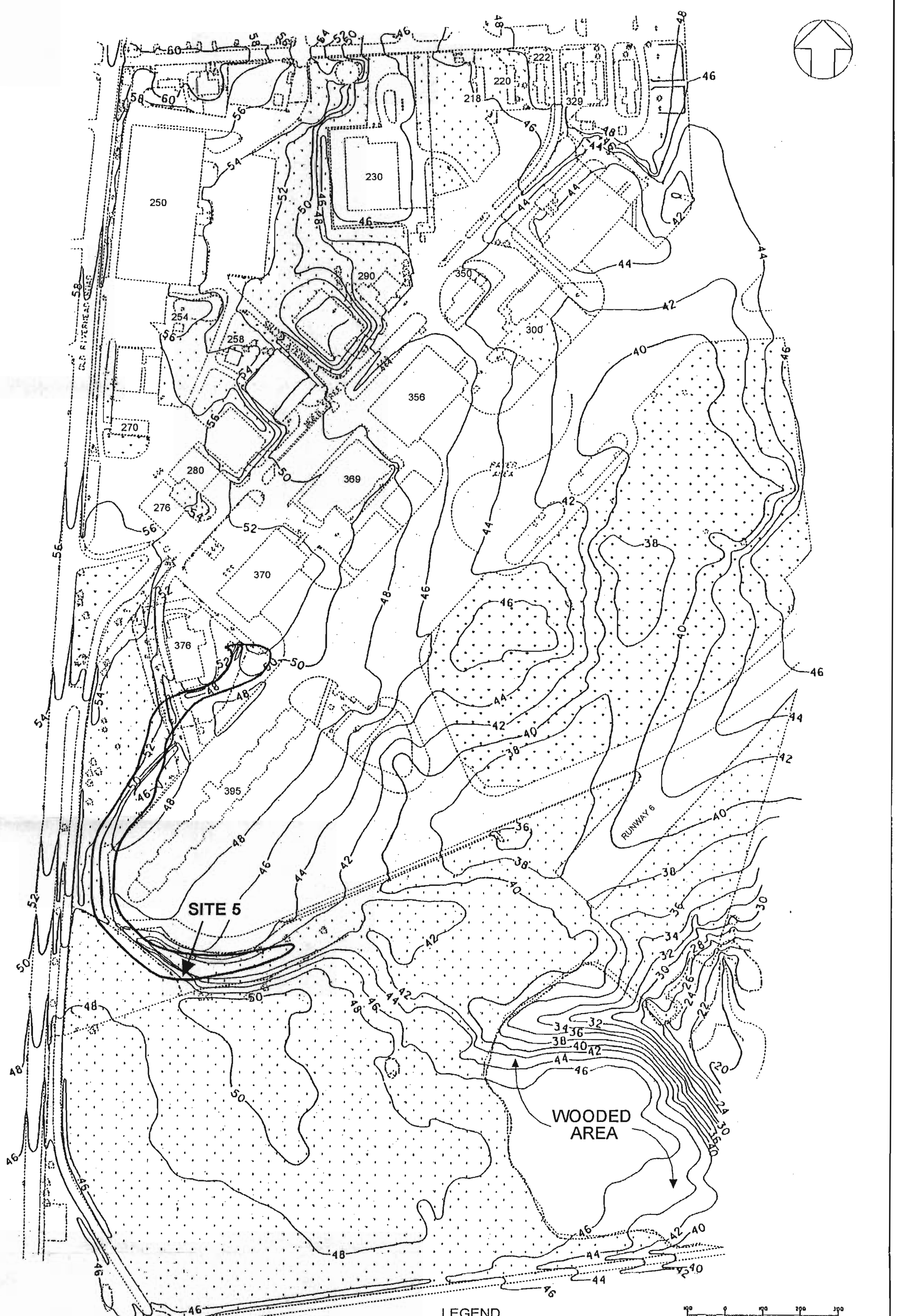
GAB/FINAL 5 NFRAP/FIG 1.4

SURFACE WATER DRAINAGE IN BASE VICINITY
106th RESCUE WING, NEW YORK AIR NATIONAL GUARD
FRANCIS S. GABRESKI AIRPORT
WESTHAMPTON BEACH, NEW YORK

FIGURE 1.4



LEGEND

Lawn Area

Paved Area

Vertical Datum: NGVD 1929

Elevations in ft. Above Mean Sea Level

Source: S&W, 1999

2-Ft. Contour Intervals

PEER PROJ./003005-009 GAB/FINAL5 NFRAP/FIG1.5.PDD	BASEWIDE TOPOGRAPHY 106 th RESCUE WING, NEW YORK ANG FRANCIS S. GABRESKI WESTHAMPTON BEACH, NEW YORK	FIGURE 1.5

1.1.3 Critical Environments

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

The Francis S. Gabreski Airport is located within the Long Island Pine Barrens. The Pine Barrens are characterized by open, sunlit woodlands dominated by pitch pine interspersed with white and scarlet oak. In the immediate area of the airport, the Pine Barrens are characterized by a transition from 30 to 80 ft tall pitch pines. The Quogue Wildlife Refuge, adjacent to the east side of the airport, is characterized by dwarf pitch pines ranging from 3 to 6 ft tall. The airport is surrounded by wooded areas consisting of 25 ft pitch pines and scattered scrub oak (Dames & Moore 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 (A. 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 business. 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 village of Westhampton Beach, New York. The population of the Westhampton Beach area is approximately 1,900 people.

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, and approximately 6500 ft east of Site 5. There is no permanent surface water at Site 5, and there are no adjacent wetlands. During storm events, surface run-off flows from Site 5, through the storm drainage system to where it discharges to a dry ravine, about 1400 ft southeast of the site. The ravine carries runoff about 1400 ft further southwest to where it intersects Aspatuck Creek. This is the point where runoff from Site 5 may discharge to Aspatuck Creek.

Groundwater Resources

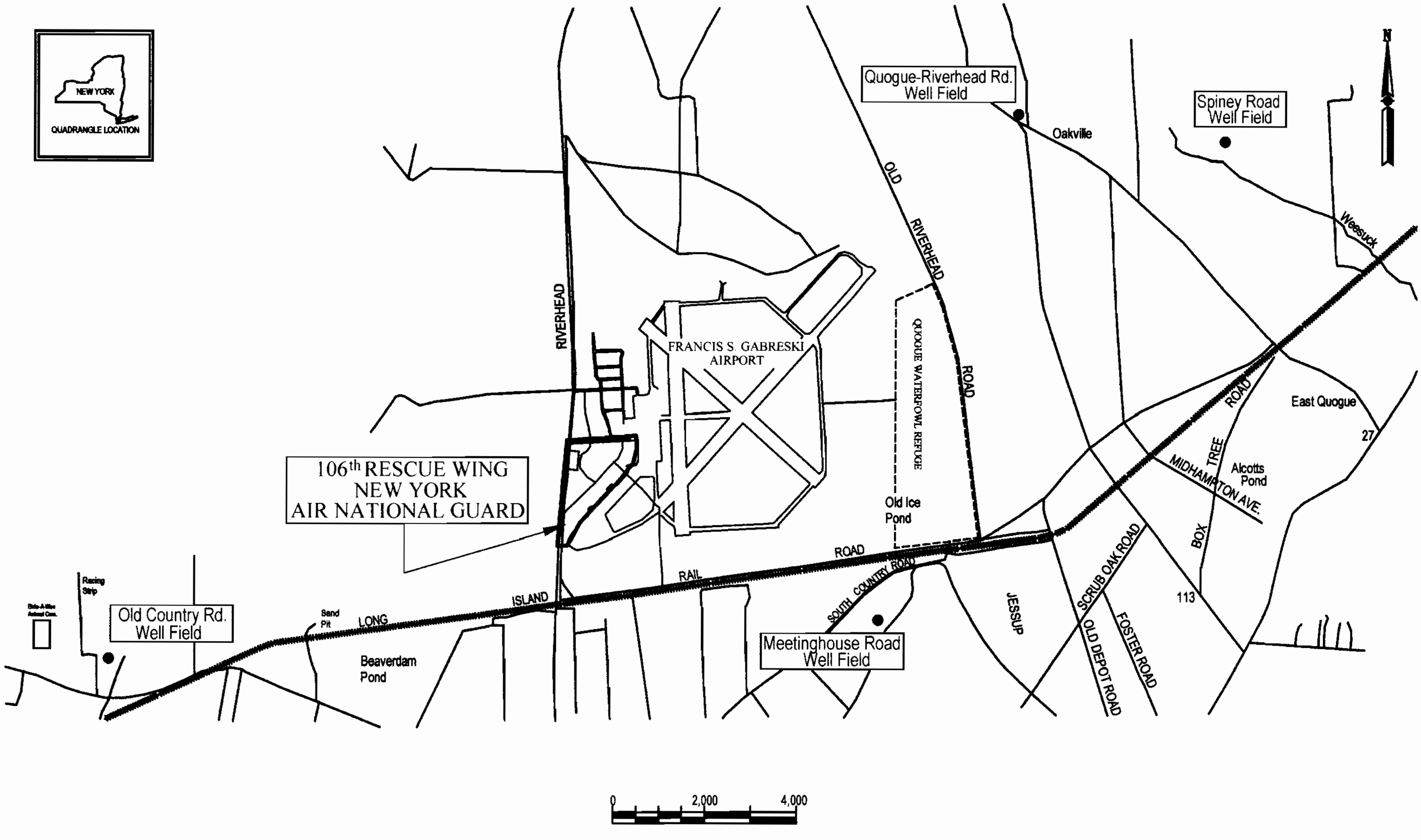
Groundwater is the only water supply source for Suffolk County. The majority of the public water supply in Westhampton Beach area is obtained from the Upper Glacial Aquifer; while the rest is obtained from the Magothy and Lloyd aquifers. Hydrogeology is discussed further in Section 2.1.3.

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. Figure 1.6 shows the location of identified public drinking water supply wells. Table 1.1 provides information pertaining to the public drinking water supply wells.

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

1.1.7 Surface and Subsurface Features

Aside from underground utilities such as water, electric and sanitary sewer, no unknown surface or subsurface features, or structures such as tanks or drums are believed to exist at Site 5.



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

PEER

PROJ./003005-011

GAB/FINAL 5 NFRAP/SITE1/FIG 1.6

PUBLIC DRINKING WATER SUPPLY WELL LOCATIONS
106th RESCUE WING, NEW YORK ANG
FRANCIS S. GABRESKI AIRPORT
WESTHAMPTON BEACH, NEW YORK

FIGURE 1.6

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

Well Field I.D.	Distance from Site (miles)	Aquifer Tapped	Screened Interval (ft BGS)		Total Depth (ft BGS)		Population Served (Approximate)
Meeting House Road	0.61	Upper Glacial	Well #20	55-75	Well #20	78	6,538
			Well #22	74-104	Well #22	104	
			Well #15A	31-51	Well #15A	53	
Quogue-Riverhead Road	1.16	Magothy	Well #1	386-447	Well #1	449	1,189
Spinny Road	1.7	Upper Glacial	Well #1	85-115	Well #1	118	189
			Well #2	118-158	Well #2	163	
Old Country Road	2.18	Upper Glacial	Well #1	60-75	Well #1	76	1,783
			Well #2	NA	Well #2	70	
			Well #3	128-157	Well #3	161	

Source Dames & Moore 1987.
BGS Below Ground Surface

1.2 SITE HISTORY AND ENFORCEMENT ACTIVITIES

Sections 1.2.1 and 1.2.2 present a brief discussion of the investigative and enforcement activities which have occurred at the site. Further details concerning analytical results of environmental samples are provided in Section 1.4.

1.2.1 Site History

Three sampling events have occurred at Site 5 since 1994. These included a 1994 SI, performed by ABB-ES, a 1998 RI, performed by S&W, and a 2000-2001 RI, performed by PEER.

During the 1994 SI, ABB-ES conducted sediment, subsurface soil, and groundwater sampling at Site 5. Contaminants of potential concern (COPCs) were identified based on detected concentrations exceeding NYSDEC action levels. COPCs identified in sediment included benzene, toluene, dibenzofuran, polynuclear aromatic hydrocarbons (PAHs), arsenic, cadmium, chromium, selenium, silver, and lead exceeding NYSDEC Action Levels in effect at the time. Sediment within the drainage ditch was primarily impacted at the two most up-gradient and exposed sections of the ditch. Groundwater collected from a single direct-push boring at Site 5 exceeded the NYSDEC action level for chromium. The detected exceedance by chromium was attributed to the direct-push sampling methodology (ABB-ES 1997). The 1994 SI is described in detail in Section 1.4.1.

During the 1998 RI, S&W conducted sediment and shallow subsurface soil sampling within the drainage ditch at Site 5. The results of the 1998 RI indicated sediment and shallow subsurface soil samples were impacted by PAHs, arsenic and lead, confirming the detections of these COPCs during the 1994 SI. However, benzene, toluene, dibenzofuran, cadmium, chromium, selenium, and silver were not detected in sediment during the 1998 RI, and these COPCs, which were previously detected during the 1994 SI, were not confirmed. Chromium was not detected in exceedances of action levels in groundwater samples collected from monitoring wells at adjacent ERP Site 8 – Cell 5 during the 1998 RI. This supports the conclusion of the 1994 SI, which attributed the detected exceedance of chromium in groundwater to the direct-push sampling methodology. The 1998 RI is described in detail in Section 1.4.2.

The 1998 RI included a basewide baseline risk assessment, which included an evaluation of Site 5 for 25 contaminants using two exposure scenarios for current and future use by a maintenance worker and a construction/utility worker. The risk assessment results showed that both non-cancer and cancer risks due to exposure to COPCs at Site 5 for both scenarios were within the EPA's range for acceptable risk. In support of the 1998 RI risk assessment, risks associated with lead in soil have been further assessed in Section 3.0, using the EPA Technical Review Workgroup (TRW) Adult Lead Methodology (ALM). This methodology indicates that lead risks in surface soil are acceptable at Site 5.

During the 2000-2001 RI, two rounds of groundwater samples were collected from the five previously installed monitoring wells. There were no exceedances of action levels in any of the groundwater monitoring samples collected during the 2000 – 2001 RI. This further supports the conclusion of the 1994 SI which attributed the detection of chromium in exceedance of groundwater action levels to the direct-push sampling methodology. Background sampling during the 2000 – 2001 RI further established that chromium concentrations exceeding action levels can occur naturally in soil and groundwater at the base. The 2000 – 2001 RI is described in detail in Section 1.4.3.

1.2.2 Regulatory Agency Involvement

There is no history of United States Environmental Protection Agency (EPA) involvement at Site 5. The 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 5, and there are no permits or agreements that govern response action at 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 ERP documents are available for public review at the Westhampton Beach Public Library.

1.4 SCOPE OF RESPONSE ACTIONS

Section 1.4.1 describes the initial SI, completed in 1994. Section 1.4.2 describes the initial RI, conducted in 1998, and Section 1.4.3 describes the most recent response activity, the RI completed in 2001.

1.4.1 Site Investigation (1994)

Surface water, sediment, subsurface soil, and groundwater sampling was conducted at Site 5 during the 1994 SI by ABB-ES.

- Three direct-push soil borings were performed, designated DP-034, DP-035, and DP-036. A total of 11 subsurface soil samples and one groundwater sample were collected.

- Nine sediment grab samples were collected from eight locations within the ditch.
- One sample was collected from surface water pooled at the head of the ditch.

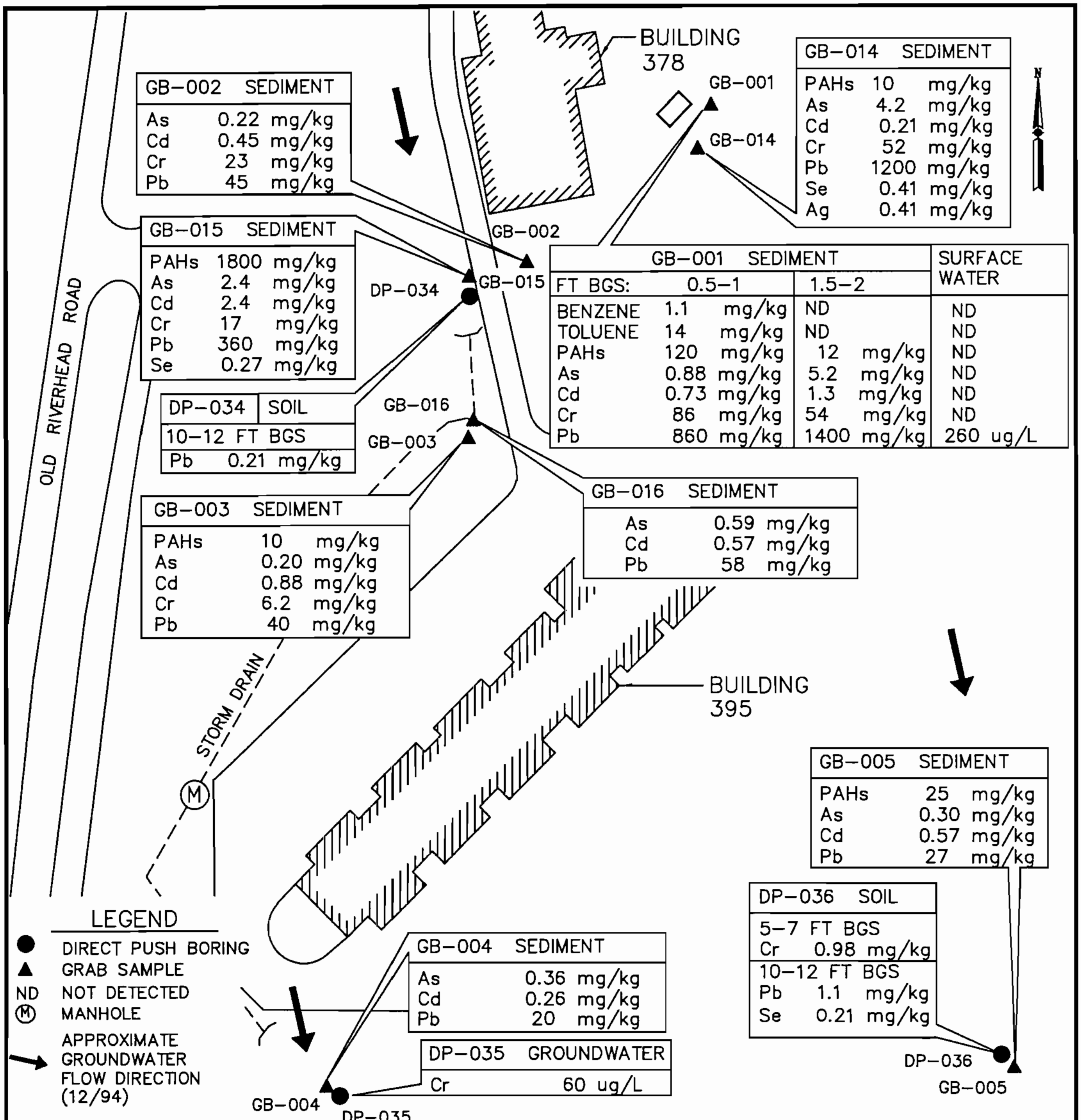
The samples were analyzed for volatile and semivolatile organics and metals. The locations and analytical results of the Site 5 samples collected during the 1994 SI are depicted on Figure 1.7. The analytical results of the 1994 SI Site 5 sediment and shallow subsurface soil samples and of the surface water and groundwater samples are summarized in Tables 1.2 and 1.3, respectively.

The results of the 1994 SI at Site 5 showed that the following media had exceedances of the NYSDEC action levels in effect at the time:

- Surface water (pooled at the head of the ditch) was impacted by lead.
- Sediment was impacted by exceedances of:
    - The volatile organic compounds benzene and toluene;
    - Several PAHs, including acenaphthene, anthracene, benzo(a)anthracene, benzo(a)pyrene, benzo(b)fluoranthene, benzo(g,h,i)perylene, benzo(k)fluoranthene, chrysene, dibenz(a,h)anthracene, fluoranthene, indeno(1,2,3-cd)pyrene, phenanthrene, and pyrene;
    - The semivolatile organic compound dibenzofuran; and
    - The metals arsenic, cadmium, chromium, lead, selenium, and silver.
- Shallow subsurface soil at the site was impacted by chromium and lead.

1.4.2 Remedial Investigation (1998)

In 1998, S&W conducted an RI at Site 5 which included sediment sampling within the drainage ditch, and 2 rounds of groundwater monitoring. The sediment sample locations and analytes with exceedances of action levels are summarized in Table 1.4, and shown on Figure 1.8. The sample locations and results from the 1994 SI are included on Figure 1.8 for comparison purposes.



NOTES:

1. RESULTS FOR INORGANIC COMPOUNDS IN SOIL COMPARED TO BACKGROUND CONCENTRATIONS (ABB-ES 1997).
2. GROUNDWATER RESULTS COMPARED TO FEDERAL AND NEW YORK STATE DRINKING WATER STANDARDS.
3. RESULTS FOR ORIGINAL COMPOUNDS IN SOIL COMPARED TO NYSDEC GUIDANCE LEVELS (ABB-ES-1997).
4. SEDIMENT SAMPLES COLLECTED AT 0.5-1 BGS, EXCEPT AS NOTED.

SOURCE: ADAPTED FROM ABB-ES,1997

PEER
PROJ./003005-009
GAB/FINAL 5 NFRAP/FIG1.7

SITE 5 - 1994 SAMPLE RESULTS
106th RESCUE WING, NEW YORK AIR NATIONAL GUARD
FRANCIS S. GABRESKI AIRPORT
WESTHAMPTON BEACH, NEW YORK

FIGURE 1.7

Table 1.2
Site 5 - Sediment and Shallow Subsurface Soil Results Exceeding Action Levels - 1994 Site Investigation
106th Rescue Wing
New York Air National Guard
Westhampton Beach, New York

Sample ID	Action Levels		GB-001	GB-001	GB-002	GB-003	GB-004	GB-005	GB-014	GB-015	GB-016	DP-034	DP-036	DP-036
Depth (Ft BGS)	Saturated	Unsaturated	0.5-1	1.5-2	0.5-1	0.5-1	0.5-1	0.5-1	0.5-1	0.5-1	0.5-1	10-12	5-7	10-12
Volatile Organics (µg/kg)														
Benzene	0.6	60	**1100**	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Toluene	15	1500	**14000**	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Semivolatile Organics (µg/kg)														
Acenaphthene	330	50,000	NA	NA	NA	NA	NA	NA	NA	**58,000**	NA	NA	NA	NA
Anthracene	330	50,000	NA	NA	NA	NA	NA	NA	NA	**76,000**	NA	NA	NA	NA
Benzo(a)anthracene	330	330	**19,000**	NA	NA	**1700**	NA	**4900**	**1800**	**140,000**	NA	NA	NA	NA
Benzo(a)pyrene	0.33	330	**22,000**	NA	NA	**1600**	NA	**4300**	**2600**	**120,000**	NA	NA	NA	NA
Benzo(b)fluoranthene	330	1100	**21,000**	**12,000**	NA	**1600**	NA	**4300**	**3500**	**120,000**	NA	NA	NA	NA
Benzo(g,h,i)perylene	330	50,000	NA	NA	NA	NA	NA	NA	NA	**71,000**	NA	NA	NA	NA
Benzo(k)fluoranthene	330	1100	**20,000**	NA	NA	**1500**	NA	**3800**	**2600**	**91,000**	NA	NA	NA	NA
Chrysene	400	400	**19,000**	NA	NA	**1800**	NA	**500**	**2600**	**140,000**	NA	NA	NA	NA
Dibenz(a,h,)anthracene	340	340	**7700**	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Dibenzofuran	62	6200	NA	NA	NA	NA	NA	NA	NA	**27000**	NA	NA	NA	NA
Fluoranthene	1000	50,000	NA	NA	NA	NA	NA	NA	NA	**340,000**	NA	NA	NA	NA
Indeno(1,2,3-cd)pyrene	320	3200	**18,000**	NA	NA	NA	NA	NA	NA	**68,000**	NA	NA	NA	NA
Phenanthrene	330	50,000	NA	NA	NA	NA	NA	NA	NA	**300,000**	NA	NA	NA	NA
Pyrene	1000	50,000	NA	NA	NA	NA	NA	NA	NA	**270,000**	NA	NA	NA	NA
Metals (mg/kg)														
Arsenic	7.5 or SB	0.10/0.10	**0.88**	**5.2**	**0.22**	**0.20**	**0.36**	**0.30**	**4.2**	**2.4**	**0.59**	NA	NA	NA
Cadmium	1 or SB	0.10/0.10	**0.73**	**1.3**	**0.45**	**0.88**	**0.26**	**0.57**	**0.21**	**2.4**	**0.57**	NA	NA	NA
Chromium	10 or SB	6.1/0.84	**86**	**54**	**23**	**6.2**	NA	NA	**52**	**17**	NA	NA	**0.98**	**1.1**
Lead	SB	4.4/0.65	**860**	**1400**	**45**	**40**	**20**	**27**	**1200**	**360**	**58**	**0.21**	NA	**0.21**
Selenium	2 or SB	0.10/0.10	NA	NA	NA	NA	NA	NA	**0.41**	**0.27**	NA	NA	NA	NA
Silver	SB	0.10/0.10	NA	NA	NA	NA	NA	NA	**0.41**	NA	NA	NA	NA	NA

Source: Site Investigation Report, Vol. 1, ABB-ES 1997.

BGS Below ground surface.
DP Direct probe sample
GB Soil grab sample.
NA Not available.
NYS New York State Recommended Soil Cleanup Objectives.
SB Site background.

Note: Bolding and shading indicates exceedances of action levels.

Table 1.3
Site 5 - Surface Water and Groundwater Results Exceeding Action Levels - 1994 Site Investigation
106th Rescue Wing
New York Air National Guard
Westhampton, New York

	Action Levels		GB-001	DP-035
Depth (BGS)	**NYS**	**MCL**	**0 - 0.2**	**30-32**
Volatile Organics (µg/L)				
Benzene	0.7	5	NA	NA
TCE	5	5	NA	NA
Metals (µg/L)				
Chromium	50	1000	NA	**60**
Lead	25	15	**260**	NA

Source: Site Investigation Report, Vol. 1, ABB-ES 1997.
GB-001 Surface water sample
DP-035 Direct-push groundwater sample
MCL Maximum contaminant level
NA Not available
NYS New York State Class GA Groundwater
TCE Trichloroethene
Note: Bold and shade indicates exceedance of action level.

The results of the 1998 RI at Site 5 showed that sediment and shallow subsurface soil had exceedances of action levels by:

- The PAHs benzo(a)anthracene, chrysene, benzo(a)pyrene, benzo(b)fluoranthene, benzo(k)fluoranthene, dibenz(a,h)anthracene, and indeno(1,2,3-cd)pyrene, and
- The metals arsenic and lead.

The exceedances which were initially detected during the 1994 SI in sediment and shallow subsurface soils by benzene, toluene, dibenzofuran, cadmium, and chromium, did not recur during the 1998 RI. The sample locations, media, and analyses were similar for both the 1994 SI, and the 1998 RI, indicating that the concentrations of benzene, toluene, dibenzofuran, cadmium, and chromium in sediment had decreased during the time between the two sampling events. Since the 1998 RI found no sediment or subsurface soil detections of benzene, toluene, dibenzofuran, cadmium, or chromium, they were eliminated as COPCs in sediment and subsurface soils.

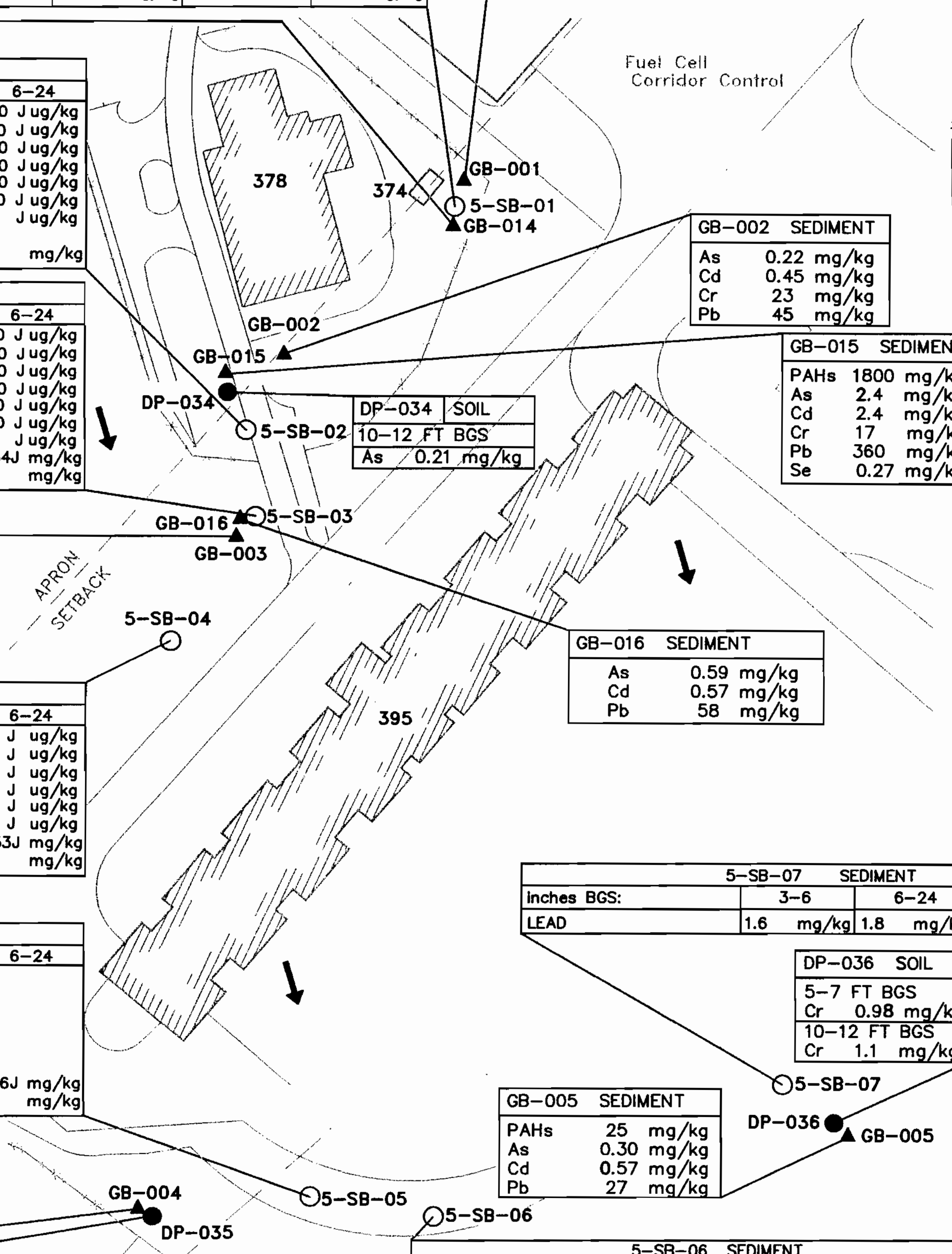
Table 1.4
Site 5 - Sediment and Shallow Soil Samples – 1998 Remedial Investigation
106th Rescue Wing
New York Air National Guard
Westhampton Beach, New York

Sample	Action Levels		5-SB-01	5-SB-01	5-SB-01	5-SB-02	5-SB-02	5-SB-02	5-SB-03	5-SB-03	5-SB-03	5-SB-04
Depth (in. BGS)	**Saturated**	**Unsaturated**	**0-3**	**3-6**	**6-24**	**0-3**	**3-6**	**6-24**	**0-3**	**3-6**	**0-3**	**0-3**
Semivolatile Organics (µg/kg)												
Benzo(a)anthracene	330	330	**6500**	3200	ND	**3900**	**4700**	260 J	**1100**	**1200**	170 J	46 J
Chrysene	400	400	**7400**	3900	ND	**4400**	**5000**	310 J	**1400**	**1400**	200 J	60 J
Benzo(b)fluoranthene	330	1100	**6400**	4100	40 J	**3900**	**5700**	320 J	**1500**	**1600**	220 J	59 J
Benzo(k)fluoranthene	330	1100	**5400**	2400 D	38 J	**3200 D**	**3300 D**	320 J	880	**1000**	230 J	60 J
Benzo(a)pyrene	0.33	330	**6500**	3300	ND	**3900**	**4400**	250 J	**1100**	**1200**	190 J	48 J
Indeno(1,2,3-cd)pyrene	320	3200	**5400 D**	3100 D	ND	3100 D	1900 D	140 J	910	520 DJ	140 J	ND
Dibenz(a,h,)anthracene	340	340	**1800 DJ**	**1000 DJ**	ND	**1100**	**740 DJ**	39 J	**350 J**	190 DJ	38 J	ND
Metals (mg/kg)	**NYS**	**BKG**										
Arsenic	7.5 or SB	0.2	2.7	**29.8**	0.59 J	1.1 J	0.77 J	ND	0.77 J	0.67 DJ	0.54 J	ND
Lead	SB	4.4	**778**	**625**	**59**	**66**	**83.4**	**20**	**54**	**75**	**35**	**8**

Sample	Action Levels		5-SB-04	5-SB-04	5-SB-05	5-SB-05	5-SB-05	5-SB-06	5-SB-06	5-SB-06	5-SB-07	5-SB-07
Depth (in. BGS)	**Saturated**	**Unsaturated**	**3-6**	**6-24**	**0-3**	**3-6**	**6-24**	**0-3**	**3-6**	**6-24**	**3-6**	**6-24**
Semivolatile Organics (µg/kg)												
Benzo(a)anthracene	330	330	110 J	64 J	ND	86 J	ND	230 J	ND	ND	ND	ND
Chrysene	400	400	200 J	69 J	63 J	150 J	ND	290 J	ND	47 J	ND	ND
Benzo(b)fluoranthene	330	1100	180 J	90 J	110 J	500 J	ND	310 J	ND	45 J	ND	ND
Benzo(k)fluoranthene	330	1100	170 J	68 J	60 J	ND	ND	310 J	ND	51 J	ND	ND
Benzo(a)pyrene	0.33	330	130 J	60 J	ND	120 J	ND	320 J	ND	35 J	ND	ND
Indeno(1,2,3-cd)pyrene	3200	3200	79 J	45 J	ND	93 J	ND	250 J	ND	36 J	ND	ND
Dibenz(a,h,)anthracene	340	340	ND	ND	ND	ND	ND	58 J	ND	ND	ND	ND
Metals (mg/kg)	**NYS**	**BKG**										
Arsenic	7.5 or SB	0.1/0.10	0.70 J	0.53 J	2.2	1.6 J	0.76 J	0.79 J	0.65 J	1.2 J	NR	NR
Lead	SB	4.4/0.65	**15**	**12**	**27**	**13**	1.7	**14**	**4**	**16**	1.6	1.8

BGS Below ground surface.
BKG Upper limit of background concentrations (surface/subsurface).
D Indicates a sample dilution.
J Estimated value.
ND Not detected.
NR Not reported.
NYS New York State Recommended Soil Cleanup Objectives.
SB Site background (Action Level), or soil boring (sample ID).

Notes:
1. Shading and bolding indicate Action Level exceeded.
2. Source: Revised Draft Remedial Investigation Sites 4, 5, 8, and 9, S&W 1999.



GB-014 SEDIMENT		
PAHs	10	mg/kg
As	4.2	mg/kg
Cd	0.21	mg/kg
Cr	52	mg/kg
Pb	1200	mg/kg
Se	0.41	mg/kg
Ag	0.41	mg/kg

5-SB-01 SEDIMENT			
inches BGS:	0-3	3-6	6-24
BENZO(a)ANTHRACENE	6500 ug/kg	3200 ug/kg	ND
CHRYSENE	7400 ug/kg	3900 ug/kg	ND
BENZO(b)FLUORANTHENE	6400 ug/kg	4100 ug/kg	40 J ug/kg
BENZO(k)FLUORANTHENE	5400 ug/kg	2400D ug/kg	38 J ug/kg
BENZO(a)PYRENE	6500 ug/kg	3300 ug/kg	ND
INDENEO(1,2,3-cd)PYRENE	5400D ug/kg	3100D ug/kg	ND
DIBENZ(a,h)ANTHRACENE	1800DJ ug/kg	1000DJ ug/kg	ND
ARSENIC	2.7 mg/kg	29.8 mg/kg	0.59J mg/kg
LEAD	778 mg/kg	625 mg/kg	59 mg/kg

GB-001 SEDIMENT			SURFACE WATER
FT BGS:	0.5-1	1.5-2	
BENZENE	1.1 mg/kg	ND	ND
TOLUENE	14 mg/kg	ND	ND
PAHs	120 mg/kg	12 ug/kg	ND
As	0.88 mg/kg	5.2 mg/kg	ND
Cd	0.73 mg/kg	1.3 mg/kg	ND
Cr	86 mg/kg	54 mg/kg	ND
Pb	860 mg/kg	1400 mg/kg	260 ug/L

5-SB-02 SEDIMENT			
inches BGS:	0-3	3-6	6-24
BENZO(a)ANTHRACENE	3900 ug/kg	4700 ug/kg	260 J ug/kg
CHRYSENE	4400 ug/kg	5000 ug/kg	310 J ug/kg
BENZO(b)FLUORANTHENE	3900 ug/kg	5700 ug/kg	320 J ug/kg
BENZO(k)FLUORANTHENE	3200D ug/kg	3300D ug/kg	320 J ug/kg
BENZO(a)PYRENE	3900 ug/kg	4400 ug/kg	250 J ug/kg
INDENEO(1,2,3-cd)PYRENE	3100D ug/kg	1900D ug/kg	140 J ug/kg
DIBENZ(a,h)ANTHRACENE	1100 ug/kg	740DJ ug/kg	39 J ug/kg
ARSENIC	1.1 J mg/kg	0.77J mg/kg	ND
LEAD	66 mg/kg	83.4 mg/kg	20 mg/kg

GB-002 SEDIMENT		
As	0.22	mg/kg
Cd	0.45	mg/kg
Cr	23	mg/kg
Pb	45	mg/kg

5-SB-03 SEDIMENT			
inches BGS:	0-3	3-6	6-24
BENZO(a)ANTHRACENE	1100 ug/kg	1200 ug/kg	170 J ug/kg
CHRYSENE	1400 ug/kg	1400 ug/kg	200 J ug/kg
BENZO(b)FLUORANTHENE	1500 ug/kg	1600 ug/kg	220 J ug/kg
BENZO(k)FLUORANTHENE	880 ug/kg	1000 ug/kg	230 J ug/kg
BENZO(a)PYRENE	1100 ug/kg	1200 ug/kg	190 J ug/kg
INDENEO(1,2,3-cd)PYRENE	910 ug/kg	520DJ ug/kg	140 J ug/kg
DIBENZ(a,h)ANTHRACENE	350 J ug/kg	190DJ ug/kg	38 J ug/kg
ARSENIC	0.77J mg/kg	0.67DJ mg/kg	0.54J mg/kg
LEAD	54 mg/kg	75 mg/kg	35 mg/kg

GB-015 SEDIMENT		
PAHs	1800	mg/kg
As	2.4	mg/kg
Cd	2.4	mg/kg
Cr	17	mg/kg
Pb	360	mg/kg
Se	0.27	mg/kg

DP-034	SOIL
10-12 FT BGS	
As	0.21 mg/kg

GB-003 SEDIMENT		
PAHs	10	ug/kg
As	0.20	mg/kg
Cd	0.88	mg/kg
Cr	6.2	mg/kg
Pb	40	mg/kg

GB-016 SEDIMENT		
As	0.59	mg/kg
Cd	0.57	mg/kg
Pb	58	mg/kg

5-SB-04 SEDIMENT			
inches BGS:	0-3	3-6	6-24
BENZO(a)ANTHRACENE	46 J ug/kg	110 J ug/kg	64 J ug/kg
CHRYSENE	60 J ug/kg	200 J ug/kg	69 J ug/kg
BENZO(b)FLUORANTHENE	59 J ug/kg	180 J ug/kg	90 J ug/kg
BENZO(k)FLUORANTHENE	60 J ug/kg	170 J ug/kg	68 J ug/kg
BENZO(a)PYRENE	48 J ug/kg	130 J ug/kg	60 J ug/kg
INDENEO(1,2,3-cd)PYRENE	ND	79 J ug/kg	45 J ug/kg
ARSENIC	ND	0.70J mg/kg	0.53J mg/kg
LEAD	8 mg/kg	15 mg/kg	12 mg/kg

5-SB-07 SEDIMENT		
inches BGS:	3-6	6-24
LEAD	1.6 mg/kg	1.8 mg/kg

DP-036 SOIL	
5-7 FT BGS	
Cr	0.98 mg/kg
10-12 FT BGS	
Cr	1.1 mg/kg

5-SB-05 SEDIMENT			
inches BGS:	0-3	3-6	6-24
BENZO(a)ANTHRACENE	ND	86 J ug/kg	ND
CHRYSENE	63 J ug/kg	150J ug/kg	ND
BENZO(b)FLUORANTHENE	110J ug/kg	500J ug/kg	ND
BENZO(k)FLUORANTHENE	60 J ug/kg	ND	ND
BENZO(a)PYRENE	ND	120J ug/kg	ND
INDENEO(1,2,3-cd)PYRENE	ND	93 J ug/kg	ND
ARSENIC	2.2 mg/kg	1.6J mg/kg	0.76J mg/kg
LEAD	27 mg/kg	13 mg/kg	1.7 mg/kg

GB-005 SEDIMENT		
PAHs	25	mg/kg
As	0.30	mg/kg
Cd	0.57	mg/kg
Pb	27	mg/kg

GB-004 SEDIMENT		
As	0.36	mg/kg
Cd	0.26	mg/kg
Pb	20	mg/kg

DP-035 GROUNDWATER	
Cr	60 ug/L

5-SB-06 SEDIMENT			
inches BGS:	0-3	3-6	6-24
BENZO(a)ANTHRACENE	230J ug/kg	ND	ND
CHRYSENE	290J ug/kg	ND	47 J ug/kg
BENZO(b)FLUORANTHENE	310J ug/kg	ND	45 J ug/kg
BENZO(k)FLUORANTHENE	310J ug/kg	ND	51 J ug/kg
BENZO(a)PYRENE	320J ug/kg	ND	35 J ug/kg
INDENEO(1,2,3-cd)PYRENE	250J ug/kg	ND	36 J ug/kg
DIBENZ(a,h)ANTHRACENE	58 J ug/kg	ND	ND
ARSENIC	0.79J mg/kg	0.65J mg/kg	1.2J mg/kg
LEAD	14 mg/kg	4 mg/kg	16 mg/kg

LEGEND

- ○ SEDIMENT AND SHALLOW SOIL SAMPLE LOCATIONS
- ● DIRECT PUSH BORING
- ▲ GRAB SAMPLE
- → APPROXIMATE GROUNDWATER FLOW DIRECTION (12/94)

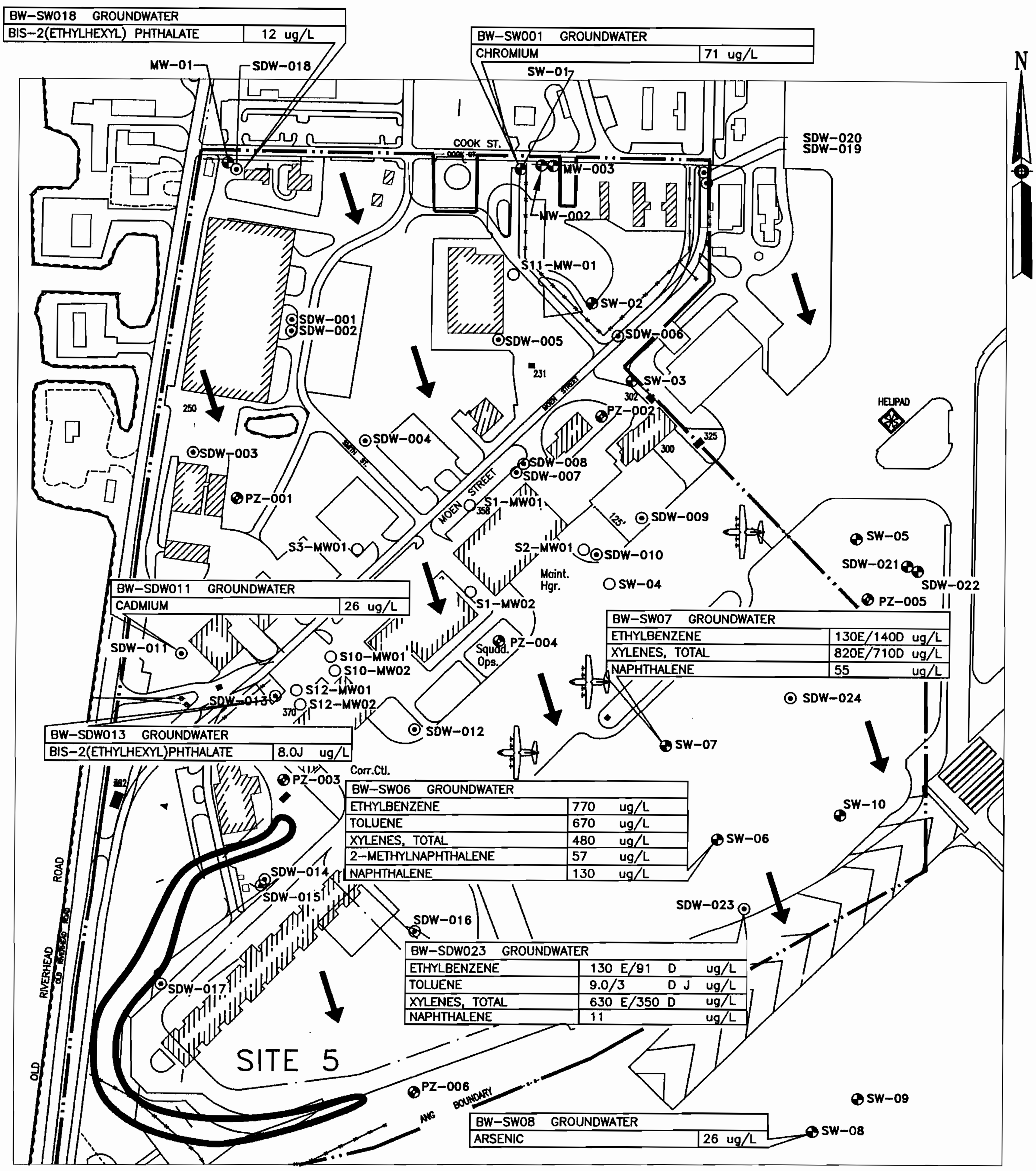
D SAMPLE DILUTION
J ESTIMATED CONCENTRATION
ND NOT DETECTED

NOTES:
1. RESULTS FOR INORGANIC COMPOUNDS IN SOIL COMPARED TO BACKGROUND CONCENTRATIONS (ABB-ES 1997).
2. GROUNDWATER RESULTS COMPARED TO FEDERAL AND NEW YORK STATE DRINKING WATER STANDARDS.
3. RESULTS FOR ORIGINAL COMPOUNDS IN SOIL COMPARED TO NYSDEC GUIDANCE LEVELS (ABB-ES-1997).
4. SEDIMENT SAMPLES COLLECTED AT 0.5-1 BGS, EXCEPT AS NOTED.

0 50 100
SCALE IN FEET

SOURCE: S&W 1999, VOLUME I

PEER	SITE 5 – 1998 SEDIMENT AND SHALLOW SOIL SAMPLE LOCATIONS 106th RESCUE WING, NEW YORK AIR NATIONAL GUARD FRANCIS S. GABRESKI AIRPORT WESTHAMPTON BEACH, NEW YORK	FIGURE 1.8
PROJ./003005-009		
GAB/FINAL 5 NFRAP/FIG 1.8		



LEGEND

⦿	PRE-EXISTING SMALL DIAMETER WELL
◕	PRE-EXISTING WELL
⊛	PRE-EXISTING PIEZOMETER
○	NEW MONITORING WELL (RI, 2000–2001)
➔	APPROXIMATE GROUNDWATER FLOW DIRECTION (05/01)
D	SECONDARY DILUTION FACTOR
E	ESTIMATED VALUE OR NOT REPORTED DUE TO INTERFERENCES
J	ESTIMATED CONCENTRATION BELOW DETECTION LIMIT

NOTE: WELL LOCATIONS APPROXIMATE

0 200 400
SCALE IN FEET

SOURCE: BASE MAP AND ABB-ES, 1997

PEER	SITE 5 – 2000 – 2001 BASEWIDE CONTAMINANTS IN GROUNDWATER 106th RESCUE WING, NEW YORK AIR NATIONAL GUARD FRANCIS S. GABRESKI AIRPORT WESTHAMPTON BEACH, NEW YORK	FIGURE 1.9
PROJ./003005-009 GAB/FINAL 5 NFRAP/FIG 1.9		

During the 1998 RI, 2 rounds of groundwater monitoring samples were collected from monitoring wells at adjacent ERP Site 8 – Cell 5, in the vicinity of Site 5. There were no detections of chromium exceeding action levels. This result supports the conclusion of the 1994 SI that the exceedance of chromium detected was due to the sampling methodology.

The 1998 RI included a basewide baseline risk assessment, which included Site 5, performed in accordance with CERCLA guidance. The baseline risk assessment concluded that: "Based on these conservative evaluations…human receptors at [Site 5] will experience acceptable levels of exposure to non-cancer and cancer causing [contaminants] in soil and groundwater," (S&W 1999). Based on the risk assessment conclusions, the Revised Draft RI Report concluded that no further action was required at Site 5 (S&W 1999). The risk assessment is detailed in Section 4.0 of this NFRAP DD. In support of the 1998 RI risk assessment, risks associated with lead in soil have further assessed using the EPA Technical Review Workgroup (TRW) Adult Lead Methodology (ALM), as presented in Section 3.0. This methodology indicates that lead risks in surface soil are acceptable at Site 5.

1.4.3 Remedial Investigation (2000-2001)

The most recent response action was the completion in 2001 of an RI for ERP Sites 1, 2, 3, 7, 10, 11, and 12. Although Site 5 was not investigated directly during the 2001 RI, one round of base-wide groundwater samples was collected. During the base-wide sampling, monitoring wells located at Site 8 Cell – 5, adjacent to Site 5, were sampled, including PZ-003, PZ-006, SDW-014, SDW-015, and SDW-017. The analytical results are summarized on Table 1.5. Figure 1.9 shows the locations of the monitoring wells sampled during the base-wide sampling, and contaminants detected. Bis(2-ethylhexyl)phthalate was detected in one monitoring well in the vicinity of Site 5, but was below the Maximum Contaminant Level (MCL) of 4 µg/L, was determined to be a sampling artifact, and is not considered a COPC (PEER 2002). Chromium, TCE, carbon disulfide, chloroform, and 1,1,1-trichloroethane were detected in groundwater, but were below the MCLs, and were considered not to be COPCs.

Table 1.5
Site 5 - Groundwater Monitoring 2000 – 2001
Volatile and Semivolatile Organics and Metals Results
2000-2001 Remedial Investigation
106th Rescue Wing
New York Air National Guard
Westhampton Beach, New York

Parameter	NYS (b)	MCL (c)	Concentration Location (a)					
			BW-SDW014-02	BW-SDW015-02	BW-SDW017-02	BW-PZ003-02	BW-PZ003-22 (Duplicate)	BW-PZ006-02
Benzene	0.7	5	ND	ND	ND	ND	ND	ND
Carbon Disulfide	50	--	ND	ND	ND	0.2 J	4.0	ND
Chloroform	7	80	ND	ND	2.0	0.7 J	0.3 J	ND
Ethylbenzene	5	700	ND	ND	ND	ND	ND	ND
Toluene	5	1000	ND	ND	ND	ND	ND	ND
1,1,1-Trichloroethane	5	200	ND	ND	ND	1.0	1.0	ND
Trichloroethene	5	5	ND	ND	ND	2.0	2.0	ND
Vinyl acetate	--	--	ND	ND	ND	ND	ND	ND
Total Xylenes	5	10,000	ND	ND	ND	ND	ND	ND
Semivolatile Organics (µg/L)								
Bis(2-ethylhexyl)phthalate	50	6	ND	4.0	ND	ND	ND	ND
1,2-Dichlorobenzene	4.7	--	ND	ND	ND	ND	ND	ND
Diethyl phthalate	50 (d)	--	ND	ND	ND	ND	ND	ND

Parameter	NYS (b)	MCL (c)	Concentration Location/Depth (a)					
			BW-SDW014-02	BW-SDW015-02	BW-SDW017-02	BW-PZ003-02	BW-PZ003-22 (Duplicate)	BW-PZ006-02
Metals (µg/L)								
Aluminum	--	--	2000	600	2600	230	240	330
Arsenic	25	50 (d)	ND	ND	ND	ND	ND	7.1
Barium	--	2000	21	62	19	8.1	8.1	13 E
Cadmium	10	5.0	ND	ND	ND	ND	ND	ND
Calcium	--	--	12,000	11,000	8200	12,000	11,000	27,000
Chromium	50	100	8.9	2.7	12	ND	ND	2.3
Cobalt	--	--	ND	ND	ND	ND	ND	ND
Copper	--	1300 (e)	ND	ND	ND	ND	ND	ND
Iron	--	--	4000	2600	4600	220	260	570 E
Lead	25	15 (e)	ND	ND	ND	ND	ND	ND
Magnesium	--	--	2600	1600	2400	2900	2700	1700
Manganese	--	--	150	120	220	19	18	300
Nickel	--	--	ND	ND	ND	ND	ND	ND
Potassium	--	--	1400	2700	2100	1400	1300	1700
Silver	50	100 (f)	ND	ND	ND	ND	ND	3.0
Sodium	--	--	7700	42,000	12,000	23,000	22,000	3700
Vanadium	--	--	7.0	ND	5.6	ND	ND	ND
Zinc	--	--	54	28	130	ND	ND	28

E Estimated value or not reported due to the presence of interferences.

ND Not detected.

-- No applicable action level.

Notes:

Shading and bolding indicates exceedance of action level.

(a) "SDW" refers to small-diameter well; "SW" refers to Stone & Webster well; "-01" refers to Round 1 sampling, February –March 2001; "02" refers to round 2 sampling, May – June 2001;

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

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

(d) Federal MCL is under review.

(e) Treatment Technique Action Level. Federal MCL is concentration in water collected from tap.

(f) Secondary Federal MCL.

The 2001 RI included an investigation of background soils and groundwater. Upgradient soil and groundwater sampling was conducted, which provided data leading to the conclusion that chromium can occur naturally in soil and groundwater at concentrations that exceed action levels (PEER 2002). This result indicates that the exceedance by chromium in groundwater detected during the 1994 SI was due either to the sampling methodology, or to naturally occurring chromium. Based on this conclusion, chromium was eliminated as a COPC in surface and subsurface soil, sediment, and groundwater at Site 5.

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2.0 SUMMARY OF SITE CHARACTERISTICS

Section 2.0 provides a summary of the characteristics of Site 5, 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

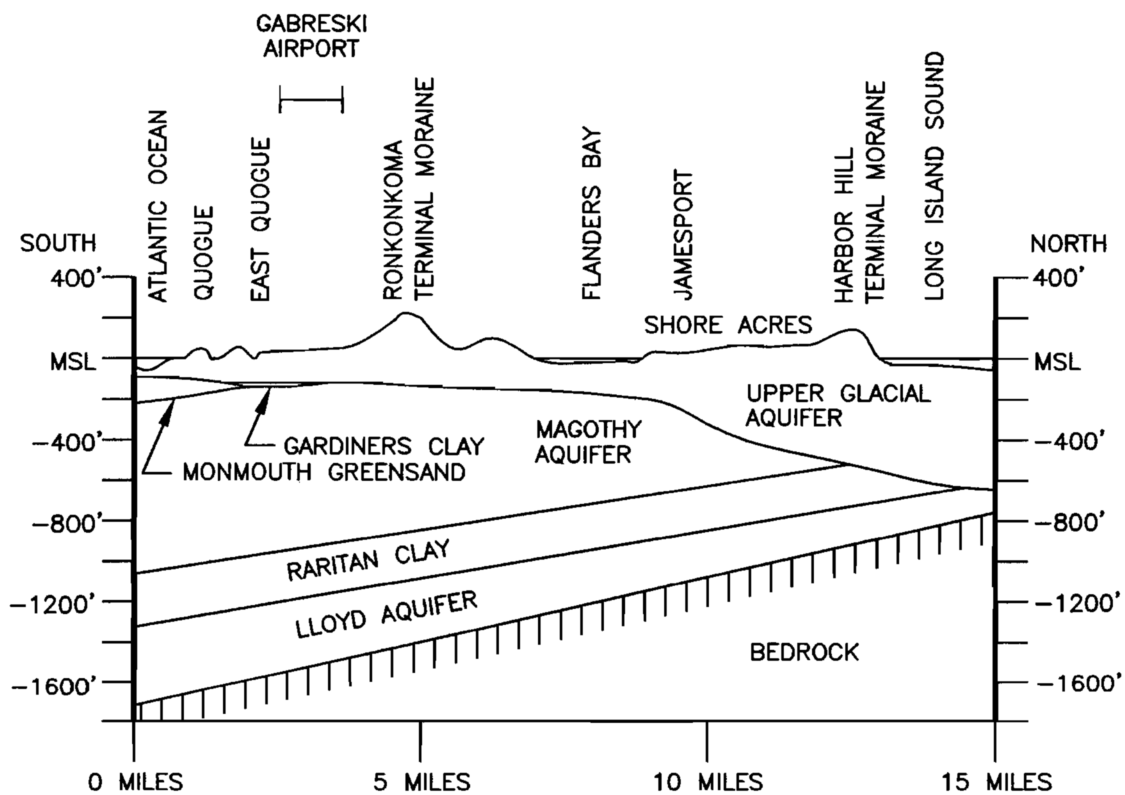
The base is located on the eastern end of Long Island. Long Island is included in the Atlantic Coastal Plain physiographic province. The island is characterized by glacial landforms related to the Wisconsin Glaciation. The island is located at the southern limit of glaciation, and exhibits a series of 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 north-south-trending cross-section of the geologic formations present in the region. The cross-section location is shown in Figure 1.1.

2.2.1 <u>Upper Glacial Deposits</u>

The upper Pleistocene glacial deposits are of greatest importance in regards to Site 5. These deposits form the soil surface across the base, makeup all of the subsurface soils of interest regarding Site 5, and form the matrix for the Upper Glacial Aquifer, described in Section 2.7.1.



SCALE: 1 IN = APPROXIMATELY 3 MILES

PEER	REGIONAL STRATIGRAPHY AND HYDROGEOLOGY 106th RESCUE WING, NEW YORK ANG FRANCIS S. GABRESKI AIRPORT WESTHAMPTON BEACH, NEW YORK	FIGURE 2.1
PROJ./003005-009 GAB/FINAL 5 NFRAP/FIG 2.1		

These unconsolidated sediments are composed of glacial outwash deposits; lucastrine 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 5 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

Although Site 5 was not specifically investigated during the 2000-2001 RI, the soils encountered during the RI are considered representative of the base as a whole, and therefore inclusive of Site 5. The soils encountered during the 2000-2001 RI direct-push and hollow-stem auger (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 x 10^{-1} centimeters per second (cm/sec) from 4 to 6 ft BGS at Site 1, to 1.76 x 10^{-2} cm/sec from 20 to 21.5 ft BGS at Site 2. Natural soil density ranged from 90.3 to 96.1 pounds per cubic ft (lbs/ft^3) dry, and from 94.8 to 103.6 lbs/ft^3 wet. Overall, the soils are well-sorted medium sands, with some gravel and traces of fines. The geology of the soils encountered during the RI is described below.

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

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 rare very fine sands. The sands were commonly well sorted, with some poorly sorted, and often contained trace to common amounts of fine to coarse gravel. Sand densities were commonly loose to very loose from the surface to about 20 to 25 ft below ground surface (BGS); with some medium dense sands from 25 ft to 40 ft BGS. Moisture content was low in the vadose zone, with surface soils being dry, followed by slightly moist soils from approximately 1 to 2 ft BGS, extending downward to about 2 ft above saturation. Moist soils were rarely encountered more then 2 ft above the top of saturation. The capillary zone was usually less than 2 ft in thickness. Saturation was encountered from 35 to 36 ft BGS at Site 12, nearby Site 5. 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 AND SEDIMENT INVESTIGATION RESULTS

Sediment and shallow subsurface soil sampling was performed within the drainage ditch at Site 5 during the 1994 SI, as described in Section 1.4.1. Sample results showed that surficial soil and sediment was primarily impacted at the two most upgradient and exposed sections of the drainage ditch.

During the 1998, RI sediment and shallow subsurface soil sampling was conducted within the drainage ditch at Site 5. The samples had exceedances of action levels for the PAHs benzo(a)anthracene, chrysene, benzo(b)fluoranthene, benzo(k)fluoranthene, benzo(a)pyrene, indeno(1,2,3-cd)pyrene, and dibenzo(a,h)anthracene, and the metals arsenic and lead.

During the 2000-2002 RI sampling of off-site upgradient background soils was performed. The data gathered showed that chromium is naturally occurring in the area soils. Therefore, chromium was eliminated as a COPC.

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 infiltrates rapidly into the extremely well drained soil and recharges the subsurface aquifers. Runoff may move limited distances before infiltration, for example during extreme storm events. 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 the Aspatuck River, then into Quantuck Bay, a tidal estuary which is separated from the Atlantic Ocean by a narrow barrier island (S&W 1999).

Since Site 5 consists of a storm water drainage ditch that extends southwestward from near the southern corner of Building 370, curves southeastward around the eastern end of Building 395, then runs eastward to an area below the apron south of Building 395. Storm water runoff occurs during precipitation events and temporary surface water may be briefly present. However, the extremely porous and well-drained soils allow the majority of runoff to infiltrate rapidly. Most surface water is expected to infiltrate or evaporate, except in rare extreme storm events. During the 1994 SI temporary surface water and sediment were occasionally present in the vicinity of Site 5 near the head of the ditch. Therefore, surface water and sediment sampling were performed in association with Site 5 during the 1994 SI, and follow-up sediment sampling was performed the 1998 RI. Subsequent improvements to the drainage system prevent surface water from ponding.

2.6 SURFACE WATER INVESTIGATION RESULTS

A single surface water sample was collected during the 1994 SI at Site 5. Lead was detected exceeding the NYSDEC action levels then in effect. Surface water at Site 5 is temporary in nature, quickly infiltrating to the subsurface or evaporating. The sample result is considered non-reproducible, since there is no permanent surface water at the site. Therefore, lead in surface water is not considered a COPC.

2.7 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 5. General characteristics of the hydrogeologic units present are summarized on

Table 2.1. Since they are of the most interest, the hydrologic properties of the upper glacial aquifer and the Gardiners clay aquitard further are discussed below.

Table 2.1
Hydrologic Properties of Regional Aquifers
106th Rescue Wing
New York Air National Guard
Westhampton Beach, New York

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

Source: Dames & Moore 1986.

2.7.1 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 (9.4×10^{-2} cm/s) (ABB-ES 1997), and transmissivity is approximately 200 gpd/ft (2.9×10^{-1} cm^2/s) (Dames & Moore 1987).

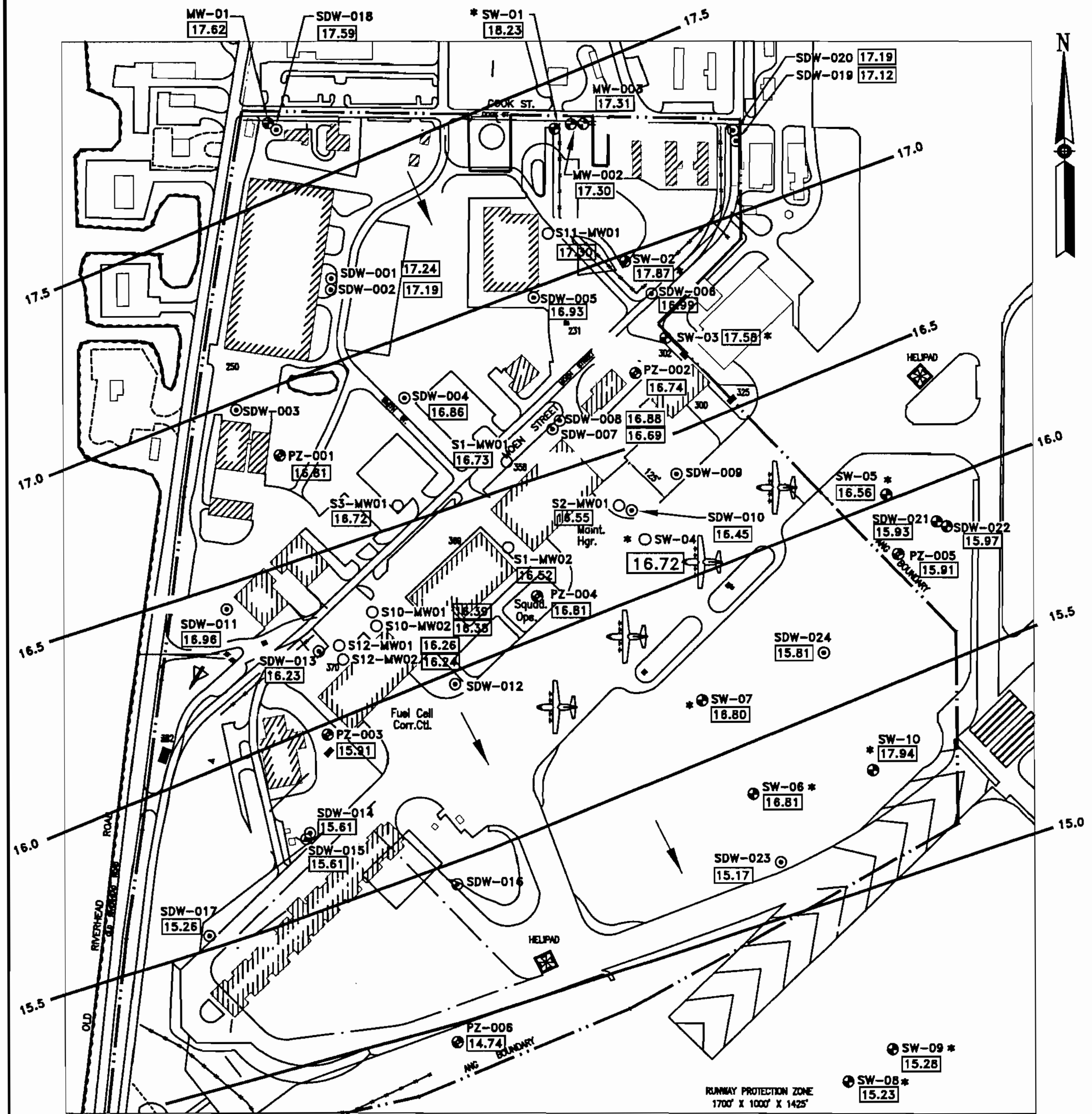
Slug tests performed on base monitoring wells and piezometers, screened in the upper glacial aquifer, indicated hydraulic conductivities ranging from 1.6 x 10^{-2} to 5.2 x 10^{-2} cm/sec (Dames & Moore 1986). A potentiometric surface map for the area of the ANG base, based on measurements recorded on May 15-16, 2001, is shown on Figure 2.2. 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).

2.7.2 Gardiner's 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).

2.8 GROUNDWATER CONTAMINATION INVESTIGATION RESULTS

During the SI completed in 1994, chromium was detected at a concentration below the MCL but above the NYSDEC action level in one groundwater-screening sample collected from Site 5. The elevated chromium was ascribed to the direct-push sampling methodology (ABB-ES 1999). Groundwater sampling in the vicinity of Site 5 was subsequently performed during both the 1998 RI and the 2000 – 2001 RI, with no exceedances of chromium detected. During the 2000 –2001 RI, chromium was further determined to be naturally occurring during the 2000-2001 RI. Consequently, the detection of chromium exceeding action levels in groundwater during the1994 SI is considered to be due to either the sampling methodology, or the natural occurrence of chromium. Therefore, chromium is not considered a COPC (PEER 2002). Groundwater



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

SOURCE: BASE MAP AND ABB-ES, 1997

NOTE: WELL LOCATIONS APPROXIMATE

0 200 400 SCALE IN FEET

PEER	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 2.2
PROJ./003005-011 GAB/FINAL 5 NFRAP/FIG 2.2		

Consequently, the detection of chromium exceeding action levels in groundwater during the1994 SI is considered to be due to either the sampling methodology, or the natural occurrence of chromium. Therefore, chromium is not considered a COPC (PEER 2002). Groundwater monitoring during both the 1994 RI and the 2000 – 2001 RI, has found no detections of other COPCs in groundwater in the vicinity of Site 5.

2.9 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.

2.10 AIR

Air sampling was not conducted at Site 5. The contaminants detected at Site 5 are non-volatile and would not be of concern since the majority of this site is covered in lawn and asphalt.

2.11 RECEPTORS

Site 5 is located within the boundaries of the 106th RQW, a secured government installation, and the Francis S. Gabreski Airport, itself a secure facility. Access to the base is restricted to authorized military and civilian personnel. Access to Site 5 is mixed; part of the site is in a fenced-in, secure area, with access restricted to authorized personnel only; the remainder of the site is unfenced and accessible to personnel from the base. The site surface is 90% covered with lawn, the remainder being scattered asphalt and concrete. The shallow groundwater in the immediate vicinity of the site is not used by the base for water supply. The groundwater occurs at approximately 30 to 35 ft BGS, and is inaccessible except through monitoring wells. Therefore, there is no potential exposure route to base personnel from groundwater at Site 5. Exposure to off-site receptors via surface water runoff is considered highly unlikely due to the soil characteristics at the site, and the configuration of the drainage ditch. 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. The downstream end of the ditch is located on the base property, in a fenced-in, secure area. Therefore, there is no potential exposure route to off site personnel from surface water runoff at Site 5.

Consequently, the only exposure likely to occur in connection with Site 5 would be to construction workers or base personnel who could become exposed to impacted sediment or surface 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 4.3.

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 known habitat to any federally protected, threatened, or endangered animal species (Dames & Moore 1986).

All of the endangered species except the Northern Harrier 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 pathways 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 5 and the airport. Potential mechanisms for transport of contaminants from the sites include surface water run off.

Surface water impact by contaminants from Site 5 is considered highly unlikely for the reasons stated above. The nearest surface water body downgradient of Site 5 is Aspatuck Creek. Aspatuck Creek occasionally 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. The point of discharge for surface water from Site 5 to Aspatuck Creek is located approximately 2500 ft southeast of Site 5. The source of Aspatuck Creek is a spring, located on the base, just east of the southern end of Runway 1, and approximately 3000 ft east of Site 5. Site 5 is covered with 90% grassy lawn, with the remainder being a mix of asphalt and concrete. This significantly limits erosion of impacted soils by surface runoff during high rainfall events. On this basis, surface water bodies in the vicinity of the base are not likely to 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 5, exposure of endangered species to contaminants from the sites is not expected.

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3.0 EVALUATION OF LEAD IN SURFACE SOIL

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. Although the 1998 RI included a risk assessment for Site 5, which included lead, the results of the lead risk assessment could be unreliable. Therefore, in support of the 1998 RI risk assessment, discussed in detail in Section 4.0, risks associated with lead in sediment/surface soil at Site 5 were evaluated using the EPA Technical Review Workgroup (TRW) Adult Lead Methodology (ALM) (EPA 1999). This methodology is currently only applicable to lead.

The decision to use the TRW ALM was based on the following factors:

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

- Site 5 is partially enclosed within a secure area, with access strictly controlled, and is restricted to authorized personnel only, limiting civilian exposure.
- The sediment sample results are considered analogous to surface soils, since the drainage ditch is normally dry, except during rainfall events.

Equations allow calculation of fetal risks from adult exposures to specified levels of soil lead contamination, to support the EPA's goal of limiting exposure risk, which can also be applied in a "forward" manner to predict baseline risks resulting from measured concentrations. The EPA has set the blood level of concern based on the current Office of Solid Waste and Emergency Response guidance, which calls for the establishment of cleanup goals to limit childhood risk of exceeding 10 μg/dL blood lead level to 5%, also known as the 95^{th} percentile (USEPA 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 childbearing 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 from the most recent sampling event for Site 5, which was 778 mg/kg in sediment at 5-SB-01, from 0 to 3 inches BGS (S&W 1998). The results of the calculation are presented in Table 3.2. Figure 3.1 presents the EPA TRW ALM spreadsheet used in the calculation for lead in surface soil at Site 5. In order to obtain reasonably conservative risk estimates, the values assigned to the parameter of $GSD_{i,adult}$ was 2.1, representing a heterogeneous population, and the value assigned to $PbB_{adult,0}$ was 2.0 µg/L, representing the middle portion of the range. The calculated probability that $PbB_{fetal,0.95}$ will exceed the PbB_t at Site 5 is 4.3%. Probabilities of 5% or less are considered acceptable levels of risk (EPA 2001).

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 childbearing 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 USEPA (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: USEPA 1996.

AF_S	Absolute gastrointestinal absorption fraction for ingested lead in soil and lead in dust derived from soil (dimensionless).
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).
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.
IR_S	Intake rate of soil, including both outdoor soil and the soil-derived component of indoor dust (g/day).
$PbB_{fetal,GM}$	Central estimate of blood lead concentrations (μg/dL) for fetuses carried by women who have site exposures to soil lead at concentration, PbS.
$PbB_{adult,0}$	Typical blood lead concentration (μg/dL) in adults (i.e., women of childbearing age) in the absence of exposures to the site that is being assessed.
PbS	Soil lead concentration (μg/g) (appropriate average concentration for individual).
$R_{fetal/maternal}$	Constant of proportionality between fetal and maternal blood lead concentrations.
RBRGs	Risk-Based Remediation Goals.

Table 3.2
Calculation of Blood Lead Concentrations and
Probability of Risk for Site 5
106th Rescue Wing
New York Air National Guard Base
Westhampton Beach, New York

Site ID	PbS	$PbB_{adult, central}$	$PbB_{fetal, 0.95}$	PbB_t	P
5	778	3.1	9.5	10 µg/L	4.3%

Notes:

PbS	Highest detected lead concentration in surface or shallow soils in µg/g, which is equivalent to mg/kg.
$PbB_{adult, central}$	Central estimate of blood lead concentrations (µg/dL) in adults (i.e., women of childbearing 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.

Figure 3.1
Gabreski ANG Site 5 TRW ALM 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	Soil lead concentration	ug/g or ppm	778.0	778.0	778.0	778.0
$R_{fetal/maternal}$	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	3.1	3.1	3.1	3.1
$PbB_{fetal,0.95}$			95th percentile PbB among fetuses of adult workers	ug/dL	7.4	9.5	7.4	9.5
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	%	1.5%	4.3%	1.5%	4.3%

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

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4.0 BASELINE RISK ASSESSMENT

This section describes the process and summarizes the findings of the risk assessment performed as part of the 1998 RI. The baseline risk assessment was conducted for Sites 4, 5, 8 and 9, in accordance with guidelines in the EPA Risk Assessment Guidance document (EPA 1989). For the purposes of this DD, only the portions of the risk assessment relevant to Site 5 are discussed.

The COPCs that were included in the Site 5 risk assessment included: toluene, PAHs, arsenic, and lead. The COPCs were evaluated according to standard risk assessment procedures (EPA 1989). The baseline risk assessment was conducted in four steps. These four steps included:

- Hazard identification;
- Toxicity assessment;
- Exposure assessment; and
- Risk characterization.

Section 4.1 describes hazard identification; Section 4.2 describes the toxicity assessment; Section 4.3 covers the exposure assessment; and Section 4.4 summarizes the results of the risk characterization.

4.1 HAZARD IDENTIFICATION

The risk assessment used NYSDEC screening levels for soil and groundwater [NYSDEC Technical Assistance Guidance Memorandum (TAGM) No. 4046] to identify COPCs, based on the 1998 RI data. Using these criteria, the COPCs that were identified for Site 5 are listed in Table 4.1. This group of COPCs is considered very conservative. It includes compounds such as bis(2-ethylhexyl)phthalate and butylbenzylphthalate which are likely to be sampling artifacts, a compound not detected in the most recent rounds of sampling (toluene), and lead, which has been independently evaluated using the TRW ALM, and found not to pose an unacceptable risk (see Section 3.0).

Table 4.1
Site 5 - Contaminants of Potential Concern Identified During 1998 Risk Assessment
106th Rescue Wing
New York Air National Guard Base
Westhampton Beach, New York

Volatile Organics	Semivolatile Organics		Metals
Toluene	Acenaphthene	Carbazole	Arsenic
	Acenaphthylene	Chrysene	Lead
	Anthracene	Dibenz(a,h)anthracene	
	Benzo(a)anthracene	Dibenzofuran	
	Benzo(a)pyrene	Fluoranthene	
	Benzo(b)fluoranthene	Fluorene	
	Benzo(g,h,i)perylene	Indeno(1,2,3-cd)pyrene	
	Benzo(k)fluoranthene	2-Methylnaphthalene	
	Bis(2-ethylhexyl)phthalate	4-Methylphenol	
	Butylbenzylphthalate	Naphthalene	
		Phenanthrene	
		Pyrene	

Source: S&W 1999.

4.2 TOXICITY ASSESSMENT

The toxicity assessment was compiled from databases including the Integrated Risk Information System (EPA 1998) and the Health Effects Assessment Summary Table (EPA 1997). Both noncarcinogenic effects and cancer slope factors (CSFs) were included in the toxicity assessment.

Assessment of noncarcinogenic effects included consideration of the no observed adverse effect level (NOAEL), lowest observed adverse effect level (LOAEL), to estimate chemical-specific reference doses (RfDs). Due to limited data on dermal toxicity, RfDs derived for inhalation routes of exposure were used to estimate risks for the dermal adsorption route. The represents a conservative assumption, since inhalation adsorption is likely to significantly exceed dermal adsorption.

The derivation of CSFs is designed to be conservative, representing an upper bound of the ratio of increase in cancer risk to lifetime average daily dose. Oral CSFs were used to evaluate dermal dose, another conservative assumption.

Certain conservative assumptions were made due to the fact that toxicity values were not available for all of the COPCs. Toxicity values for non-cancer and cancer effects were cross-assigned between structurally similar compounds where chemical-specific information was not available. Cross-assignments included:

- Toxicity value for acenaphthene was assigned to acanaphthylene;
- Toxicity value for pyrene was assigned to phenanthrene; and
- Toxicity value for benzo(k)fluoranthene was assigned to benzo(g,h,i)perylene;

A further conservative assumption included the assignment of the carcinogenic toxicity value to arsenic. Although arsenic can be present in both carcinogenic and noncarcinogenic forms, the assessment assumed that all of the arsenic present was the more toxic carcinogenic form (S&W 1999).

4.3 EXPOSURE ASSESSMENT

Exposure was 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. The exposure assessment was conducted to estimate the magnitude of actual and/or potential exposures, the frequency and duration of these exposures, and the routes and pathways by which organisms are potentially exposed. Physical characteristics of the site were considered to assess pathways, and reasonable exposure scenarios were developed. Estimated exposure doses were then calculated for the exposure pathways for the receptor populations for both current and future use scenarios (S&W 1999).

4.3.1 Exposure Setting

This section generally describes the physical characteristics of Site 5, as found during the 2000-2001 RI. Additional information concerning the physical characteristics of the base and Site 5 is provided in Sections 2.0 and 3.0 of the Draft-Final RI Report (PEER 2002). These conditions are little changed since the 1998 risk assessment.

Access to the base is restricted to base personnel and authorized civilians only. The base is fenced and Site 5 is located within the base perimeter fence. Site 5 is located in the southwest portion of the base. Approximately 90 % of the site is covered with lawn. The site is partially enclosed within a gated chain link fence, which is a secure area, with strict control against unauthorized entry. The portion of the site which is enclosed includes those areas where the highest concentrations of contaminants have been detected. The unfenced portion of the site is also in a restricted area. Future plans call for the base and airport to remain active indefinitely, with no future plans for any residential usage of the property (PEER 2002).

Groundwater at the site is present at approximately 30-to-35 ft BGS and moves towards the southeast. Groundwater is not used for any purpose by the base. Water for all purposes, including human consumption, is supplied by the Suffolk County Water Authority. Surface water is temporary, and quickly infiltrates or evaporates (PEER 2002).

4.3.2 Potential Receptors

Potential receptors and exposure scenarios were identified in the 1998 risk assessment based on demographics and land use information. Site 5 is currently used for drainage and open space.

4.3.2.1 Current Use Scenarios

Two current use scenarios were considered for Site 5 in the 1998 risk assessment; on-site maintenance worker and construction/utility worker.

On-Site Maintenance Worker

An onsite maintenance worker was assumed to perform grounds maintenance from 1 to 2 days a week at the site, for 9 months a year for up to 25 years. Exposure could occur through inhalation of fugitive dust, incidental ingestion of surface soil/sediment, and dermal contact with surface soil/sediment. Exposure to COPCs in groundwater was considered negligible and not considered further (S&W 1999).

Construction/Utility Worker

A construction/utility worker was assumed to perform general construction and utility maintenance on the surface and subsurface at the site 5 days a week, for 20 to 30 days a year, for 0.5 to 1 years. Exposure could occur to surface or subsurface COPCs through inhalation of fugitive dust, incidental ingestion of surface soil/sediment, and dermal contact with surface soil/sediment. Exposure to COPCs in groundwater was considered negligible and not considered further (S&W 1999).

4.3.2.2 Potential Future Use Scenarios

Two potential future use scenarios were considered for Site 5 in the 1998 risk assessment: onsite maintenance worker and construction/utility worker (S&W 1999). Both of these potential future use scenarios are essentially identical to the analogous current use scenarios, with the addition of exposure to groundwater-borne COPCs, via ingestion, based on potential future use of groundwater for drinking water supply. These are extremely unlikely and highly conservative scenarios, given the environmental status of the site and the ready availability of drinking water from other reliable sources. Furthermore, the most recent groundwater samples at Site 5 found no COPC concentrations exceeding MCLs or NYSDEC action levels (PEER 2002).

4.3.2.3 Potential Offsite Receptors

Potential off-site receptors were not considered during the 1998 risk assessment. However, the 2000-2001 RI evaluated off-site receptors, which were identified as area residents that might be exposed to surface water impacted by contaminated runoff from the site. This evaluation, which supports the 1998 risk assessment, is summarized below.

Potential exposure routes evaluated in the 2000-2001 RI for off-site receptors included ingestion of impacted surface water, and 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 PAHs or metals. Infiltration rates at the base are relatively high and little surface water leaves the base as runoff. Currently, the site is mostly covered by lawn which permits efficient infiltration over the majority of surface soil at the site. If excavation activities occur at the site in the future, then exposed surface soils may have a higher potential for reaching 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 2500 ft) and the low concentrations of contaminants. Therefore, there are no complete exposure pathways identified for off-site receptors (PEER 2002).

4.3.3 Exposure Parameters

The 1998 risk assessment used site-specific considerations and risk assessment guidelines to select conservative parameters to quantify exposures. Exposure parameters were developed to approximate the central tendency exposure and reasonable maximum exposure for each potential receptor (S&W 1999).

4.3.4 Exposure Point Concentrations

In the 1998 risk assessment, exposure point concentrations (EPCs), the quantity of a COPC in an environmental medium to which a receptor may be exposed, were approximated to the upper bound limit using the 95th percentile upper confidence limit of the mean detected concentrations of the COPCs in each media. The data was adjusted to allow a conservative estimate of exposure. EPCs were developed for exposure points including: surface soil; groundwater; fugitive dust from surface soil; fugitive dust from subsurface soil; indoor air from groundwater; and indoor air from soil. Relative adsorption factors were assigned as follows: inhalation and ingestion doses = 1.0; dermal exposure to volatile organics = 0.25; dermal exposure to semivolatile organics = 0.1; and dermal exposure to metals = 0.01 (S&W 1999).

4.3.5 Fate and Transport of Contaminants

Fate and transport of contaminants was modeled in the 1998 risk assessment using equations to estimate reasonable EPCs for contaminants in fugitive dust, the migration of volatile COPCs from groundwater to air in the capillary zone, and the contribution of soil contamination to indoor air (S&W 1999).

4.3.6 Estimation of Potential Exposure Doses

In order to quantitatively asses the risk posed by one or more contaminants in a medium, the exposure dose for each COPC was estimated. The 1998 risk assessment accomplished this using an equation to calculate the exposure dose. The equation accounted for: the concentration of the COPC in the media; the intake rate; exposure frequency; exposure duration; the relative adsorption factor; body weight; and averaging time (S&W 1999).

4.4 RISK CHARACTERIZATION

The risk characterization process was used to estimate the magnitude of noncarcinogenic and carcinogenic risks to human health associated with exposure to the COPCs. It combines the results of the previous steps to arrive at a quantitative estimate of risk (S&W 1999).

4.4.1 Noncarcinogenic Risk Methodology

In the 1998 risk assessment, noncarcinogenic exposure effects were measured using the Non-cancer Hazard Index (HI), as defined by the EPA. The HI is defined as the ratio of the exposure dose to the RfD. The risk assessment developed HIs for individual receptors for each exposure route. The derived HIs were than summed to obtain the total hazard index for the individual receptor (S&W 1999). According to the EPA, an HI less than 1.0 indicates that risk from non-cancer effects resulting from COPC exposure is acceptable (EPA 1989).

4.4.2 Carcinogenic Risk Methodology

Lifetime cancer risk was estimated by the 1998 risk assessment, by calculating total incremental lifetime cancer risk for each exposure pathway and summing the resulting risk for each individual COPC. Cancer risk predicts the likelihood that an exposed individual will develop cancer, over and above the background cancer rate. Cancer risk was arrived at by multiplying the cancer dose times the CSF (S&W 1999). The acceptable level of total lifetime cancer risk as defined by the EPA is from 1.0E-04 to 1.0E-06, or from 1 in 10,000 to I in 1,000,000 people over the course of a lifetime (EPA 1989).

4.4.3 <u>Risk Characterization</u>

The risk characterization results of the 1998 risk assessment are summarized in Table 4.2, including the non-cancer HI and cancer risks for each receptor considered under current and future use scenarios.

4.4.3.1 Risk to Maintenance Worker

Under the current use scenario, the Site 5 non-cancer HI estimated for the maintenance worker was 6.9E-04 under average exposure, and 2.8E-03 under reasonable maximum exposure. These indices are less than 1, and considered acceptable. The maintenance worker current use cancer risk estimated for Site 5 was 4.5E-07 under average exposure conditions, and 5.3E-06 under reasonable maximum exposure conditions. These cancer risks are within the acceptable range of between 1.0E-04 and 1.0E-06.

Under the maintenance worker future use scenario, the Site 5 non-cancer HI estimated for the maintenance worker was 6.9E-04 under average exposure, and 2.8E-03 under reasonable maximum exposure. These indices are less than 1, and considered acceptable. The maintenance worker future use cancer risk estimated for Site 5 was 4.5E-07 under average exposure conditions, and 5.3E-06 under reasonable maximum exposure conditions. These cancer risks are within the acceptable range of between 1.0E-04 and 1.0E-06.

4.4.3.2 Risk to Construction/Utility Worker

Under the current use scenario, the Site 5 non-cancer HI estimated for the construction/utility worker was 3.5E-03 under average exposure, and 2.6E-02 under reasonable maximum exposure.

Table 4.2
Baseline Risk Assessment - Estimated Lifetime Risk
106th Rescue Wing
New York Air National Guard Base
Westhampton Beach, New York

CURRENT EXPOSURE SCENARIOS					
Total Non-Cancer Hazard Index			**Total Cancer Risk**		
Exposure Scenario	**Average Exposure**	**Reasonable Maximum Exposure**	**Exposure Scenario**	**Average Exposure**	**Reasonable Maximum Exposure**
Maintenance Worker	6.9E-04	2.8E-03	Maintenance Worker	4.5E-07	5.3E-06
Construction/Utility Worker	3.5E-03	2.6E-02	Construction/Utility Worker	1.8E-07	1.9E-06
FUTURE EXPOSURE SCENARIOS					
Total Non-Cancer Hazard Index			**Total Cancer Risk**		
Exposure Scenario	**Average Exposure**	**Reasonable Maximum Exposure**	**Exposure Scenario**	**Average Exposure**	**Reasonable Maximum Exposure**
Maintenance Worker	6.9E-04	2.8E-03	Maintenance Worker	4.5E-07	5.3E-06
Construction/Utility Worker	3.5E-03	2.6E-02	Construction/Utility Worker	1.8E-07	1.9E-06

NA Not applicable.

These indices are less than 1, and considered acceptable. The construction/utility worker current use cancer risk estimated for Site 5 was 1.8E-07 under average exposure conditions, and 1.9E-06 under reasonable maximum exposure conditions. These cancer risks are within the acceptable range of between 1.0E-04 and 1.0E-06.

Under the construction/utility worker future use scenario, the Site 5 non-cancer HI estimated for the construction/utility worker was 1.8E-07 under average exposure, and 1.9E-06 under reasonable maximum exposure. These indices are less than 1, and considered acceptable. The construction/utility worker future use cancer risk estimated for Site 5 was 1.8E-07 under average exposure conditions, and 1.9E-06 under reasonable maximum exposure conditions. These cancer risks are within the acceptable range of between 1.0E-04 and 1.0E-06.

4.6 SUMMARY OF HUMAN HEALTH RISK

The 1998 risk assessment of Site 5 determined that based on current and future use scenarios, and as a result of exposure to COPCs at Site 5, potential workers will experience non-cancer and cancer risks that are within acceptable levels. The estimated non-cancer risks are well below 1.0, which is the EPA accepted level for HI. Incremental cancer risks were estimated within or below the EPA-accepted range of from 1.0E-04 to 1.0E-06 for all potential receptors. The 1998 RI Report therefore recommended no further action at Site 5.

4.7 ECOLOGICAL ASSESSMENT

The ecological assessment characterized the risks to the environment posed by the COPCs that were identified at Site 5. Contaminants were detected in surface soil at the site, but not in saturated subsurface soil. Potential ecological receptors to the COPCs were evaluated on the basis of the transport mechanisms identified for the site. Contaminated media considered consisted of surface soils. Accordingly, potential receptors and potential exposure pathways may include:

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

Potential endpoint receptors that were considered for the ecological assessment included endangered species that have been identified within a 4 mile radius of the base. These include the Northern Harrier, the Osprey, the Tiger Salamander, and the Eastern Mud Turtle. There are no endangered plant species within a 4-mile radius of the base. Accordingly, plant species were not 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).

4.7.1 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), with the possible exception of the Northern Harrier. 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. Both Old Ice Pond and North Pond are part of the Quogue Waterfowl Refuge, located approximately 7000 ft east of Site 5. There is no surface water or groundwater connection between Site 5 and the Quogue Wildlife Refuge. Potential mechanisms for transport of contaminants from the sites include surface water run off.

Surface water may be potentially impacted by contaminated surface water runoff from the sites with COPCs in surface soils. Groundwater beneath the base and airport generally flows toward the southeast. Contamination of surface water via the groundwater pathway is not likely since none of the surface water bodies (including the waterfowl refuge) are located hydraulically downgradient of Site 5. Contamination of nearby surface water bodies due to impacted surface water runoff from the base is not likely either. The nearest 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 approximately 2500 ft east-southeast of the site. Additionally, the majority of the site is covered with lawn and brush which 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 5 groundwater, or by contaminated surface runoff, exposure of endangered species to contaminants from the sites is not expected.

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5.0 SELECTED ACTION: NO FURTHER RESPONSE ACTION PLANNED

A NFRAP decision is proposed for Site 5 on the basis that the site poses no significant risks to human health and the environment. This decision was developed in accordance with the June 1995 U.S. Air Force NFRAP Guide; CERCLA, as amended by the Superfund Amendments and Reauthorization Act; and to the extent practicable, the National Oil and Hazardous Substances Pollution Contingency Plan.

According to the June 1995 U.S. Air Force NFRAP Guide, a Category III NFRAP decision is appropriate for a geographically contiguous area or parcel of real property where environmental evidence demonstrates that hazardous substances or petroleum products or their derivatives have been stored, released, or disposed of, but are present in quantities that require no response action to protect human health and the environment. Based on the results of the 1994 SI, 1998 RI, and the 2000-2001 RI conducted at Site 5, these criteria have been met.

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APPENDIX A

REFERENCES

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REFERENCES

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