INSTALLATION RESTORATION PROGRAM

FINAL
REMEDIAL INVESTIGATION/FEASIBILITY STUDY
WORK PLAN
FOR
SITES 1, 2, 3, 7, 10, 11, AND 12

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

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Prepared for the

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LIST OF ACRONYMS

ABB-ES	ABB–Environmental Services, Inc.
ANG	Air National Guard
ANG/CEVR	Air National Guard/Environmental Division
AOC	Area of Concern
ARAR	Applicable or Relevant and Appropriate Requirements
AST	Aboveground Storage Tank
ASTM	American Society for Testing and Materials
AVGAS	Aviation Gasoline
BGS	Below Ground Surface
BOD	Biological Oxygen Demand
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CFR	Code of Federal Regulations
CGI	Combustible Gas Indicator
CLP	Contract Laboratory Program
COD	Chemical Oxygen Demand
CRDL	Contract Required Detection Limit
DERP	Defense Environmental Restoration Program
DO	Dissolved Oxygen
DoD	Department of Defense
DOT	Department of Transportation
EM	Environmental Manager
EPA	Environmental Protection Agency
ERP	Environmental Restoration Program
FID	Flame Ionization Detector
FS	Feasibility Study
FTA	Fire Training Area
GIS	Geographical Information System
HASP	Health and Safety Plan
IDLH	Immediately Dangerous to Life or Health
IDMAES	Integrated Data Management, Analysis, and Evaluation System
IRP	Installation Restoration Program
LEL	Lower Explosive Limit
MCL	Maximum Contaminant Level
MS/MSD	Matrix Spike/Matrix Spike Duplicate
MSL	Mean Sea Level
NGB	National Guard Bureau
NOV	Notice of Violation
NYSDEC	New York State Department of Environmental Conservation
O.D.	Outer Diameter
OSHA	Occupational Safety and Health Administration
OVD	Organic Vapor Detector
PA	Preliminary Assessment
PAH	Polynuclear Aromatic Hydrocarbons

LIST OF ACRONYMS (Continued)

PCB	Polychlorinated Biphenyl
PCE	Tetrachloroethene
PEER	PEER Consultants, P.C.
PEL	Permissible Exposure Limit
PID	Photoionization Detector
POL	Petroleum, Oils, and Lubricants
PPE	Personal Protective Equipment
PVC	Polyvinyl Chloride
QA	Quality Assurance
QC	Quality Control
QAPP	Quality Assurance Program Plan
QAPjP	Quality Assurance Project Plan
RAGS	Risk Assessment Guidance for Superfund
RI	Remedial Investigation
S&W	Stone & Webster Environmental and Technology Services
SARA	Superfund Amendments and Reauthorization Act
SCDHS	Suffolk County Department of Health Services
SHSO	Site Health and Safety Officer
SOP	Standard Operating Procedure
SOW	Statement of Work
STEL	Short-Term Exposure Limit
TAL	Target Analyte List
TCLP	Toxicity Characteristic Leaching Procedure
TCP	Tri-Ortho Cresyl Phosphate
TDS	Total Dissolved Solids
TLV-TWA	Threshold Limit Value – Time Weighted Average
TOC	Total Organic Carbon
TPH	Total Petroleum Hydrocarbons
TSS	Total Suspended Solids
UST	Underground Storage Tank System

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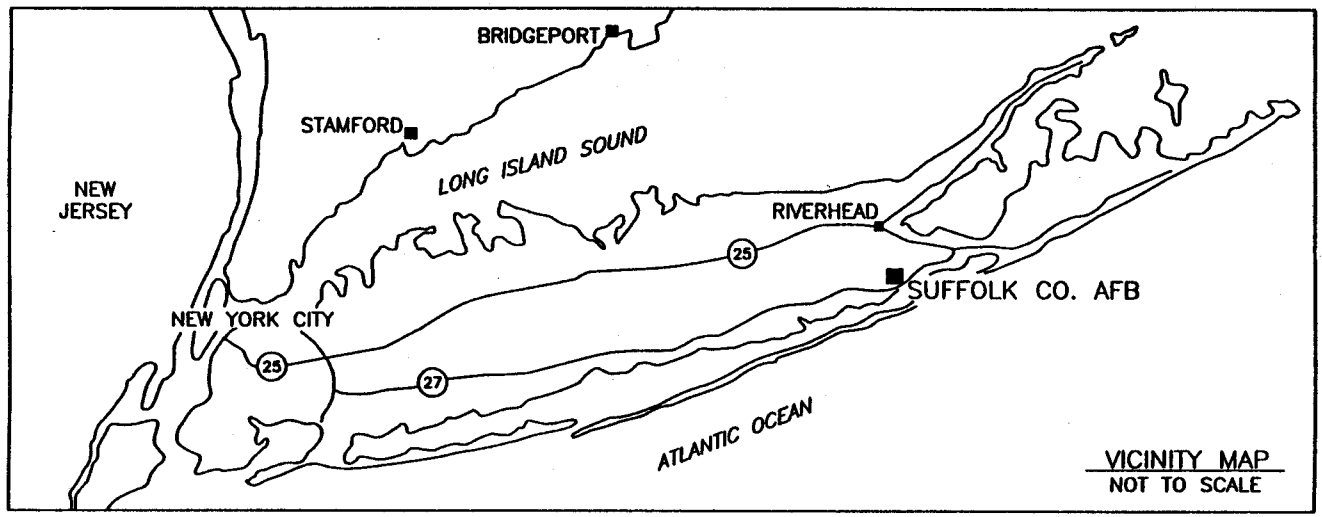
1.0 INTRODUCTION

This Work Plan outlines activities to be conducted for a Remedial Investigation/Feasibility Study (RI/FS) at Sites 1, 2, 3, 7, 10, 11, and 12 at the 106th Rescue Wing, New York Air National Guard (ANG), located at the Francis S. Gabreski Airport in Westhampton Beach, New York. Figure 1.1 shows the location of the Francis S. Gabreski Airport in relation to Long Island, New York, and to the local area. The sites to be investigated are:

- Site 1 – Aviation Gasoline (AVGAS) Spill Site
- Site 2 - Former Hazardous Waste Storage Facility (1970 to 1982)
- Site 3 - Former Waste Storage Area (1984 to 1989)[1]
- Site 7 - Former Fire Training Area (FTA)
- Site 10 - Waste Stripper Tank
- Site 11 - Trench Drain Sump[2]
- Site 12 - Spill Site Northwest of Building 370

Figure 1.2 shows the locations of Sites 1, 2, 3, 7, 10, 11, and 12 in relation to the 106th Rescue Wing (RQW) ANG facility.

[1] Historically, this site was referred to as "Current Waste Storage Area." For clarity, the site will be referred to herein as shown.
[2] Formerly referred to as the "Waste Oil Vessel." The site will be referred to herein as the "Trench Drain Sump."



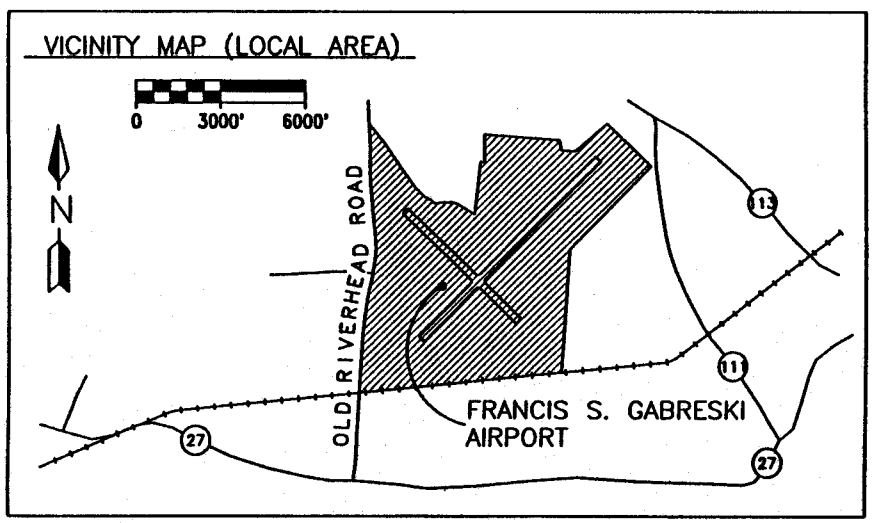


FIGURE 1.1	FRANCIS S. GABRESKI LOCATION MAP 106th RESCUE WING, NEW YORK AIR NATIONAL GUARD FRANCIS S. GABRESKI AIRPORT WESTHAMPTON BEACH, NEW YORK	PEER PROJ./1566-055 FILE: GAB-023.DWG

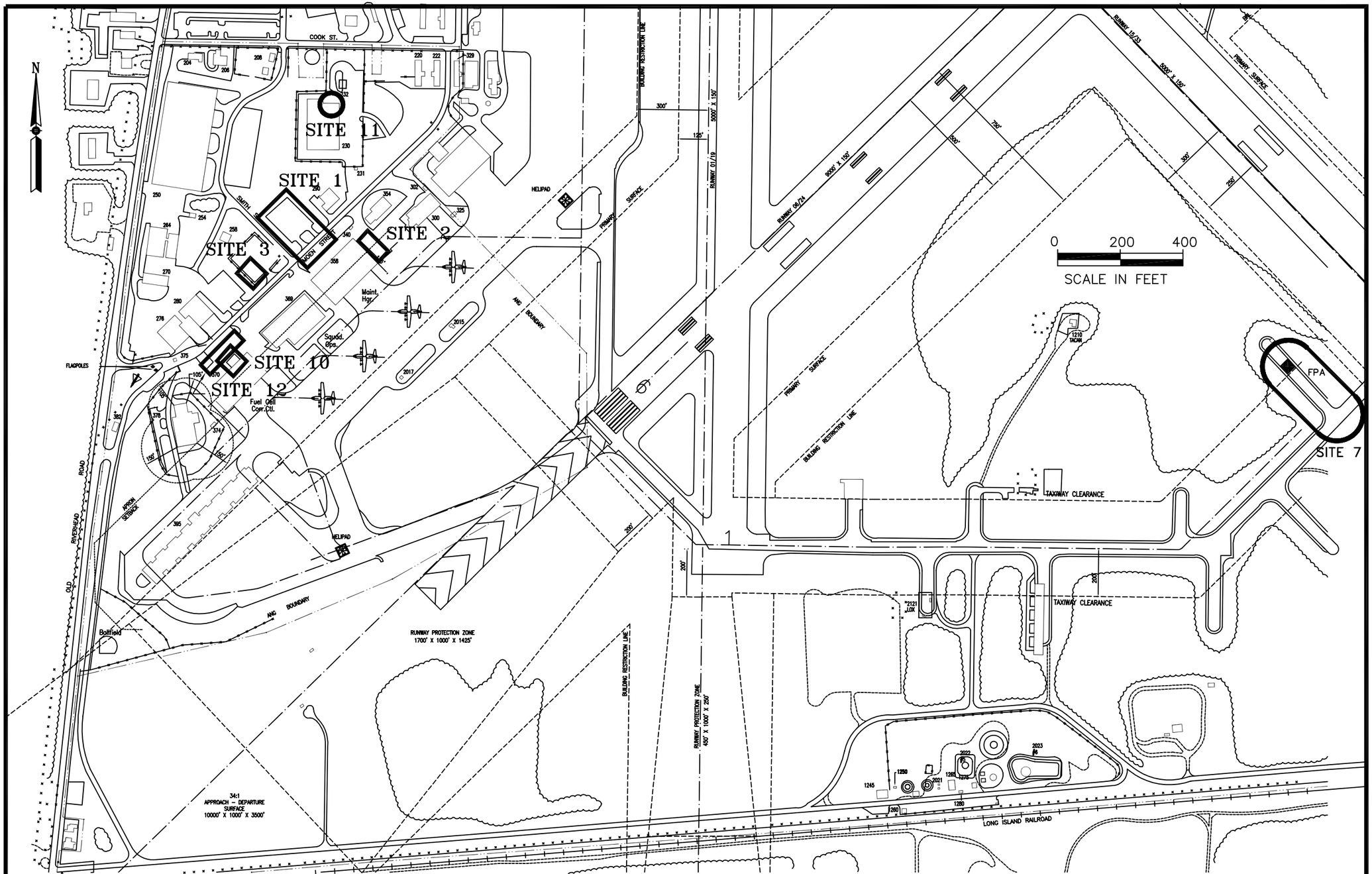


FIGURE
1.2

IRP LOCATION MAP FOR SITES 1, 2, 3, 7, 10, 11, AND 12
106th RESCUE WING, NEW YORK AIR NATIONAL GUARD
FRANCIS S. GABRESKI AIRPORT
WESTHAMPTON BEACH, NEW YORK

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In addition, information and data for Sites 4, 5, 8, and 9, as presented in the "Revised Draft Remedial Investigation, Sites 4, 5, 8, and 9" [Stone & Webster Environmental Technology & Services (S&W), January 1999], will be evaluated and incorporated into this RI/FS. The focus will be to identify and address potential data gaps, and to organize and present the existing data in a comprehensive fashion. The sites to be evaluated and incorporated into this RI/FS are:

- Site 4 – Aircraft Refueling Apron Spill Site
- Site 5 – Southwest Storm Drainage Ditch
- Site 8 – Old Base Septic System
- Site 9 – Ramp Drainage Outfall

The activities to be conducted at the 106th Rescue Wing are described in detail in this Work Plan.

PEER Consultants, P.C. (PEER), has been tasked by the ANG/Environmental Division, Installation Restoration Branch (ANG/CEVR) to prepare this RI/FS Work Plan. The activities are necessary due to the presence of potential contamination in surface soils, subsurface soils, and groundwater in the vicinity of the sites, which was detected during previous investigations.

A kickoff/scoping meeting was held at the base on March 29, 2000. Representatives from the New York State Department of Environmental Conservation (NYSDEC), the ANG/CEVR, the installation, the Suffolk County Department of Health Services (SCDHS), and PEER were present when the project objectives were discussed. Minutes of the meeting were distributed to all parties in April 2000.

A regulatory meeting was held at the base on August 31, 2000. The NYSDEC, the ANG/CEVR, the 106th RQW, SCDHS, and PEER were again present. Revisions to this Work Plan were discussed, finalized, and are incorporated herein.

1.1 PROJECT OBJECTIVES AND SCOPE

The project objectives are to characterize the nature and extent of contamination at the sites, and to assess the risks associated with any identified threat to human health or the environment by conducting an RI. The results of the RI will be documented in the RI Report as discussed in Section 17.0. Additionally, data necessary to perform an FS will be collected during the RI. An FS, as described in Section 12.0, will be conducted if the RI results indicate that a remedial action is necessary. The results of the FS will be documented in an FS Report, which is described in Section 18.0.

The scope of activities to be performed in order to meet the project objectives for the seven sites of concern includes:

- determining the source(s) of soil and groundwater contamination to the extent feasible;
- defining the extent of soil and groundwater contamination in the vicinity of each site;
- identifying the chemicals of potential concern at each site;
- screening those chemicals of potential concern identified against risk-based concentrations (EPA 1996 and 1997);
- taking those chemicals of potential concern remaining after the screening through risk assessment;
- evaluating the routes of contaminant migration and identifying potential receptors;
- developing, screening, and evaluating potential remedial alternatives; and
- providing data for use in remedial design.

1.2 IRP DESCRIPTION - IRP PROCESS AND FLOW CHART

The Defense Environmental Restoration Program (DERP) [later renamed the Environmental Restoration Program (ERP)] was established in 1984 to promote and coordinate efforts for the

evaluation and cleanup of contamination at Department of Defense (DoD) installations. On January 23, 1987, Presidential Executive Order 12580 was issued which assigned the responsibility to the Secretary of Defense for carrying out DERP within the overall framework of the Superfund Amendments and Reauthorization Act (SARA) and the Comprehensive Environmental Response, Compensation, and Liability Act of 1980 (CERCLA). The Installation Restoration Program (IRP) was established under DERP to identify, investigate, and clean up contamination at installations. The IRP focuses on the cleanup of contamination associated with past DoD activities to ensure that threats to public health are eliminated, and to restore natural resources for future use (DoD 1991).

The IRP is divided into several phases, as illustrated on Figure 1.3. The major phases are defined and described in the following paragraphs.

Preliminary Assessment - The objective of the Preliminary Assessment (PA) is to identify and evaluate past disposal and/or spill sites that might pose a potential or actual hazard to public health, public welfare, or the environment. Activities performed during the PA phase include identification of areas of concern (AOCs) and identification of applicable or relevant and appropriate requirements (ARARs) for site cleanup, if necessary (DoD 1991).

Site Investigation - The Site Investigation (referred to as a Site Inspection under CERCLA) is conducted to confirm the presence or absence of contamination at AOCs identified during the PA, and to evaluate their potential for harm to human health or the environment from a worst-case scenario.

Remedial Investigation - The objectives of the RI are to determine the nature and extent of contamination at a site, assess the risks associated with any identified threat to human health or the environment, and provide a basis for determining the types of response actions to be considered (EPA 1988a).

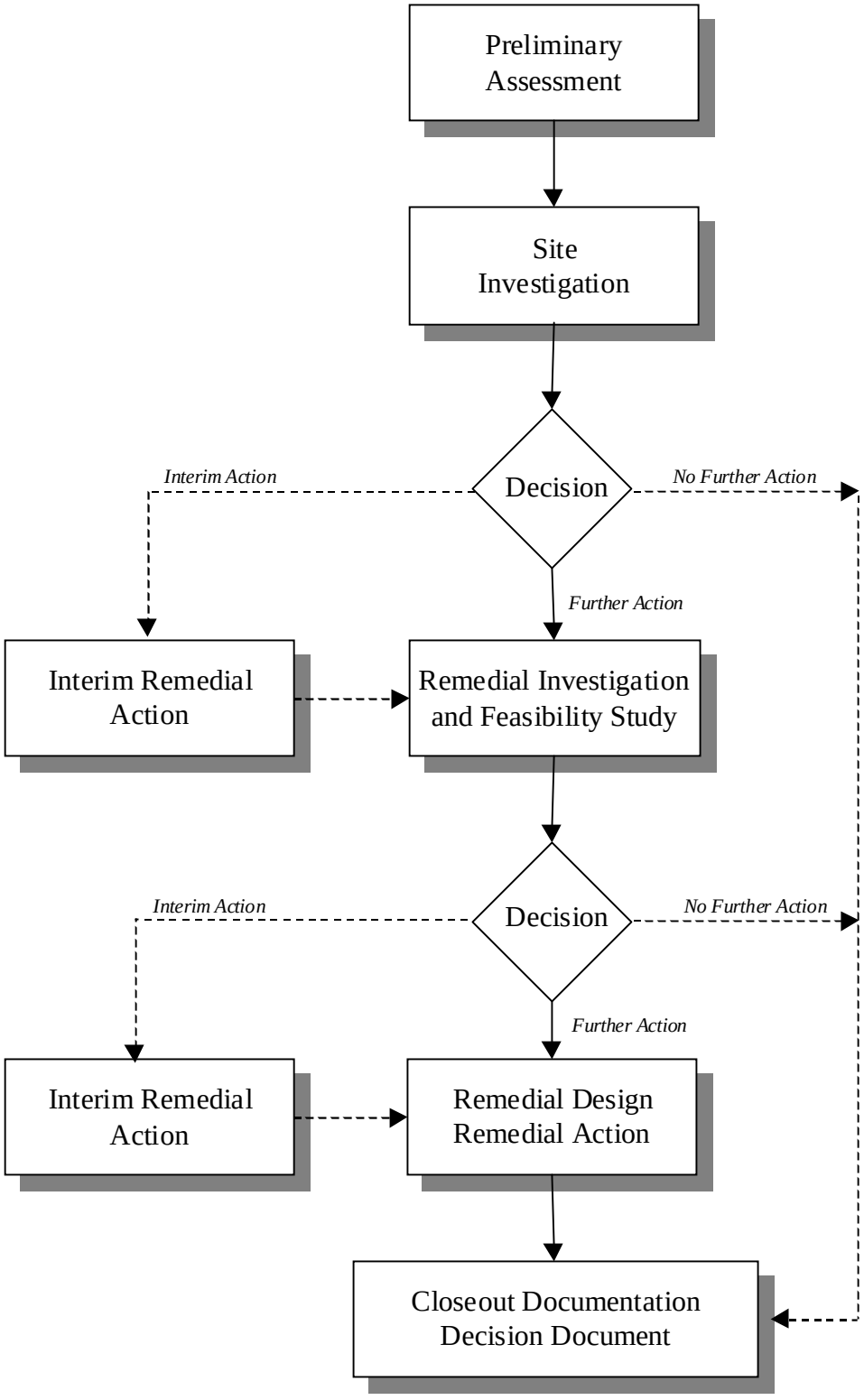

Figure 1.3 IRP Decision Flow Diagram

The RI includes field activities performed to quantify the potential contaminants, delineate the extent of contamination, evaluate contaminant migration pathways, and obtain the data necessary to support any remedial action decisions identified during the FS. Field activities may include the installation of soil borings and/or monitoring wells, and the collection and analysis of groundwater and soil samples.

Hydrogeologic studies are required to evaluate the subsurface groundwater flow rates and direction of contaminant migration. A risk assessment will be performed for contaminants that cannot be eliminated as contaminants of concern using screening levels established by the EPA and/or NYSDEC.

The risk assessment will provide the basis for determining whether or not a remedial action is necessary (EPA 1988a).

The findings from the RI result in the selection of one of the following options:

- No Further Action: The results of the investigation indicate that contaminants do not pose a significant threat to human health or the environment. Therefore, no further action is warranted and a decision document will be prepared to close the site.

- Long-Term Monitoring: The results of the investigation indicate that contamination is present at the site. However, off-site migration of contaminants has not occurred, or is expected to occur at a relatively slow rate, if at all. Long-term monitoring may be recommended to detect the possibility of future problems.

- Feasibility Study: The results of the investigation indicate the presence of contamination that may pose a threat to human health and the environment, and some sort of cleanup or remedial action is necessary.

Feasibility Study - Based on results of the RI and review of state and federal regulatory requirements, an FS is prepared to develop, screen, and evaluate alternatives for the remediation of contaminated media at a site.

Remedial Design - The remedial design involves the formulation and approval of the engineering designs required to implement the selected remedial action identified in the FS.

Remedial Action - The remedial action is the actual implementation of remedial measures to eliminate the hazard or, at a minimum, to reduce it to an acceptable limit.

Interim Remedial Action Alternatives - At any point, it may be determined that a site poses an immediate threat to public health or the environment, thus necessitating prompt removal of the contaminants. Interim remedial actions or other appropriate remedial actions may be implemented during any phase of an IRP project (EPA 1988b).

1.3 GENERAL INVESTIGATION APPROACH

The general investigation approach for the seven sites of concern will be: to focus on site groundwater at Sites 1, 2, 3, 10, and 11, and to focus on surface soils at Sites 1 and 2, and subsurface soils at Sites 3, 7, 11, 12, to determine the nature and extent of surface and subsurface soils contamination in the vicinity of each site.

Analytes detected will be identified as contaminants of potential concern. The concentrations of contaminants of potential concern will be compared to risk-based concentrations defined by the U.S. Environmental Protection Agency (EPA), Region III (EPA 1997). Contaminants with concentrations less than the risk-based concentrations will not be considered as a potential concern. A risk assessment will be performed for those chemicals of concern that fail the screening process.

Data required for conducting an FS also will be obtained during the RI, although an FS may not be necessary.

1.4 WORK PLAN STRUCTURE

This RI/FS Work Plan is organized into 19 sections and 2 appendices:

- Section 1.0 presents the introduction to the Work Plan;
- Section 2.0 describes the project management approach;
- Sections 3.0 and 4.0 provide information on the facility background and environmental setting;
- Section 5.0 provides the permit requirements;
- Sections 6.0, 7.0, and 8.0 provide the investigative approach, the field investigation procedures, and sample collection procedures;
- Section 9.0 outlines ARARs;
- Section 10.0 describes the data requirements and objectives necessary for assessing contaminant fate and transport;
- Section 11.0 describes the data requirements and objectives for a risk assessment and an ecological evaluation;
- Section 12.0 discusses the key elements of the FS;
- Section 13.0 discusses the equipment decontamination procedures;
- Section 14.0 contains borehole abandonment procedures;
- Section 15.0 contains the procedures for handling of investigation-derived waste.
- Section 16.0 discusses the project schedule and deliverables;
- Sections 17.0 and 18.0 discuss the purpose and format of the RI/FS Report;
- Section 19.0 provides the references;
- Appendix A contains the Site-Specific Health and Safety Plan (HASP); and
- Appendix B contains the site-specific Quality Assurance Project Plan (QAPjP).

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2.0 PROJECT MANAGEMENT APPROACH

The following sections describe the overall project management approach. Individual sections are devoted to descriptions of the Project Management Organization, Project Responsibilities, Project Procedures, Quality Management, and Subcontract Management.

2.1 PROJECT MANAGEMENT ORGANIZATION

The RI/FS will be implemented by a Project Management Team that includes personnel from the installation, ANG/CEVR, and PEER. The team will also include representation from the NYSDEC, SCDHS, and necessary support subcontractors. The structure of communication that will be followed for this work is shown in Figure 2.1.

2.2 PROJECT RESPONSIBILITIES

2.2.1 ANG/CEVR Project Manager

The ANG/CEVR Project Manager has the following responsibilities:

- Acts as a technical representative for the contracting officer;
- Provides site information and history from previously conducted activities presented in reports located at the ANG/CEVR;
- Provides logistical assistance, in terms of scheduling and IRP process guidance;
- Reviews all results and recommendations and provides management and technical oversight; and
- Communicates comments from ANG/CEVR reviewers, NYSDEC, and SCDHS to the Contractor.

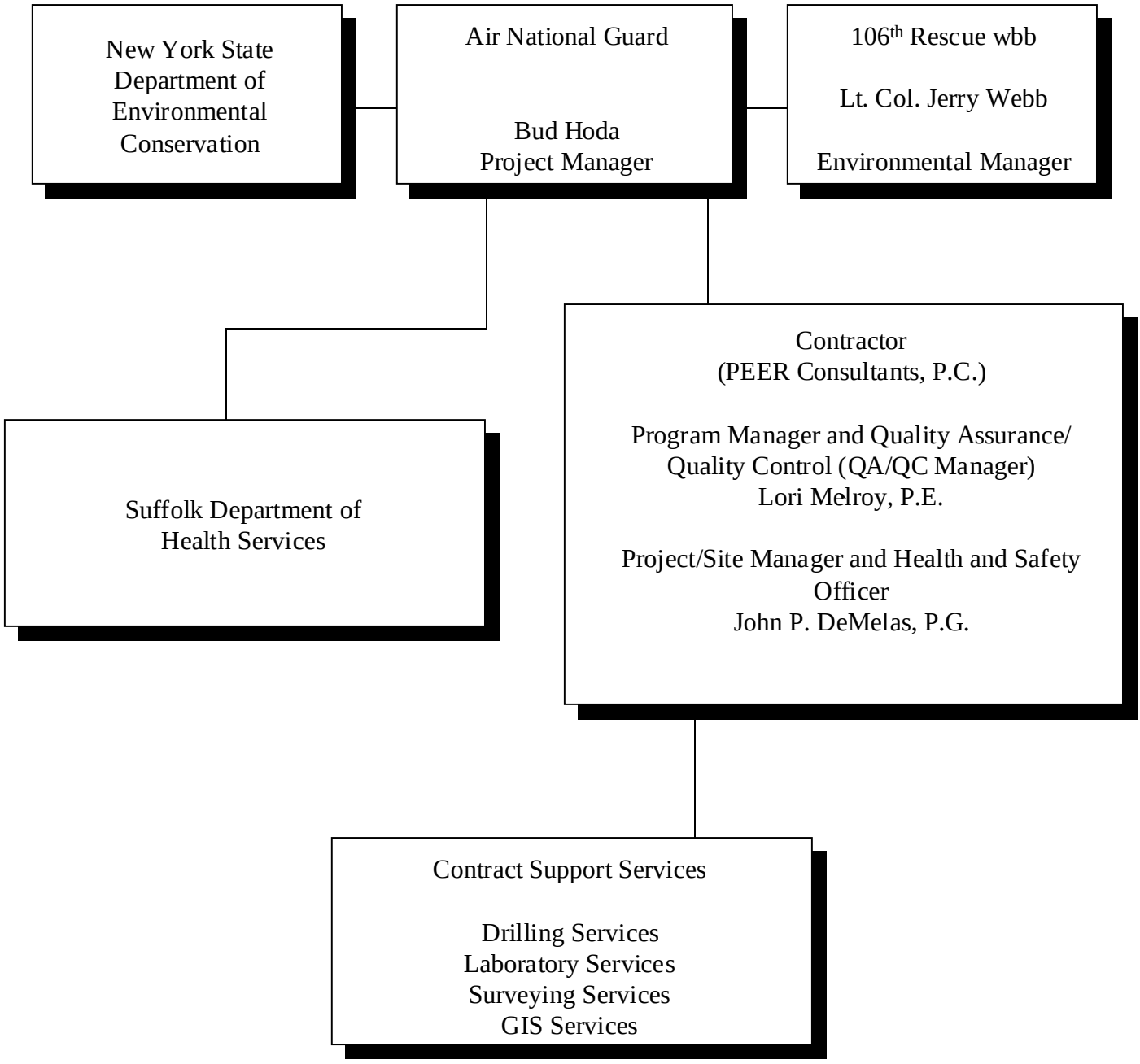

Figure 2.1 Project Management Organization Chart for the RI/FS at 106th Rescue Wing, New York ANG

2.2.2 106th Rescue Wing

The 106th Rescue Wing Environmental Manager (EM) has the overall responsibility for all the following:

- Provides base-specific information and IRP site history or obtains such information in the facility files located at the installation;
- Provides on-base logistical assistance, including issuance of digging permits, location of IRP sites, and coordination with local regulatory agencies; and
- Reviews all results and recommendations and provides management and technical oversight, in addition to that provided by the ANG Project Manager.

2.2.3 Contractor Program Manager and Quality Assurance/Quality Control Manager

This Contractor staff person has responsibilities as both the Contractor Program Manager and the Quality Assurance/Quality Control (QA/QC) Manager, as follows:

- Ensures that the project meets ANG objectives and the Contractor quality standards;
- Provides the Contractor Project Manager with access to corporate management resources;
- Interacts with the ANG Project Manager, as necessary, to ensure compliance with ANG quality standards and the satisfaction of all ANG objectives;
- Develops and revises the QA/QC program, as required;
- Makes recommendations to the Contractor Project Manager and Laboratory QA/QC Coordinator;
- Prepares the QAPP in accordance with the EPA guidance documents;
- Ensures that all protocols described in the QAPP are met;
- Verifies that the specified data collection methods comply with all QA/QC requirements and will obtain data of desired quality and integrity;
- Approves all deliverables and associated documents prior to transmittal;

- Evaluates laboratory procedures and deliverables to ensure that all analyses are in accordance with the QAPP; and
- Ensures that all nonconformances have been identified and that appropriate corrective actions have been taken.

2.2.4 Contractor Project/Site Manager and Health and Safety Officer

The Contractor Project/Site Manager is responsible for implementing the project, and has the authority to commit resources necessary to meet project objectives and requirements. The Project Manager ensures that technical, financial, and scheduling objectives are achieved successfully.

The Project/Site Manager directs all on-site activities, including those of subcontractors, and ensures that all procedures described in this plan are adhered to in the field. The Project/Site Manager is responsible for ensuring that field equipment is properly calibrated and maintained, and that individual samples are properly handled and documented to allow the tracking of the possession and handling of samples from collection to laboratory receipt. The Project/Site Manager is also responsible for maintaining documentation regarding the type, quantity, and holding time of wastes generated during the RI activities, prior to disposal or treatment. The Project/Site Manager is also the liaison for the Contractor with base personnel during the course of the field work. Additionally, the Project/Site Manager is responsible for maintaining a daily field log containing documentation as outlined in the Statement of Work (SOW). The Project/ Site Manager is also responsible for contacting the ANG/CEVR Project Manager (or designee) by telephone each morning prior to beginning the day's activities.

The Project/Site Manager will also serve as the Site Health and Safety Officer, and is responsible for instituting, and supervising compliance with the HASP (Appendix A). The Site Health and Safety Officer (SHSO) is responsible for daily safety meetings.

In addition, the responsibilities of the Project Manager include:

- Establishes and maintains communication among technical staff, field staff, ANG/CEVR Project Manager, 106th Rescue Wing EM, SCDHS, Program and QA/QC Manager, and Geologist;
- Implements all programs and protocols related to the project;
- Ensures the completion of all QC requirements;
- Supervises the health and safety program;
- Verifies that site personnel adhere to the site safety requirements;
- Provides guidance on appropriate corrective action procedures;
- Prepares all deliverables and reports for submittal to the ANG;
- Coordinates field investigation and sampling activities;
- Coordinates Subcontractors to ensure timely project completion; and
- Analyzes and evaluates analytical data.

2.2.5 Project/Site Geologist

The Project/Site Geologist is responsible for the following:

- Obtains groundwater levels from existing and new monitoring wells, prepares potentiometric surface maps, and identifies groundwater flow direction;.
- Provides oversight of all drilling activities by the Subcontractor, including decontamination and drilling procedures;
- Classifies and logs soils during split-spoon soil sampling;
- Recommends to drilling Subcontractor proper depths for shallow and deep monitoring wells and piezometers;
- Provides oversight of well construction activities;
- Ensures drilling Subcontractor maintains a safe work zone and adheres to proper housekeeping;
- Ensures drilling Subcontractor restores site conditions;

- Assists in sample collection;
- Prepares soil boring logs and well construction logs;
- Performs slug and pump testing in identified monitoring wells; and
- Prepares sections of the RI Report applicable to geology descriptions, drilling, and well construction.

2.2.6 Site Technician

The Site Technician assists the Project/Site Manager and Geologist in sample collection, packaging, and delivery; decontamination procedures; slug and pump testing; and other related tasks.

2.3 PROJECT PROCEDURES

2.3.1 Internal Quality Control

A Quality Assurance Program Plan (QAPP) has been developed for all ANG work and will be followed to ensure that quality is maintained on this project (PEER 1995a).

2.3.2 Maintenance of Records

A central project file has been established at PEER's Oak Ridge, Tennessee, office containing all project correspondence and documentation. Future correspondence, QA information, and all project documents will be filed there. All incoming records are assigned a document file number, distributed, and filed. A similar file will be established during field work and maintained by the Project/Site Manager under direction of the Program Manager. Upon completion of the field work, the on-site file will be transferred to the central project file.

2.3.3 Reporting

The PEER Project Manager will use monthly progress reports and frequent telecommunication for briefing the ANG Project Manager to ensure that technical project objectives are met and that the project is kept on schedule and within budget. The monthly progress reports will address work performed during the month, problems encountered, schedule adherence, work planned for the next period, and budget status.

After the field activities are completed and the analytical results are received, PEER will prepare the RI Report. If necessary, an FS Report will be completed. Draft reports will be submitted to ANG and the installation for review. The ANG will provide draft-final reports to NYSDEC for review. After comments are incorporated, final reports will be prepared and submitted to the ANG and the installation. The ANG will provide final reports to NYSDEC and SCDHS.

2.4 QUALITY MANAGEMENT

All work to be performed under this project will be performed in accordance with the programmatic QAPP and the HASP (PEER 1995a and b). Site-specific health and safety requirements are provided in Appendix A. Site-specific QA/QC requirements are addressed in Appendix B of this Work Plan.

PEER will coordinate all activities with the EM at the installation and the ANG/CEVR Project Manager. A summary of the daily activities will be provided to the ANG/CEVR Project Manager each day. Activities planned for the following day will also be discussed with the ANG/CEVR Project Manager.

2.5 SUBCONTRACT MANAGEMENT

PEER will utilize the services of four subcontractors in the performance of the field activities: drilling services, analytical services, geographical information system (GIS) services (optional work), and surveying services. [Within this Work Plan, activities designated as "optional work" will not be implemented without written authorization by the National Guard Bureau (NGB) Contracting Officer.]

The Project/Site Manager will ensure that the Drilling Subcontractor obtains all necessary permits and approvals from federal, state, and local authorities prior to implementing drilling activities. The Drilling Subcontractor will obtain all licenses and pay all fees required for implementing drilling activities at the site.

The Project/Site Manager will coordinate with the EM and the Drilling Subcontractor to ensure that all underground utilities are identified. It is the installation's responsibility to ensure that water, gas, electric, and other underground utility lines are properly marked prior to start of work. It is the Driller's responsibility to ensure that all marked or otherwise identified utilities are not damaged as a result of the implementation of the activities described in this Scope of Work. The Drilling Subcontractor will repair any marked or otherwise identified damaged utilities at their expense. The Project/Site Manager will ensure that the Drilling Subcontractor provides a daily report of materials and time used to complete the tasks described in the Scope of Work. This report will be verified and signed by the Drilling Subcontractor and PEER on a daily basis.

It is the responsibility of the Drilling Subcontractor to ensure that all health and safety procedures, including medical monitoring, are followed. The Program Manager will ensure that the Drilling Subcontractor submits a letter documenting this condition prior to mobilization.

The Project/Site Manager will coordinate sample shipping and receipt with the project laboratory. The laboratory will be notified of sample shipments and called to verify that

shipments were received without breakage. The Project/Site Manager will coordinate collection of additional samples to replace any that are broken in shipping.

The Project/Site Manager will coordinate with the laboratory to ensure that sample holding times are met and that all requested analyses are completed. The Project/Site Manager will be the contact person for all laboratory analytical reports and completed Chain-of-Custody forms.

The Program Manager will coordinate data access to the subcontractor performing the GIS and the Integrated Data Management, Analysis, and Evaluation System (IDMAES) (optional work).

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3.0 INSTALLATION BACKGROUND INFORMATION

3.1 INSTALLATION DESCRIPTION

The 106th Rescue Wing of the New York ANG is located at the Francis S. Gabreski Airport in Suffolk County, New York, on the eastern end of Long Island. Gabreski Airport, formerly known as Suffolk County Airport is on Old Riverhead Road, approximately 2 miles north of the Atlantic Ocean shoreline in Westhampton Beach. The airport is owned by Suffolk County and consists of about 11,550 acres of relatively flat terrain. The 106th Rescue Group leases approximately 70 acres of runways, hangars, and maintenance/service facilities on the southwest side of the airport. 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, and to the west by Old Riverhead Road.

The airport property was acquired in 1942 by the Civil Aeronautics Authority and was used for military training, aircraft maintenance, and armed forces support until 1969. Since 1970, Suffolk County has leased a portion of the airport to numerous tenants, including the New York ANG. In 1990, Suffolk County purchased the property and began operation of Suffolk County Airport; the name of the airport was changed then to the Francis S. Gabreski Airport.

3.2 SITE DESCRIPTIONS

The following subsections provide a description of each site of concern for this RI. Site locations are shown on Figure 1.2.

3.2.1 Site 1, AVGAS Spill Site

Site 1 is located northeast of Smith Avenue on both sides of Moen Street. In 1965, a tanker truck parked in an elevated parking lot northwest of Moen Street allegedly released a maximum of 5,000 gal of AVGAS. The petroleum product is thought to have accumulated in an adjacent

drainage swale where it reportedly evaporated and/or infiltrated the subsurface [ABB-Environmental Services, Inc. (ABB-ES), 1997]. This event occurred prior to the establishment of reporting requirements for petroleum spills. There was apparently no reported recovery of the spilled fuel. Further evaluation has been deemed necessary since no recovery occurred and because the area is over a sole-source aquifer.

3.2.2 Site 2, Former Hazardous Waste Storage Area (1970 to 1982)

Site 2 is located adjacent to a loading dock along the northeast wall of Building 358. The site includes grass- and gravel-covered areas, concrete, and asphalt. The outside area was used from 1970 until 1982 to store shop solvent wastes including PD-680, and recovered fuels and oils in drums. The former hazardous waste storage area is an open gravel space with no containment structures. Previous investigations estimated that less than 500 gal of liquids from minor spills would have been released [Hazardous Materials Technical Center (HMTC) 1987]. No spills were reported at the site, however stained surface soils were observed during a site visit in 1986 (ABB-ES 1997). The site was not assigned a RCRA permit since the 106th RQW determined the status was as a small quantity generator.

3.2.3 Site 3, Former Waste Storage Facility (1984 to 1989)

Site 3 is located in the southeast corner of a paved parking lot at the intersection of Moen Street and Smith Avenue. The site is a gravel area which used to be the floor of Building 282 (ABB-ES 1997). Past practices in this area included the storage of shop wastes, recovered oils, and waste fuels stored in drums from 1984 to 1989. The drums were placed on the gravel floor of the former buildings. This facility had an open gravel floor, holes in the roof, and no doors or window. Spills were not reported, however, stained gravel and soil were observed during the second records search. The cumulative volume of any potential releases was estimated to have been less than 1,000 gal (HMTC 1987). The site was not assigned a RCRA permit since the 106th RQW determined the status was as a small quantity generator.

3.2.4 Site 7, Fire Training Area

This site was used for fire training exercises by the Air Force from 1943 to 1971. The area was originally an unlined pit encompassing 1 acre, located 3,000 ft southeast and across the airport from the current ANG facility. The site is situated 130 ft northwest of the taxiway on the southeast side of the airport, on a 10-in.-thick concrete, hard stand approximately 400 ft long x 50 ft wide, bordered by a 10-ft-wide asphalt apron.

Prior to 1971, the site was used by the Air Force. Waste fuels, solvents (e.g., kerosene, mineral spirits, trichloroethylene, 2-butanone, toluene, etc.), and jet fuel were poured directly on the ground and ignited for fire training exercises.

The area was paved with a concrete hard stand in 1971 after the ANG took over operations. Curbing 1 ft high and 50 ft x 50 ft in size was constructed in 1978 to act as a berm enclosing the burn area. Burn procedures were modified by floating a layer of jet fuel inside the berm on water, then either separating the fuel into a concrete UST, or burning off excess fuel. Fuel to be used in training exercises was stored in an aboveground steel tank located about 250 ft south-southeast of the FTA. Both tanks were connected to the FTA by buried piping. The site is 0.75 miles upgradient of the Suffolk County Water Authority, Meeting House Road well field. [Use of the site for fire training was discontinued by the ANG in 1986.] The water contained in the UST was sampled on July 16, 1987, for lead and petroleum hydrocarbons, with negative results (E.C. Jordan 1987).

3.2.5 Site 10, Waste Stripper Tank No. 61, Building 370

Site 10 consists of a former 1,200-gal underground storage tank (UST) located about 10 ft northwest of Building 370. The tank was used to store used solvents but may have contained fuel or oil at one time (ABB-ES 1997). The integrity of the former tank at this site is unknown, and there is potential that spent solvents leaked or overflowed from the tank in the past. The tank

was reportedly removed in 1997 and granted closure by the NYSDEC. Documentation of NYSDEC closure is being sought by 106th RQW personnel.

The site was not addressed in the Phase I Records Search, but was added to the IRP in 1992 (Dames & Moore 1986).

3.2.6 Site 11, Trench Drain Sump, Building 230

Site 11 is a former trench drain sump located beneath the northeast corner of Building 230. The building is used for Motor Pool maintenance of heavy equipment. During renovations at the Motor Pool building, a vertical cylindrical structure was discovered under the floor that appeared to contain either used oil, water, or both. The cylinder has been estimated as approximately 2 ft in diameter and 18 ft deep, with an internal volume of about 200 gal. The sump is constructed of steel pipe and is connected to the trench drain system. Currently, the sump contains about ½ in. of water (Lt Col Webb, 106th RQW EM, personal communication). Arsenic, chromium, and lead were detected in subsurface soils exceeding NYSDEC action levels. Chromium was also detected exceeding action limits in groundwater (ABB-ES 1997). The vessel has reportedly been emptied and steam cleaned by 106th RQW, with no evidence of leakage observed.

The site was not addressed in the Phase I records search, but was added to the IRP in 1992 (Dames & Moore 1986).

3.2.7 Site 12, Spill Site Northwest of Building 370

This site is an area on the northwest side of Building 370, where visibly contaminated soils were discovered during excavation for installation of a new underground pipeline. The site was discovered in May 1999, when workers installing a forced-main sanitary sewer noted a "strange smell." The SCDHS conducted limited soil sampling at the site. Sample analysis detected tri-ortho cresyl phosphate (TCP) and polynuclear aromatic hydrocarbons (PAHs) (SCDHS 1999). No other investigations of this site have been performed.

3.3 PREVIOUS INVESTIGATIONS

In 1986, a Phase I IRP Records Search was completed by Dames & Moore, and evaluated past practices at two disposal areas located east of the ANG facility: the Runway Disposal Area (previously referred to as Site 1); and the Canine Kennel Landfill (formerly known as Site 2) (Dames & Moore 1986). These two sites are specifically excluded from the scope of this RI/FS, as agreed at the August 31, 2000 regulatory meeting. They are being addressed by the Army Corps of Engineers.

In 1987, a second base-wide IRP Phase I Records Search by Dynamac Corporation identified six sites for further investigation (HMTC 1987). These sites were identified as Sites 1 through 6:

- Site 1 – AVGAS Spill Area (currently referred to as the AVGAS Spill Site)
- Site 2 – Former Hazardous Waste Storage Area (1970 to 1982)
- Site 3 – Former Waste Storage Area (1984 to 1989)
- Site 4 – Aircraft Refueling Apron Spill Site
- Site 5 – Southwest Storm Drainage Ditch
- Site 6 – Petroleum, Oil, and Lubricants (POL)

Site 7, the former FTA, was not included in the HMTC Phase I Records Search because Site Investigation and RI/FS activities were already underway (ABB-ES 1997).

In 1988, a tracer leak test was conducted at Sites 4 and 6 by Tracer Research Corporation. Potential leaks were identified (Tracer Research Corporation 1988).

In 1989, the site characterization was competed for Site 7 by ABB-ES (formerly E.C. Jordan Co.). Although a Phase I records search was not conducted at Site 7, concerns regarding the potential impact on groundwater from fuels used during fire training activities, caused this site to be included in the IRP (ABB-ES 1997). The results of the study concluded that there was

insignificant contamination from fuels, and an additional investigation of 2-butanone in groundwater samples indicated that this chemical was a sampling artifact (ABB-ES 1992). No further action was recommended for Site 7 (ABB-ES 1997).

In July 1989, Site 6, the POL Tank Farm was removed from the Site Investigation program, pending resolution of legal issues. Therefore, Site 6 was not included in Site Investigation activities. Remediation efforts were underway in early 1997 (ABB-ES 1997).

About 1990, Site 4 was subdivided into two sites (Sites 4 and 9) (ABB-ES 1997).

In August 1991, a survey of cesspools and septic tanks was initiated by ABB-ES. Samples were collected and volatile and semivolatile organics were detected in some of the samples. All remaining structures of this type were designated as part of Site 8 (ABB-ES 1997).

In August 1991, Site 8 was added to the IRP, including all remaining cesspool/septic tank sub-sites after completion of the Phase I Records Search.

In September 1991, a limited soil-gas survey was conducted at Sites 1 through 4 as a precursor to Site Investigation activities by ABB-ES. Field screening was performed, but the results were not published (ABB-ES 1997). In October 1991, three monitoring wells and six piezometers were installed. The results of these activities were used to develop conceptual models for the conduct of the Site Investigation.

In December 1992, Sites 10 and 11 were added to the IRP. Neither site was addressed in the Phase I Records Searches (ABB-ES 1997).

From August to December 1994, nine sites were investigated as part of the Site Investigation (ABB-ES 1997):

- Site 1 – AVGAS Spill Site
- Site 2 – Former Hazardous Waste Storage Area (1970 to 1982)
- Site 3 – Former Waste Storage Facility (1984 to 1989)
- Site 4 – Aircraft Refueling Apron Spill Site
- Site 5 – Southwest Storm Drainage Ditch
- Site 8 – Old Base Septic Systems
- Site 9 – Ramp Drainage Outfall
- Site 10 – Waste Stripper Tank #61, Building 370
- Site 11 – Trench Drain Sump (currently the Trench Drain Sump), Building 230

Site 7, the former FTA, was not included in the scope of work for the Site Investigation because Site Investigation and Remedial Investigation/Feasibility Study (RI/FS) activities had previously been conducted between 1987 and 1989. No further investigation and action was recommended at Site 7 (ABB-ES 1989). However, an additional investigation was conducted due to the presence of 2-butanone in groundwater samples collected during the RI/FS (ABB-ES 1992). The NYSDEC had provided comments to the 1992 RI Report, and a Response to Comments was submitted to the NYSDEC by ABB-ES which indicated concluded that the 2-butanone was a sampling artifact. For further discussion of 2-butanone at Site 7, see Section 6.3. No further action was recommended (ABB-ES 1992). The status of the recommendation for no further action regarding 2-butanone in groundwater is still pending acceptance by NYSDEC. The State of New York had reportedly requested a limited removal action at Site 7 to address petroleum-contaminated soil prior to site closure (ABB-ES 1997).

No further action was recommended for five of the sites (1, 2, 3, 10, and 11). Chromium was detected in groundwater above applicable guidance or background concentrations at these five sites. The presence of chromium was thought to be associated with elevated sediment content due to direct-push sample collection.

The investigation identified the presence of chlorinated solvents and petroleum related volatile organics at four sites (4, 5, 8, and 9). Additional site characterization was recommended for

Site 4. Risk assessments were recommended for the remaining three sites (5, 8, and 9). An RI field effort was conducted recently for Sites 4, 5, 8, and 9. A Draft RI Report has been prepared for these sites (S&W 1999).

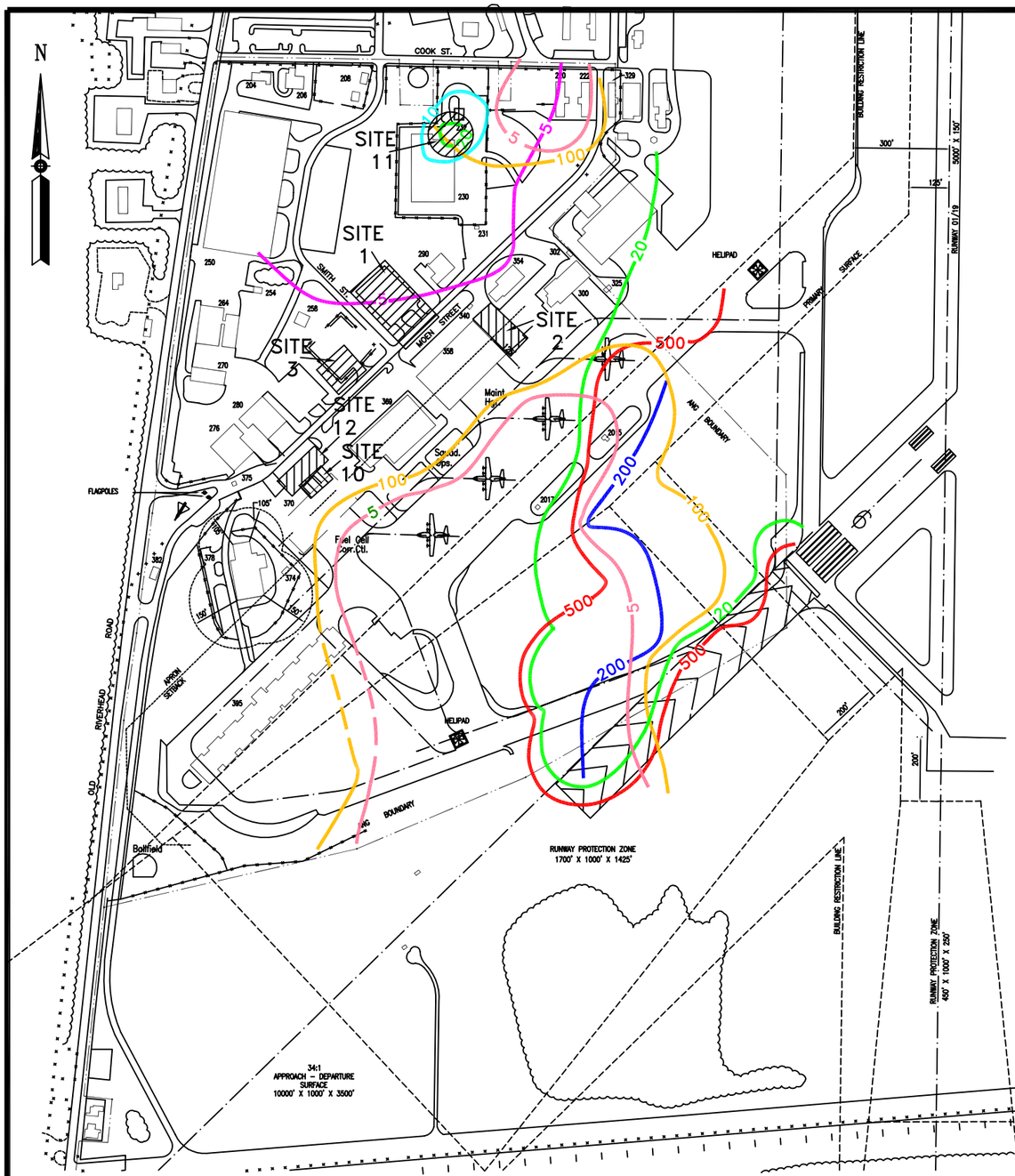
January 1999, Stone & Webster, Inc., submitted the "Revised Draft Remedial Investigation Sites 4, 5, 8, and 9." This RI for Sties 4, 5, 8, and 9 included geoprobe sampling of soil and groundwater and monitoring well sampling. Groundwater concentrations of total BTEX (sum of concentrations of benzene, ethylbenzene, toluene, and total xylenes), total chlorinated volatile organics (sum of all detected), and naphthalene plus 2-methyl naphthalene were partially delineated. Figure 3.1 presents the partially delineated groundwater plumes for geoprobe samples from 25 to 35 ft BGS; geoprobe samples from 46 to 45 ft BGS; and from monitoring wells. The RI Report recommended further action at Site 4 due to soil contamination; Site 5 due to soil contamination; Site 8 - wells 2, 4, and 5 due to soil contamination; and basewide groundwater due to contamination by chlorinated and aromatic volatile organics.

May 1999, Site 12 was discovered during sewer pipeline installation. Sampling by the SCDHS detected TCP and PAHs. The site was subsequently added to the IRP. There have been no other investigations of this site.

The RI for this SOW is focused on seven sites: Sites 1, 2, 3, 7, 10, 11, and 12. The results of previous investigations of these sites (primarily the Site Investigation by ABB-ES 1997) are summarized as follows:

3.3.1 Site 1, AVGAS Spill Site

A Site Investigation was conducted in 1994 (ABB-ES 1997). Chromium was detected exceeding applicable guidance or background concentrations in groundwater. However, the presence of this metal at elevated concentrations in groundwater was considered a sampling artifact related to high levels of suspended particles in the samples, due to direct-push sample collection, and were not considered representative of actual groundwater quality.



LEGEND

- 500 — BETX (TOTAL) IN GEOPROBE GROUND WATER SAMPLES, 25–35 FT BGS, 500 ug/L
- 20 — NAPHTHALENE PLUS 2–METHYLNAPHTHALENE IN GEOPROBE GROUNDWATER, 25–35 FT BGS, 20 ug/L
- 200 — BETX (TOTAL) IN GEOPROBE GROUND WATER SAMPLES, 46–56 FT BGS, 200 ug/L
- 10 — NAPHTHALENE PLUS 2–METHYLNAPHTHALENE IN GEOPROBE GROUNDWATER, 46–56 FT BGS, 10 ug/L
- 5 — CHLORINATED VOLATILE ORGANIC COMPOUNDS (TOTAL) FROM MONITOR WELL GROUNDWATER SAMPLES, 5 ug/L
- 100 — BETX (TOTAL) IN MONITOR WELL GROUNDWATER SAMPLES, 100 ug/L
- 5 — NAPHTHALENE IN MONITOR WELL GROUNDWATER SAMPLES, 5 ug/L

NOTE: CONTOURS ARE AS APPROXIMATED FROM STONE AND WEBSTER, 1999
BROKEN CONTOURS INDICATE INCOMPLETE DATA.

0 200 400
SCALE IN FEET

FIGURE 3.1

GROUNDWATER CONTAMINATION PLUMES
106th RESCUE WING, NEW YORK AIR NATIONAL GUARD
FRANCIS S. GABRESKI AIRPORT
WESTHAMPTON BEACH, NEW YORK

PEER

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Lead was detected exceeding applicable guidance levels in surface soils in the south-central portion of the drainage swale. However, none the concentrations exceeded typical lead values found in eastern U.S. soils. The highest lead concentration detected was 14 mg/kg while the average concentration of lead in soils from rural areas in the eastern U.S. ranges from 4 to 61 mg/kg (ABB-ES 1997).

The Site Investigation concluded that the groundwater was not impacted, and recommended no further action (ABB-ES 1997).

3.3.2 Site 2, Former Hazardous Waste Storage Area (1970 to 1982)

The Site Investigation, conducted by ABB-ES in 1994 (ABB-ES 1997), reported that arsenic was the only analyte detected above applicable guidance levels in one surface soil sample. The concentration was slightly above the action level, but was below the average concentration of arsenic in New York state background soils. Chromium and lead were also detected above reporting limits, but were below the applicable soil guidance levels. The Site Investigation reported no other evidence to suggest that metal-bearing solutions such as solvents or fuels were released at this site, therefore, the metals were considered to be naturally- occurring constituents of the soils.

Chromium was the only analyte detected above action levels or reporting limits in groundwater. However, the sample was collected from a direct push boring, and therefore, the levels of metals detected were attributed to the high levels of suspended solids (ABB-ES 1997).

The Site Investigation recommended no further action at Site 2.

3.3.3 Site 3, Former Waste Storage Facility (1984 to 1989)

A Site Investigation was conducted at Site 3 in 1994 (ABB-ES 1997). Silver was the only analyte detected at or above action levels in the soil samples obtained from Site 3. However, the

metal silver detected in only one sample obtained 17 ft below ground surface (BGS) and appeared to be an isolated occurrence.

Chromium was the only analyte detected above action levels or reporting limits in groundwater. However, the sample was collected from a direct-push boring and not a monitoring well; therefore, the level of metal detected was attributed to the high levels of suspended sediments.

The results of the Site Investigation recommended no further action at Site 3.

3.3.4 Site 7, Fire Training Area

Site 7 was not included in the Phase I Records Search (HMTC 1987) because Site Investigation and RI/FS activities were already underway at that time. In the Final Site Characterization Report (ABB-ES 1989), several volatile organics and semivolatile organics were detected in soil samples and groundwater samples, and lead was detected in soil samples. These results were screened using the action levels developed for the Site Investigation of the low priority sites (ABB-ES 1997), and are listed as contaminants of concern in Section 6.3.

Groundwater concentrations of 2-butanone have been detected exceeding NYSDEC action limits (ABB-ES 1992). However, 2-butanone has been argued to be a sampling artifact, as discussed in Section 6.3. A limited soil removal to address soil contaminated with petroleum hydrocarbons has reportedly been requested by the NYSDEC (ABB-ES 1997).

3.3.5 Site 10, Waste Stripper Tank No. 61, Building 370

The site was not addressed in the Phase I Records Search, but was added to the IRP in 1992. A Site Investigation was performed in 1994 (ABB-ES 1997).

Chromium was the only analyte detected above action levels in subsurface soils collected from this site. However, the level detected was below the average range of concentrations detected in

New York state background soils; therefore, the metal was deemed to be a naturally occurring constituent of the soils (ABB-ES 1997).

Tetrachloroethene (PCE) was detected in three unsaturated soil samples at 7, 14, and 16 ft BGS, and in groundwater. The chemical was not detected in soil samples collected at 30 ft BGS, which was interpreted to suggest that the overlying soils may not be the source of tetrachloroethene in groundwater at Site 10. None of the detected concentrations of PCE exceeded applicable guidance levels (ABB-ES 1997).

Chromium was the only analyte detected above action levels in groundwater. However, the sample was collected from a direct-push boring and not a monitoring well, therefore, the level of metal detected was attributed to the high levels of suspended sediments (ABB-ES 1997).

The results of the Site Investigation recommended no further action at Site 10.

3.3.6 Site 11, Trench Drain Sump, Building 230

The site was not addressed in the Phase I Records Search, but was added to the IRP in 1992. A Site Investigation was performed in 1994 (ABB-ES 1997).

No volatile or semivolatile organics, which are typically associated with solvent or fuel contamination, were detected in soil samples collected from this site. Arsenic, chromium, and lead were detected in exceedance of applicable guidance levels in subsurface soils collected from this site. However, since none of the metals detected exceeded the range of average concentrations in the eastern U.S. or New York state background soils, these metals were considered to be naturally occurring constituents of the soil (ABB-ES 1997).

Chromium was the only analyte detected above the reporting limits and exceeding the applicable guidance level in groundwater. However, the sample was collected from a direct-push boring

and not a monitoring well, therefore, the level of metal detected was attributed to the high levels of suspended sediments (ABB-ES 1997).

The results of the Site Investigation recommended no further action at Site 11.

3.3.7 Site 12, Spill Site Northwest of Building 370

Contamination was detected in May 1999 when workers noted what was described as a "strange smell" while working in an excavation installing a forced-main sewer line, at a depth from 8 ft to 15 ft BGS, on the northwest side of Building 370. Preliminary subsurface direct-push soil sampling by the SCDHS identified tri-ortho cresyl phosphate (TCP), a component of high temperature hydraulic fluid, but estimated concentrations of 100 μg/kg were not confirmed. Other direct-push soil sampling identified elevated concentrations of polynuclear aromatic hydrocarbons (PAHs). It is unclear from the available SCDHS documentation as to whether the soil samples with PAH detections came from the vicinity of Site 12 or another, nearby, location. The nature and extent of contamination in soil and groundwater is unknown.

To date, there has been no other investigations of Site 12.

4.0 ENVIRONMENTAL SETTING

This section discusses the environmental setting of Francis S. Gabreski Airport, which includes the 106th Rescue Wing, in terms of the climate, topography, geology, soils, surface water hydrology, hydrogeology, critical environments, and threatened and endangered species.

4.1 CLIMATE

The climate of the area surrounding Gabreski Airport is humid-continental with a maritime influence characterized by periods of freeze-free temperatures, a reduced range in diurnal and annual temperature, and heavy precipitation in winter relative to that in summer. The winter season lasts about three months with the coolest temperatures generally ranging from 0°F to 10°F (ABB-ES 1997). Average temperatures during the winter months (December through February) range from approximately 26°F to 39°F (S&W 1999). Temperatures 90°F or higher occur on average 4 to 6 days per year during summer (ABB-ES 1997). Average temperatures during the summer months (June through August) range from approximately 62°F to 81°F (S&W 1999).

The freeze-free growing season is about 200 to 210 days per year in much of Suffolk County (ABB-ES 1997). Precipitation averages approximately 43.4 in. per year, and dry periods during June and July are common. Average snowfall is approximately 26 in. (Stone & Webster 1999). Net precipitation at the base is 14.5 in. per year, and dry periods during June and July are common (Dames & Moore 1986). The 2-year, 24-hour rainfall total for the installation is 3.5 in. (Department of Commerce 1963).

4.2 TOPOGRAPHY

Gabreski Airport is situated on a glacial outwash plain south of the Ronkonkoma terminal moraine, which formed during Wisconsin glaciation. The outwash plain slopes southward from the terminal moraine to the bays and barrier islands along the Atlantic Ocean shoreline. Relief is

characteristically flat with subtle rolling terrain and steeper stream channels (ABB-ES 1997). Figure 4.1 shows the basewide topography.

4.3 GEOLOGY

Five unconsolidated formations are found below, or near, Gabreski Airport. These units dip generally to the south with the thicker units very widespread and underlying most of Suffolk County. Figure 4.2 is a generally north-south-trending cross-section of the geologic formations present in the region. Figure 4.3 shows a generalized stratigraphic column of the regional geology (S&W 1997).

Bedrock

The bedrock that underlies the unconsolidated deposits include hard, dense schist, gneiss, and granite similar in character to that which underlies much of the mainland in nearby parts of New York and Connecticut. Elevation of the bedrock is approximately 1,600 ft below mean sea level (MSL). These rocks are either metamorphosed Precambrian or early Paleozoic Age sediments. Two deep borings penetrated bedrock at a depth of approximately 1,600 ft at locations 18 miles west of the airport. The bedrock was hard, banded, granite gneiss (Dames & Moore 1986).

Mineralogy of the gneiss showed almost 50% plagioclase feldspar, almost 50% quartz, about 1% biotite, and a trace of garnet. The surface of the bedrock in the region around the airport dips almost directly southward with an average gradient of 1% (Dames & Moore 1986).

Raritan Formation

The Raritan formation rests directly on highly to slightly weathered bedrock. The formation is probably entirely continental and was laid down as a coastal-plain deposit by streams flowing off the mainland. On Long Island, the formation has two fairly distinct members: the Lloyd sand member below, and a clay member above. The formation probably occurs beneath all central

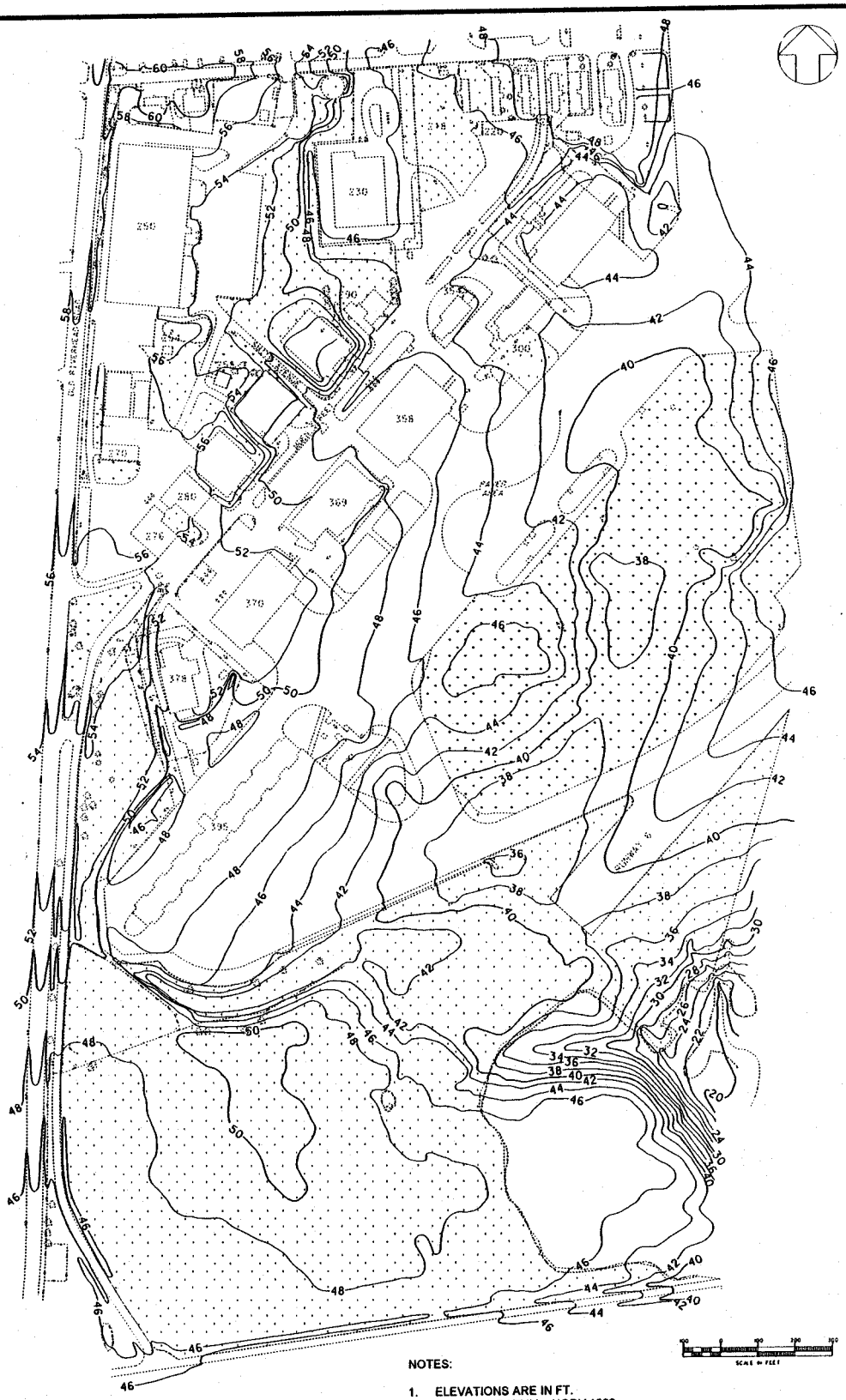

FIGURE 4.1	BASEWIDE TOPOGRAPHY 106th RESCUE WING, NEW YORK ANG FRANCIS S. GABRESKI AIRPORT WESTHAMPTON BEACH, NEW YORK	PEER PROJ./1566-055 FILE: GAB-025.DWG

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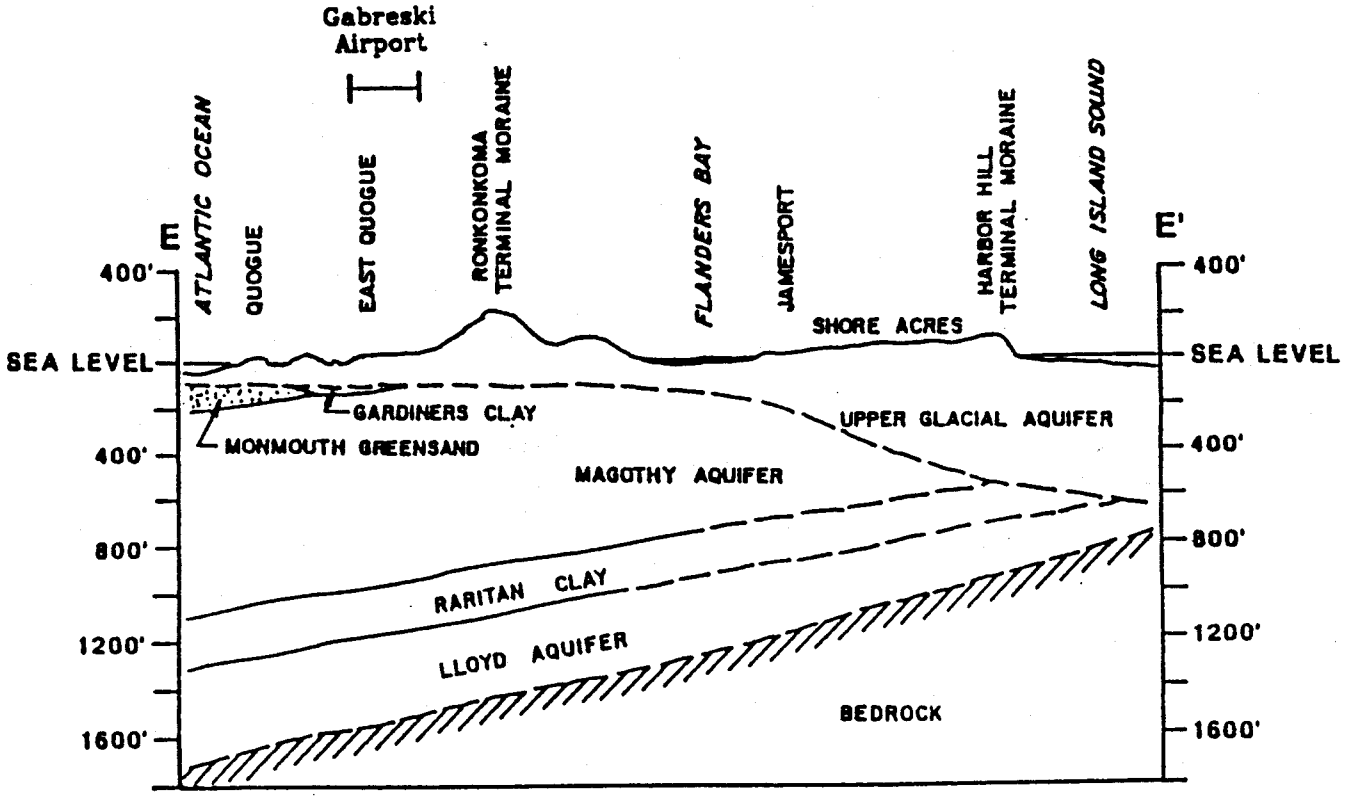
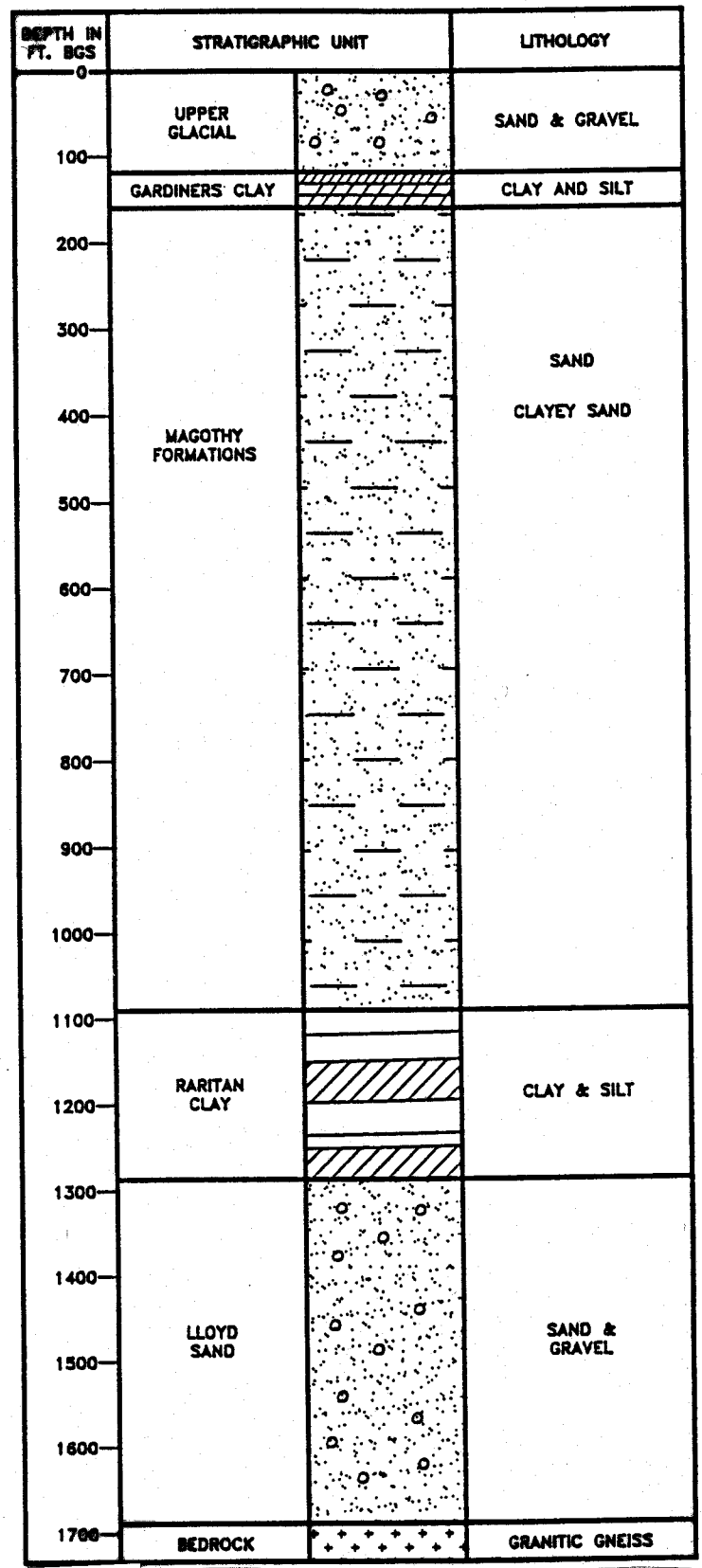


SOURCE: ABB ENVIRONMENTAL SERVICES, INC.

FIGURE 4.2	REGIONAL STRATIGRAPHY 106th RESCUE WING, NEW YORK AIR NATIONAL GUARD FRANCIS S. GABRESKI AIRPORT WESTHAMPTON BEACH, NEW YORK	PEER PROJ./1566-053 FILE: GAB-001.DWG



SOURCE: ABB ENVIRONMENTAL SERVICES, INC.

FIGURE 4.3	GENERALIZED STRATIGRAPHIC COLUMN 106th RESCUE WING, NEW YORK AIR NATIONAL GUARD FRANCIS S. GABRESKI AIRPORT WESTHAMPTON BEACH, NEW YORK	PEER PROJ./1566-053 FILE: GAB-002.DWG

Suffolk County. Northward, the Lloyd sand thins and probably pinches out beneath Long Island Sound, and the clay member may do likewise. Southward, the formation extends a considerable distance offshore, possibly as far as the continental shelf (about 100 miles) (Dames & Moore 1986).

Lloyd Sand Member of the Raritan Formation

The Lloyd sand member is a fairly uniform and extensive unit consisting predominantly of sand and gravel with some clay. It is known only from well logs. At two deep test wells, it is separated from the hard crystalline bedrock by 15 to 30 ft of tough, white, structureless clay containing scattered angular grains of quartz, which is considered to be weathered bedrock. The upper contact of the Lloyd sand member with the overlying clay member is fairly well defined by a change in the lithology of the sediments.

The Lloyd sand member is about 400 ft thick. It is largely composed of fine to coarse sand containing silt and clay in the interstices. It also includes beds of clay or sandy clay and coarser textured beds that contain gravel. Near the middle, the unit consists chiefly of sand and coarse gravel, which contains some pebbles at least 2 in. in diameter. The voids between the pebbles are for the most part filled with sand and some clay. The porosity of the unit is appreciably less than that of a well-sorted sand or gravel.

The pebbles and the sand found in the Lloyd member are composed almost entirely of quartz. This composition suggests that the material was derived from a region in which the climate was warm and the rate of erosion slow, so that all but the most resistant material was entirely decomposed. The clay is entirely or dominantly kaolinite, a material indicative of complete weathering (Dames & Moore 1986).

Clay Member of the Raritan Formation

The clay member, which overlies the Lloyd sand, makes up the balance of the Raritan formation. The top of the clay member is approximately 1,000 ft below MSL at the airport. Its thickness is about 200 ft. It is largely composed of tough dark-gray or black lignitic clay and some red and white clay, and includes some sandy layers and thin lenses of gravel. It also contains some light-gray silty and sandy clay. It is not clearly bedded, as the textures and colors grade into one another. Zones containing well-marked, narrow bands of light colored silty clay alternate with darker colored clay.

The clay member shows little, if any, systematic variation in thickness on Long Island. In most of the carefully logged wells that penetrate it, the clay is about 200 ft thick, and at least some of the greater or lesser thicknesses reported may be due to difficulty in placing the contacts, for these depend only on differences in lithology.

Like the Lloyd member below and the Magothy formation above, the clay member has not yielded any fossils except plant remains and is probably nonmarine. The scattered pieces and grains of lignite, the widely distributed spores and pollen, the casts of twigs and leaves, and possible varving suggest deposition on a coastal plain by generally sluggish, but sometimes flooded, rivers that drained a deeply weathered area of moderate relief. The coarser grained materials found in seams probably are lenses of limited extent both horizontally and vertically, and may act as relatively permeable but devious paths for the movement of water (Dames & Moore 1986).

Magothy Formation

The Magothy formation is a thick body of continental deposits composed of lenses of sand, sandy clay, clay, and some gravel. It rests on the Raritan formation and is in turn unconformably overlain by upper Pleistocene deposits. The greatest thickness revealed by drilling is about

1,000 ft. The present upper surface of the Magothy on Long Island is an erosional surface, and the original thickness is not known.

The Magothy formation underlies most of Long Island except for some western areas where it was removed by erosion. It may extend beneath Long Island Sound, but is probably truncated by erosion and overlain by Pliestocene deposits. To the south, the Magothy formation, like the Raritan, extends out under the sea, where it also probably changes from a terrestrial to a marine deposit.

The Magothy is composed of beds of poorly sorted quartzose sand mixed with and interbedded with silt and clay, and locally it contains pebbles or small lenses of gravel. Sandy clay and clayey sand make up most of the fine beds, but there are also several thick beds of clay. The basal 100 to 150 ft of the Magothy contains a greater proportion of coarse-grained material. This consists partly of coarse sand and gravel that contains pebbles as much as 2 or 3 in. in diameter. Voids are largely filled with silt and soft clay. The coarse-grained beds are separated by beds of sandy clay. A zone immediately overlying the clay member of the Raritan contains relatively coarse-grained permeable material.

The Magothy formation typically contains several clay layers, some of them as much as 50 ft thick. Where the Magothy itself is thick, the aggregate thickness of the clay beds is nearly as great as that of the clay member of the Raritan. It is difficult or impossible to trace any of these clay beds from one well to the next, which suggests they are probably lenticular and individually of small extent. These clay beds probably do not constitute as effective a barrier to the movement of groundwater as the clay member of the Raritan formation (Dames & Moore 1986).

Monmouth Greensand

Unconformably overlying the Magothy formation is the Monmouth Greensand. This unit is not present beneath the airport or to the north but is present 3,000 ft to the south. This unit extends southward and forms a wedge-like layer which thickens towards the south. It is approximately

50 ft thick beneath the barrier beach. The Monmouth Greensand consists of interbedded marine deposits of dark-gray, olive-green, dark-greenish-gray, and greenish-black glauconitic and lignitic clay, silt, and clayey and silty sand. This layer has a low hydraulic conductivity and tends to confine the water of the underlying aquifer (Dames & Moore 1986).

Gardiners Clay

An approximately 40-ft-thick clay bed lies above the Magothy formation and below the glacial deposits below the airport. This clay is present at about 100 ft below MSL at the airport and extends southward where it overlaps the Monmouth Greensand. The Gardiners clay pinches out just north of the airport, but equivalent clay bodies can be found locally at various locations on Long Island. This unit is made up of green and gray clay, silt, and clayey and silty sand including some interbedded clayey and silty gravel. This layer as a whole has low hydraulic conductivity and tends to confine water in the underlying aquifer (Dames & Moore 1986).

Glacial Deposits

These upper Pleistocene 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. 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 airport. Lacustrine and marine deposits are usually thin and discontinuous and are found locally throughout Long Island.

The Pleistocene epoch is divided into four major glacial stages: the Nebraskan, Kansan, Illinoian, and Wisconsin. The youngest epoch, the Wisconsin, produced Long Island Sound and most of the topographic features of Suffolk County as it is known today.

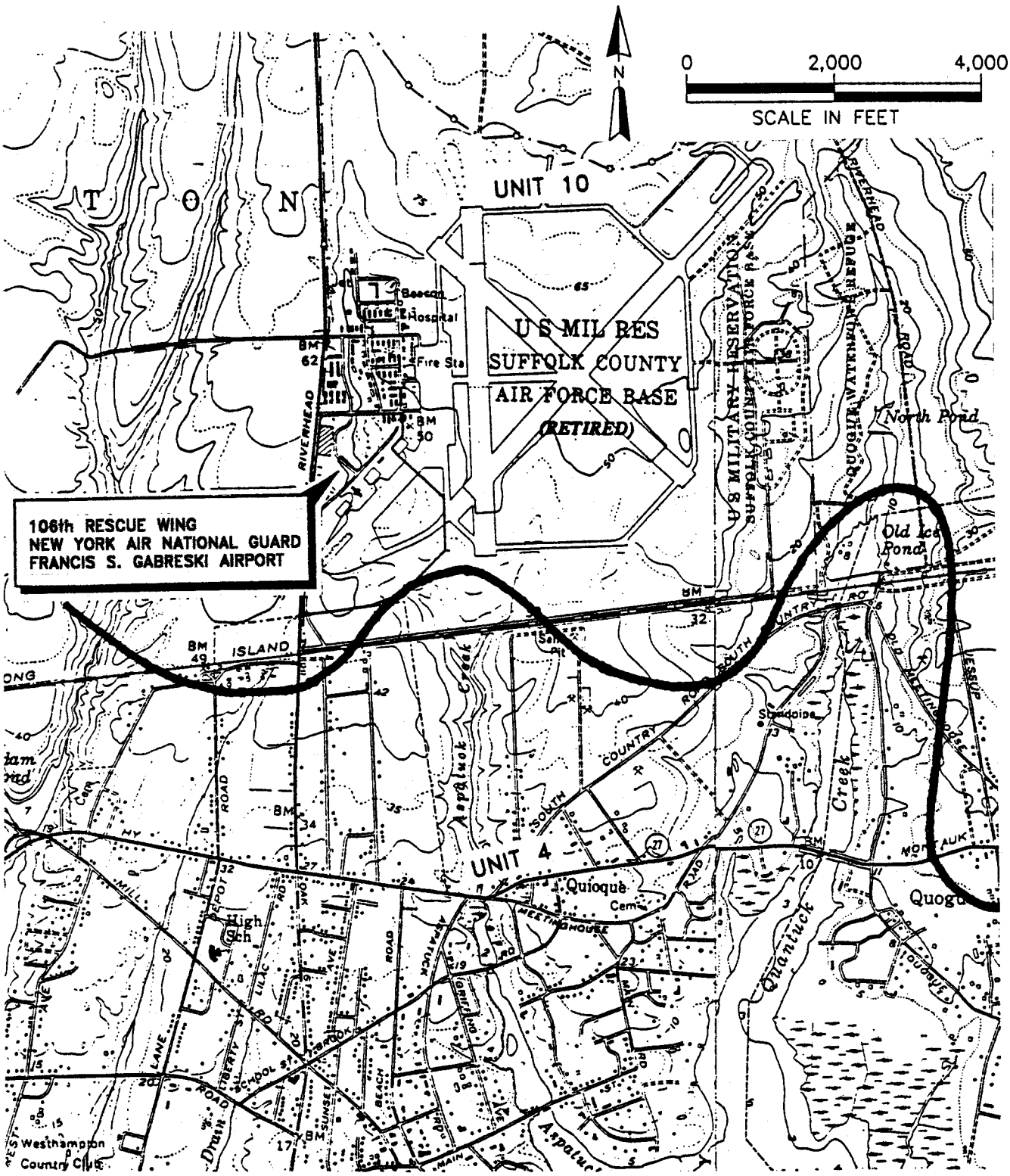
During the earlier part of the Wisconsin stage, the ice sheet moved to about the middle of the county and stopped, leaving before it the central ridge or terminal moraine. This ice sheet was called the Ronkonkoma sheet, and the moraine, which runs the entire length of the county from the Nassau County line to Montauk Point, was given the same name. The glacier retreated from this point back to the north of Long Island and then readvanced. The last advance terminated along the north shore, and again, a hilly terminal moraine was formed. This last advance of the ice was called the Harbor Hill sheet, and the moraine was called the Harbor Hill Moraine.

After the two ice sheets reached their southern limits in the county, they began to melt. As they melted, meltwater streams flowed from the glaciers and carried a large volume of sand and gravel farther south. The sand and gravel were deposited in a more or less flat plain, developing what is known as an outwash plain. Two outwash plains are in the county, with the one between the Ronkonkoma moraine and the Atlantic Ocean being the one present below the airport (Dames & Moore 1986).

For the RI, the upper Pleistocene glacial deposits are of greatest importance. The glacial sediments underlying the airport are mainly outwash deposits consisting of 100 to 120 ft of stratified fine to coarse sand and gravel. Sieve analyses of two subsurface samples indicated the following average percentages: 90.5% sand, 7.9% gravel, and 1.6% silt/clay. Surface soil was found to contain higher percentages of silt (ABB-ES 1977).

4.4 SOILS

Surface soils in the vicinity of the airport belong to either the Riverhead-Plymouth-Carver Association or the Plymouth-Carver Association (Figure 4.4). As the names suggest, both 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



SOURCE: ABB ENVIRONMENTAL SERVICES, INC.

FIGURE 4.4	SOIL ASSOCIATIONS 106th RESCUE WING, NEW YORK AIR NATIONAL GUARD FRANCIS S. GABRESKI AIRPORT WESTHAMPTON BEACH, NEW YORK	PEER PROJ./1566-053 FILE: GAB-003.DWG

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 which are not suitable for most agricultural purposes and, therefore, supporting only limited types of native vegetation (Dames & Moore 1986).

4.5 SURFACE WATER HYDROLOGY

The topography of the Gabreski Airport area is such that surface water runoff flows in a southerly and southeasterly direction. Runoff from the airport mainly percolates into the soil and moves in the subsurface aquifers although some may move as sheet flow. The airport drains to Aspatuck Creek located near the southeast corner of the installation. This creek flows into Quantuck Bay, which is separated from the Atlantic Ocean by a narrow barrier island (Figure 4.5) (S&W 1997).

4.6 HYDROGEOLOGY

Three aquifers and two aquitards are present in the region around the 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 general characteristics of each aquifer and aquitard including hydrologic properties are presented below. Table 4.1 presents the hydrologic properties of each unit.

Table 4.1
Hydrologic Properties of Regional Aquifers [(a)]
106th Rescue Wing
New York Air National Guard
Westhampton Beach, New York

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

(a) Source: Dames & Moore 1986.

Bedrock

This metamorphic unit is mostly plagioclase and quartz gneiss with no primary porosity. Some secondary porosity due to joints and fractures is present, which allows its use as a water source on western Long Island where bedrock is near surface and the overlying aquifers are absent. This unit has low hydraulic conductivity and is considered an aquiclude due to its texture and the highly weathered surface zone which has become a greenish-white residual clay (Dames & Moore 1986).

Lloyd Aquifer

The Lloyd sand is one of the most important aquifers on Long Island largely because it yields adequate supplies of good water in areas, generally beneath the margins of Long Island, where supplies from overlying formations are inadequate or are contaminated by or readily subject to contamination by sea water. The Lloyd can supply water under these circumstances because it is overlain by the relatively impermeable and virtually continuous blanket of the clay member (Dames & Moore 1987).

The usefulness of the aquifer is seriously compromised by the probability of poor yield. In the western part of the island, many wells tapping the Lloyd sand member yield 10 to 20 gpm/ft of drawdown. A well at Brookhaven National Laboratory was finished with 25 ft of screen and had a yield of about 2 gpm/ft of drawdown (Dames & Moore 1987).

The hydraulic conductivity of the Lloyd around the airport was estimated to be 300 gpd/ft^2 (1.4 x 10^{-2} cm/s), and transmissivity was estimated as 75 gpd/ft (1.1 x 10^{-1} cm^2/s) (Dames & Moore 1987).

The Lloyd aquifer as of 1974 was not used as a water source at or near the Suffolk County Airport. In 1982, 0.19 mgd was taken from the Lloyd in the east central area of Long Island (Dames & Moore 1986).

Raritan Clay

The Raritan Clay member of the Raritan formation is considered an aquitard separating the underlying Lloyd Aquifer from the overlying Magothy Aquifer. Thickness below the airport is approximately 200 ft. The hydraulic conductivity of a clay similar to the Raritan was determined to be 0.2 gpd/ft^2 (9.4 x 10^{-6}) cm/s, which is several orders or magnitude less than either the Lloyd or Magothy aquifers indicating that mixing of waters is quite small (Dames & Moore 1986).

Magothy Aquifer

Although it consists in part of beds of dense clay and layers or coarse sand and gravel, by far the greater part of the Magothy formation is made up of sandy clay and clayey sand. The formation as a whole, because of this thickness, can transmit and store large amounts of groundwater. There are no effective barriers to the movement of water through the formation except locally. Wells that are constructed and developed carefully yield large quantities of water from all but the

most clayey parts of the formation. The Magothy is important as an alternate aquifer in the event that the water in the overlying upper Pleistocene deposits becomes contaminated.

The highly productive beds of the Magothy are not confined to the basal gravely zone, but there is no other zone in which a reliable supply can be predicted. A well at Brookhaven National Laboratory penetrated considerable material in the Magothy from which water might be obtained. This well had only 20 ft of screen, no gravel pack, and little development but still yielded water at a specific capacity of 15 gpm/ft of drawdown (Dames & Moore 1987).

Hydraulic conductivity of the Magothy below the airport was estimated to be 380 gpd/ft^2 (1.8 x 10^{-2} cm/s), and transmissivity was at least 300 gpd/ft (4.5 x 10^{-1} cm^2/ft) with a saturated thickness of approximately 930 ft. In 1982, 1.0 mgd was removed from this aquifer in east Central Long Island. Below the airport, the top of the Magothy aquifer is about 150 ft below MSL. The potentiometric surface of this aquifer is approximately 15 ft above MSL. This confined, artesian nature of the Magothy would cause an upward flow of water through the overlying Gardiners clay (Dames & Moore 1986).

Gardiners Clay

This clay is poorly permeable and constitutes a confining layer for the underlying aquifer. Occasionally, some sand layers within the Gardiner may yield small quantities of water. The effectiveness of the Gardiners clay as a barrier to groundwater movement is an important factor in determining whether contamination reaching the groundwater in the glacial sands would be carried down to the lower aquifer. The sandy zones in the clay, which as far as is known may occur anywhere, would offer relatively little restriction to the movement of the water, which could then pass downward wherever the hydraulic gradient is favorable. Water can pass through the Gardiners clay, although at a slow rate, in small amounts and probably at most places only by circuitous routes.

Below the airport, the beds of clay and sand within the Gardiners are probably an effective barrier to the movement of groundwater into lower aquifers. The combination of low permeability with the generally upward movement of Magothy aquifer water would tend to keep near-surface contamination from migrating into the lower aquifer (Dames & Moore 1986).

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 aquifer present directly below the airport. Groundwater elevations are approximately 15 to 19 ft above the NGVD, but may be less or more due to seasonal variations.

The clean, coarse sand and gravel is very porous and highly permeable. It makes a porous soil, so that a high proportion of the rainfall infiltrates where it falls. There is virtually no surface runoff. Because of their high porosity, the deposits store large quantities of water. Because of their high permeability, the deposits yield large quantities of water to wells and are 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.

Some of these minor various in water-bearing characteristics might become significant in connection with possible movement of a contaminant. As the moraine deposits and outwash were developed by water flowing in general from north to south, individual lenses of sand and gravel may themselves be elongated in this direction. Thus, there may be threads of material with relatively higher permeably material along which water might move a little more rapidly under proper hydraulic conditions. Hydraulic conductivity of the outwash was estimated (ABB-ES 1997) to be about 2,000 gpd/ft^2 (9.4 x 10^{-2} cm/s), and transmissivity is approximately 200 gpd/ft (2.9 x 10^{-1} cm^2/s) (Dames & Moore 1987)

The direction of groundwater movement beneath the Gabreski Airport (i.e., in the upper glacial aquifer) is toward the south-southeast. Depth to groundwater averages 50 to 40 ft BGS. Slug tests performed on installation monitoring wells and piezometers (screened in the upper glacial aquifer) produced hydraulic conductivities ranging from 1.6×10^{-2} to 5.2×10^{-2} cm/sec (Dames & Moore 1986). PEER has developed a potentiometric surface map for the area of the ANG base, based on measurements recorded by ABB-ES, as shown on Figure 4.5.

The upward movement of water from the Magothy Aquifer would cause the upper glacial water to flow horizontally toward surface water discharge points. Migration of contaminants downward into lower aquifers is very unlikely (Dames & Moore 1986).

Groundwater is the only water supply source for Suffolk County. Most of the water in the Gabreski Airport area is obtained from the upper glacial aquifer; the rest is obtained from the Magothy an Lloyd aquifers. At present, Suffolk County Water Authority supplies the majority of the water in the 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 Gabreski Airport. Table 4.2 provides information pertaining to the public drinking water supply wells. Figure 4.6 shows the location of identified public drinking water supply wells. Some domestic wells are located within 1 mile, south of the airport (ABB-ES 1997).

4.7 CRITICAL HABITATS AND ENDANGERED/THREATENED SPECIES

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 (Dames & Moore 1987). In the immediate area of the airport, the Pine Barrens are characterized by a transition from 33 to 83 ft tall pitch pines. The nearby Quogue Wildlife Refuge is characterized by dwarf pitch pines ranging from 3 to 6 ft tall (Dames & Moore 1987). The airport itself is characterized by surrounding wooded areas consisting of 25 ft pitch pines and scattered scrub oak (Dames & Moore 1987).

Table 4.2
Public Drinking Water Supply Well Information [(a)]
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)	Total Depth (ft)	Population Served (Approximate)
Meeting House Road	0.61	Upper Glacial	Well #20 55-5 Well #22 74-104 Well #15A 31-51	Well #20 78 Well #22 104 Well #15A 53	6,538
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 #2 118-158	Well #1 118 Well #2 163	189
Old Country Road	2.18	Upper Glacial	Well #1 60-75 Well #2 NA Well #3 128-157	Well #1 76 Well #2 70 Well #3 161	1,783

(a) Source: Dames & Moore 1987.

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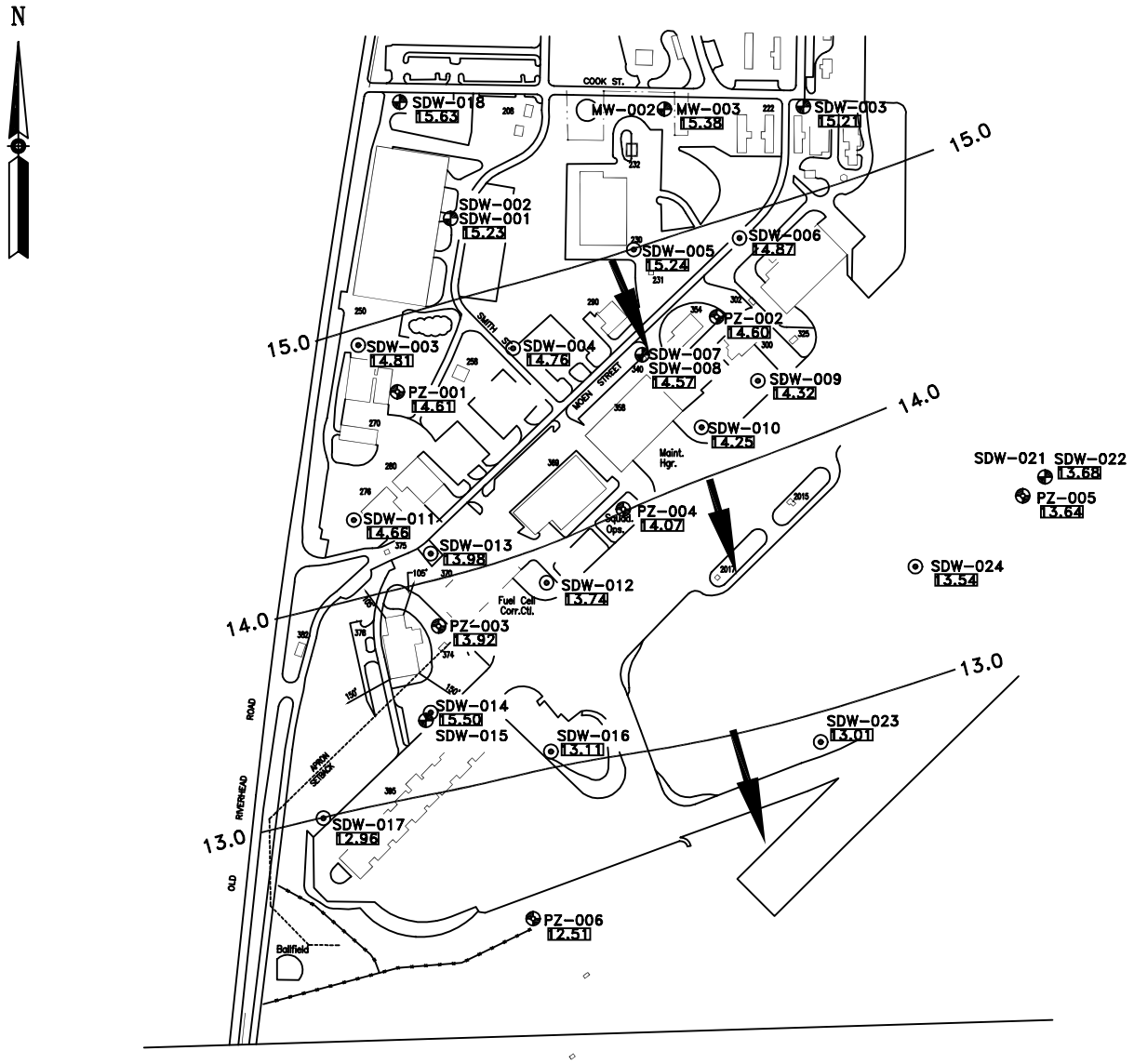

LEGEND

- SHALLOW WELL
- DEEP WELL
- SHALLOW PIEZOMETER
- POTENTIOMETRIC SURFACE CONTOUR
- DIRECTION OF GROUNDWATER MOVEMENT
- 12.51 — WATER ELEVATION IN FEET ABOVE MEAN SEA LEVEL MEASURED DECEMBER 1994

0 200 400

SCALE IN FEET

NOTE:
WATER LEVELS MEASURED IN THE SHALLOW WELLS WERE USED TO CONSTRUCT THIS FIGURE.
SOURCE: ABB ENVIROMENTAL SERVICES, INC

FIGURE 4.5	POTENTIOMETRIC SURFACE MAP 106th RESCUE WING, NEW YORK AIR NATIONAL GUARD FRANCIS S. GABRESKI AIRPORT WESTHAMPTON BEACH, NEW YORK	PEER PROJ./1566-053 FILE: GAB-029.DWG

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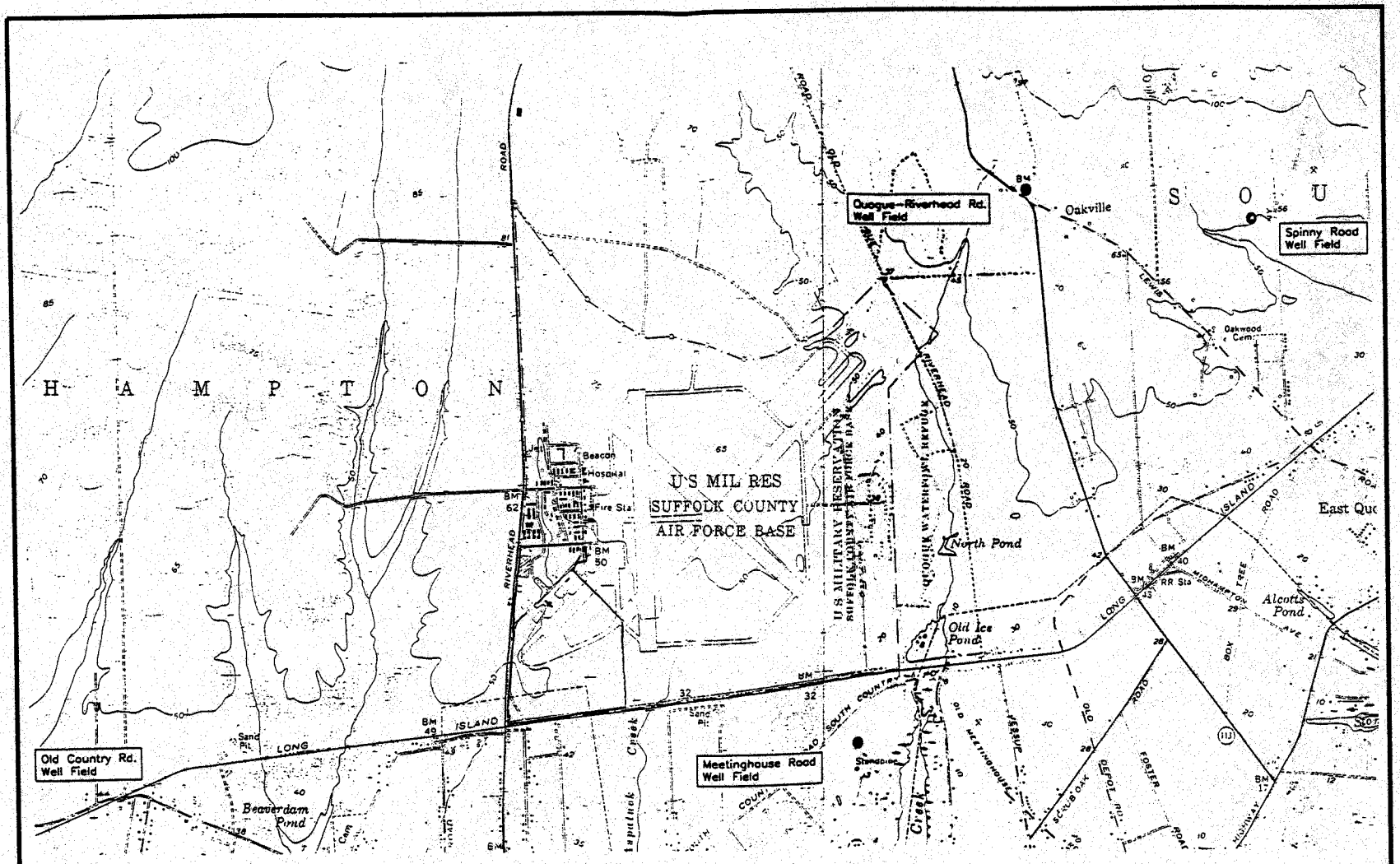

FIGURE 4.6	PUBLIC DRINKING WATER SUPPLY WELL LOCATIONS 106th RESCUE WING, NEW YORK AIR NATIONAL GUARD FRANCIS S. GABRESKI AIRPORT WESTHAMPTON BEACH, NEW YORK	PEER PROJ./1566-055 FILE: GAB-004.DWG

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Of the wildlife, birds are the most abundant in the area. Few mammals inhabit the region. Of those that do, the most common are the white-tail deer and red fox. Large animals generally do not inhabit the airport but may pass through. 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).

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5.0 PERMITS

The NYSDEC does not require permits for drilling soil borings intended for installation of monitoring wells or that are part of an ongoing investigation under CERCLA and SARA. PEER will assist the 106th Rescue Wing Environmental Manager in obtaining digging permits from the installation's Civil Engineer for soil boring advancement and monitoring well installation, as necessary. In addition, prior to advancing any soil borings, utility clearances will be obtained from the installation's Civil Engineer and the local utility company.

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6.0 INVESTIGATIVE APPROACH

This section presents the investigative approach for the RI at the installation. Discussed below are the Work Plan objectives, the general approach to the RI, and site-specific investigative activities.

6.1 WORK PLAN OBJECTIVE

The objective of this Work Plan is to provide the strategy, rationale, sequence, and methodology for proposed activities designed to meet the objectives of the RI/FS.

The strategy is to build on existing data, using previous investigations to develop a site model. This will allow identification of data gaps left by previous investigations. The rationale is to identify and address data gaps so as to complete the site model, and allow determination of the status of each site. Once the status of each site is known, recommendations can be made as to options for future work. It is anticipated that the sequence and methodology of investigations planned herein will allow the best options for each site to be selected. These options may include no further action, proceeding with a risk assessment, and a feasibility study, if required.

6.2 GENERAL APPROACH – SAMPLING STRATEGY AND RATIONALE

The major activities planned for the project are summarized in Table 6.1 and include:

- Obtain additional data for determining site-specific background concentrations of metals in soils and groundwater, especially chromium, lead, arsenic, and silver.
- Confirm or deny the presence of chromium in groundwater at Site Nos. 1, 2, 3, 10, and 11, and determine the extent of chromium contamination, if confirmed.
- Determine the lateral and horizontal extent in surface soils of lead at Site No. 1 and arsenic at Site No. 2.

Table 6.1
Planned Project Activities for the RI
106th Rescue Wing
New York Air National Guard
Westhampton Beach, New York

Activity	Quantity	Method	Round	Purpose	Laboratory Analyses
Preliminary Water Level Measurements	1 Round (All Existing Wells)	Water Level Meter	Round 1	• To confirm previously determined groundwater flow directions • To evaluate and modify soil and groundwater sample locations as needed	N/A
Direct-Push Probes/Soil Sampling	32	Direct-Push Probe Shelby Tubes	Round 1	• Obtain soil samples for lithological description, field screening, chemical analysis, and geotechnical analysis	Volatile Organics, Semivolatile Organics TAL Metals TPH (Site 7 and BKG only) PCBs (Sites 2, 3, 11, 12, and BKG) TCP (Site 12 and BKG only)
Soil Boring	9	Hollow-Stem Auger/Split-Spoon Shelby Tubes	Round 1	• Obtain soil samples for lithological description, field screening, chemical analysis, and geotechnical analysis • Installation of 2-in. monitoring wells	Volatile Organics, Semivolatile Organics TAL Metals TPH (Site 7 and BKG only) TCP (Site 12 and BKG only)
Direct-Push Probes/ Groundwater	32	Direct-Push (Mini Bailer or Peristaltic Pump)	Round 1	• Obtain groundwater samples for chemical analysis • Determine approximate depth to water	Volatile Organics, Semivolatile Organics TAL Metals TCP (Site 12 and BKG only)
Monitoring Well Installation	11	Hollow-Stem Auger	Round 1	• For collection of groundwater samples and measurement of water levels	N/A
Water Level Measurements	2 Rounds (All Existing and New Wells)	Water Level Meter	Rounds 1 and 2	• To determine groundwater flow direction and hydraulic gradient • To evaluate and modify additional sample locations as needed	N/A
Groundwater Sampling	11 New Wells and 28 Existing Wells	Teflon® Disposal Bailer	Round 1	• Evaluate nature and extent of groundwater contamination • Provide sufficient background data to serve as a baseline for comparison	Volatile Organics Semivolatile Organics TAL Metals TCP (Site 12 and BKG only) Remediation Parameters (1 Well/Site, plus BKG)
	11 New Wells and 54 Existing Wells	Teflon® Disposal Bailer	Round 2	• Evaluate nature and extent of groundwater contamination • Provide sufficient background data to serve as a baseline for comparison	Volatile Organics Semivolatile Organics TAL Metals TCP (Site 12 and BKG only) Remediation Parameters (1 Well/Site, plus BKG)

Table 6.1 (Continued)
Planned Project Activities for the RI
106th Rescue Wing
New York Air National Guard
Westhampton Beach, New York

Activity	Quantity	Method	Round	Purpose	Laboratory Analyses
Hydrogeologic Testing	11 New Monitoring Wells	Slug Tests	Round 2	• Determine aquifer characteristics, including hydraulic conductivity, transmissivity, and specification capacity	N/A
IDW Sampling	TBD	Grab or Composite Samples	Rounds 1 and 2	• Characterize IDW for proper disposal classification	TCLP (Full)
Civil Survey	1	TBD	After Round 1	• Survey to locate structural features, ground surface elevations, soil probe locations, soil boring and well locations, and top of casing elevations	N/A

N/A Not applicable.
TBD To be determined.
TCLP Toxicity Characteristic Leachate Procedure.

- Determine the lateral and vertical extent of silver in subsurface soils at Site No. 3, chromium in subsurface soils at Site No. 10, and of arsenic, chromium, and lead in subsurface soils at Site No. 11.
- Reevaluate 2-butanone as a contaminant of concern at Site No. 7.
- Define the nature and extent of volatile and semivolatile organics in groundwater, and of lead, volatile organics, semivolatile organics, and petroleum hydrocarbon contamination in soil at Site No. 7.
- Define the nature and extent of tetrachloroethene in soil and groundwater at Site No. 10.
- Define the nature and extent of contamination by TCP and PAHs at Site No. 12.
- Characterize background levels of chromium in site soils and groundwater.
- Collect baseline data on background levels of chromium in site soils and groundwater.
- Collect baseline data on parameters required to allow evaluation of natural attenuation processes at each site.
- Evaluate PCBs as potential contaminants of concern at Sites 2, 3, 11, and 12.

The general approach planned for the RI is based on a conceptual model developed by consideration of the available data. This understanding of the site incorporates site conditions, geology and hydrogeology, contaminant characteristics, pathway dynamics, and remedial alternatives. The approach will maximize use of available data. Additional information gained from the RI will be incorporated into the conceptual model to refine understanding of each site. This will help to limit additional cost and schedule, resulting in remedial decisions that are timely and realistic.

6.3 SITE INVESTIGATION ACTIVITIES

Potential contaminants of concern for each site, based on given screening levels and results for previous investigations are summarized in Table 6.2. Chemicals of concern are those identified in the Site Investigation Report (ABB-ES 1997) for Site Nos. 1, 2, 3, 10, and 11. PCBs have

Table 6.2
Potential Contaminants of Concern at Sites 1, 2, 3, 7, 10, 11, and 12
106th Rescue Wing
New York Air National Guard
Westhampton Beach, New York

Site No.	Surface Soils	Subsurface Soils	Groundwater
1	Lead* Chromium	Lead	Chromium*
2	Chromium Lead Arsenic* PCBs [(b)]	Chromium PCBs [(b)]	Chromium*
3	Toluene Chromium Lead PCBs [(b)]	Chromium Lead Silver* PCBs [(b)]	Chromium*
7	Benzene Ethylbenzene Toluene Xylenes (Total) Chlorobenzene PCE BEHP PAHs 2-Methylnaphthalene PHCs Lead	Ethylbenzene* Toluene Xylenes (Total)* PCE BEHP PHCs* 2-Methylnaphthalene Naphthalene 2-Methylphenol 2,4-Dimethylphenol 4-Methylphenol PHCs Lead	Benzene* Ethylbenzene* Toluene* Xylenes (Total)* 1,1,1-TCA* 1,1-DCA* PCE* Acetone* BEHP* 2-Butanone*
10	N/A	PCE Chromium* Lead	PCE Chromium*
11	N/A PCBs [(b)]	Arsenic* Chromium* Lead* PCBs [(b)]	Chromium*
12	Unknown ([a]) PCBs [(b)]	TCP[(a)] PAHs[(a)] PCBs [(b)]	Unknown[(a)]

*	Exceeded action levels.
(a)	Insufficient information available to attain certainty concerning these items.
(b)	Suspected.

1,1-DCA	1,1-Dichloroethane.
1,1,1-TCA	1,1,1-Trichloroethane.
BEHP	Bis-2(ethylhexyl)phthalate.
N/A	Not applicable.
PAHs	Polynuclear aromatic hydrocarbons.
PCBs	Polychlorinated byphenyls.
PCE	Tetrachloroethene.
PHCs	Petroleum hydrocarbons.
TCP	Tri-ortho cresyl phosphate.

been added as potential contaminants of concern at Sites 2, 3, 11, and 12, based on the unknown nature of contaminants at Sites 2 and 3, and the suspected presence of hydraulic oils at Sites 11 and 12.

For Site No. 7, sample data from the Final Site Characterization Report (ABB-ES 1989) were screened using the action levels developed for the Site Investigation Report (ABB-ES 1997). Data reported with "B" or "J" flags were excluded. The semivolatile organic, 2-butanone, is included for consideration as a chemical of concern in groundwater. The presence of 2-butanone in groundwater samples has been evaluated previously (ABB-ES 1992). The evaluation considered statistical analysis, chemical fingerprint evidence, and circumstantial evidence of the occurrence of 2-butanone in groundwater samples, in connection with the use of methyl hydride as a decontamination fluid during groundwater sampling. This analysis indicates that the occurrence of 2-butanone in groundwater samples at Site 7 was a sampling artifact. The RI will reevaluate 2-butanone as a chemical of concern in groundwater in the light of previous studies and new data to be developed in this RI.

Site investigation activities for obtaining additional background data and the additional data for potential contaminants of concern are discussed in the following sections.

6.3.1 Land Surveying

A civil survey of each site and any associated cultural features will be prepared by a New York state-licensed and registered surveyor. The survey will determine the locations of soil borings and monitoring wells within +/- 0.01 ft, horizontal and vertical.

Surveys will be tied to existing benchmarks and include the following information: site contours, surface drainage network and any surface water impoundments, location of other natural or cultural features, and an appropriate coordinate system and boundary locations. Topographic drawings identifying the benchmarks and horizontal and vertical controls used will be produced, using a contour interval not more than 2 ft, and adequately portraying the

topographic relief on the sites. The survey will be provided to the ANG in a compatible electronic format.

6.3.2 Soil Borings and Soil Sampling

Soil borings will be installed using both direct-push and hollow-stem auger techniques. Direct-push (e.g., Geoprobe®) borings will be used to obtain surface and subsurface soil samples for screening using the PID, for lithologic description by the geologist, and for geotechnical analysis. Direct-push soil boring samples will also be submitted for laboratory analysis of volatile and semivolatile organics, TCP isomers (Site 12 and background only), total petroleum hydrocarbons (TPH) (Site 7 and background only), PCBs, and metals, at a rate of approximately 25%, or two to four samples per borehole. PCB samples will only be collected from source areas at Sites 2, 3, 11, 12, and background for a total of 14 field samples.

Specific soil sample intervals to be collected include:

- Surface soil: To be collected from 0 to 2 in. BGS, per New York State Health Department requirements.
- Middle interval(s): To be determined based on field screening and observation of contamination.
- Deep interval: To be collected at the top of groundwater, as indicated by observed saturation.

Hollow-stem auger soil borings will also be used to collect soil samples for lithology, screening, laboratory analysis, and geotechnical analysis, but will only be employed where monitoring well installation is planned. Soil samples will be collected during monitoring well installation using standard split-spoon techniques, at the same intervals as specified for the direct-push soil borings. Table 6.3 summarizes the planned, site-specific soil samples and analyses for both direct-push and hollow-stem auger soil borings.

Table 6.3
Summary of Planned Site-Specific Soil Samples and
Analyses from Direct-Push Probes and Hollow-Steam Auger Borings
106th Rescue Wing
New York Air National Guard
Westhampton Beach, New York

Site No.	Direct-Push Borings	Soil [a] Screening Samples	Direct-Push Soil Analytical Samples	HSA Borings	Split-Spoon Samples	Split-Spoon Soil Analytical Samples	Number of Soil Analyses						
							Volatile Organics	Semivolatile Organics	TAL Metals	TCP Isomers	PCBs	TPH	Geotechnical
1	3	48	9	2	32	6	15	15	15	0	0	0	0
2	3	32	9	1	16	3	12	12	12	0	3 [b]	0	0
3	2	35	6	1	18	3	9	9	9	0	3 [b]	0	0
7	5	63	15	0	0	0	15	15	15	0	0	15	1
10	4	76	12	2	38	6	18	18	18	0	0	0	1
11	3	48	9	1	24	3	12	12	12	0	3 [b]	0	0
12	10	60	30	2	60	6	36	36	36	36	3 [b]	0	1
BKG	2	40	6	0	0	0	6	6	6	6	3 [b]	6	1
Totals	32	402	96	9	168	27	123	123	123	42	15	21	4

HSA Hollow-stem auger.
PCB Polychlorinated biphenyls.
TAL Target Analyte List.
TCP Tri-ortho cresyl phosphate.
TPH Total petroleum hydrocarbons.

(a) Calculated based on predicted depth to water x number of borings ÷ 2 ft/sample. Assumes continuous probe/split spoon sampling from surface to top of groundwater.
(b) One direct-push borehole will be sampled for PCBs at each of these locations.

6.3.3 Groundwater Sampling

Groundwater samples will be collected from monitoring wells in two rounds of sampling. Round 1 will consist of site-specific sampling for Sites 1, 2, 3, 7, 10, 11, 12, and for the existing background location, including all new monitoring wells and selected existing wells. Round 2 of groundwater sampling will be a basewide synoptic sampling of all new and existing monitoring wells that can be located, identified, and sampled. The Round 2 synoptic sampling will take place after the site-specific sample Round 1 is completed. Table 6.4 summarizes the site-specific Round 1 groundwater samples and analyses. Table 6.5 summarizes the synoptic sampling Round 2 groundwater samples and analyses. As requested by the NYSDEC, approximately 10% of the new and existing monitoring wells to be sampled in Rounds 1 and 2 will be sampled twice. These selected wells will have one sample collected from the top of the wetted screen interval, and a second sample collected from the bottom of the screen. Tables 6.4 and 6.5 reflect this. Planned sample analysis for monitoring well groundwater samples include volatile and semivolatile organics, TCP isomers (Site 12 and background only), TAL metals, and remediation parameters. Table 6.6 summarizes the analytical methods, containers, and preservatives for the planned RI effort.

Groundwater samples will also be collected for screening purposes from direct-push boreholes. Those direct push boreholes that reach groundwater will be used to collect groundwater screening samples, to be analyzed for volatile and semivolatile organics. Direct-push borings associated with Site No. 12 will also be sampled for TCP isomers. Previous investigations have analyzed direct-push groundwater samples for TAL metals; however, the results from these analyses were considered suspect due to the presence of entrained sediments. Therefore, no groundwater samples will be collected or analyzed for TAL metals from direct-push boreholes. TAL metals samples will only be collected from properly installed, developed, and purged new or existing monitoring wells. Collection of semivolatile organics and TCP isomers will be contingent upon obtaining sufficient volume of groundwater from the direct-push soil borings.

Table 6.4
Summary of Planned Site-Specific Round 1 Groundwater Samples and Analyses
From Direct-Push Probes and New and Existing Monitoring Wells
106th Rescue Wing
New York Air National Guard
Westhampton Beach, New York

Site No.	Direct-Push Groundwater Screening			Existing Monitoring Wells					New Monitoring Wells				
	Volatile Organics	Semivolatile Organics	TCP Isomers[a]	Volatile Organics	Semivolatile Organics	TAL Metals	Remediation Parameters	TCP Isomers	Volatile Organics	Semivolatile Organics	TAL Metals	Remediation Parameters	TCP Isomers
1	3	3	0	0	0	0	0	0	2	2	2	1	0
2	3	3	0	3 (4) [b]	3 (4) [b]	3 (4) [b]	0	0	1	1	1	1	0
3	2	2	0	1	1	1	0	0	1	1	1	1	0
7	5	5	0	22 (24) [b]	22 (24) [b]	22 (24) [b]	1	0	0	0	0	0	0
10	4	4	0	0	0	0	0	0	2	2	2	1	0
11	3	3	0	0	0	0	0	0	1 (2) [b]	1 (2) [b]	1 (2) [b]	1	0
12	10	10	10	0	0	0	0	0	2	2	2	1	2
BKG	2	2	2	2	2	2	2	2	2	2	2	1	2
Totals	32	32	12	28 (31) [b]	28 (31) [b]	28 (31) [b]	3	2	11 (12) [b]	11 (12) [b]	11 (12) [b]	7	4

(a) Provided sufficient sample volume can be obtained.
(b) Includes wells to be sampled twice: once each from the top and bottom of the screened interval.

TAL Target Analyte List
TCP Tri-ortho cresyl phosphate

Note: Optional samples from probes, soil borings, and monitoring wells are not included in this table.

Table 6.5
Summary of Basewide Synoptic Round 2 Groundwater Sampling Round
106th Rescue Wing
New York Air National Guard
Westhampton Beach, New York

	Volatile Organics	Semivolatile Organics	TAL Methods	TCP Isomers	Remediation Parameters [a]
New Monitoring Wells	11 (12) [b]	11 (12) [b]	11 (12) [b]	2	8 [b]
Existing Monitoring Wells	54 (58) [b]	54 (58) [b]	54 (58) [b]	2	2
Totals	65 (70) [b]	65 (70) [b]	65 (70) [b]	4	10

(a) One well per site to be sampled for remediation parameters.
(b) Includes 10% of wells to be sampled twice: once each from the top and bottom of the screened interval.

TAL Target Analyte List
TCP Tri-ortho cresyl phosphate

Table 6.6
Summary of Analytical Methods, Container Types, and Preservatives
106th Rescue Wing
New York Air National Guard
Westhampton Beach, New York

Type of Sample	Parameter	Analytical Method	Containers	Preservatives
Direct-Push Soil	Volatile Organics	EPA 8240B	1, 4-oz. G	Cool at 4°C
	Semivolatile Organics	EPA 8270	1, 8-oz. G	Cool at 4°C
	PCBs	EPA 8080	1, 8-oz. G	Cool at 4°C
	TPH	EPA 8015 (Modified)	1, 8-oz. G	Cool at 4°C
	TAL Metals	EPA 6010/7000	1, 8-oz. G	Cool at 4°C
	TCP	EPA 8321	1, 8-oz. G	Cool at 4°C
	Grain Size/Moisture	ASTM D422/D2216	2-ft Shelby Tube	None
	Triaxial Sheer	ASTM D2850	2-ft Shelby Tube	None
	Density	ASTM D698	2-ft Shelby Tube	None
Hollow-Stem Auger	Volatile Organics	EPA 8240B	1, 4-oz. G	Cool at 4°C
	Semivolatile Organics	EPA 8270	1, 8-oz G	Cool at 4°C
	PCBs	EPA 8080	1, 8-oz. G	Cool at 4°C
	TPH	EPA 8015 (Modified)	1, 8-oz. G	Cool at 4°C
	TAL Metals	EPA 6010/7000	1, 8-oz. G	Cool at 4°C
	TCP	EPA 8321	1, 8-oz. G	Cool at 4°C
	Grain Size/Moisture	ASTM D422/D2216	2-ft Shelby Tube	None
	Triaxial Sheer	ASTM D2850	2-ft Shelby Tube	None
	Density	ASTM D698	2-ft Shelby Tube	None
Direct-Push Groundwater	Volatile Organics	EPA 8240B	2, 40-mL G vials	HCl pH < 2, Cool at 4°C
	Semivolatile Organics	EPA 8270	1, 1-L amber g	Cool at 4°C
	TCP	EPA 8321	1, 1-L amber G	Cool at 4°C
Monitoring Well Groundwater Samples	Volatile Organics	EPA 8240B	2, 40 mL G vials	HCl pH < 2, Cool at 4°C
	Semivolatile Organics	EPA 8270	1, 1-L amber G	Cool at 4°C
	TAL Metals	EPA 6010/7000	1, 500 mL G, P	HNO_3, pH < 2
	TCP	EPA 8321	1, 1-L amber G	Cool at 4°C
	BTEX	EPA 8020	2 40-mL G vials	HCl pH < 2, Cool at 4°C
	TPH-GRO	EPA 8015	2, 40-mL g vials	HCl pH < 2, Cool at 4°C
	TPH-DRO	EPA 8015	1, 1-L amber G	HCl pH < 2, Cool at 4°C
	Sulfate ($SO4^{-3}$)	IC Method 5300	2, 40-mL G, P	Cool at 4°C
	Chloride	IC Method E300	1 250-mL G	Cool at 4°C
	Iron II (Fe^{+2})	Colorimetric HACH Method 8146	1, 500-mL G, P	None, analyze immediately
	Methane	Kempbell, et al., 1989	2, 50-mL G, crimped	H_2SO_4, pH < 2, Cool 4°C
	Alkalinity	HACH Test Kit, ALAP MG-L	100-mL G	None, analyze immediately
	PH	Electrode, In Field	1-L flow-thru HYDROLAB	None, analyze immediately
	DO	Electrode, In Field	1-L flow-thru HYDROLAB	None, analyze immediately
	Temperature	Electrode, In Field	1-L flow-thru HYDROLAB	None, analyze immediately
	Conductivity	Electrode, In Field	1-L flow-thru HYDROLAB	None, analyze immediately
	Turbidity	Electrode, In Field	1-L flow-thru HYDROLAB	None, analyze immediately
	Redox	Electrode, In Field	1-L flow-thru HYDROLAB	None, analyze immediately
IDW – Soil and Water	Full TCLP	EPA 1311	1, 8-oz. G; 1, 1-L amber G	None, Cool at 4°C

BTEX The sum of benzene, toluene, ethylbenzene, and xylenes.
DRO Diesel range organics.
G Glass.
GRO Gasoline range organics.
IC Ion chromatograph.
IDW Investigation-derived waste.
P Polyethylene.
PCBs Polychlorinated biphenyls.
STM Standards Methods (1989).
TCLP Toxicity Characteristic Leachate Procedure
TCP Tri-ortho cresyl phosphate and isomers.
TPH Total petroleum hydrocarbons.
Notes: TAL metals include total (unfiltered) for: aluminum, antimony, arsenic, barium, beryllium, cadmium, calcium, chromium (III and VI), cobalt, copper, iron, lead, magnesium, manganese, mercury, nickel, potassium, selenium, silver, sodium, thallium, vanadium, and zinc.

Chromium VI preserved cool at 4°C (no acid), and must be analyzed within 24 hours.

All new and selected existing monitoring wells will be sampled for volatile organics, semivolatile organics, and TAL metals in the site-specific Round 1. One new or existing well from each site and the background location will be sampled for remediation parameters. In the synoptic sampling round, all newly installed and existing monitoring wells will be sampled for volatile organics, semivolatile organics, and TAL metals. Wells that were sampled for remediation parameters in the site-specific Round 1 will be resampled for remediation parameters again during the synoptic sampling Round 2. Monitoring wells associated with Site No. 12, a suspected hydraulic oil spill, and the existing background well, will also be sampled for TCP isomers during both Rounds 1 and 2.

As stated above, selected new and existing wells will be sampled twice. During Round 1, two new and two existing wells will be sampled twice. During Round 2, one new and four existing monitoring wells will be sampled twice. These samples will be considered as separate field samples, and are not considered as duplicates or replicates.

6.3.4 Sampling Locations

Deviation from the proposed sampling locations will not occur without the consent of the ANG/CEVR. Monitoring well locations or sampling locations may be adjusted depending on the results of the initial groundwater elevation survey, direct-push field screening results, or access prohibitions to existing utilities or structures. Any deviations to this Work Plan will be handled as discussed in Section 6.5.

Final approval of soil boring/monitoring well locations will be obtained from the ANG/CEVR prior to drilling.

6.3.5 Slug Testing

Hydraulic conductivity of all newly installed monitoring wells will be characterized using Bouwer and Rice rising and/or falling head slug tests, as appropriate.

6.4 SITE-SPECIFIC INVESTIGATORY ACTIVITIES

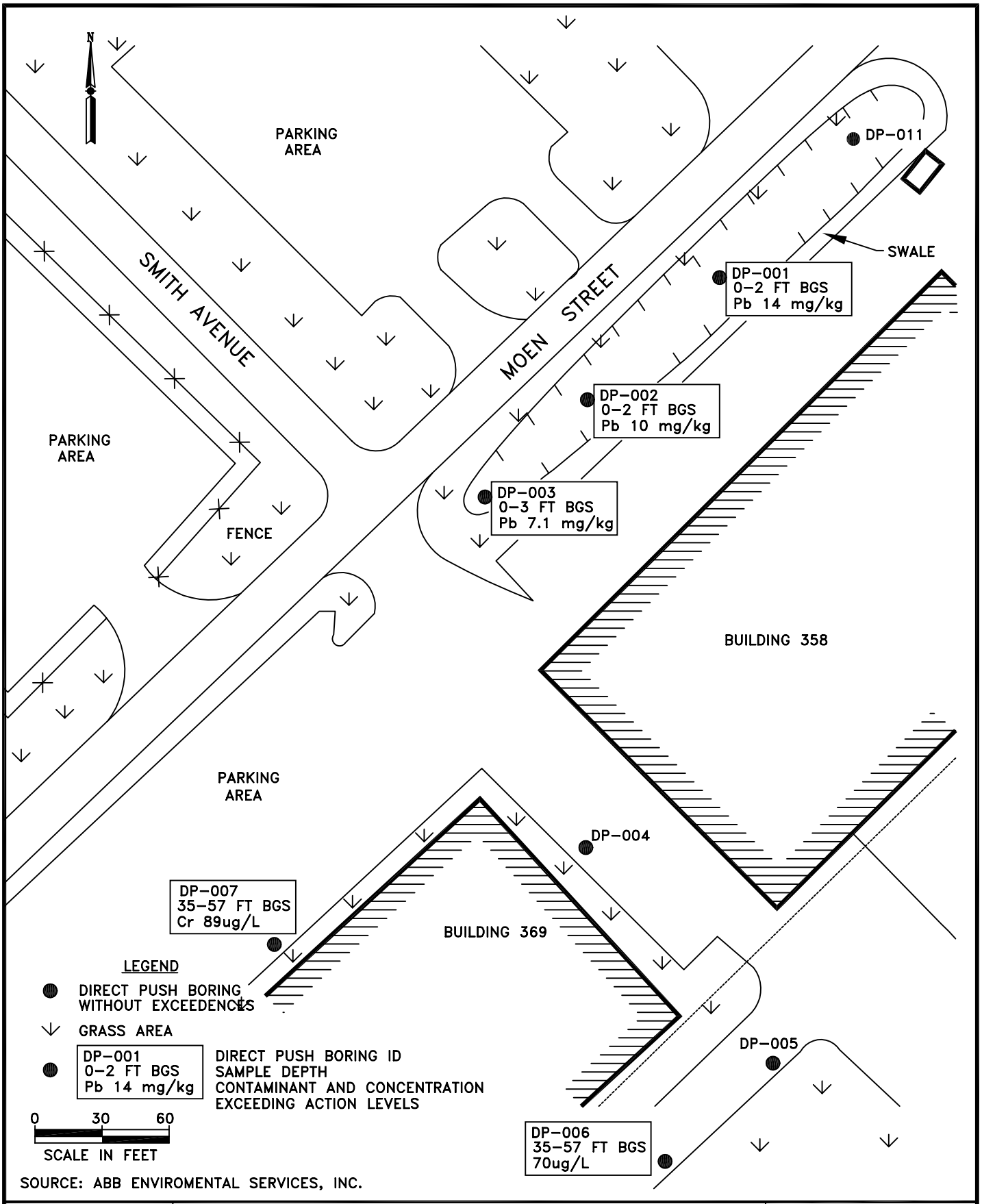
6.4.1 Site No. 1, AVGAS Spill Site

During the Site Investigation at Site No. 1, a total of eight direct-push borings were installed in an attempt to evaluate suspected AVGAS contamination. Up to 5,000 gal of AVGAS is alleged to have been spilled from a tanker truck parked at a parking structure on the northwest side of Moen Street. The AVGAS is thought to have pooled in the adjacent drainage swale, and then to have infiltrated the soil and to have reached the water table (ABB-ES 1997). The drainage swale was 5 to 6 ft deep at the time of the alleged spill, but has since been filled nearly level with surrounding surfaces.

Soil and groundwater samples found no detections of petroleum-related compounds or aromatic hydrocarbons that would be indicative of petroleum product contamination. Lead and chromium were detected in soil samples, with lead exceeding action levels in three surface soil samples from the drainage swale. Chromium was detected exceeding action levels in two direct-push groundwater samples located 220 and 260 ft south of the drainage swale. These were the only groundwater samples analyzed for TAL metals at Site No. 1. Figure 6.1 shows the locations of the Site No. 1 direct-push soil and groundwater samples. Tables 6.7 and 6.8 summarize the Soil Investigation soil and groundwater samples that exceeded action levels (ABB-ES 1997).

The investigatory activities planned for this RI at Site No. 1 are intended to accomplish the following:

- Confirm or deny the presence of chromium contamination in site groundwater in exceedance of action levels by sampling from a newly installed, properly developed monitoring well.
- Define the nature and extent of chromium contamination in site groundwater, if confirmed.



SOURCE: ABB ENVIROMENTAL SERVICES, INC.

FIGURE 6.1	SITE 1 – AVIATION GASOLINE SPILL SITE 106th RESCUE WING, NEW YORK AIR NATIONAL GUARD FRANCIS S. GABRESKI AIRPORT WESTHAMPTON BEACH, NEW YORK	PEER PROJ./1566-053 FILE: GAB-005.DWG

Table 6.7
Surface Soil Results Above Action Levels [(a)]
Site 1 – Aviation Gasoline Spill Site
106th Rescue Wing
New York Air National Guard
Westhampton Beach, New York

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

(a) Source: (ABB-ES 1997).

Table 6.8
Groundwater Results Above Action Levels [(a)]
Site 1 – Aviation Gasoline Spill Site
106th Rescue Wing
New York Air National Guard
Westhampton Beach, New York

Analyte	Depth (ft BGS)	Sample Location	Concentration (µg/L)	Action Level (µg/L)
Chromium	35 – 57	DP-006	70	50
	35 – 57	DP-007	89	50

(a) Source: (ABB-ES 1997).

- Confirm or deny petroleum-related and aromatic hydrocarbon contamination in the soil or groundwater at the site.
- Define the nature and extent of petroleum hydrocarbon contamination, if detected.

To accomplish these goals, direct-push borings will be used to collect surface soils, subsurface soils, and groundwater screening samples.

Three direct-push borings (S1-DP01 through S1-DP03) will be installed to confirm or deny the presence of lead and chromium in surface soils in excess of action levels, to evaluate subsurface soil for metals, and to confirm the absence of petroleum-related aromatic hydrocarbons in soil and groundwater. The borings will be installed as follows:

- One boring in the approximate center of the drainage swale.
- Two borings downgradient of the drainage swale.

Soil samples will be collected for lithologic description and field PID screening purposes at 2-ft intervals, commencing at the surface.

Two to four soil samples will be collected from each direct-push probe location, for laboratory analysis for volatile and semivolatile organics and TAL metals. Analytical samples will be collected from the surface, the vadose zone between the top of saturation and the surface, and from the top of or just above the saturated zone. Additional samples may be collected from the vadose zone if suspected soil contamination is encountered.

Groundwater screening samples will be collected from each probe and analyzed for volatile and semivolatile organics.

Installation of two new monitoring wells is planned at Site 1 (S1-MW01 through S1-MW03):

- one well will be installed in the approximate center of the drainage swale; and
- a second well will be installed about 200 ft south-southeast of the drainage swale.

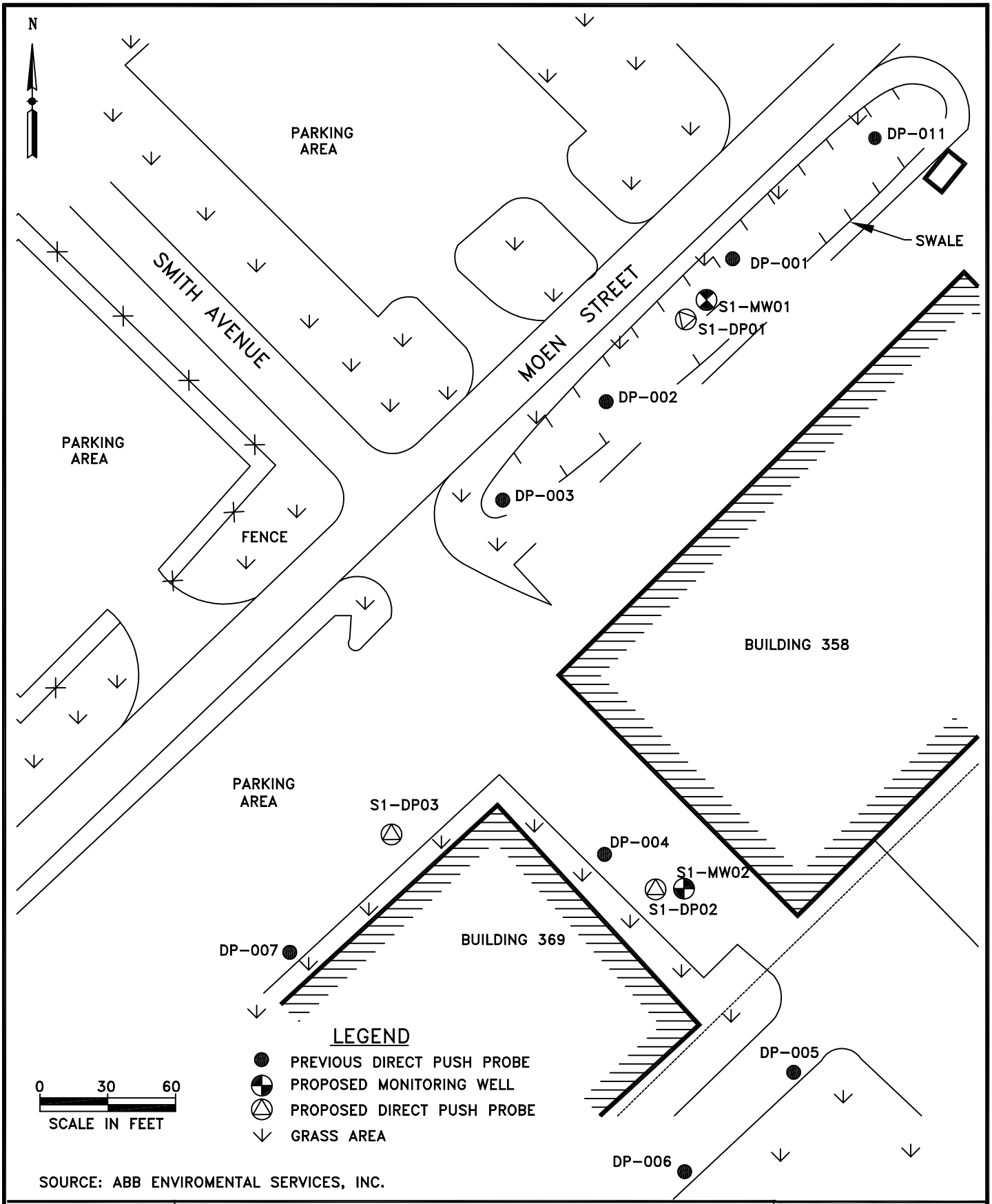
The two monitoring well boreholes will be sampled for description, screening, and analysis of soils as for the direct-push probes. These planned locations may be modified based upon he results of the initial groundwater elevation survey, PID field screening, or groundwater screening sample results. The new wells will be screened from 27 to 42 ft BGS based on the 32 to 33 ft depth BGS of groundwater encountered during the Site Investigation. The new monitoring wells will be properly developed, purged, and sampled for volatile organics, semivolatile organics, and TAL metals. Monitoring well S1-MW01 will also be sampled for intrinsic remediation parameters.

Depending on the findings of the direct-push and monitoring well investigations, up to three optional direct-push borings and one optional monitoring well may be recommended for this site.

Figure 6.2 shows the approximate planned locations of the three direct-push soil borings and two new monitoring wells.

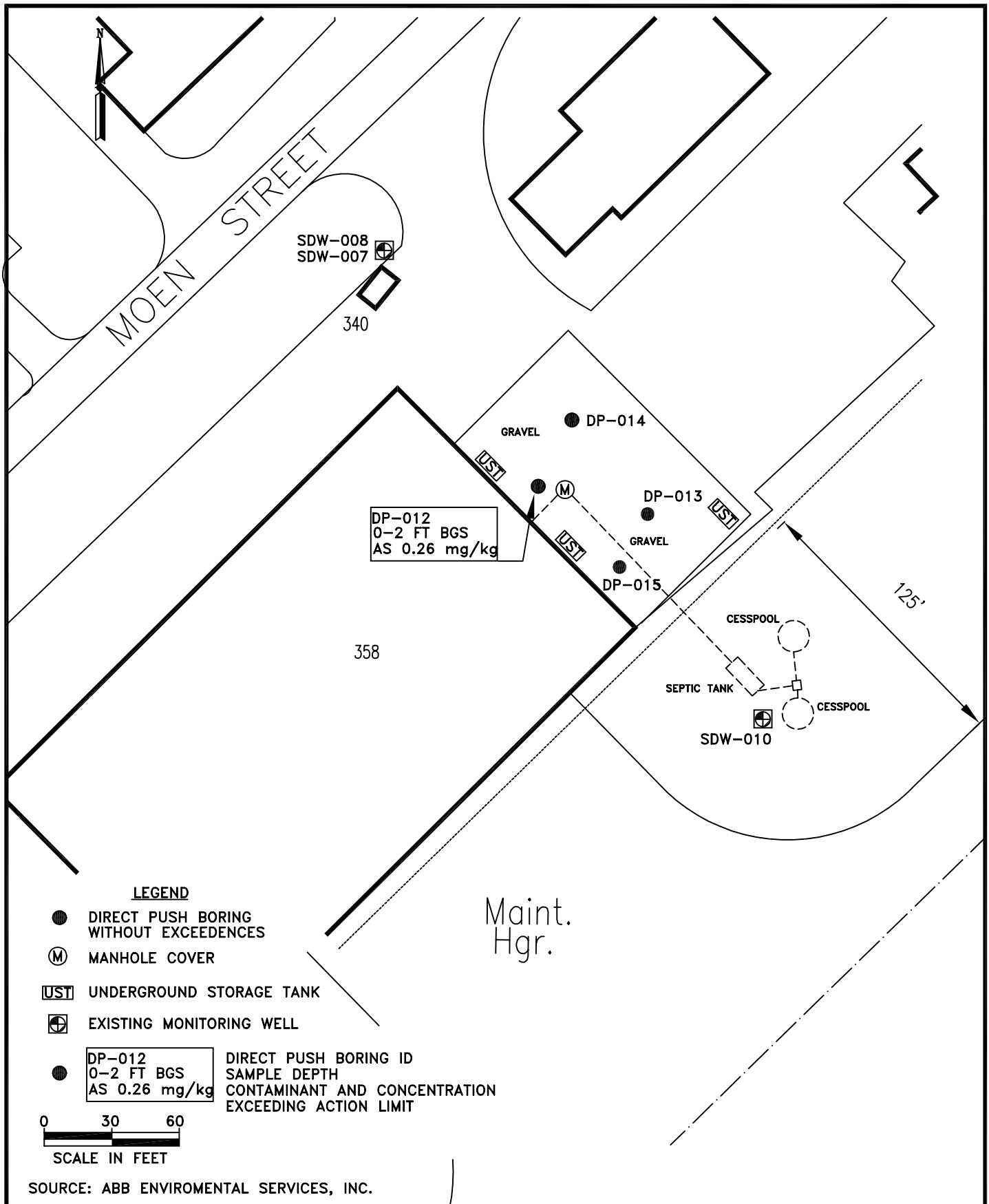
6.4.2 Site No. 2, Former Waste Storage Area

During the Site Investigation at Site 2, a total of four direct-push soil borings were installed in an effort to evaluate suspected contamination of surface and subsurface soils and groundwater. Less than 500 gal was assumed to have been spilled over the 14-year period the site was in use. Two direct-push borings were sampled for surface soil (0 to 2 ft BGS) only. One direct-push borehole was sampled to a depth of 5 to 7 ft BGS, and one was sampled for soil to the top of the saturated zone, and for groundwater. Arsenic, chromium, and lead were detected in surface soils, with one sample containing a concentration of arsenic in exceedance of action levels. Chromium was detected in one subsurface soil sample, but did not exceed action levels. Chromium was detected in the single groundwater sample at a concentration exceeding action levels. Figure 6.3 shows the locations of the Site 2 direct-push soil and groundwater samples. Table 6.9 summarizes the analytes detected above action limits at Site 2 (ABB-ES 1977).



SOURCE: ABB ENVIROMENTAL SERVICES, INC.

FIGURE 6.2	SITE 1 – PROPOSED DIRECT PUSH PROBE AND MONITORING WELL LOCATIONS AT THE AVIATION GASOLINE SPILL SITE 106th RESCUE WING, NEW YORK AIR NATIONAL GUARD FRANCIS S. GABRESKI AIRPORT WESTHAMPTON BEACH, NEW YORK	PEER PROJ./1566-053 FILE: GAB-006.DWG



SOURCE: ABB ENVIROMENTAL SERVICES, INC.

FIGURE 6.3	SITE 2 – FORMER HAZARDOUS WASTE STORAGE AREA 106th RESCUE WING, NEW YORK AIR NATIONAL GUARD FRANCIS S. GABRESKI AIRPORT WESTHAMPTON BEACH, NEW YORK	PEER PROJ./1566-053 FILE: GAB-007.DWG

Table 6.9
Surface Soil Results Above Action Levels [(a)]
Site 2 – Former Hazardous Waste Storage Area
106th Rescue Wing
New York Air National Guard
Westhampton Beach, New York

Analyte	Depth (ft BGS)	Sample Location	Concentration (mg/kg)	Action Level (mg/kg)
Arsenic	0 – 2	DP-012	0.26	0.20

(a) Source: ABB-ES 1997.

The investigatory activities planned for this RI at Site 2 are intended to accomplish the following:

- To evaluate the possible presence of PCBs in soil.
- Confirm or deny the presence of arsenic in surface soils above action levels.
- Define the extent of arsenic and other metals contamination, if confirmed.
- Confirm or deny the presence of chromium in groundwater by sampling from newly installed, properly developed monitoring wells.
- Define the nature and extent of groundwater contamination by chromium, if confirmed.
- Screen surface soil, subsurface soils, and groundwater for any additional contaminants of concern.

In order to accomplish these goals, three direct-push soil borings (S2-DP01 through S2-DP03) will be installed to confirm or deny the presence of arsenic above the action level in surface soils, to evaluate other potential surface and subsurface soil contaminants, and to collect groundwater screening samples. The borings will be installed as follows:

- One boring slightly downgradient of former DP-012, near the former concrete loading dock.
- One boring adjacent to DP-015.
- One boring between the concrete loading dock and DP-013.

Soil samples will be collected for lithologic description and field PID screening purposes at 2-ft intervals, commencing at the surface.

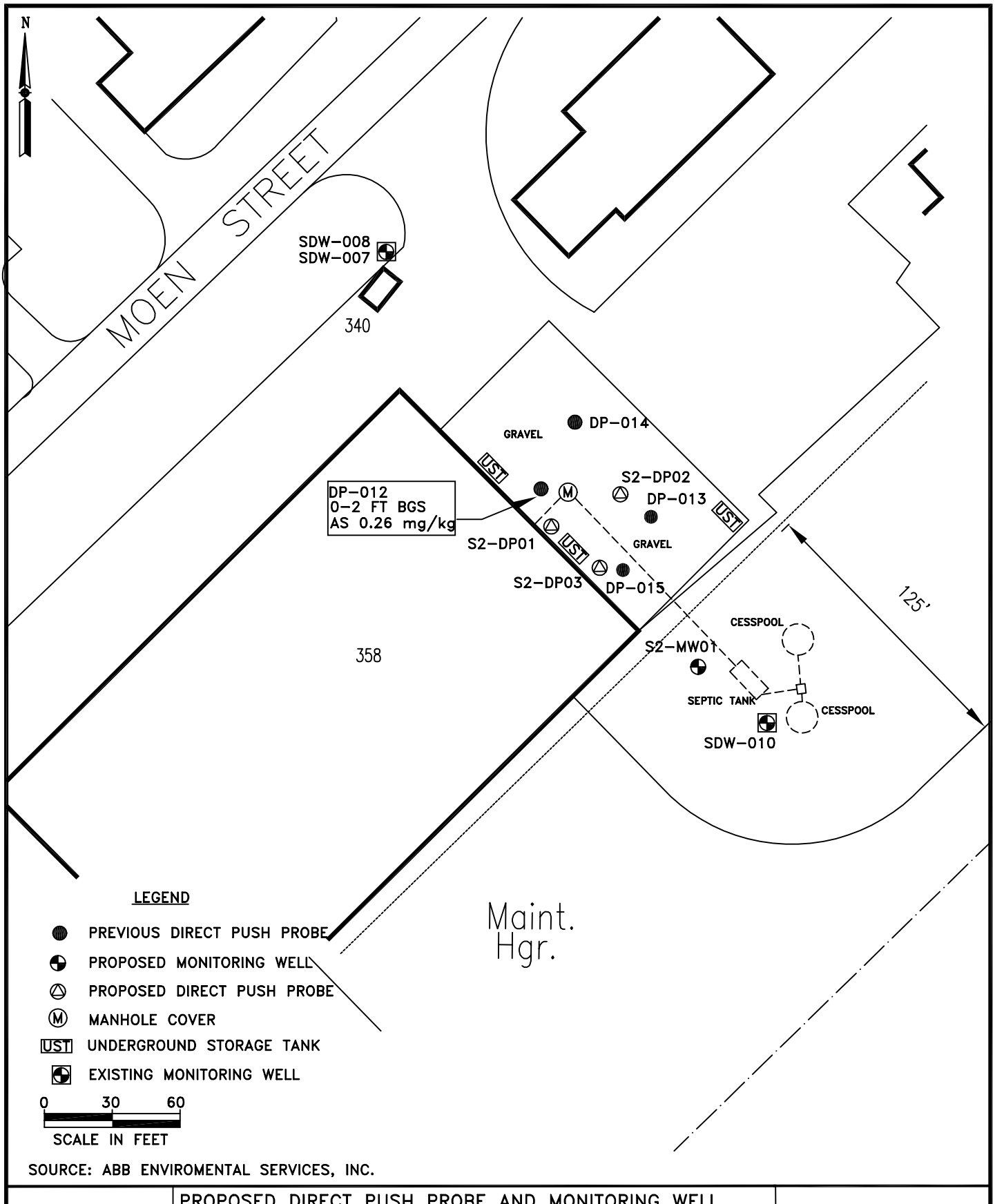
Two to four soil samples will be collected from each direct-push probe, for laboratory analysis of volatile and semivolatile organics and TAL metals. One direct-push probe will also be sampled for PCBs, for a total of three samples. Analytical samples will be collected from the surface, the vadose zone, and the top or just above the saturated zone. Additional samples may be collected from the vadose zone if suspected soil contamination is encountered.

Groundwater samples will be collected from each probe and analyzed for volatile and semivolatile organics.

One new monitoring well (S2-MW01) will be installed in a location slightly downgradient from Site 2. The monitoring well borehole will be sampled for description, screening, and analysis of soils as for the direct-push probes. The new well is anticipated to be screened from 27 to 42 ft BGS, and will be properly developed. The new monitoring well and three existing monitoring wells (SDW007, SDW008, and SDW010) will be purged and sampled for volatile organics, semivolatile organics, and TAL metals. The new monitoring well (S2-MW01) will also be sampled for intrinsic remediation parameters. One existing monitoring well will be sampled twice: once each from the top and bottom of the screened interval, during the site-specific sampling Round 1. The planned new monitoring well location and existing wells to be sampled may be modified based on the results of PID field screening and groundwater screening sample results.

Depending on the findings of the direct-push and monitoring well investigations, up to two optional direct-push and one optional monitoring well may be recommended for this site.

Figure 6.4 shows the approximate planned locations of the three direct-push boreholes and one new monitoring well.



SOURCE: ABB ENVIROMENTAL SERVICES, INC.

FIGURE 6.4	PROPOSED DIRECT PUSH PROBE AND MONITORING WELL LOCATIONS AT SITE 2 – FORMER HAZARDOUS WASTE STORAGE AREA 106th RESCUE WING, NEW YORK AIR NATIONAL GUARD FRANCIS S. GABRESKI AIRPORT WESTHAMPTON BEACH, NEW YORK	PEER PROJ./1566-053 FILE: GAB-008.DWG

Three USTs are shown on Figures 6.3 and 6.4. These USTs are not addressed by this RI. AFAA Area Audit Office Report of Audit 51897013, April 1997, states that all USTs at the 106th RQW have been managed within environmental compliance guidelines and requirements.

6.4.3 Site No. 3, Former Waste Storage Area (1984 to 1989)

Two direct-push soil borings were installed during the Site Investigation at Site No. 3 in an effort to investigate the suspected release of solvents, oils, and waste petroleum products. Wastes were stored in drums on-site from 1984 to 1989. The waste drums were stored on the gravel covered ground surface, beneath a leaky roof. The two direct-push borings were completed at depths of 17 and 38 ft BGS. Chromium and lead were found in surface and subsurface soil samples, but did not exceed action levels. Silver was detected at the action level in a subsurface soil sample from 15 to 17 ft BGS. Chromium was detected above the action levels in the single groundwater sample. Figure 6.5 shows the locations of the direct-push boreholes installed during the Site Investigation (ABB-ES 1997). Tables 6.10 and 6.11 summarize the analytes detected above action limits at Site No. 3 (ABB-ES 1997).

Table 6.10
Surface Soil Results Above Action Levels [(a)]
Site 3 – Former Hazardous Waste Storage Facility (1984 to 1989)
106th Rescue Wing
New York Air National Guard
Westhampton Beach, New York

Analyte	Depth (ft BGS)	Sample Location	Concentration (mg/kg)	Action Level (mg/kg)
Silver	15 – 17	DP-017	0.20	0.20

(a) Source: ABB-ES 1997.

Table 6.11
Groundwater Result Above Action Levels
Site 3 – Former Hazardous Waste Storage Facility (1984 to 1989)
106th Rescue Wing
New York Air National Guard
Westhampton Beach, New York

Analyte	Depth (ft BGS)	Sample Location	Concentration (µg/L)	Action Level (µg/L)
Chromium	36 – 38	DP-016	67	50

(a) Source: ABB-ES 1997.

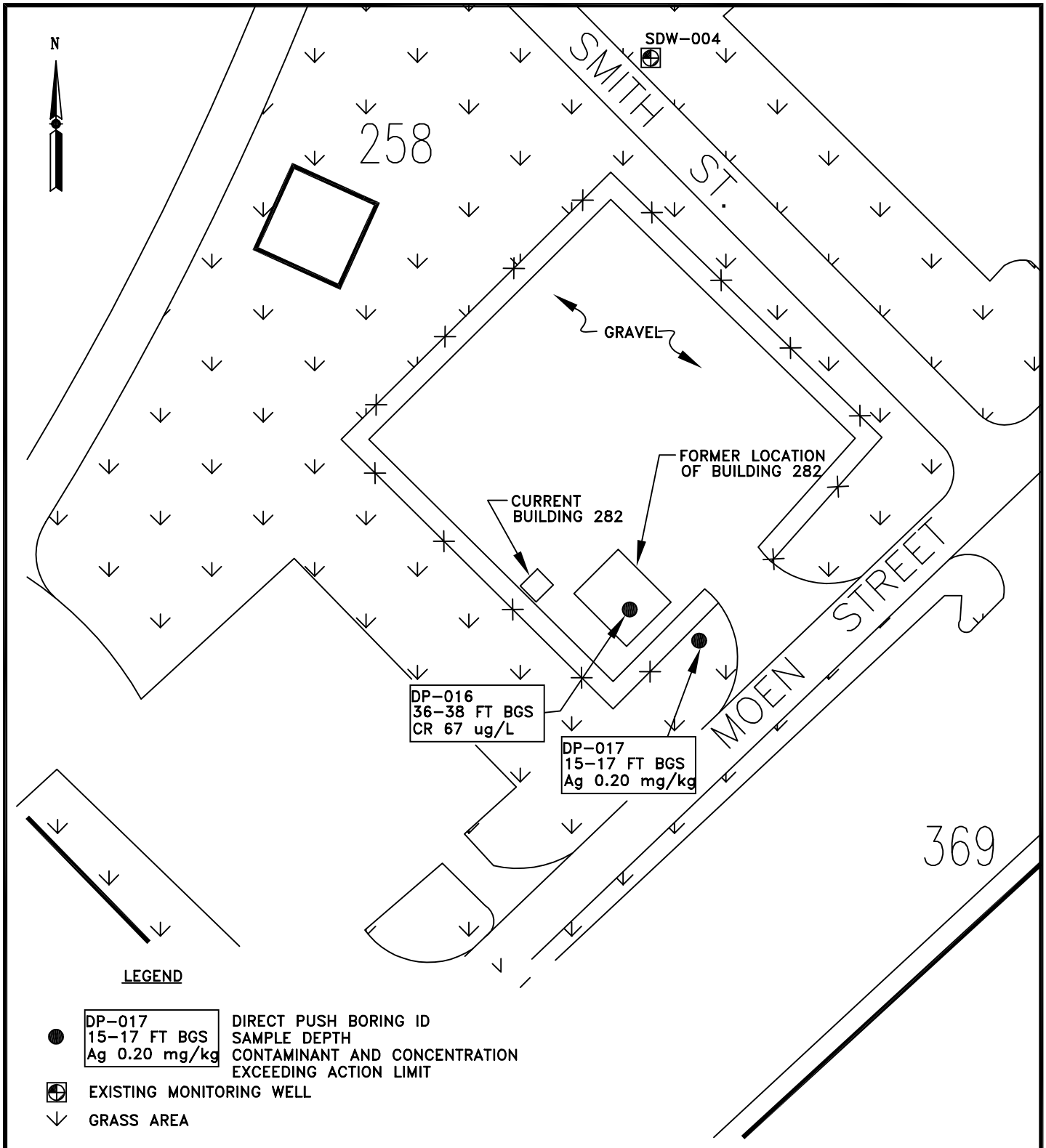


FIGURE 6.5

SITE 3 – FORMER HAZARDOUS WASTE STORAGE AREA (1984–1989)
106th RESCUE WING, NEW YORK AIR NATIONAL GUARD
FRANCIS S. GABRESKI AIRPORT
WESTHAMPTON BEACH, NEW YORK

PEER

PROJ./1566-053
FILE: GAB-009.DWG

The RI activities planned for this site are intended to accomplish the following:

- Evaluate the possible presence of PCBs in soil.
- Further assess surface soils for the presence of metals and toluene.
- Confirm or deny the presence of silver at the action limit in subsurface soils.
- Define the extent of soil contamination by silver, or other metals, if confirmed.
- Confirm or deny the presence of chromium in groundwater by sampling from newly installed, properly developed monitoring wells.
- Define the nature and extent of groundwater contamination by chromium, if confirmed.
- Screen surface soil, subsurface soils, and groundwater for any additional contaminants of concern.

To accomplish this, two direct-push soil borings (S3-DP01 through S3-DP03) will be installed at Site 3 to confirm or deny the presence of silver at the action level in subsurface soils, to evaluate other potential surface and subsurface soil contaminants, and to collect groundwater screening samples. The borings will be installed as follows:

- One direct-push soil boring will be extended to the top of groundwater, slightly upgradient of DP-016.
- One direct-push boring will be extended to the top of the groundwater, slightly downgradient of the first.

Soil samples will be collected for lithologic description and field PID screening purposes at 2-ft intervals, commencing at the surface.

Two to four soil samples will be collected from each direct-push borehole for laboratory analysis of volatile organics and semivolatile organics. Analytical samples will be collected from the surface, vadose zone, and the top of the saturated zone. Samples will be analyzed for volatile and semivolatile organics and TAL metals. One direct-push borehole will also be sampled for

PCBs, for a total of three samples. If suspected soil contamination is encountered in the vadose zone, an additional soil sample may be collected at the discretion of the Geologist.

Groundwater screening samples will be collected from each borehole reaching the saturated zone, and analyzed for volatile organics and semivolatile organics.

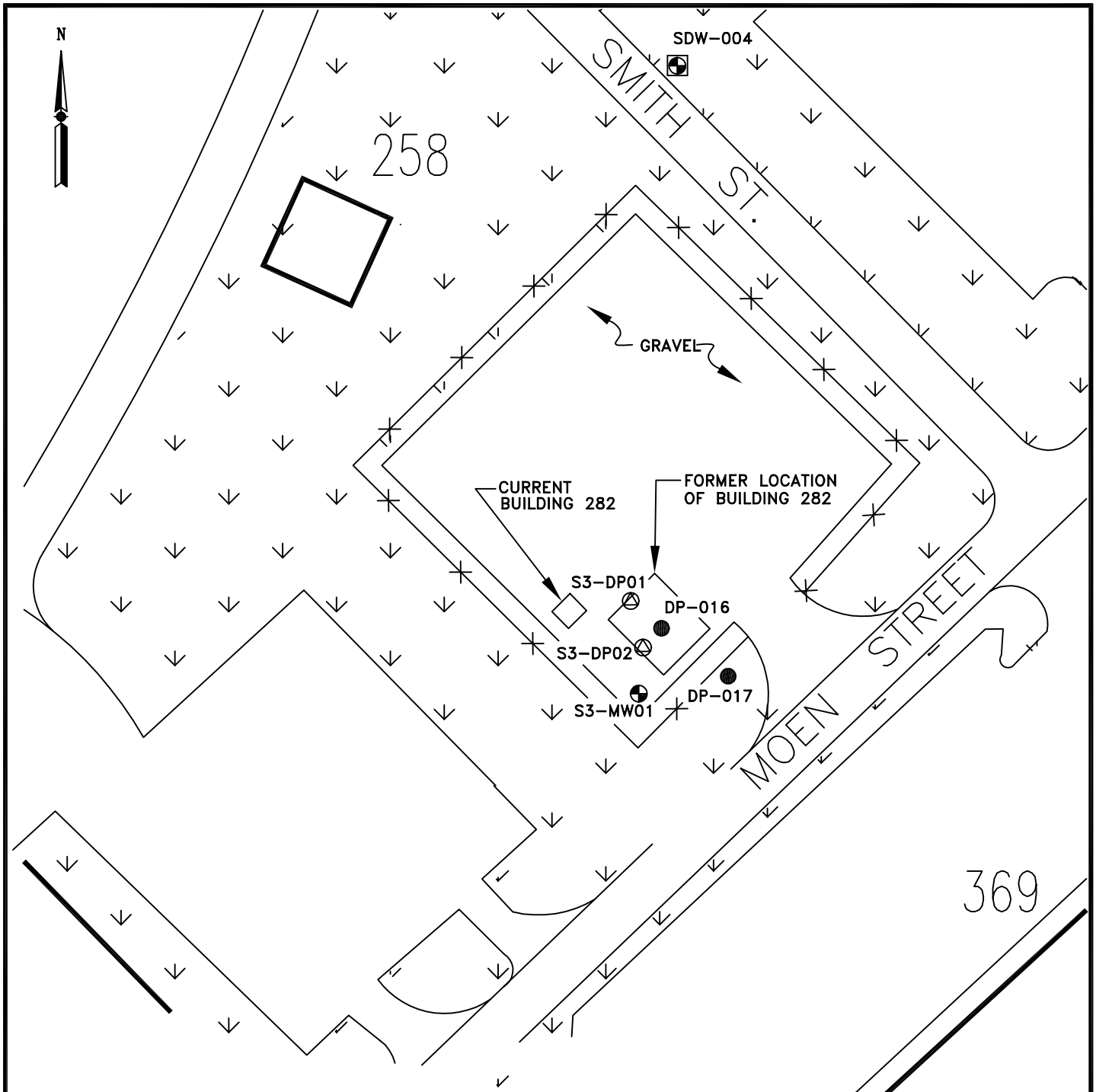
One new monitoring well (S3-MW01) will be installed in a location slightly downgradient from Site 3. The monitoring well borehole will be sampled for lithologic description, PID field screening, and laboratory analysis as for the direct-push borings. The new well will be screened from approximately 30 to 45 ft BGS, and will be properly installed and developed. The new monitoring well, and an existing upgradient monitoring well (SDW-004) will be purged and sampled for two rounds for volatile and semivolatile organics and TAL metals. The new well will be sampled for intrinsic remediation parameters (S3-MW01). The planned locations for new monitoring wells may be modified based on the results of the initial groundwater elevation survey or the direct-push soil investigation.

Depending on the results of the direct-push and monitoring well investigations, up to two optional direct-push soil borings and one optional monitoring well may be recommended for Site 3. Figure 6.6 shows the approximate planned locations of the two direct-push boreholes and one new monitoring well.

6.4.4 Site No. 7 Fire Training Area

Site Investigation and RI/FS activities have previously been conducted at this site by E.C. Jordan, HAZWRAP, and ABB-ES from 1987 to 1989.

A series of monitoring wells have been installed at the site to assess and track groundwater contamination, and an extensive surface and subsurface soil sampling program has defined surface and subsurface soil contamination (YEC, Inc., 1989, and ABB-ES 1989).



SOURCE: ABB ENVIROMENTAL SERVICES, INC.

FIGURE 6.6

PROPOSED DIRECT PUSH PROBE AND MONITORING WELL LOCATIONS AT SITE 3 – FORMER HAZARDOUS WASTE STORAGE AREA (1984–1989)
106th RESCUE WING, NEW YORK AIR NATIONAL GUARD
FRANCIS S. GABRESKI AIRPORT
WESTHAMPTON BEACH, NEW YORK

PEER

PROJ./1566-053

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A draft consent decree was issued on June 11, 1986, requiring that a Site Investigation be developed and implemented for the FTA, to be followed by development and implementation of the Remedial Action Plan.

Over the course of investigations at the site, a total of 22 monitoring wells and 4 piezometers have been installed and sampled at the FTA. The sampling results of the monitoring wells are summarized on Table 6.12, and the locations of the existing monitoring wells and prevailing hydraulic gradient are shown on Figure 6.7. Table 6.12 shows the highest analyzed concentration for each contaminant at each well over five rounds of sampling conducted by E.C. Jordan and ABB-ES. These concentrations are compared to action levels developed by ABB-ES for the Site Investigation of these sites (ABB-ES 1997). Volatile organics that were detected all exceeded their action limits, including benzene, toluene, xylenes (total), ethylbenzene, 1,1-dichloroethane, 1,1,1-trichloroethane, tetrachloroethene, and acetone. One semivolatile organic, bis-2(ethyl hexyl) phthalate, also exceeded its action level. Lead was detected but did not exceed its action level (ABB-ES 1997). Initial investigations by E.C. Jordan and ABB-ES found detections of 2-butanone. However, later evaluation has shown these detections to be questionable due to more than likely sample contamination by residual decontamination fluid. Figure 6.8 shows the existing wells and organic contaminants detected at Site No. 1.

The investigation of Site No. 7 soil by E.C. Jordan included both hand-auger and soil boring sampling of surface soils, shallow subsurface soils, and deeper subsurface soils. Soil samples were analyzed for volatile organics, semivolatile organics, polychlorinated biphenyls (PCBs), and lead. Volatile organics detected included benzene, ethylbenzene, toluene, xylenes, chlorobenzene, and tetrachloroethene. Of these, ethylbenzene, xylenes (total), fluorene, and 2-methyl phenol exceeded action levels for saturated soil at JTB-2 (30 ft BGS), and xylenes (total) exceeded action levels for unsaturated soils at JTB-2 (20 ft BGS), as summarized on Table 6.13.

Surface and subsurface soils were sampled for lead during the E.C. Jordan Co. Site Characterization. Table 6.14 summarizes the results of lead analyses and provides the lead action level for comparison. All of the surface soil samples (0 to 0.5 ft BGS), 7 out of 9 soil

Table 6.12
Summary of Volatile and Semivolatile Organics Detected in Groundwater, 1986 – 1987
At Site No. 7 Fire Training Area
106th Rescue Wing
New York Air National Guard
Westhampton Beach, New York

Parameter	Action Level [a]	Concentration (µg/L) [b]							
		MW-00X	MW-14	MW-22	MW-101A	MW-103	MW-106	MW-107A	MW-107B
Benzene	5					**13**			
Toluene	5	**8**	**5**			**36**			
Xylenes (Total)	5	**34**	**140**			**68**			
Ethylbenzene	5	**7**	**13**			**10**			
PCE	5			**6**					
1,1,1-TCA	5		**35**						
1,1-DCA	5						**5.8**		
Acetone	50				26	18		14	**610**
BEHP	50				37				**52**

(a) Source: ABB-ES 1997.
(b) Compiled from: ABB-ES (YEC, Inc.) 1989, and E.C. Jordan 1987.

1,1-DCA 1,1-Dichloroethane
1,1,1-TCA 1,1,1-Trichloroethane
BEHP bis(2-ethyl hexyl) phthalate
PCE Tetrachloroethene

Note: Bolding and shading indicate concentrations at or above the action level.

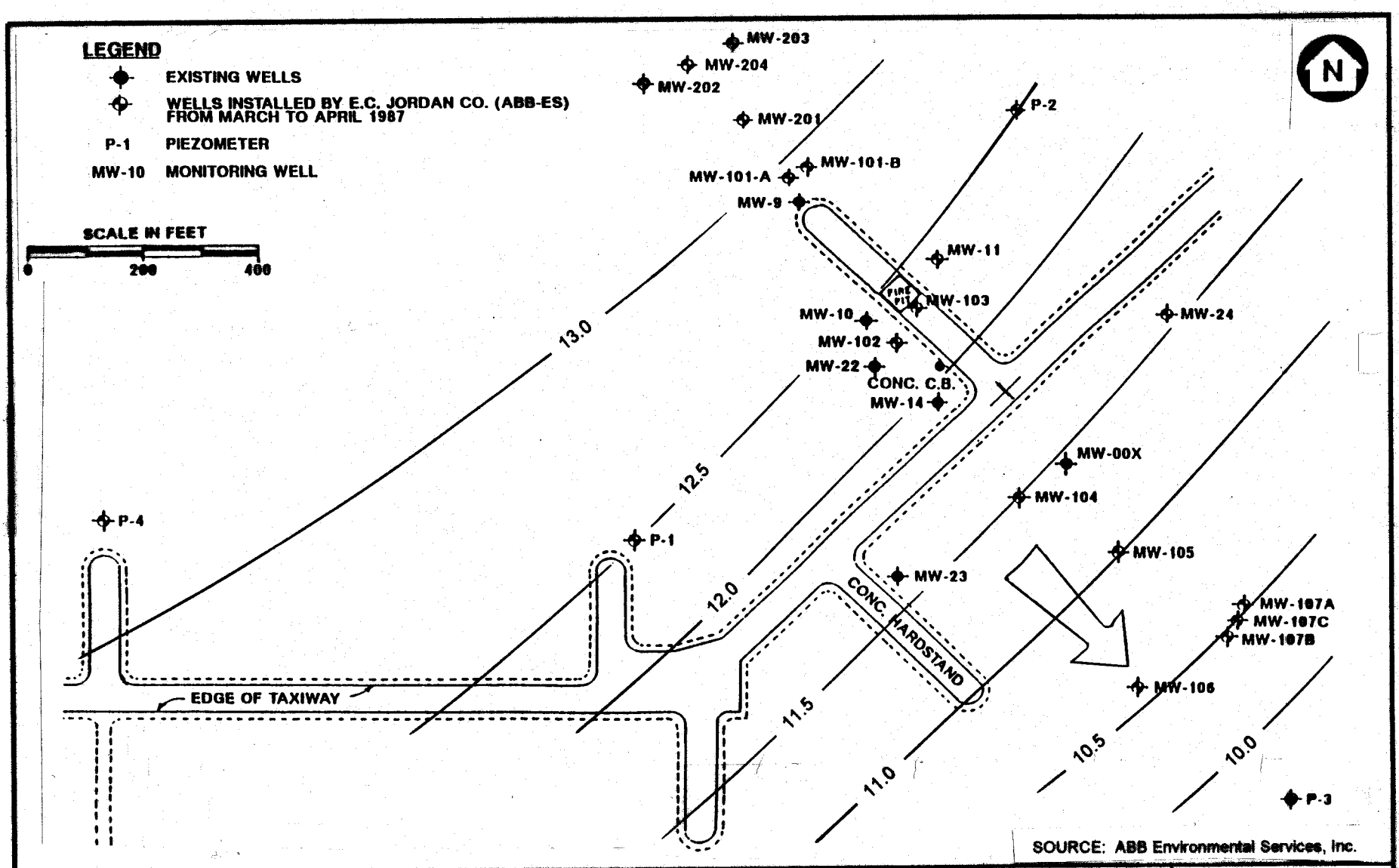

FIGURE 6.7

SITE 7 FIRE TRAINING AREA – POTENTIOMETRIC GROUNDWATER SURFACE
SITE CHARACTERIZATION (1987)
106th RESCUE WING, NEW YORK AIR NATIONAL GUARD
FRANCIS S. GABRESKI AIRPORT
WESTHAMPTON BEACH, NEW YORK

PEER

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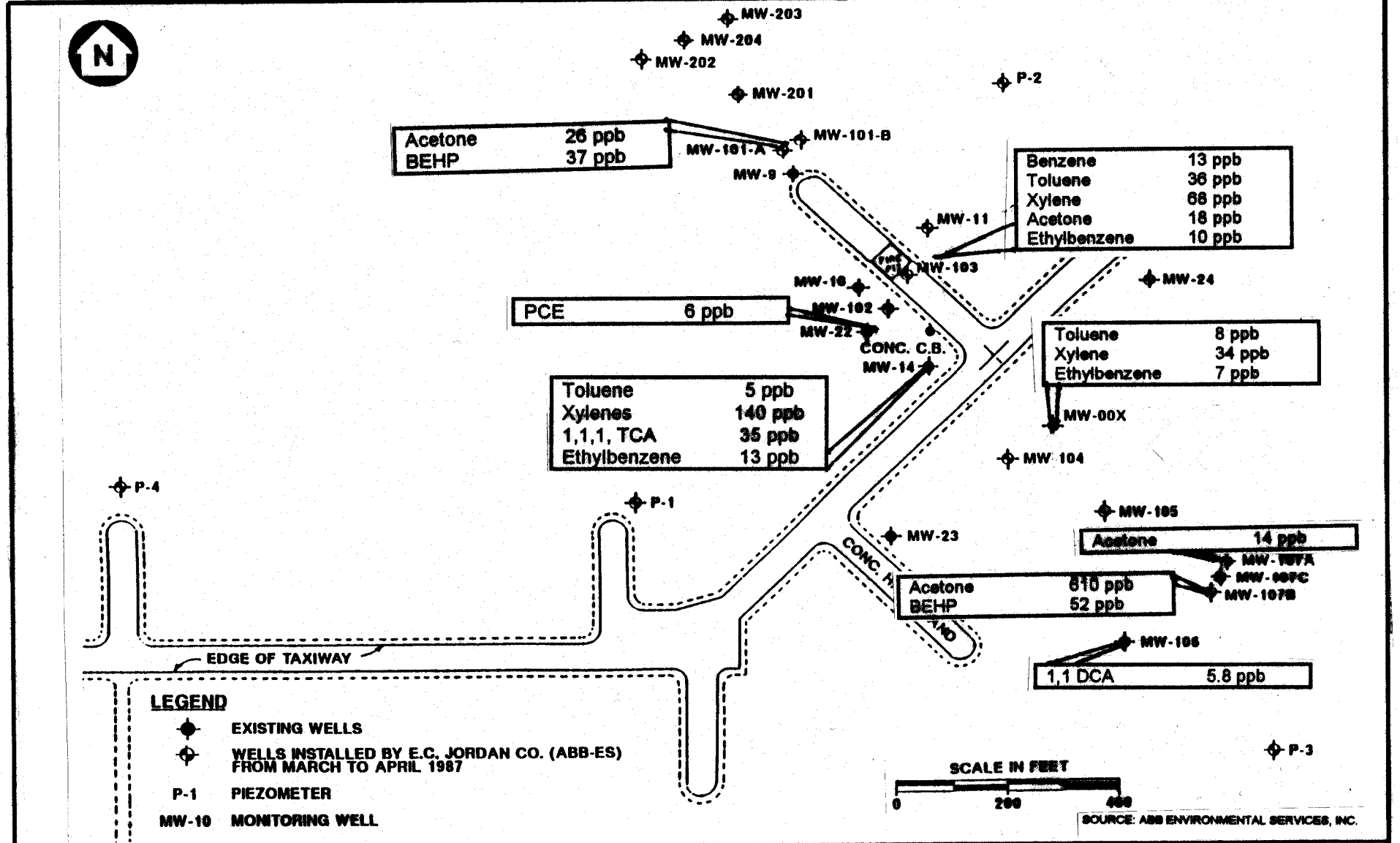

FIGURE 6.8

SITE 7 FIRE TRAINING AREA – VOLATILE ORGANIC GROUNDWATER CONTAMINATION
SITE CHARACTERIZATION (1987)
106th RESCUE WING, NEW YORK AIR NATIONAL GUARD
FRANCIS S. GABRESKI AIRPORT
WESTHAMPTON BEACH, NEW YORK

PEER

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FILE: GAB-012.DWG

Table 6.13
Summary of Volatile and Semivolatile Organics in Soil Samples at the Site No. 7 - FTA
106th Rescue Wing
New York Air National Guard
Westhampton Beach, New York

Sample ID	Action (1) Levels	JSS-4	JSS-6	JSS-11	JSS-13	JSS-20	JSS-21	JSS-28	JSS-33	JTB-2	JTB-2 (4)	JTB-2	JTB-3	JTB-3	JTB-4	TJB-4	JTB-5
Depth BGS	**Unsaturated/ Saturated**	**0.5**	**0.5**	**0.5**	**0.5**	**0.5**	**2.0**	**0.5**	**0.5**	**20**	**30(2)**	**35(2)**	**15**	**20**	**10**	**15**	**15**
Volatile Organics																	
Benzene	0.06/NA						0.009										
Ethylbenzene	5.5/0.055						0.008			0.10	**0.035**					0.028	
Toluene	1.5/0.015						0.066		0.13	0.092						0.012	
Xylenes	1.2/0.012					0.091	0.069			**2.8**	**0.68**		**2.4**	0.95	0.044	0.29	
PCE	1.4/0.014					0.091				0.37							0.38
Chlorobenzene	1.7/0.017					0.10											
Semivolatile Organics																	
Chrysene	1.0(3)		0.93	0.91		0.91											
Phenanthrene	50/2.2	0.73	2.8		1.2												
Pyrene	50/6.65		1.3		1.3	0.88											
Benzo(a)anthracene	1.0(3)			0.91													
2-methyl-naphthalene	36.4					2.5	9.0			9.6	7.5	1.6			0.43	64	
Naphthalene	13/0.13								5.7							1.2	
Fluorene	50/3.5										**4.7**					0.66	
N-nitrosodiphnylamine	NA															0.59	
Dibenzofuran	6.2															0.43	
2,4-Dimethylphenol	NA										4.7				1.0		
2-methylphenol	1.0(3)										**1.1**						

(1) Action levels from ABB-ES, 1997, and NYS-TAGM #4046 unsaturated soil/saturated soil.
(2) Soils considered to be saturated (within 5 ft of top of groundwater).
(3) Detection limit.

JSS Jordan Soil Sample.
JTB Jordan Test Boring.
PCE Tetrachloroethene.

Source: Compiled from data contained in ABB-ES, 1989, Volume 2, Appendix E.

Note: Bolding and shading indicate concentrations at or above the action level.

Table 6.14
Summary of Lead Concentrations in Shallow Soil Samples
Fire Training Area
106th Rescue Wing
New York Air National Guard
Westhampton Beach, New York

Soil Sample Location	Concentration (mg/kg) Depth in ft BGS		
	0 – 0.5	1.5 – 2.0	3.5 – 4.0
JSS-1	14	NA	NA
JSS-2	18	NA	NA
JSS-4	5.9	NA	NA
JSS-6	4.7	NA	NA
JSS-7	4.5	NA	1
JSS-8	38	35	NA
JSS-9	13	7.9	21
JSS-10	NA	2	NA
JSS-11	10	NA	0.5
JSS-12	7.7	NA	1.4
JSS-13	17	NA	6.9
JSS-14	12	NA	NA
JSS-15	6.1	NA	NA
JSS-16	12	NA	1.3
JSS-17	36	2.8	1.6
JSS-19	360	NA	NA
JSS-20	15	16	NA
JSS-21	NA	29	4.0
JSS-22	8.1	NA	0.74
JSS-24	13	NA	NA
JSS-25	5.4	NA	0.70
JSS-26	25	NA	9.8
JSS-27	70	4.6	NA
JSS-28	148	5.0	NA
JSS-29	27	NA	NA
JSS-30	46	13	3
JSS-31	10	NA	NA
JSS-32	7.8	NA	NA
JSS-33	128	NA	NA
JSS-51	16	NA	NA
JSS-52	14	NA	NA
JSS-53	6.1	NA	NA
JSS-54	7.7	NA	NA
JSS-55	3.6	NA	NA
JSS-57	8.7	NA	NA
JSS-58	23	NA	NA
JSS-59	7.3	NA	NA
JSS-60	24	NA	NA

Note: Lead action level in soil is 4.4 mg/kg, Eastern USA and NYS background is 4 to 500 mg/kg.
JSS 3, 5, 18, and 23 were not analyzed in the laboratory (JSS: Jordan Soil Sample).
NA Not analyzed.

Source: E.C. Jordan Co. (1987) Site Characterization Report/Installation Restoration Program SCA-FTA. Final Draft/Volume I.

samples from 0.5 to 2.0 ft BGS, and 3 out of 12 samples from 3.5 to 4.0 ft BGS exceeded the lead action level of 4.4 mg/kg. However, all analyses were within the range of eastern USA or NYS background concentrations of from 4 to 500 mg/kg. The highest lead concentrations were centered approximately on the FTA, with an additional area of higher concentrations near the concrete waste fuel UST. (The April 1997 AFAA audit found that USTs at the 106th RQW were managed within environmental compliance.) Contour maps of lead concentrations were developed by YEC, Inc., and are provided herein as Figures 6.9, 6.10, and 6.11. Soil sampling was also conducted for TPH and oil and grease at the FTA site by E.C. Jordan Co. (E.C. Jordan 1987). Table 6.15 summarizes the results of the shallow soil analyses (from 0 to 4 ft BGS), and Table 6.16 summarizes the deeper soil analyses. Figures 6.12 and 6.13 present contour maps of the oil and grease TPH analyses, as developed using E.C. Jordan, Inc.'s (E.C. Jordan 1987) data by YEC, Inc. (YEC 1989).

Investigatory activities for Site 7 are planned to confirm and supplement the previous investigations performed, as follows:

- Confirm soil contamination by volatile organics, semivolatile organics, lead, and petroleum hydrocarbons.
- Confirm groundwater contamination by volatile and semivolatile organics, and evaluate the presence of other contaminants, including metals.
- Evaluate the impact, if any, of natural attenuation processes on the contaminants documented by the 1987 Site Investigation.

To accomplish this, installation of five direct-push probes will be used to confirm soil contaminants of concern, and to screen groundwater for contaminants of concern. The probes will be installed as follows:

- S7-DP01 adjacent to test boring JTB-3, where lead and volatile organic action levels for soil were exceeded. This location is approximately 230 ft northwest of the taxiway, and 50 ft southwest of the burn pit area, just slightly upgradient of MW-10.

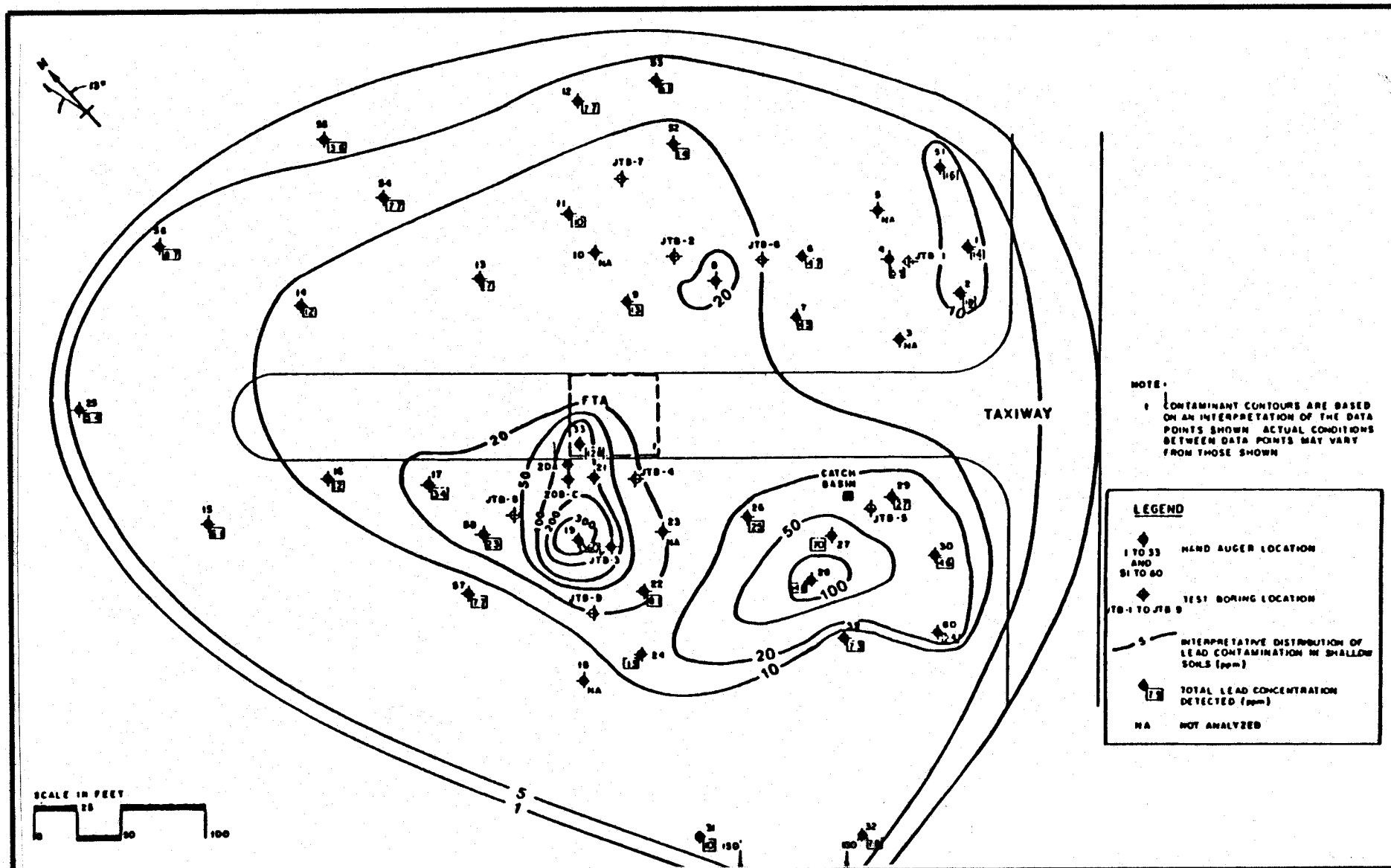

FIGURE 6.9

SITE 7 FIRE TRAINING AREA – LEAD CONTAMINATION (SURFACE SOIL)
SITE CHARACTERIZATION (1987)
106th RESCUE WING, NEW YORK AIR NATIONAL GUARD
FRANCIS S. GABRESKI AIRPORT
WESTHAMPTON BEACH, NEW YORK

PEER

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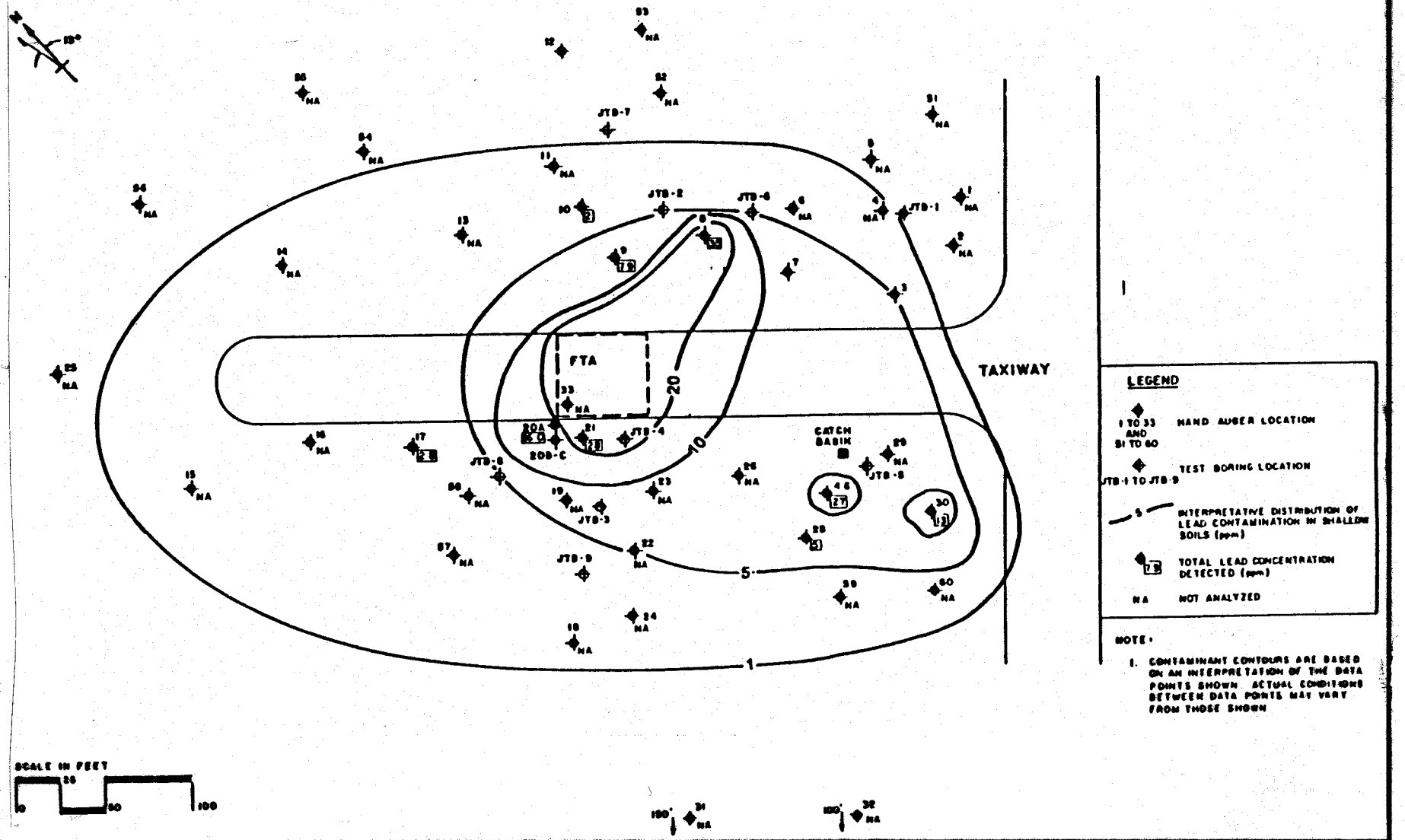

FIGURE 6.10

SITE 7 FIRE TRAINING AREA – LEAD SOIL CONTAMINATION (2 FT BGS)
SITE CHARACTERIZATION (1987)
106th RESCUE WING, NEW YORK AIR NATIONAL GUARD
FRANCIS S. GABRESKI AIRPORT
WESTHAMPTON BEACH, NEW YORK

PEER

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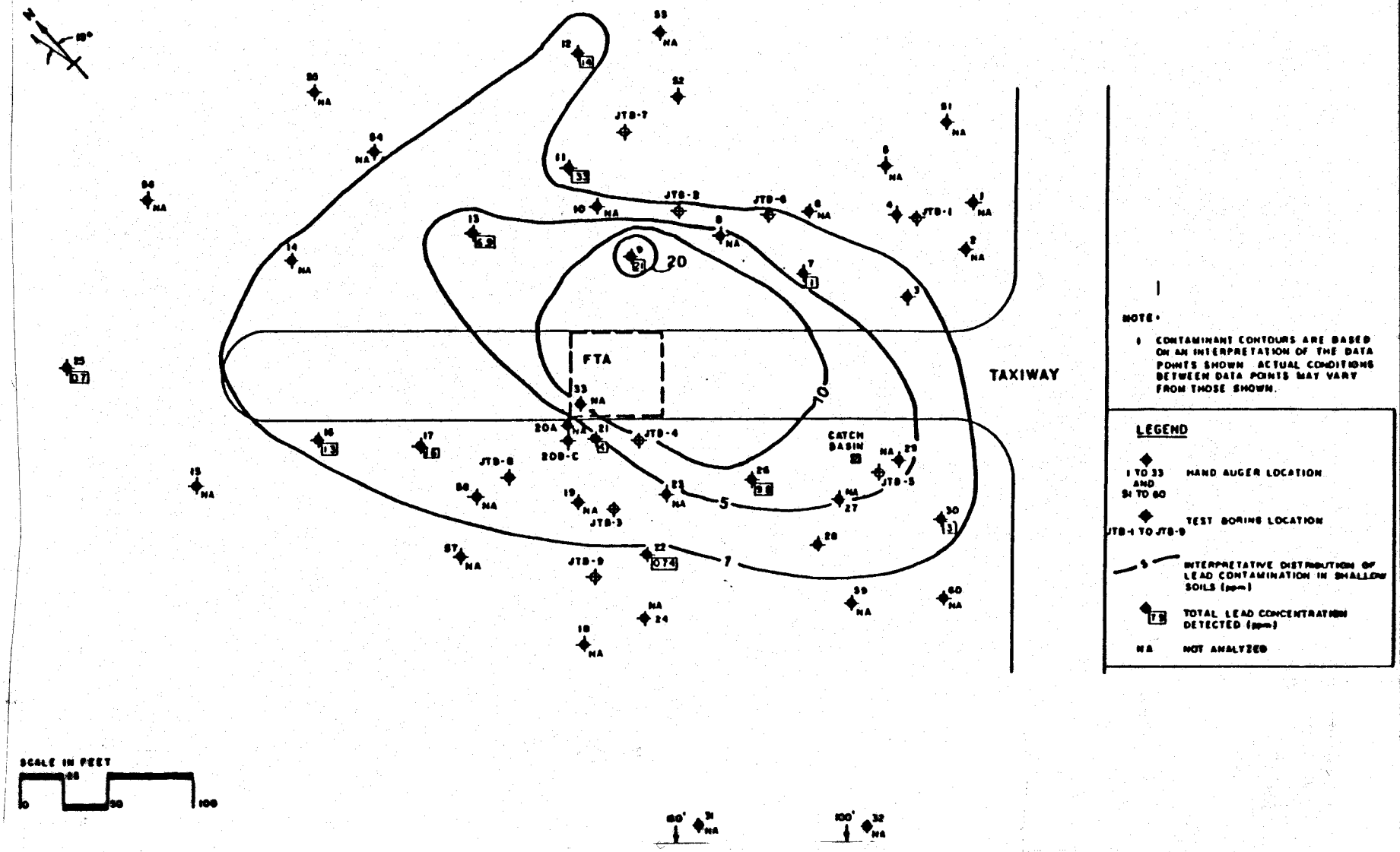

FIGURE 6.11

SITE 7 FIRE TRAINING AREA – LEAD SOIL CONTAMINATION (4 FT BGS)
SITE CHARACTERIZATION (1987)
106th RESCUE WING, NEW YORK AIR NATIONAL GUARD
FRANCIS S. GABRESKI AIRPORT
WESTHAMPTON BEACH, NEW YORK

PEER

PROJ./1566-055
FILE: GAB-015.DWG

Table 6.15
Summary of Oil and Grease Contamination in Shallow Soil Samples
Fire Training Area
106th Rescue Wing
New York Air National Guard
Westhampton Beach, New York

Soil Sample Location	Concentration (mg/kg)		
	Depth in ft BGS		
	0 – 0.5	1.5 – 2.0	3.5 – 4.0
JSS-1	120	NA	NA
JSS-2	320	NA	NA
JSS-4	1,900	NA	520
JSS-6	5,800	NA	NA
JSS-7	2,000	NA	6,400
JSS-8	26,000	680	NA
JSS-9	21,000	1,000	6,300
JSS-10	NA	360	NA
JSS-11	23,000	NA	34
JSS-12	52	NA	NA
JSS-13	6,200	NA	110
JSS-14	150	NA	NA
JSS-16	62	NA	NA
JSS-17	16,000	20,000	1,600
JSS-20	8,100	19,000	NA
JSS-21	NA	19,000	1,500
JSS-22	160	NA	NA
JSS-24	36	NA	NA
JSS-25	170	NA	NA
JSS-26	1,600	NA	200
JSS-27	120	130	NA
JSS-28	18,000	280	NA
JSS-29	240	NA	NA
JSS-30	26,000	27,000	8,500
JSS-31	76	NA	NA
JSS-32	240	NA	NA
JSS-33	49,000	NA	NA
JSS-51	72	NA	NA
JSS-52	590	NA	NA
JSS-53	36	NA	NA
JSS-54	190	NA	NA
JSS-55	42	NA	NA
JSS-56	170	NA	NA
JSS-57	69	NA	NA
JSS-58	89	NA	NA
JSS-59	74	NA	NA
JSS-60	40	NA	NA

JSS 3, 5, 15, 18, 19, and 23 were not analyzed in the laboratory.
NA Not analyzed.

Source: YEC, Inc., Phase I Investigation (1989); E.C. Jordan Co. (1987) Site Characterization Report/Installation Restoration Program SCA-FTA. Final Draft/Volume I.

Table 6.16
Summary of Oil and Grease Contamination in Deep Soil Samples
Fire Training Area
106th Rescue Wing
New York Air National Guard
Westhampton Beach, New York

Soil Sample Location	Concentration (mg/kg)						
	Depth (ft)						
	5.0	10	15	20	25	30	35
JTB-1	NA	NA	NA	NA	NA	NA	NA
JTB-2	26	NA	NA	9,000	NA	6,500	450
JTB-3	NA	410	4,300	4,200	NA	NA	NA
JTB-4	NA	1,900	3,400	NA	25	NA	27
JTB-5	NA	240	26	NA	NA	NA	25
JTB-6	NA	3,500 TPH	NA	NA	NA	160 TPH	NA
JTB-7	NA	NA	NA	NA	NA	NA	NA
JTB-8	NA	NA	140 TPH	NA	NA	NA	NA
JTB-9	NA	NA	NA	NA	NA	NA	33 TPH

NA Field screened but not analyzed.
TPH Total petroleum hydrocarbons.

Source: YEC, Inc., Phase I Investigation (1989); E.C. Jordan Co. (1987) Site Characterization Report/Installation Restoration Program SCA-FTA. Final Draft/Volume I.

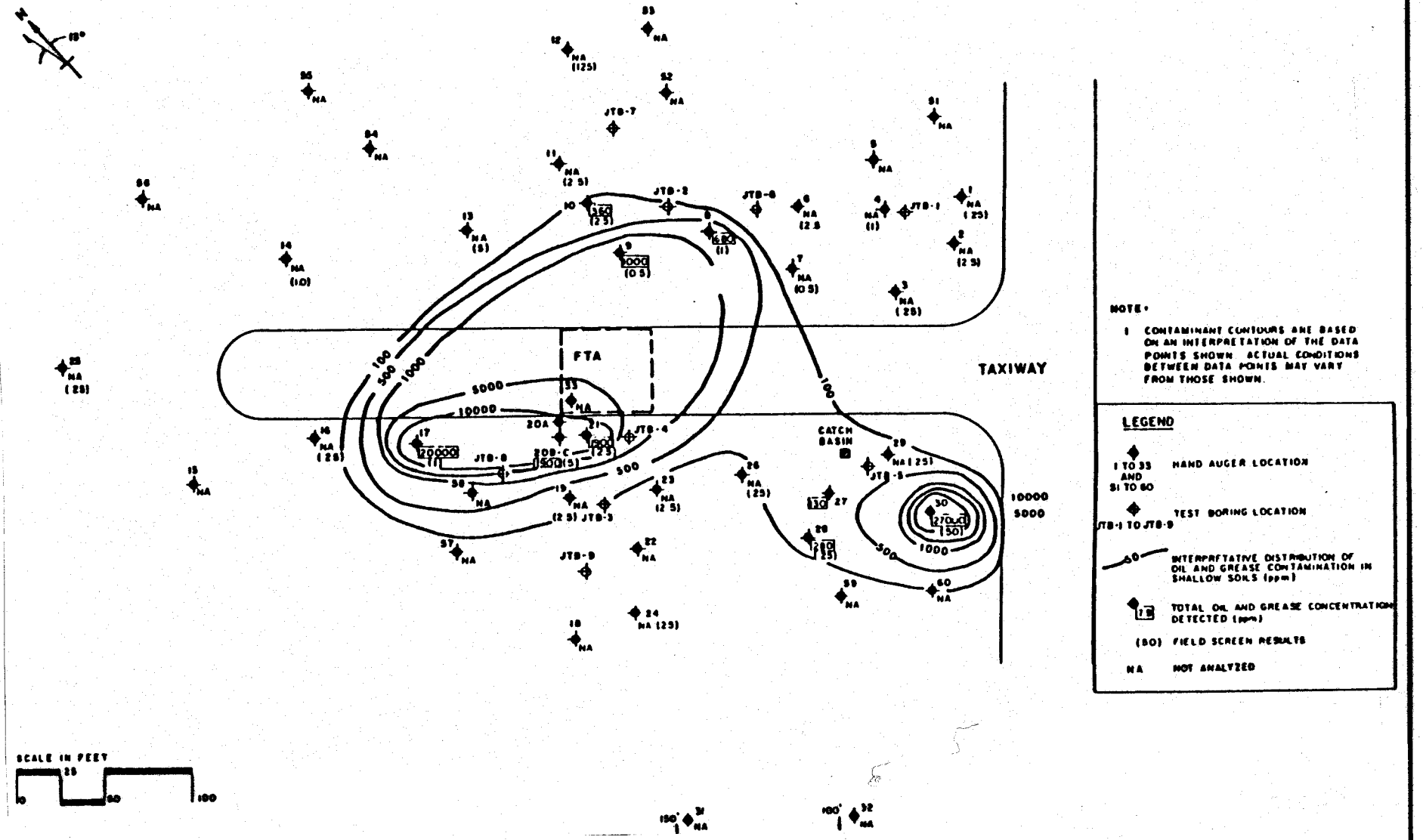

FIGURE 6.12

SITE 7 FIRE TRAINING AREA – OIL AND GREASE SOIL CONTAMINATION (2 FT BGS)
SITE CHARACTERIZATION (1987)
106th RESCUE WING, NEW YORK AIR NATIONAL GUARD
FRANCIS S. GABRESKI AIRPORT
WESTHAMPTON BEACH, NEW YORK

PEER

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FILE: GAB-016.DWG

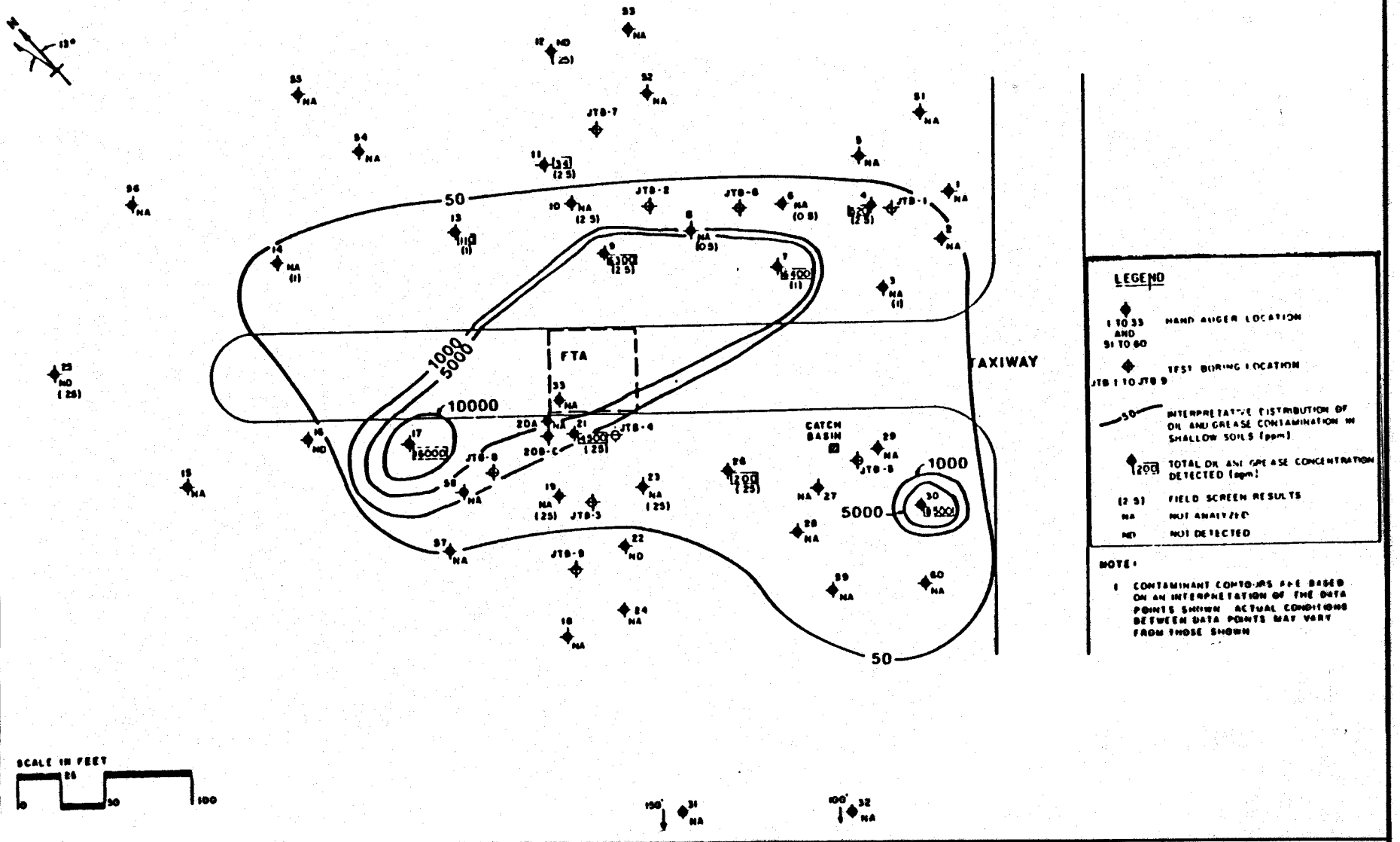


FIGURE 6.13

SITE 7 FIRE TRAINING AREA – OIL AND GREASE SOIL CONTAMINATION (4 FT BGS)
SITE CHARACTERIZATION (1987)
106th RESCUE WING, NEW YORK AIR NATIONAL GUARD
FRANCIS S. GABRESKI AIRPORT
WESTHAMPTON BEACH, NEW YORK

PEER

PROJ./1566-055
FILE: GAB-017.DWG

- S7-DP02 adjacent to test boring JTB-4, where several volatile and semivolatile organics were detected, and lead action levels for soil were exceeded. This location is approximately 210 ft northwest of the taxiway and 10 ft southwest of the burn pit area, upgradient of MW-102.

- S7-DP03 adjacent to test boring JTB-5, where one volatile organic compound was detected, and lead action levels for soil were exceeded. This location is near the concrete waste fuel UST, approximately 10 ft to the south, and upgradient of MW-14.

- S7-DP04 across the taxiway from Site 7, in a previously unsampled location. This probe will be located approximately 30 ft southeast of the taxiway and upgradient from MW-00X.

- S7-DP05 in a previously unsampled location on the southeast side of the taxiway. The probe will be located approximately 225 ft southeast of the taxiway and 220 ft northeast of the nearest concrete hard stand, approximately 75 ft west of MW-105, and downgradient from MW-104. Geotechnical samples will be collected at this location using Shelby tubes.

It is anticipated that additional direct-push soil probes will not be required. However, the results of the soil probe investigation, or of existing monitoring well sampling, may indicate the need for additional borings to further evaluate the progress of natural attenuation of contaminant concentrations. Therefore, up to four optional direct-push probes may be recommended.

Two to four soil samples will be collected from each planned and any optional direct-push probes for laboratory analysis of volatile and semivolatile organics, TAL metals, and petroleum hydrocarbons. Soil samples will be collected for lithologic description and field PID screening at 2-ft intervals beginning at the surface. Analytical samples will be collected from the surface, the vadose zone, and the top of the saturated zone, as necessary. Groundwater screening samples will be collected from each borehole that reaches the saturated zone, and will be analyzed for

volatile organics, semivolatile organics, and petroleum hydrocarbons. If suspected soil contamination is encountered, an additional sample may be collected from the vadose zone.

Since the site has an extensive existing network of 22 monitoring wells, it may be unnecessary for additional wells to be installed at Site No. 7. As shown on Figure 6.8, three of four downgradient wells installed at Site No. 7 have had previous hits of volatile organics, including acetone (MW-103), bis-(2-ethylhexyl)phthalate (BEHP) (MW107A and MW-108B), and 1,1-dichloroethane (MW-106). While acetone is a common laboratory contaminant and BEHP is an occasional laboratory contaminant and sampling artifact, both occur at relatively high concentrations, and were not present in the associated laboratory blank samples. Acetone was found in only one on-site monitoring well (MW-103), while both acetone and BEHP were found in MW101-A at an upgradient location. While acetone and BEHP may be laboratory or sampling artifacts, the data available at this time is insufficient to support a determination. The occurrence of these chemicals, as well as 1,1-dichloroethane, at the downgradient locations, indicates that these wells were likely within the plume of groundwater contamination when sampled. However, given the time that has passed since the initial samples were collected, it is unlikely that the contamination situation has remained static. Therefore, the existing wells will be sampled prior to making any determination as to the necessity for, or exact placement of, any additional monitoring wells at Site No. 7. Groundwater samples will be submitted for volatile organics, semivolatile organics, TAL metals, and intrinsic remediation parameters (one well only). Two of the existing wells will be sampled twice, once each from the top and bottom of the screened interval, during the site-specific sampling Round 1, making the total field samples 24 from 22 wells.

Should sampling indicate that contamination is present in the downgradient wells, then up to four optional downgradient monitoring wells may be recommended, most likely in two deep/shallow well pairs. Monitoring well placement, if necessary, will be expedited by use of Geoprobe® groundwater screening sampling. Depending on the results of the monitoring well sampling, up to six optional Geoprobe® groundwater samples may be collected.

Up to four optional monitoring wells may be recommended for installation at Site 7. The wells would be installed in downgradient locations, as two shallow well/deep well pairs. If installed, monitoring well boreholes will be sampled for lithologic description, PID field screening, and laboratory analysis, as for the direct-push soil borings. Shallow wells will be installed with 15-ft screens straddling the top of the water table, which is anticipated at around 36 to 40 ft BGS, based on the Site Investigation findings. Therefore, shallow wells will be screened from approximately 31 to 50 ft BGS, depending on the actual water table elevation measured. The deep wells will be screened from approximately 60 to 75 ft BGS. The four new wells would be purged and sampled for two rounds for volatile organics, semivolatile organics, TAL metals, and petroleum hydrocarbons. The need for and locations of optional monitoring wells will be determined based on the results of the initial groundwater elevation survey, the existing monitoring well sampling, and planned and optional direct-push sampling.

Figure 6.14 shows the approximate locations of the planned direct-push boreholes with respect to the locations of the existing monitoring wells.

6.4.5 Site No. 10 Waste Stripper Tank #61

Four direct-push soil borings were installed during the Site Investigation at Site 10 in an effort to assess the possible impact of liquids from the former 1,200-gal underground tank on subsurface soils and groundwater. Spent stripper solvents were stored in the tank and may have escaped through leaks or overflows. The tank has been removed and reportedly granted closure by NYSDEC. (The April 1997 AAFA audit reported that all USTs at the 106th RQW were managed within environmental compliance.) Three of the borings were completed at 30 ft BGS and the fourth was completed at 60 ft BGS. Chromium, lead, and PCE were detected in subsurface soils. Chromium and PCE were detected in the two groundwater samples. Only chromium exceeded action levels, in subsurface soils and groundwater. Chromium exceeded action levels in both shallow (42 to 44 ft BGS) and deep (58 to 60 ft BGS) groundwater samples. Figure 6.15 shows the locations of direct-push boreholes installed during the Site Investigation (ABB-ES 1997). Tables 6.17 and 6.18 summarize the analytes detected above action limits at Site 10 (ABB-ES 1997).

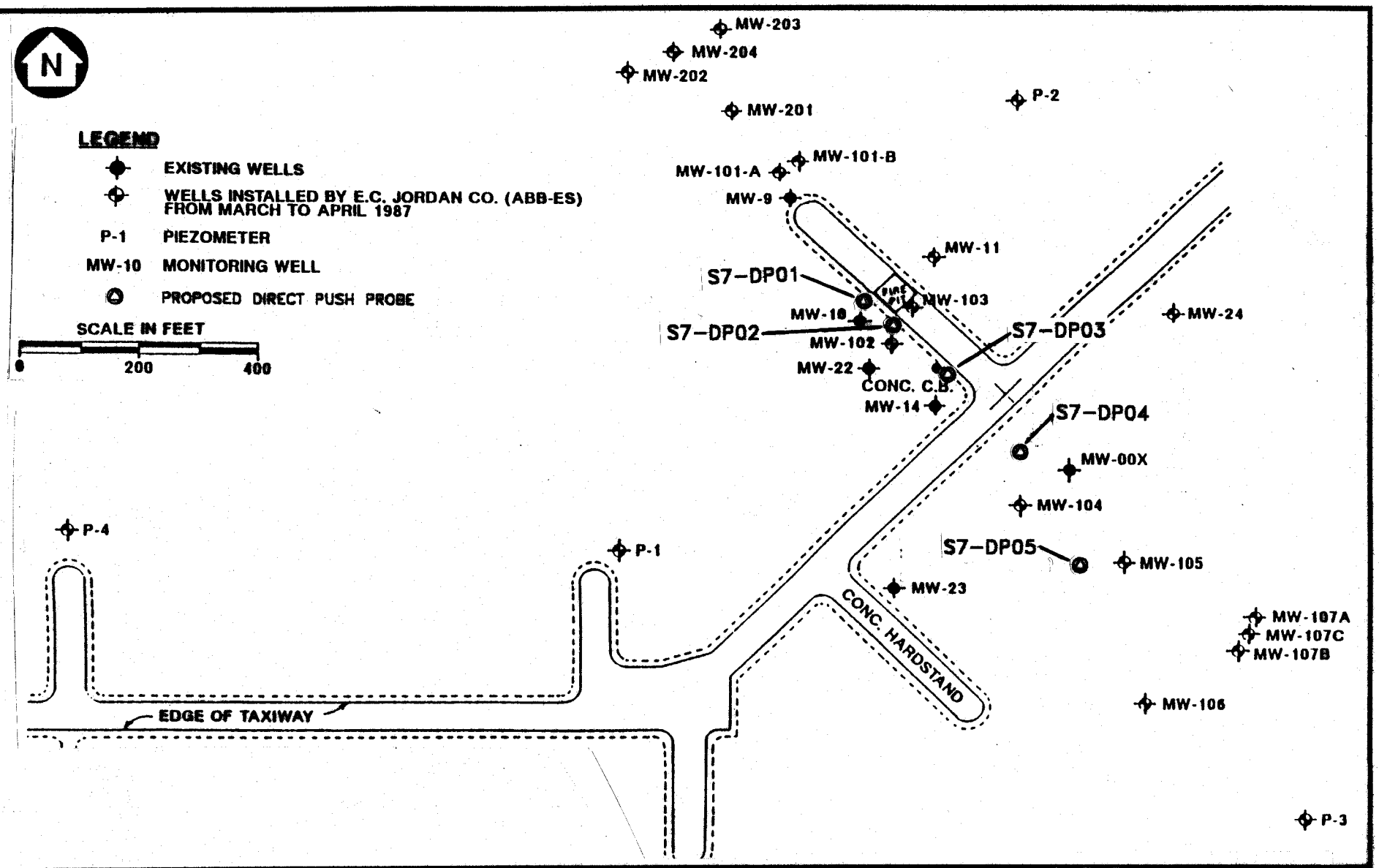


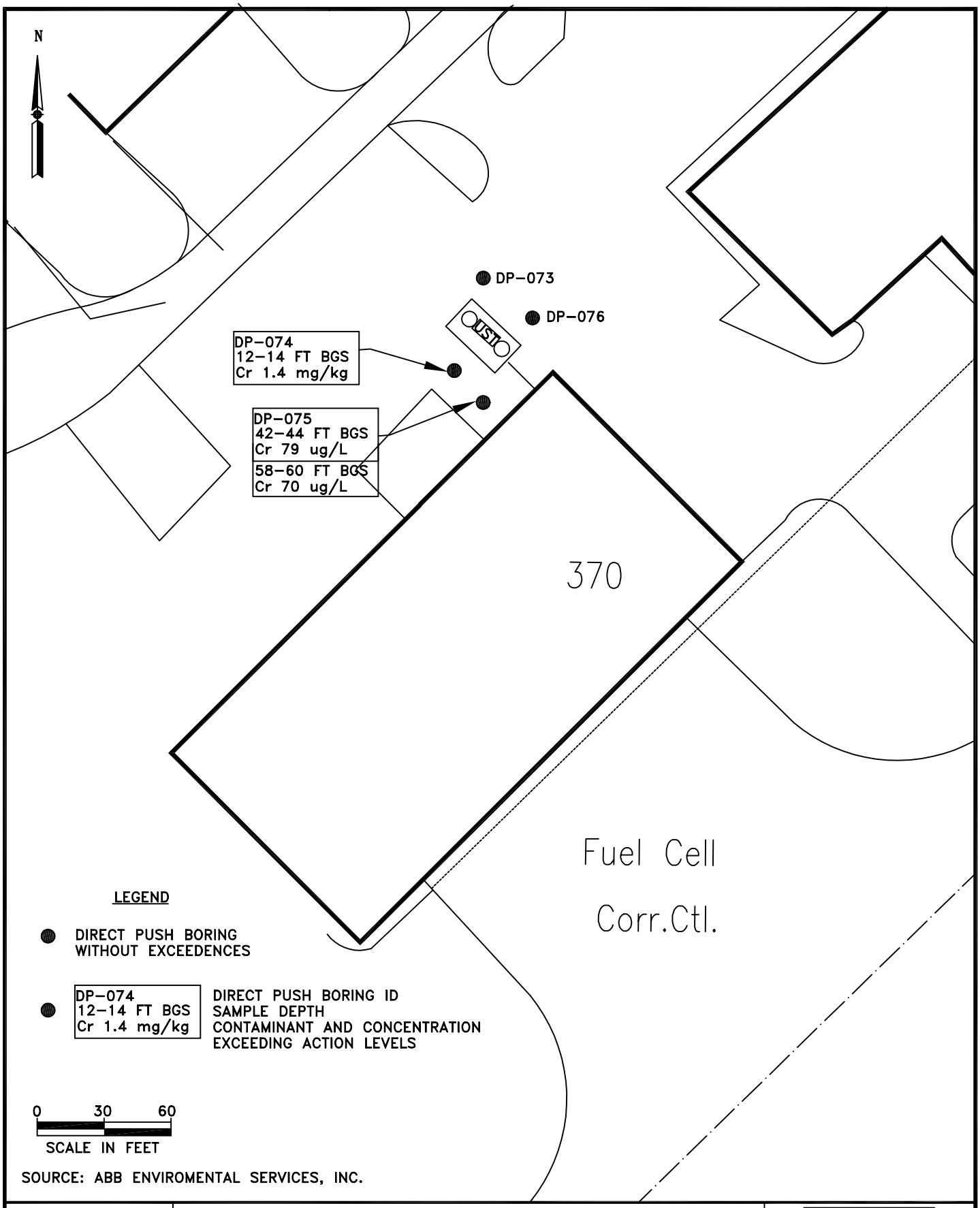
FIGURE 6.14

SITE 7 FIRE TRAINING AREA – PROPOSED DIRECT PUSH PROBE LOCATIONS

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

PEER

PROJ./1566-055
FILE: GAB-018.DWG



SOURCE: ABB ENVIROMENTAL SERVICES, INC.

FIGURE 6.15	SITE 10 – WASTE STRIPPER TANK #61, BUILDING 370 106th RESCUE WING, NEW YORK AIR NATIONAL GUARD FRANCIS S. GABRESKI AIRPORT WESTHAMPTON BEACH, NEW YORK	PEER PROJ./1566-053 FILE: GAB-019.DWG

Table 6.17
Subsurface Soil Results Above Action Levels [(a)]
Site 10 – Waste Stripper Tank #61, Building 370
106th Rescue Wing
New York Air National Guard
Westhampton Beach, New York

Analyte	Depth (ft BGS)	Sample Location	Concentration (mg/kg)	Action Level (mg/kg)
Chromium	12 – 14	DP074	1.4	0.84

(a) Source: ABB-ES 1997.

Table 6.18
Groundwater Results Above Action Levels [(a)]
Site 10 – Waste Stripper Tank #61, Building 370
106th Rescue Wing
New York Air National Guard
Westhampton Beach, New York

Analyte	Depth (ft BGS)	Sample Location	Concentration (µg/L)	Action Level (µg/L)
Chromium	42 – 44	DP-075	70	50
	58 – 60	DP-075	70	50

(a) Source: ABB-ES 1997.

The RI activities planned for this site are intended to accomplish the following:

- Confirm or deny the presence of chromium in subsurface soils above action limits.
- Define the extent of chromium in soils, if confirmed.
- Further assess the presence of PCE and lead in subsurface soils.
- Confirm or deny the presence of chromium in both shallow and deep groundwater above action limits, by sampling from properly installed and developed monitoring wells.
- Define the extent of chromium in groundwater, if confirmed.
- Further assess the presence of PCE in groundwater, including both shallow and deep groundwater.
- Screen surface soil, subsurface soil, and groundwater for any additional contaminants of concern.

To accomplish this, four direct-push borings (S10-DP01 through S10-DP04) will be installed. The borings will be installed as follows:

- One direct-push boring will be extended to the top of the water table at the location of the former UST.
- Two direct-push borings will be installed slightly downgradient of the former UST, and extended to the top of the water table.
- One direct-push boring will be installed about 20 ft downgradient (southeast) of the former UST, and extended to the top of the water table.

Soil samples will be collected for lithologic description and field PID screening purposes at 2-ft intervals, commencing at the surface.

Two to four soil samples will be collected from each direct-push borehole for laboratory analysis of volatile organics, semivolatile organics, and TAL metals. Analytical samples will be collected from the surface, vadose zone, and the top of the saturated zone. If suspected soil contamination is encountered within the vadose zone, additional soil samples may be collected for analysis.

Groundwater screening samples will be collected from each probe reaching the saturated zone, and analyzed for volatile organics and semivolatile organics.

Two new monitoring wells (S10-MW01 and S10-MW02) will be installed at Site 10, as follows:

- Shallow monitoring well S10-MW01 will be installed about 10 ft downgradient (southeast) of the former UST, and will monitor the top of the groundwater.
- Deep monitoring well S10-MW02 will be installed as a pair to the shallow well. This well will be screened below the top of the vadose zone at approximately 70 ft BGS. This location will have a geotechnical sample collected by means of a Shelby tube.

Up to four optional monitoring wells may be recommended as follows:

- One shallow/deep monitoring well pair would be installed about 20 ft southeast of the former UST, to monitor the downgradient groundwater.
- One shallow/deep monitoring well pair would be installed about 20 ft northwest of the former UST, to monitor the upgradient groundwater.

The soil borings performed for installation of the new monitoring wells will be sampled for description, screening, and analysis of soils as for the direct-push probes. The new deep and shallow monitoring wells will be properly developed, purged, and sampled for two rounds of volatile organics, semivolatile organics, TAL metals, and intrinsic remediation monitoring parameters (one well only). The planned locations of the monitoring wells may be modified based on the results of the initial groundwater elevation survey and the direct-push investigation.

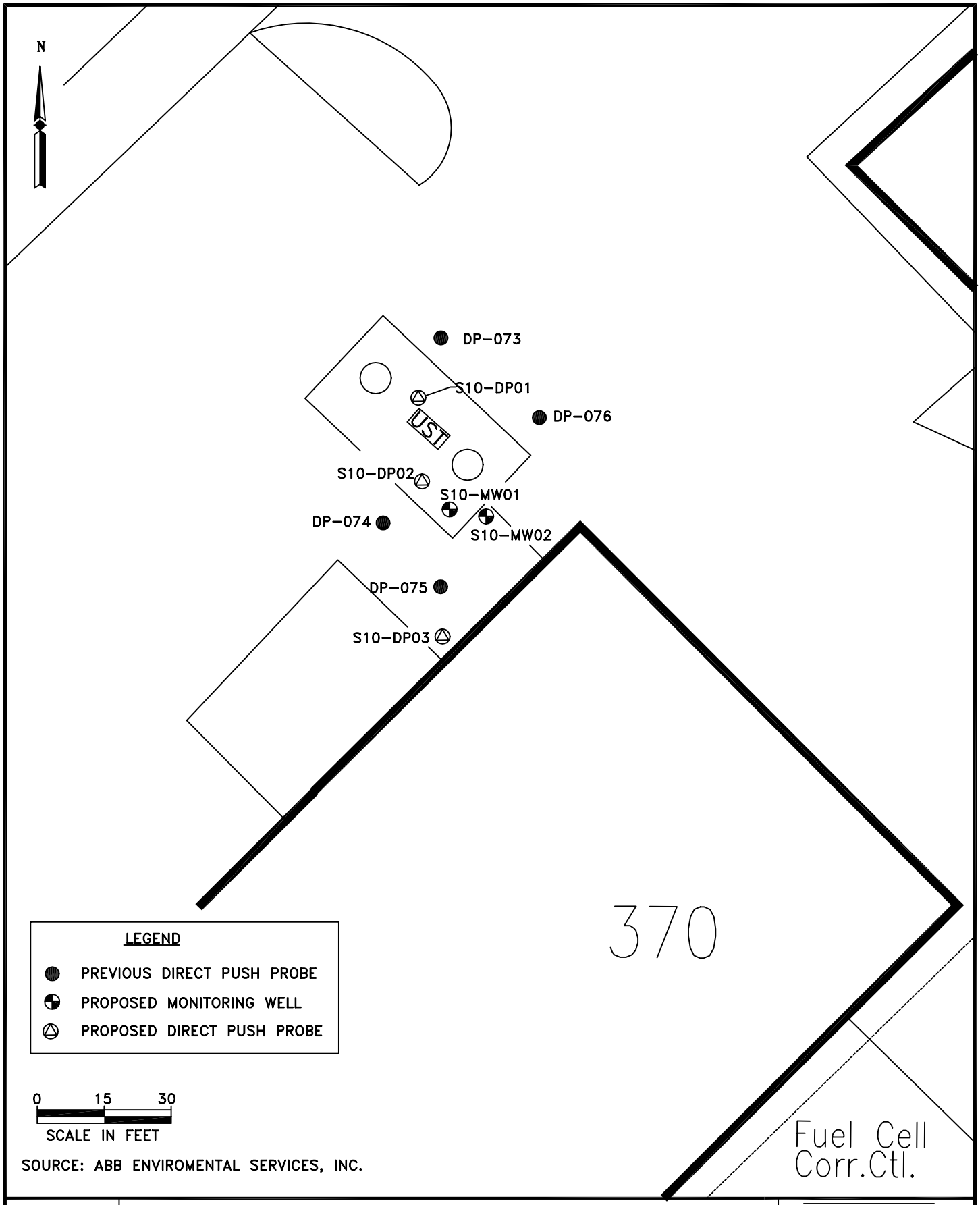
Depending on the results of the direct-push and monitoring well investigations, up to four optional direct-push boreholes and two shallow/deep monitoring well pairs may be recommended for Site No. 10.

Figure 6.16 shows the approximate planned locations of the planned direct-push soil borings and new monitoring wells.

6.4.6 Site No. 11, Trench Drain Sump

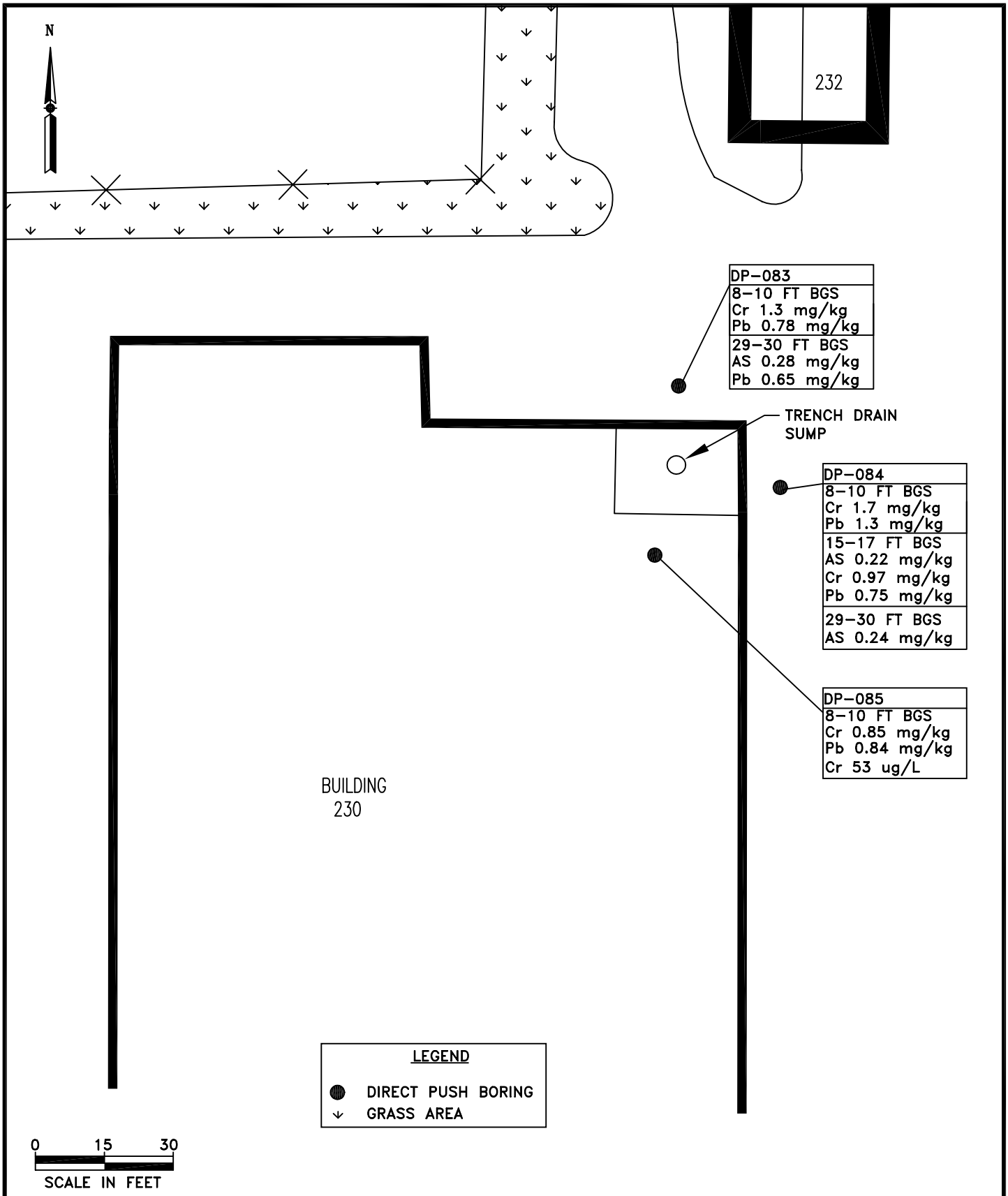
During renovations in 1994 at Building 230, an underground cylindrical structure, then assumed to be a waste oil vessel, was discovered beneath the floor on the northeast corner of the building, measuring approximately 2 ft in diameter and 18 ft deep. An unknown quantity of oil and/or water was found to be contained in the cylindrical structure. The sump has recently been determined to be constructed of ¼-in steel pipe, with steel welded end caps. Traces of an asphalt lining are visible as is minor corrosion. A fill pipe enters the sump at approximately 6 ft above the bottom, and is connected to the trench drain system that served the floor jacks. The 106th RQW has removed residual liquids and steam-cleaned the sump. Currently, the sump contains about ½ in. of water. No evidence of leakage from the tank has been observed. The tank appears sound and intact (Lt Col Jerry Webb, 2000, personal communication). Because the Trench Drain Sump received runoff that could have included hydraulic oil, PCB contamination is of concern at this site.

Three direct-push soil borings were installed during the Site Investigation at Site 11, to assess the impact of any possible release of waste oil on subsurface soils and groundwater. Two of the soil borings were completed at 30 ft BGS and did not encounter groundwater. One boring that was driven to 35 ft BGS encountered groundwater at 33 ft BGS. The metals arsenic, chromium, and lead were each detected in subsurface soils exceeding action levels at two or more of the borings. The metal chromium was detected exceeding the action level in the single direct-push groundwater sample. Figure 6.17 shows the site and previous direct-push soil boring locations. Tables 6.19 and 6.20 summarize the analytes detected above action limits at Site 10 (ABB-ES 1997).



SOURCE: ABB ENVIROMENTAL SERVICES, INC.

FIGURE 6.16	PROPOSED DIRECT PUSH PROBE AND MONITORING WELL LOCATIONS SITE 10 – WASTE STRIPPER TANK #61, BUILDING 370 106th RESCUE WING, NEW YORK AIR NATIONAL GUARD FRANCIS S. GABRESKI AIRPORT, WESTHAMPTON BEACH, NEW YORK	PEER PROJ./1566-053 FILE: GAB-020.DWG



SOURCE: ABB ENVIROMENTAL SERVICES, INC.

FIGURE 6.17	SITE 11 – WASTE OIL VESSEL, BUILDING 230 106th RESCUE WING, NEW YORK AIR NATIONAL GUARD FRANCIS S. GABRESKI AIRPORT WESTHAMPTON BEACH, NEW YORK	PEER PROJ./1566-053 FILE: GAB-021.DWG

Table 6.19
Subsurface Soil Results Above Action Levels [(a)]
Site 11 – Trench Drain Sump, Building 230
106th Rescue Wing
New York Air National Guard
Westhampton Beach, New York

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

(a) Source: ABB-ES 1997.

Table 6.20
Groundwater Results Above Action Levels [(a)]
Site 11 – Trench Drain Sump, Building 230
106th Rescue Wing
New York Air National Guard
Westhampton Beach, New York

Analyte	Depth (ft BGS)	Sample Location	Concentration (µg/L)	Action Level (µg/L)
Chromium	8 – 10	DP-085	53	50

(a) Source: ABB-ES 1997.

The RI activities planned for this site are intended to accomplish the following:

- Confirm or deny the presence of arsenic, chromium, and lead in subsurface soils exceeding the action limits.
- Define the extent of soil contamination by chromium, arsenic, and lead in subsurface soils, if confirmed.
- Confirm or deny the presence of chromium in groundwater by sampling from newly installed, properly developed monitoring wells.
- Define the nature and extent of chromium contamination in groundwater, if confirmed.
- Evaluate the potential presence of PCBs in soil.
- Assess surface soil, subsurface soil, and groundwater for any additional contaminants of concern.

To accomplish this, a minimum of three direct-push probes (S11-DP01 through S11-DP03) will be installed. The borings will be installed as follows:

- Direct-push probe S11-DP01 will be installed immediately downgradient (south-southeast) of the vessel, extending to the top of groundwater.
- Direct-push probe S11-DP02 will be installed approximately 20 ft downgradient of the vessel (south), extending to the top of the groundwater.
- Direct-push probe S11-DP03 will be installed approximately 25 ft downgradient of the vessel (south-southeast), extending to the top of the groundwater.

Soil samples will be collected for lithologic description and field PID screening at 2-ft intervals, commencing at the top of soil.

Two to four soil samples will be collected from each direct-push borehole for laboratory analysis of volatile and semivolatile organics and TAL metals. Samples from the soil boring will also be analyzed for PCBs, for a total of three samples. Analytical samples will be collected from the

surface, vadose zone, and the top of the saturated zone. If suspected soil contamination is encountered within the vadose zone, an additional soil sample may be collected.

Groundwater screening samples will be collected from each borehole reaching the saturated zone, and analyzed for volatile organics and semivolatile organics

One new monitoring well will be installed at Site 11 as follows:

- Shallow monitoring well S11-MW01 will be installed about 20 ft downgradient (south) of the vessel.

The soil boring performed for installation of the new monitoring well will be sampled for description, screening, and analysis of soils as for the direct-push probes.

The monitoring well will be installed with its screen straddling the top of the water table, approximately 28 to 43 ft BGS. The well will be properly developed, purged, and sampled for two rounds of volatile and semivolatile organics, TAL metals, and intrinsic remediation monitoring parameters. The well will be sampled twice, once each from the top and bottom of the screened interval, during the site-specific sampling Round 1.

Depending on the results of the direct-push and monitoring well investigations, up to three optional direct-push soil borings and two optional monitoring wells may be recommended for Site 11.

Figure 6.18 shows the approximate planned locations of the three direct-push boreholes and one new monitoring well.

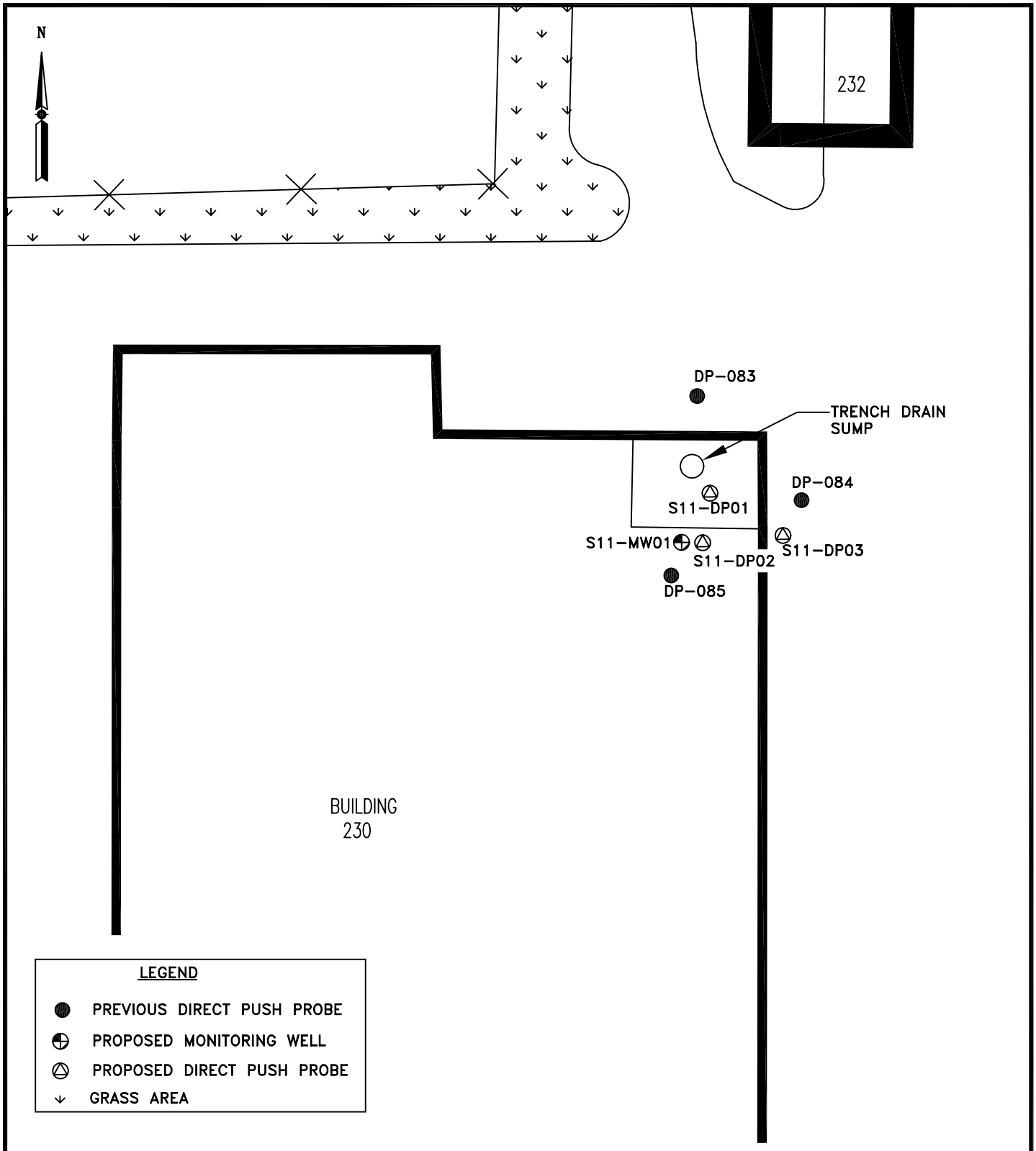
6.4.7 Site No. 12, Spill Site Northwest of Building 370

Contaminated soils with detectable odors were discovered during excavating for installation of a forced-main sewer pipeline on the northwest side of Building 370. Contamination persisted from 8 ft BGS to the total depth of the excavation at 15 ft BGS. The nature and extent of the contamination was unknown. Preliminary sampling by the SCDHS had identified Tri-Ortho Cresyl Phosphate (TCP) a component of high temperature hydraulic fluid, but had not confirmed concentrations. SCDHS sampling had also identified polynuclear aromatic hydrocarbons. However, from the documentation available to PEER, it is unclear if the samples containing polynuclear aromatic hydrocarbon came from Site No. 12 or another nearby area. Figure 6.19 shows the approximate location of Site 12. Table 6.21 presents the available data for Site 12.

TCP is a dense, non-aqueous phase liquid. It is toxic by ingestion and dermal contact. It hydrolizes rapidly on exposure to water, and has a relatively short half life in the environment. Currently, the complete nature and extent of contamination by either TCP or polynuclear aromatic hydrocarbons is unknown. Since TCP is used in hydraulic fluids, the possible presence of PCBs is suspected.

The RI activities planned for this site are intended to accomplish the following:

- Confirm or deny the presence of TCP and polynuclear aromatic hydrocarbons in subsurface soils at this site.
- Define the extent of TCP and polynuclear aromatic hydrocarbon contamination, if confirmed.
- Assess site groundwater for potential contamination by TCP and polynuclear aromatic hydrocarbon.
- Evaluate the possible presence of PCBs.
- Assess site soil and groundwater for other potential contaminants.



SOURCE: ABB ENVIROMENTAL SERVICES, INC.

FIGURE 6.18	PROPOSED DIRECT PUSH PROBE AND MONITORING WELL LOCATIONS SITE 11 – TRENCH DRAIN SUMP, BUILDING 230 106th RESCUE WING, NEW YORK AIR NATIONAL GUARD FRANCIS S. GABRESKI AIRPORT, WESTHAMPTON BEACH, NEW YORK	PEER PROJ./1566-053 FILE: GAB-022.DWG

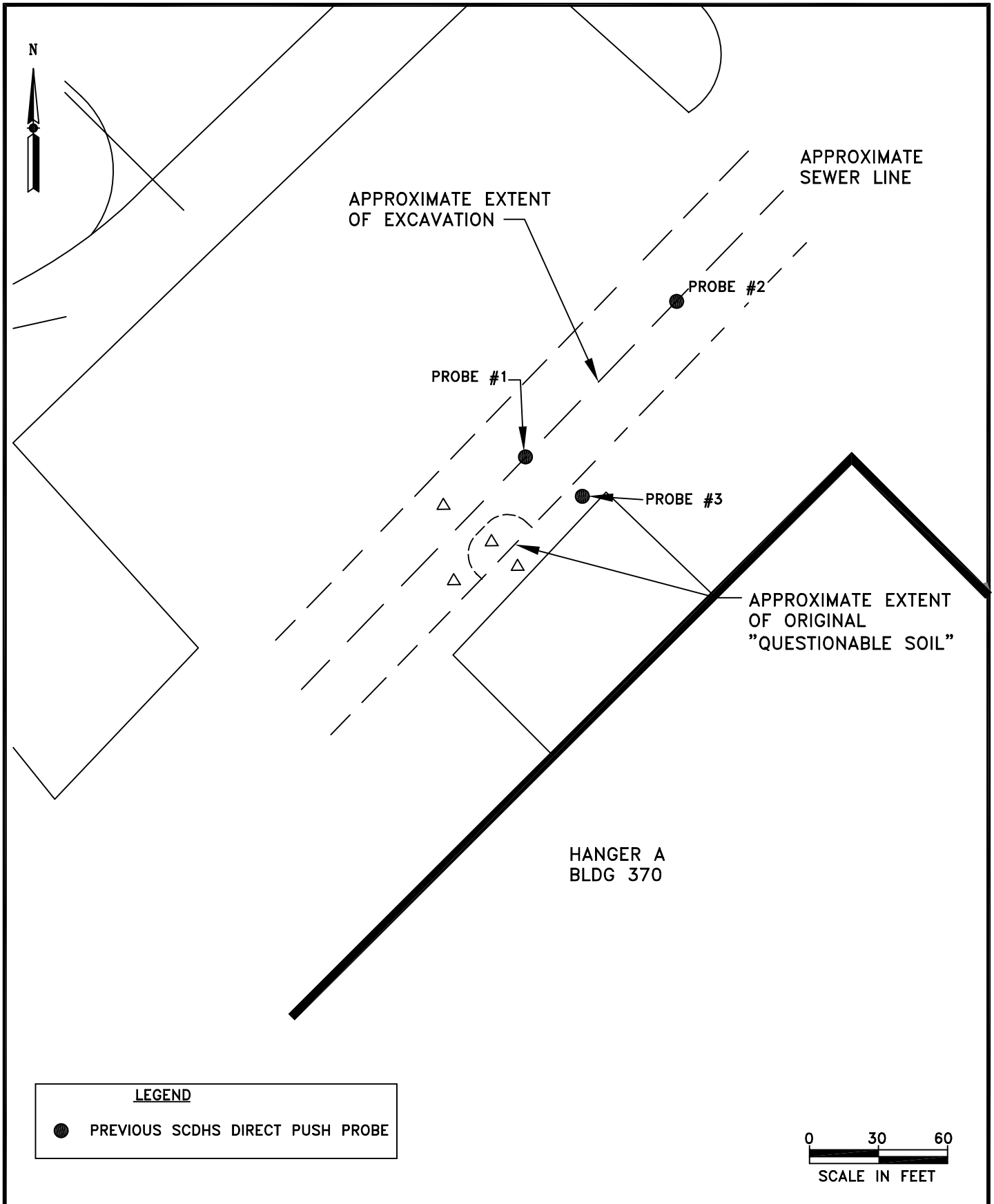


FIGURE 6.19	SITE 12 – SPILL SITE NORTHWEST OF BUILDING 370 106th RESCUE WING, NEW YORK AIR NATIONAL GUARD FRANCIS S. GABRESKI AIRPORT WESTHAMPTON BEACH, NEW YORK	PEER PROJ./1566-053 FILE: GAB-028.DWG

Table 6.21
Direct-Push Soil Sample Analytical Results
Site 12 Spill Site Northwest of Building 370
106th Rescue Wing
New York Air National Guard
Westhampton Beach, New York

Analyte (ppb)	Action Levels	SCDHS Sample Identification				
		I2573	I2574	I2575	I5004	I5004
		1, 2, 3, 4, 5	1, 2	1	1	2
Acenaphthylene	41,000	NR	NR	NR	112	ND
Phenanthrene	50,000	NR	NR	NR	625	ND
Anthracene	50,000	NR	NR	NR	211	ND
Fluoranthene	50,000	NR	NR	NR	1,890	56.4 J
Pyrene	50,000	NR	NR	NR	2,020	ND
Benzo(a)anthracene	224	NR	NR	NR	1,140	ND
Chrysene	400	NR	NR	NR	1,020	ND
bis(2-ethyl hexyl)phthalate	50,000	NR	NR	NR	85.2 J	ND
Benzo(b)fluoranthene	1,100	NR	NR	NR	626	ND
Benzo(k)fluoranthene	1,100	NR	NR	NR	1,440	ND
Benzo(a)pyrene	60.9	NR	NR	NR	1,080	ND
Indeno(1,2,3-cd)pyrene	3,200	NR	NR	NR	425	ND
Dibenz(a,h)anthracene	14	NR	NR	NR	190	ND
Benzo(g,h,i)perylene	50,000	NR	NR	NR	360	ND
Triortho cresyl phosphate	NA	ND	ND	300 [(a)]	ND	ND
Gasoline	NA	NR	NR	NR	ND	ND
Lubricating Oil	NA	NR	NR	NR	ND	ND
Kerosene/Jet Fuel	NA	NR	NR	NR	ND	ND
Diesel Fuel, Fuel Oil #2	NA	NR	NR	NR	ND	ND
Fuel Oil #4	NA	NR	NR	NR	ND	ND
Fuel Oil #6	NA	NR	NR	NR	ND	ND

(a) Three isomer peaks identified, at 100 ppb each.

NA Not applicable.
ND Not detected.
NR Not reported.

To accomplish this, the intended plan for this site includes:

- Installation of 10 direct-push borings in a modified grid pattern centered on the forced main sewer line where TCP contamination has been identified. Borings will be sampled continuously at 2-ft intervals to the top of the water table. Soil samples will be collected for lithologic description, PID field screening, and laboratory analysis of volatile organics, semivolatile organics, and TCP. One direct-push borehole will also be analyzed for PCBs. Two to four laboratory analytical samples will be collected from each borehole. Groundwater screening samples will be collected from each direct-push soil boring and analyzed for volatile organics, semivolatile organics, and TCP isomers.

Two new monitoring wells will be installed at Site 12 as follows:

- Monitoring well S12-MW01 will be installed at the approximate center of the area of contaminated soil.
- Monitoring well S12-MW02 will be installed approximately 20 ft downgradient of the center of the area of contaminated soil.

Monitoring wells will be properly developed, purged, and sampled for two rounds of volatile organics, semivolatile organics, TCP isomers, and intrinsic remediation parameters (one well only). The monitoring well soil borings will be sampled for description, screening, and analysis of soils as for the direct-push probes. One hollow-stem auger boring will be sampled for geotechnical parameters using a Shelby tube.

Depending on the results of the direct-push and monitoring well investigations, up to four optional direct-push soil borings and two additional optional monitoring wells may be recommended for Site 12.

Figure 6.20 shows Site 12 and planned direct-push soil boring and monitoring well locations.

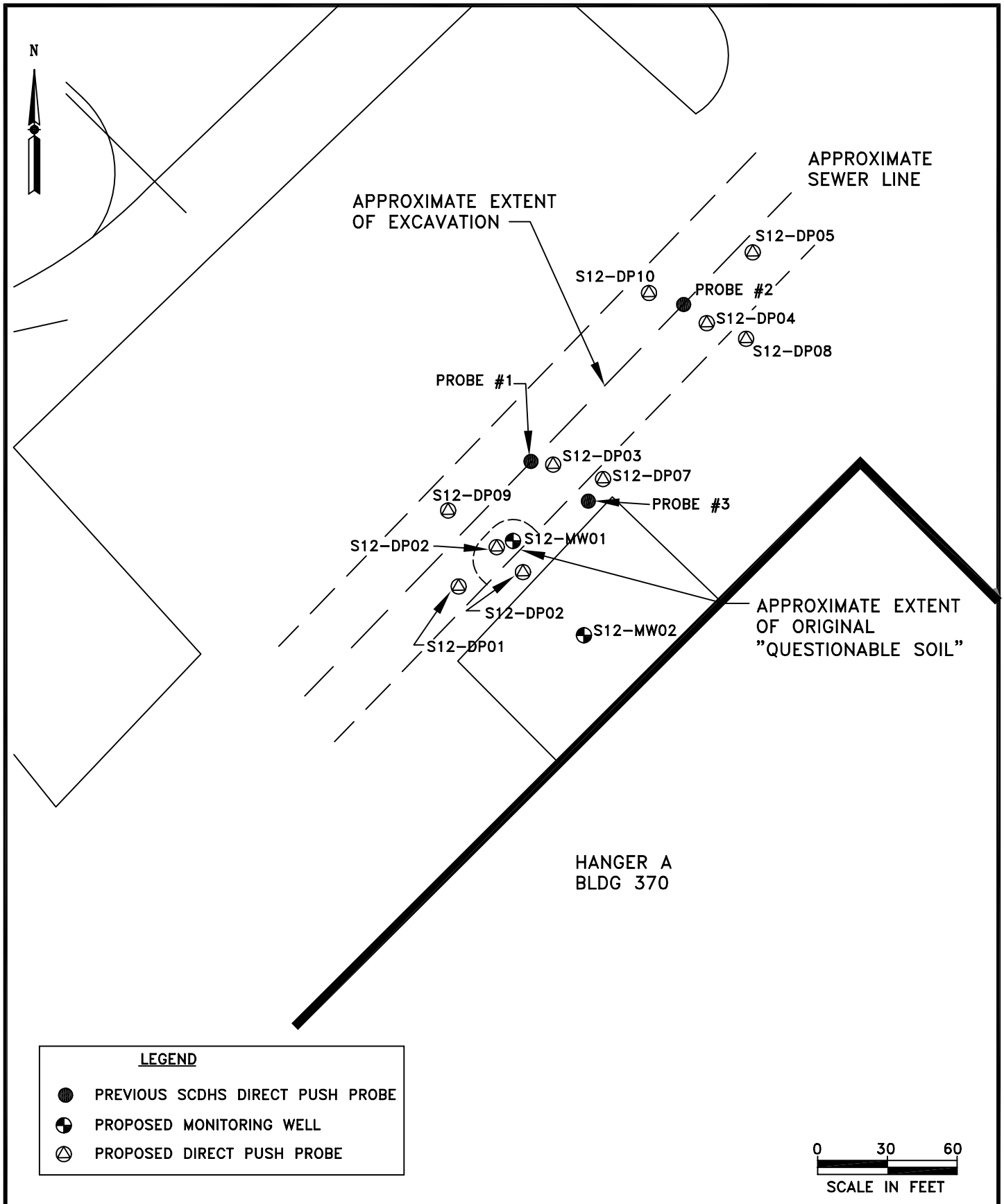


FIGURE 6.20	PROPOSED DIRECT PUSH PROBE AND MONITORING WELL LOCATIONS SITE 12 – SPILL SITE NORTHWEST OF BUILDING 370 106th RESCUE WING, NEW YORK AIR NATIONAL GUARD FRANCIS S. GABRESKI AIRPORT WESTHAMPTON BEACH, NEW YORK	PEER PROJ./1566-053 FILE: GAB-027.DWG

6.4.8 Background Location

In order to provide baseline data to allow evaluation of background conditions for comparison with Site Nos. 1 through 12, both existing on-site and new off-site locations will be investigated.

Two locations will be used for background investigations, one of which will be a completely new location. The new background location will be placed on Suffolk County property, so as to provide useful information from a previously uninvestigated off-site area. This location is to be determined and access provided by the SCDHS.

The new background location will be investigated by installation of two direct-push soil borings extending to the top of the saturated zone (BK-DP01 and BK-DP02). Soil samples will be collected at 2-ft intervals for description, field screening, and for chemical and geotechnical analysis. The background soil borings will be sampled for chemical analysis of volatile and semivolatile organics, TAL metals, TCP isomers, and TPH. Two to four soil samples will be collected from each direct-push probe for chemical analysis, including samples from the surface, vadose zone, and the top of the saturated zone. Also, one direct-push borehole will be sampled for PCBs for a total of three samples. Groundwater screening samples will be collected from the soil probes for analysis of volatile and semivolatile organics and TCP isomers.

The on-site background location will be a previously installed monitoring well pair selected in an appropriate location. The well pair selected is SDW-019 and SDW-020. The pair was selected for the following reasons:

- Being a shallow/deep pair, they allow characterization of background conditions in both zones.
- The wells are situated in an area that is approximately upgradient of the majority of on-site monitoring wells.
- The wells are outside of areas previously identified as sources/plumes by prior investigations.

The existing on-site monitoring wells will be sampled for volatile and semivolatile organics, TCP isomers, petroleum hydrocarbons, TAL metals, and remediation parameters. They will also be tested for hydrogeologic parameters by rising and/or falling head slug tests as appropriate. Figure 6.21 shows the proposed existing background monitoring well locations.

6.5 DEVIATIONS FROM THE WORK PLAN

Any deviations from the Work Plan, Standard Operating Procedures (SOPs), or project requirements impacting technical performance of the work, costs, or scheduling as specified in this document require prior approval and documentation using a Field Change Request Form (Figure 6.22). This form will be completed in the field by the Site/Project Manager and forwarded to the PEER Program Manager and then to the ANG Project Manager by facsimile for approval.

Changes that require an immediate response may be authorized by telephone and then documented using the procedure described. A copy of the completed Field Change Request Form will be retained in the project records.

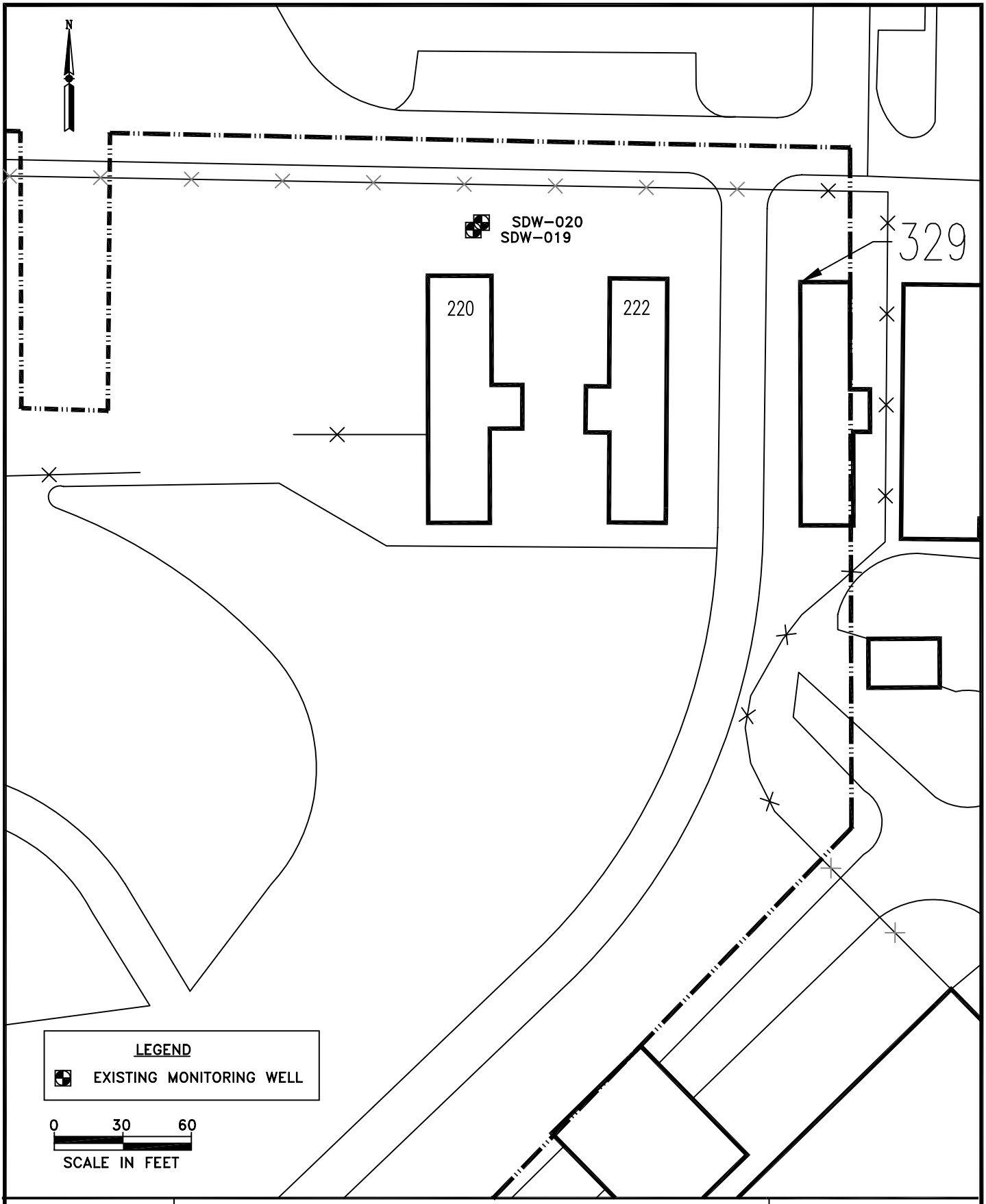


FIGURE 6.21

PROPOSED BACKGROUND LOCATIONS FOR EXISTING MONITORING WELLS SDW-019 AND SDW-020
106th RESCUE WING, NEW YORK AIR NATIONAL GUARD
FRANCIS S. GABRESKI AIRPORT
WESTHAMPTON BEACH, NEW YORK

PEER

PROJ./1566-053

FILE: GAB-030.DWG

FORM 001G-1 **FIELD CHANGE REQUEST**	FIELD CHANGE NO. _____ PAGE _____ OF _____
PROJECT:	
PROJECT NO.:	
APPLICABLE DOCUMENT:	
REQUESTED CHANGE: _____	
☐ MAJOR CHANGE ☐ MINOR CHANGE	
REASON FOR CHANGE: _____	
RECOMMENDED DISPOSITION: _____	
IMPACT ON PRESENT AND COMPLETED WORK: _____	
FINAL DISPOSITION: _____	
REQUESTED BY: _____ NAME AND TITLE SIGNATURE AND DATE	

APPROVALS:

ACCEPT	REJECT			
☐	☐	PROJECT/SITE MANAGER:	_____	DATE:
☐	☐	DELIVERY ORDER MANAGER:	_____	DATE:
☐	☐	PROGRAM MANAGER:	_____	DATE:
☐	☐	CLIENT PROJECT MANAGER:	_____	DATE:

CC: QAS
QA/QC MANAGER

Figure 6.22. Field Change Request Form

7.0 FIELD INVESTIGATION PROCEDURES

Field activities during the investigation will be in accordance with the "Quality Assurance Program Plan for the Air National Guard Readiness Center" (PEER 1995b), and the "Statement of Work for Environmental Engineering/Professional and Technical Support" (National Guard Bureau 1993). These documents will be kept for reference in the field at all times by the Site Manager. Field screening with a PID will be used during soil boring installation to assist in characterizing the distribution of ionizable organic vapors in the soil column, and to ensure that monitoring wells are not installed in areas of significant volatile organic contamination. PID field screening will be conducted during all field operations to monitor ambient air for health and safety purposes. All health and safety procedures will be followed as specified in the HASP (PEER 1995b).

7.1 INVESTIGATIVE METHODS AND PROCEDURES

7.1.1 Water Level Readings

Initially, groundwater level measurements will be obtained from the previously installed wells to verify the groundwater flow direction. Any changes noted from previously determined measurements may require change in the proposed new monitoring well locations. Any changes will require a Field Change Order, described in Section 6.4.

Groundwater level measurements will be obtained from all newly installed monitoring wells before and after well development and purging. Two complete rounds of groundwater level data will be collected from the newly installed and all existing wells (one during each round of sampling).

Data collected from each round of water level measurements will be used to create potentiometric surface maps.

Water levels will be measured using an electronic water level indicator. Upon arriving at the well, the headspace will be measured for the presence of organic vapors using a PID immediately after the well cap is removed. Upon clearance by the Site Health and Safety Officer, the decontaminated water level indicator will be lowered into the well and the measurement will be taken according to QAPP SOP-F13 "Water Level Measurements Using Electronic Water Level Indicator" (PEER 1995a). All readings will be taken from an existing benchmark on the well. If there is no benchmark on the well, one will be created prior to taking water level readings. The readings will be recorded in the field logbook. Upon completion of the water level measurement, the probe and measuring line will be decontaminated in accordance with QAPP SOP-Q3, "Decontamination -Field Equipment," as the sensor and line are removed from the well (PEER 1995a).

7.1.2 Monitoring Wells

Monitoring wells will be installed by a New York state-certified well drilling company in accordance with QAPP SOP F-15, "Well Installation, Development, and Abandonment." Water levels will be obtained from existing wells near the sites to assist in determining how the wells will be installed and screened. A Subsurface Log containing a well construction diagram will be completed by the Geologist for each new monitoring well (Appendix B).

7.1.2.1 Monitoring Well Installation

Monitoring wells will be installed using a truck-mounted drill rig through 6 1/4-in. OD (nominal) hollow-stem augers in soil borings advanced until groundwater is encountered. The augers will ensure the integrity of the boreholes, allow proper alignment of well casings and screens, and allow correct placement of sand packs, seals, and grout within the annular space between the monitoring well and auger.

Well screen lengths of 15 ft will be used. Shallow well screens will be installed so that they straddle the shallow water table, if possible, with 5 ft above and 10 ft below the average water

table surface. Normally, wells for the ANG projects use a 10-ft screen. However, due to fluctuating water elevations, a 15-ft screen is deemed more appropriate for anticipated site conditions. This will ensure that the wells will provide suitable samples regardless of the water level conditions.

The wells will be completed using 4-in. diameter Schedule 40 PVC casings, and 15-ft screens (0.010-in. slot) with threaded end caps. Prior to installation of screens and casings, at least 1 ft of sand will be placed in the bottom of the borehole. After positioning the casing and screen by resting the end cap on the sand in the bottom of the borehole, a sand pack will be placed a minimum of 2 ft above the well screen using a 1-in. diameter tremie pipe. The sand will consist of washed, bagged, and well rounded quartz sand properly sized for the well screen. A minimum of 2 ft of bentonite slurry will be placed above the sand pack using a tremie pipe. Bentonite-cement grout with a density of 13.5 to 14.1 lbs/gal will be tremied into the annular space to a depth of approximately 1 ft BGS or less. The grout will be allowed to set for at least 24 hours in order to allow for settling. Then, the remainder of the annular space in the well will be filled with neat cement or concrete, and the well will be secured with an 8-in. diameter, flush-mounted, load-bearing curb box, and a lockable well cap. The curb box will be surrounded by a 3 ft x 3 ft, sloped concrete pad, a minimum of 4 in. deep. The wells will be permanently identified using embossed metal tags. Reference measurements will be made by using a steel tape from at least three permanent locations and recorded in the field logbook. An example well construction diagram is provided in Figure 7.1.

7.1.2.2 Monitoring Well Development

Well development will be conducted according to QAPP SOP F-15, “Well Installation, Development, and Abandonment.” Development will proceed following installation to ensure that fine particulates are removed, and that a normal flow of representative groundwater into the well screen is achieved. A minimum of 24 hours will be allowed after installation, before well development.

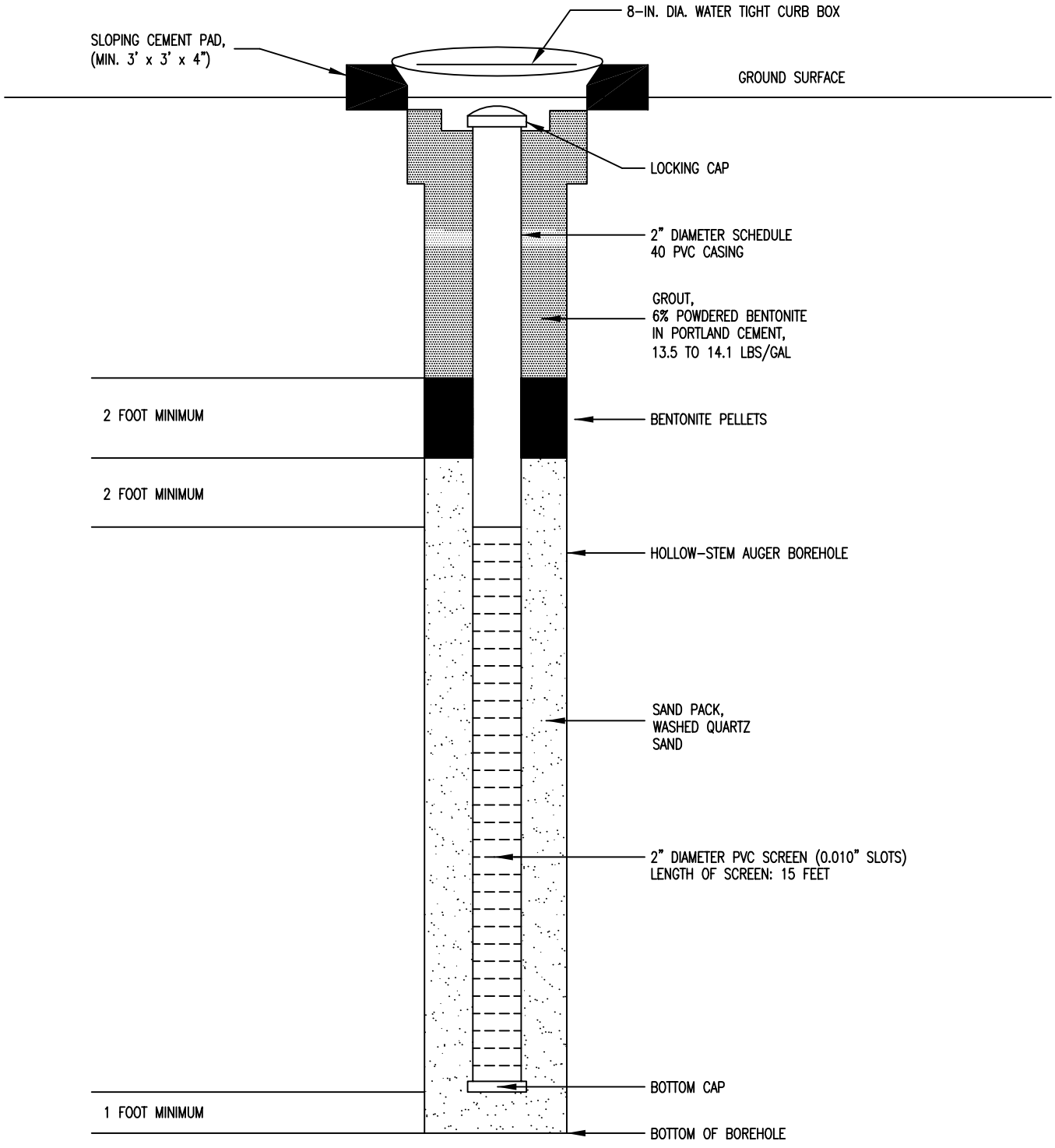


FIGURE 7.1	MONITORING WELL CONSTRUCTION DIAGRAM 106th RESCUE WING, NEW YORK AIR NATIONAL GUARD FRANCIS S. GABRESKI AIRPORT WESTHAMPTOM BEACH, NEW YORK	PEER PROJ./DISK: 1566-053 FILE: GAB-026.DWG

Well development will be performed using bailers, and/or a submersible pump. A surge block or similar device may be used for shallow and/or deep wells to expedite removal of excessive fine sediment as required at the direction of the Geologist. The bailer will be placed in the well and allowed to sink to the bottom of the well. Then, the bailer will be slowly withdrawn while being simultaneously raised and lowered throughout the screened interval of the well. Once the bailer reaches the ground surface, it will be emptied, and the process will be repeated. The parameters of pH, conductivity, temperature, and turbidity will be recorded initially and after each well volume. The well development will continue until the water is relatively free and clear of sediment and until the pH and conductivity are stable. Turbidity will be checked periodically and recorded. The volume of water removed will be recorded on well development logs. As agreed to by the NYSDEC and SCDHS, development water will not be containerized, but will be allowed to infiltrate back to the water table aquifer.

7.1.2.3 Monitoring Well Purging

Well purging will be conducted prior to sampling to ensure that a fresh, representative groundwater sample will be collected.

After determining the depth to static water and the volume of water in the well, purging will proceed using the indicator method in accordance with QAPP SOP-F16, "Guidelines for Well Purging," using low pumping rate purging (PEER 1995a). For site-specific purging guidelines, see Section 8.3.2.

7.1.3 Slug Tests

Once the initial round of groundwater samples has been collected, slug testing will be performed in the newly installed monitoring wells using a Hermit® data logger or similar electronic device. Depending on the static water levels in the wells, rising head or falling head slug tests will be conducted. A rising head slug test will be performed if the water level in the well is present above the screen, or a falling head slug test will be performed if the water level is within the

screen. The rising head slug test will involve lowering a slug of known volume into the well, and allowing the well to equilibrate to static water level. The slug will be quickly withdrawn, the time of withdrawal will be recorded, and the rise in water level versus time will be recorded. A falling head slug test will be conducted by quickly lowering a slug into the well and recording the fall in water level versus time. Recording of depth-time data for both rising head and falling head slug tests will continue until the well has recovered to at least 90% of the static water level. Upon completion of the slug tests, downhole equipment will be decontaminated in accordance with the QAPP, SOP-Q3, "Decontamination - Field Equipment" (PEER 1995a).

7.1.4 Soil Borings

Subsurface soil samples will be collected using direct-push (Geoprobe®) methodology and from hollow-stem auger soil borings during installation of the monitoring wells. The samples will be submitted to a state-certified laboratory for analysis, as described in Section 10.4.

7.2 FIELD SCREENING

7.2.1 Soil Samples

Soil samples from both the direct-push probes and soil borings (for the monitoring wells) will be screened for photoionizable organic compounds using a calibrated PID.

Direct-Push Sampling. After removal of the acetate liners from the direct-push sampling tool, the sample will be screened by making a series of small holes or cuts along the length of the recovered core using a clean sampling tool, and carefully scanning the core length with the PID. If the sample is homogeneous, then three to four holes will be made and screened. If distinct layers are discernible, as for example, by color or lithology change, aqueous saturation, visible staining, detectable odor, or the presence of sheen or product, then each layer will be screened individually. Suspect soil may be placed in a clean container, such as a resealable plastic bag or glass sample bottle, allowed to equilibrate for 10 to 15 minutes, then the headspace will be

carefully screened using the PID. The need for, and appropriate frequency and procedures of, soil screening can vary greatly and will therefore be determined at the discretion of the supervising Geologist. Screening results will be recorded by the Geologist in the site logbook.

Soil Borings. Soil samples will be collected at 2-ft intervals from all soil borings. Immediately upon opening the split-spoon, the length of the core will be screened with the PID. Additional screening may be conducted at the discretion of the Geologist as described previously for the direct-push probes.

7.2.2 Groundwater Samples

Groundwater samples will be screened for photoionizable organic contaminants using a calibrated PID. Prior to closing the lid of one of the nonvolatile sample aliquots collected from each well, the tip of the PID will be placed over the container opening for approximately 1 minute. The resultant PID reading will be observed and recorded in the field logbook. The tip of the PID will not be placed in the sample container to ensure that samples are not cross-contaminated, and to ensure that water is not drawn into the PID. Screening results will be recorded by the Geologist in the site logbook.

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8.0 SAMPLE COLLECTION PROCEDURES

The following sections describe the field sampling procedures to be used during the RI field activities.

8.1 SURFACE SOIL SAMPLING

Surface soil samples will be collected from 0 to 2 in. BGS, as per State Health Department requirements, using a stainless steel scoop and mixing bowl. Soil samples for volatile organics analysis will be placed immediately into a sample container so as to prevent loss of volatiles. The container will be filled with soil as completely as possible so as to eliminate any headspace. Soil samples for semivolatile organics and metals analysis will be composited and a portion will be placed in a 4-oz. sample container using a stainless steel scoop. The container will be wiped clean, labeled, bagged, and cooled to 4°C. Chain-of-custody will be maintained on all surface soil samples from the time of collection through laboratory analysis. Samples will be submitted to a state-certified laboratory for chemical analysis for volatile and semivolatile organics, TAL metals, PCBs (Sites 2, 3, 11, 12, and BKG), and TCP (Site 12 and BKG only).

8.2 SUBSURFACE SOIL SAMPLING

Subsurface soil samples will be collected from direct-push boreholes using an acetate-lined decontaminated stainless steel sample probe. Subsurface soil samples will also be collected during the installation of monitoring wells using a standard split-spoon. All boreholes will be sampled at 2-ft intervals for geologic classification. A decontaminated split-spoon barrel will be installed on the center rod and inserted into the hollow-stem auger. A hammer assembly will be connected and used to drive the spoon, in accordance with American Society of Testing and Materials (ASTM) D-1586. Upon retrieving and opening the direct-push sample probe or split-spoon, the soil core will be measured and described by the Geologist, including any lithologically distinct units or evidence of contamination, then the sample will be screened with a PID, and the readings recorded. A portion of the core will immediately be placed in a 4-oz. sample container

using a decontaminated stainless steel spatula for analyses of volatile organic compounds. The container will be filled with soil as completely as possible. A portion of the core will then be placed in an 8-oz. sample container for analyses of semivolatile organics and TAL metals. The remaining soil will be classified by the field Geologist, using the Unified Soil Classification System. The containers will be wiped clean, labeled, bagged, and cooled to 4°C. Chain-of-custody will be maintained on all surface soil samples from the time of collection through laboratory analysis. Samples will be submitted to a state-certified laboratory for chemical analysis of volatile and semivolatile organics, TAL metals, and TCP (Site 12 only).

Shelby tube samples will be collected of representative lithologies during the installation of direct-push soil borings and monitoring wells. These soil samples will be analyzed for moisture, density, soil grain analysis, and triaxial sheer.

8.3 GROUNDWATER SAMPLING

8.3.1 Direct-Push Sampling

Groundwater samples will be collected, insofar as possible, from all direct-push boreholes that penetrate the top of the water table. Samples will be collected using a downhole apparatus, such as a Hydroprobe®, disposal Teflon® mini-bailers, or a peristaltic pump equipped with disposable Teflon® tubing. Every reasonable attempt will be made to obtain samples for volatile organic analysis, conditions permitting. If insufficient volume can be obtained, semivolatile organic samples may be omitted at the discretion of the Geologist.

8.3.2 Monitoring Well Sampling

Monitoring wells will be sampled no sooner than 24 to 48 hours following completion of well development. Before each round of sampling, monitoring wells will be purged to ensure a representative sample is collected. After determining the static water level of the well, but prior to collecting a sample, the total volume of water standing in the well will be calculated and

recorded in the logbook. A minimum of three well volumes will then be purged from the well. Conductivity, temperature, and pH will be measured upon removal of each well volume and recorded on a field form (Appendix B). Purging will proceed until conductivity, temperature, and pH remain stable (temperature within +/- 1°C, pH within +/- 0.1 units, and conductivity within +/- 10%) for three consecutive recording intervals, and turbidity is less than 50 NTU. If the turbidity still exceeds 5 NTU after removal of five well volumes, the wells shall be purged until purge parameters are stabilized and the discharge water is visually clear. If the well is purged to dryness before three well volumes are obtained, no further purging will be required. As soon as the well contains a sufficient volume of water, the required sample will be collected. Low-flow sampling will be conducted using a Grundfos Rediflow® (or equivalent) submersible pump, and disposable Teflon® tubing. The pump will be operated at a rate of less than 0.1 L/min, or the slowest sustainable discharge rate, whichever is faster. As recommended by the SCDHS and agreed to by the NYSDEC, all purge water will be disposed by allowing it to infiltrate back to the water table aquifer.

After purging is complete and a sufficient volume of groundwater is present in the well, sample collection will commence. Groundwater samples will be collected from monitoring wells using disposable Teflon® bailers and unused nylon twine. Sample aliquots for analysis of volatiles will be collected first into three pre-labeled, precleaned and pre-preserved 40-mL amber-glass vials. In order to ensure that no airspace or bubbles are present, each vial will be slowly filled until a meniscus is formed over each rim. Caps will then be placed on the vials, and the vials will be inverted, lightly tapped, and checked for the presence of air bubbles. Following collection of the volatile sample aliquots, sample aliquots for semivolatile organics, PCBs and TCP isomers analysis will be collected. Once all organic analyses have been collected, inorganic analyses, including remediation parameters on metal samples, will be obtained. Petroleum hydrocarbons samples will be collected with the volatile organics and semivolatile organics for GRO and DRO analyses, respectively. The sample container designated for total metals will be preserved before or immediately after collection. Metals analysis for groundwater samples will be performed on unfiltered samples. Samples for inorganic intrinsic remediation parameters will be collected after the metals samples. After sample collection, each sample container will be

labeled, wiped clean with a paper towel, labeled, individually bagged, packed in a cooler with double-bagged water ice, and cooled to 4°C. Chain-of-custody will be maintained on all groundwater samples from the time of collection through laboratory analyses.

8.4 LAND SURVEYING

All plane and vertical surveys will be of third-order accuracy (vertical control 0.01 ft and horizontal control 0.1 ft) and will be conducted under the supervision of a New York state-licensed/registered Land Surveyor. All elevations will be referenced to the National Geodetic Vertical Datum (e.g., mean sea level).

8.5 FIELD QUALITY CONTROL (QA/QC)

All laboratory analyses will be conducted at EPA Quality Control (QC) Level III. To enhance the reliability of field sampling procedures and materials, field QC samples will be collected or prepared as described in the following sections. The Site-Specific Qualify Assurance Project Plan (QAPP) is provided in Appendix B.

8.5.1 Duplicates

Duplicate groundwater and soil samples will be collected during the field activities, at the rate of 1 duplicate per 10 samples per matrix per event. Duplicate samples will be analyzed for the same parameters as the environmental samples.

8.5.2 Trip Blanks

A trip blank will accompany each shipping container containing samples that are to be analyzed for volatile organics. The trip blanks will be supplied by the laboratory and will be analyzed for volatile organics.

8.5.3 Rinsate Samples

Decontamination rinsate samples will be collected from the final deionized water rinse from the decontamination of sampling equipment, at the rate of 1 rinsate sample per 10 samples. Rinsate samples may be omitted in cases where disposable one-time-use sampling equipment (not requiring decontamination) is used for sample collection. Rinsate samples will be analyzed for the same parameters as the environmental samples.

8.5.4 Matrix Spike/Matrix Spike Duplicates

During sample collection, additional volume of sample from groundwater, surface soil, surface water, and sediment will be collected and submitted to the laboratory for analysis as matrix spike/matrix spike duplicates (MS/MSD) samples, at the rate of 1 MS/MSD sample per 20 samples per matrix per event. The MS/MSD samples will be analyzed for the same parameters as the environmental samples.

8.5.5 Field Blank Samples

Two field blank samples will be collected during the field activities from the water sources used for equipment decontamination for each round of sampling. One sample will be collected from the potable (tap) water source used for decontamination, and the second sample will be collected from the American Society for Testing and Materials (ASTM) Type II water used for decontamination. Field blank samples will be analyzed for the same parameters as the environmental samples.

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9.0 ARARs – SOIL AND GROUNDWATER ACTION LEVELS

9.1 GROUNDWATER

New York State (NYS) Class GA[3] standards or guidance values will be used as action levels for groundwater. The levels are selected by determining the applicability of the principle organic contaminant (POC) groundwater standard. This procedure consists of five steps which are outlined in the Division of Water Technical and Operational Guidance Series (TOGS) (1.1.1) (Zambrano, J., 1991).

The first step for determining an action level requires finding the constituent of concern in one of three tables present in the TOGs. These tables are summarized below. If the constituent of concern is not listed in Table 9.1, then Table 9.2 is used, then Table 9.3. If the constituent of concern is not included in any of the three tables, then definitions included on page 9 of the TOGS are followed (also listed below). If the constituent of concern is not found in these four steps, NYSDEC assistance is required (Step 5).

- NYS Ambient Water Quality Standards and Guidance Values (Table 9.1)
- Partial List of Substances Regulated by the Principle Organic Contaminant Groundwater Standard of 5 µg/L (Table 9.2)
- Partial List of Substances Not Regulated by the Principle Organic Contaminant Groundwater Standard (Table 9.3)
- Definitions of POC Classes 1 (halogenated alkanes) and 2 (halogenated ether) (page 9)

Table 9.1 presents action levels for groundwater relative to NYS guidance and federal maximum contaminant levels (MCLs). If standards or guidance values are less than laboratory reporting limits (RLs), the RLs will be used as action levels (ABB-ES 1997).

[3] New York State water is classified by primary or best usage. Guidance and standards are developed to provide protection of the primary usage(s) assigned to each water class. Usages are described in Part 701 of the NYS Administrative Code.

Table 9.1
Action Levels for Groundwater
106th Rescue Group
New York Air National Guard
Westhampton Beach, New York

Parameter	USEPA MCL (µg/L)	NYS Class GA Groundwater (µg/L)	Reporting Limit (µg/L)
Volatile Organics			
Benzene	**5**	0.7	5
Chlorobenzene	-	**5**	5
Chloroform	100	**7**	5
1,1-Dichloroethane	-	**5**	5
1,1-Dichloroethene	7	5	**10**
cis-1,2-Dichloroethene	70	**5**[1]	5
trans-1,2-Dichloroethene	100	**5**	5
Ethylbenzene	700	**5**	5
Tetrachloroethene	5	**5**	5
Toluene	1,000	**5**	5
1,1,1-Trichloroethane	200	**5**	5
Trichloroethene	5	**5**	5
o-Xylene[2]	10,000	**5**	5
m/p-Xylenes[2]	10,000	5	10
Semivolatile Organics			
Acenaphthene	-	**20 G**	20
Acenaphthylene	-	**50**[3]	20
Anthracene	-	**50 G**	20
Benzo(a)anthracene	0.1 P	0.0002 G	**20**
Benzo(a)pyrene	0.2	ND	**20**
Benzo(b)fluoranthene	0.2 P	0.002 G	**20**
Benzo(g,h,i)perylene	-	**50**[3]	20
Benzo(k)fluoranthene	0.2 P	0.002 G	**20**
bis(2-ethylhexyl)phthalate[4]	6	**50**	20
Butylbenzylphthalate	100 P	**50 G**	20
4-Chloro-3-methylphenol	-	1[5]	**20**
2-Chloronaphthalene	-	10 G	**20**
2-Chlorophenol	-	1[5]	**20**
Chrysene	0.2 P	0.002 G	**20**
Dibenzofuran	-	**50**[3]	20
Dibenz(a,h)anthracene	0.3 P	**50**[3]	20
1,2-Dichlorobenzene	600	4.7	**5**
1,3-Dichlorobenzene	600	**5**	5

Table 9.1 (Continued)
Action Levels for Groundwater
106th Rescue Group
New York Air National Guard
Westhampton Beach, New York

Parameter	USEPA MCL (µg/L)	NYS Class GA Groundwater (µg/L)	Reporting Limit (µg/L)
Semivolatile Organics			
1,4-Dichlorobenzene	75	4.7	**5**
2,4-Dichlorophenol	-	1[5]	**20**
Diethylphthalate	-	**50 G**	20
Dimethylphthalate	-	**50 G**	20
2,4-Dimethylphenol	-	1[5]	**20**
Di-n-butylphthalate	-	**50**[3]	20
Di-n-octylphthalate	-	**50 G**	20
2,4-Dinitrophenol	-	1[5]	**20**
2,4-Dinitrotoluene	-	5[1]	**20**
2,6-Dinitrotoluene	-	5	**20**
4,6-Dinitro-2-methylphenol	-	1[5]	**20**
Fluoranthene	-	**50 G**	20
Fluorene	-	**50 G**	20
Hexachlorobenzene	1	0.35	**20**
Hexachlorobutadiene	-	5	**20**
Hexachlorocyclopentadiene	50	5	**20**
Hexachloroethane	-	5[1]	**20**
Indeno(1,2,3-c,d)pyrene	0.4 P	0.002 G	**20**
Isophorone	-	**50 G**	20
2-Methylnaphthalene	-	**50**[3]	20
2-Methylphenol	-	1[5]	**20**
4-Methylphenol	-	1[5]	**20**
Naphthalene	-	**10 G**	10
Nitrobenzene	-	5	**20**
2-Nitrophenol	-	1[5]	**20**
4-Nitrophenol	-	1[5]	**50**
2,2-oxybis(1-chloropropane)	-	**50**[3]	20
Pentachlorophenol	1	1[5]	**20**
Phenanthrene	-	**50 G**	20
Phenol	-	1[5]	**50**
Pyrene	-	**50 G**	20
1,2,4-Trichlorobenzene	70	5[1]	**20**
2,4,5-Trichlorophenol	-	1[5]	**20**
2,4,6-Trichlorophenol	-	1[5]	**20**

Table 9.1 (Continued)
Action Levels for Groundwater
106th Rescue Group
New York Air National Guard
Westhampton Beach, New York

Parameter	USEPA MCL (µg/L)	NYS Class GA Groundwater (µg/L)	Reporting Limit (µg/L)
Inorganic Constituents			
Arsenic	50[6]	**25**	10
Cadmium	5	**10**	10
Chromium	100	**50**	10
Lead	TT 15[7]	**25**	10
Selenium	50	**10**	10
Silver	100 S	**50**	10

Note: Action levels are bolded and shaded.

- No promulgated standard or guidance value available.
G Guidance values taken from Zambrano, J., 1991.
MCL Maximum Contaminant Level.
ND Non-detectable concentration.
NYS New York State
P Standard is proposed.
S Secondary Federal Maximum Contaminant Level.
TT Treatment Technique Action Level.
USEPA United States Environmental Protection Agency.

1 Compound is a Principal Organic Contaminant (POC). Under NYDOH Drinking Water Standards (10 NYCRR Subpart 5-1), a general standard of 5 µg/L applies to all POCs unless a more stringent, compound-specific standard has been set (ABB-ES 1994).
2 Total xylene standard is applied to each isomer, equally, based upon toxicity profile data.
3 Compound is an Unspecified Organic Contaminant (UOC). Under NYDOH Drinking Water Standards (10 NYCRR Subpart 5-1), a general standard of 50 µg/L applies (ABB-ES 1994).
4 Bis(2-ethylhexyl)phthalate is listed as diethylhexylphthalate under 6 NYCRR 700-705 (ABB-ES 1994), and USEPA Drinking Water Regulations and Health Advisories, November 1994.
5 NYS groundwater phenol standard of 1.0 µg/L is for total phenolic compounds.
6 Federal MCL for arsenic is under review.
7 Federal MCL and MCLG for lead is concentration in water collected from the tap.
8 Action level selection criteria are presented in Section 8.0.

References:

USEPA, 1992, Drinking Water Regulations and Health Advisories: USEPA Office of Water, Washington, D.C.

Zambrano, J., 1991, "Ambient Water Quality Standards and Guidance Values," Memorandum by the Division of Water Technical and Operational Guidance Series (1.1.1).

State of New York, 1993, New York Public Water Supply Regulations, Title 10, Code of Rules and Regulations, Subpart 5-1.

ABB-ES, 1997, "Site Investigation Report," Volume I.

Table 9.2
Action Levels for Organic Compounds in Soil and Sediment
106th Rescue Group
New York Air National Guard
Westhampton Beach, New York

Parameter	USEPA Health-Based Levels		Range of Background Concentrations (mg/kg)	Environmental Concentrations Protective of Groundwater Quality		Reporting Limit
	Carcinogens (mg/kg)	Systemic Toxicants (mg/kg)		Saturated [1] Soil (mg/kg)	Unsaturated [2] Soil (mg/kg)	
Volatile Organics [3]						
Benzene	24	NA	Nd – 0.8	0.0006	0.06	0.005
Chlorobenzene	NA	2,000	ND	0.017	1.7	0.005
Chloroform	114	800	ND	0.003	0.3	0.005
1,1-Dichloroethane	NA	NA	ND	0.002	0.2	0.005
1,1-Dichloroethene	12	700	ND	0.004	0.4	0.010
cis-1,2-Dichloroethene	NA	NA	ND	NA	NA	0.005
trans-1,2-Dichloroethene	NA	2,000	ND	0.003	0.3	0.005
Ethylbenzene	NA	8,000	ND – 0.032	0.055	5.5	0.005
Tetrachloroethene	14	800	ND	0.014	1.4	0.005
Toluene	NA	20,000	ND	0.015	1.5	0.005
1,1,1-Trichloroethane	NA	7,000	ND – 0.16	0.0076	0.76	0.005
Trichloroethene	64	NA	ND	0.007	0.7	0.005
o-Xylene[2]	NA	200,000	ND	0.012	1.2	0.005
m/p-Xylenes[2]	NA	200,000	ND	0.012	1.2	0.010
Semivolatile Organics [5]						
Acenaphthene	NA	5,000	ND	0.9	**50.0**[6]	**1.0**
Acenaphthylene	NA	NA	ND	0.41	**41.0**	**1.0**
Anthracene	NA	20,000	ND	**7**	**50.0**[6]	1.0
Benzo(a)anthracene	0.224	NA	ND	0.03	0.224 OR RL[7]	**1.0**
Benzo(a)pyrene	0.0609	NA	ND	0.0609 OR RL[7]	0.0609 OR RL[7]	**1.0**
Benzo(b)fluoranthene	NA	NA	ND	0.011	**1.1**	**1.0**
Benzo(g,h,i)perylene	NA	NA	ND	**8**	**50.0**[6]	1.0
Benzo(k)fluoranthene	NA	NA	ND	0.011	**1.1**	1.0
bis(2-ethylhexyl)phthalate[4]	50	2,000	ND	**4.35**	**50.0**[6]	1.0
Butylbenzylphthalate	NA	20,000	ND	**1.215**	**50.0**[6]	1.0
4-Chloro-3-methylphenol	NA	NA	ND	0.0024	0.24 OR RL	1.0
2-Chloronaphthalene	NA	NA	ND	**NA**	**NA**	1.0
2-Chlorophenol	NA	400	ND	0.008	0.8	**1.0**
Chrysene	NA	NA	ND	0.004	0.4	**1.0**
Dibenzofuran	NA	NA	ND	0.062	**6.2**	**1.0**
Dibenz(a,h)anthracene	0.0143	NA	ND	0.014 or RL[7]	0.014 or RL[7]	**1.0**
1,2-Dichlorobenzene	NA	NA	ND	**0.079**	**7.9**	0.005
1,3-Dichlorobenzene	NA	NA	ND	**0.0155**	**1.55**	0.005

Table 9.2 (Continued)
Action Levels for Organic Compounds in Soil and Sediment
106th Rescue Group
New York Air National Guard
Westhampton Beach, New York

Parameter	USEPA Health-Based Levels		Range of Background Concentrations (mg/kg)	Environmental Concentrations Protective of Groundwater Quality		Reporting Limit
	Carcinogens (mg/kg)	Systemic Toxicants (mg/kg)		Saturated [1] Soil (mg/kg)	Unsaturated [2] Soil (mg/kg)	
Semivolatile Organics [3]						
1,4-Dichlorobenzene	NA	NA	ND	**0.085**	**8.5**	0.005
2,4-Dichlorophenol	NA	200	ND	0.004	0.4	**1.0**
Diethylphthalate	NA	60,000	ND	0.071	**7.1**	**1.0**
Dimethylphthalate	NA	80,000	ND	0.02	**2**	**1.0**
2,4-Dimethylphenol	NA	NA	ND	**NA**	**NA**	1.0
Di-n-butylphthalate	NA	8,000	ND	0.081	**8.1**	1.0
Di-n-octylphthalate	NA	2,000	ND	**1.2**	**50.0**[6]	1.0
2,4-Dinitrophenol	NA	200	ND	0.002	0.2 or RL	1.0
2,4-Dinitrotoluene	NA	NA	ND	**NA**	**NA**	1.0
2,6-Dinitrotoluene	1.03	NA	ND	0.01	**1**	**1.0**
4,6-Dinitro-2-methylphenol	NA	NA	ND	**NA**	**NA**	1.0
Fluoranthene	NA	3,000	ND	**19**	**50.0**[6]	1.0
Fluorene	NA	3,000	ND	**3.5**	**50.0**[6]	1.0
Hexachlorobenzene	0.41	60	ND	0.014	0.41[7]	**1.0**
Hexachlorobutadiene	NA	NA	ND	**NA**	**NA**	1.0
Hexachlorocyclopentadiene	NA	NA	ND	**NA**	**NA**	1.0
Hexachloroethane	NA	NA	ND	**NA**	**NA**	1.0
Indeno(1,2,3-cd)pyrene	NA	NA	ND	0.032	**3.2**	**1.0**
Isophorone	1,707	20,000	ND	**NA**	**NA**	1.0
2-Methylnaphthalene	NA	NA	ND	0.364	**36.4**	**1.0**
2-Methylphenol	NA	NA	ND	0.001	0.1 or RL	**1.0**
4-Methylphenol	NA	4,000	ND	0.009	0.9	**1.0**
Naphthalene	NA	300	ND – 4.6	**0.13**	**13**	0.010
Nitrobenzene	NA	40	ND	0.002	0.2 or RL	**1.0**
2-Nitrophenol	NA	NA	ND	0.0033	0.33 or RL	**1.0**
4-Nitrophenol	NA	NA	ND	0.001	0.1 or RL	**1.0**
2,2-oxybis(1-chloropropane)	NA	NA	ND	**NA**	**NA**	1.0
Pentachlorophenol	NA	2,000	ND	0.01	**1 or RL**	**1.0**
Phenanthrene	NA	NA	ND	**2.2**	**50.0**[6]	1.0
Phenol	NA	50,000	ND	0.0003	0.03 or RL	**1.0**
Pyrene	NA	2,000	ND	**6.65**	**50.0**[6]	1.0
1,2,4-Trichlorobenzene	NA	NA	ND	**NA**	**NA**	1.0
2,4,5-Trichlorophenol	NA	8,000	ND	0.001	0.1	**1.0**
2,4,6-Trichlorophenol	NA	NA	ND	**NA**	**NA**	1.0

Note: Action levels are bolded and shaded.

NA Not available.
ND Non-detectable concentration.
RL Reporting Limit
USEPA United States Environmental Protection Agency

1 Soil in direct contact with groundwater.
2 Greater than 5 ft above the water table.
3 Maximum allowable total volatile organics ≤ 10 mg/kg based on soil cleanup objectives.
4 Total xylene standard is applied to each isomer, equally, based upon toxicity profile data.
5 Maximum allowable total semivolatile organics ≤ 500 mg/kg based on soil cleanup objectives.
6 Per the Technical and Administrative Guidance Memorandum (O'Toole 1994), the action level of an individual semivolatile organic is 50 mg/kg.
7 Recommendation from USEPA Health Board.
8 Action level selection criteria are presented in Section 8.0.

References

O'Toole, M.J., Jr., 1994, Division technical and Administrative Guidance Memorandum: Determination of Soil Cleanup Objectives and Cleanup Levels: NYSDEC Division of Hazardous Waste Remediation, 10 p.

ABB-ES, 1997, "Site Investigation Report," Volume I.

Table 9.3
Action Levels for Inorganic Compounds in Surface Soil and Sediment
106th Rescue Group
New York Air National Guard
Westhampton Beach, New York

Parameter	Eastern USA or NYS Background Concentrations (mg/kg)	Range of Site Background Concentrations (mg/kg)	NYS Soil Cleanup Objectives (mg/kg)	Upper Limit of Background Concentrations (mg/kg)[1]	Reporting Limit (mg/kg)
Inorganic Constituents					
Arsenic	3 – 12	ND	7.5 or SB	0.10	**0.20**
Cadmium	0.1 – 1	ND	1 or SB	0.10	**0.20**
Chromium	1.5 – 40	0.53 – 3.8	10 or SB	**6.1**	0.20
Lead	4 – 500[2]	0.46 – 2.4	SB	**4.4**	0.20
Selenium	0.1 – 3.9	ND	2 or SB	0.10	**0.20**
Silver	NA	ND	SB	0.10	**0.20**

Note: Action levels are shaded and bolded.

NA Not available.
ND Non-detectable concentration.
NYS New York State.
SB Site background.
USA United States of America.

1 Upper limit of background concentrations are based on the mean concentration of site background constituents plus 3 times the standard deviation, excluding outliers.
2 Average concentrations in rural or undeveloped areas may range from 4 to 61 mg/kg. Average background concentrations in metropolitan or suburban areas or near highways are much higher and typically range from 200 to 500 mg/kg.
3 Action level selection criteria are provided in Section 8.0.

References

O'Toole, M.J., Jr., 1994, Division Technical and Administrative Guidance Memorandum: Determination of Soil Cleanup Objectives and Cleanup Levels: NYSDEC Division of Hazardous Waste Remediation, 10 p.

ABB-ES, 1997, "Site Investigation Report," Volume I.

9.2 SOIL

9.2.1 Organic Compounds

Action levels for volatile and semivolatile organics were developed from NYSDEC guidance for determination of soil cleanup objectives (O'Toole 1994). These levels reflect the most stringent value obtained from the following alternative criteria:

a. Human health-based levels that correspond to excess lifetime cancer risks of one in 1,000,000 for Class A and B carcinogens, or one in 100,000 for Class C carcinogens. These levels are calculated by NYSDEC using USEPA cancer slope factors and exposure scenarios which ensure acceptable risk. Class A carcinogens are proven human carcinogens; Class B are probable human carcinogens; and Class C are possible human carcinogens.

b. Human health-based levels for systemic toxicants, calculated from Reference Doses (RfDs). RfDs represent an estimate of daily exposure an individual can experience without appreciable risk of health effects during a lifetime.

c. Environmental concentrations protective of groundwater/drinking water quality. These concentrations are based on the Water-Soil Equilibrium Partition Theory which assumes that organic matter present in soils will adsorb organic compounds and attenuate continued migration. The concentrations are dependent on the amount of carbon present in the soil and whether or not the soil is in contact with groundwater. This approach predicts a maximum, estimated soil concentration which does not generate a leachate likely to impact groundwater quality above applicable standards.

Human health-based criteria were compiled from USEPA Health Effects Assessment Summary data (O'Toole 1994). Environmental concentrations protective of groundwater/drinking water quality are based on NYSDEC calculations which assume 1% total organic carbon and a

correction factor of 100 for saturated soils. Soils located within 5 ft of the water table were considered saturated (ABB-ES 1997).

Action levels are summarized relative to NYS guidance and RLs in Table 9.2 RLs which exceed NYS guidance will be used as action levels. Site background data from the Site Investigation Report are included in this table for comparison because background concentrations which exceed health-based levels can be used as action levels. Soils with a discernible odor of a particular chemical or substance will be considered indicative of a release, regardless of contaminant concentration(s) (ABB-ES 1997).

9.2.2 Inorganic Compounds

Action levels for inorganic constituents were developed from NYSDEC guidance for determination of soil cleanup objectives (O'Toole 1994). The levels are based on the upper limit value (ULV) of site background concentrations, excluding outliers, as recommended by NYSDEC (Harrington 1994). The ULV was calculated from the mean of background constituent concentrations plus three standard deviations. The Coefficient of Variation Test, presented below, was used to evaluate data distribution.

$$X_b = \frac{X1 + X2 + \ldots X_n,}{n}$$

$$S_b^2 = \frac{(\overline{X}_1 - \overline{X}_b)^2 + (X_2 - \overline{X}_b)^2 \ldots (X_n - \overline{X}_b)^2,}{n-1}$$

S_b = (I need to figure this out – CH) S_b^2 , and

CV = S_b / X_b where,

X_b = background mean

X = concentration of individual concentrations

n = total number of background readings.

S_b^2 = background variance

n-1	=	degrees of freedom
S_b	=	background standard deviation
CV	=	coefficient of variance

Background data for which CV was greater than 0.50 were reevaluated without outliers and the maximum allowable concentration or ULV for individual constituents was calculated again by adding the new background (X_b) mean to 3 times the standard deviation (S_b). Outliers which do not exceed this upper limit are not considered indicative of a release. Calculations can be found in Appendix K of the ABB-ES 1997 Site Investigation Report.

Action levels for inorganic compounds in surface soils, sediment, and subsurface soils are summarized in Tables 9.3 and 9.4. Eastern USA or NYS background concentrations are provided for comparison. Action levels for chromium and lead in subsurface soils are different because background concentrations were lower in these soils than in the surface samples.

Table 9.4
Action Levels for Inorganic Compounds in Subsurface Soil
106th Rescue Group
New York Air National Guard
Westhampton Beach, New York

Parameter	Eastern USA or NYS Background Concentrations (mg/kg)	Range of Site Background Concentrations (mg/kg)	NYS Soil Cleanup Objectives (mg/kg)	Upper Limit of Background Concentrations (mg/kg)[1]	Reporting Limit (mg/kg)
Inorganic Constituents					
Arsenic	3 – 12	ND 0.22	7.5 or SB	0.10	**0.20**
Cadmium	0.1 – 1	ND	1 or SB	0.10	**0.20**
Chromium	1.5 – 40	ND	10 or SB	**0.84**	0.20
Lead	4 – 500[2]	ND – 0.6	SB	**0.65**	0.20
Selenium	0.1 – 3.9	ND	2 or SB	0.10	**0.20**
Silver	NA	ND	SB	0.10	**0.20**

Note: Action levels are shaded and bolded.

NA Not available.
ND Non-detectable concentration.
NYS New York State.
SB Site background.
USA United States of America.

1 Upper limit of background concentrations are based on the mean concentration of site background constituents plus 3 times the standard deviation, excluding outliers.
2 Average concentrations in rural or undeveloped areas may range from 4 to 61 mg/kg. Average background concentrations in metropolitan or suburban areas or near highways are much higher and typically range from 200 to 500 mg/kg.
3 Action level selection criteria are provided in Section 8.0.

References

O'Toole, M.J., Jr., 1994, Division Technical and Administrative Guidance Memorandum: Determination of Soil Cleanup Objectives and Cleanup Levels: NYSDEC Division of Hazardous Waste Remediation, 10 p.

ABB-ES, 1997, "Site Investigation Report," Volume I.

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10.0 CONTAMINANT FATE AND TRANSPORT - DATA REQUIREMENTS AND OBJECTIVES

The analytical results will be compared to the action levels (as discussed in Section 9.0). A Risk Assessment will be required for those contaminants of concern not eliminated during the screening process.

Data collected during the investigation regarding the physical characteristic of the site, and contaminant source characteristics of the chemicals of concern not eliminated by the screening process, will be combined when evaluating contaminant fate and transport. The objective of assessing contaminant fate and transport is to evaluate the possibility for contaminant contact with potential receptors, such as station personnel.

The fate and transport of contaminants identified at the station will be evaluated by qualitatively assessing the following aspects:

- Potential routes of migration;
- Contaminant persistence;
- Contaminant mobility and the potential for migration of contaminants in soil, sediment, surface water, and groundwater; and
- Location and characteristics of potential receptors.

Contaminant persistence and the potential for migration will be evaluated using studies published in scientific literature based on the environmental conditions at the station, and the soil, sediment, surface water, and groundwater data obtained during the investigation.

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11.0 RISK ASSESSMENT

Analytical results from the RI will be compared to the NYSDEC screening values. Potential chemicals of concern for each site will be identified and a determination made if human health and ecological risk evaluations will be required for each sites. These evaluations will be used to establish any potential risks to human and ecological receptors. Based on the results, one of the following recommendations can be made for each site:

- take no further action;
- initiate immediate removal or interim action; or
- prepare an FS.

If the evaluations are required, they will be conducted in accordance with EPA guidance for conducting risk assessments for Superfund sites, including Risk Assessment Guidance (RAGs), and supplemental bulletins (U.S. EPA 1996).

11.1 HUMAN HEALTH RISK ASSESSMENT

The objective of the risk assessment is to evaluate potential risks to individuals under both current and future potential site conditions at each of the sites. The results of the assessment provide the basis for determining whether remediation is warranted for each site, and identify which media and constituents contribute significantly to potential risk so that remediation efforts can be focused on effectively reducing potential risk

11.1.1 Identification of Contaminants of Potential Concern

The analytical results from the RI, as well as other site-specific information, will be reviewed to identify contaminants of potential concern for detailed study in the risk assessment. Factors considered in selecting a chemical of potential concern include the suspected source, past activities at each site, and site-specific background or upgradient levels of concern.

Before contaminants of concern are selected, the data collected during the RI will be summarized by environmental medium, that is, groundwater and soil. Each chemical detected for a given medium will be summarized by frequency of detection, range of detected concentrations, and range of background concentrations.

Inorganic chemicals, in this case metals, at naturally occurring levels may be eliminated from the risk assessment based on comparison to background concentrations. If analytical results from background samples indicated they are not representative or appropriate to use as background, the background regional data could be used. If regional data must be used because of lack of base-wide background data, and if adequate regional data are not available to conduct statistical analysis, the chemical concentrations for each medium may be compared to two times the maximum regional background sample concentration. Inorganic chemicals that remain after the comparison to background will be selected and evaluated in the risk assessment (EPA 1989).

11.1.2 Human Exposure Assessment

The exposure assessment is used to characterize the route, frequency, duration, and magnitude of exposure to chemicals related to each site. The exposure assessment will be conducted in a series of three steps:

- receptor characterization;
- exposure pathway identification; and
- exposure quantification.

Exposure will be evaluated assuming that land use does not change in the future and that all sites will continue to support ANG activities.

Receptor Characterization. Potentially exposed populations (receptors) will be identified for each site. Assuming that the current and future land use will remain constant, human receptors will be limited to installation personnel and other on-site workers.

Identification of Exposure Pathways. The exposure pathways associated with each site are identified and are based on consideration of the sources, releases, types and location of chemicals at each site; the probable fate and transport of the chemicals; and the location and activity of receptor populations. Each exposure pathway includes: a source; a transport medium; a point of potential exposure with the contaminated medium; and a route of exposure, that is, direct contact with soil or ingestion of groundwater. A discussion will be provided in the risk assessment justifying the inclusion or exclusion of pathways from evaluation.

Quantification of Exposure. For each exposure pathway selected for quantitative evaluation, concentrations at the exposure point will use the RI data.

11.1.3 Toxicity Assessment

Contaminants of potential concern will be characterized with respect to their toxic effects in humans.

11.1.4 Risk Characterization

Potential human health impacts will be evaluated by comparing levels associated with estimated exposures to appropriate USEPA acceptable risk ranges.

11.2 ECOLOGICAL RISK EVALUATION

The Ecological Risk Evaluation, if required, will use existing literature to evaluate the site for the presence of any threatened and endangered species, wetlands, and sensitive habitats.

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12.0 FEASIBILITY STUDY

The following sections summarize the basic content of an FS, as described in the EPA guidance document "Guidance for Conducting Remedial Investigations and Feasibility Studies Under CERCLA" (EPA 1988).

12.1 PURPOSE AND ORGANIZATION

The purpose of the FS is to develop and screen remedial alternatives for contaminated media identified during the investigation.

12.2 IDENTIFICATION OF SCREENING TECHNOLOGIES

The screening criteria used to assess the remedial alternatives will include effectiveness, implementability, and relative cost. Remedial technologies will be evaluated in a two-step process. The first step will assess the applicability of a particular remedial technology and process options based on site conditions. Each alternative will be evaluated based on the physiographic, geologic, and hydrogeologic conditions at each site. Any remedial technologies and process options that cannot be accomplished at the site will be eliminated as not applicable. The second step involves further assessing the remedial technologies and process options that are potentially applicable to the site in terms of their effectiveness in achieving the remedial action objectives, ease of implementation, relative capital costs, and operation and maintenance.

The category of "effectiveness" will address the effectiveness of the remedial technologies and process options in achieving the remedial action objectives. The category of "implementability" will address the ability of the process option to be implemented based on factors such as institutional restraints, site conditions, the types of contaminants at the site, and the degree of difficulty in designing a viable process. The categories of "capital" and "operation and maintenance costs" will address the overall costs which will be categorized as low, moderate, or high within each type of remedial technology.

12.3 DEVELOPMENT OF SCREENING ALTERNATIVES

The primary objective of this phase of the FS is to develop an appropriate range of waste management options that will be analyzed fully in the detailed and comparative analysis phase of the FS. Potentially applicable treatment technologies and process options for site remediation will be identified for both soil and groundwater. Potential remedial technologies will be gathered from EPA documents, various research documents, and private industry documents.

12.4 DETAILED ANALYSIS OF ALTERNATIVES

Detailed analysis of alternatives will follow the development and screening of alternatives and will precede the actual selection of a remedy. The National Oil and Hazardous Substances Pollution Contingency Plan, 40 CFR 300.430 (iii), sets forth nine criteria to be used for a detailed and comparative analysis of the alternatives retained after the screening portion of the FS. The nine criteria which will be used for detailed and comparative analysis of the remedial alternatives are as follows:

- Overall protection of human health and the environment;
- Compliance with ARARs:
- Long-term effectiveness and permanence;
- Reduction of toxicity, mobility, or volume through treatment;
- Short-term effectiveness;
- Implementability;
- Cost;
- State acceptance; and
- Community acceptance.

12.5 RECOMMENDATIONS

Based on the results of the RI, an FS Report will be prepared, if necessary, to document the development and analysis of alternatives. It will include background information about the site based on the RI Report; the remedial action objectives for soil and/or groundwater; the estimated volume or area of soil and/or groundwater to which remedial alternatives will be applied; and the description of development, screening, and detailed and comparative analysis process of remedial alternatives and process options.

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13.0 EQUIPMENT DECONTAMINATION PROCEDURES

Decontamination procedures for all sampling and drilling activities will be in accordance with QAPP SOP-Q3, "Decontamination-Field Equipment," or SOP-Q4, "Decontamination-Heavy Equipment" (PEER 1995), with respect to the type of equipment being decontaminated. All decontamination procedures performed during the field investigation will be documented in the field logbook. Any variances from the procedures will be noted on either a field change form or in the site logbook. Decontamination activities will take place either on a temporary decontamination pad or within the specific work area. All decontamination activities will be approved by the station Environmental Manager prior to initiation.

13.1 SAMPLING EQUIPMENT

All tools used for sampling will be decontaminated before each use in accordance with QAPP SOP-Q3, "Decontamination-Field Equipment" (PEER 1995a). Tools not used immediately will be wrapped in aluminum foil or plastic sheets.

All sampling equipment which is not pre-cleaned and disposable (stainless steel scoops, split-spoons, etc.) and all monitor equipment shall be properly decontaminated before each use by the following procedure:

1. cleaned with a laboratory grade detergent;
2. rinsed with potable water;
3. rinsed with laboratory grade 2-propanol;
4. rinsed with ASTM Type II water; and
5. allowed to air dry.

Sampling equipment will be dried with paper towels if needed for immediate use after decontamination. No sampling equipment will be placed directly on the ground or any other

potentially contaminated surface prior to use. A clean plastic sheet or other appropriate material will be placed by each sample location for all sampling equipment.

13.2 DRILLING EQUIPMENT DECONTAMINATION

The drilling and soil boring equipment will be thoroughly cleaned prior to drilling or soil boring activities. The split spoons and direct-push samplers used to collect soil samples during installation of the monitoring well and soil borings will be decontaminated according to Section 13.1. Decontamination of other drilling equipment, such as rods, hollow-stem auger, bits, etc., will take place upon completion of work activities at each designated soil boring/monitoring well location, as described below.

All drilling equipment decontamination will take place in a temporary decontamination pad constructed for this field effort. The location of the decontamination pad where drilling equipment decontamination will take place will be approved by the station Environmental Manager prior to construction. All drilling or soil boring equipment decontamination activities will be conducted in accordance with QAPP SOP-Q4, "Decontamination-Heavy Equipment" (PEER 1995a).

Prior to starting any work, the Drilling Subcontractor will construct a temporary pad on-site for decontamination of equipment, primarily augers, using a steam cleaner. The pad will be large enough to collect and hold all decontamination materials, including decontamination water, and prevent both spillage and overspray of liquids. The pad will have a sump or low area to collect liquids. The Drilling Subcontractor will be responsible for removal of the pad after the work has been completed, and for containerization of decontamination materials.

The drill rig and associated downhole equipment will be decontaminated by steam cleaning prior to beginning any drilling activities. Thereafter, all downhole drilling equipment will be steam cleaned between each drilling location. Dirty augers will not be allowed to contact the ground

surface, but instead will be placed on plastic. All augers will be cleaned and readied for work prior to leaving the site for the day. Clean augers will be stored on plastic.

Prior to work commencing, the drill rigs and other equipment will be inspected for lubricant or fluid leaks which could be a potential contaminant to soil or groundwater. Any leaks will be adequately repaired by the drillers prior to beginning work. All over-the-hole portions of the drilling equipment will be steam cleaned prior to use and as necessary between boring locations. All downhole equipment (augers, drill rods, tools, etc.) will be steam cleaned prior to use and between all subsequent boring locations.

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14.0 BOREHOLE ABANDONMENT PROCEDURES

Boreholes not designated for well installation will be abandoned by backfilling with bentonite/cement grout according to state requirements. Grout will be tremied in-place where applicable. After abandonment, temporary markers will be left in place so that borehole locations can be identified during the civil survey.

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15.0 INVESTIGATION-DERIVED WASTE HANDLING PROCEDURES

Materials generated from the investigation activities will consist of drill cuttings from monitoring well and soil boring installation, decontamination fluids, well development and purge water, and miscellaneous solid materials such as personal protective equipment (PPE) and supplies. Drill cuttings will be field screened. Those drill cuttings with no signs of contamination will be taken to Site 7 and spread on the ground near other areas of construction fill material. Any drill cuttings indicating possible contamination will be placed in 55-gal drums, dated, and labeled as to the source of generation. Any PPE and supplies deemed to be possibly contaminated will also be placed in 55-gal drums. All liquid wastes such as development water, purge water, and decontamination water will be field screened. Liquid wastes with no signs of contamination will be discharged on-site. Any liquid wastes deemed to be contaminated will be placed in 55-gal drums. All drums will be stored at a designated drum storage area, approved by the station Environmental Manager until wastes are properly characterized and disposed.

The characterization of any investigation-derived wastes placed in drums during the field operations will be based on the analytical data obtained from soil and groundwater samples. If any is generated, PEER will assist the base with waste characterization and disposition, manifesting, or other paperwork. Waste disposal/treatment will be the responsibility of the ANG.

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16.0 PROJECT SCHEDULES AND DELIVERABLES

The baseline project schedule is shown in Figure 16.1. The key project milestones and deliverables are also shown in Figure 16.1.

The project deliverables include:

- the Draft RI/FS Work Plan
- the Draft Final RI/FS Work Plan,
- the Final RI/FS Work Plan,
- the Draft RI/FS Report,
- the Draft-Final RI/FS Report, and
- the Final RI/FS Report.

ID	WBS	Task Name	Duration	Start	Finish
1	--	**Notice to Proceed**	**0d**	**09/28/99**	**09/28/99**
2	**1A**	**Kickoff Meeting**	**36d**	**03/20/00**	**05/08/00**
3	--	Meeting at Base	2d	03/20/00	03/21/00
4	--	Draft Meeting Minutes	2w	03/22/00	04/04/00
5	--	ANG/Base Review	2w	04/18/00	05/01/00
6	--	Final Meeting Minutes	1w	05/02/00	05/08/00
7	**2**	**RI Work Plan**	**227d**	**03/22/00**	**02/01/01**
8	2A	Draft RI Work Plan	12.6w	03/22/00	06/16/00
9	--	ANG/Base/Regulatory Review	7.2w	06/17/00	08/07/00
10	**1B**	**Regulatory Meeting**	**37d**	**08/23/00**	**10/12/00**
11	--	Meeting Preparation	5d	08/23/00	08/29/00
12	--	Meeting	1d	08/30/00	08/30/00
13	--	Draft Meeting Minutes	5d	08/31/00	09/06/00
14	--	ANG/Base Review	5d	09/19/00	09/25/00
15	--	Final Meeting Minutes	5d	10/06/00	10/12/00
16	--	Response to Comments	2w	09/06/00	09/19/00
17	--	Revised Resp. to Comments	1d	10/13/00	10/13/00
18	2B	Draft-Final Work Plan	2w	10/16/00	10/27/00
19	--	ANG/Base Review	2w	10/30/00	11/10/00
20	--	Regulatory Review	2w	11/13/00	11/24/00
21	--	Response to Comments	1w	11/27/00	12/01/00
22	2C	Final RI Work Plan	2w	01/19/01	02/01/01
23	**3**	**Field Work**	**130d**	**11/13/00**	**05/11/01**
24	3A-1	Field Work -- 1st Round	20w	11/13/00	03/30/01
25	3A-2	Field Work -- 2nd Round	2w	04/30/01	05/11/01
26	*3B*	*Soil Borings (Optional)*	1w	04/02/01	04/06/01
27	*3C*	*Monitoring Wells (Opt.)*	1w	04/09/01	04/13/01
28	**4**	**RI Report**	**125d**	**05/14/01**	**11/02/01**
29	4A	Draft RI Report	8w	05/14/01	07/06/01
30	--	ANG/Base Review	4w	07/09/01	08/03/01
31	--	Response to Comments	2w	08/06/01	08/17/01
32	4B	Draft-Final RI Rep.	2w	08/20/01	08/31/01

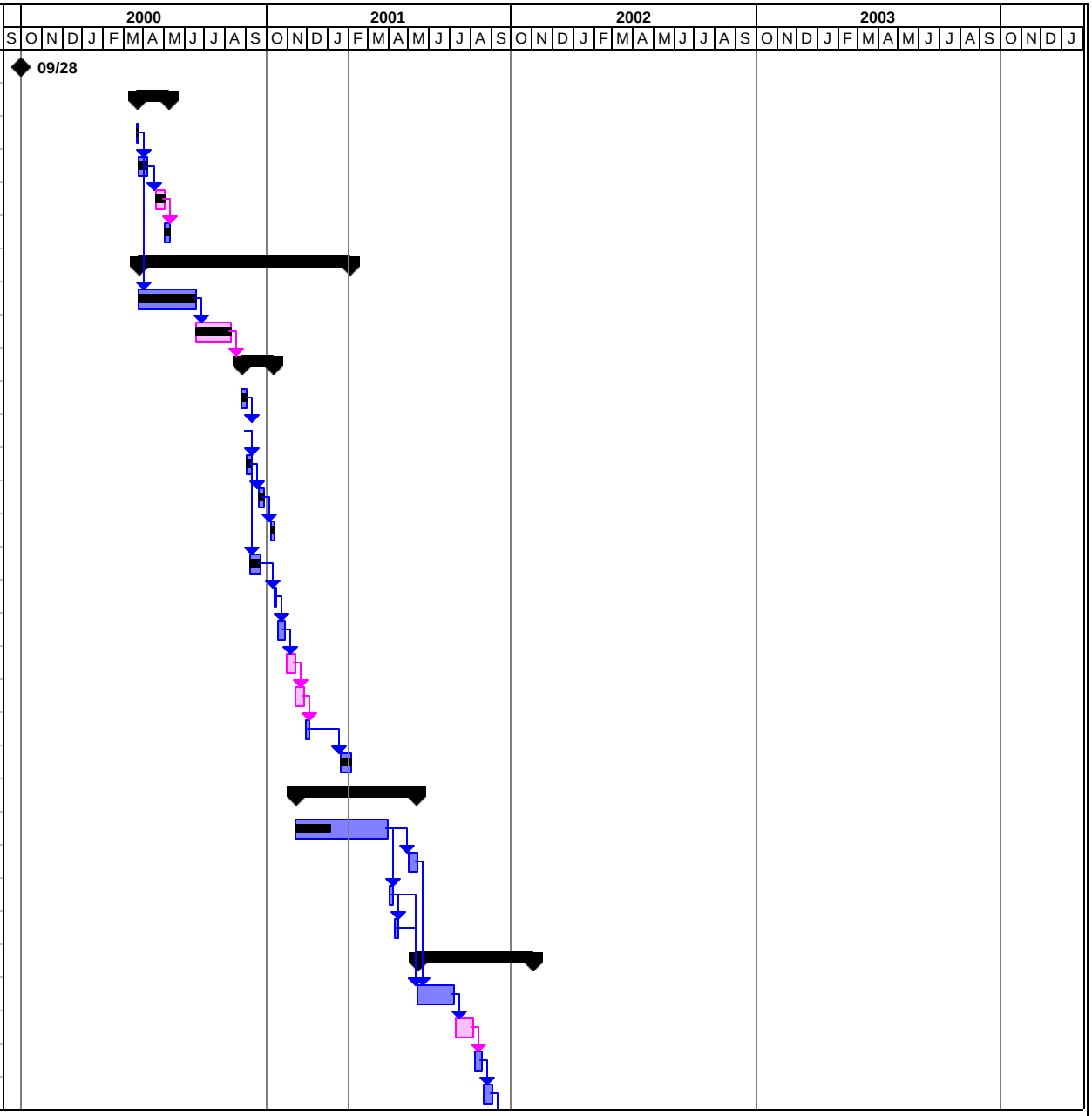

Figure 16.1 Project Schedule and Deliverables
Gabreski, New York RI/FS
Date: 02/01/01

Task
Progress
Milestone
Summary
Rolled Up Task
Rolled Up Milestone
Rolled Up Progress

ID	WBS	Task Name	Duration	Start	Finish
33	--	ANG/Base Review	2w	09/03/01	09/14/01
34	--	Regulatory Review	2w	09/17/01	09/28/01
35	--	Response to Comments	1w	10/01/01	10/05/01
36	4C	Final RI Report	4w	10/08/01	11/02/01
37	***5***	***FS Report (Optional)***	**135d**	**11/05/01**	**05/10/02**
38	*5A*	*Draft FS Report (Optional)*	6w	11/05/01	12/14/01
39	*5A*	*ANG/Base Review (Opt.)*	4w	12/17/01	01/11/02
40	*5A*	*Response to Comments(Opt.)*	2w	01/14/02	01/25/02
41	*5B*	*Draft-Final RS Rep. (Opt.0*	4w	01/28/02	02/22/02
42	*5B*	*ANG/Base Review (Opt.)*	4w	02/25/02	03/22/02
43	*5B*	*Regulatory Review*	4w	03/25/02	04/19/02
44	*5B*	*Response to Comments(Opt.)*	1w	04/22/02	04/26/02
45	*5C*	*Final FS Report (Optional)*	2w	04/29/02	05/10/02

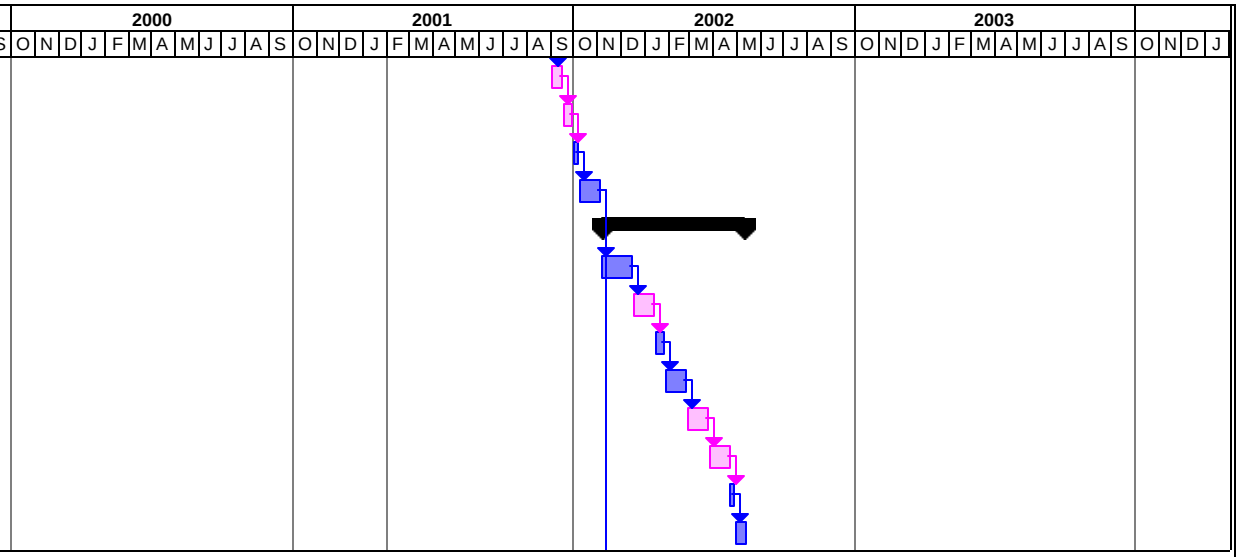

Figure 16.1 Project Schedule and Deliverables
Gabreski, New York RI/FS
Date: 02/01/01

Task
Progress
Milestone
Summary
Rolled Up Task
Rolled Up Milestone
Rolled Up Progress

ID	WBS	Task Name	Duration	Start	Finish
46	*6*	***Decision Documents (Opt.)***	**110d**	**11/05/01**	**04/05/02**
47	*6A*	*Draft DDs (Optional)*	4w	11/05/01	11/30/01
48	*6A*	*ANG/Base Review (Opt.)*	4w	12/03/01	12/28/01
49	*6A*	*Response to Comments(Opt.)*	2w	12/31/01	01/11/02
50	*6B*	*Draft-Final DDs (Opt.)*	2w	01/14/02	01/25/02
51	*6B*	*ANG/Base Review (Opt.)*	2w	01/28/02	02/08/02
52	*6B*	*Regulatory Review*	4w	02/11/02	03/08/02
53	*6B*	*Response to Comments(Opt.)*	2w	03/11/02	03/22/02
54	*6C*	*Final DDs (Opt.)*	2w	03/25/02	04/05/02
55	*7*	***GIS/IDMAES (Optional)***	**240d**	**01/17/00**	**12/15/00**
56	*7A*	*Draft IDMAES WP (0pt.)*	4w	01/17/00	02/11/00
57	*7A*	*ANG/Base Review (Opt.)*	4w	02/14/00	03/10/00
58	*7A*	*Response to Comments(Opt.)*	2w	03/13/00	03/24/00
59	*7B*	*Final IDMAES WP (Opt.)*	2w	03/27/00	04/07/00
60	*7C*	*Database Set-Up (Opt.)*	6w	04/10/00	05/19/00
61	*7D*	*Analyze/Eval. Data (Opt.)*	8w	05/22/00	07/14/00
62	*7E*	*Draft Tech. Memo. (Opt.)*	6w	07/17/00	08/25/00
63	*7E*	*ANG/Base Review (Opt.)*	4w	08/28/00	09/22/00
64	*7E*	*Regulatory Review*	4w	09/25/00	10/20/00
65	*7E*	*Response to Comments(Opt.)*	2w	10/23/00	11/03/00
66	*7F*	*Final Tech. Memo. (Opt.)*	2w	11/06/00	11/17/00
67	*7G*	*IDMAES Sys. Main. (Opt.)*	4w	11/20/00	12/15/00
68	**8**	**Monthly Progress Reports**	**414d**	**11/10/99**	**06/11/01**

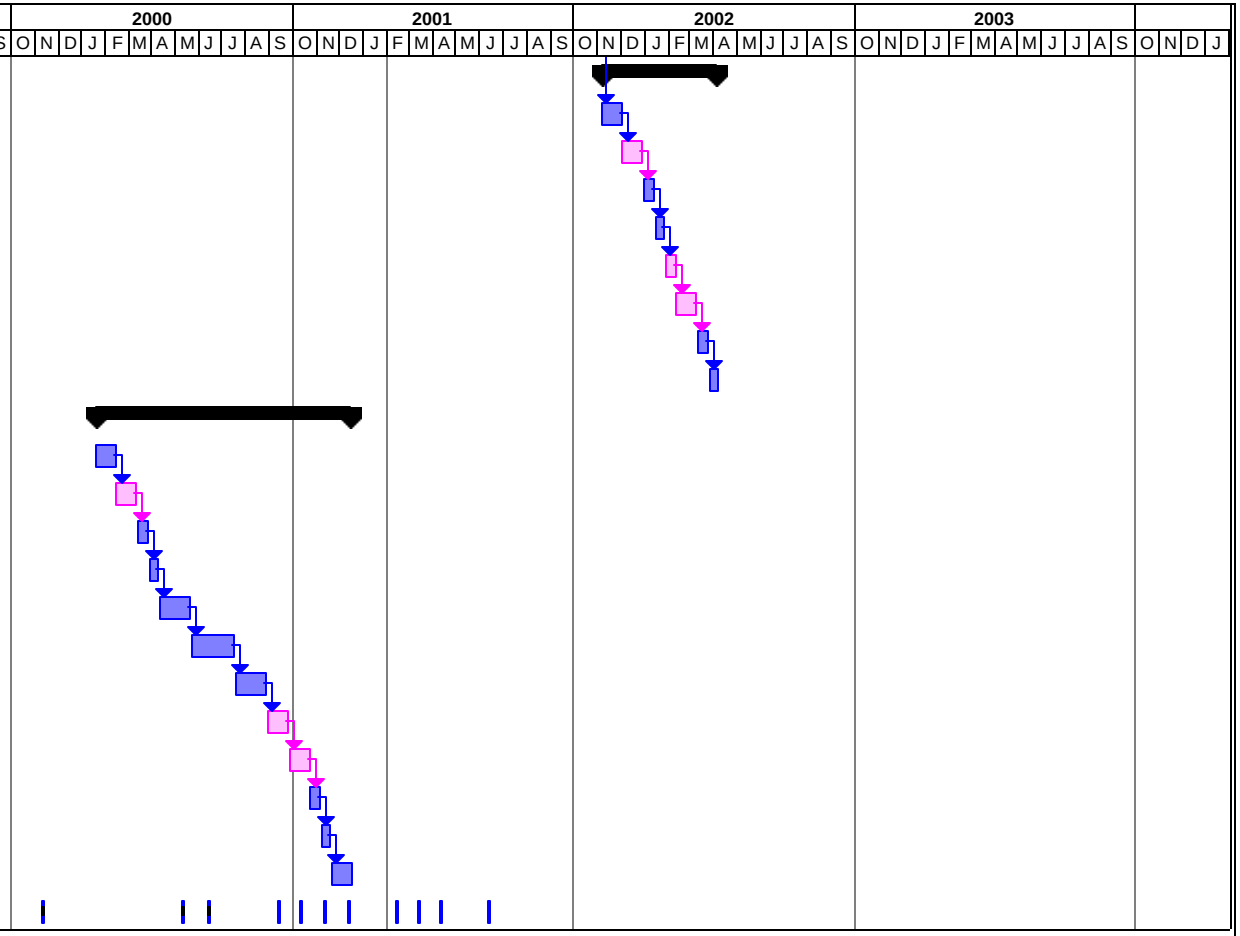

Figure 16.1 Project Schedule and Deliverables
Gabreski, New York RI/FS
Date: 02/01/01

Task
Progress
Milestone
Summary
Rolled Up Task
Rolled Up Milestone
Rolled Up Progress

17.0 RI REPORT

17.1 RI REPORT PURPOSE

The purpose of an RI Report is to document and discuss the investigation findings concerning the nature and extent of groundwater contamination, the rates and routes of contamination migration, any potential receptors, and all other data.

17.2 RI REPORT FORMAT

The RI Report format will be prepared in accordance with the ANG sample outline presented in Figure 17.1.

RI Report Sample Outline

TABLE OF CONTENTS
LIST OF FIGURES
LIST OF TABLES
LIST OF ACRONYMS/ABBREVIATIONS

EXECUTIVE SUMMARY: This is a short synopsis of what was done, what was found, and what conclusions and recommendations were reached. This should be done for each site. Each site discussion should be limited to one or two paragraphs. The total Executive Summary should be no more than two or three pages.

1.0 INTRODUCTION: This should include a discussion of the IRP process. The purpose of the Remedial Investigation (RI) should be discussed in more detail than other phases of the IRP including how the RI relates to other phases and possible further actions (RA, DD, etc.). The IRP flow chart should be included in this section.

2.0 FACILITY BACKGROUND:

2.1 FACILITY HISTORY: Overall base history should be discussed, including mission (past and present) and aircraft operations (past and present). Provide any other events in the history of the facility that could relate to environmental studies. Provide a map showing the location of the base within the state. Prior investigations should be discussed in this section. In most cases, the only prior investigations will be the PA and SI. List sites that were recommended for DDs. Defer discussions of sites under study (RI) until the next section.

2.2 SITE DESCRIPTIONS: Provide a map showing the IRP sites on the base. This is a site-by-site description of, and discussion of why, each site was selected for study in the RI. This should include findings from the SI and history of sites.

3.0 ENVIRONMENTAL SETTING: Provide topographic information, regional and local geology, soils, groundwater, and surface water hydrology. Maps and figures should include soils map, geology maps, stratigraphic column, and surface drainage map.

4.0 FIELD PROGRAM: Site-specific information should be avoided in this section. This section is intended to summarize the methods used in the field program.

4.1 SUMMARY: Discuss overall approach, such as screening versus confirmation sampling activities and locations.

4.2 DEVIATIONS FROM THE WORK PLAN: This is a discussion of base-wide deviations from the Work Plan, such as substituting one drilling method for another due to unexpected conditions, changing sampling protocols, or changing lab methods, etc. If extra sampling is required at a site, or there is a change in the sampling locations at a site, then supply information in the discussion for that particular site under Investigation Findings (Section 5.0). If there are no significant base-wide deviations, then this section may be omitted.

4.3 FIELD SCREENING ACTIVITIES: Discuss only the screening methods employed in the field program. Avoid site specifics. Discuss the methods and uses of the various techniques employed, including:

4.3.1 Geophysics
4.3.2 Soil Gas Survey
4.3.3 Hydropunch
4.3.4 Piezometer Installation

Figure 17.1. RI Report Format

4.4 CONFIRMATION ACTIVITIES: Avoid site specifics (Section 5.0 will address). Include discussion of the following:

4.4.1 Soil Borings
4.4.2 Surface Sampling
4.4.3 Monitoring Well Installation
4.4.4 Specific Media Sampling (List analytical methods for the different media. A table may also be provided to summarize activities.)

4.5 INVESTIGATION-DERIVED WASTE Discuss the methods used to handle drill cuttings, wastewater, decon, etc. State how they were disposed of, or if they remain, recommend how they should be disposed of.

5.0 INVESTIGATION FINDINGS

5.1 BASEWIDE GEOLOGIC AND HYDROGEOLOGIC INVESTIGATION RESULTS: Discuss overall geology/hydrogeology as determined through the field effort. Provide basewide potentiometric map along with a table displaying dates, elevations and depths to groundwater, etc. Discuss also any geologic conditions that may affect contaminant migration, such as confining layers, perched groundwater, etc. Cross-sections may also be provided to aid in describing the local conditions.

5.2 BACKGROUND SAMPLING RESULTS: Discuss background sampling locations, analytical results, constituents that exceed ARARs/MCLs, etc.

5.3 SITE FINDINGS (Site 1 - Site X site by site presentation): Section 5.3 = Site 1, Section 5.4 = Site 2, etc. Maps and other figures displayed in this section should show all pertinent details referred to in the text, including sample locations, USTs with associated piping and pumps, oil/water separators, ditches, etc. Show paved and unpaved areas, building titles, and other pertinent information as appropriate.

5.3.1 Geologic and Hydrologic Investigation Results

5.3.2 Screening Results: This section is intended to discuss soil gas survey results. If a soil gas survey (or similar systematic data collection technique) is performed at the site, a map of the results should be displayed in this section. However, borehole screening results should be included in the appropriate appendix. Screening results should be discussed in this section as they pertain to selection of samples for laboratory analyses and comparison of results with samples analyzed.

5.3.3 Soils: Discuss soil study findings, including surface and subsurface. Provide maps of borehole locations, contoured to show distribution of contaminants (one map for each significant contaminant). Cross-sections should be provided showing distribution of contaminants and lithologies. Show the water table on the cross-sections. Data tables should be organized to clearly show analytical methods, the boring number and elevation from which the samples were collected, contaminant levels, and detection limits for non-detects. Duplicates (and other appropriate QC samples) should be displayed on the table next to the samples for which they were duplicated. All other QC samples associated with the site should be displayed in table form also.

Any anomalous results should be discussed. Comparisons with background should be made during these discussions.

Figure 17.1 (Continued)

5.3.4 Groundwater: The layout for groundwater findings should be similar to the section on soils. Provide a potentiometric map for the base showing piezometer and monitoring well locations and water level data. In addition, contour contaminant levels.

5.3.5 Conclusions: Compare results to background, ARARs/MCLs, etc. Include any immediate response actions taken. Data gaps (site-specific) should also be discussed.

6.0 DISCUSSION OF ARARs

7.0 CONTAMINANT FATE AND TRANSPORT

- 7.1 POTENTIAL ROUTES OF MIGRATION
- 7.2 CONTAMINANT PERSISTENCE
- 7.3 CONTAMINANT MIGRATION

8.0 BASELINE RISK ASSESSMENT

- 8.1 CHEMICAL AND PHYSICAL PROPERTIES OF CONTAMINANT OF CONCERN
- 8.2 HUMAN HEALTH EVALUATION
- 8.3 ECOLOGICAL EVALUATION

9.0 CONCLUSIONS

10.0 RECOMMENDATIONS

11.0 REFERENCES

APPENDICES:

TECHNICAL MEMORANDA ON FIELD ACTIVITIES
FIELD CHANGE REQUEST FORMS
SCREENING RESULTS
PIEZOMETER/MONITORING WELL CONSTRUCTION DIAGRAMS
BORING/WELL LOGS
AQUIFER TESTING RESULTS
CHAIN-OF-CUSTODY
ANALYTICAL DATA AND QA/QC EVALUATION RESULTS (Include data validation reports)
INVESTIGATION-DERIVED WASTE MANAGEMENT (Data tables, correspondence)

Figure 17.1 (Continued)

18.0 FS REPORT

18.1 FS REPORT PURPOSE

The purpose of a FS Report is to document and evaluate the types of response actions being considered at the site, the potential remedial alternatives being considered, and to recommend the most cost-effective remedial alternatives that will adequately protect human health, welfare, and the environment.

18.2 FS REPORT FORMAT

The FS Report (if required) will be prepared in accordance with the suggested ANG report outline, as presented in Figure 18.1.

Feasibility Study Report Format

TABLE OF CONTENTS
LIST OF FIGURES
LIST OF TABLES
ACRONYM LIST

EXECUTIVE SUMMARY

1.0 INTRODUCTION
- 1.1 Purpose and Organization of Report
- 1.2 Background Information (Summarized from RI Report)
  - 1.2.1 Site Description
  - 1.2.2 Site History
  - 1.2.3 Nature and Extent of Contamination
  - 1.2.4 Contamination Fate and Transport
  - 1.2.5 Baseline Risk Assessment

2.0 IDENTIFICATION AND SCREENING OF TECHNOLOGIES
- 2.1 Introduction
- 2.2 Remedial Action Objectives - Present the development of remedial action objectives for each medium of interest (i.e., groundwater, soil, surface water, air, etc.). For each medium, the following should be discussed:
  - Contaminants of Interest
  - Allowable exposure based on risk assessment (including ARARs)
  - Development of remediation goals
- 2.3 General Response Actions - For each medium of interest, describe and estimate the areas or volumes to which treatment, contaminant, or exposure technologies may be applied.
- 2.4 Identification and Screening of Technology Types and Process Options - For each medium of interest, describe:
  - 2.4.1 Identification and Screening Technologies
  - 2.4.2 Evaluation of Technologies and Selection of Representative Technologies

3.0 DEVELOPMENT AND SCREENING OF ALTERNATIVES
- 3.1 DEVELOPMENT OF ALTERNATIVES
- 3.2 SCREENING OF ALTERNATIVES
  - 3.2.1 Introduction
  - 3.2.2 “No Action” Alternative
    - 3.2.2.1 Description
    - 3.2.2.2 Evaluation
  - 3.2.3 Alternative 2
    - 3.2.3.1 Description
    - 3.2.3.2 Evaluation
  - 3.2.4 Alternative 3
    - 3.2.4.1 Description
    - 3.2.4.2 Evaluation

Figure 18.1. Feasibility Study Report Format

Feasibility Study Report Format (Continued)

4.0 DETAILED ANALYSIS OF ALTERNATIVES
- 4.1 INTRODUCTION
- 4.2 ASSESSMENT CRITERIA
  - 4.2.1 Overall Protection of Human Health and the Environment
  - 4.2.2 Compliance with ARARs
  - 4.2.3 Long-Term Effectiveness and Permanence
  - 4.2.4 Reduction of Toxicity, Mobility, or Volume through Treatment
  - 4.2.5 Short-Term Effectiveness
  - 4.2.6 Implementability
  - 4.2.7 Cost
- 4.3 INDIVIDUAL ANALYSIS OF ALTERNATIVES
  - 4.3.1 "No Action" Alternative
    - 4.3.1.1 Description
    - 4.3.1.2 Assessment
  - 4.3.2 Alternative 2
    - 4.3.2.1 Description
    - 4.3.2.2 Assessment
  - 4.3.3 Alternative 3
    - 4.3.3.1 Description
    - 4.3.3.2 Assessment
- 4.4 COMPARATIVE ANALYSIS

BIBLIOGRAPHY
APPENDICES

Figure 18.1 (Continued)

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19.0 REFERENCES

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APPENDIX A

HEALTH AND SAFETY PLAN

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SITE HEALTH AND SAFETY PLAN

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

FEBRUARY 2001

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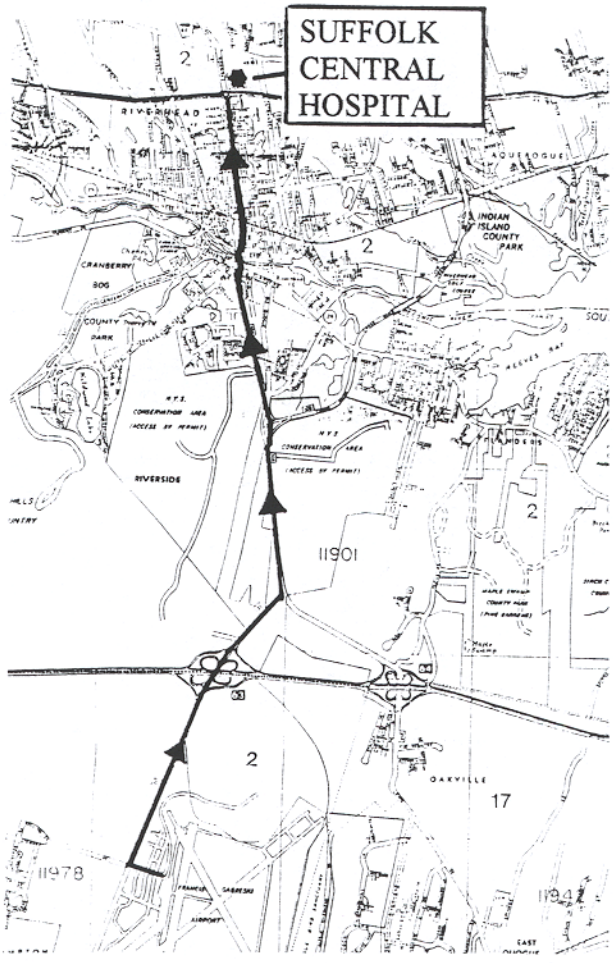
EMERGENCY RESPONSE PLAN

Emergency Number		911
Base Environmental Manager	Lt. Col. J. Webb	(631) 288-7349
PEER Health and Safety Officer	D. Nelson	(865) 483-3191
PEER Program Manager	L. Melroy	(865) 483-3191
Central Suffolk Hospital	Main Number	(631) 548-6000
	Emergency Dept.	(631) 548-6200

Directions to Hospital:

- From Gabreski ANG Front Gate
- Turn right onto Old Riverhead Road North (1.9 miles)
- Old Riverhead Road becomes CF-104 (2.8 miles)
- Enter next roundabout (circle) and take second exit onto Peconic Avenue (0.2 miles)
- Turn right onto W. Main Street (0.0 miles)
- Turn left onto Roanoke Avenue. Pass through one roundabout (3.0 miles)



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FINAL
RI/FS WORK PLAN
SITE HEALTH AND SAFETY PLAN

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

1.0 INTRODUCTION

1.1 PURPOSE AND POLICY

This Health and Safety Plan (HASP) covers the health and safety practices, procedures, and policies that will be followed during the field activities at the 106th Rescue Group, New York Air National Guard, Francis S. Gabreski Airport, Westhampton Beach, New York. The "HEALTH AND SAFETY PLAN FOR THE AIR NATIONAL GUARD READINESS CENTER," prepared by PEER (February 1995b) will be kept on-site at all times by the Site Manager. This site-specific HASP also covers personnel responsibilities, personal air monitoring, site air monitoring, personal protective equipment (PPE), and contingency plans.

1.2 APPLICABILITY

1.2.1 Modification of Plan

Any changes to this plan must be approved by the PEER Office Manager and the ANG/CEVR Project Manager.

1.2.2 Contractor Responsibilities

The PEER Project Manager shall be the designated incident manager and site safety and health officer (SHSO) whose responsibility shall be to implement, monitor, and enforce the HASP. The SHSO shall have a sound working knowledge of federal and state occupational safety and health regulations.

1.3 SITE LOCATION

106th Rescue Wing, New York Air National Guard, Francis S. Gabreski Airport, Westhampton Beach, New York.

1.4 SCOPE OF WORK

Seven sites are to be investigated. Some of the investigation tasks may result in the release of airborne hazardous contaminants. The major tasks to be conducted are:

- installation of soil borings and monitoring wells;
- collection of groundwater and soil samples; and
- obtaining groundwater level measurements.

1.5 HEALTH AND SAFETY PLANNING

This project may involve releases of volatile organics and metals. Field personnel will be working with soil and groundwater known to be contaminated with metals and potentially volatile organics. The work will involve sampling, conducting field screening, and other activities. Known risks to the health and safety of personnel include contamination by metals, fire, explosion, electrocution, and crushing. All underground utilities (including water, gas, electric, sewer, and telephone) will be located and marked on a site map prior to drilling. All overhead utilities will be clearly noted.

1.6 RESPONSIBILITIES

In general, supervisory personnel are directly responsible for the health and safety of individuals under their direction by ensuring that HASP provisions are adhered to and that all operations are performed with the utmost regard for the health and safety of all personnel involved. Supervisors are required to ensure that all employees are properly trained, are provided with appropriate health and safety equipment, are medically qualified, and are made aware of any potential hazards associated with the work.

Field team members are also responsible for the prevention of accidents by following all health and safety procedures necessary to perform the assigned work without injury. All field team members are required to follow the provisions of the HASP.

1.7 PROJECT TEAM ORGANIZATION

1.7.1 Project/Site Manager

The Project/Site Manager is directly responsible for ensuring that all requirements of the HASP and the site-specific HASP are adhered to and that all PEER field team members, PEER field support personnel, and PEER subcontractors exercise their particular duties safely.

1.7.2 Site Safety Officer

The PEER SHSO will be assigned to the site by the PEER Program Manager. The SHSO will likely be selected from the personnel assigned to the field team. The SHSO will have the following responsibilities:

- selects PPE;
- periodically inspects PPE;
- monitors PPE storage;
- coordinates entry and exit at control points;
- confirms each team member's suitability;

- helps monitor the team members for signs of stress, such as cold exposure, heat stress, and fatigue;
- monitors on-site hazards and changing conditions;
- determines if site-specific HASP is being followed;
- knows emergency procedures, evacuation routes, and emergency telephone numbers; and
- coordinates emergency medical care.

1.7.3 Field Team

All field team members, support personnel and subcontractors are individually responsible for complying with the HASP. Prior to the start of field activities, all field personnel will read and sign a log that they have read and will comply with the HASP. In addition, each individual working on-site must notify the PEER SHSO of any unsafe conditions.

1.8 SUBCONTRACTOR'S SAFETY REPRESENTATIVE

The Subcontractor's Safety Representative will ensure that all of their personnel comply with the HASP, and that they will also sign a daily log that they have read and will comply with the HASP.

2.0 SAFETY AND HEALTH RISK ANALYSIS

2.1 CHEMICAL HAZARDS

All of the tasks to be conducted will involve chemical hazards. These chemicals include organic compounds and metals. The important chemical hazard data are listed in Table A-1 in Attachment 1. Several of the chemicals are eye and skin irritants. Any eye discomfort or skin disorders should be reported to the PEER SHSO immediately.

2.2 PHYSICAL HAZARDS

2.2.1 Construction Hazards

Not applicable.

2.2.2 Heavy Equipment

Motor vehicles and heavy equipment such as drilling rigs will be in use at the site. The SHSO will ensure that vehicles are operated in compliance, and that safety measures are followed. All components of the drilling rigs must have at least a 10-ft clearance from overhead electrical lines. No drilling activities will be allowed during thunderstorms.

2.2.3 Noise Hazards

Hearing protection will be used by all field personnel when the drilling rigs or other machinery are operating.

2.2.4 Fire/Explosion

All underground utilities will be clearly marked before drilling activities begin. Ambient air at the site will be monitored for organic vapors. Ignition sources will be kept from all work areas. Smoking will not be allowed in close proximity to any fuel storage, or within the exclusion zone. In case where ignition sources are required to perform site work, e.g., welding or cutting metal, a fire extinguisher will be immediately available.

2.2.5 Oxygen Deficient Atmospheres

All work is anticipated to occur outdoors and above grade. An oxygen-deficient atmosphere is not anticipated to occur and routine air monitoring for oxygen levels will not be conducted. Should work elements or field conditions change, the SHSO will evaluate the need for appropriate monitoring.

2.2.6 Heat/Cold Related Stress/Illness

The field work is scheduled for summer; therefore, it is unlikely that cold stress would be a factor, although early mornings may be cooler. It is likely that high ambient temperatures could occur and therefore heat stress conditions could result. The following are typical symptoms of heat stress:

- heat rash from prolonged exposure to heat or humid air;
- heat cramps characterized by muscle spasms and pain in the feet, abdomen, and hands;
- heat exhaustion with symptoms such as dizziness; nausea; fainting; heavy sweating; and moist, cool, pale skin; and
- heat stroke with symptoms such as absent or reduced sweat; hot, red, usually dry skin; dizziness and confusion, nausea; strong, rapid pulse; and coma.

2.2.7 Prevention of Heat/Cold Related Stress/Illness

Prevention to heat stress are as follows:

- routinely observe workers for signs of heat stress;
- rearrange work schedules and adjust work/rest periods;
- maintain normal body fluids; and
- provide shade for workers.

3.0 PERSONNEL PROTECTION AND MONITORING

3.1 MEDICAL SURVEILLANCE

The PEER medical surveillance program meets, at a minimum, the requirements specified in Occupational Safety and Health Administration (OSHA) 29 Code of Federal Regulations (CFR) 1910.120.

3.2 SITE-SPECIFIC TRAINING

To maintain a high level of health and safety awareness on the part of all field team members, daily tailgate health and safety training sessions shall be conducted on site by the PEER SHSO. A safety briefing will be held prior to planning of each day's activities. Topics to be discussed during the safety briefing include: the location of the nearest telephone, locations of fire extinguishers, location of the nearest hospital, and safety procedures pertinent to the day's planned activities.

3.3 PERSONAL PROTECTIVE EQUIPMENT AND ACTION LEVELS

All PEER and Subcontractor personnel will wear a minimum of Level D protective equipment at all times when drilling or sampling is in progress. Level D protective equipment consists of:

- Hard Hats;
- Steel-toed shoes or boots;
- Safety glasses or goggles; and
- Work gloves (as needed).

Higher levels of protection might be needed under certain conditions. These higher levels will be used if air monitoring or site conditions indicate the need for them. The selection for levels of protection are specified in the "HEALTH AND SAFETY PLAN FOR THE AIR NATIONAL GUARD READINESS CENTER," (PEER 1995b).

3.4 MONITORING REQUIREMENTS

3.4.1 Routine Monitoring for Organic Vapors

The background levels of photoionizable hydrocarbons will be determined by the PEER SHSO taking periodic organic vapor detector (OVD) readings in the breathing zone with an HNu Model 101 photoionization detector (PID) fitted with a 10.2 eV lamp, or equivalent device. The background level of hydrocarbons will be determined by taking OVD readings prior to beginning work, and at periodic intervals away from the areas of suspected contamination.

Subsequent OVD readings will be taken in the breathing zone where work is being conducted. An OVD reading above 10 ppmv will be cause to stop work, depart the immediate area, utilize engineering controls, or don Level C protective equipment until the OVD readings drop below

10 ppmv, or a determination is made as to the source, and personnel health considerations. The PEER SHSO shall make that determination.

3.4.2 Routine Monitoring for Explosive Environments

All work is anticipated to occur outdoors or above grade, and contaminants present are not anticipated to occur at concentrations likely to produce explosive environments. Should work elements of field activities change, the SHSO will monitor the environment for explosive environments with an MSA combustible gas indicator (CGI). All site work will be halted if the combustible gas content exceeds 20% lower explosive limit (LEL) and will not resume until the combustible gas content is less than 20% LEL. No heat-producing equipment (i.e., welders, lighters) will be permitted in the work zone. No welding or other work requiring a heat source will be conducted anywhere on site until the work area has been screened for combustible gases, and the PEER SHSO has given express approval for the work be conducted. When the combustible gas content reaches 10% LEL, monitoring will no longer be routine, but will be increased in frequency.

3.4.3 Oxygen Monitoring

A combination CGI/Oxygen Meter will be used to monitor oxygen-deficient atmospheres, if required by the SHSO. If the environment becomes oxygen deficient (< 19.5% O_2), air purifying respirators (Level C) will be prohibited. Work will be ceased under this condition.

3.4.4 Monitoring for Heat/Cold Stress/Illness

The PEER SHSO will frequently emphasize the dangers of heat stress to workers and train them to recognize the symptoms in themselves and their coworkers.

3.5 BACKGROUND READINGS

The PEER SHSO will be responsible for taking background readings with the OVA prior to the beginning of daily activities.

3.6 DATA LOGGING

Any unusual occurrences, such as injuries requiring first aid, or the field determination that Level C protection is required, will be documented in the field logbook.

3.7 DUST CONTROL

Drilling activities may cause high dust levels. The PEER SHSO will be responsible for noting high levels of dust and requiring the use of dust masks or PPE Level upgrade.

3.8 PERSONAL PROTECTIVE EQUIPMENT

All field personnel will be in Level D PPE. Any upgrades required by the SHSO will follow the guidelines in the "HEALTH AND SAFETY PLAN FOR THE AIR NATIONAL GUARD READINESS CENTER" (PEER 1995b). Upgrading from Level D PPE to Level C PPE will be required if PID readings exceed 5 ppmv above background levels in the breathing zone. If PID readings are in excess of 10 ppmv above background levels for longer than 15 minutes, the Exclusion Zone will be evacuated until the vapor levels have subsided. If elevated organic levels do not dissipate, the SHSO will notify the PEER Program Manager and the ANG Project Manager for assistance in determining a course of action that will allow safe operations.

4.0 SITE CONTROLS, MEASURES, ACCIDENT PREVENTION, AND CONTINGENCY PLAN

4.1 SITE CONTROL MEASURES

Each site will have controlled access during field activities to prevent access by unauthorized personnel.

4.2 SITE ORGANIZATION-OPERATION ZONE

Designated work zones delineate the areas of sites where certain levels of PPE must be worn, confine certain types of work activities and contamination to discrete areas, and support the location and evacuation of workers during emergencies.

The site maps (to be provided) indicate the locations of the exclusion zone, contaminant reduction zone, and support zone, which correspond to the immediate vicinity of the excavation, the decontamination area, and the remainder of the site, respectively. The map will be posted at the site.

4.3 WORK ZONES

Designated work zones delineate the areas of sites where certain levels of PPE must be worn, confine certain types of work activities and contamination to discrete areas, and support the location and evacuation of workers during emergencies. Work zones will be designated at sites in accordance with the levels of PPE required to perform work at those sites. Sites requiring PPE will be subdivided into three designated work zones, which is usually the maximum number for a site. These are the exclusion zone, the contamination reduction zone, and the support zone.

4.3.1 Exclusion Zone (Contamination Zone)

The exclusion zone is the area where hazardous contaminants have been identified and where physical hazards demand special precaution. No one will be allowed in this zone without proper PPE.

Eating, smoking, drinking, and chewing tobacco or gum will be prohibited.

Around each operating drill rig, an exclusion zone with a 50-ft radius will be established. Because of the physical hazards and splash hazards associated with groundwater monitoring well installation, this will be done even when drilling activities are conducted in Level D PPE. At a minimum, all persons who enter such exclusion zones will be required to wear safety boots, safety glasses, and a hard hat.

4.3.2 Contamination Reduction Zone

This is the buffer between the exclusion zone and the support zone. It contains the various stations used to decontaminate workers and equipment exiting the exclusion zone. Consequently, it will be established on all sites. The SHSO will establish contamination reduction zones in areas devoid of air contamination and upwind of the exclusion zone.

4.3.3 Support Zone

This is the outermost designated zone. Management and support activities will be conducted in this zone. No one will be allowed to enter this area from the contaminant reduction zone unless they have passed through decontamination stations. Worker rest and refreshment areas are located in this zone.

4.4 SAFE WORK PRACTICES

All field personnel will be responsible for practicing safe work.

4.5 HEALTH AND SAFETY EQUIPMENT CHECKLIST

The PEER SHSO and Field Team Leader will be responsible for checking and maintaining safety equipment.

4.6 ACCIDENT PREVENTION

4.6.1 Heavy Equipment Operation

All field personnel around the drilling rig will exercise precautions and will note and remove any hazards. The drill rig will have a working emergency shutoff (kill switch) installed, which will be tested at the beginning of each day.

4.6.2 Sampling Practices

All field personnel will exercise safe procedures during sampling soil and groundwater, and purging/developing of monitoring wells.

4.7 SITE SECURITY

The entire base is fenced and all personnel must enter through guard station.

4.8 COMMUNICATION

The Project/Site Manager will be responsible for communicating with base personnel, PEER management, and ANG personnel.

4.9 CONTINGENCY PLAN

The location of the next nearest telephone will be determined prior to beginning work, and will be posted along with the site map.

An industrial-sized first aid kit and fire extinguisher will be maintained at the site during the investigation. The locations of the first aid kit and fire extinguisher will be discussed during the daily safety briefing.

The telephone numbers of emergency response personnel and the location of the hospital are provided on the inside cover of this HASP.

4.9.1 Chemical Exposure

Any worker exposed to chemicals will be removed from the work zone. The PEER SHSO will determine proper decontamination procedures prior to removing the worker.

4.9.2 Personal Injury

The SHSO will be responsible for determining the need for calling medical personnel to the site, or for removing personnel to a medical facility.

4.9.3 Evacuation Procedures

The PEER SHSO and Project/Site Manager will determine evacuation routes prior to work. The presence of harmful and/or hazardous concentrations of petroleum vapors may be encountered. If such concentrations do occur, (as indicated by the environmental surveillance program) the site will be evacuated, or Level C protective clothing will be donned. Workers affected by petroleum vapors will be removed from the work area into fresh air, and medical treatment will be obtained as necessary.

4.10 DECONTAMINATION PROCEDURES

Decontamination of personnel is done to protect workers from hazardous contaminants, and to prevent the spread of hazardous contaminants to clean areas on or around the site. The

complexity of the decontamination process at a particular site will hinge primarily on the types of contaminants encountered and their concentrations.

All personnel will be in a minimum of Level D PPE at all times, with upgrades to be determined by the SHSO. Prior to leaving the exclusion area, workers will conduct a visual examination of their boots and, if necessary, use a scrub brush to clean them. If an upgraded level of PPE is required by the SHSO, decontamination procedures in the "Health and Safety Plan for the Air National Guard Readiness Center" (PEER 1995b) shall be followed. This procedure may be modified by the SHSO based on effectiveness and applicability measured by visual observation and monitoring with the PID.

4.10.1 Decontamination-Medical Emergencies

If a worker dressed in PPE has certain types of illnesses or injuries, the decontamination process may exacerbate their seriousness. In deciding the aid to be delivered to the worker, it is important to weigh the risk of exposure to contaminants against the risks of proceeding through decontamination. **Generally, if immediate, life-saving first aid and emergency medical services are necessary, the decontamination process should be passed over to allow prompt treatment of the worker**. Appropriate site personnel should be able to provide attending medical personnel with any needed information on contaminant exposure, personal protection, and decontamination.

Physical Injury

Physical injuries can range from minor cuts to massive trauma. Many minor injuries can be treated on-site by properly trained personnel. Serious or critical injuries may require emergency medical assistance at the site and transportation of the victim to the nearest emergency medical facility. When a person appears to be seriously or critically injured, life-saving actions must be taken immediately without decontamination. Respiratory equipment should be removed immediately, as long as removal will not further endanger the victim's life or health. This might require moving the injured person to a safer area. Normally, it is unwise to move an injured person, and such a decision should be made only when it is clear that not moving the victim presents a greater danger to their life or health. Unless a worker is contaminated with an extremely toxic or corrosive material that threatens them with severe injury or death, no attempt should be made to wash or rinse the victim on-site. If necessary, protective clothing may be cut from the victim. When it is not possible or advisable to removal protective clothing, the victim should be wrapped in plastic, rubber, or blankets to prevent contamination of other site workers, emergency medical personnel, and emergency vehicles. Personnel at the emergency medical facility will then remove the protective clothing. Workers with minor injuries and illnesses will go through normal decontamination procedures.

Exposure to Hazardous Chemicals

Although properly dressed in protective clothing and equipment, workers may still have accidents that would expose them to hazardous chemicals. In such an accident, protective clothing that is heavily contaminated with hazardous chemicals may pose a risk of severe injury

or death to the victim and attending personnel. In such instances, protective clothing should be quickly washed and carefully removed before transporting the exposed worker to an emergency medical facility.

Heat Stress

Heat stroke can cause severe personal injury and death. Heat stroke victims must be treated immediately. Therefore, decontamination should be bypassed or held to an absolute minimum. A possible exception requiring the best judgment of the SHSO would be a situation in which contamination of the victim's clothing presents a similar threat of injury or death. In any heat stroke situation, protective clothing may have to be cut from the victim's body. Earlier stages of heat stress also require immediate treatment because they can quickly lead to heat stroke.

4.10.2 Decontamination of Tools

Decontamination of sampling equipment is addressed in the Work Plan, Section 13.0.

4.10.3 Heavy Equipment Decontamination

Decontamination of drilling equipment is addressed in the Work Plan, Section 13.0.

4.11 PLACES OF REFUGE

The PEER SHSO and Project/Site Manager will determine a safe place of refuge based on recommendations from the Base Environmental Coordinator.

4.12 FIRE

Work shall be performed in a fire-safe manner. All work areas shall be equipped with a 20-lb ABC-type dry chemical fire extinguishers placed at readily accessible locations.

4.13 SAFETY EYEWASH

A portable safety eyewash kit will be maintained on-site by PEER.

4.14 INCIDENT REPORT

Any unusual events will be recorded in the logbook and entered on an incident form.

4.15 OPERATION SHUTDOWN

The Project/Site Manager will make the determination for work shutdown.

4.16 SPILL OR HAZARDOUS MATERIALS RELEASE

Any spill or release of a hazardous chemical will cause work to stop and the Base Environmental Manager or Base Civil Engineer to be immediately notified.

4.17 COMMUNITY SAFETY

The Project/Site Manager will immediately notify the Base Environmental Manager or Base Civil Engineer of any conditions that may put the safety of all base personnel or the general public in jeopardy.

4.18 TRAINING AND MEDICAL SURVEILLANCE

The Project/Site Manager is responsible for ensuring all field personnel are under a medical surveillance program. All PEER field team members and subcontractors will have completed 40-hours of training as required by OSHA 29 CFR 1910.120, with annual updates, and be part of an approved occupational medical surveillance program. Subcontractors will be required to provide a letter of certification that all employees to work on-site will have completed 40-hours of training as required by OSHA 29 CFR 1910.120, with annual updates, and be part of an approved occupational medical surveillance program.

4.19 RECORD KEEPING

4.19.1 Medical and Training Records

PEER medical authorization and training records are maintained in the PEER personnel files. Individual medical records are maintained by the medical service provider as confidential files. Field team individuals are issued 40-hour OSHA cards (and updates), medical cards, and respirator cards, which are to be carried when in the field. Subcontractors will be required to provide a letter of certification that all employees to work on-site will have completed 40-hours of training as required by OSHA 29 CFR 1910.120, with annual updates, and be part of an approved occupational medical surveillance program.

4.19.2 Project Health and Safety Plan Acceptance Form and Accident and/or Injury Form

These forms are provided in Attachment 2.

4.19.3 Material Safety Data Sheets

These forms are provided in Attachment 3.

ATTACHMENT 1

TABLES

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Table A-1
Health Hazards of Potential Contaminants

Compound/Element	PEL (ppm)	TLV-TWA (ppm)	STEL (ppm)	IDLH (ppm)	Chemical Properties	Health Effects/ Symptoms
2-Methylphenol (ortho-cresol)	5	2.3	*	250	IP = 8.93 eV FP = 178°F VP = 1 mm	CNS effects; confusion, depression, respiratory failure; dyspepsia, irregular rapid respiration, weak pulse; skin, eye burns, dermatitis; lung, liver, kidney damage
2,4-Dimethyl-phenol (Xylenol)	*	*	*	*	IP = * FP = * VP = *	Toxic by ingestion and skin absorption
Arsenic	0.010 mg/m^3	0.002 mg/m^3 (Ceiling)	*	Ca	IP = None FP = None VP = Omm Hg	Ulceration of nasal septum, dermatitis, GI disturbances, peripheral neuropathy, respiratory irritation, hyperpigmentosis of skin, carcinogen
Benzene	1	10	None	2000	IP = 9.25 eV FP = 12°F VP = 75 mm Hg	Eye and respiratory irritant; headache; nausea; CNS depressant; carcinogenic
Bromomethane	5	Ca	*	Ca (2,000)	IP = 10.54 eV FP = None VP = > 1 atm	Headache; visual disturbances; vertigo; nausea, vomiting; malaise; hand tremor; convulsions; dyspepsia; irritated eyes, skin; vesiculation, carcinogen
Chlorobenzene	75	*	*	2,400	IP = 9.07 eV FP = 85°F VP = 12 mm	Irritated skin, eyes, nose; drowsiness, incoherence
Chloroform	2	Ca	2	Ca (1,000)	IP = 11.42 eV FP = None VP = 160 mm	Dizziness, mental dullness, nausea, dissorientation; headach, fatigue; anesthesia; hepatomegaly; irritated eyes, skin; carcinogen
Chromium (as Cr)	1 mg/m^3	0.5 mg/m^3	*	*	IP = None FP = None VP = Omm Hg	Histolic fibrosis of lungs
Coal Tar Pitch Volatiles (PAHs)	0.2 mg/m^3	Ca	0.1 mg/m^3	Ca (700 mg/m^3)	Properties vary	Dermatitis, bronchitis, carcinogen
Ethylbenzene	100	100	125	2000	IP = 8.76 eV FP = 59°F VP = 7.1 mm HG	Eye and mucous membrane irritant; headaches; dermatitis; narcosis; coma
Lead	0.05 mg/m^3	0.15 mg/m^3	None	*	IP = None FP = None VP = *	Lassitude; insomnia; pallor constipation; abdominal pain; colic; hypotension; anemic.
Petroleum distillates (naphtha)	400	300	None	10,000	IP = * FP = 40 - 56°F VP = About 40 mm Hg	Eye, nose, throat irritant; dizziness; headaches; nausea; drowsiness
Silver	0.01 mg/m^3	0.01 mg/m^3	*	*	IP = None FP = None VP = Omm	Blue-gray eyes, nasal septum, throat, skin; irritated skin, ulceration; GI disturbance.
Sulfuric acid	1.0 mg/m^3	1.0 mg/m^3	3 mg/m^3	80 mg/m^3	IP = * FP = None VP = <0.001 mm Hg	Eye, nose, throat irritant; burns eyes and skin; dermatitis; bronchial emphysema; pulmonary edema

Table A-1 (Continued)
Health Hazards of Potential Contaminants

Compound/ Element	PEL (ppm)	TLV-TWA (ppm)	STEL (ppm)	IDLH (ppm)	Chemical Properties	Health Effects/ Symptoms
Tetrachloroethene (PCE)	25	Ca	*	Ca (500)	IP = 9.32 eV FP = None VP = 14 mm	Irritated eyes, nose, throat; nausea; flushed face, neck; vertigo, dizziness, incoherence; headache, somnolence; skin erythema; liver damage, carcinogen
Toluene	100	100	None	2000	IP = 8.82 eV FP = 40°F VP = 22 mm Hg	Fatigue; confusion; dizziness; headaches; dilated pupils; nervousness; dermatitis; paresthesia
Trichloroethylene	50	50	100	*	IP = 9.47 eV FP = None VP = 58 mm Hg	Headaches; vertigo; visual disturbance; tremors; nausea; vomiting; eye irritant; dermatitis; cardiac arrhythmia; carcinogenic
Xylene (o-, m-, and p-isomers)	100	100	150	1000	IP = 8.56/8/56/8.44 eV FP = 90/84/81°F VP = 7/9/9 mm Hg	Eye, nose, throat irritant; dizziness; excitement; staggering gate; anorexia; nausea; vomiting; abdominal pain; dermatitis

KEY:

Ca	NIOSH Carcinogen
CNS	Central nervous system.
PEL	Permissible Exposure Limit - OSHA maximum average concentration of an airborne chemical to which a worker may be exposed for an 8-hour workday without harm.
TLV-TWA	Threshold Limit Value - Time-weighted average concentration for a normal 8-hour workday and a 40-hour work week to which nearly all workers may be exposed day after day without adverse effect.
IDLH	Immediately Dangerous to Life or Health - Maximum airborne chemical concentration from which a person could escape at the time of respirator failure without impairment or irreversible health effects.
STEL	Short-term exposure limit.
ppm	Parts per million.
IP	Ionization potential.
VP	Vapor pressure at 68°F.
FP	Flash point.
eV	Electron volt.
*	No data available.

Source: National Safety Council, 1979; NIOSH and OSHA, 1981; NIOSH 1985; Sittig 1995; Sax and Lewis 1987; ACGIH 1989a; ACGIH 1989b; Federal Register 1989a; Federal Register 1988b; Federal Register 1989c.

Table A-2

Summary of Potential Exposure Routes and Protective Measures

Exposure Route	Potential Contaminants	Source	Protective Measures
Inhalation	Volatile organics	Potential site contaminant	Breathing zone monitoring; evacuate or upgrade to Level C with air-purifying respirators if concentration is > 10 ppmv
Dermal Contact/ Adsorption	Metals	Potential site contaminant	Gloves Safety Glasses Protective Clothing Safe Work Practices
	Free Product (Gasoline)	Potential site contaminant	
	Acid	Sample Preservative	

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ATTACHMENT 2

HEALTH AND SAFETY FORMS

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PROJECT HEALTH AND SAFETY PLAN
ACCEPTANCE FORM

The undersigned has read and has agreed to abide by the requirements as described in this Health and Safety Plan for all site investigation activities at the following project area:

106th Rescue Wing
New York Air National Guard
Francis S. Gabreski Airport
Westhampton Beach, New York

_____
Name (Please Print)

_____
Signature

_____
Date

This signed and dated acceptance form must be returned to the site Health and Safety Officer **BEFORE** entering any work areas.

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ACCIDENT AND/OR INJURY REPORT FORM

Please print

Project: _____

ILL OR INJURED EMPLOYEE

Name: _____

Mail Address: _____
No. and Street City State Zip

Street Address, if different from mailing address: _____

_____

Social Security No.: _____ Age: _____ Sex: Male/Female
(*circle one*)

Occupation or job title: _____

Department: _____
Enter only the name of the department in which the injured person is employed.

EMPLOYER

Name: _____

Mail Address: _____
No. and Street City State Zip

Street Address, if different from mailing address: _____

_____

THE ACCIDENT OF EXPOSURE TO OCCUPATIONAL ILLNESS

Address where accident occurred: _____
No. and Street City State Zip

Did the accident occur on employer's premises? Yes/No (*circle one*)

What was the employee doing when injured or exposed to illness? _____

_____

_____

How did the accident or exposure to illness occur? _____
Describe fully the events leading up to the accident or

_____
injury. Give precise details. A separate sheet may be used for additional space.

_____

_____

ACCIDENT AND/OR INJURY REPORT FORM (Continued)

Time of accident or illness: _____

Witnesses to accident or illness:

Name	Affiliation	Phone No.
Name	Affiliation	Phone No.
Name	Affiliation	Phone No.

INJURY OR OCCUPATIONAL ILLNESS

Describe the injury or illness in complete detail and indicate the affected body part(s).

_____

_____

_____

Identify the object or substance that directly injured the employee (i.e., vapor or poison inhaled or swallowed; object that struck or fell on employee; or the object the employee was lifting, pulling, etc., when the injury occurred). _____

_____

_____

_____

Date of injury or initial diagnosis of occupational illness: _____

Did the accident or occupational illness result in employee fatality? Yes/No (*circle one*)

OTHER

Name and address of physician: _____

Hospital name and address, if hospitalized: _____

_____

Prepared by: _____ Official Position _____

Date: _____

ATTACHMENT 3

MATERIAL SAFETY DATA SHEETS

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MSDS for ALCONOX(R) Page 1

1 - PRODUCT IDENTIFICATION

PRODUCT NAME: ALCONOX(R)
FORMULA:
FORMULA WT: .00
CAS NO.: - -
COMMON SYNONYMS: ALKYL ARYL SULFONATES
PRODUCT CODES: A461
EFFECTIVE: 11/22/85
REVISION #01

PRECAUTIONARY LABELLING

BAKER SAF-T-DATA(TM) SYSTEM

HEALTH	-	1	SLIGHT
FLAMMABILITY	-	0	NONE
REACTIVITY	-	1	SLIGHT
CONTACT	-	2	MODERATE

HAZARD RATINGS ARE 0 TO 4 (0 = NO HAZARD; 4 = EXTREME HAZARD).

LABORATORY PROTECTIVE EQUIPMENT

SAFETY GLASSES; LAB COAT

PRECAUTIONARY LABEL STATEMENTS

WARNING
CAUSES IRRITATION

KEEP IN TIGHTLY CLOSED CONTAINER. WASH THOROUGHLY AFTER HANDLING.

SAF-T-DATA(TM) STORAGE COLOR CODE: ORANGE (GENERAL STORAGE)

2 - HAZARDOUS COMPONENTS

COMPONENT	%	CAS NO.
ALCONOX(R)	90-100	

3 - PHYSICAL DATA

BOILING POINT: N/A
VAPOR PRESSURE(MM HG): N/A

MELTING POINT: N/A
VAPOR DENSITY(AIR=1): N/A

SPECIFIC GRAVITY: 0.00 (H2O=1)
EVAPORATION RATE: N/A (BUTYL ACETATE=1)

SOLUBILITY(H2O): APPRECIABLE (MORE THAN 10 %) % VOLATILES BY VOLUME: N/A

APPEARANCE & ODOR: WHITE OPAQUE POWDER.

4 - FIRE AND EXPLOSION HAZARD DATA

FLASH POINT (CLOSED CUP: N/A

FLAMMABLE LIMITS: UPPER - N/A % LOWER - N/A %

FIRE EXTINGUISHING MEDIA
USE EXTINGUISHING MEDIA APPROPRIATE FOR SURROUNDING FIRE.

5 - HEALTH HAZARD DATA

CARCINOGENICITY: NTP: NO IARC: NO Z LIST: NO OSHA REG: NO

EFFECTS OF OVEREXPOSURE
CONTACT WITH SKIN OR EYES MAY CAUSE IRRITATION.
INGESTION MAY BE HARMFUL.

TARGET ORGANS
NONE IDENTIFIED

MEDICAL CONDITIONS GENERALLY AGGRAVATED BY EXPOSURE
NONE IDENTIFIED

ROUTES OF ENTRY
NONE INDICATED

EMERGENCY AND FIRST AID PROCEDURES
CALL A PHYSICIAN.
IF SWALLOWED, IF CONSCIOUS, IMMEDIATELY INDUCE VOMITING.
IN CASE OF CONTACT, IMMEDIATELY FLUSH EYES OR SKIN WITH PLENTY OF WATER FOR AT LEAST 15 MINUTES.

6 - REACTIVITY DATA

STABILITY: STABLE HAZARDOUS POLYMERIZATION: WILL NOT OCCUR

CONDITIONS TO AVOID: NONE DOCUMENTED

7 - SPILL AND DISPOSAL PROCEDURES

STEPS TO BE TAKEN IN THE EVENT OF A SPILL OR DISCHARGE
WEAR SELF-CONTAINED BREATHING APPARATUS AND FULL PROTECTIVE CLOTHING.
WITH CLEAN SHOVEL, CAREFULLY PLACE MATERIAL INTO CLEAN, DRY CONTAINER AND COVER; REMOVE FROM AREA. FLUSH SPILL AREA WITH WATER.

DISPOSAL PROCEDURE
DISPOSE IN ACCORDANCE WITH ALL APPLICABLE FEDERAL, STATE, AND LOCAL ENVIRONMENTAL REGULATIONS.

8 - PROTECTIVE EQUIPMENT

VENTILATION:	USE ADEQUATE GENERAL OR LOCAL EXHAUST VENTILATION TO KEEP FUME OR DUST LEVELS AS LOW AS POSSIBLE.
RESPIRATORY PROTECTION:	NONE REQUIRED WHERE ADEQUATE VENTILATION CONDITIONS EXIST. IF AIRBORNE CONCENTRATION IS HIGH, USE AN APPROPRIATE RESPIRATOR OR DUST MASK.
EYE/SKIN PROTECTION:	SAFETY GLASSES WITH SIDESHIELDS, PROPER GLOVES ARE RECOMMENDED.

9 - STORAGE AND HANDLING PRECAUTIONS

SAF-T-DATA(TM) STORAGE COLOR CODE: ORANGE (GENERAL STORAGE)

SPECIAL PRECAUTIONS
KEEP CONTAINER TIGHTLY CLOSED. SUITABLE FOR ANY GENERAL CHEMICAL STORAGE AREA.

10 - TRANSPORTATION DATA AND ADDITIONAL INFORMATION

DOMESTIC (D.O.T.)

PROPER SHIPPING NAME CHEMICALS, N.O.S. (NON-REGULATED)

INTERNATIONAL (I.M.O.)

PROPER SHIPPING NAME CHEMICALS, N.O.S. (NON-REGULATED)

1 - PRODUCT IDENTIFICATION

PRODUCT NAME: BUFFER SOLUTION (BIPHTHALATE), PH 4
FORMULA:
FORMULA WT: .00
CAS NO.: - -
PRODUCT CODES: 5657,5606
EFFECTIVE: 05/05/86
REVISION #01

PRECAUTIONARY LABELLING

BAKER SAF-T-DATA(TM) SYSTEM

HEALTH	-	0	NONE
FLAMMABILITY	-	0	NONE
REACTIVITY	-	0	NONE
CONTACT	-	1	SLIGHT

HAZARD RATINGS ARE 0 TO 4 (0 = NO HAZARD; 4 = EXTREME HAZARD).

LABORATORY PROTECTIVE EQUIPMENT

SAFETY GLASSES; LAB COAT

PRECAUTIONARY LABEL STATEMENTS

CAUTION
MAY CAUSE IRRITATION
MAY BE HARMFUL IF SWALLOWED

DURING USE AVOID CONTACT WITH EYES, SKIN, CLOTHING. WASH THOROUGHLY AFTER HANDLING. WHEN NOT IN USE KEEP IN TIGHTLY CLOSED CONTAINER.

SAF-T-DATA(TM) STORAGE COLOR CODE: ORANGE (GENERAL STORAGE)

2 - HAZARDOUS COMPONENTS

COMPONENT	%	CAS NO.
NOT APPLICABLE		

3 - PHYSICAL DATA

BOILING POINT: 100 C (212 F)
VAPOR PRESSURE(MM HG): N/A

MELTING POINT: N/A
VAPOR DENSITY(AIR=1): N/A

SPECIFIC GRAVITY: N/A (H2O=1)
EVAPORATION RATE: N/A (BUTYL ACETATE=1)

SOLUBILITY(H2O): COMPLETE (IN ALL PROPORTIONS) % VOLATILES BY VOLUME: ~99

APPEARANCE & ODOR: CLEAR, COLORLESS SOLUTION WITHOUT AN ODOR.

4 - FIRE AND EXPLOSION HAZARD DATA

FLASH POINT (CLOSED CUP: N/A

FLAMMABLE LIMITS: UPPER - N/A % LOWER - N/A %

FIRE EXTINGUISHING MEDIA
USE EXTINGUISHING MEDIA APPROPRIATE FOR SURROUNDING FIRE.

5 - HEALTH HAZARD DATA

CARCINOGENICITY: NTP: NO IARC: NO Z LIST: NO OSHA REG: NO

EFFECTS OF OVEREXPOSURE
LIQUID MAY BE IRRITATING TO SKIN AND EYES.
INGESTION MAY BE HARMFUL.

TARGET ORGANS
NONE IDENTIFIED

MEDICAL CONDITIONS GENERALLY AGGRAVATED BY EXPOSURE
NONE IDENTIFIED

ROUTES OF ENTRY
NONE INDICATED

EMERGENCY AND FIRST AID PROCEDURES

INGESTION:	IF SWALLOWED AND THE PERSON IS CONSCIOUS, IMMEDIATELY GIVE LARGE AMOUNTS OF WATER. GET MEDICAL ATTENTION.
INHALATION:	IF A PERSON BREATHES IN LARGE AMOUNTS, MOVE THE EXPOSED PERSON TO FRESH AIR. GET MEDICAL ATTENTION.
EYE CONTACT:	IMMEDIATELY FLUSH WITH PLENTY OF WATER FOR AT LEAST 15 MINUTES. GET MEDICAL ATTENTION.
SKIN CONTACT:	IMMEDIATELY WASH WITH PLENTY OF SOAP AND WATER FOR AT LEAST 15 MINUTES.

6 - REACTIVITY DATA

STABILITY: STABLE HAZARDOUS POLYMERIZATION: WILL NOT OCCUR

CONDITIONS TO AVOID: NONE DOCUMENTED

7 - SPILL AND DISPOSAL PROCEDURES

STEPS TO BE TAKEN IN THE EVENT OF A SPILL OR DISCHARGE

WEAR SUITABLE PROTECTIVE CLOTHING. TAKE UP WITH SAND OR OTHER NONCOMBUSTIBLE ABSORBENT MATERIAL AND PLACE INTO CONTAINER FOR LATER DISPOSAL. FLUSH SPILL AREA WITH WATER.

DISPOSAL PROCEDURE

DISPOSE IN ACCORDANCE WITH ALL APPLICABLE FEDERAL, STATE, AND LOCAL ENVIRONMENTAL REGULATIONS.

8 - PROTECTIVE EQUIPMENT

VENTILATION:	USE ADEQUATE GENERAL OR LOCAL EXHAUST VENTILATION TO KEEP VAPOR AND MIST LEVELS AS LOW AS POSSIBLE.
RESPIRATORY PROTECTION:	NONE REQUIRED WHERE ADEQUATE VENTILATION CONDITIONS EXIST. IF AIRBORNE CONCENTRATION IS HIGH, USE AN APPROPRIATE RESPIRATOR OR DUST MASK.
EYE/SKIN PROTECTION:	SAFETY GOGGLES, UNIFORM, APRON, PROPER GLOVES ARE RECOMMENDED.

9 - STORAGE AND HANDLING PRECAUTIONS

SAF-T-DATA(TM) STORAGE COLOR CODE: ORANGE (GENERAL STORAGE)

SPECIAL PRECAUTIONS

KEEP CONTAINER TIGHTLY CLOSED. SUITABLE FOR ANY GENERAL CHEMICAL STORAGE AREA.

10 - TRANSPORTATION DATA AND ADDITIONAL INFORMATION

DOMESTIC (D.O.T.)

PROPER SHIPPING NAME CHEMICALS, N.O.S. (NON-REGULATED)

INTERNATIONAL (I.M.O.)

PROPER SHIPPING NAME CHEMICALS, N.O.S. (NON-REGULATED)

1 - PRODUCT IDENTIFICATION

PRODUCT NAME: BUFFER SOLUTION (PHOSPHATE), PH 7
FORMULA:
FORMULA WT: .00
CAS NO.: - -
PRODUCT CODES: 5656,5608
EFFECTIVE: 03/20/86
REVISION #01

PRECAUTIONARY LABELLING

BAKER SAF-T-DATA(TM) SYSTEM

HEALTH	-	0	NONE
FLAMMABILITY	-	0	NONE
REACTIVITY	-	1	SLIGHT
CONTACT	-	1	SLIGHT

HAZARD RATINGS ARE 0 TO 4 (0 = NO HAZARD; 4 = EXTREME HAZARD).

LABORATORY PROTECTIVE EQUIPMENT

SAFETY GLASSES; LAB COAT

PRECAUTIONARY LABEL STATEMENTS

CAUTION
MAY CAUSE IRRITATION
MAY BE HARMFUL IF SWALLOWED
DURING USE AVOID CONTACT WITH EYES, SKIN, CLOTHING. WASH THOROUGHLY AFTER HANDLING. WHEN NOT IN USE KEEP IN TIGHTLY CLOSED CONTAINER.

SAF-T-DATA(TM) STORAGE COLOR CODE: ORANGE (GENERAL STORAGE)

2 - HAZARDOUS COMPONENTS

COMPONENT	%	CAS NO.
NOT APPLICABLE		

3 - PHYSICAL DATA

BOILING POINT: N/A
VAPOR PRESSURE(MM HG): N/A
MELTING POINT: N/A
VAPOR DENSITY(AIR=1): N/A
SPECIFIC GRAVITY: N/A (H2O=1)
EVAPORATION RATE: N/A (BUTYL ACETATE=1)
SOLUBILITY(H2O): COMPLETE (IN ALL PROPORTIONS) % VOLATILES BY VOLUME: ~98

APPEARANCE & ODOR: CLEAR, COLORLESS SOLUTION WITHOUT AN ODOR.

4 - FIRE AND EXPLOSION HAZARD DATA

FLASH POINT (CLOSED CUP: N/A

FLAMMABLE LIMITS: UPPER - N/A % LOWER - N/A %

FIRE EXTINGUISHING MEDIA
USE EXTINGUISHING MEDIA APPROPRIATE FOR SURROUNDING FIRE.

TOXIC GASES PRODUCED
PHOSPHORUS OXIDE

5 - HEALTH HAZARD DATA

CARCINOGENICITY: NTP: NO IARC: NO Z LIST: NO OSHA REG: NO

EFFECTS OF OVEREXPOSURE
LIQUID MAY BE IRRITATING TO SKIN AND EYES.
INGESTION MAY BE HARMFUL.

TARGET ORGANS
NONE IDENTIFIED

MEDICAL CONDITIONS GENERALLY AGGRAVATED BY EXPOSURE
NONE IDENTIFIED

ROUTES OF ENTRY
NONE INDICATED

EMERGENCY AND FIRST AID PROCEDURES

INGESTION:	IF SWALLOWED AND THE PERSON IS CONSCIOUS, IMMEDIATELY GIVE LARGE AMOUNTS OF WATER. GET MEDICAL ATTENTION.
INHALATION:	IF A PERSON BREATHES IN LARGE AMOUNTS, MOVE THE EXPOSED PERSON TO FRESH AIR. GET MEDICAL ATTENTION.
EYE CONTACT:	IMMEDIATELY FLUSH WITH PLENTY OF WATER FOR AT LEAST 15 MINUTES. GET MEDICAL ATTENTION.
SKIN CONTACT:	IMMEDIATELY WASH WITH PLENTY OF SOAP AND WATER FOR AT LEAST 15 MINUTES.

6 - REACTIVITY DATA

STABILITY: STABLE HAZARDOUS POLYMERIZATION: WILL NOT OCCUR

CONDITIONS TO AVOID: NONE DOCUMENTED

DECOMPOSITION PRODUCTS: OXIDES OF PHOSPHORUS

7 - SPILL AND DISPOSAL PROCEDURES

STEPS TO BE TAKEN IN THE EVENT OF A SPILL OR DISCHARGE
WEAR SUITABLE PROTECTIVE CLOTHING. TAKE UP WITH SAND OR OTHER NONCOMBUSTIBLE ABSORBENT MATERIAL AND PLACE INTO CONTAINER FOR LATER DISPOSAL. FLUSH SPILL AREA WITH WATER.

DISPOSAL PROCEDURE
DISPOSE IN ACCORDANCE WITH ALL APPLICABLE FEDERAL, STATE, AND LOCAL ENVIRONMENTAL REGULATIONS.

8 - PROTECTIVE EQUIPMENT

VENTILATION:	USE ADEQUATE GENERAL OR LOCAL EXHAUST VENTILATION TO KEEP VAPOR AND MIST LEVELS AS LOW AS POSSIBLE.
RESPIRATORY PROTECTION:	NONE REQUIRED WHERE ADEQUATE VENTILATION CONDITIONS EXIST. IF AIRBORNE CONCENTRATION IS HIGH, USE AN APPROPRIATE RESPIRATOR OR DUST MASK.
EYE/SKIN PROTECTION:	SAFETY GOGGLES, UNIFORM, APRON, PROPER GLOVES ARE RECOMMENDED.

9 - STORAGE AND HANDLING PRECAUTIONS

SAF-T-DATA(TM) STORAGE COLOR CODE: ORANGE (GENERAL STORAGE)

SPECIAL PRECAUTIONS
KEEP CONTAINER TIGHTLY CLOSED. SUITABLE FOR ANY GENERAL CHEMICAL STORAGE AREA.

10 - TRANSPORTATION DATA AND ADDITIONAL INFORMATION

DOMESTIC (D.O.T.)

PROPER SHIPPING NAME CHEMICALS, N.O.S. (NON-REGULATED)

INTERNATIONAL (I.M.O.)

PROPER SHIPPING NAME CHEMICALS, N.O.S. (NON-REGULATED)

1 - PRODUCT IDENTIFICATION

PRODUCT NAME: BUFFER SOLUTION (BORATE), PH 10
FORMULA:
FORMULA WT: .00
CAS NO.: - -
PRODUCT CODES: 5655,5609
EFFECTIVE: 11/24/86
REVISION #02

PRECAUTIONARY LABELLING

BAKER SAF-T-DATA(TM) SYSTEM

HEALTH	-	2	MODERATE
FLAMMABILITY	-	0	NONE
REACTIVITY	-	0	NONE
CONTACT	-	3	SEVERE (LIFE)

HAZARD RATINGS ARE 0 TO 4 (0 = NO HAZARD; 4 = EXTREME HAZARD).

LABORATORY PROTECTIVE EQUIPMENT

GOGGLES & SHIELD; LAB COAT & APRON; VENT HOOD; PROPER GLOVES

PRECAUTIONARY LABEL STATEMENTS

DANGER
HARMFUL IF SWALLOWED
EXCEPTIONAL CONTACT HAZARD - READ MATERIAL SAFETY DATA SHEET
DO NOT GET IN EYES, ON SKIN, ON CLOTHING.
AVOID BREATHING VAPOR. KEEP IN TIGHTLY CLOSED CONTAINER. USE WITH ADEQUATE VENTILATION. WASH THOROUGHLY AFTER HANDLING.

SAF-T-DATA(TM) STORAGE COLOR CODE: BLUE (HEALTH)

2 - HAZARDOUS COMPONENTS

COMPONENT	%	CAS NO.
BUFFER SOLUTION (BORATE), PH 10	90-100	

3 - PHYSICAL DATA

BOILING POINT: 100 C (212 F)
MELTING POINT: N/A
SPECIFIC GRAVITY: 1.00 (H2O=1)
VAPOR PRESSURE(MM HG): N/A
VAPOR DENSITY(AIR=1): N/A
EVAPORATION RATE: N/A (BUTYL ACETATE=1)

SOLUBILITY(H2O): COMPLETE (IN ALL PROPORTIONS) % VOLATILES BY VOLUME: 99

APPEARANCE & ODOR: CLEAR, COLORLESS ODORLESS LIQUID.

4 - FIRE AND EXPLOSION HAZARD DATA

FLASH POINT (CLOSED CUP: N/A

FLAMMABLE LIMITS: UPPER - N/A % LOWER - N/A %

FIRE EXTINGUISHING MEDIA
USE EXTINGUISHING MEDIA APPROPRIATE FOR SURROUNDING FIRE.

5 - HEALTH HAZARD DATA

CARCINOGENICITY: NTP: NO IARC: NO Z LIST: NO OSHA REG: NO

EFFECTS OF OVEREXPOSURE
VAPORS MAY BE IRRITATING TO SKIN, EYES, AND MUCOUS MEMBRANES.
LIQUID MAY BE IRRITATING TO SKIN AND EYES.
INGESTION MAY CAUSE NAUSEA, VOMITING, HEADACHES, DIZZINESS, GASTROINTESTINAL IRRITATION.

TARGET ORGANS
NONE IDENTIFIED

MEDICAL CONDITIONS GENERALLY AGGRAVATED BY EXPOSURE
NONE IDENTIFIED

ROUTES OF ENTRY
INHALATION, INGESTION, ABSORPTION, SKIN CONTACT, EYE CONTACT

EMERGENCY AND FIRST AID PROCEDURES
CALL A PHYSICIAN.
IF SWALLOWED, DO NOT INDUCE VOMITING; IF CONSCIOUS, GIVE LARGE AMOUNTS OF WATER.
IF INHALED, REMOVE TO FRESH AIR. IF NOT BREATHING, GIVE ARTIFICIAL RESPIRATION. IF BREATHING IS DIFFICULT, GIVE OXYGEN.
IN CASE OF CONTACT, IMMEDIATELY FLUSH EYES OR SKIN WITH PLENTY OF WATER FOR AT LEAST 15 MINUTES WHILE REMOVING CONTAMINATED CLOTHING AND SHOES.
WASH CLOTHING BEFORE RE-USE.

6 - REACTIVITY DATA

STABILITY: STABLE HAZARDOUS POLYMERIZATION: WILL NOT OCCUR

CONDITIONS TO AVOID: NONE DOCUMENTED

7 - SPILL AND DISPOSAL PROCEDURES

STEPS TO BE TAKEN IN THE EVENT OF A SPILL OR DISCHARGE
WEAR SELF-CONTAINED BREATHING APPARATUS AND FULL PROTECTIVE CLOTHING. STOP LEAK IF YOU CAN DO SO WITHOUT RISK. USE WATER SPRAY TO REDUCE VAPORS. TAKE UP WITH SAND OR OTHER NON-COMBUSTIBLE ABSORBENT MATERIAL AND PLACE INTO CONTAINER FOR LATER DISPOSAL. FLUSH SPILL AREA WITH WATER.

DISPOSAL PROCEDURE
DISPOSE IN ACCORDANCE WITH ALL APPLICABLE FEDERAL, STATE, AND LOCAL ENVIRONMENTAL REGULATIONS.

8 - PROTECTIVE EQUIPMENT

VENTILATION:	USE ADEQUATE GENERAL OR LOCAL EXHAUST VENTILATION TO KEEP VAPOR AND MIST LEVELS AS LOW AS POSSIBLE.
RESPIRATORY PROTECTION:	A RESPIRATOR WITH DUST/MIST FILTER IS RECOMMENDED. IF AIRBORNE CONCENTRATION EXCEEDS CAPACITY OF RESPIRATOR, A SELF-CONTAINED BREATHING APPARATUS IS ADVISED.
EYE/SKIN PROTECTION:	SAFETY GOGGLES AND FACE SHIELD, UNIFORM, PROTECTIVE SUIT, PROPER GLOVES ARE RECOMMENDED.

9 - STORAGE AND HANDLING PRECAUTIONS

SAF-T-DATA(TM) STORAGE COLOR CODE: BLUE (HEALTH)

SPECIAL PRECAUTIONS
KEEP CONTAINER TIGHTLY CLOSED. STORE IN SECURE POISON AREA.

10 - TRANSPORTATION DATA AND ADDITIONAL INFORMATION

DOMESTIC (D.O.T.)

PROPER SHIPPING NAME CHEMICALS, N.O.S. (NON-REGULATED)

INTERNATIONAL (I.M.O.)

PROPER SHIPPING NAME CHEMICALS, N.O.S. (NON-REGULATED)

ALLIED CHEMICAL ALLIED -- HYDROCHLORIC ACID,ACS - HYDROCHLORIC ACID,ACS
MATERIAL SAFETY DATA SHEET
FSC: 6810
NIIN: 007534786
Manufacturer's CAGE: 82196
Part No. Indicator: A
Part Number/Trade Name: HYDROCHLORIC ACID,ACS

General Information

Item Name: HYDROCHLORIC ACID,ACS
Company's Name: ALLIED CHEMICAL, ALLIED CORP.
Company's Street: COLUMBIA RD AND PARK AVE
Company's P. O. Box: 1087R
Company's City: MORRISTOWN
Company's State: NJ
Company's Country: US
Company's Zip Code: 07960
Company's Emerg Ph #: 201-455-2000
Company's Info Ph #: 201-455-2000
Distributor/Vendor # 1: CHEMICAL COMMODITIES AGENCY
Distributor/Vendor # 1 Cage: 60777
Record No. For Safety Entry: 006
Tot Safety Entries This Stk#: 007
Date MSDS Prepared: 01JAN85
Safety Data Review Date: 21AUG81
Supply Item Manager: CX
MSDS Serial Number: BFNCZ
Specification Number: O-C-265
Hazard Characteristic Code: C1
Unit Of Issue: PT
Unit Of Issue Container Qty: 16 FL OUNCES
Type Of Container: BOTTLE
Net Unit Weight: 1.2 LBS

Ingredients/Identity Information

Proprietary: NO
Ingredient: HYDROGEN CHLORIDE (HYDROCHLORIC ACID) (SARA III)
Ingredient Sequence Number: 01
Percent: 37.0
NIOSH (RTECS) Number: MW4025000
CAS Number: 7647-01-0
OSHA PEL: C 5 PPM
ACGIH TLV: C 5 PPM; 9192

Physical/Chemical Characteristics

Appearance And Odor: COLORLESS. IRRITATING PUNGENT ODOR.
Boiling Point: 230F,110C
Vapor Pressure (MM Hg/70 F): 212
Vapor Density (Air=1): 1.3
Specific Gravity: 1.19
Decomposition Temperature: UNKNOWN
Solubility In Water: COMPLETE

Fire and Explosion Hazard Data

Flash Point: N/A
Extinguishing Media: USE WATER WITH CHEMICALLY BASIC SUBSTANCE
Special Fire Fighting Proc: WEAR PROTECTIVE CLOTHING
Unusual Fire And Expl Hazrds: HIGHLY CORROSIVE TO MOST METALS WITH EVOLUTION OF H2 GAS,WHICH IS HIGHLY FLAMMABLE WHEN MIXD. W/AIR

Reactivity Data

Stability: YES
Materials To Avoid: REACT WITH METALS TO PRODUCE H2 GAS.FL & AL ARE CORRODED
Hazardous Poly Occur: NO

Health Hazard Data

Signs/Symptoms Of Overexp: MATERIAL IS CORROSIVE & CAUSES SEVERE BURNS. MAY BE FATAL IF SWALLOWED.
Emergency/First Aid Proc: CALL A DOCTOR.IN CASE OF EYE CONTACT,FLUSH W/WATER FOR AT LEAST 15 MIN.FOR SKIN CONTACT,FLOOD W/TAP WATER,THEN WATER CONTAINING SODIUM BICARVONATE.DO NOT GIVE EMETICS.GIVE TAP WATER,MILK OR MILK OF MAGNESIA,DO NOT GET IN EYES ON SKIN ,CLTHG.

Precautions for Safe Handling and Use

Steps If Matl Released/Spill: NEUTRALIZE WITH WATER WITH BASIC CHEMICAL IN SOLUTION SUCH AS SODA ASH OR SLAKED LIME.ABSORB IF POSSIBLE
Waste Disposal Method: PLACE ABSORBED MATERIAL IN CONTAINER SUITABLE FOR SHIPPING CORROSIVE MATERIALS
Precautions-Handling/Storing: KEEP IN TIGHTLY CLOSED CONTAINER IN COOL PLCAC.LOOSEN CLOSURE CAREFULLY. WASH THOROUGHLY AFTER HANDLING.

Control Measures

Respiratory Protection: SELF-CONTAINED BREATHING APPARATUS, IF TLV > 5PPM
Ventilation: LOCAL EXHAUST & MECHANICAL.
Protective Gloves: RUBBER
Eye Protection: FACE SHIELD
Other Protective Equipment: PROTECTIVE CLOTHING,EYE WASH STATION
Suppl. Safety & Health Data: THE PERCENTAGE, 37%, OF ITEM IS AN ASSAY VALUE.

Transportation Data

Trans Data Review Date: 81233
DOT PSN Code: HJG
DOT Proper Shipping Name: HYDROCHLORIC ACID, SOLUTION
DOT Class: 8
DOT ID Number: UN1789
DOT Pack Group: II
DOT Label: CORROSIVE
IMO PSN Code: IEX
IMO Proper Shipping Name: HYDROCHLORIC ACID,SOLUTION
IMO Regulations Page Number: 8183
IMO UN Number: 1789
IMO UN Class: 8
IMO Subsidiary Risk Label: -
IATA PSN Code: NPG
IATA UN ID Number: 1789
IATA Proper Shipping Name: HYDROCHLORIC ACID SOLUTION
IATA UN Class: 8
IATA Label: CORROSIVE
AFI PSN Code: NPG
AFI Symbols: T
AFI Prop. Shipping Name: HYDROCHLORIC ACID, SOLUTION
AFI Class: 8
AFI ID Number: UN1789
AFI Pack Group: II
AFI Label: CORROSIVE

AFI Special Prov: A3,A6,N41
AFI Basic Pac Ref: 12-5

Disposal Data

Disposal Data Review Date: 88291
Rec # For This Disp Entry: 03
Tot Disp Entries Per NSN: 004
Landfill Ban Item: YES
Disposal Supplemental Data: THE PERCENTAGE,37%,OF ITEM IS AN ASSAY VALUE. IN CASE OF ACCIDENTAL EXPOSURE OR DISCHARGE, CONSULT HEALTH AND SAFETY FILE FOR PRECAUTIONS.
1st EPA Haz Wst Code New: D002
1st EPA Haz Wst Name New: CORROSIVE
1st EPA Haz Wst Char New: CORROSIVITY
1st EPA Acute Hazard New: NO

Label Data

Label Required: YES
Label Status: G
Common Name: HYDROCHLORIC ACID,ACS
Special Hazard Precautions: MATERIAL IS CORROSIVE & CAUSES SEVERE BURNS.MAY BE FATAL IF SWALLOWED.
Label Name: CHEMICAL COMMODITIES(DIST),ALLIED CHEMICAL(MFR)
Label Emergency Number: 201-455-2000

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LIQUID AIR CORPORATION
ALPHAGAZ DIVISION

ALPHAGAZ

Specialty Gas

Material Safety Data Sheet

	PRODUCT NAME: Isobutylene	
	TELEPHONE (415) 977-6500 EMERGENCY RESPONSE INFORMATION ON PAGE 2	
LIQUID AIR CORPORATION ALPHAGAZ DIVISION One California Plaza, Suite 350 2121 N. California Blvd. Walnut Creek, California 94596	TRADE NAME AND SYNONYMS: Isobutylene	CAS NUMBER: 115-11-7
	CHEMICAL NAME AND SYNONYMS: Isobutene, Isobutylene, 2-Methylpropene	
ISSUE DATE AND REVISIONS: OCTOBER 1, 1985 CORPORATE SAFETY DEPT.	FORMULA: (iso) C_4H_8 MOLECULAR WEIGHT: 56.03	CHEMICAL FAMILY: Monolefin

See last page.

HEALTH HAZARD DATA

TIME WEIGHTED AVERAGE EXPOSURE LIMIT Isobutylene is defined as a simple asphyxiant. Oxygen levels should be maintained at greater than 18 molar percent at normal atmospheric pressure which is equivalent to a partial pressure of 135 mm Hg. (ACGIH, 1984-85)

SYMPTOMS OF EXPOSURE

Inhalation: Moderate concentrations so as to exclude an adequate supply of oxygen to the lungs causes dizziness, drowsiness and eventual unconsciousness. It also has a very mild anesthetic effect which might cause lack of co-ordination or lessened mental alertness.

Skin and Eye Contact: It is mildly irritating to mucous membranes. Due to its rapid rate of evaporation, it can cause tissue freezing or frostbite on dermal contact.

TOXICOLOGICAL PROPERTIES

It has a very mild anesthetic effect; however, the major property is the exclusion of an adequate supply of oxygen to the lungs.

Frostbite effects are a change in color of the skin to gray or white possibly followed by blistering.

Listed as Carcinogen or Potential Carcinogen	National Toxicology Program	I.A.R.C. Monographs	OSHA
	Yes ☐ No ☒	Yes ☐ No ☒	Yes ☐ No ☒

RECOMMENDED FIRST AID TREATMENT

PROMPT MEDICAL ATTENTION IS MANDATORY IN ALL CASES OF OVEREXPOSURE TO ISOBUTYLENE. RESCUE PERSONNEL SHOULD BE EQUIPPED WITH SELF-CONTAINED BREATHING APPARATUS AND BE COGNIZANT OF EXTREME FIRE AND EXPLOSION HAZARD.

Inhalation: Conscious persons should be assisted to an uncontaminated area and inhale fresh air. Quick removal from the contaminated area is most important. Unconscious persons should be moved to an uncontaminated area, given mouth-to-mouth resuscitation and supplemental oxygen. Medical assistance should be sought immediately.

Dermal Contact or Frostbite: Remove contaminated clothing and flush affected areas

(Continued on last page.)

HAZARDOUS MIXTURES OF OTHER LIQUIDS, SOLIDS, OR GASES

Isobutylene is flammable over a wide range in air.

PHYSICAL DATA

BOILING POINT 19.18°F (-7.12°C)	LIQUID DENSITY AT BOILING POINT 39.09 lb/ft^3 (626.2 kg/m^3)
VAPOR PRESSURE @ 70°F (21.1°C) = 38.43 psia (265 kPa)	GAS DENSITY AT 70°F 1 atm .148 lb/ft^3 (2.37 kg/m^3)
SOLUBILITY IN WATER Insoluble	FREEZING POINT -220.63°F (-140.35°C)

APPEARANCE AND ODOR Colorless gas with an unpleasant odor similar to that which is emitted when burning anthracite coal. Specific gravity @70°F (Air = 1.0) is 1.98.

FIRE AND EXPLOSION HAZARD DATA

FLASH POINT (METHOD USED) -105°F (-76°C) Closed cup	AUTO IGNITION TEMPERATURE 869°F (465°C)	FLAMMABLE LIMITS % BY VOLUME LEL: 1.8 UEL: 9.6
EXTINGUISHING MEDIA Water, carbon dioxide, dry chemical		ELECTRICAL CLASSIFICATION Class 1, Group not specified

SPECIAL FIRE FIGHTING PROCEDURES

If possible, stop the flow of isobutylene. Use water spray to cool surrounding containers.

UNUSUAL FIRE AND EXPLOSION HAZARDS Isobutylene is heavier than air and may travel a considerable distance to a source of ignition. Should flame be extinguished and flow of gas continue, increase ventilation to prevent flammable mixture formation in low areas or pockets.

REACTIVITY DATA

STABILITY		CONDITIONS TO AVOID
Unstable		
Stable	X	

INCOMPATIBILITY (Materials to avoid)
Oxidizers

HAZARDOUS DECOMPOSITION PRODUCTS
None

HAZARDOUS POLYMERIZATION		CONDITIONS TO AVOID
May Occur		
Will Not Occur	X	

SPILL OR LEAK PROCEDURES

STEPS TO BE TAKEN IN CASE MATERIAL IS RELEASED OR SPILLED
Evacuate all personnel from affected area. Use appropriate protective equipment. If leak is in user's equipment, be certain to purge piping with an inert gas prior to attempting repairs. If leak is in container or container valve, contact the closest Liquid Air Corporation location.

WASTE DISPOSAL METHOD
Do not attempt to dispose of waste or unused quantities. Return in the shipping container properly labeled, with any valve outlet plugs or caps secured and valve protection cap in place to Liquid Air Corporation for proper disposal. For emergency disposal, contact the closest Liquid Air Corporation location.

EMERGENCY RESPONSE INFORMATION
IN CASE OF EMERGENCY INVOLVING THIS MATERIAL, CALL DAY OR NIGHT (800) 231-1366

SPECIAL PROTECTION INFORMATION

RESPIRATORY PROTECTION (Specify type) Positive pressure air-line with mask or self-contained breathing apparatus should be available for emergency use.

VENTILATION	LOCAL EXHAUST	SPECIAL
Hood with forced ventilation	To prevent accumulation above the LEL.	
	MECHANICAL (Gen.) In accordance with electrical codes.	OTHER

PROTECTIVE GLOVES
Plastic or rubber

EYE PROTECTION
Safety goggles or glasses

OTHER PROTECTIVE EQUIPMENT
Safety shoes, safety shower, eyewash "fountain"

SPECIAL PRECAUTIONS*

SPECIAL LABELING INFORMATION
DOT Shipping Name: Liquefied petroleum gas DOT Hazard Class: Flammable gas
DOT Shipping Label: Flammable gas I.D. No.: UN 1075

SPECIAL HANDLING RECOMMENDATIONS
Use only in well-ventilated areas. Valve protection caps must remain in place unless container is secured with valve outlet piped to use point. Do not drag, slide or roll cylinders. Use a suitable hand truck for cylinder movement. Use a pressure reducing regulator when connecting cylinder to lower pressure (<250 psig) piping or systems. Do not heat cylinder by any means to increase the discharge rate of product from the cylinder. Use a check valve or trap in the discharge line to prevent hazardous back flow into the cylinder.

For additional handling recommendations consult L'Air Liquide's Encyclopedia de Gaz or Compressed Gas Association Pamphlet P-1.

SPECIAL STORAGE RECOMMENDATIONS
Protect cylinders from physical damage. Store in cool, dry, well-ventilated area of non-combustible construction away from heavily trafficked areas and emergency exits. Do not allow the temperature where cylinders are stored to exceed 130F (54C). Cylinders should be stored upright and firmly secured to prevent falling or being knocked over. Full and emptry cylinders should be segregated. Use a "first in-first out" inventory system to prevent full cylinders being stored for excessive periods of time. Post "No Smoking or Open Flames" signs in the storage or use area. There should be no sources of ignition in the storage or use area.

For additional storage recommendations consult L'Air Liquide's Encyclopedia de Gaz or Compressed Gas Association Pamphlet P-1.

SPECIAL PACKAGING RECOMMENDATIONS
Isobutylene is noncorrosive and may be used with any common structural material.

OTHER RECOMMENDATIONS OR PRECAUTIONS
Earth-ground and bond all lines and equipment associated with the isobutylene system. Electrical equipment should be non-sparking or explosion proof. Compressed gas cylinders should not be refilled except by qualified producers of compressed gases. Shipment of a compressed gas cylinder which has not been filled by the owner or with his (written) consent is a violation of Federal Law (49CFR).

*Various Government agencies (i.e., Department of Transportation, Occupational Safety and Health Administration, Food and Drug Administration and others) may have specific regulations concerning the transportation, handling, storage or use of this product which may not be contained herein. The customer or user of this product should be familiar with these regulations.

LIQUID AIR CORPORATION
ALPHAGAZ DIVISION

ADDITIONAL DATA

RECOMMENDED FIRST AID TREATMENT: (Continued)

with lukewarm water. DO NOT USE HOT WATER. A physician should see the patient promptly if the cryogenic "burn" has resulted in blistering of the dermal surface or deep tissue freezing.

TIME WEIGHTED AVERAGE EXPOSURE LIMIT (Continued)

TWA (OSHA, 1985) for LPG (Liquefied Petroleum Gas) is 1,000 molar PPM.

1 - PRODUCT IDENTIFICATION

PRODUCT NAME: ISOPROPYL ALCOHOL
FORMULA: CH3CHOHCH3
FORMULA WT: 60.10
CAS NO.: 67-63-0
NIOSH/RTECS NO.: NT805000
COMMON SYNONYMS: 2-PROPANOL; ISOPROPANOL; SEC-PROPYL ALCOHOL; IPA; DIMETHYLCARBINOL
PRODUCT CODES: U298,5082,9080
EFFECTIVE: 09/03/86
REVISION #02

PRECAUTIONARY LABELLING

BAKER SAF-T-DATA(TM) SYSTEM

HEALTH	-	1	SLIGHT
FLAMMABILITY	-	3	SEVERE (FLAMMABLE)
REACTIVITY	-	1	SLIGHT
CONTACT	-	1	SLIGHT

HAZARD RATINGS ARE 0 TO 4 (0 = NO HAZARD; 4 = EXTREME HAZARD).

LABORATORY PROTECTIVE EQUIPMENT

SAFETY GLASSES; LAB COAT; VENT HOOD; PROPER GLOVES; CLASS B EXTINGUISHER

PRECAUTIONARY LABEL STATEMENTS

WARNING
FLAMMABLE
CAUSES IRRITATION
HARMFUL IF SWALLOWED OR INHALED

KEEP AWAY FROM HEAT, SPARKS, FLAME. AVOID CONTACT WITH EYES, SKIN, CLOTHING. AVOID BREATHING VAPOR. KEEP IN TIGHTLY CLOSED CONTAINER. USE WITH ADEQUATE VENTILATION. WASH THOROUGHLY AFTER HANDLING. IN CASE OF FIRE, USE ALCOHOL FOAM, DRY CHEMICAL, CARBON DIOXIDE - WATER MAY BE INEFFECTIVE. FLUSH SPILL AREA WITH WATER SPRAY.

SAF-T-DATA(TM) STORAGE COLOR CODE: RED (FLAMMABLE)

2 - HAZARDOUS COMPONENTS

COMPONENT	%	CAS NO.
ISOPROPYL ALCOHOL	90-100	67-63-0

3 - PHYSICAL DATA

BOILING POINT: 82 C (180 F) VAPOR PRESSURE(MM HG): 33

MELTING POINT: -89 C (-128 F) VAPOR DENSITY(AIR=1): 2.1

SPECIFIC GRAVITY: 0.79 (H2O=1) EVAPORATION RATE: 2.83 (BUTYL ACETATE=1)

SOLUBILITY(H2O): COMPLETE (IN ALL PROPORTIONS) % VOLATILES BY VOLUME: 100

APPEARANCE & ODOR: COLORLESS LIQUID WITH SLIGHT ODOR OF RUBBING ALCOHOL.

4 - FIRE AND EXPLOSION HAZARD DATA

FLASH POINT (CLOSED CUP 12 C (53 F) NFPA 704M RATING: 1-3-0

FLAMMABLE LIMITS: UPPER - 12.0 % LOWER - 2.0 %

FIRE EXTINGUISHING MEDIA
USE ALCOHOL FOAM, DRY CHEMICAL OR CARBON DIOXIDE.
(WATER MAY BE INEFFECTIVE.)

SPECIAL FIRE-FIGHTING PROCEDURES
FIREFIGHTERS SHOULD WEAR PROPER PROTECTIVE EQUIPMENT AND SELF-CONTAINED BREATHING APPARATUS WITH FULL FACEPIECE OPERATED IN POSITIVE PRESSURE MODE. MOVE CONTAINERS FROM FIRE AREA IF IT CAN BE DONE WITHOUT RISK. USE WATER TO KEEP FIRE-EXPOSED CONTAINERS COOL.

UNUSUAL FIRE & EXPLOSION HAZARDS
VAPORS MAY FLOW ALONG SURFACES TO DISTANT IGNITION SOURCES AND FLASH BACK. CLOSED CONTAINERS EXPOSED TO HEAT MAY EXPLODE. CONTACT WITH STRONG OXIDIZERS MAY CAUSE FIRE.

TOXIC GASES PRODUCED
CARBON MONOXIDE, CARBON DIOXIDE

5 - HEALTH HAZARD DATA

THRESHOLD LIMIT VALUE (TLV/TWA): 980 MG/M3 (400 PPM)

SHORT-TERM EXPOSURE LIMIT (STEL): 1225 MG/M3 (500 PPM)

PERMISSIBLE EXPOSURE LIMIT (PEL): 980 MG/M3 (400 PPM)

TOXICITY:

LD50 (ORAL-RAT) (MG/KG)	- 5045
LD50 (IPR-MOUSE) (MG/KG)	- 933
LD50 (SKN-RABBIT) (G/KG)	- 13
LD50 (IV-MOUSE) (MG/KG)	- 1863

CARCINOGENICITY: NTP: NO IARC: NO Z LIST: NO OSHA REG: NO

EFFECTS OF OVEREXPOSURE
INHALATION OF VAPORS MAY CAUSE HEADACHE, NAUSEA, VOMITING, DIZZINESS,

DROWSINESS, IRRITATION OF RESPIRATORY TRACT, AND LOSS OF CONSCIOUSNESS.
INHALATION OF VAPORS MAY CAUSE PULMONARY EDEMA.
LIQUID MAY BE IRRITATING TO SKIN AND EYES. PROLONGED SKIN CONTACT MAY RESULT IN DERMATITIS. EYE CONTACT MAY RESULT IN TEMPORARY CORNEAL DAMAGE.
INGESTION MAY CAUSE NAUSEA, VOMITING, HEADACHES, DIZZINESS, GASTROINTESTINAL IRRITATION.
INGESTION MAY CAUSE CENTRAL NERVOUS SYSTEM DEPRESSION.

TARGET ORGANS
EYES, SKIN, RESPIRATORY SYSTEM

MEDICAL CONDITIONS GENERALLY AGGRAVATED BY EXPOSURE
NONE IDENTIFIED

ROUTES OF ENTRY
INHALATION, INGESTION, EYE CONTACT, SKIN CONTACT

EMERGENCY AND FIRST AID PROCEDURES
CALL A PHYSICIAN.
IF SWALLOWED, DO NOT INDUCE VOMITING.
IF INHALED, REMOVE TO FRESH AIR. IF NOT BREATHING, GIVE ARTIFICIAL RESPIRATION. IF BREATHING IS DIFFICULT, GIVE OXYGEN.
IN CASE OF CONTACT, IMMEDIATELY FLUSH EYES WITH PLENTY OF WATER FOR AT LEAST 15 MINUTES. FLUSH SKIN WITH WATER.

6 - REACTIVITY DATA

STABILITY: STABLE

HAZARDOUS POLYMERIZATION: WILL NOT OCCUR

CONDITIONS TO AVOID: HEAT, FLAME, OTHER SOURCES OF IGNITION

INCOMPATIBLES: STRONG OXIDIZING AGENTS, ALUMINUM, NITRIC ACID, SULFURIC ACID, AMINES AND AMMONIA, HALOGEN ACIDS AND HALOGEN COMPOUNDS

DECOMPOSITION PRODUCTS: CARBON MONOXIDE, CARBON DIOXIDE

7 - SPILL AND DISPOSAL PROCEDURES

STEPS TO BE TAKEN IN THE EVENT OF A SPILL OR DISCHARGE
WEAR SUITABLE PROTECTIVE CLOTHING. SHUT OFF IGNITION SOURCES; NO FLARES, SMOKING, OR FLAMES IN AREA. STOP LEAK IF YOU CAN DO SO WITHOUT RISK. USE WATER SPRAY TO REDUCE VAPORS. TAKE UP WITH SAND OR OTHER NON-COMBUSTIBLE ABSORBENT MATERIAL AND PLACE INTO CONTAINER FOR LATER DISPOSAL. FLUSH AREA WITH WATER.
J. T. BAKER SOLUSORB(R) SOLVENT ADSORBENT IS RECOMMENDED FOR SPILLS OF THIS PRODUCT.

DISPOSAL PROCEDURE
DISPOSE IN ACCORDANCE WITH ALL APPLICABLE FEDERAL, STATE, AND LOCAL ENVIRONMENTAL REGULATIONS.

EPA HAZARDOUS WASTE NUMBER: D001 (IGNITABLE WASTE)

8 - PROTECTIVE EQUIPMENT

VENTILATION: USE GENERAL OR LOCAL EXHAUST VENTILATION TO MEET TLV REQUIREMENTS.

RESPIRATORY PROTECTION: RESPIRATORY PROTECTION REQUIRED IF AIRBORNE CONCENTRATION EXCEEDS TLV. AT CONCENTRATIONS UP TO 1000 PPM, A CHEMICAL CARTRIDGE RESPIRATOR WITH ORGANIC VAPOR CARTRIDGE IS RECOMMENDED. ABOVE THIS LEVEL, A SELF-CONTAINED BREATHING APPARATUS IS RECOMMENDED.

EYE/SKIN PROTECTION: SAFETY GOGGLES, UNIFORM, APRON, NEOPRENE GLOVES ARE RECOMMENDED.

9 - STORAGE AND HANDLING PRECAUTIONS

SAF-T-DATA(TM) STORAGE COLOR CODE: RED (FLAMMABLE)

SPECIAL PRECAUTIONS
BOND AND GROUND CONTAINERS WHEN TRANSFERRING LIQUID. KEEP CONTAINER TIGHTLY CLOSED. STORE IN A COOL, DRY, WELL-VENTILATED, FLAMMABLE LIQUID STORAGE AREA.

10 - TRANSPORTATION DATA AND ADDITIONAL INFORMATION

DOMESTIC (D.O.T.)

PROPER SHIPPING NAME	ISOPROPANOL
HAZARD CLASS	FLAMMABLE LIQUID
UN/NA	UN1219
LABELS	FLAMMABLE LIQUID

INTERNATIONAL (I.M.O.)

PROPER SHIPPING NAME	ISOPROPANOL
HAZARD CLASS	3.2
UN/NA	UN1219
LABELS	FLAMMABLE LIQUID

1 - PRODUCT IDENTIFICATION

PRODUCT NAME: METHANOL
FORMULA: CH3OH
FORMULA WT: 32.04
CAS NO.: 67-56-1
NIOSH/RTECS NO.: PC1400000
COMMON SYNONYMS: METHYL ALCOHOL; WOOD ALCOHOL; CARBINOL; METHYLOL; WOOD SPIRIT
PRODUCT CODES: 9049,9072,9075,9076,9071,5217,5370,9074,P704,9093,5536,9068 9073,9091,9263,9069,9070
EFFECTIVE: 09/26/86
REVISION #04

PRECAUTIONARY LABELLING

BAKER SAF-T-DATA(TM) SYSTEM

HEALTH	-	3	SEVERE (POISON)
FLAMMABILITY	-	3	SEVERE (FLAMMABLE)
REACTIVITY	-	1	SLIGHT
CONTACT	-	1	SLIGHT

HAZARD RATINGS ARE 0 TO 4 (0 = NO HAZARD; 4 = EXTREME HAZARD).

LABORATORY PROTECTIVE EQUIPMENT

GOGGLES & SHIELD; LAB COAT & APRON; VENT HOOD; PROPER GLOVES; CLASS B EXTINGUISHER

PRECAUTIONARY LABEL STATEMENTS

POISON DANGER
FLAMMABLE
HARMFUL IF INHALED
CANNOT BE MADE NON-POISONOUS
MAY BE FATAL OR CAUSE BLINDNESS IF SWALLOWED

KEEP AWAY FROM HEAT, SPARKS, FLAME. DO NOT GET IN EYES, ON SKIN, ON CLOTHING. AVOID BREATHING VAPOR. KEEP IN TIGHTLY CLOSED CONTAINER. USE WITH ADEQUATE VENTILATION. WASH THOROUGHLY AFTER HANDLING. IN CASE OF FIRE, USE ALCOHOL FOAM, DRY CHEMICAL, CARBON DIOXIDE - WATER MAY BE INEFFECTIVE. FLUSH SPILL AREA WITH WATER SPRAY.

SAF-T-DATA(TM) STORAGE COLOR CODE: RED (FLAMMABLE)

2 - HAZARDOUS COMPONENTS

COMPONENT	%	CAS NO.
METHANOL	90-100	67-56-1

3 - PHYSICAL DATA

BOILING POINT: 65 C (149 F)

MELTING POINT: -98 C (-144 F)

SPECIFIC GRAVITY: 0.79 (H2O=1)

SOLUBILITY(H2O): COMPLETE (IN ALL PROPORTIONS)

VAPOR PRESSURE(MM HG): 96

VAPOR DENSITY(AIR=1): 1.11

EVAPORATION RATE: 4.6 (BUTYL ACETATE=1)

% VOLATILES BY VOLUME: 100

APPEARANCE & ODOR: CLEAR, COLORLESS LIQUID WITH CHARACTERISTIC PUNGENT ODOR.

4 - FIRE AND EXPLOSION HAZARD DATA

FLASH POINT (CLOSED CUP 12 C (54 F)

NFPA 704M RATING: 1-3-0

FLAMMABLE LIMITS: UPPER - 36.0 % LOWER - 6.0 %

FIRE EXTINGUISHING MEDIA
USE ALCOHOL FOAM, DRY CHEMICAL OR CARBON DIOXIDE.
(WATER MAY BE INEFFECTIVE.)

SPECIAL FIRE-FIGHTING PROCEDURES
FIREFIGHTERS SHOULD WEAR PROPER PROTECTIVE EQUIPMENT AND SELF-CONTAINED BREATHING APPARATUS WITH FULL FACEPIECE OPERATED IN POSITIVE PRESSURE MODE. MOVE CONTAINERS FROM FIRE AREA IF IT CAN BE DONE WITHOUT RISK. USE WATER TO KEEP FIRE-EXPOSED CONTAINERS COOL.

UNUSUAL FIRE & EXPLOSION HAZARDS
VAPORS MAY FLOW ALONG SURFACES TO DISTANT IGNITION SOURCES AND FLASH BACK. CLOSED CONTAINERS EXPOSED TO HEAT MAY EXPLODE. CONTACT WITH STRONG OXIDIZERS MAY CAUSE FIRE.
BURNS WITH A CLEAR, ALMOST INVISIBLE FLAME.

TOXIC GASES PRODUCED
CARBON MONOXIDE, CARBON DIOXIDE, FORMALDEHYDE

5 - HEALTH HAZARD DATA

TLV LISTED DENOTES (TLV-SKIN).

THRESHOLD LIMIT VALUE (TLV/TWA): 260 MG/M3 (200 PPM)

SHORT-TERM EXPOSURE LIMIT (STEL): 310 MG/M3 (250 PPM)

PERMISSIBLE EXPOSURE LIMIT (PEL): 260 MG/M3 (200 PPM)

TOXICITY: LD50 (ORAL-RAT)(MG/KG) - 5628
LD50 (IPR-RAT)(MG/KG) - 9540

LD50 (SCU-MOUSE)(MG/KG) - 9800
LD50 (SKN-RABBIT) (G/KG) - 20

CARCINOGENICITY: NTP: NO IARC: NO Z LIST: NO OSHA REG: NO

EFFECTS OF OVEREXPOSURE
INHALATION AND INGESTION ARE HARMFUL AND MAY BE FATAL.
INHALATION MAY CAUSE HEADACHE, NAUSEA, VOMITING, DIZZINESS, NARCOSIS, SUFFOCATION, LOWER BLOOD PRESSURE, CENTRAL NERVOUS SYSTEM DEPRESSION.
LIQUID MAY BE IRRITATING TO SKIN AND EYES. PROLONGED SKIN CONTACT MAY RESULT IN DERMATITIS. EYE CONTACT MAY RESULT IN TEMPORARY CORNEAL DAMAGE.
INGESTION MAY CAUSE BLINDNESS.
INGESTION MAY CAUSE NAUSEA, VOMITING, HEADACHES, DIZZINESS, GASTROINTESTINAL IRRITATION.
CHRONIC EFFECTS OF OVEREXPOSURE MAY INCLUDE KIDNEY AND/OR LIVER DAMAGE.

TARGET ORGANS
EYES, SKIN, CENTRAL NERVOUS SYSTEM

MEDICAL CONDITIONS GENERALLY AGGRAVATED BY EXPOSURE
NONE IDENTIFIED

ROUTES OF ENTRY
INHALATION, INGESTION, EYE CONTACT, SKIN CONTACT

EMERGENCY AND FIRST AID PROCEDURES
CALL A PHYSICIAN.
IF SWALLOWED, IF CONSCIOUS, IMMEDIATELY INDUCE VOMITING.
IF INHALED, REMOVE TO FRESH AIR. IF NOT BREATHING, GIVE ARTIFICIAL RESPIRATION. IF BREATHING IS DIFFICULT, GIVE OXYGEN.
IN CASE OF CONTACT, IMMEDIATELY FLUSH EYES OR SKIN WITH PLENTY OF WATER FOR AT LEAST 15 MINUTES WHILE REMOVING CONTAMINATED CLOTHING AND SHOES.
WASH CLOTHING BEFORE RE-USE.

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6 - REACTIVITY DATA

STABILITY: STABLE HAZARDOUS POLYMERIZATION: WILL NOT OCCUR

CONDITIONS TO AVOID: HEAT, FLAME, OTHER SOURCES OF IGNITION

INCOMPATIBLES: STRONG OXIDIZING AGENTS, STRONG ACIDS, ALUMINUM

DECOMPOSITION PRODUCTS: CARBON MONOXIDE, CARBON DIOXIDE, FORMALDEHYDE

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7 - SPILL AND DISPOSAL PROCEDURES

STEPS TO BE TAKEN IN THE EVENT OF A SPILL OR DISCHARGE
WEAR SELF-CONTAINED BREATHING APPARATUS AND FULL PROTECTIVE CLOTHING.
SHUT OFF IGNITION SOURCES; NO FLARES, SMOKING OR FLAMES IN AREA. STOP LEAK IF YOU CAN DO SO WITHOUT RISK. USE WATER SPRAY TO REDUCE VAPORS. TAKE UP WITH SAND OR OTHER NON-COMBUSTIBLE ABSORBENT MATERIAL AND PLACE INTO CONTAINER FOR LATER DISPOSAL. FLUSH AREA WITH WATER.

J. T. BAKER SOLUSORB(R) SOLVENT ADSORBENT IS RECOMMENDED

FOR SPILLS OF THIS PRODUCT.

DISPOSAL PROCEDURE
DISPOSE IN ACCORDANCE WITH ALL APPLICABLE FEDERAL, STATE, AND LOCAL ENVIRONMENTAL REGULATIONS.

EPA HAZARDOUS WASTE NUMBER: U154 (TOXIC WASTE)

8 - PROTECTIVE EQUIPMENT

VENTILATION:	USE GENERAL OR LOCAL EXHAUST VENTILATION TO MEET TLV REQUIREMENTS.
RESPIRATORY PROTECTION:	RESPIRATORY PROTECTION REQUIRED IF AIRBORNE CONCENTRATION EXCEEDS TLV. AT CONCENTRATIONS ABOVE 200 PPM, A SELF-CONTAINED BREATHING APPARATUS IS ADVISED.
EYE/SKIN PROTECTION:	SAFETY GOGGLES AND FACE SHIELD, UNIFORM, PROTECTIVE SUIT, RUBBER GLOVES ARE RECOMMENDED.

9 - STORAGE AND HANDLING PRECAUTIONS

SAF-T-DATA(TM) STORAGE COLOR CODE: RED (FLAMMABLE)

SPECIAL PRECAUTIONS
BOND AND GROUND CONTAINERS WHEN TRANSFERRING LIQUID. KEEP CONTAINER TIGHTLY CLOSED. STORE IN A COOL, DRY, WELL-VENTILATED, FLAMMABLE LIQUID STORAGE AREA.

10 - TRANSPORTATION DATA AND ADDITIONAL INFORMATION

DOMESTIC (D.O.T.)

PROPER SHIPPING NAME	METHANOL
HAZARD CLASS	FLAMMABLE LIQUID
UN/NA	UN1230
LABELS	FLAMMABLE LIQUID
REPORTABLE QUANTITY	5000 LBS.

INTERNATIONAL (I.M.O.)

PROPER SHIPPING NAME	METHANOL
HAZARD CLASS	3.2, 6.1
UN/NA	UN1230
LABELS	FLAMMABLE LIQUID, POISON

04 OCT 96

MATERIAL SAFETY DATA SHEET
Weston Environmental Metrics, Inc.
2417 Bond Street
University Park, IL 60466-3182

Section 1. Name and Product

Product Name: Milli-Q Water

Trade Names or Synonyms: Water, Dihydrogen oxide

Formula Mixture or Components: N/A

Section 2. Physical Data

Boiling Point: 100oC
Melting Point: 0oC
Vapor Pressure at 20°C: 17.5
Vapor Density (air=1): N/A
Percent Volatiles by Volume: 100
Evaporation Rate (Butyl Acetate=1): N/A

Specific Gravity (H_2O=1): 1
Solubility in H_2O % by Wt.: 100
Appearance and Odor: clear, colorless

Section 3. Fire and Explosion Hazard Data

Flash Point: N/A °F Flammable Limits: LEL N/A UEL N/A
Extinguishing Media: Use extinguishing media appropriate for fire in area
Special Hazards and Procedures: None identified

Unusual Fire and Explosion Hazards: None identified

Section 4. Reactivity Data

Stable X
Unstable

Conditions to Avoid None identified

Materials to Avoid Strong reducing agents, acid chlorides, sodium

Hazardous Decomposition Products None identified

Section 5. Spill or Leak Procedures and Disposal

Steps to be Taken in Case Material is Released or Spilled Take up with absorbent material and contain for disposal

Waste Disposal Method performed in compliance with all current local, state, and federal regulations

Section 6. Health Hazard Data

TLV Not established

Effects of Overexposure None identified

First Aid Procedures None required

FOR ALL CASES OF OVEREXPOSURE, GET MEDICAL ASSISTANCE

Section 7. Special Protection Information

Eyes: goggles or approved eye protection
Skin: None required
Inhalation: General or local exhaust ventilation to keep mist levels low
Other:

Section 8. Special Handling and Storing Precautions

Keep container tightly closed. Keep from freezing.
Do not heat sealed container.

Section 9. Hazardous Ingredients

None other than specified product

Section 10. Other Information

N/A = not applicable/not available
DOT regulations Non regulated

MSDS for NITRIC ACID Page 1

1 - PRODUCT IDENTIFICATION

PRODUCT NAME: NITRIC ACID
FORMULA: HNO3
FORMULA WT: 63.01
CAS NO.: 7697-37-2
NIOSH/RTECS NO.: QU5775000
COMMON SYNONYMS: HYDROGEN NITRATE; AZOTIC ACID
PRODUCT CODES: 4801,9605,9602,9598,9606,9601,5371,9597,9600,5113,9616
EFFECTIVE: 09/10/86
REVISION #02

PRECAUTIONARY LABELLING

BAKER SAF-T-DATA(TM) SYSTEM

HEALTH	-	3	SEVERE (POISON)
FLAMMABILITY	-	0	NONE
REACTIVITY	-	3	SEVERE (OXIDIZER)
CONTACT	-	4	EXTREME (CORROSIVE)

HAZARD RATINGS ARE 0 TO 4 (0 = NO HAZARD; 4 = EXTREME HAZARD).

LABORATORY PROTECTIVE EQUIPMENT

GOGGLES & SHIELD; LAB COAT & APRON; VENT HOOD; PROPER GLOVES

PRECAUTIONARY LABEL STATEMENTS

POISON DANGER
STRONG OXIDIZER - CONTACT WITH OTHER MATERIAL MAY CAUSE FIRE
LIQUID AND VAPOR CAUSE SEVERE BURNS - MAY BE FATAL IF SWALLOWED
HARMFUL IF INHALED AND MAY CAUSE DELAYED LUNG INJURY
SPILLAGE MAY CAUSE FIRE OR LIBERATE DANGEROUS GAS
KEEP FROM CONTACT WITH CLOTHING AND OTHER COMBUSTIBLE MATERIALS. DO NOT STORE NEAR COMBUSTIBLE MATERIALS. DO NOT GET IN EYES, ON SKIN, ON CLOTHING. DO NOT BREATHE VAPOR. KEEP IN TIGHTLY CLOSED CONTAINER. USE WITH ADEQUATE VENTILATION. IN CASE OF FIRE, USE WATER SPRAY, ALCOHOL FOAM, DRY CHEMICAL, OR CARBON DIOXIDE. FLUSH SPILL AREA WITH WATERSPRAY.

SAF-T-DATA(TM) STORAGE COLOR CODE: YELLOW (REACTIVE)

2 - HAZARDOUS COMPONENTS

COMPONENT	%	CAS NO.
NITRIC ACID	65-75	7697-37-2

3 - PHYSICAL DATA

BOILING POINT: 121 C (250 F) VAPOR PRESSURE(MM HG):

MELTING POINT: -42 C (-44 F) VAPOR DENSITY(AIR=1):

SPECIFIC GRAVITY: 1.41 (H2O=1) EVAPORATION RATE: N/A (BUTYL ACETATE=1)

SOLUBILITY(H2O): COMPLETE (IN ALL PROPORTIONS) % VOLATILES BY VOLUME: 100

APPEARANCE & ODOR: COLORLESS LIQUID, WITH CHOKING ODOR.

4 - FIRE AND EXPLOSION HAZARD DATA

FLASH POINT (CLOSED CUP N/A NFPA 704M RATING: 3-0-0 OXY

FLAMMABLE LIMITS: UPPER - N/A % LOWER - N/A %

FIRE EXTINGUISHING MEDIA
USE WATER SPRAY.

SPECIAL FIRE-FIGHTING PROCEDURES
FIREFIGHTERS SHOULD WEAR PROPER PROTECTIVE EQUIPMENT AND SELF-CONTAINED BREATHING APPARATUS WITH FULL FACEPIECE OPERATED IN POSITIVE PRESSURE MODE. MOVE EXPOSED CONTAINERS FROM FIRE AREA IF IT CAN BE DONE WITHOUT RISK. USE WATER TO KEEP FIRE-EXPOSED CONTAINERS COOL; DO NOT GET WATER INSIDE CONTAINERS.

UNUSUAL FIRE & EXPLOSION HAZARDS
STRONG OXIDIZER. CONTACT WITH OTHER MATERIAL MAY CAUSE FIRE.

TOXIC GASES PRODUCED
NITROGEN OXIDES, HYDROGEN GAS

5 - HEALTH HAZARD DATA

THRESHOLD LIMIT VALUE (TLV/TWA): 5 MG/M3 (2 PPM)

SHORT-TERM EXPOSURE LIMIT (STEL): 10 MG/M3 (4 PPM)

PERMISSIBLE EXPOSURE LIMIT (PEL): 5 MG/M3 (2 PPM)

CARCINOGENICITY: NTP: NO IARC: NO Z LIST: NO OSHA REG: NO

EFFECTS OF OVEREXPOSURE
INHALATION OF VAPORS MAY CAUSE NAUSEA, VOMITING, LIGHTHEADEDNESS OR HEADACHE.
INHALATION OF VAPORS MAY CAUSE SEVERE IRRITATION OF THE RESPIRATORY SYSTEM.
INHALATION OF VAPORS MAY CAUSE COUGHING, CHEST PAINS, DIFFICULTY BREATHING, OR UNCONSCIOUSNESS.
CONTACT WITH LIQUID OR VAPOR MAY CAUSE SEVERE IRRITATION OR BURNS OF THE

SKIN, EYES, AND MUCOUS MEMBRANES.
INGESTION MAY CAUSE SEVERE BURNS TO MOUTH, THROAT, AND STOMACH. MAY HAVE ADVERSE EFFECT ON KIDNEY FUNCTION AND MAY BE FATAL.

INGESTION IS HARMFUL AND MAY BE FATAL.

TARGET ORGANS
EYES, SKIN, RESPIRATORY SYSTEM, TEETH

MEDICAL CONDITIONS GENERALLY AGGRAVATED BY EXPOSURE
NONE IDENTIFIED

ROUTES OF ENTRY
INHALATION, INGESTION, EYE CONTACT, SKIN CONTACT

EMERGENCY AND FIRST AID PROCEDURES
CALL A PHYSICIAN.
IF SWALLOWED, DO NOT INDUCE VOMITING; IF CONSCIOUS, GIVE WATER, MILK, OR MILK OF MAGNESIA.
IF INHALED, REMOVE TO FRESH AIR. IF NOT BREATHING, GIVE ARTIFICIAL RESPIRATION. IF BREATHING IS DIFFICULT, GIVE OXYGEN.
IN CASE OF CONTACT, IMMEDIATELY FLUSH EYES OR SKIN WITH PLENTY OF WATER FOR AT LEAST 15 MINUTES WHILE REMOVING CONTAMINATED CLOTHING AND SHOES.
WASH CLOTHING BEFORE RE-USE.

6 - REACTIVITY DATA

STABILITY: STABLE HAZARDOUS POLYMERIZATION: WILL NOT OCCUR

CONDITIONS TO AVOID: HEAT, LIGHT, MOISTURE

INCOMPATIBLES: STRONG BASES, COMBUSTIBLE MATERIALS, STRONG REDUCING AGENTS, ALKALIES, MOST COMMON METALS, ORGANIC MATERIALS, ALCOHOLS, CARBIDES

DECOMPOSITION PRODUCTS: OXIDES OF NITROGEN, HYDROGEN

7 - SPILL AND DISPOSAL PROCEDURES

STEPS TO BE TAKEN IN THE EVENT OF A SPILL OR DISCHARGE
WEAR SELF-CONTAINED BREATHING APPARATUS AND FULL PROTECTIVE CLOTHING. STOP LEAK IF YOU CAN DO SO WITHOUT RISK. VENTILATE AREA. NEUTRALIZE SPILL WITH SODA ASH OR LIME. WITH CLEAN SHOVEL, CAREFULLY PLACE MATERIAL INTO CLEAN, DRY CONTAINER AND COVER; REMOVE FROM AREA. FLUSH SPILL AREA WITH WATER. KEEP COMBUSTIBLES (WOOD, PAPER, OIL, ETC.) AWAY FROM SPILLED MATERIAL.

J. T. BAKER NEUTRASORB(R) OR NEUTRASOL(R) "LOW NA+" ACID NEUTRALIZERS ARE RECOMMENDED FOR SPILLS OF THIS PRODUCT.

DISPOSAL PROCEDURE
DISPOSE IN ACCORDANCE WITH ALL APPLICABLE FEDERAL, STATE, AND LOCAL ENVIRONMENTAL REGULATIONS.

EPA HAZARDOUS WASTE NUMBER: D002 (CORROSIVE WASTE)

8 - PROTECTIVE EQUIPMENT

VENTILATION:	USE GENERAL OR LOCAL EXHAUST VENTILATION TO MEET TLV REQUIREMENTS.
RESPIRATORY PROTECTION:	RESPIRATORY PROTECTION REQUIRED IF AIRBORNE CONCENTRATION EXCEEDS TLV. AT CONCENTRATIONS UP TO 100 PPM, A CHEMICAL CARTRIDGE RESPIRATOR WITH ACID CARTRIDGE IS RECOMMENDED. ABOVE THIS LEVEL, A SELF-CONTAINED BREATHING APPARATUS IS ADVISED.
EYE/SKIN PROTECTION:	SAFETY GOGGLES AND FACE SHIELD, UNIFORM, PROTECTIVE SUIT, ACID-RESISTANT GLOVES ARE RECOMMENDED.

9 - STORAGE AND HANDLING PRECAUTIONS

SAF-T-DATA(TM) STORAGE COLOR CODE: YELLOW (REACTIVE)

SPECIAL PRECAUTIONS
KEEP CONTAINER TIGHTLY CLOSED. STORE SEPARATELY AND AWAY FROM FLAMMABLE AND COMBUSTIBLE MATERIALS.

10 - TRANSPORTATION DATA AND ADDITIONAL INFORMATION

DOMESTIC (D.O.T.)

PROPER SHIPPING NAME	NITRIC ACID (OVER 40%) POISON - INHALATION HAZARD
HAZARD CLASS	OXIDIZER
UN/NA	UN2031
LABELS	OXIDIZER, CORROSIVE, POISON
REPORTABLE QUANTITY	1000 LBS.

INTERNATIONAL (I.M.O.)

PROPER SHIPPING NAME	NITRIC ACID
HAZARD CLASS	8
UN/NA	UN2031
LABELS	CORROSIVE

1 - PRODUCT IDENTIFICATION

PRODUCT NAME: SULFURIC ACID
FORMULA: H2SO4
FORMULA WT: 98.08
CAS NO.: 7664-93-9
NIOSH/RTECS NO.: WS5600000
COMMON SYNONYMS: OIL OF VITRIOL
PRODUCT CODES: 5030,9691,9675,5340,9679,9687,9674,9686,9694,9681,5374,9688 9673,5432,5137,9685,4802,9684,9683,5643,9680
EFFECTIVE: 09/08/86
REVISION #02

PRECAUTIONARY LABELLING

BAKER SAF-T-DATA(TM) SYSTEM

HEALTH	-	3	SEVERE (POISON)
FLAMMABILITY	-	0	NONE
REACTIVITY	-	3	SEVERE (WATER REACTIVE)
CONTACT	-	4	EXTREME (CORROSIVE)

HAZARD RATINGS ARE 0 TO 4 (0 = NO HAZARD; 4 = EXTREME HAZARD).

LABORATORY PROTECTIVE EQUIPMENT

GOGGLES & SHIELD; LAB COAT & APRON; VENT HOOD; PROPER GLOVES

PRECAUTIONARY LABEL STATEMENTS

POISON DANGER
HARMFUL IF INHALED
CAUSES SEVERE BURNS
MAY BE FATAL IF SWALLOWED
REACTS VIOLENTLY WITH WATER.

DO NOT GET IN EYES, ON SKIN, ON CLOTHING.
DO NOT BREATHE VAPOR. KEEP IN TIGHTLY CLOSED CONTAINER. LOOSEN CLOSURE CAUTIOUSLY. USE WITH ADEQUATE VENTILATION. WASH THOROUGHLY AFTER HANDLING. IN CASE OF SPILL NEUTRALIZE WITH SODA ASH OR LIME AND PLACE IN DRY CONTAINER.

SAF-T-DATA(TM) STORAGE COLOR CODE: WHITE (CORROSIVE)

2 - HAZARDOUS COMPONENTS

COMPONENT	%	CAS NO.
SULFURIC ACID	90-100	7664-93-9

3 - PHYSICAL DATA

BOILING POINT: 327 C (621 F) VAPOR PRESSURE(MM HG): <0.3

MELTING POINT: -2 C (28 F) VAPOR DENSITY(AIR=1): 3.4

SPECIFIC GRAVITY: 1.84 (H2O=1) EVAPORATION RATE: <1 (BUTYL ACETATE=1)

SOLUBILITY(H2O): COMPLETE (IN ALL PROPORTIONS) % VOLATILES BY VOLUME: N/A

APPEARANCE & ODOR: CLEAR, COLORLESS TO LIGHT YELLOW, OILY ODORLESS LIQUID.

---

4 - FIRE AND EXPLOSION HAZARD DATA

FLASH POINT (CLOSED CUP N/A NFPA 704M RATING: 3-0-2 W

FLAMMABLE LIMITS: UPPER - N/A % LOWER - N/A %

FIRE EXTINGUISHING MEDIA
USE DRY CHEMICAL OR CARBON DIOXIDE. DO NOT USE WATER.

SPECIAL FIRE-FIGHTING PROCEDURES
FIREFIGHTERS SHOULD WEAR PROPER PROTECTIVE EQUIPMENT AND SELF-CONTAINED BREATHING APPARATUS WITH FULL FACEPIECE OPERATED IN POSITIVE PRESSURE MODE.
DO NOT GET WATER INSIDE CONTAINERS.

UNUSUAL FIRE & EXPLOSION HAZARDS
REACTS WITH MOST METALS TO PRODUCE HYDROGEN GAS, WHICH CAN FORM AN EXPLOSIVE MIXTURE WITH AIR.
A VIOLENT EXOTHERMIC REACTION OCCURS WITH WATER. SUFFICIENT HEAT MAY BE PRODUCED TO IGNITE COMBUSTIBLE MATERIALS.

TOXIC GASES PRODUCED
SULFUR DIOXIDE

---

5 - HEALTH HAZARD DATA

THRESHOLD LIMIT VALUE (TLV/TWA): 1 MG/M3 (PPM)

PERMISSIBLE EXPOSURE LIMIT (PEL): 1 MG/M3 (PPM)

TOXICITY: LD50 (ORAL-RAT)(MG/KG) - 2140

CARCINOGENICITY: NTP: NO IARC: NO Z LIST: NO OSHA REG: NO

EFFECTS OF OVEREXPOSURE
INHALATION OF VAPORS MAY CAUSE SEVERE IRRITATION OF THE RESPIRATORY SYSTEM.
LIQUID MAY CAUSE SEVERE BURNS TO SKIN AND EYES.
INGESTION IS HARMFUL AND MAY BE FATAL.
INGESTION MAY CAUSE NAUSEA AND VOMITING.
INGESTION MAY CAUSE SEVERE BURNS TO MOUTH, THROAT, AND STOMACH. MAY HAVE ADVERSE EFFECT ON KIDNEY FUNCTION AND MAY BE FATAL.

CHRONIC OVEREXPOSURE MAY RESULT IN LUNG DAMAGE.

TARGET ORGANS
RESPIRATORY SYSTEM, EYES, SKIN, TEETH

MEDICAL CONDITIONS GENERALLY AGGRAVATED BY EXPOSURE
NONE IDENTIFIED

ROUTES OF ENTRY
INHALATION, INGESTION, EYE CONTACT, SKIN CONTACT

EMERGENCY AND FIRST AID PROCEDURES
CALL A PHYSICIAN.
IF SWALLOWED, DO NOT INDUCE VOMITING; IF CONSCIOUS, GIVE WATER, MILK, OR MILK OF MAGNESIA.
IF INHALED, REMOVE TO FRESH AIR. IF NOT BREATHING, GIVE ARTIFICIAL RESPIRATION. IF BREATHING IS DIFFICULT, GIVE OXYGEN.
IN CASE OF CONTACT, IMMEDIATELY FLUSH EYES OR SKIN WITH PLENTY OF WATER FOR AT LEAST 15 MINUTES WHILE REMOVING CONTAMINATED CLOTHING AND SHOES.
WASH CLOTHING BEFORE RE-USE.

6 - REACTIVITY DATA

STABILITY: STABLE HAZARDOUS POLYMERIZATION: WILL NOT OCCUR

CONDITIONS TO AVOID: MOISTURE, HEAT

INCOMPATIBLES: WATER, MOST COMMON METALS, ORGANIC MATERIALS, STRONG REDUCING AGENTS, COMBUSTIBLE MATERIALS, STRONG BASES, STRONG OXIDIZING AGENTS

DECOMPOSITION PRODUCTS: OXIDES OF SULFUR

7 - SPILL AND DISPOSAL PROCEDURES

STEPS TO BE TAKEN IN THE EVENT OF A SPILL OR DISCHARGE
WEAR SELF-CONTAINED BREATHING APPARATUS AND FULL PROTECTIVE CLOTHING.
STOP LEAK IF YOU CAN DO SO WITHOUT RISK. DO NOT USE WATER.
NEUTRALIZE SPILL AND/OR WASHINGS WITH SODA ASH OR LIME.
WITH CLEAN SHOVEL, PLACE MATERIAL INTO CLEAN, DRY CONTAINER AND COVER.
MOVE CONTAINER(S) FROM SPILL AREA.

J. T. BAKER NEUTRASORB(R) OR NEUTRASOL(R) "LOW NA+" ACID NEUTRALIZERS ARE RECOMMENDED FOR SPILLS OF THIS PRODUCT.

DISPOSAL PROCEDURE
DISPOSE IN ACCORDANCE WITH ALL APPLICABLE FEDERAL, STATE, AND LOCAL ENVIRONMENTAL REGULATIONS.

EPA HAZARDOUS WASTE NUMBER: D002, D003 (CORROSIVE, REACTIVE WASTE)

8 - PROTECTIVE EQUIPMENT

VENTILATION: USE GENERAL OR LOCAL EXHAUST VENTILATION TO MEET

TLV REQUIREMENTS.

RESPIRATORY PROTECTION: NONE REQUIRED WHERE APPROPRIATE VENTILATION CONDITIONS EXIST. IF THE TLV IS EXCEEDED, A SELF-CONTAINED BREATHING APPARATUS IS ADVISED.

EYE/SKIN PROTECTION: SAFETY GOGGLES AND FACE SHIELD, UNIFORM, PROTECTIVE SUIT, RUBBER GLOVES ARE RECOMMENDED.

9 - STORAGE AND HANDLING PRECAUTIONS

SAF-T-DATA(TM) STORAGE COLOR CODE: WHITE (CORROSIVE)

SPECIAL PRECAUTIONS
KEEP CONTAINER TIGHTLY CLOSED. STORE IN CORROSION-PROOF AREA.
KEEP CONTAINERS OUT OF SUN AND AWAY FROM HEAT.

10 - TRANSPORTATION DATA AND ADDITIONAL INFORMATION

DOMESTIC (D.O.T.)

PROPER SHIPPING NAME	SULFURIC ACID
HAZARD CLASS	CORROSIVE MATERIAL (LIQUID)
UN/NA	UN1830
LABELS	CORROSIVE
REPORTABLE QUANTITY	1000 LBS.

INTERNATIONAL (I.M.O.)

PROPER SHIPPING NAME	SULPHURIC ACID
HAZARD CLASS	8
UN/NA	UN1830
LABELS	CORROSIVE

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APPENDIX B

QUALITY ASSURANCE PROJECT PLAN

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FINAL
RI/FS WORK PLAN

SITE-SPECIFIC QUALITY ASSURANCE PROJECT PLAN

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

FEBRUARY 2001

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FINAL
RI/FS WORK PLAN

SITE-SPECIFIC QUALITY ASSURANCE PROJECT PLAN

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

1.0 INTRODUCTION

This Site-Specific Quality Assurance Project Plan (QAPjP) presents specific requirements for quality control (QC) of the field activities, quality assurance (QA) samples, and sample custody. This Site-specific QAPjP, in conjunction with PEER's programmatic QAPP for the ANG (PEER 1995a) provides a comprehensive QA/QC program.

2.0 FIELD QUALITY CONTROL

2.1 SAMPLE NUMBERING SYSTEM

All samples collected will be assigned a unique sample number according to QAPP SOP F-2, "Sample Identification," and as described below:

- a 3-character code representing the PEER project name (GAB for Gabreski ANG);
- a 2-character code representing the site number (01 for Site 1; 02 for Site 2; 03 for Site 3; 07 for Site 7; 10 for Site 10; 11 for Site 11; and 12 for Site 12; or a background location (BK for background);
- a 2-character code representing the sample type (DP = direct-push soil boring, SB = hollow-stem auger soil boring, SS = surface soil, GW = groundwater from a monitor well, SW = surface water, PW = groundwater from a direct-push boring, FB = field blank, RS = rinsate, and TB = trip blank);
- for monitoring wells, a 1- or 2-character and 2-digit code representing the well location (MW-01 = shallow monitor well -01, DW-07 = deep monitor well -07);
- for soil borings, a 2-digit location identifier (SB-01 = soil boring No. 01, or DP-01 = direct-push soil boring No. 01); and
- for soil boring samples, a second 2-digit number representing the sample interval (01 = the first sampling interval [i.e., for continuous sampling = 0 to 2 ft, or for 5-ft intervals = 0 to 2 ft]; 02 = the second sampling interval [i.e., for continuous sampling = 2 to 4 ft ,or for 5-ft intervals = 5 to 7 ft]).

For example, GAB-11-GW-MW-03 represents the groundwater sample obtained from monitoring well MW-03 at Site 11. GAB-BK-GW-DW-19 represents the groundwater sample from the background, deep well No. 19. GAB-BK-SB-20-03 represents the third soil sample collected from the soil boring to install the background monitor well No. 20. GAB-08-SS-01 represents the first surface soil sample collected at Site 8. GAB-DP-24-02 represents the 5- to 10-ft interval soil sample collected from direct-push soil boring No. 24. GAB-PW-13-01 represents the first groundwater sample from direct-push soil boring No. 13.

2.2 INSTRUMENT CALIBRATION

The portable photoionization detector (PID) used for screening for the presence of photoionizable organic compounds will be calibrated daily according to the manufacturer's instructions and in accordance with PEER SOP-F-5, "Field Measurement Using HNu (PEER 1994). The calibration will be accomplished using isobutylene gas and will be documented in the field logbook. The instrument will be zeroed using ambient air in an area away from the work zone which is representative of background conditions.

2.3 SAMPLE CONTAINERS AND LABELS

Sample containers will be purchased new and precleaned from the designated analytical laboratory. Sample volume requirements, preservation techniques, maximum holding times, and container material requirements are dictated by the medium being sampled and the analyses to be performed. A summary of these requirements is provided in Table 6.6 in the Work Plan. Field personnel will collect a sufficient volume of each sample in appropriate containers, properly preserved, to allow for all the analyses that are scheduled to be performed.

The sample labels will be supplied along with the bottles. The labels will be placed upon the containers prior to sample collection, and immediately upon collection, a unique sample number will be assigned to each sample in waterproof ink as described in Section 9.4.2.

2.4 FIELD LOGBOOK

During the RI, a field logbook will be maintained to record field data and observations of both PEER and Subcontractor activities. The logbook will be maintained in accordance with PEER Standard Operating Procedure (SOP) F-1, "Field Logbook" (PEER 1994).

The field logbook shall be bound and contain sequentially numbered pages, and all entries will be written in waterproof black ink. The following information will be included in the field logbook:

1. date and time task started; weather conditions; names, titles, and organizations of PEER personnel and subcontractor personnel performing the task;

2. name of drilling company, type of drill rig, drilling equipment, equipment condition, decontamination pad construction, names of drillers, ft of auger flight on-site;

3. a description of site activities as they occur in specific detail including date, time, name of any visitors, phone calls to PEER, and results, soil boring and well installation procedures, well development, and sampling;

4. a description of field screening activities in detail, including instrument calibration;

5. a description in specific detail of samples collected, including Universal Soil Classification System (USCS) classifications, blow counts, moisture, color, percent recovery, odor, and date and time collected, sample identification numbers, Chain-of-Custody form numbers (Section 2.6), and airbill number or other shipping identification number for samples shipped;

6. a list of the time, equipment type, and decontamination procedures followed;

7. documentation of equipment failures or breakdowns, reasons, time resolved, and description of repairs;

8. any field changes made to the Work Plan; and

9. a list of investigation derived wastes, each container identification number, contents, volume, recommended disposition, location stored.

Each page shall be dated and signed by the person making the entry. Incorrect entries will be corrected by drawing a single line through the error, and initialing it.

2.5 SAMPLE PACKAGING AND SHIPMENT

Samples will be packed and shipped, as necessary, in accordance with PEER SOP F-3, "Packaging and Shipment of Environmental Samples" (PEER 1994), within 24 hours of collection. Immediately upon collection, samples will be placed in a shipping container at the point of collection and surrounded with double-bagged water ice (or blue ice) so that the temperature of the samples is maintained at 4°C. Packing material will be used to secure the samples in the shipping container to help prevent breakage of glass containers. Enough packing material shall be placed in the cooler so that the samples do not rattle or shake inside the shipping container. When the samples are deemed secure from breakage and properly iced, the chain-of-custody form (Figure B.1) will be placed in a plastic cover and taped inside the lid of the shipping container. The lid of the container will then be closed, secured using clear or nylon strapping tape, and custody sealed to ensure that samples will not be disturbed during shipment.

Coolers or other shipping containers will be either shipped by a next-day delivery service to the laboratory or hand-delivered to the laboratory by PEER personnel. Notification of shipment, including airbill number, will be telephoned to the laboratory the day of sample collection. Receipt of the previous day's shipment will be confirmed daily. All sample containers, preservatives, and shipping crates/coolers will be supplied by the designated analytical laboratory.

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CHAIN-OF-CUSTODY RECORD

COC # _____

PROJECT NO.	PROJECT NAME	NUMBER, TYPE, AND VOLUME OF CONTAINERS	ANALYSES	PRESERVATIVES
SAMPLERS (SIGNATURE)				

ITEM NO.	DATE (MM/DD/YY)	TIME (MILITARY)	COMP	GRAB	SAMPLE NUMBER	MATRIX (1)

Relinquished By: (Signature)	Date/Time	Received By: (Signature)
Relinquished By: (Signature)	Date/Time	Received By: (Signature)
Relinquished By: (Signature)	Date/Time	Received By: (Signature)

Analytical Laboratory: _____

Contact: _____

Phone No: _____

Send results to:

PEER CONSULTANTS, P.C.
575 Oak Ridge Turnpike
Oak Ridge, TN 37830
Attn: _____
(615) 483-3191

Distribution:
White Copy Accompanies Shipment
Yellow Copy to Project Manager
Pink Copy for Field Files

(1) S - Soil SD - Sediment SL - Sludge SO - Solid Waste
GW - Ground Water SW - Surface Water LW - Liquid Waste

Figure B.1 Example Chain-of-Custody Form

2.6 CHAIN-OF-CUSTODY

Chain-of-custody shall be maintained from the time of sample collection through analysis. All samples collected for laboratory analyses will be documented on a Chain-of-Custody Form (Figure B-1). The original chain-of-custody form will accompany all samples from the time of collection through laboratory receipt. Copies of the chain-of-custody forms will be maintained by the PEER Site Manager. Each custody transfer by hand delivery will be documented by signature of the relinquishing and receiving individuals and the date and time of transfer. The chain-of-custody form for samples to be shipped will be placed in a sealing plastic bag inside the coder or shipping container; the airbill number (or other shipment identification number) will be entered on the chain-of-custody form.

The chain-of-custody form will document the following information: project name, signature of sampler, sampling station, sample number, date and time of sample collection, grab or composite designation, matrix, preservatives, analyses requested, and signatures of individuals involved in sample transfer.

This procedure will be used throughout the closure assessments to guide the transmittal of information regarding collected samples to the analytical laboratory, and other necessary parties. Samples are considered to be under custody if:

- they are in the sampler's possession, or
- they are in the sampler's line of sight after being in possession,
- they are locked or sealed so that no one can tamper with it after having been in physical custody, or
- they are in a designated controlled secure area.

The Project/Site Manager will have overall responsibility for ensuring the care and custody of the samples collected is maintained until they are transferred or properly dispatched to the laboratory. Each individual who collects a sample is responsible for sample custody until transferred to someone else via the chain-of-custody form.

2.7 PREVENTION OF CROSS-CONTAMINATION

Cross-contamination will be prevented by decontaminating all sampling, development and measurement equipment before each use. Additionally, during sampling events, personnel will wear new disposable gloves which will be changed between sampling points. Sampling equipment will not be placed directly on the ground, but will be placed on clean plastic sheeting. Further, environmental assessment activities will begin in areas least likely to be contaminated and end where the higher levels of contamination are expected to exist.

2.8 FIELD QUALITY CONTROL SAMPLES

To enhance the reliability of field sampling procedures and materials, field QC samples will be collected or prepared during each round of sampling as described in the following sections and shown on Table B.1. A summary of analytical methods and collection requirements is provided in Table 6.1 in the Work Plan.

Duplicates. Duplicate groundwater and soil samples will be obtained at a frequency of 10% and analyzed for TPH-GRO/DRO, volatile and semivolatile organics, and metals (groundwater only).

Trip Blank. A trip blank will accompany each shipping container containing samples that are to be analyzed for volatile organics at the off-site laboratory. The trip blanks will be supplied by the laboratory and will be analyzed for volatile organics.

Equipment Rinsate. One decontamination rinsate sample will be collected per every 10 samples from the final deionized water rinse from the decontamination of downhole and sampling equipment. Rinsate samples will be analyzed for TPH-GRO/DRO, volatile and semivolatile organics, and metals (groundwater only).

Field Blank Samples. Two field blank samples will be collected during the field activities from the water sources used for decontamination during each event. One sample will be collected from the potable (tap) water used for decontamination, and a second will be collectd from the ASTM Type II final rinse water.

Matrix Spike/Matrix Spike Duplicate. Additional volume of sample will be collected from wells and soil borings at a frequency of 5% and submitted to the analytical laboratory for analysis for TPH-GRO/DRO, volatile and semivolatile organics, and metals (groundwater only).

Table B.1

Summary of Quality Control Samples

Sample Type	Sample Frequency	Estimated Number of Samples per Round	Analyses
Groundwater/Soil Duplicate	10%	Round 1 = 1 Round 2 = 1 1	As shown on Table 6.1
Trip Blank	1/cooler w/volatiles	Round 1 = 4 Round 2 = 2	Volatiles
Equipment Rinsate	1 per every 10 samples	Round 1 = 5 Round 2 = 1	Volatile Organic Compounds, Semivolatile Organic Compounds, Pesticides/ PCBs, Metals
Matrix Spike/Matrix Spike Duplicates	20%	Round 1 = 8 Round 2 = 2	As shown on Table 6.1
Field Blanks (Potable and ASTM Type II Water)	2/Round	Round 1 = 2 Round 2 = 2	Volatile Organic Compounds, Semivolatile Organic Compounds, Pesticides/ PCBs, Metals

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