

**INSTALLATION RESTORATION
PROGRAM
SITE INVESTIGATION REPORT
IRP SITES NO.1, NO.2, AND NO.3**

VOLUME I

**106th CIVIL ENGINEERING FLIGHT
NEW YORK AIR NATIONAL GUARD
ROSLYN AIR NATIONAL GUARD STATION
ROSLYN, NEW YORK**

NOVEMBER 1996

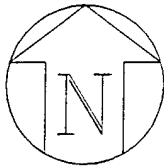


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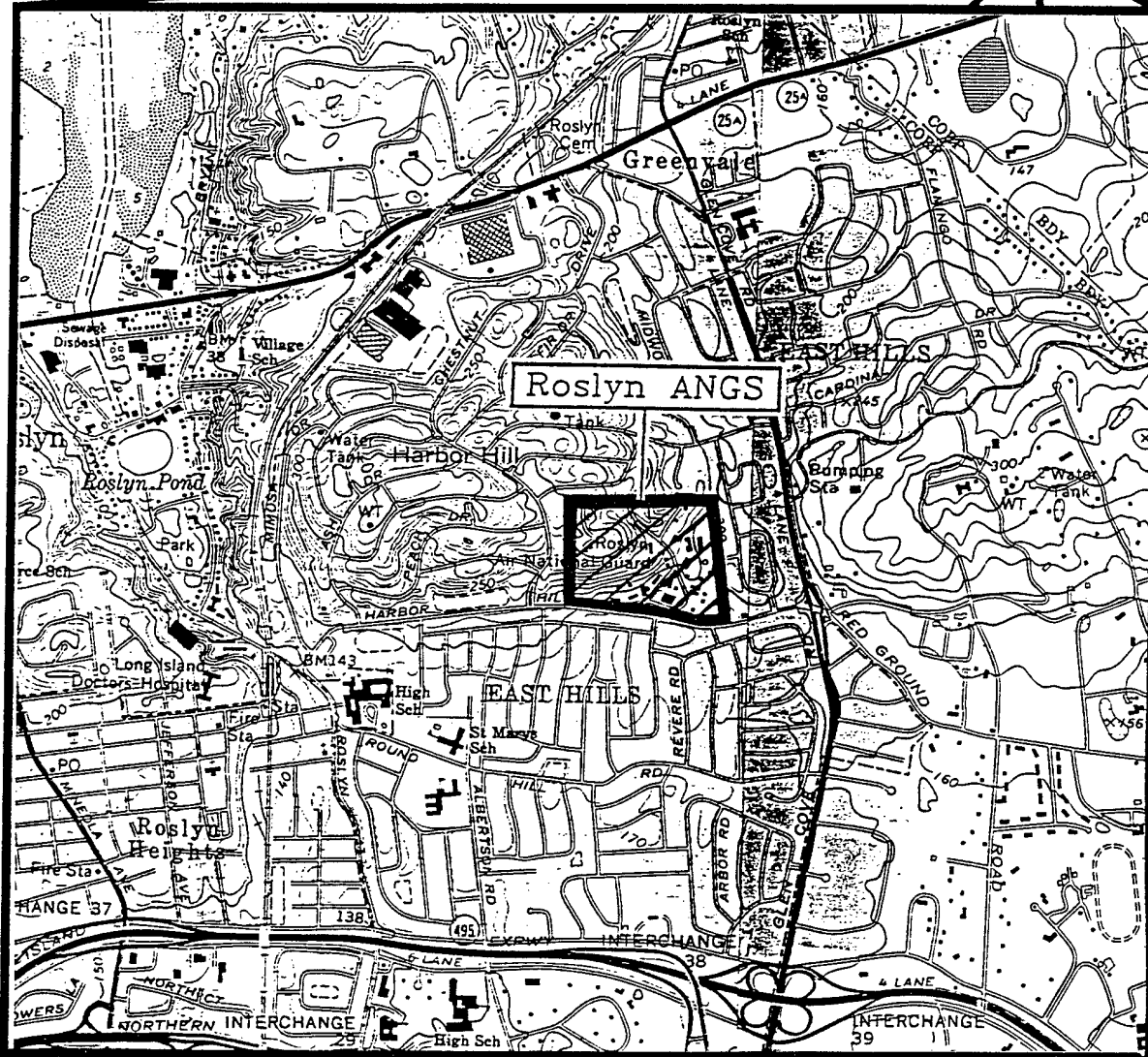
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STATE LOCATION MAP OF ROSLYN
AIR NATIONAL GUARD STATION
New York Air National Guard
Roslyn, New York

OPTTECH
OPERATIONAL TECHNOLOGIES
CORPORATION

JULY 1994

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NOVEMBER 1996

Prepared For

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ANDREWS AFB, MARYLAND**

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Prepared By

**Operational Technologies Corporation
4100 N.W. Loop 410, Suite 230
San Antonio, Texas 78229-4253
(210) 731-0000**

SI Report
106th Civil Engineering Flight
Roslyn Air National Guard Station
New York Air National Guard, Roslyn, New York

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LIST OF ACRONYMS

AGE	Aerospace Ground Equipment
AMSL	Above mean sea level
ANG	Air National Guard
ANGRC	Air National Guard Readiness Center
ANGS	Air National Guard Station
ARARs	Applicable or Relevant and Appropriate Requirements
ASP	Analytical Services Program
ASTM	American Society of Testing and Materials
ATHA	Ambient Temperature Headspace Analysis
AWQC	Ambient Water Quality Criteria
BH	Borehole
BLS	Below Land Surface
BMSL	Below mean sea level
BTEX	Benzene, Toluene, Ethylbenzene, and Xylenes
C	Centigrade
CAP	Civil Air Patrol
CCS	Combat Communications Squadron
CEF	Civil Engineering Flight
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CLP	Contract Laboratory Program
cm/sec	Centimeters per second
CRDL	Contract Required Detection Limit
CRQL	Contract Required Quantitation Limit
CRZ	Contamination Reduction Zone
DD	Decision Document
DERP	Defense Environmental Restoration Program
DoD	Department of Defense
DOT	Department of Transportation
DRMO	Defense Reutilization and Marketing Office
EIS	Engineering Installation Squadron
EO	Executive Order
F	Fahrenheit
FS	Feasibility Study
GC	Gas Chromatograph
GC/MS	Gas Chromatograph/Mass Spectrometer
GPM	Gallons per minute
HARM	Hazard Assessment Rating Methodology
HAS	Hazard Assessment Score
HQ ANG/CEVR	Headquarters Air National Guard
HRS	Hazard Ranking System
HSA	Hollow-Stem Auger

LIST OF ACRONYMS (Continued)

ID	Interior Diameter
IDL	Instrument Detection Limit
IRP	Installation Restoration Program
MCL	Maximum Contaminant Level
MOGAS	Motor Gasoline
MSL	Mean Sea Level
MTBE	Methyl-t-butyl-ether
MW	Monitoring Well
NFA	No Further Action
NYANG	New York Air National Guard
NYSDEC	New York State Department of Environmental Conservation
OpTech	Operational Technologies Corporation
OWS	Oil/Water Separator
PA	Preliminary Assessment
PCBs	Polychlorinated Biphenyls
PID	Photoionization Detector
PPE	Personal Protective Equipment
PVC	Polyvinyl Chloride
QA/QC	Quality Assurance/Quality Control
QAPP	Quality Assurance Project Plan
RA	Remedial Action
RAS	Routine Analytical Services
RCRA	Resource Conservation and Recovery Act
RD	Remedial Design
RI	Remedial Investigation
RI/FS	Remedial Investigation/Feasibility Study
RPD	Relative Percent Difference
RSCO	Recommended Soil Cleanup Objective
SARA	Superfund Amendments and Reauthorization Act
SCS	Soil Conservation Service
SDG	Sample Delivery Group
SI	Site Investigation
SVOC	Semivolatile Organic Compounds
TAGM	Technical and Administrative Guidance Document
TAL	Target Analyte List
TCL	Target Compound Level
TPH	Total Petroleum Hydrocarbons
TVHC	Total Volatile Hydrocarbons
$\mu\text{g}/\text{kg}$	Micrograms per kilogram
$\mu\text{g}/\text{L}$	Micrograms per liter
USAF	United States Air Force

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LIST OF ACRONYMS (Concluded)

USDA	United States Department of Agriculture
USEPA	United States Environmental Protection Agency
USGS	United States Geological Survey
UST	Underground Storage Tank
VOA	Volatile Organic Analysis
VOC	Volatile Organic Compounds

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EXECUTIVE SUMMARY

ES 1.0 INTRODUCTION

This report presents the results of the Site Investigation (SI) conducted at IRP Sites No. 1, No. 2, and No. 3 at the 106th Civil Engineering Flight (CEF) located at Roslyn Air National Guard Station (ANGS), Roslyn, Long Island, New York. A Preliminary Assessment (PA) of the 106th CEF was published by Science and Technology, Inc., in February 1991. The PA resulted in the identification of two potentially contaminated waste holding areas and a waste sludge application site. These sites were identified as IRP Site No. 1 (Access Road to Aerospace Ground Equipment "AGE" Shop), IRP Site No. 2 (Old Waste Holding Area No. 1), and IRP Site No. 3 (Old Waste Holding Area No. 2) and recommended for further investigation under the Installation Restoration Program (IRP).

The Air National Guard Readiness Center/Installation Restoration Branch (HQ ANG/CEVR) authorized Operational Technologies Corporation (OpTech) to prepare an SI Work Plan and conduct the SI at the three identified IRP sites. A groundwater investigation was conducted as part of the SI to determine if groundwater at the Station was impacted by the existence of dry wells in the parking area, and at the vehicle maintenance shop and paint shop. This investigation was conducted as outlined in the SI Work Plan submitted to the HQ ANG/CEVR and the New York State Department of Environmental Conservation (NYSDEC) in April 1993, and approved in May 1993. The field investigation was conducted in two phases. Initial field work commenced on 10 September 1993, included the majority of the soil investigation, and was completed on 24 September 1993. The second phase, which included the groundwater investigation and final soil sampling commenced on 5 April 1994 and was completed on 18 May 1994.

The field investigation at Roslyn ANGS was accomplished by completing the following tasks.

- Collect 58 soil gas samples;
- Install three piezometer wells;
- Drill 19 soil borings;
- Collect 52 investigative soil samples;
- Install three groundwater monitoring wells;
- Collect two rounds of water level measurements on all newly installed piezometer and monitoring wells;
- Collect two rounds of groundwater samples from three newly installed monitoring wells;

- Test three newly installed monitoring wells for hydraulic conductivity using the rising head slug test method; and
- Survey the location of all soil gas sampling points, and the location and elevation of all soil borings, piezometers, and monitoring wells.

ES 2.0 INVESTIGATIONS AT THE IRP SITES

ES 2.1 IRP Site No. 1 - Access Road to the AGE Shop

The site was a dirt road located on the east side of Roslyn ANGS used as an access route to the AGE Shop. It extends from the entrance to the AGE Shop (Building 36) parking area to the perimeter fence. Potential contaminants at the site include new and waste oil, paint thinners, diesel fuels, leaded MOGAS, and possibly solvents that were poured on the access road bed to settle dust. The site was completely covered with asphalt as the motor pool/parking lot was expanded.

Five volatile organic compounds (VOCs) were detected in soil samples obtained from IRP Site No. 1 above NYSDEC Contract Required Quantitation Limits (CRQLs), however, when compared against NYSDEC Recommended Soil Cleanup Objectives (RSCOs) none exceeded State recommended cleanup objectives. There were no semivolatile organic compounds (SVOCs) detected in soil samples from the site at concentrations greater than CRQLs. Four pesticides were detected in soil samples at the site, however, none exceeded State RSCOs.

Fourteen TAL metals exceeded data collected from background sampling at various soil sampling locations at IRP Site No. 1. Six TAL metals exceeded eastern USA background/RSCO concentrations in various samples, however, the TAL metals were not directly attributed to potential contaminants at the site and may be naturally occurring.

Considering the Roslyn ANGS has restricted access, the entire site is covered by asphalt, and groundwater at the site is at least 140 feet below land surface (BLS), further site-specific investigations at IRP Site No. 1 are not recommended.

Based on the results of the SI, a No Further Action Decision Document should be generated for IRP Site No. 1.

ES 2.2 IRP Site No. 2 - Old Waste Holding Area No. 1

This site is the old waste holding area for the Vehicle Maintenance Shop and is located adjacent to the north wall of Building 16 (Vehicle Maintenance Shop). New and waste oil, PD-680 solvent, paint thinner, and leaded MOGAS from the Vehicle Maintenance Shop have been stored at the site. Additionally, liquid wastes from the old AGE Shop in use prior to 1971, were also stored here. The quantities of materials and waste spilled at this site over its life is unknown.

Six VOCs, one SVOC, six pesticides, and one polychlorinated biphenyl (PCB) compound were detected in soil samples obtained from IRP Site No. 2 above CRQLs. However, when compared against RSCOs, no analytes detected at the site exceeded State recommended cleanup objectives.

All TAL metals detected in soil samples from IRP Site No. 2 exceeded data collected from background sampling with the exception of thallium and cyanide. Seven TAL metals exceeded Eastern USA/RSCO concentrations in various samples. However, the TAL metals were not directly attributed to potential contaminants at the site and may be naturally occurring.

This site is mostly grass covered with only the northeast portion covered by asphalt. Additional investigation concerning naturally occurring concentrations of TAL metals at the Station is recommended since contact with the soil at this site is possible. Additional background sampling at the Station is recommended to evaluate TAL metals concentrations found at IRP Site No. 2.

ES 2.3 IRP Site No. 3 - Old Waste Holding Area No. 2

This site was the old waste holding area for the AGE Shop located along the north wall of Building 36 (AGE shop). Waste oil, paint thinner, JP-4, PD-680 solvent, diesel fuel, toluene, and leaded MOGAS were stored at the site. The PA reported that petroleum stains were visually evident at the site, however, the total quantity of liquid wastes spilled is unknown. This area is now paved with asphalt and there is no visible indication of the waste holding area at the site.

Two VOCs and seven pesticides were detected at IRP Site No. 3 at concentrations greater than CRQLs, however when compared against RSCOs, no contamination exceeded State recommended cleanup objectives. Twelve SVOCs were detected at the site at concentrations greater than CRQLs of which eight were below State recommended cleanup objectives. Four additional SVOCs, naphthalene, benzo(a)anthracene, benzo(b)pyrene, and chrysene have concentrations in excess of State RSCO concentrations. All SVOCs in excess of State RSCOs were detected in soil from the

top-most interval, immediately under the asphalt cover. SVOC analysis from the next 5-foot interval indicated all compounds were below CRQLs.

TAL metals detected in soil samples from IRP Site No. 3 exceeded data collected from background sampling in 14 analytes tested. Eight TAL metals exceeded Eastern USA/RSCO concentrations in various samples, but cannot be directly attributed to potential contaminants at the site and may be naturally occurring. Cyanide was detected in only one soil sample at IRP Site No. 3 at 0.87 milligrams per kilogram (mg/kg) which slightly exceeds the general Station background concentration of 0.66 mg/kg.

The site is completely covered by asphalt that prevents exposure to soil and significantly decreases the possibility of contaminants migrating. Groundwater at this location is over 139 feet BLS. Therefore, further site-specific investigations at IRP Site No. 3 are not recommended.

Based on the results of the SI, a No Further Action Decision Document should be prepared for IRP Site No. 3.

ES 2.4 Groundwater Findings

Two dry wells are located in close proximity to IRP Site No. 2. The first dry well is located under the western portion of the Vehicle Maintenance Shop (Building 16) and the second dry well is located west of the Vehicle Maintenance Shop and north of the Vehicle Paint Shop (Building 9). Floor drains in the Vehicle Maintenance Shop and Vehicle Paint Shop discharge directly into the respective dry wells. These dry wells were included in the investigation to determine if maintenance and painting activities in close proximity to the dry wells has affected groundwater.

Two additional dry wells are located approximately 35 feet northeast of IRP Site No. 3. These dry wells receive precipitation runoff channeled through ditches, catch basins, and surface flows from the northeast portion of the Station. As with IRP Site No. 2, these sites were added to the investigation to attempt to determine if contamination from surface runoff has affected the groundwater.

Three monitoring wells were installed at the Station to investigate the dry wells. One monitoring well (01-001MW) was located upgradient of the dry wells near the Station boundary and used to provide background groundwater conditions applicable to the area. Two monitoring wells, 02-001MW and 03-001MW, were installed immediately downgradient of the two sets of dry wells.

Two rounds of water samples were collected and analyzed from three monitoring wells installed at the Station. No VOCs or PCBs were detected above NYSDEC CRQLs in any groundwater samples collected at the Station. Three SVOCs were detected in groundwater from 03-001MW in round 1 sampling only. Groundwater concentrations for these compounds were all below Guidance Values, as outlined in the NYSDEC Ambient Water Quality Standards and Guidance Values. The pesticide endrin was detected in both groundwater samples collected from 03-001MW. There are no Guidance Values for endrin promulgated in the NYSDEC memorandum for groundwater, however, the pesticide detected did not exceed surface water standards classified as "Protected for Source for Drinking Water."

TAL metals levels found in groundwater samples from 02-001MW and 03-001MW were compared against the maximum values obtained from the background sampling location (01-001MW) to determine if analyte levels exceeded naturally occurring concentrations. Thirteen TAL metals slightly exceeded maximum background levels in at least one sampling round. Only manganese and nickel were detected in excess of maximum background levels from the same well (03-001MW) in both sampling rounds. Due to the location of the background well, background levels are indicative of water quality entering the base. Lead was detected at a maximum concentration of 47.6 micrograms per liter ($\mu\text{g/L}$) in 03-001MW (round 2) which slightly exceed the maximum background concentration of 35.9 $\mu\text{g/L}$.

ES 3.0 RECOMMENDATIONS

Based on the results of the SI conducted, on 12 October 1995 the NYSDEC agreed with the following recommendations:

1. Generate No Further Action Decision Documents for IRP Site No. 1 and Site No. 3.
2. Conduct additional soil sampling to establish background concentrations of TAL metals in soil to determine if levels detected at IRP Site No. 2 exceed naturally occurring conditions. Station TAL metals background conditions have not been defined sufficiently to allow a determination if concentrations detected at this site are naturally occurring.

In addition, the NYSDEC will remove the Roslyn ANGS from any further investigation consideration.

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SECTION 1.0 INTRODUCTION

This Site Investigation (SI) report presents the results of investigation activities conducted at the 106th Civil Engineering Flight (CEF), Roslyn Air National Guard Station (ANGS), Roslyn, Long Island, New York (Inside Front Cover Figure). A PA of the 106th CEF, Roslyn ANGS, was published by Science and Technology, Inc., in February 1991. Information obtained through interviews, review of Station records, and field observations resulted in the identification of two potentially contaminated waste holding areas and a waste sludge application site. These sites are identified as Installation Restoration Program (IRP) Site No. 1 (Access Road to Aerospace Ground Equipment "AGE" Shop), IRP Site No. 2 (Old Waste Holding Area No. 1), and IRP Site No. 3 (Old Waste Holding Area No. 2). These sites are presented on Figure 1.1. In addition, four dry wells in the vicinity of the sites (two south of IRP Site No. 2 and two northeast of IRP Site No. 3) were recommended by Air National Guard Readiness Center (ANGRC) and Station personnel for investigation to determine if contamination resulting from floor drains discharging into these wells exists, and if groundwater has been adversely affected.

The Air National Guard Readiness Center/Installation Restoration Branch (HQ ANG/CEVR) authorized Operational Technologies Corporation (OpTech) to prepare an SI Work Plan and conduct the SI at the three identified IRP sites. This investigation was conducted as outlined in the May 1993 SI Work Plan submitted to the HQ ANG/CEVR and the New York State Department of Environmental Conservation (NYSDEC).

1.1 INSTALLATION RESTORATION PROGRAM

The Defense Environmental Restoration Program (DERP) was established in 1984 to promote and coordinate efforts for the evaluation and cleanup of contamination at Department of Defense (DoD) installations. On 23 January 1987, Presidential Executive Order (EO) 12580 assigned specific responsibility to the Secretary of Defense for carrying out DERP within the overall framework of the Superfund Amendments and Reauthorization Act (SARA) of 1986 and the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) of 1980. The IRP was established under DERP to identify, investigate, and clean up contamination at DoD installations. The IRP focused on cleanup of contamination associated with past DoD activities to ensure that threats to public health were minimized and natural resources were restored for future use. Within the Air National Guard, HQ ANG/CEVR manages the IRP.

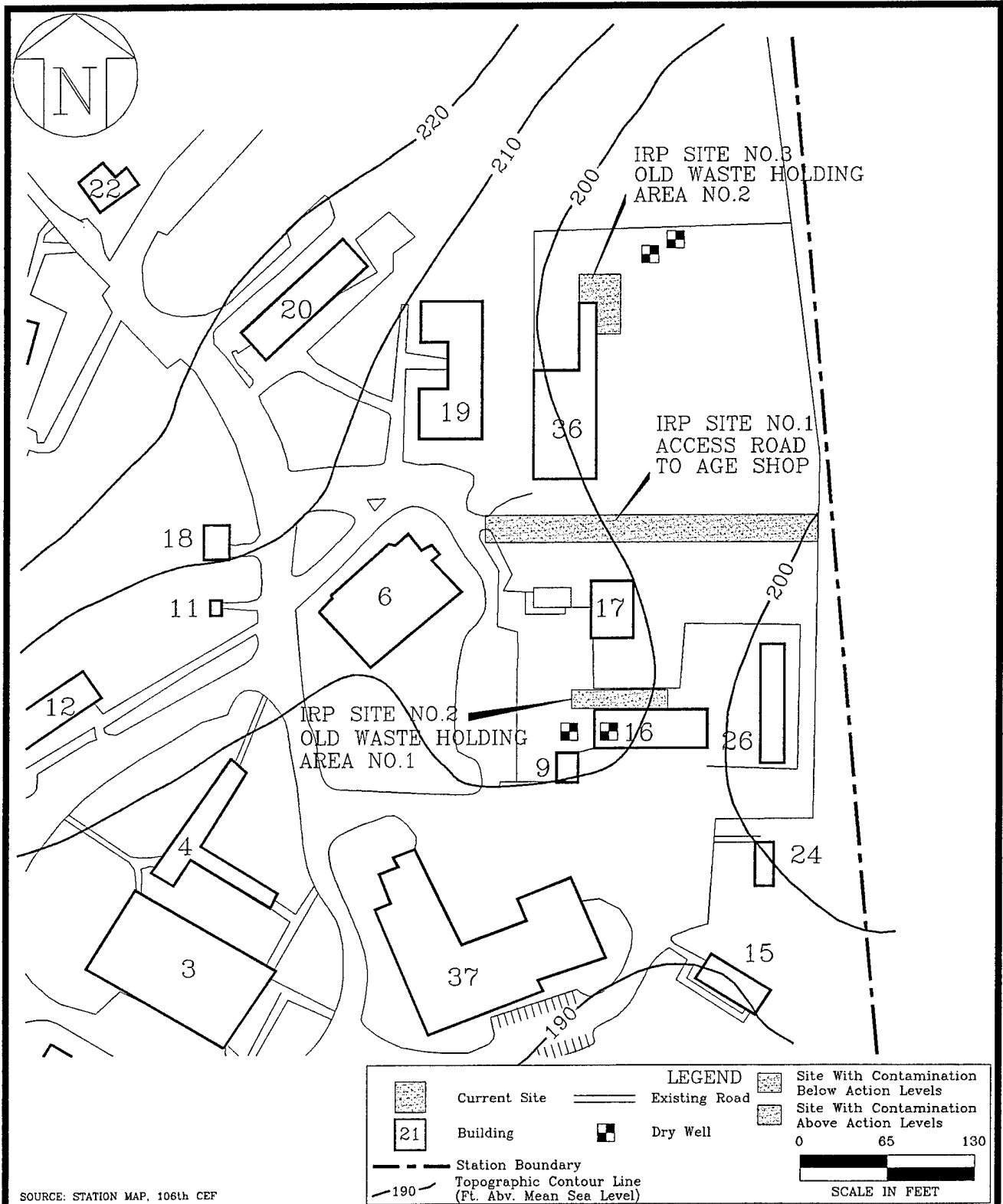


FIGURE 1.1

ROSLYN\ROSL1-2C

IRP SITES AT ROSLYN
AIR NATIONAL GUARD STATION
New York Air National Guard
Roslyn, New York

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SEPTEMBER 1995

The IRP is divided into six phases as illustrated in Figure 1.2, and defined and described in the following subsections.

1.1.1 Preliminary Assessment (PA)

The PA process consists of personnel interviews, a records search, and site visits designed to identify and evaluate past disposal and/or spill sites that might pose a potential and/or actual hazard to public health, public welfare, or the environment. Previously undocumented information is obtained through the interview process. The records search focuses on obtaining useful information from aerial photographs; installation plans; facility inventory documents; lists of hazardous materials used; subcontractor reports; correspondence; Material Safety Data Sheets; Federal/State agency scientific reports and statistics; Federal administrative documents; Federal/State records on endangered species, threatened species, and critical habitats; documents from local government offices; and numerous standard reference sources.

1.1.2 Site Investigation (SI)

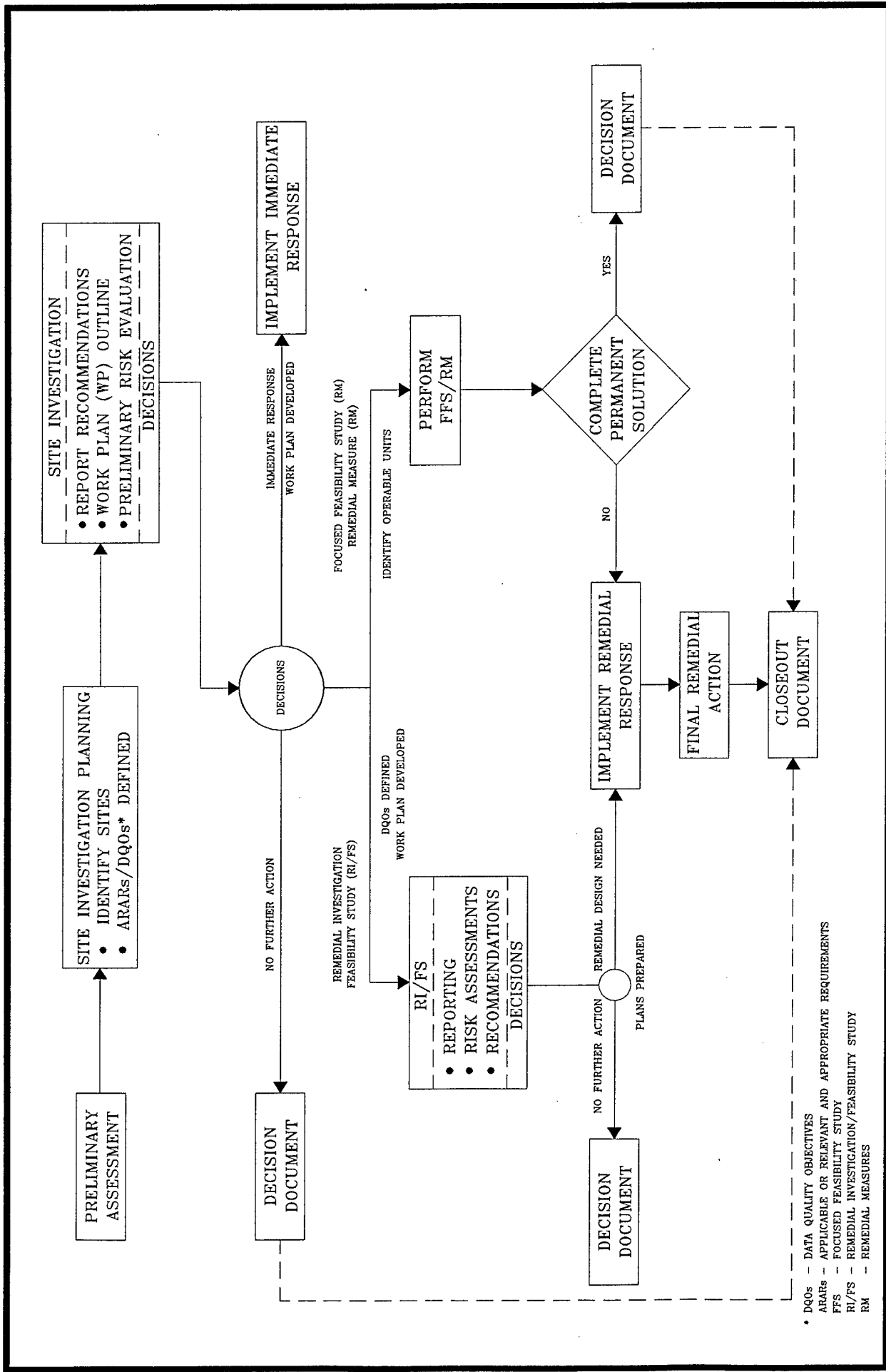
The SI phase consists of field activities designed to confirm the presence or absence of contamination at the potential sites identified in the PA or during non-related IRP investigations, and to provide data needed to reach a decision point for the site. The activities undertaken during the SI generally fall into three distinct categories: screening, confirmation, and optional activities.

Screening Activities

Screening activities are conducted prior to drilling activities to gather preliminary data on each site. Screening activities may include the use of such tools as a magnetometer survey to locate underground lines, tanks, and utilities; soil gas surveys for developing the optimum number and location of soil borings needed to delineate soil contamination, and to be used as a guide in the selection of monitoring well locations; or the installation of a piezometer network in order to determine groundwater flow direction prior to installation of any groundwater monitoring wells.

Confirmation Activities

Confirmation activities include the installation of soil borings and/or monitoring wells; specific media sampling; and laboratory analysis to confirm either the presence or the



* DQOs - DATA QUALITY OBJECTIVES
 ARARs - APPLICABLE OR RELEVANT AND APPROPRIATE REQUIREMENTS
 FFS - FOCUSED FEASIBILITY STUDY
 RI/FS - REMEDIAL INVESTIGATION/FEASIBILITY STUDY
 RM - REMEDIAL MEASURES

DRAFT
FIGURE 1.2

FLOW OF INSTALLATION RESTORATION PROGRAM TASKS
 Roslyn Air National Guard Station
 New York Air National Guard
 Roslyn, New York

absence of contamination, levels of contamination, and the potential for contaminant migration. Information obtained during the subsurface investigation is also utilized to define the installation and site hydrology, geology, and soil characteristics.

Optional Activities

Optional activities are used if additional data are needed to reach a decision point for a site, such as no further IRP action is warranted, prompt removal of contaminants is necessitated, or further IRP work is required. Optional activities may include increasing the number of soil gas sampling points or the number of soil borings and/or monitoring wells to be drilled.

The general approach for the design of the SI activities is to sequence the field activities so that data are acquired and used as the field investigation progresses. This is done in order to determine the absence or presence of contamination in a relatively short period of time, optimize data collection and data quality, and to keep costs to a minimum. Information, data, and analytical results obtained from the SI field investigation will support the selection of one of the following decisions:

No Further Action (NFA) - Investigation did not indicate harmful levels of contamination that pose a significant threat to human health or the environment. Therefore, no further IRP action is warranted and a Decision Document (DD) will be prepared to close out the site.

Immediate cleanup/remedial activities - Investigation indicates that the site poses an immediate threat to public health or the environment. Therefore, prompt removal of contaminants or measures to reduce contaminant levels to an acceptable limit is warranted.

Remedial Investigation/Feasibility Study (RI/FS) - Investigation indicates further IRP work is required and the next phase of the IRP needs to be implemented. The RI is described more fully in the following subsection.

1.1.3 Remedial Investigation (RI)

The objectives of the RI are to determine the nature and extent of contamination at a site, determine the nature and extent of the threat to human health and the environment, and to provide

a basis for determining the types of response actions to be considered (decision document, feasibility study, remedial design, remedial action).

The RI consists of field activities designed to quantify and identify the potential contaminant, the extent of the contaminant plume, and the pathways of contaminant migration. Field activities may include the installation of soil borings and/or monitoring wells, and the collection and analysis of water, soil, and/or sediment samples. Careful documentation and quality control procedures in accordance with CERCLA/SARA guidelines ensure the validity of data. Hydrogeologic studies are conducted to determine the underlying strata, groundwater flow rates, and direction of contaminant migration.

A baseline risk assessment may be conducted which provides an evaluation of the potential threat to human health in the absence of remedial action. The assessment provides the basis for determining whether remedial action is necessary, justification for performing remedial actions, and what imminent and substantial endangerment to public health or the environment exists.

1.1.4 Feasibility Study (FS)

Based on results of the RI, the baseline risk assessment, and a review of State and Federal regulatory requirements, an FS will be prepared to develop, screen, and evaluate alternatives for remediation of groundwater and/or soil contamination at the subject sites. The overall objective of the FS is to provide information necessary for remedial alternatives development. The FS is conducted to support selection of a remedy that is: protective of human health and the environment; attains ARARs; satisfies the preference for treatment that significantly and permanently reduces toxicity, mobility, or volume of hazardous constituents as a principal element; and is cost-effective. Activities associated with the FS include the following:

- Development of alternatives;
- Preliminary screening of remedial alternatives;
- Detailed analysis of alternatives;
- Comparative analysis of alternatives; and
- The creation of an FS report.

The end result of the FS is the selection of the most appropriate remedial action with concurrence by State and/or Federal regulatory agencies.

1.1.5 Remedial Design (RD)

The RD involves formulation and approval of the engineering designs required to implement the selected remedial action identified in the FS.

1.1.6 Remedial Action (RA)

The RA is the actual implementation of the remedial alternative. It refers to the accomplishment of measures to eliminate the hazard or, at a minimum, reduce it to an acceptable limit. Covering a landfill with an impermeable cap, pumping and treating contaminated groundwater, installing a new water distribution system, and *in-situ* biodegradation of contaminated soils are examples of remedial measures that might be selected. In some cases, after the RAs have been completed, an LTM system may be installed as a precautionary measure to detect contaminant migration or to document the efficiency of remediation.

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SECTION 2.0 FACILITY BACKGROUND

2.1 FACILITY DESCRIPTION

Roslyn ANGS occupies 50.34 acres and is located at 209 Harbor Hill Road in the Village of East Hills, within the City of Roslyn, Long Island, New York (Figure 2.1). The host unit is the 106th CEF which provides day-to-day operational support to the Station. The two principal tenants at the Station are the 213th Engineering Installation Squadron (EIS) and the 274th Combat Communications Squadron (CCS). The PA identified satellite offices for branches of the Federal Government, Civil Air Patrol (CAP), and a United States Air Force (USAF) Recruiting Office, none of which are suspected of producing hazardous waste. The Station population during the week is 66, and increases to 390 during monthly Unit Training Assemblies. Additionally, approximately 50 individuals attend weekly meetings of the CAP.

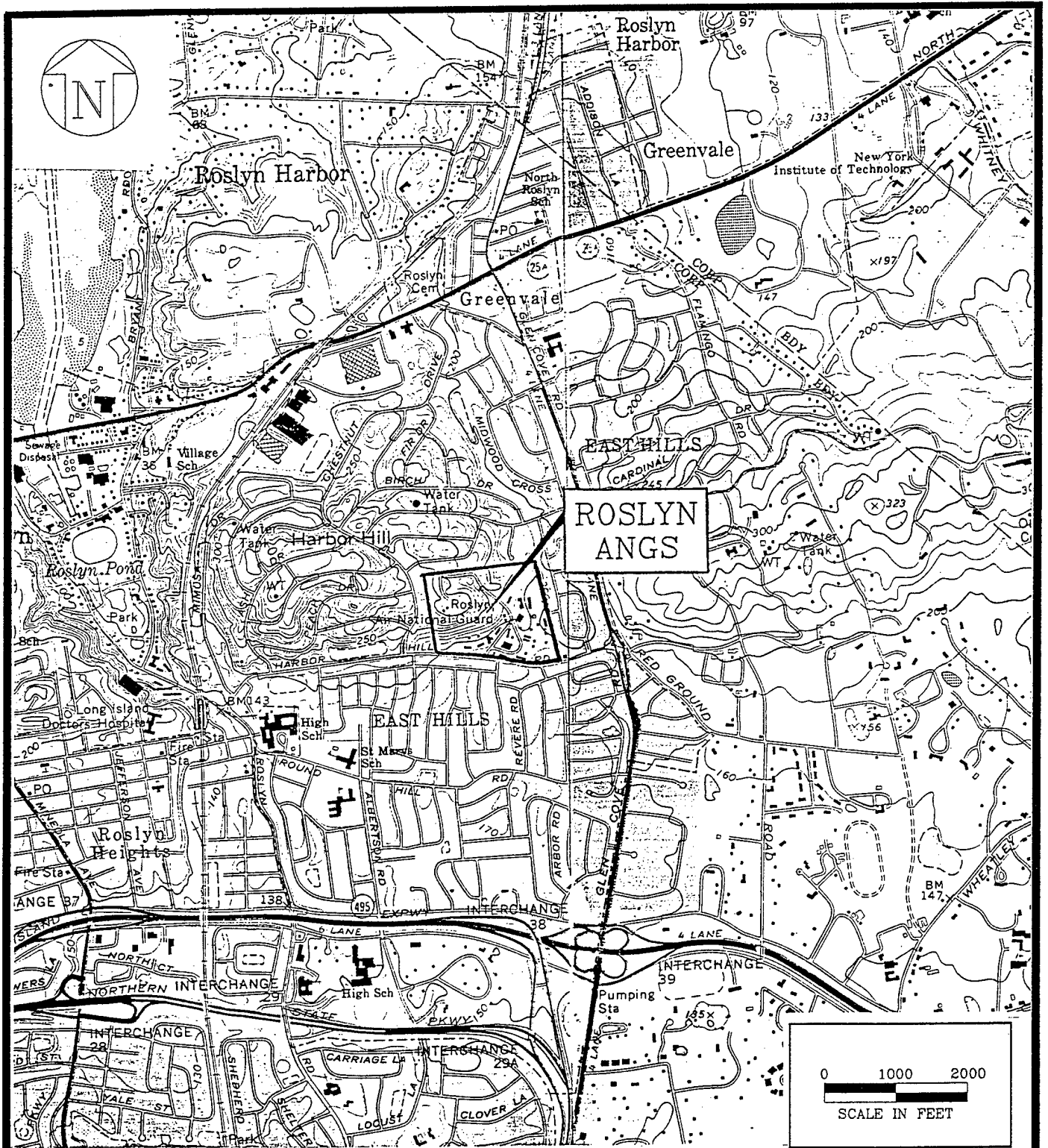
2.1.1 Station History

The Station occupies land purchased by the United States Government in 1953, that was used primarily by the I Fighter Command and later by the 26th Air Division, USAF Air Defense Command. The Roslyn Air Force Station was redesignated the Roslyn ANGS on 1 July 1959, and the New York Air National Guard (NYANG) has remained in residence since that date.

The mission of the 106th CEF is to provide daily engineering support and host unit functions to the Station. Its military mission is to provide civil engineering service and support on a worldwide basis. The 106th CEF does not possess heavy equipment, but obtains these assets, as necessary, from its parent organization, the 106th Civil Engineering Squadron, located at West Hampton Beach, New York.

The mission of the 213th EIS is to accomplish the engineering, installation, removal, and relocation of ground communications-electronics facilities and to perform serviceability certification and emergency and/or on-site repair and modification of communications equipment. The mission of the unit includes the use of a vehicle maintenance shop.

The mission of the 274th CCS is to maintain, deploy, and operate tactical communications packages in support of Air Force missions worldwide. This includes tactical telephonic services and routine and classified messages for aircraft flights, weather, supplies, maintenance, and intelligence reports.



SOURCE: USGS 7.5 min. SERIES Hicksville N.Y./Sea Cliff (1979).

FIGURE 2.1

ROSLYN/TOPO

7.5' TOPOGRAPHIC MAP
 Roslyn Air National Guard Station
 New York Air National Guard
 Roslyn, New York

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AUGUST 1995

Since 1959, the Station has supported a maintenance function, including the repair and servicing of motor vehicles and AGE items, and, to a lesser degree, electronic equipment. Little information exists on the use of the property prior to 1959 other than as a radio/communications center. One oil/water separator (OWS) and numerous aboveground storage tanks for heating oil, diesel oil, JP-4, and MOGAS are located on the Station. All underground storage tanks (USTs) at the Station are in the process of being removed.

2.1.2 Waste Disposal Practices

Present and past ANG activities at Roslyn ANGS involved the use of hazardous materials and the disposal of potentially hazardous wastes. These activities include vehicle maintenance, generator maintenance, vehicle painting activities, and dust control on an unpaved access road.

Maintenance operations require the use and disposal of hazardous materials such as oils, solvents, paint thinners, and fuels. Through the years, such waste materials have usually been disposed by a contractor or the Defense Reutilization and Marketing Office (DRMO). From 1961 to 1971, a moderate amount of liquid wastes were disposed by application to a dirt access road as a means of dust control. This access road is now IRP Site No. 1 and is described in Subsection 2.2.1. The PA was unable to determine the methods used between 1959 and the early 1970s for disposal of some potentially hazardous wastes.

Refuse and other non-hazardous solid wastes from the Station are collected and disposed by the A-1 Carting Company, a private solid-waste contractor. The Station receives its water from the Roslyn Public Water Utility and treats its own wastewater via septic systems and leach fields within the boundaries of the Station.

2.1.3 Previous Investigations

The PA of the 106th CEF, Roslyn ANGS, was published by Science and Technology, Inc., in February 1991. Information obtained through interviews, review of Station records, and field observations resulted in the identification of two potentially contaminated waste holding areas and a waste sludge application site. These sites are identified as IRP Site No. 1 (Access Road to Aerospace Ground Equipment "AGE" Shop), IRP Site No. 2 (Old Waste Holding Area No. 1), and IRP Site No. 3 (Old Waste Holding Area No. 2). These sites are shown in Figure 1.1.

Under the IRP at the time of the PA, when sufficient information was available, sites were numerically scored and assigned a Hazard Assessment Score (HAS) using the USAF Hazard Assessment Rating Methodology (HARM). This system was established to set priorities for further action at sites based upon information gathered during the PA phase of the IRP. Because the potential for contaminant migration exists at the three sites, each was recommended for further investigation under the IRP.

2.2 SITE DESCRIPTIONS AND POTENTIAL RELEASE SOURCES

2.2.1 IRP Site No. 1 (Access Road to AGE Shop)

2.2.1.1 Description

This site is located on the east side of Roslyn ANGS (Figure 1.1). The site measures approximately 260 feet in length and 20 feet in width and was once an unpaved access road to the AGE Shop. The site extends from the entrance to the AGE Shop (Building 36) parking area to the perimeter fence. Since the identification of this site in the PA, it has been completely covered with asphalt as the motor pool/parking lot was expanded. Distinct pavement breaks currently delimit its east and west ends.

2.2.1.2 Potential Release Sources

From 1961 to 1971, waste and product oil, paint thinners, diesel fuels, leaded MOGAS, and possibly solvents, were poured on the access road bed to dispose of the materials and to settle dust. The PA identified that one 55 gallon drum of liquid waste was used per application, and applications were made up to a maximum of three times per year. Assuming the applications took place over a 10-year period, as many as 1,650 gallons of mixed liquid wastes were applied to the road bed.

2.2.2 IRP Site No. 2 (Old Waste Holding Area No. 1)

2.2.2.1 Description

This site is the old waste holding area for the Vehicle Maintenance Shop. It is located adjacent to the north wall of the Vehicle Maintenance Shop (Building 16) and extends east-west from a point 10 feet east of the shop back door to the site of a removed UST once used for waste oil

storage. Beginning at the north wall of the Vehicle Maintenance Shop, the site extends approximately 15 feet to the south (Figure 1.1). There was no visible evidence of the storage area or indications of contamination at the site.

Two dry wells are located in close proximity to IRP Site No. 2. The first dry well is located under the western portion of the Vehicle Maintenance Shop (Building 16). Items of particular concern are three floor drains in the Vehicle Maintenance Shop that once discharged directly into this dry well. The second dry well is located west of the Vehicle Maintenance Shop and north of the Vehicle Paint Shop (Building 9). A floor drain in the Vehicle Paint Shop once discharged directly into the second dry well. The drains in these shops are now sealed and do not flow into the dry wells. These dry wells allow collected fluids to infiltrate the glacial materials and possibly enter the aquifer. The PA did not identify these dry wells as sites of potential contamination. However, concerns raised in conversations between Station and HQ ANG/CEVR personnel over the floor drains prompted the inclusion of these wells into the investigation. The investigation will determine if contamination exists in the underlying aquifer down gradient from the dry wells.

2.2.2.2 Potential Release Sources

New oil, solvents, and cleaning compounds have been stored at different locations in this area since 1959. Drips and spills from the product drums have been reported at this site. The PA reported that recent stains from new product spills were visible at the site.

Waste oil, PD-680 solvent, paint thinner, and leaded MOGAS from the Vehicle Maintenance Shop have been stored at the site over a 33-year period. Liquid wastes from the old AGE Shop, which was in use prior to 1971, were also stored here. For a brief, but unknown period of time, liquid wastes from the new AGE Shop were also stored here. With the possible exception of JP-4 and toluene, these wastes were essentially the same as those from the Vehicle Maintenance Shop. During periods of precipitation, petroleum products were reported to have floated out of some containers and onto the soil. The quantities of materials and waste spilled at this site over its life is unknown.

2.2.3 IRP Site No. 3 (Old Waste Holding Area No. 2)

2.2.3.1 Description

This site is the old waste holding area for the AGE Shop. It is located along the north wall of Building 36 (AGE shop) and extends for approximately 10 feet along the north end of the shop's east wall. The use area extended 5 to 10 feet from each wall (Figure 1.1). This site was in operation as a waste holding area for the AGE Shop from 1971 to 1989. This area is now paved with asphalt and there is no visible indication that a waste holding area existed at the site.

Two dry wells are located approximately 35 feet to the northeast of IRP Site No. 3. These dry wells receive precipitation runoff channeled through ditches, catch basins, and surface flows from the northeast portion of the Station. These dry wells allow runoff to infiltrate into the surrounding glacial material and recharge the glacial aquifer under the Station. As with IRP Site No. 2, the PA did not identify these dry wells as a site of potential contamination; however, these sites were added to the investigation to determine if contamination from surface runoff has affected the groundwater.

2.2.3.2 Potential Release Sources

Waste oil, paint thinner, JP-4, PD-680 solvent, diesel fuel, toluene, and leaded MOGAS were stored at IRP Site No. 3. The PA reported six to eight drums of waste, all stored on wooden pallets, were usually present in this area at one time, and as many as 15 to 20 drums of waste were accumulated here during a year.

The PA also identified at this site:

- Petroleum products stored in this area were also reported to have floated out onto the soil during periods of precipitation, and at least one drum burst along its seams in 1977. From 1982 to 1989, 25 to 30 gallons of liquid wastes per year may have been spilled onto the soil in this area. The PA reported that petroleum stains were visually evident within the site's confines. However, the total quantity of liquid wastes spilled at this site throughout its overall period of use is unknown.

- Five or six times during the period of 1982 to 1989, a tractor was used to scrape stained soil from the site. The cut was approximately one inch deep across a 15 x 15 foot area. On one occasion the cut was two inches deep. New sand and crushed stone fill were placed in the area of this deeper cut.

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SECTION 3.0 ENVIRONMENTAL SETTING

No previous Site Investigations have been conducted at Roslyn ANGS. However, a PA was conducted by Science & Technology, Inc., and a final report issued in February 1991. Environmental information in the PA, referenced from the Climatic Atlas of the United States (United States Department of Commerce, National Climatic Center, Ashville, N. C., 1979), Soil Survey of Nassau County, New York (United States Department of Agriculture (USDA): Soil Conservation Service (SCS), February, 1987), and from Hydrogeology of Northwestern Nassau and Northeastern Queens Counties, Long Island, New York (United States Geological Survey (USGS), Geological Survey Water Supply Paper No. 1657, Swarzenski, 1963), was used, where applicable, to describe the environmental and geologic setting, and the hydrologic characteristics of Roslyn ANGS.

3.1 PHYSIOGRAPHY AND CLIMATE

Roslyn ANGS is located in Nassau County in the western portion of Long Island, New York, and is situated entirely in the Coastal Plain physiographic province. The Coastal Plain physiographic province is characterized by rolling hills and an undulating landscape in northern Nassau County while the southern part of the county exists as a flat plain that gently slopes toward the Atlantic Ocean. Roslyn ANGS is located along the southeast side of Harbor Hill with surface elevations ranging from 273 feet above mean sea level (AMSL) in the northwest to 189 feet AMSL in the southeast corner of the Station property.

The climate in the area of Roslyn ANGS is characterized by humid, relatively cold winters and mild summers. The total average annual precipitation is 42 inches based on a 29-year record from 1951 to 1980. Rainfall is well-distributed throughout the year and ranges from an average monthly high of 4.44 inches in March to an average monthly low of 2.93 inches in June. By calculating net precipitation according to the method outlined in the Federal Regulations CERCLA Pollution Contingency Plan (United States Environmental Protection Agency (USEPA), 55 FR 8813, Subpart K, March 8, 1990), net annual precipitation is 12 inches. The one year, 24-hour rain event for the county is approximately 2.75 inches. Thunderstorms occur on an average of 22 days a year. The heaviest rainfall, 8.2 inches, occurred on August 12, 1955 at Mineola, approximately 5 miles southwest of the Station. Snowfall averages 27 inches a year, and approximately 15 days each winter there is at least 1 inch of snow cover on the ground. The average daily temperature is 52.9 degrees Fahrenheit (F) and ranges from an average daily high of 74.6 degrees (F) in July to an average daily low of 31.4 degrees (F) in January. Prevailing

winds are from the west-northwest and highest in the spring. The year-round average wind speed is 14 miles per hour.

3.2 GEOLOGY

3.2.1 Regional Geology

The geology and landforms of Long Island have been dramatically influenced by two stages of glaciation in the Wisconsin stage at the end of the Pleistocene Epoch. Three distinct geomorphologic areas were formed in the vicinity of the Station, within northwestern Nassau County. They exist from north to south as the headlands, the Harbor Hill terminal moraine, and the glacial outwash plain.

The headlands area consist of a relatively uniform undulating land surface which rises abruptly above the north-south oriented bays of Long Island Sound. Located immediately south of the headlands area, the Harbor Hill terminal moraine is composed of a series of irregular hills that form a distinct northeast trending ridge. The highest surface elevations on western Long Island are associated with this ridge, and the highest point measures 368 feet AMSL on the crest of Harbor Hill. South from the Harbor Hill terminal moraine, the glacial outwash plain slopes southeast at 20 feet per mile. Specifically, Roslyn ANGS is located along the southeastern side of Harbor Hill, and exists partially in the terminal moraine area in the glacial outwash plain. The northwest one-half of the Station is located in the terminal moraine, and the southeast one-half exists in the glacial outwash plain. The topographic relief is greatest in the northwest one-half of the property along Harbor Hill, and a flattening of the land surface occurs to the southeast in association with the outwash plain.

The surficial material in northwestern Nassau County is almost entirely composed of Pleistocene glacial deposits. Only on a very localized basis do more recent deposits exist, and they are commonly associated with streams, marshes, and coast lines. Wisconsin glaciation produced two types of glacial drift in the area, known as the Ronkonkoma and Harbor Hill deposits (Figure 3.1). Each type of drift is composed of till, which is associated with ground and terminal moraines, and of stratified drift that is attributed to outwash plains.

The Ronkonkoma drift was deposited as the ice sheet advanced south to a point that is represented by the terminal moraine deposits forming a series of discontinuous hills located approximately 2 miles south of the Station. A sequence of stratified drift and till was deposited north of the terminal moraine by the advance of the ice front, and south of the terminal moraine

System	Geologic Unit	Thickness (feet)	Depth from land surface (feet)	Character of deposits	Water-bearing characteristics	
Quaternary	Recent deposits: Artificial fill, salt-marsh deposits, swamp deposits, stream alluvium, etc.	0-50	0	Sand, gravel, silt, and clay; organic mud, peat, loam and shells. Colors are gray, black, and brown.	Permeable zones near the shoreline or in stream valleys may yield small quantities of fresh or brackish water at shallow depths.	
	Upper Pleistocene Deposits	Harbor Hill drift	20-200	0-50	Till composed of unsorted clay, sand, and boulders, present in Harbor Hill moraine and, as ground moraine, in area adjacent to north. Outwash deposits of stratified brown sand and gravel, including advance outwash plain and other interglacial deposits.	Till, relatively impermeable, may cause local conditions of perched water and impede downward percolation of water. Outwash deposits of sand and gravel are highly permeable. Wells screened in glacial outwash deposits, generally at depths of less than 130 ft. yield as much as 1400 gpm to wells. Specific capacities of wells range from 5 to 57 gpm per ft. of drawdown. Water is generally fresh and unconfined.
		Ronkonkoma drift	1-120	20-200	Till composed of unsorted clay, sand and boulders present in Ronkonkoma terminal moraine and, as buried ground moraine, in an area extending northward into Manhasset Neck. Outwash deposits of stratified brown sand and gravel, including proglacial deposits from Ronkonkoma ice sheet.	
	Unconformity?	Gardiners clay	0-200	60-170	Clay and silt, gray-green, some lenses of sand and gravel. May contain shell. Altitude of surface generally between 50 and 80 ft. below mean sea level.	Relatively impermeable. Confines water in underlying Jameco gravel. Lenses of sand and gravel may provide small sources of water supply.
	Unconformity?	Jameco gravel and undifferentiated deposits	0-200	120-350	Sand, fine to coarse, gray and brown, and gravel. May contain clay and silt layers. Probably early glacial outwash deposits.	Moderately to highly permeable. Yields as much as 500 gpm to wells. Water is confined under artesian pressure.
	Cretaceous	Unconformity	Magothy formation	0-400	5-200	Sand, fine to medium, clayey, gray, white, pink, and yellow. Gravel generally in lower 50 -100 ft. of formation.
Raritan formation		Clay member	0-200	100-500	Clay, solid and silty, gray, white and red. May contain lenses or layers of sand and gravel.	Relatively impermeable. Retards but does not prevent movement of water between the Magothy formation and Lloyd sand member
		Lloyd sand member	0-200	350-700	Sand, fine to coarse, white, gray, or yellow, and gravel, commonly in clayey matrix. Contains lenses and layers of solid or silty clay.	Moderately permeable. Wells yield as much as 1600 gpm. Water is generally of excellent quality but may have high iron content.
Unconformity	Bedrock	—	180-900	Crystalline metamorphic and igneous rocks; muscovite-biotite schist, gneiss and granite. Weathered zone at top may be as much as 70 ft. thick.	Relatively impermeable. Contains some water in fractures, but impermeable to develop owing to low permeability.	

FIGURE 3.1

ROSL4-5G

GENERALIZED STRATIGRAPHIC
COLUMN OF THE AREA
Roslyn Air National Guard Station
New York Air National Guard
Roslyn, New York

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JULY 1984

stratified drift was deposited on an outwash plain. The Ronkonkoma ice sheet retreated northward depositing additional amounts of ground moraine and stratified drift in its wake.

The last phase of glaciation occurred subsequent to the Ronkonkoma ice retreat as the Harbor Hill ice sheet advanced southward to a point that is marked by the Harbor Hill terminal moraine and the corresponding discontinuous Harbor Hill ridge. South of the Harbor Hill terminal moraine, a thin layer of stratified drift was deposited in the outwash plain on top of the Ronkonkoma drift. North of the Harbor Hill terminal moraine, the associated drift is much thicker and consists of a sequence of till and stratified drift deposited by the advance and retreat of the ice sheet. The Harbor Hill drift occurs at the surface and blankets the Ronkonkoma drift at almost every location in northern Nassau County, except where the Ronkonkoma exists as terminal moraine.

The two phases of glaciation produced a sequence of nonpermeable till and permeable stratified drift with thicknesses ranging up to 200 or 300 feet in the terminal moraine areas. In addition, the more permeable stratified deposits are associated with outwash plains; therefore, a thicker sequence of permeable stratified drift occurs south of the existing terminal moraines.

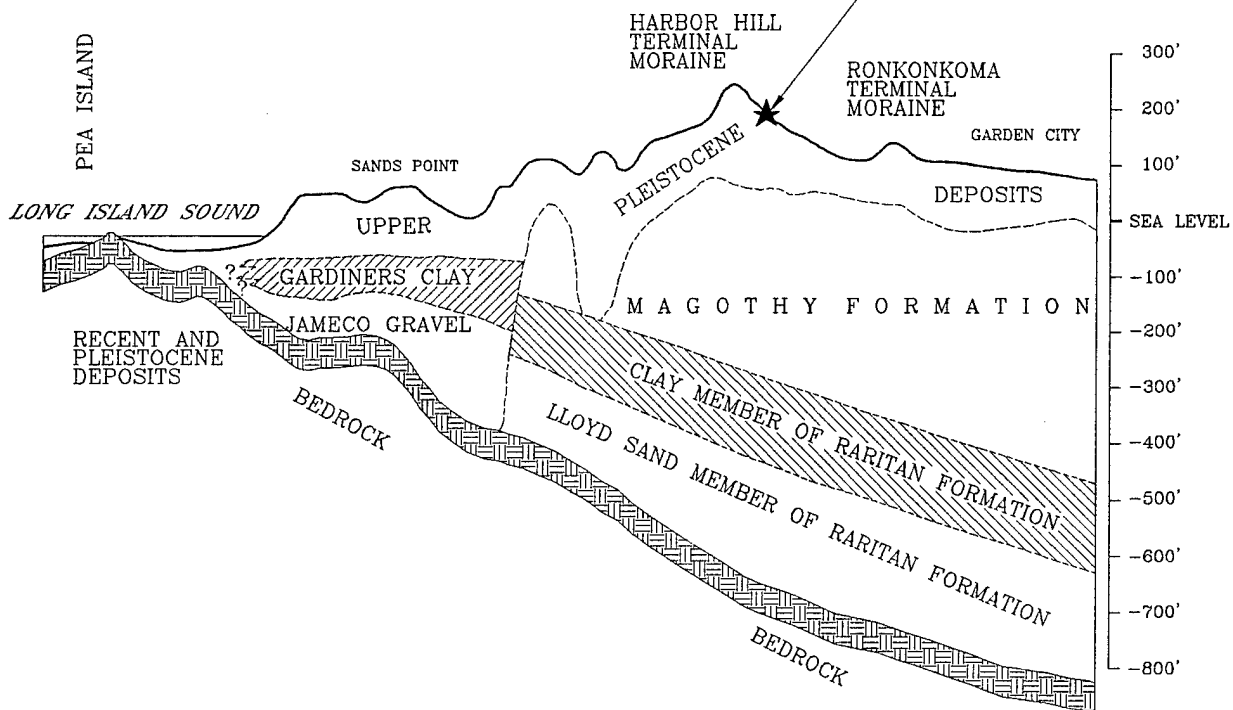
The Pleistocene glacial deposits rest unconformably on top of Upper Cretaceous deposits that are identified as the Magothy Formation and the deeper Raritan Formation (Figure 3.2). The Raritan Formation is further divided into the upper Clay Member and the lower Lloyd Sand member. The Cretaceous deposits are continental in origin and consist of unconsolidated, interbedded sand, gravel, clay, and silt (Figure 3.1). Lithologically, these formations are commonly very lenticular; however, as a whole they are relatively permeable deposits with the exception of the Clay Member of the Raritan Formation. The Magothy Formation is generally more permeable than the Lloyds Sand member and contains a permeable basal gravel member that is significant from a groundwater standpoint. The thickness of the Cretaceous deposits ranges from zero along northern Long Island to approximately 800 feet in the south part of the island (Figure 3.1). In the vicinity of Roslyn ANGS, the thickness is estimated to be 575 feet. The thickness of the Cretaceous deposits is likely evenly divided between the Magothy and Raritan Formations.

The Cretaceous age formations were deposited unconformably on top of Precambrian age bedrock. The bedrock consists of impermeable crystalline, metamorphic, and igneous material that has an upper weathered zone as much as 75 feet in thickness (Figure 3.1). Structure mapping (Swarzenski, 1963) on top of the bedrock surface indicates it is approximately 814 to 898 feet below land surface (BLS) at the Station location.

STATION

NORTHWEST

SOUTHEAST



SOURCE: USGS, HYDROLOGY OF NORTHWESTERN NASSAU AND NORTHERN QUEENS COUNTIES, LONG ISLAND, NEW YORK, 1963.

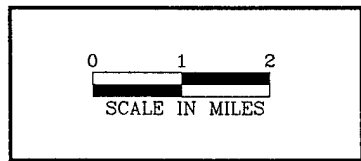


FIGURE 3.2

GENERALIZED CROSS SECTION
 OF THE AREA
 Roslyn Air National Guard Station
 New York Air National Guard
 Roslyn, New York

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3.2.2 Local Geology

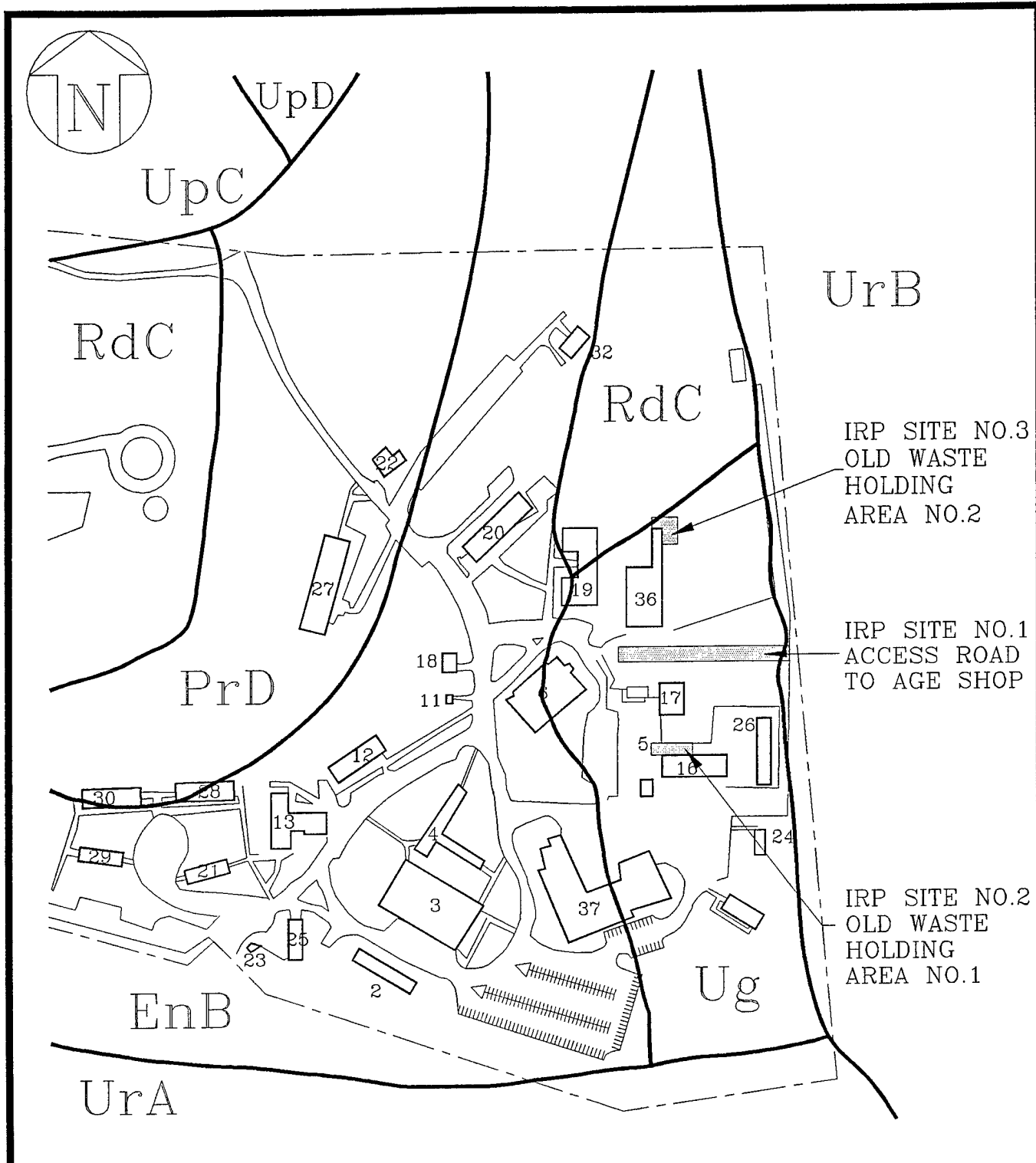
Roslyn ANGS is located on the southeast side of Harbor Hill terminal moraine where it overlaps the contact between the terminal moraine and the outwash plain. Surficial geologic mapping indicates the Station property is underlain by the Harbor Hill terminal moraine and the pitted outwash plain deposits to the northwest and southeast, respectively (Figure 3.3). Based on structure mapping on the top of the Cretaceous surface (Swarzenski, 1963), the thickness of the glacial sequence at the Station location ranges from approximately 140 to 225 feet.

3.3 SOILS

Roslyn ANGS is underlain by soils of the Riverhead, Plymouth, and Enfield series (Figure 3.4). Riverhead and Plymouth series are very deep, well-drained soils that form in glacial outwash deposits. They occur on the crests and slopes of morainic hills and on top of outwash plains. The Enfield series is also composed of deep and well-drained soils that are commonly formed in association with eolian material as it overlies sand and gravel deposits. Enfield soils are generally located on the side slopes and tops of outwash plains.

Riverhead and Plymouth soils occupy the northwest one-half of the Station property located on Harbor Hill. The principal soil types in the northwest one-half of the property are the Riverhead sandy loam (RdC), the Plymouth Riverhead complex, and, to a lesser degree, the urban derivatives of the Plymouth soils (UpC and UpB). These soil types are generally composed of sandy loam and loamy sand, respectively, with a gravelly sand substratum occurring in each type. The depth of the typical soil layer is 60 inches with permeabilities ranging from moderately rapid (2.00 to 6.00 inches per hour or 1.41×10^{-3} to 4.24×10^{-3} cm/sec) to very rapid (more than 20.00 inches per hour or more than 1.41×10^{-2} cm/sec) for the group.

Enfield series soils are the most areally extensive soils in the southeast one-half of the Station property because of their location with respect to the outwash plain. The specific soil types are the Enfield silt loam (EnB), the Urban land (Ug), and the Riverhead sandy loam (RdC). The EnB soil occurs to a depth of 60 inches with a very gravelly sand substratum, and the permeability ranges from moderate (0.63 to 2.00 inches per hour or 4.45×10^{-4} to 1.41×10^{-3} cm/sec) to very rapid (more than 20.00 inches per hour or more than 1.41×10^{-2} cm/sec). A considerable part of the southeast one-half is occupied by the Ug soil type. Ug soils are urban areas where 85 percent of the surface is covered by impermeable building material such as asphalt or concrete. The RdC soils occupy only a small part of this area in the northeast corner of the property.



LEGEND	
Ug - Urban Land	Existing Roads
UrB - Urban Land, Riverhead Complex, 3 to 8 percent slope	Current Site
UrA - Urban Land, Riverhead Complex, 0 to 3 percent slope	Building
RdC - Riverhead Sandy Loam, 8 to 15 percent slope	Station Boundary
EnB - Enfield Silt Loam, 3 to 8 percent slope	
PrD - Plymouth-Riverhead Complex, 15 to 35 percent slope	
RdC - Riverhead Sandy Loam, 8 to 15 percent slopes	
UpC - Urban Land-Plymouth Complex, 8 to 15 percent slope	
UpD - Urban Land-Plymouth Complex, 15 to 25 percent slope	

0 150 300
SCALE IN FEET

FIGURE 3.4

SOIL SURVEY MAP
Roslyn Air National Guard Station
New York Air National Guard
Roslyn, New York

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3.4 HYDROGEOLOGY

In northwestern Nassau County, three aquifers are identified (Swarzenski, 1963) as comprising the groundwater reservoir. Although the aquifers are identified separately, they are considered to constitute a single hydrologic system. The aquifers are classified as the upper unconfined, the principal, and the deep confined. In addition to the aquifers, groundwater can also occur in localized perched bodies that form a temporary zone of saturation above the water table. With regards to the Station location, each of the three aquifers is present. Perched groundwater exists locally in the Pleistocene glacial deposits above the water table and close to the land surface. Percolating surface water becomes trapped in depressions underlain by impermeable clay-rich till. Areas north of the Harbor Hill terminal moraine and within the Harbor Hill and Ronkonkoma terminal moraine commonly have perched bodies of groundwater. Isolated bodies of perched water also occur in the intermorainal area between the Harbor Hill and Ronkonkoma terminal moraines. As a result of Roslyn ANGS's position with respect to the Harbor Hill terminal moraine, perched groundwater is likely to occur at this location. However, perched water is not used as a groundwater supply source because of its high susceptibility to surface contamination (Swarzenski, 1963, and Isbister, 1966).

The upper unconfined aquifer is defined (Swarzenski, 1963) as permeable Pleistocene and Cretaceous deposits that occur below the water table to a point slightly below mean sea level (BMSL). By this definition, the upper unconfined aquifer would be approximately the lower most 15 to 20 feet of the Pleistocene deposits and the upper 50 to 60 feet of the Cretaceous Magothy Formation at the Station location. The determination of the upper unconfined aquifer at the Station location is based on information obtained from mapping on top of the Cretaceous surface in conjunction with potentiometric maps of the water table (Swarzenski, 1963 and Koszalka, 1975). Higher water yields from the upper unconfined aquifer occur from the permeable sand and gravel deposits associated with the glacial outwash plains that occur in the area south from the Harbor Hill terminal moraine. The Station is located in an area where permeable outwash deposits can be expected to occur; however, the majority of the glacial deposits here likely exist above the water table which precludes them as a probable aquifer. The existence of the permeable glacial deposits above the water table is significant in that their presence enhances the downward movement and flow of groundwater toward the water table (Swarzenski, 1963).

The principal aquifer is defined as being that section of the Magothy Formation that occurs above the Clay Member of the Raritan Formation to approximately 50 feet BMSL. Also included in the principal aquifer are more recent deposits that are associated with channel erosion and subsequent

deposition in the upper Magothy Formation. In addition, the entire Magothy Formation is absent north of the Station along the northern reaches of Long Island. Here, the Magothy Formation is replaced by more recent deposits that are in hydrologic communication with the Magothy Formation and rest unconformably on top of the Gardiners Clay (Figure 3.2). The depth to the base of the Magothy Formation is projected at approximately 275 feet BMSL at the Station location. Groundwater exists under both unconfined and confined conditions in the principle aquifer. The upper part of the principal aquifer is generally unconfined and in hydraulic communication with the upper unconfined aquifer. However, artesian conditions commonly exist and become more frequent with increased depth in the principal aquifer. Artesian conditions are related to the lenticular nature of the Magothy Formation along with the high concentration of clay lenses. At the base of the Magothy Aquifer, the Clay Member of the Raritan Formation serves as a bottom confining aquiclude. The principle aquifer is the major source of water in the Station area, and yields from wells penetrating the Magothy Formation are highest from the basal zone. Yields as high as 1,400 gallons per minute (GPM) have been reported from the basal zone, while the upper part rarely yields more than 500 GPM.

The deep confined aquifer consists of the Lloyd Sand member of the Raritan Formation. It is confined at the base by impermeable bedrock and at the top by the Clay Member of the Raritan Formation or locally by the Gardiners Clay, where it exists. Although the deep aquifer is considered to be confined, it actually functions as a semi-confined aquifer as a result of the leaky nature of the upper confining unit. At the Station location, the top and bottom of the Lloyds Sand member is projected to occur at approximately 450 feet and 625 feet BMSL, respectively. Like the Magothy Formation, the Raritan Formation has been eroded and replaced by younger deposits north of the Station along the northern reaches of Long Island. Here, the Lloyd Sand member is eroded and replaced locally by the Jameco gravel; however, they are in hydraulic communication. The deep confining aquifer is a major source of water in the area, and water yields from wells have been reported as high as 1,600 GPM (Swarzenski, 1963 and Isbister, 1966).

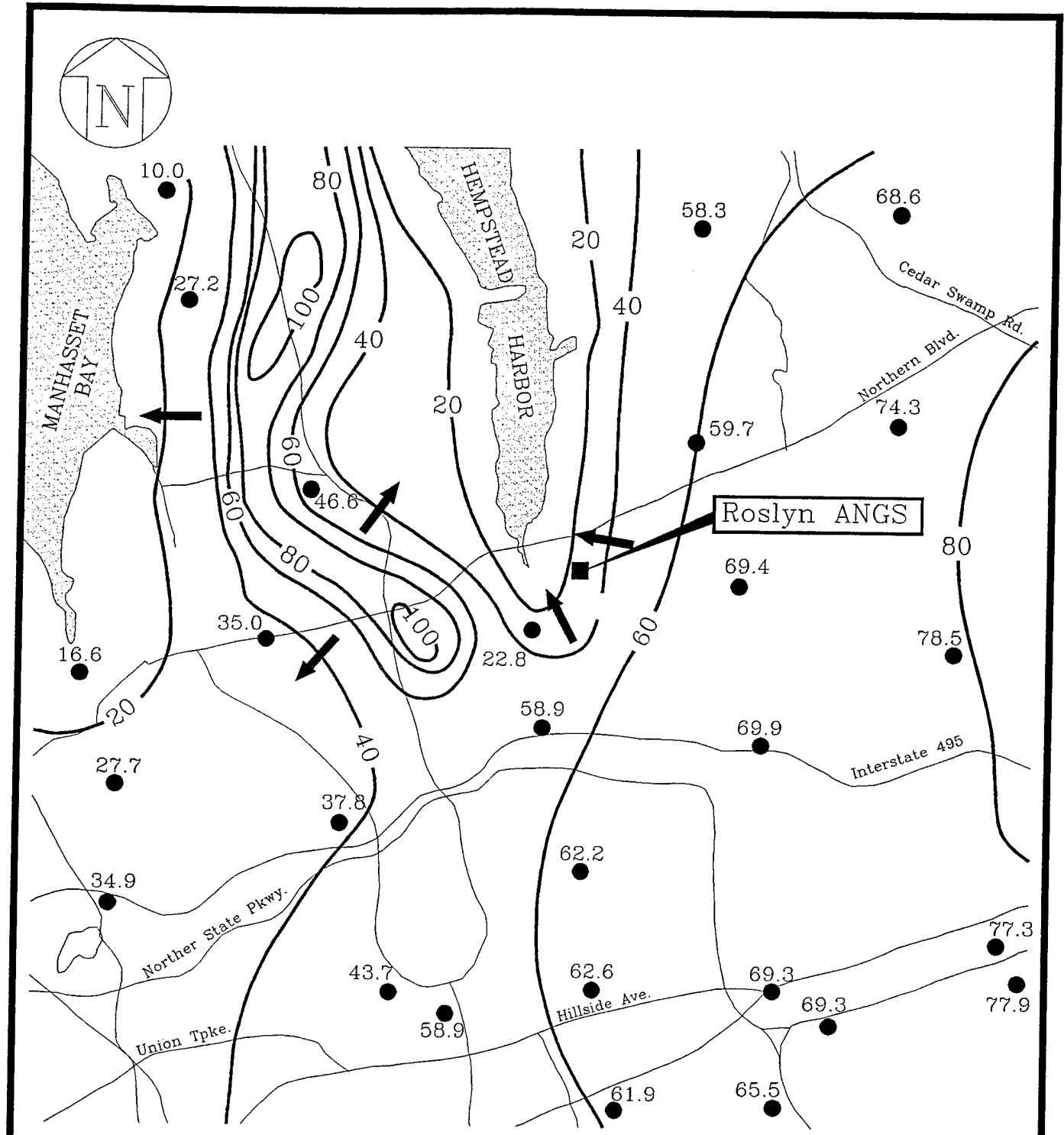
Recharge of the groundwater system occurs primarily from precipitation. The upper unconfined aquifer is recharged by downward percolating surface water. The principal and deep confined aquifers are similarly recharged by the continued downward movement of groundwater from the upper unconfined aquifer. Groundwater movement and recharge rates are affected by the permeability of the overlying material. Nonpermeable deposits like glacial till retard groundwater flow while permeable deposits such as those associated with the glacial outwash plains enhance movement. Consequently, recharge of the upper unconfined aquifer is more rapid in areas underlain by outwash deposits. Recharge of the deep confined aquifer is severely retarded by the

overlying Clay Member of the Raritan Formation. The potentiometric map of the upper unconfined aquifer suggests a major recharge area exists east of the Station in eastern Nassau County. In addition, many surface water retention basins exist to enhance local recharge through the collection and introduction of surface water runoff into the groundwater system. Hempstead Harbor, to the northwest of the facility is expected to have a controlling effect on the regional groundwater flow direction.

General groundwater movement is interpreted from the potentiometric maps for each aquifer as being in a westerly direction at the Station location. Figure 3.5 depicts the regional water table on Long Island, New York in the vicinity of the Roslyn ANGS as measured during March and April 1984. The depth to the water table on the Station property in March 1979 was estimated at 215 to 125 feet BLS from the northwest to southeast, respectively (Donaldson and Koszalka, 1979).


Well No. N-11964 was drilled into the upper glacial aquifer in November 1991 by the Nassau County Department of Public Works to record groundwater levels in this portion of the aquifer. The well was drilled to a total depth of 198.8 feet BLS. The well measuring point elevation is 222.26 feet AMSL. Measurements made since its construction, on 27 March 1992 and 2 September 1992, indicated water levels of 59.36 feet and 59.61 feet AMSL, respectively. These measurements indicate a water table at approximately 59.5 feet AMSL at a location 3,400 feet west of the IRP sites (Figure 3.6). Because the IRP sites are at an elevation of 200 feet AMSL, the first occurrence of groundwater may be encountered at a depth of approximately 141 feet BLS. Three public supply wells in the Roslyn Water District are significant because of their proximity to the Station (Figure 3.6). Wells N-5852 and N-4265 are located approximately 1,600 feet north-northwest and 1,000 feet northeast from the Station boundary, respectively. Well N-2400 is located approximately 1,800 feet south from the surface water retention basin (Nassau County No. 72) receiving surface water runoff from the Station property. Each of these wells are screened in the principle aquifer and were drilled to total depths ranging between 439 and 490 feet BLS. Approved water yield capacities for these wells range from 1,000 GPM to 1,200 GPM.

Seven observation wells in the vicinity of Roslyn ANGS were also located and are shown on Figure 3.6. Of these wells, three are in the upper glacial aquifer (N-09711, N-10246, and N-11672), three are in the Magothy Aquifer (N-09190, N-10732, and N-11732), and one is in the Lloyd Aquifer (N-11574).



LEGEND

- 68.6 Observation Well And Water-Surface Altitude Of Water Level Above National Geodetic Vertical Datum Of 1929
- 20— Line Of Equal Water-Table Altitude - Contour Interval 20 Feet
- ← Indicates Direction Of Groundwater Flow Perpendicular To Groundwater Contours

0  3
SCALE IN MILES

SOURCE: USGS Water Resources Investigation Report 86-4189, Plate 1A.

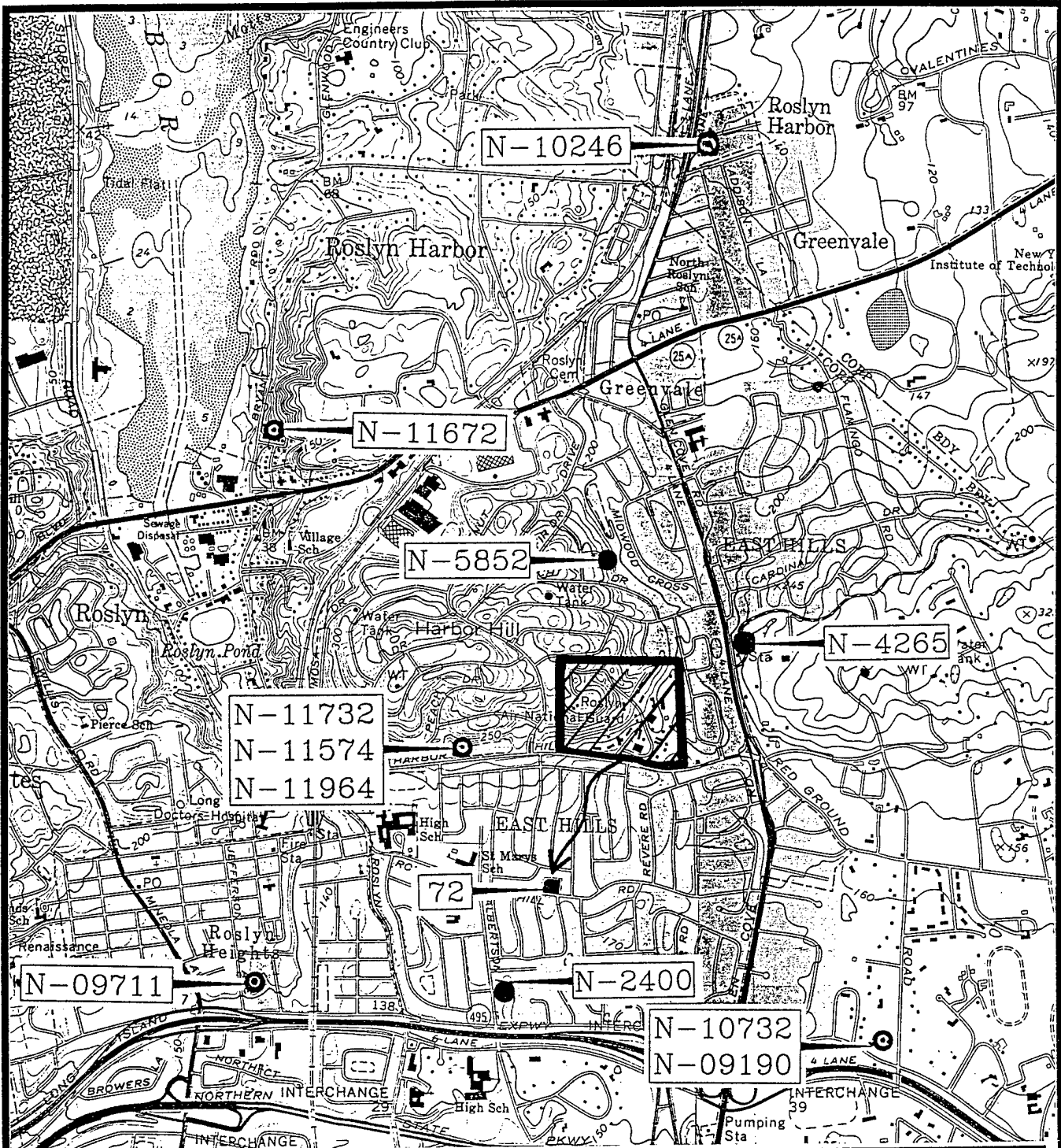
FIGURE 3.5

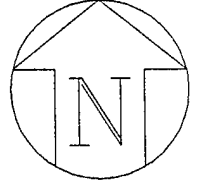
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WATER-TABLE OF THE AREA,
MARCH - APRIL 1984
Roslyn Air National Guard Station
New York Air National Guard
Roslyn, New York

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LEGEND

●	Private Supply Well	⊙	Observation Well
●	Public Supply Well	■	Retention Basin
▨	Station Property	0 1000 2000	
→	Channelized Runoff From Station	SCALE IN FEET	

SOURCE: NASSAU COUNTY DEPARTMENT PUBLIC WORKS

FIGURE 3.6

**AREA WATER WELLS AND
RETENTION BASIN**
 Roslyn Air National Guard Station
 New York Air National Guard
 Roslyn, New York

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JULY 1994

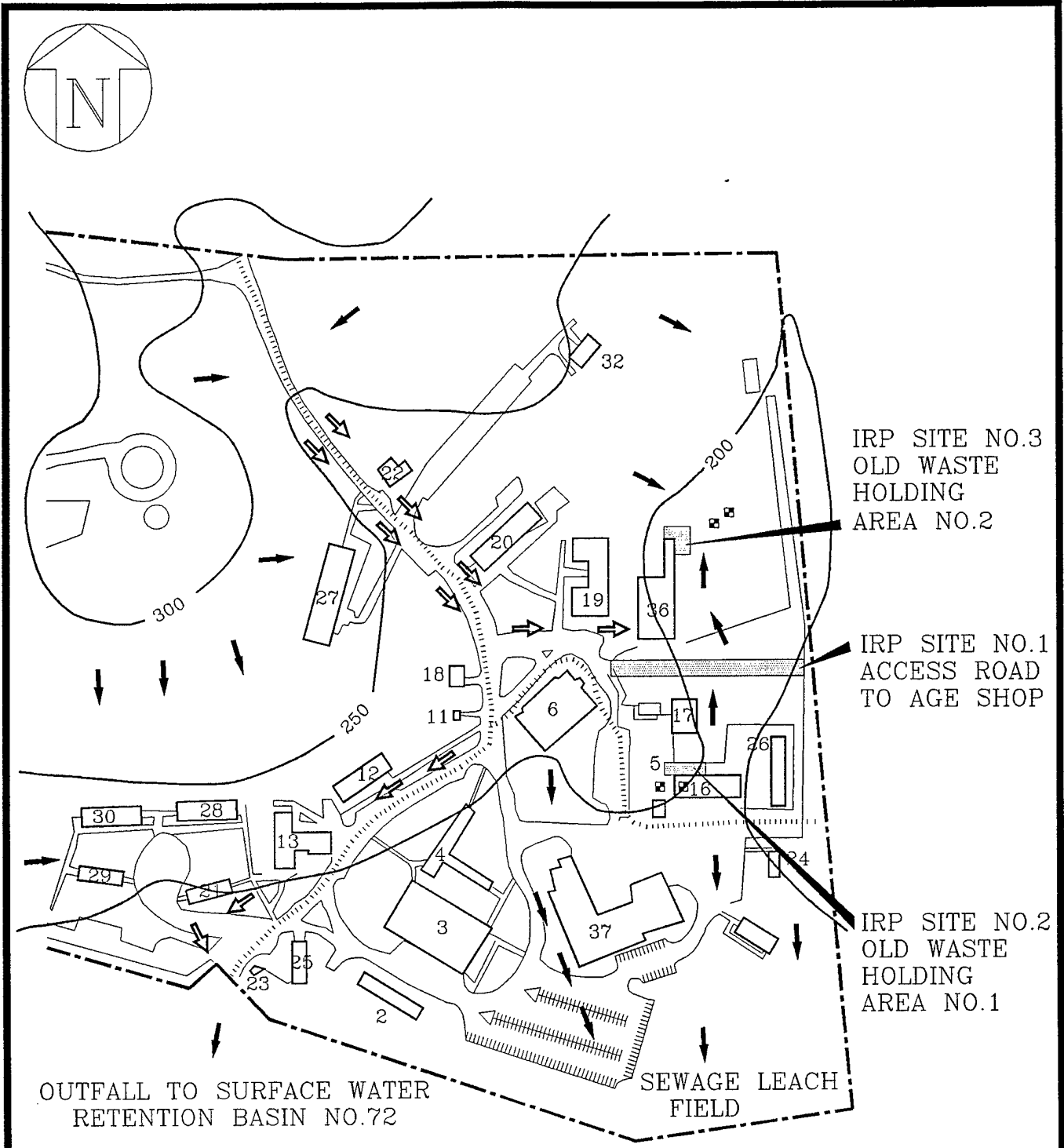
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The susceptibility of the groundwater to contamination from the Station is considered to be moderately high to high. This conclusion stems primarily from the permeable nature of the glacial outwash deposits which likely exist at the Station location, the permeable character of the soil, and the localized recharge of the groundwater system from precipitation. Furthermore, surface water is locally collected and introduced into the groundwater system through the use of dry wells, leach fields, and surface water retention basins. The upper unconfined aquifer is most susceptible, followed by the principle aquifer, and, to a much lesser degree, the deep confined aquifer. It should be noted that because of the high density of urbanization in the area, the upper aquifer is currently considered to be contaminated and is not used as a source of public water supply.

3.5 SURFACE WATER

Surface water drainage at the Station can be divided into three basic drainage areas: the west one-half, the southeast one-quarter, and the northeast one quarter of the property (Figure 3.7). Each area drains independently of the others, and transports surface runoff to separate destinations. Surface runoff from the west area of the Station property flows overland to the south and east, down the slope of Harbor Hill via natural drainage pathways. Overland runoff that occurs to the east and southeast is collected in an open ditch that parallels the main north-south street. The ditch transports surface water to the southwest along the west side of the street before emptying into a catch basin located immediately west of the main entrance to the Station. Overland runoff from the western part of the west area is routed by open ditch transport east at the base of Harbor Hill along the southwest perimeter road to the catch basin located west of the main entrance. The catch basin collects and transports all surface water runoff from the west area underground to the south approximately 0.35 miles to the Nassau County No. 72 surface water retention basin (Figure 3.6). Surface water does not exit the retention basin except through percolation into the groundwater system.

The northeast area of the Station property is drained primarily by overland runoff. Surface water from the north and west part of the northeast area is collected in an open ditch paralleling the east side of the northern segment of the main north-south road. The ditch transports water south and east to a point just west of Building 36 where it is emptied onto the ground. Runoff continues to the east from this point where it is ultimately collected in two catch basins located on the southeast corner of Building 36. The two catch basins also collect overland surface runoff from the south and east parts of the northeast area. Surface water collected in the catch basins is transported north along the east side of Building 36 and empties into two dry wells just



IRP SITE NO.3
OLD WASTE
HOLDING
AREA NO.2

IRP SITE NO.1
ACCESS ROAD
TO AGE SHOP

IRP SITE NO.2
OLD WASTE
HOLDING
AREA NO.1

OUTFALL TO SURFACE WATER
RETENTION BASIN NO.72

SEWAGE LEACH
FIELD

LEGEND	
	Drainage Area Boundary
	Runoff Through Surface Ditches
	Runoff Direction
	Dry Well
	Topographic Contour (Ft. Abv. Mean Sea Level)
	Existing Road
	Current Site
	Building
	Station Boundary

SCALE IN FEET

SOURCE: ROSLYN ANG STATION.

FIGURE 3.7

SURFICIAL DRAINAGE MAP
Roslyn Air National Guard Station
New York Air National Guard
Roslyn, New York

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SEPTEMBER 1995

northeast of the building. Water entering the dry wells is introduced into the groundwater system through natural seepage.

The southeast area is drained by a combination of overland runoff and buried storm sewers. Overland runoff is primarily directed toward the south where it percolates into the groundwater system in the area of the sewage leach field and through a leach pit that exists along the south boundary of the Station property. Two catch basins, located along the west side of Building 37, collect surface water runoff and transport it underground south to the leach pit located along the southern boundary. The western part of the southeast area is also drained by a leach pit that is located along the west side of Building 3. Surface water in the vicinity of Building 2 and 3 is collected in two catch basins and is collected in two catch basins and is transported north to the leach pit. The leach pit also receives overland runoff from the north in the vicinity of Building 14. Surface runoff from the southeast area does not outflow the Station property but is introduced into the groundwater system through the leach pits and natural seepage. The Station is not located within the 100-year flood plain.

3.6 CRITICAL HABITATS/ENDANGERED OR THREATENED SPECIES

According to current records maintained by the New York State Department of Environmental Conservation, no endangered or threatened floral or faunal species have been officially identified within a 1-mile radius of the sites at the Station. No significant habitats have been identified within this area.

SECTION 4.0 FIELD PROGRAM

The purpose of this SI was to confirm, through field activities, the presence or absence of contamination at IRP Sites No. 1, No. 2, and No. 3, to attempt to determine the areal extent of any contaminants detected, and to provide data needed to reach a decision point for each site. Included was a groundwater investigation to determine, through the collection and analysis of groundwater samples, if contaminants entering the dry wells, located within close proximity to IRP Sites No. 2 and No. 3, have impacted groundwater conditions. In addition, information was obtained during field activities and report preparation to complete the Hazard Ranking System (HRS) "Data Requirements for Federal Facilities Docket Sites." This section describes the field activities performed during the Site Investigation to accomplish the above objectives, and the methodologies used to conduct these activities.

Field activities at Roslyn ANGS began on 10 September 1993. During the initial groundwater investigation, the depth to groundwater at the Station was determined to be significantly deeper than anticipated. The groundwater program required drilling techniques not possessed by the contractor performing the work. An additional drilling contractor was obtained on 5 April 1994 to install the wells required for the groundwater investigation. Therefore, the SI was conducted in two phases. The majority of the soil investigation at the IRP sites, which commenced on 10 September 1993, was completed on 24 September 1993. The second phase, consisting of the groundwater investigation and final soil sampling began on 5 April 1994 and was completed on 18 May 1994.

4.1 GENERAL INVESTIGATION APPROACH

The field investigation at the Roslyn ANGS incorporated a soil gas survey, the installation of piezometers, and the use of soil borings and groundwater monitoring wells in order to:

- Screen soil for contamination at the three IRP sites;
- Determine Station-wide groundwater flow direction;
- Determine background groundwater quality and soil conditions;
- Screen groundwater for contamination at the IRP sites;
- Collect soil data at the IRP sites; and
- Collect groundwater data at the IRP sites.

A site-specific soil gas survey was conducted at each IRP site prior to the commencement of soil sampling or well drilling activities. The soil gas survey was used as a screening tool for determining the optimum number and location of soil borings needed to confirm the absence or presence of soil contamination. The installation of a Station-wide piezometer network established local groundwater flow direction used to finalize groundwater monitoring well locations.

Soil borings were installed to confirm contamination, if it does exist, and to attempt to determine the nature and extent of the contamination. Groundwater monitoring wells were installed to identify the presence of groundwater contamination associated with dry wells near IRP Site No. 2 and IRP Site No. 3. In addition, soil and groundwater samples collected from a specifically located soil boring and monitoring well established background conditions applicable to the Station.

4.2 DETERMINING BACKGROUND LEVELS

An evaluation of the significance of environmental contaminant concentrations is typically based on a comparison of the levels observed to known background conditions and regulatory-based standards, where applicable. Sampling of soil and water at background locations was conducted to determine naturally occurring concentration levels of target analytes already existing in the area due to general environmental conditions. Establishing soil and groundwater background conditions is necessary for risk assessment, establishing cleanup criteria, and making decisions on further site actions. Background locations were located away from any known or suspected Station sources of contamination and generally hydrologically upgradient from the IRP sites in order to provide information on background conditions.

Background data at the Roslyn ANGS consisted of one soil boring (BG-001BH) and one groundwater monitoring well (01-001MW) which was used to obtain soil and groundwater samples, respectively. Three soil samples from the soil boring were collected. Soil samples were obtained from the surface, at 5 feet BLS, and at 10 feet BLS for laboratory analysis and to characterize subsurface soil and geological conditions. Two groundwater samples (one from each sampling round) were obtained for laboratory analysis from the monitoring well. Additional information on background sampling is discussed in Section 5.2, Background Findings, and shown on the borehole logs included in Appendix A.

4.3 DEVIATIONS FROM THE WORK PLAN

There were some deviations from the Work Plan noted. However, overall objectives for the site which were to confirm the presence or absence of contamination, to attempt to determine the areal extent of any contaminants detected, and to provide data needed to reach a decision point for each site were accomplished.

The deviations from the Work Plan and the rationale for the changes are described as follows:

- In order to better characterize an area of relatively high contamination detected at IRP Site No. 3, the soil gas survey was modified, transferring two survey points from IRP Site No. 1 to IRP Site No. 3.
- During field activities conducted in September 1993, methyl-t-butyl-ether (MTBE) was not included in the target compound list for field gas chromatograph (GC) screening. MTBE was not considered a potential contaminant at any of the IRP sites and was not included in the field screening program. During the second phase activities in April/May 1994, MTBE was included in the field GC screening list as outlined in the Work Plan.
- Soil samples collected during piezometer well installation were not sieved. Screen slot size and gravel pack were selected based upon the drilling contractor's experiences with environmental well drilling in the upper glacial aquifer in the vicinity of Roslyn, Long Island, New York and conformed with NYSDEC well specifications.
- During piezometer and monitoring well construction, bentonite pellets were used above the sand pack and hydrated with Station potable water in place of a bentonite slurry. A bentonite grout was used in place of a cement/bentonite grout in completing the wells. All well installation activities at the Station conformed with NYSDEC well construction requirements.

Groundwater conditions at the Station required a change in the scope of work as stated in the Work Plan. The following deviations were a result of these modifications and were approved by the HQ ANG/CEVR Project Manager prior to being conducted in the field.

- Piezometers and monitoring wells were not drilled using hollow-stem auger (HSA) drilling techniques as specified in the Work Plan. Due to the depth to groundwater and complex subsurface geologic conditions at the Station, installation of the wells using HSA drilling techniques were not possible. The ODEX drilling method was mobilized to the site in April 1994 to install the piezometer and monitoring wells. Using the ODEX drilling method, split-spoon samples could not be collected at 5-foot intervals for geologic classification and field screening. The wells were logged continuously from the surface to the total depth from drill cuttings returned to the surface in the drilling process. Drill cuttings were field screened with the field GC at 30-foot intervals and a split spoon sample was collected from the target depth to retrieve an aquifer material sample for geologic descriptions and field screening using the photoionization detector (PID) and the field GC.
- One boring at each site was not drilled to the water table as specified in the Work Plan. The purpose of these deep borings was to provide information on subsurface geologic conditions at the IRP sites. This information was provided by continuous logging of piezometers and monitoring wells installed within close proximity (less than 100 feet) to each site. The information obtained from piezometer and monitoring well logging during drilling provided a complete description of subsurface geologic conditions at the three IRP sites.
- Due to the depth to groundwater and the complex subsurface material, BG-001MW was not installed as part of the Site Investigation. Once groundwater flow direction was determined at the Station, 01-001MW was located upgradient from all potential sources of contamination and upgradient from all the IRP sites at the Station and would, therefore, provide the background conditions of groundwater at the Station.
- The screen length used in the construction of 03-001MW was modified from 10 feet to 20 feet due to special hydrologic conditions determined during drilling. The dry wells located near IRP Site No. 3 have become silted and do not allow for the rapid infiltration of runoff during rain events. This resulted in a large ponding of water days after the rain event that slowly infiltrated to the water table. During drilling of 03-001MW, a rain event occurred and saturated conditions were encountered above the estimated static groundwater level as measured in the other wells. This was believed to be a result of the slowly infiltrating water. A screen length of 20 feet was selected for this monitoring well to insure potential

contaminants floating on the saturated/vadose zone interface would be captured by the screened interval and be allowed to enter the well.

- There was not a 48-hour delay between well development and first round of groundwater sampling as specified in the Work Plan. Since the groundwater investigation was not performed in conjunction with the soil investigation as outlined in the Work Plan, scheduling permitted sampling the wells once they stabilized following well development.
- A PVC bailer for groundwater sampling was used instead of a stainless steel or Teflon™ bailer, which conformed with NYSDEC requirements.

4.4 FIELD SCREENING ACTIVITIES

4.4.1 Soil Gas Surveys

Prior to installation of soil borings and monitoring wells, a soil gas survey was conducted at the three IRP sites. A soil gas survey was used to identify the presence and to attempt to delineate the extent of benzene, toluene, ethylbenzene, and total xylenes (BTEX) and total volatile hydrocarbons (TVHC) contamination. TVHC is defined as total volatile hydrocarbons in the range of C1 through C9. The results were used for developing the optimum location of soil borings needed to confirm and to attempt to delineate soil contamination.

The soil gas survey was conducted by Tracer Research Corporation, Monmouth Junction, New Jersey. A total of 58 sampling points (31 sampling points at IRP Site No. 1, 16 sampling points at IRP Site No. 2, and 11 sampling points at IRP Site No. 3) formed a base grid at each site with a distance of no more than 25 feet between sampling points at IRP Site No. 1 and 20 feet at IRP Site No. 2 and Site No. 3.

A probe, consisting of 3/4-inch pipe with expendable tips, was driven into the ground to a depth of five feet BLS with a hydraulic press or hammer. Holes for sampling points located through asphalt were first drilled before pushed or hammered in. After the probe was driven in, a vacuum pump was used to evacuate the ambient air within the pipe and tubing. A glass syringe was then attached and purged with soil gas prior to collecting the sample at five feet BLS. Soil gas samples were analyzed immediately on-site in a mobile laboratory. Samples were analyzed for TVHC and BTEX. A quality assurance check on analytical procedures and results was provided by the collection of one field duplicate for every ten samples. In addition, air blanks were analyzed to ensure proper equipment decontamination and performance. Soil gas survey locations and results are fully discussed in Section 5.0 and included in Appendix B.

4.4.2 Piezometer Installation

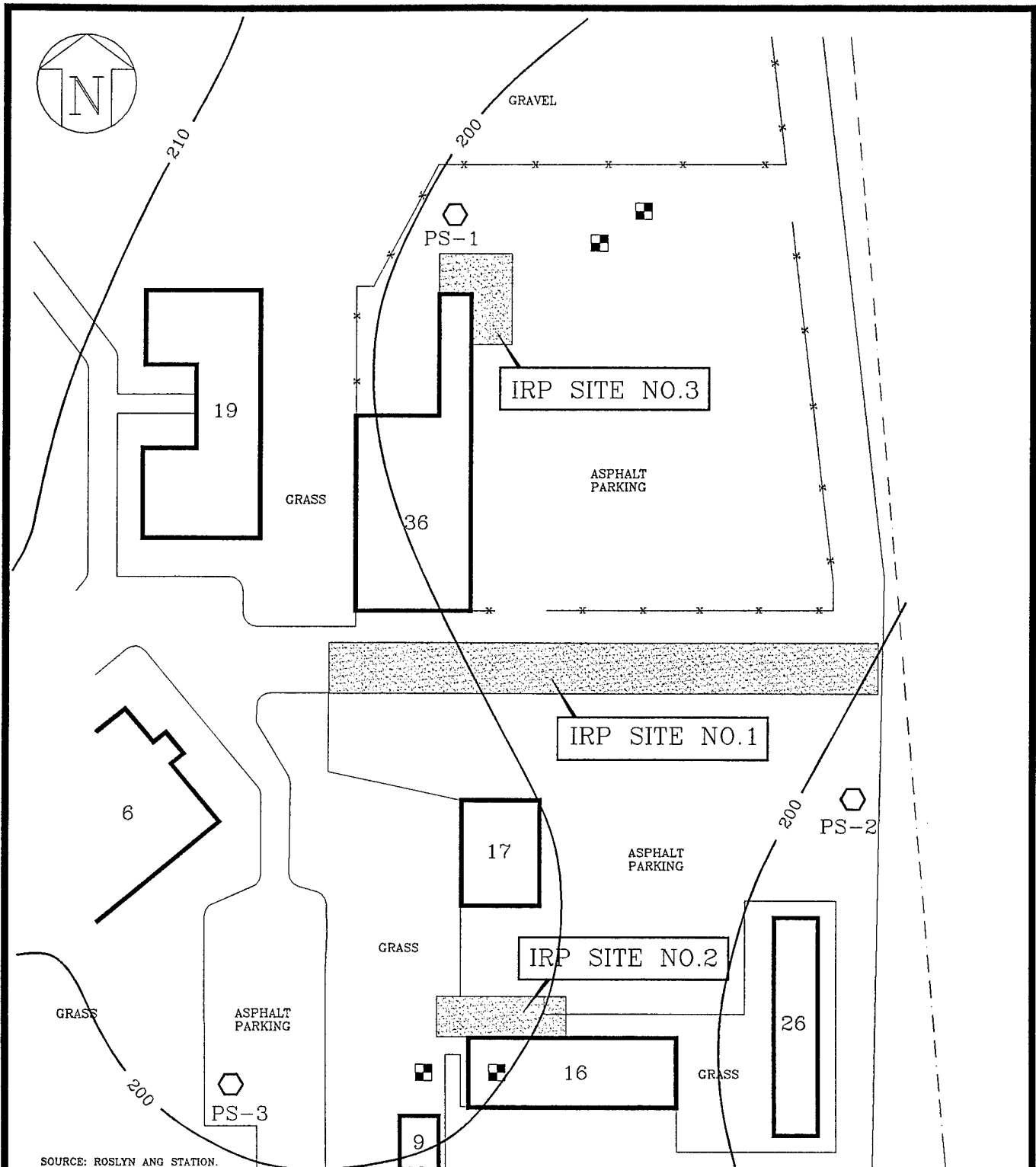
A Station-wide piezometer network was installed to measure water levels in order to determine groundwater flow direction prior to installation of monitoring wells. The piezometer network consisted of three wells placed in a triangular position at the Station. The location of the piezometers are shown in Figure 4.1. After groundwater flow direction was established, groundwater monitoring well locations were selected.

Auger flights, drill rig(s), and tools were steam-cleaned in a designated decontamination area located north of Building 17 before initial use and after the completion of each piezometer well. Likewise, all casing and screens installed in piezometer wells were unpackaged immediately prior to installation to ensure they were free from any contamination before placement within the wellbore.

The piezometers were installed using the ODEX drilling method. The ODEX drilling method employed a pneumatic hammer that advanced 6-inch ID steel casing as the hole was drilled. Compressed air was used to power the hammer and lift formation material (cuttings) to the surface. Drill rods were attached to the hammer string as the hole was advanced and steel casing sections welded together to advance with the hammer to maintain the integrity of the hole. Once the target depth of the well was reached, the drill string and air hammer were removed from the hole and the steel ODEX casing was secured until the installation of the PVC piezometer was conducted.

Once all three piezometer locations were drilled, the wells were completed by placing the PVC well in the hole and exposing the screened interval to the aquifer. This was accomplished by setting the PVC screens and casing in the well (within the 6-inch steel ODEX casing) to the desired interval. Once this was complete, a pneumatic casing extractor was welded to the steel casing and the casing was slowly "lifted" up while the gravel pack was placed in the annular space between the PVC well screen and the steel casing. The steel casing was lifted until the entire screened interval of the PVC well was exposed to the aquifer. Once this was completed, the steel casing was cut at the surface. The gravel pack was placed to a minimum of 2 feet above the top of the screen, the bentonite seal was placed above the gravel pack, and once set, bentonite grout was tremied to the surface.

The piezometers were constructed of 2-inch diameter, schedule 40 PVC casing and screen. A ten-foot section of 0.010-inch slotted screen with bottom cap was installed in each piezometer. The tops of the screens were placed approximately five feet below the static water level, and a



SOURCE: ROSLYN ANG STATION.

LEGEND	
	Dry Well
	Station Boundary
	Fence
	Topographic Contour Line (Ft. Abv. Mean Sea Level)
	Current Site
	Building
	Piezometer Well Location

0 75

SCALE IN FEET

FIGURE 4.1

PIEZOMETER WELL LOCATIONS
 Roslyn Air National Guard Station
 New York Air National Guard
 Roslyn, New York

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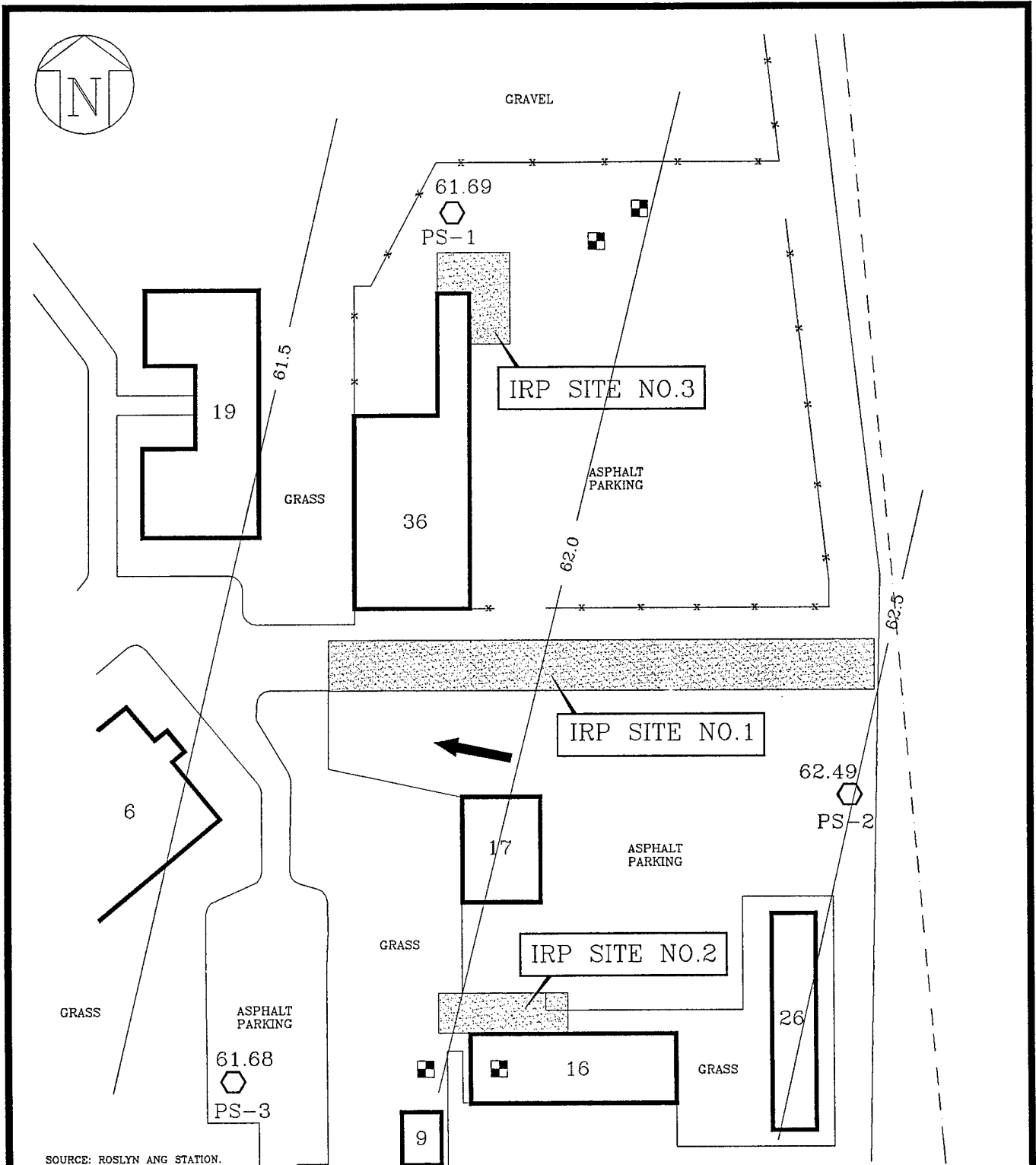
filter pack placed around each screen to a point at least two feet above the top of the screen. The filter pack was composed of #2 washed (silica sand) gravel. A two-foot (minimum) bentonite pellet seal was placed above each filter pack and allowed to hydrate (using Station potable water) at least 24 hours. Above the bentonite seal, pure bentonite grout was backfilled around the casing. All of the piezometers were completed flush with the ground surface with the PVC casing cut approximately 3 inches below the ground surface. A protective steel vault box equipped with a bolted cap was set into the ground in a concrete base around the steel (ODEX) casing and well. Airtight well caps were placed on the piezometers and provided with a stainless steel, keyed-alike locks. The master key was given to the Roslyn ANGS Civil Engineer. Piezometer well construction diagrams are included in Appendix C.

The static water level was allowed to equilibrate at the piezometer locations before water levels were measured using an ORS Model 1068 Oil-Water Interface Meter. The completed piezometer coordinates, top-of-casing elevations, and ground elevation were determined during the field investigation and later confirmed by a registered surveyor.

Approximately three days were required to drill each piezometer to the total depth required to set the well. Static water levels were obtained and recorded from the 6-inch ODEX casing as drilling at subsequent piezometer locations were being conducted. One round of water levels were obtained from the ODEX casing holes on 29 April 1994, immediately prior to completing the piezometers by setting the PVC screens and casing. This round of water levels confirmed groundwater flow direction at the Station was to the west. A potentiometric map is shown as Figure 4.2. During completion of the last piezometer (PS-3), a rupture occurred during grouting resulting in the collapse of the well. The piezometer was unusable and was abandoned. Once the two remaining piezometers were completed and allowed to stabilize, water levels were obtained to confirm and validate groundwater data obtained earlier.

4.4.3 Soil and Groundwater Screening

During soil sampling, an HNu Model DL-101 Data Logging PID was used immediately upon opening the sampler to maximize the detection of volatiles. All PID readings are indicated on the boring logs included in Appendix A. Once the soil sample for laboratory analysis was prepared, the remaining soil was field screened by ambient temperature headspace analysis (ATHA). The soil was placed in a sealable plastic bag, and the PID used to conduct the ATHA to screen for photoionizable compounds. A Photovac 10S50 Portable GC, calibrated to screen for BTEX (and MTBE during phase 2 work), was used to detect the presence of these compounds in the headspace from the soil samples collected. Headspace analysis was used to



SOURCE: ROSLYN ANG STATION.

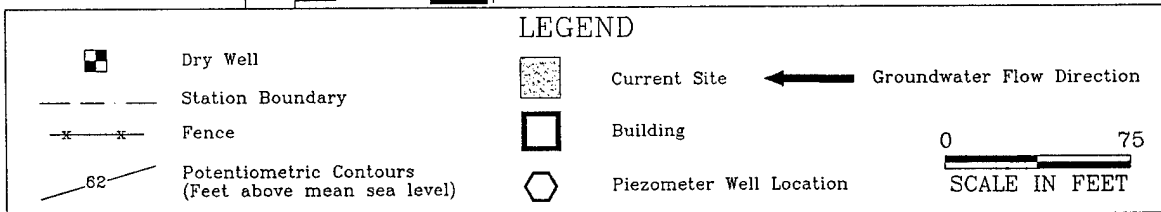


FIGURE 4.2

POTENTIOMETRIC MAP
 29 APRIL 1994
 Roslyn Air National Guard Station
 New York Air National Guard
 Roslyn, New York

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provide initial field information to characterize volatile contamination in the borehole and to supplement data obtained from laboratory analysis. ATHA information is presented on the soil boring logs in Appendix A.

During drilling of the piezometers and monitoring wells, the PID and field GC were used to screen drill cuttings. Drill cuttings were field screened at approximately 30-foot intervals for photoionizable contaminants and BTEX using the PID and field GC. Additionally, the aquifer material collected by the split-spoon sampler was field screened by ATHA and the field GC as outlined above. Field screening of cuttings produced during well drilling was conducted to confirm the soil could be used as backfill for ongoing UST removals at the Station.

Likewise, the field GC was used to analyze headspace from water samples. The temperature, pH, and specific conductance of groundwater was also collected as a part of field screening to provide the Project Manager with preliminary water quality information and to supplement data from water samples sent to the laboratory for analytical analysis. Field GC data is discussed in Section 5.0, Field GC Screening Results in applicable background sampling and IRP site subsections, and a complete summary with chromatograms are included as Appendix D.

4.5 CONFIRMATION ACTIVITIES

Soil Mechanics Drilling Corporation, Seaford, Long Island, New York, was retained as the drilling contractor for drilling boreholes for soil samples. Big Apple Testing, Inc., Whitestone, Long Island, New York was retained for drilling and installation of piezometers and monitoring wells. The selected drilling contractors mobilized personnel and equipment that met or exceeded New York ANG, NYSDEC, or other relevant regulatory requirements.

Nytest Environmental, Inc., Port Washington, Long Island, New York, was retained to perform laboratory analysis. Provisions were made for proper sample containers, labels, chain-of-custody forms, sample stabilization and preservation, and insulated sample containers.

Pratap M. Narsu, Registered Professional Engineer and Land Surveyor, Long Beach, New York, was retained as the surveying contractor. The site boundaries, buildings, parking areas, all monitoring wells, piezometer wells, and soil boring locations were surveyed. The land surface elevations of each borehole and well are shown on the borehole logs and well construction diagrams included in Appendices A and C, respectively.

4.5.1 Soil Borings

Soil borings were installed to obtain soil samples for laboratory analysis, for defining any existing soil contamination, and to aid in defining the vertical and horizontal extent of contaminants at each site. Soil samples were also used for determining site geology and subsurface soil characteristics.

Soil borings were drilled by using HSA drilling methods which employs a hollow helical steel drill tool that is rotated to advance the boring and lift formation materials (cuttings) to the surface. The flights for the HSA are welded onto steel pipe and a cutter head is attached to the "lead" (bottom) auger to cut the hole. During drilling, a center bit is inserted into the hollow area of the cutter head that prevents cuttings from re-entering the hollow portion of the auger. Generally, the center bit is flush with or extends no more than 1/2 foot below the cutter head. The center bit connects through the auger flights by small diameter drill rods and is attached to the top-head drive unit of the drill rig. The top-head drive is powered by a truck-mounted engine that mechanically rotates the entire flight of augers. The hollow opening allows the insertion of sampling tools (i.e., split-spoon sampler) with the augers in place to prevent caving of the borehole.

Auger flights, drill rig(s), and tools were steam-cleaned in the designated decontamination area at the north end of Building 17 before initial use and after the completion of each borehole.

A total of 19 soil borings, including one background, were drilled for data collection. All work was performed in a manner consistent with NYSDEC regulations. Of the 19 soil borings drilled, 14 were drilled using a hollow-stem auger and 5 were drilled using a hand auger. Depth of the HSA soil test borings was 10 feet BLS with soil samples collected at the surface, at 5 feet BLS, and at 10 feet BLS for subsurface characterization, field screening, and laboratory analysis. An 18-inch, carbon steel California-style sampler equipped with three 6-inch brass sleeves was used for collecting soil samples. Sample depths for each individual boring is discussed in Section 5.0, Investigation Findings, and shown on the borehole logs included in Appendix A. The California-style sampler was decontaminated and new brass sleeves inserted before each sampling event. Hand auger borings were drilled to 5 feet BLS with samples collected from the surface and at 5 feet BLS. The hand auger was decontaminated immediately prior to collecting soil samples once the desired depth was reached. Soil was collected with the hand auger and placed in a large-mouth, 8-oz. glass container with Teflon™ lid for laboratory analysis.

Borehole abandonment activities conformed to applicable New York State requirements. Borings were backfilled with pure bentonite grout immediately after the sampling had been accomplished

to prevent the downward migration of contaminants through the open borehole. Borings were bentonite grouted from the bottom of the borehole to the surface using a tremie pipe. Soil boring coordinates and ground elevation were determined by a professional surveyor.

4.5.2 Monitoring Well Installation

Monitoring wells were installed to obtain water level data for hydrogeologic characterization of the aquifer, evaluate horizontal groundwater flow characteristics, and obtain groundwater samples for laboratory analysis.

ODEX flights, drill rig(s), and tools were steam-cleaned in the designated decontamination area north of Building 17 before initial use and after the completion of each monitoring well. Likewise, all casing and screens installed in monitoring wells were unpackaged immediately prior to installation to ensure they were free from any contamination before placement within the wellbore.

Three monitoring wells were installed using ODEX drilling methods, previously described in Subsection 4.4.3, to a depth of at least 10 feet below the first occurrence of groundwater. All monitoring wells were logged continuously to the water table during drilling for determining site geology and subsurface soil characteristics. Monitoring wells were constructed in accordance with applicable New York State well standards.

Heaving sands were encountered at the target depths of the monitoring wells. In order to prevent these sands from entering the well when the air hammer and drilling string were being removed, Station potable water was added. This water provided positive head pressure to reduce heaving. The amount of Station water added was closely monitored and did not exceed 20 gallons in any well. During well development, a minimum of twice the volume of Station water added to the well was removed. Additionally, one Station water sample was collected for laboratory analysis to detect the presence of any contaminants of concern.

Monitoring wells were constructed of 4-inch ID, flush threaded, PVC casing and screens, and a bottom cap. A 10-foot, 0.010-inch slotted screen with bottom cap was installed in 01-001MW and 02-001MW (a 20-foot screen was placed in 03-001MW as described in Section 4.3). The bottom of the screen was placed approximately eight feet below the top of the water table, and a filter pack placed around the screen to a point at least two feet above the top of the screen. The filter pack was composed of #2 washed silica gravel. A two-foot (minimum) bentonite pellet seal

was placed above each filter pack and allowed to hydrate a minimum of 24 hours prior to grouting. Above the bentonite seals, pure bentonite grout was backfilled around the casings. All wells were completed using a flush mount well completion. A protective steel vault box equipped with a bolted cap was set into the ground in a concrete base around the steel (ODEX) casing. An airtight well cap was provided with a stainless steel keyed-alike lock. The master key was given to the Roslyn ANGS Civil Engineer. Monitoring well construction diagrams are included in Appendix C.

The monitoring wells were developed 48 hours after the last well was completed. Monitoring wells were developed with an electric submersible pump having a pump rate of approximately 4 gallons per minute. Well development continued until approximately 44 to 64 gallons of water were removed from each wellbore (7.5 to 11.3 well volumes), the water had cleared, and specific conductance and pH readings had stabilized. After development, the wells were allowed to stabilize 3 hours prior to the first round of groundwater sampling.

Each monitoring well was purged immediately prior to sample collection. Wells were purged with an electric submersible pump. Purging was considered complete when the indicator parameters of pH, temperature, conductivity, and color had stabilized and the volume of water in the screen, well casing, and saturated annulus had been removed from the well three times.

Water samples were collected using a decontaminated PVC bailer and placed in appropriate containers with preservatives, if required, and sent to the laboratory for analysis. Line used to lower aqueous sampling equipment into the well was used only for the well being sampled.

A rising head slug test was conducted at each well to determine aquifer properties. A decontaminated slug, constructed of 2.5-inch diameter, 32-inch long acrylic rod, was lowered below the water surface. The water level in the wellbore was monitored using an ORS Model 1068 Oil-Water Interface Meter until it returned to the initial static level. The slug was removed after the pre-displacement water level had been reached, and the rise in water level back to its initial static level measured at closely spaced time interval using a Hermit Model SE1000C Environmental Data Logger. The resulting data was used to compute hydraulic conductivity, and is included in Appendix E.

Average groundwater flow velocities were calculated using the horizontal hydraulic conductivities calculated from slug data. The velocities range in value from 1.4 feet per day to 4.7 feet per day. the velocities were computed from the equation:

Where:

$$V = .134 \frac{KI}{n}$$

V = velocity, in feet per day;

K = horizontal hydraulic conductivity, in gpd/ft²;

I = average hydraulic gradient, in feet per foot; and

n = aquifer net effective porosity, no dimensions.

The following values were used:

K = 519.7, 1083.4, and 1747.6 gal/day/ft², based on the aquifer slug tests (see Appendix E);

I = 0.0031, and

n = 0.20.

Monitoring well coordinates and top-of-casing and ground elevations were determined by a professional surveyor.

4.5.3 Specific Media Sampling

This subsection summarizes the analytical program followed for soil and groundwater samples collected during the SI to determine the nature, magnitude, and extent of contamination detected at the IRP sites. Also included in this subsection is a brief discussion of quality control procedures followed during the field sampling activities.

4.5.3.1 Soil

Past activities at the IRP sites indicate that suspected contamination includes waste and product oil, paint thinners, solvents (PD-680), JP-4, diesel fuel, and leaded MOGAS. Therefore, the analytical program of the SI focused on the detection of volatile organic hydrocarbons (VOCs), semivolatile organic hydrocarbons (SVOCs), total petroleum hydrocarbons (TPH) and lead. The NYSDEC required baseline analysis using NYSDEC Analytical Services Protocol (ASP) parameters for soil and groundwater. These additional parameters included an analysis for selected metals/cyanide and pesticides/polychlorinated biphenyls (PCBs).

Laboratory analysis of soil samples was conducted in accordance with the sampling plan for the IRP sites at Roslyn ANGS and were performed in accordance with analytical procedures that conform to the NYSDEC-ASP, Superfund Contract Laboratory Program (CLP) Method, 1991, and USEPA guidelines published in the Methods for Chemical Analysis of Water and Wastes (USEPA 600/4-79-20), 1986a, and Test Methods for Evaluating Solid Waste, Physical/Chemical Methods (SW-846), 1986b.

Laboratory standards for determining the identification and levels of contaminants in samples followed the NYSDEC guidelines published in the above document as required by New York. Target Compound Lists (TCLs) for VOCs, SVOCs, Pesticides/PCBs, and Target Analyte Lists (TALs) for metals/cyanide as outlined in the SI Work Plan were followed. New York has no CLP Method for TPH, therefore, California Method 8015 Modified, was used which included an extractable direct injection method for diesel and high boilers, and a purge and trap method for gasoline range hydrocarbons.

Table 4.1 summarizes the field sampling program and the NYSDEC-ASP laboratory analysis program for soil and groundwater sampling conducted during the SI.

4.5.3.2 Groundwater

Following the analytical procedures outlined in Subsection 4.5.3.1, two rounds of groundwater sampling and analysis occurred during the SI. The initial groundwater sampling round was conducted on 16 May 1994 and the second round of groundwater sampling was conducted on 18 May 1994.

4.5.3.3 Quality Control of Field Sampling

Field duplicate samples, field blanks, rinseate (equipment) blanks, and trip blanks were submitted to the analytical laboratory for assessment of the quality of data resulting from the field sampling program. Field and trip blank samples were analyzed to check for procedural contamination and ambient conditions at the site that may have caused sample contamination. Duplicate samples were submitted to provide a quality assurance check on analytical procedures and results. Rinseate blanks were submitted to insure proper decontamination of equipment used to collect soil and water samples.

The level of the quality control effort included one field blank, field duplicate, and rinseate blank for every 10 or fewer investigative soil samples and one rinseate blank for every 10 or fewer

Table 4.1
NYSDEC-ASP, Superfund CLP Methods, Laboratory Analyses Summary Table
Roslyn ANGS, Roslyn, New York

Matrix	Field Parameters	Lab Parameters	Method	Investigating Samples	Number of Field QA/QC Samples					Matrix Totals
					Trip Blanks	Equipment Blanks	Field Blanks	Field Duplicate	MS/MSD	
Soil (Subsurface)	Soil Screening using Field GC, PID, Soil Classification	VOCs SVOCs Pesticides/PCBs Metals/Cyanide TPH ^a	NYSDEC-ASP	52	6 ^b	7	7	5	3/3	77
	Temperature, pH, Specific Conductance, Field GC	VOCs SVOCs Pesticides/PCBs Metals/Cyanide TPH ^a	NYSDEC-ASP	8 ^c	2 ^b	1	-	-	1/1	11

GC - Gas Chromatograph.
 PID - Photoionization Detector.
 VOCs - Volatile Organic Compounds.
 SVOCs - Semivolatile Organic Compounds.
 PCBs - Polychlorinated Biphenyls.
 TPH - Total Petroleum Hydrocarbons.
 MS/MSD - Matrix Spike/Matrix Spike Duplicate.

Note: Field duplicate groundwater samples were not collected since the two groundwater sampling rounds occurred within a 48 hour period.

NYSDEC-ASP - New York State Department of Environmental Conservation - Analytical Services Program.
 TPH analyzed by California Method 8015 Modified.
^bTrip Blanks are not counted in Matrix totals.
^cOne sample included Station potable water used during monitoring well construction.

water samples. One VOC analysis trip blank, consisting of distilled, de-ionized, ultra pure water, was included along with each shipment of soil and water samples which contained samples to be analyzed for VOCs. One matrix spike/matrix spike duplicate was collected for every 20 or fewer investigative soil sample and groundwater samples. Matrix samples provide information about the effect of the sample matrix on the analytical methodology.

The quality control level of effort for the field measurement of pH consisted of a pre-measurement calibration and a post-measurement verification using two standard reference solutions each time. This procedure was performed at least once per day or more often as necessary. Quality control effort for field conductivity measurements included a daily calibration of the instrument using standard solutions of known conductivity.

4.5.3.4 Soil Sample Preservation

Soil samples submitted for laboratory analysis collected with a California-style sampler were contained in brass sleeves. Immediately upon removal from the California-style sampler, the sleeve ends were covered with a Teflon™ barrier, aluminum foil and fitted with a plastic cap. The plastic caps were then secured with duct tape. Samples collected with the hand auger were contained in wide-mouthed, 8-oz. glass jars with Teflon™ lids. Prepared samples were placed in a sealed zip-lock plastic bag and immediately placed in the cooled ice chest.

4.5.3.5 Groundwater Sample Preservation

VOC samples were preserved with a 1:1 solution of hydrochloric acid to a pH below 2 in 40-milliliter glass volatile organic analysis (VOA) vials having Teflon™-lined lids. SVOC and Pesticides/PCB samples were stored in 2-liter amber glass bottles having Teflon™-lined lids, and no preservatives. Cyanide samples were stored in a 1-liter high density polyethylene bottle with a Teflon™-lined lid, and preserved with a solution of 1:1 sodium hydroxide. Total recoverable metal samples were stored in a 1-liter high density polyethylene bottle with a Teflon™-lined lid, and preserved with a solution of 1:1 nitric acid to achieve a pH of less than 2. TPH samples were stored in 1-liter amber glass bottles having Teflon™-lined lids, and no preservatives.

4.5.4 Equipment Calibration

4.5.4.1 Photoionization Detector

Calibration of the PID was performed at the start of each day using 100 ppm isobutylene, a standard calibration gas. Additional calibrations were made during the day if unit readings became erratic, or if the unit was powered off. Calibration procedures were performed as outlined in the manufacturer's instructions.

4.6 FIELD DOCUMENTATION AND INFORMATION COLLECTION

An open line of communication was maintained between the contractor Project Manager, the project team at the Station, and the HQ ANG/CEVR Project Manager to ensure that all project objectives were met. Verifiable sample custody was an integral part of the field work. Samples were collected and identified, and sampling activities were carried out in accordance with the Quality Assurance Project Plan (QAPP) in Section 8.0 of the SI Work Plan. All information pertinent to field observations, screening and sampling were indelibly recorded in a bound notebook. Each member of the project team maintained a field notebook in which details of daily field activities were recorded. A complete record of these field notebooks are presented as Appendix F.

As part of field activities at the Station and report preparation, information was obtained to complete the HRS "Data Requirements for Federal Facilities Docket Sites." This information is presented as Appendix G.

4.7 INVESTIGATION DERIVED WASTE

During the SI, a certain amount of waste material (personal protective equipment (PPE), drill cuttings and purge water) were produced as a result of investigative activities. Drill cuttings were produced during the installation of soil borings, piezometers, and monitoring wells. Drill cuttings were preliminarily characterized by monitoring for photoionizable compounds with a HNu Model DL-101 PID and screening with a Photovac 10S50 Portable GC. All soil cuttings from each soil boring location and all cuttings from the saturated interval of the monitoring wells were drummed in steel, Department of Transportation (DOT) certified, 55-gallon drums at the time of drilling. Additionally, all well development and purge water from each well location was also drummed separately.

Miscellaneous derived wastes (e.g., gloves, Visqueen™ sheeting, and wipes) which came in contact with drill cuttings having PID readings less than 100 ppm, when field screened as described in Subsection 4.4.3, were disposed in a general refuse container. Miscellaneous derived wastes generated during the drilling of borings and/or wells which had PID readings in excess of 100 ppm were washed withalconox and rinsed with methanol in the decontamination area prior to being discarded in a refuse container. All decontamination water was drummed and labeled.

All drums were properly marked to indicate their contents, the collection date, contractor's name and phone number, and borehole/monitoring well identification number. The final disposition of drummed materials is discussed in Section 5.4 of this report.

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SECTION 5.0 INVESTIGATION FINDINGS

5.1 BASE-WIDE GEOLOGIC AND HYDROGEOLOGIC INVESTIGATION RESULTS

5.1.1 Subsurface Geology

Soil samples collected from a total of 19 soil borings, including one background; three monitoring wells; and three piezometers (see Figure 5.1) were used to provide geologic information for describing the subsurface geology at the facility. Soil borings were sampled to a total depth of approximately 11.5 feet BLS. Monitoring wells and piezometers were drilled to a total depth of approximately 160 feet BLS. Complete lithologic logs for the borings and wells drilled at all three IRP sites and the background sampling location are presented in Appendix A.

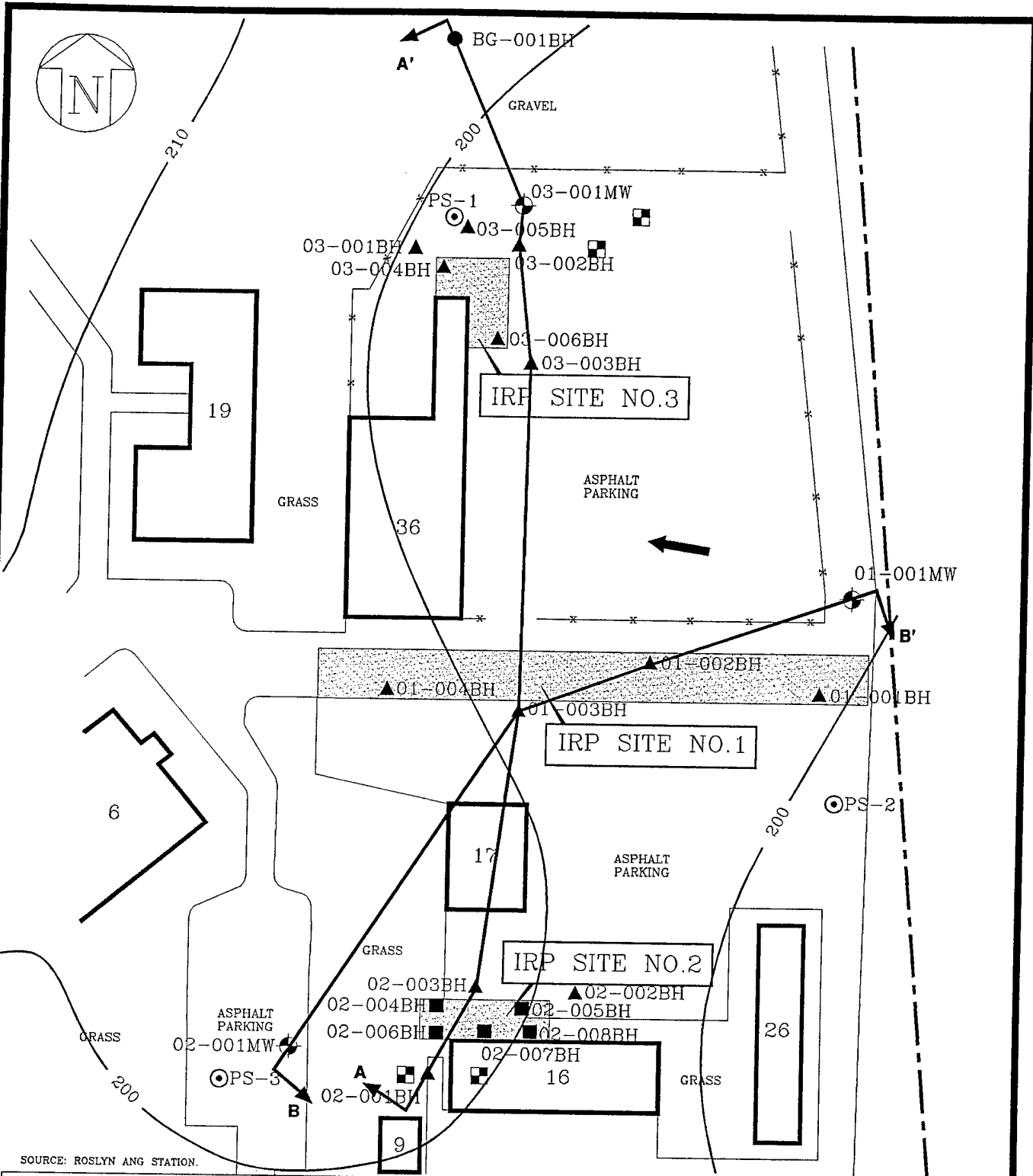
Soils encountered during drilling at the boreholes was composed in general of a dry, light brown to black, very poorly sorted silt, sand, and gravel. In parking and other paved areas, road base fill was encountered to a depth of 4.0 feet BLS. Fill material appears to be composed of nearby soils having similar lithologic characteristics. During drilling for piezometers and monitoring well, subsurface geology typified glacial terminal moraine deposits. Drill cuttings consisted of very poorly sorted medium to fine sand, silt, and gravel with intervals of mostly gravel and boulders encountered at varying depths below the surface as shown in Appendix A. Medium to fine sand was encountered near 135 feet BLS becoming a medium sand with rounded gravel from the water table, encountered from 139.6 to 142 feet BLS, to the total depth of 160 feet BLS.

At the background soil boring location, soil and subsurface material encountered was a light-brown sand, silty sand, and gravel. Some clay was present near the bottom of the boring with the bottom sampling interval containing semi-saturated sand indicating a possible perched water table of limited areal extent.

Cross-sections depicting the subsurface geology are shown in Figures 5.2 and 5.3. A more detailed discussion of subsurface geology at each site is included in Section 5.3.

5.1.2 Hydrogeology

A Station-wide piezometer network was installed to measure water levels in order to determine groundwater flow direction prior to installation of monitoring wells. The piezometer network



SOURCE: ROSLYN ANG STATION.

LEGEND			
	Current Site		Groundwater Flow Direction
	Building		Soil Boring Location (Hand Auger)
	Station Boundary		Soil Boring Location (HSA)
	Fence		Cross-Section
	Topographic Contour Line (Ft. Abv. Mean Sea Level)		Piezometer
			Background Borehole Location

0 75
SCALE IN FEET

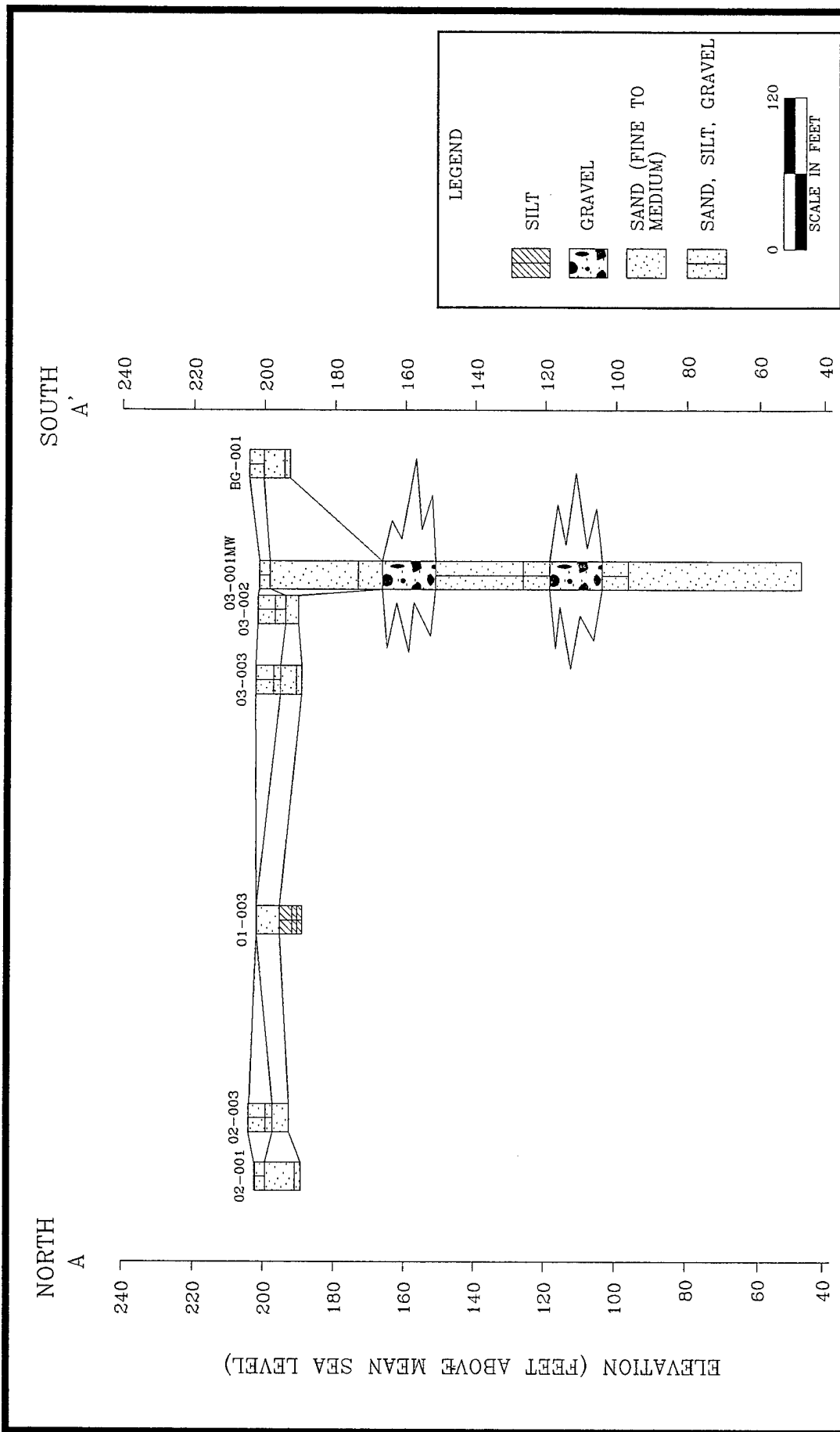
FIGURE 5.1

SAMPLING LOCATIONS AND
CROSS-SECTION MAP
Roslyn Air National Guard Station
New York Air National Guard
Roslyn, New York

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GEOLOGIC CROSS-SECTION A-A'
 Roslyn Air National Guard Station
 New York Air National Guard
 Roslyn, New York

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 CORPORATION

AUGUST 1986

FIGURE 5.2

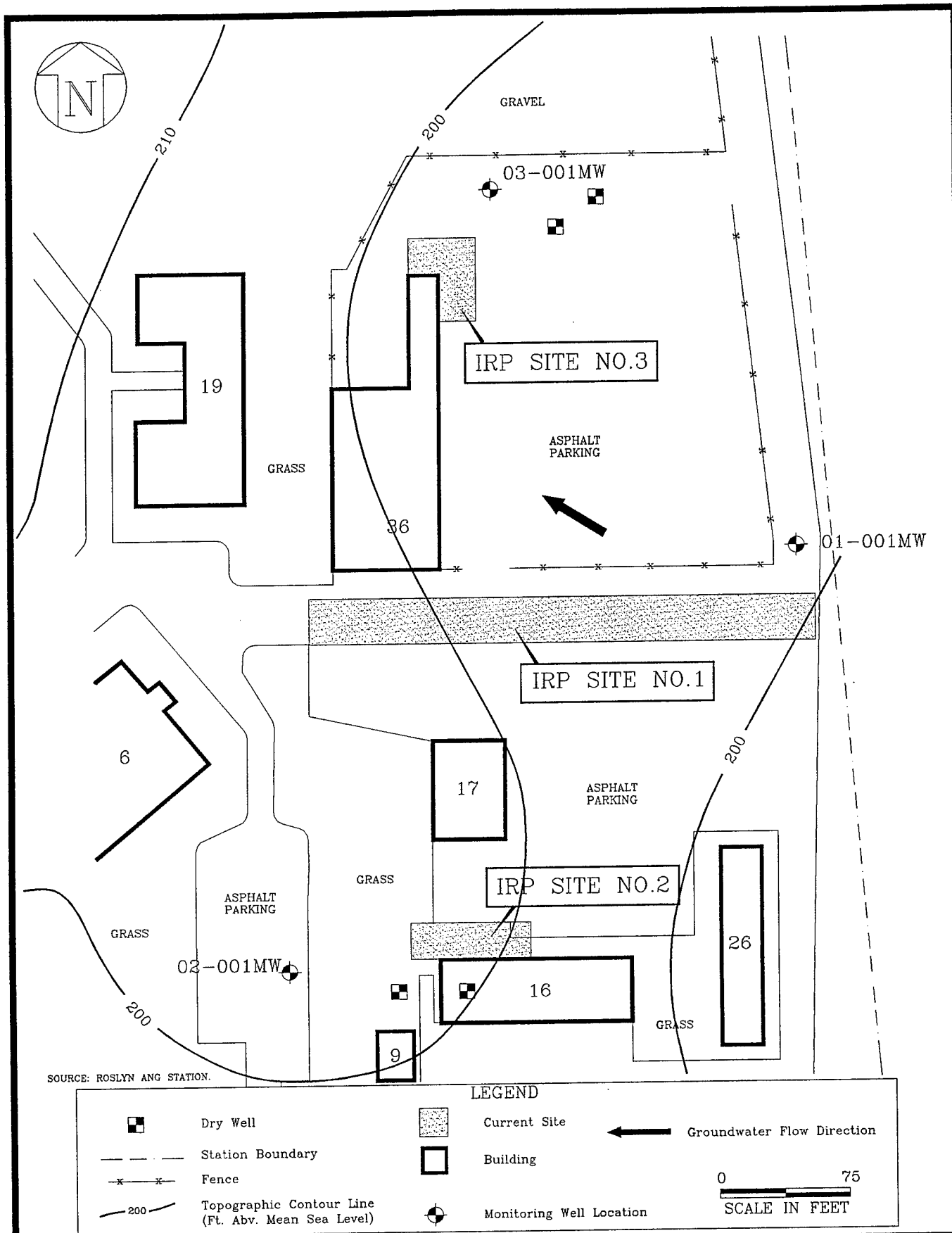
ROSLYN CROSS-A

consisted of three wells placed in a triangular position at the Station. The location of the piezometers are shown in Figure 4.1 and additional information regarding their installation is contained in Section 4.4.2.

Three monitoring wells, 01-001MW, 01-002MW, and 01-003MW were installed at the Station to obtain water level data for hydrogeologic characterization of the aquifer, to evaluate horizontal groundwater flow characteristics, and to obtain groundwater samples for laboratory analysis. The locations of the monitoring wells originally proposed in the Work Plan were modified following information obtained from the piezometer well network. Groundwater flow direction was to the west (not southeast as indicated in the Work Plan) and monitoring well locations had to be adjusted to insure they were downgradient from the dry wells to be investigated. Final monitoring well locations are indicated on Figure 5.4.

Background monitoring well 01-001MW was completed on 6 May 1994 and sampled on 16 May and 18 May 1994. Monitoring well 01-001MW was drilled to a depth of 155.7 feet BLS with groundwater encountered at a depth of 142 feet BLS. The screened interval was set at 151 feet BLS to 141 feet BLS. Subsurface soil conditions indicated an unstratified, poorly sorted, glacial material ranging from boulders to silty clay throughout the drilling interval becoming mostly medium and fine sand near and below the water table. A complete description of subsurface geological conditions are shown on the well boring log diagrams included in Appendix A.

The monitoring wells installed at the Station were screened in the upper Glacial Aquifer of Long Island, New York. Saturated conditions of the upper Glacial Aquifer were encountered between 139.6 and 142.2 feet BLS within medium- to fine-grained sand and gravel. The upper Glacial Aquifer is unconfined and recharged locally by the infiltration of precipitation (Section 3.4). The upgradient well (01-001MW) was drilled beginning on 2 May 1994 and the PVC casing installation completed on 6 May 1994. 01-001MW was drilled to a total depth of 155.7 feet BLS with the screen set between 140.7 to 150.7 feet BLS (static water level 142.2 feet BLS). 02-001MW was drilled beginning on 11 May 1994 and the PVC casing installation completed on 12 May 1994. 02-001MW was drilled to a total depth of 155.0 feet BLS with the screen set between 140.4 to 150.4 feet BLS (static water level 141.6 feet BLS). 03-001MW was drilled beginning on 9 May 1994 and the PVC casing installation completed on 10 May 1994. 03-001MW was drilled to a total depth of 153.0 feet BLS with the screen set between 126.9 to 146.9 feet BLS (static water level 139.6 feet BLS). Additional well construction information is presented in the Well Construction Diagrams presented as Appendix C.



SOURCE: ROSLYN ANG STATION.

LEGEND

- Dry Well
- Station Boundary
- Fence
- Topographic Contour Line (Ft. Abv. Mean Sea Level)
- Current Site
- Building
- Monitoring Well Location
- Groundwater Flow Direction

0 75
SCALE IN FEET

FIGURE 5.4

MONITORING WELL LOCATIONS

Roslyn Air National Guard Station
New York Air National Guard
Roslyn, New York

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Water level measurements taken prior to sampling were conducted on 16 May 1994 for the first round and again on 18 May 1994 for the second round. Figure 5.5 shows the potentiometric surface obtained from monitoring wells on 16 May 1994, Figure 5.6 shows the potentiometric surface on 18 May 1994. Groundwater flow direction is toward the west with an average hydraulic gradient of approximately 0.0031 feet per foot. Temperature, pH, and specific conductance were measured for each groundwater sample and final parameters, once the wells had stabilized, are listed in Table 5.1.

Table 5.1
Temperature, pH, and Specific Conductance Measurements
for Groundwater Samples
Roslyn ANGS, Roslyn, New York

Monitoring Well Number	Date	Temperature (° F)	pH	Specific Conductance (mmhos)
01-001MW	16 May 1994	58.3	8.10	251
	18 May 1994	55.0	6.95	318
02-001MW	16 May 1994	61.8	6.61	256
	18 May 1994	55.6	6.73	278
03-001MW	16 May 1994	61.3	6.90	124
	18 May 1994	56.5	7.53	143

A rising head slug test was performed on each monitoring well on 17 May 1994. The summary of the results are given in Table 5.2. Slug test data and analyses are given in Appendix E.

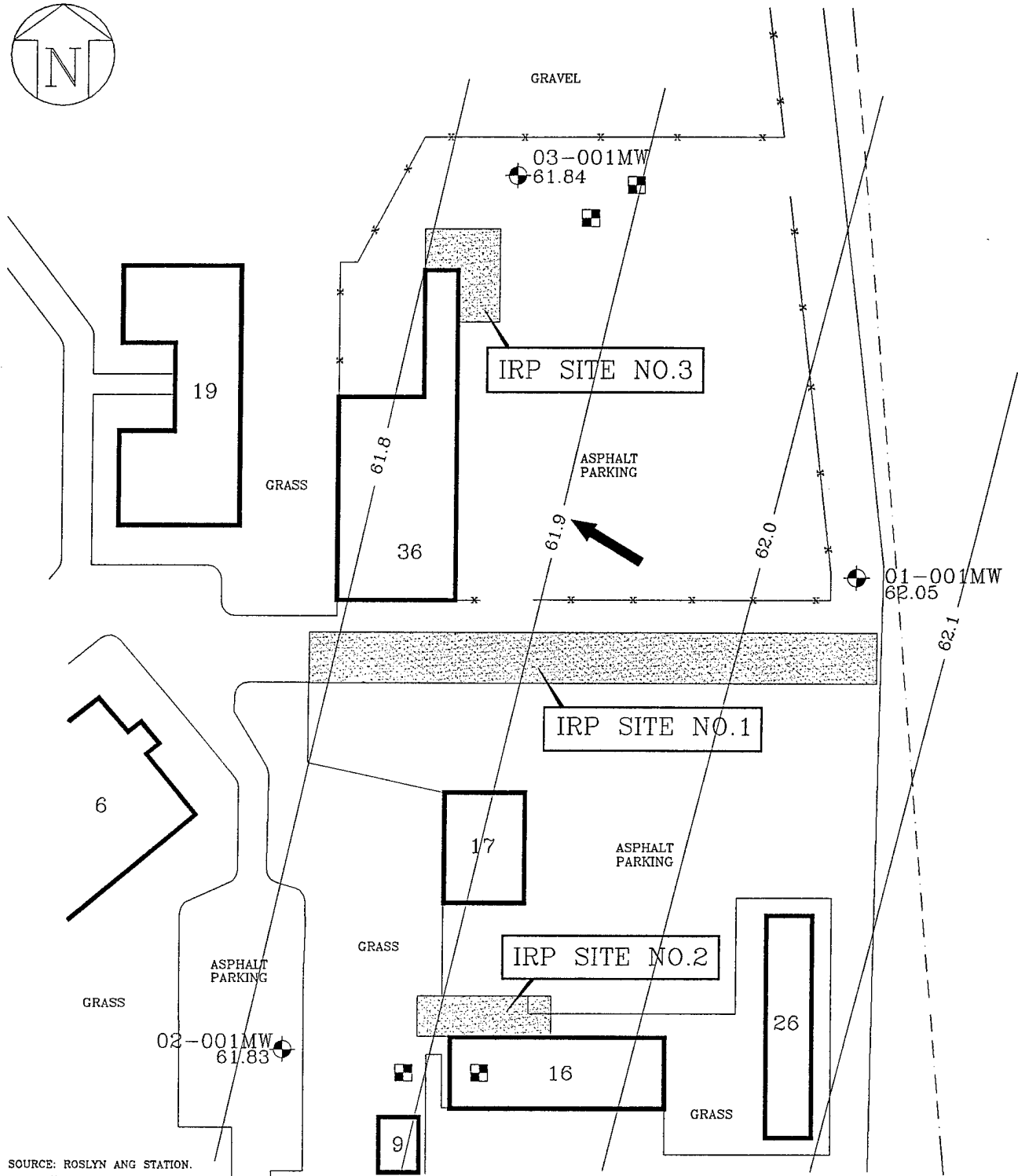
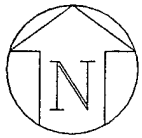
Table 5.2
Summary of Rising Head Slug Test Results
Roslyn ANGS, Roslyn, New York

Monitoring Well Number	Transmissivity (gal/day/ft)	Horizontal Hydraulic Conductivity (gal/day/ft ²)	Groundwater Flow Velocity (ft/day)
01-001MW	4,521.4	519.7 ^a	1.1
02-001MW	9,512.3	1,083.4 ^b	2.3
03-001MW	12,757.1	1,747.6 ^c	3.6

^aOnly 8.70 feet of the 10-foot screened interval was saturated.

^bOnly 8.78 feet of the 10-foot screened interval was saturated.

^cOnly 7.30 feet of the 20-foot screened interval was saturated.



SOURCE: ROSLYN ANG STATION.

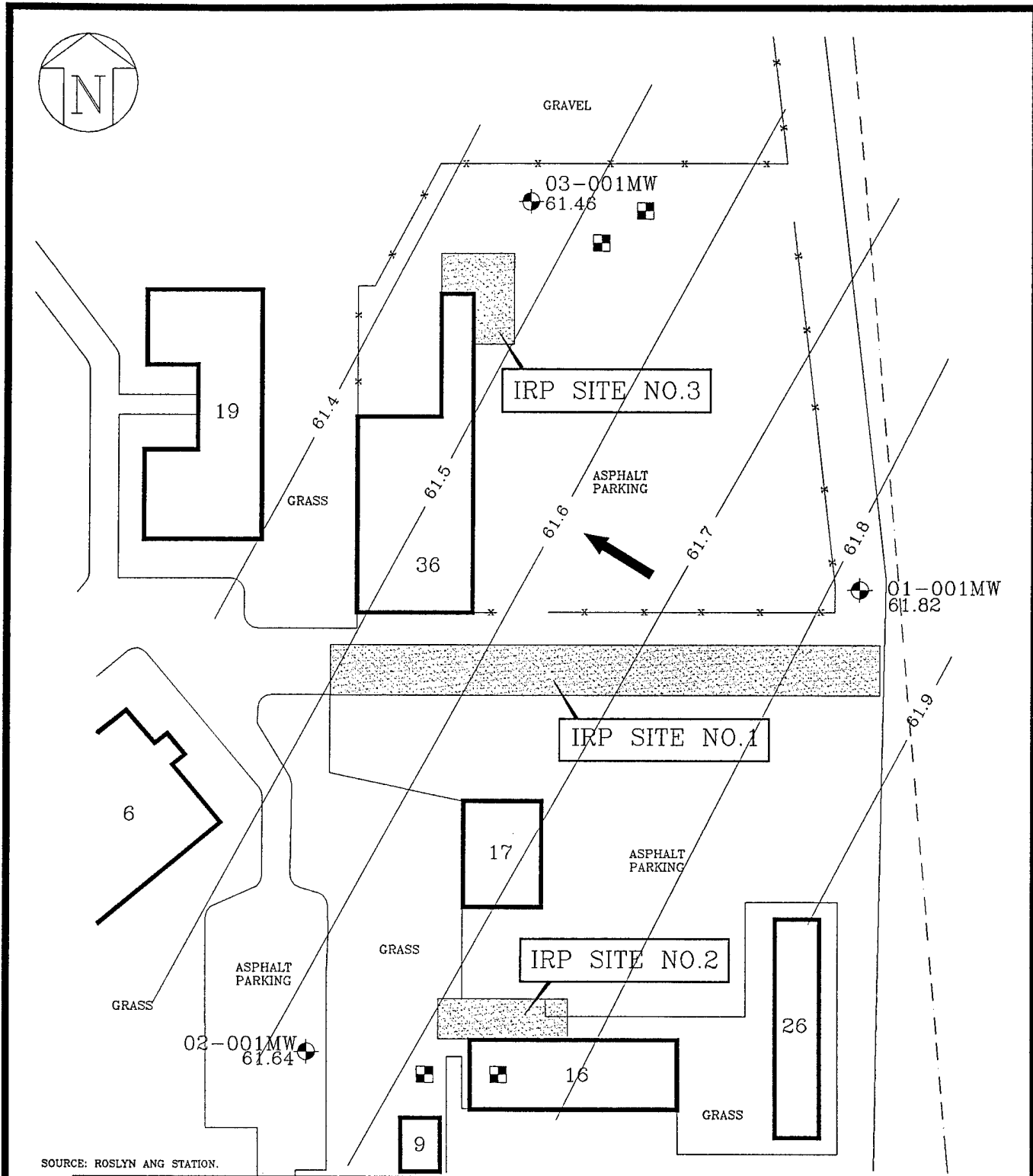
LEGEND	
	Dry Well
	Station Boundary
	Fence
	Potentiometric Contours (Feet Above Mean Sea Level)
	Current Site
	Building
	Monitoring Well Location
	Groundwater Flow Direction

0 75
SCALE IN FEET

FIGURE 5.5

POTENTIOMETRIC MAP
16 MAY 1994
Roslyn Air National Guard Station
New York Air National Guard
Roslyn, New York

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SOURCE: ROSLYN ANG STATION.

LEGEND	
	Dry Well
	Station Boundary
	Fence
	Potentiometric Contours (Feet Above Mean Sea Level)
	Current Site
	Building
	Monitoring Well Location
	Groundwater Flow Direction

0 75
SCALE IN FEET

FIGURE 5.6

POTENTIOMETRIC MAP
 18 MAY 1994
 Roslyn Air National Guard Station
 New York Air National Guard
 Roslyn, New York

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5.2 BACKGROUND FINDINGS

5.2.1 Background Sampling Locations

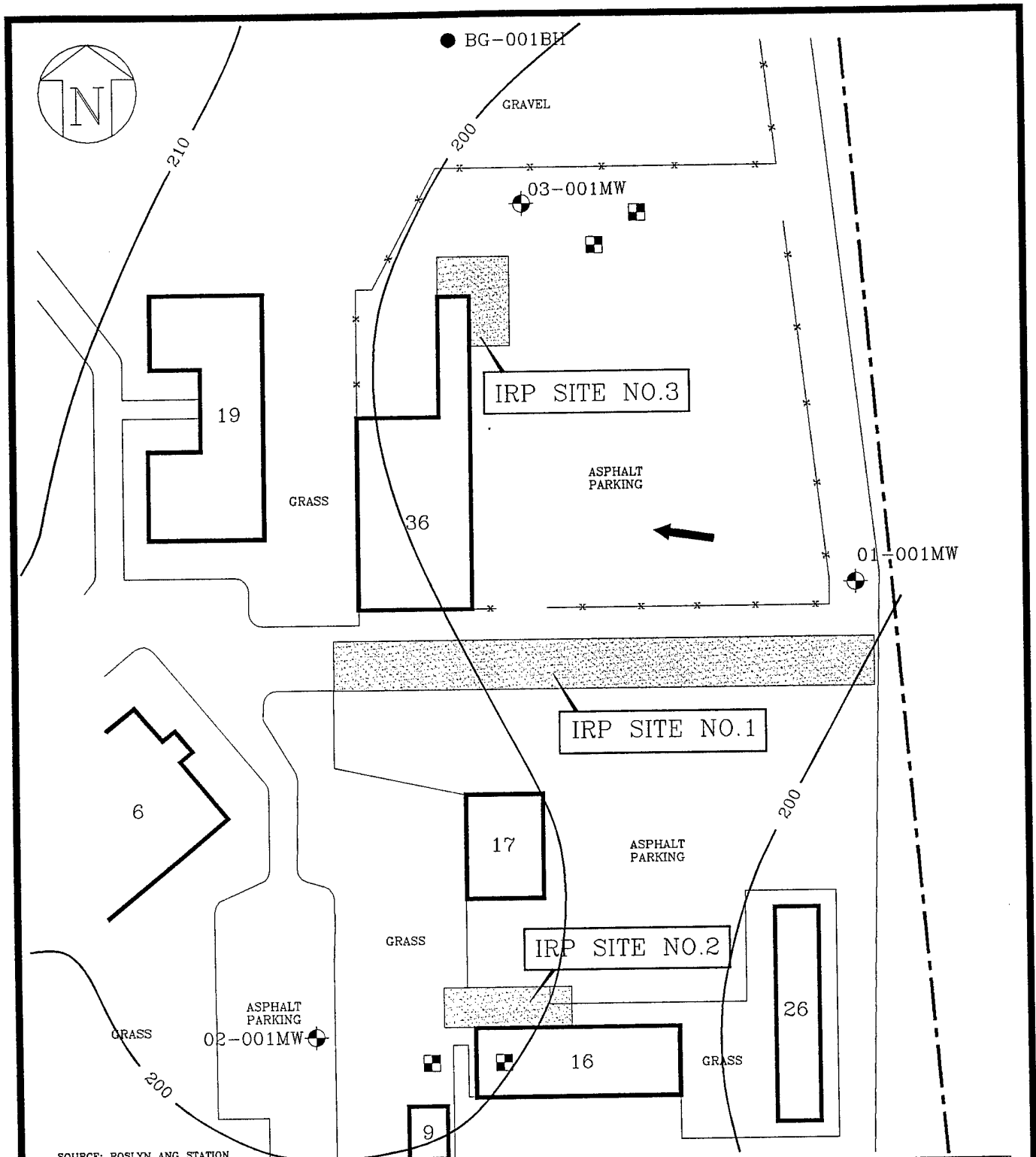
Background data obtained during the Roslyn ANGS SI consisted of one soil boring, BG-001BH, and one upgradient groundwater monitoring well, 01-001MW, which were used to obtain soil and groundwater samples, respectively.

The background soil sampling location was selected based upon published groundwater gradient information and a review of Station records that indicated it was in an area away from any known or suspected Station sources of contamination. Groundwater gradient information obtained from the Station-wide piezometer network after background soil sampling confirmed the location was not downgradient from any of the IRP sites at the Station. Soil boring BG-001BH was located approximately 130 feet north of IRP Site No. 3 at the base of an undeveloped slope of Harbor Hill and is shown on Figure 5.7.

Monitoring well 01-001MW was located 25 feet north of the easternmost edge of IRP Site No. 1 (see Figure 5.7). The location was selected after data was obtained from the Station-wide piezometer network to confirm it was located upgradient of the IRP sites. Additionally, being located near the east boundary of the Station, it provided water quality data that would be unaffected by Station activities.

5.2.2 Background Sampling

Soil and groundwater samples were collected for analytical analysis from background locations to determine naturally occurring concentration levels or chemical concentrations of target analytes already existing in the area due to general environmental conditions. Based on review of analytical data obtained during the SI, background concentrations of TAL metals were not adequately established from the one boring location. Therefore, analytical results obtained during this sampling represent only general background conditions at the Station against which contaminant concentrations detected at the three IRP sites were compared. Additional background sampling is recommended to better establish naturally occurring TAL metals concentrations at the Station so the significance of those metals detected at the three IRP sites can be determined.



SOURCE: ROSLYN ANG STATION.

LEGEND	
	Current Site
	Building
	Station Boundary
	Fence
	Topographic Contour Line (Ft. Abv. Mean Sea Level)
	Monitoring Well Location
	Dry Well
	Background Borehole Location
	Groundwater Flow Direction

0 75
SCALE IN FEET

FIGURE 5.7

BACKGROUND SAMPLING
LOCATIONS
Roslyn Air National Guard Station
New York Air National Guard
Roslyn, New York

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5.2.2.1 Field GC Screening Results

Three soil samples were collected from boring BG-001BH and were field screened with a Photovac 10S55 Portable GC. The GC had been calibrated to screen for BTEX and MTBE. BTEX or MTBE were not detected in the samples analyzed. Complete field GC data is included in Appendix D.

5.2.2.2 Soil Sampling Results

Soil boring BG-001BH was drilled and three soil samples were collected on 7 April 1994. BG-001BH was drilled to a depth of 11.5 feet BLS and soil samples were collected for laboratory analysis, field screening, and geological classification. Soil samples were collected from the surface to 1.5 feet BLS, from 5 to 6.5 feet BLS, and from 10 to 11.5 feet BLS.

Soil and subsurface material encountered was a light-brown sand, silty sand, and gravel. Some clay was present near the bottom of the boring with the bottom sampling interval containing semi-saturated sand indicating a possible perched water table of limited areal extent. A complete description of subsurface geological conditions are shown on the borehole log included in Appendix A.

No holding times were exceeded for these samples and no problems that affected analytical results were encountered. VOC and SVOC surrogate recoveries were within acceptable limits meeting quality control (QC) criteria. All spike recoveries and relative percent difference (RPD) values were within acceptable limits. A complete listing of analysis summary narratives outlining equipment calibrations, internal standards, surrogates, laboratory blanks, and sample preparations are listed in the Sample Delivery Group (SDG) Narratives presented as Appendix H. This appendix also includes analyses results for quality assurance/quality control (QA/QC) results for all other analytical parameters.

One VOC, methylene chloride, was detected at a concentration of 3 $\mu\text{g}/\text{kg}$ in all background soil samples collected. This compound does not represent background contamination because it was also detected in the trip and/or method blanks, and represents laboratory induced contamination.

One SVOC, bis(2-ethylhexyl)phthalate, was detected at a concentration of 310, 76, 110 $\mu\text{g}/\text{kg}$ at the surface, at the 5-foot BLS, and at the 10-foot BLS intervals, respectively. This compound is a common laboratory solvent and usually represents a laboratory induced contaminant.

Pesticides/PCBs and TPH were not detected in any of the samples from the background location. The NYSDEC TAL for metals included 23 metals and cyanide. The background concentrations detected at the three intervals for these 24 analytes are listed in Table 5.3. Statistical calculations were performed in order to determine the mean value for each analyte detected in the background soil samples. If analytes were not detected, the sample was not used in the statistical calculation. The mean value for each analyte detected are also included in Table 5.3. Statistical information was used to determine if concentrations detected in soil samples collected from the three IRP sites exceed general background concentrations.

Table 5.3
TAL Metals and Cyanide Analytical Results in Background Soil Samples
Roslyn ANGS, Roslyn, New York

Location: Interval (ft BLS): Concentration:	BG-001BH 0.0 - 1.5 (mg/kg)	BG-001BH 5.0 - 6.5 (mg/kg)	BG-001BH 10.0 - 11.5 (mg/kg)	Mean Concentrations (mg/kg)
Aluminum	5,380	3,340	2,400	3,707
Antimony	5.6U	4.9U	7.8B	7.8
Arsenic	1.6B	1.9B	1.1U	1.8
Barium	23.9B	8.6B	13.5B	15.3
Beryllium	0.42B	0.19U	0.22U	0.42
Cadmium	0.86U	0.75U	0.86U	U
Calcium	208B	288B	401B	299
Chromium	7.9	4.8	5.8	6.2
Cobalt	6.8B	2.4B	3.0B	4.1
Copper	12.0	8.8	104	41.6
Iron	9,930	5,660	6,840	7,477
Lead	3.6	3.0	1.9	2.8
Magnesium	1,200	791B	656B	882.3
Manganese	231	73.9	141	148.6
Mercury	0.11U	0.11U	0.11U	U
Nickel	15.1	4.3U	10.5	12.8
Potassium	774B	271B	249B	431.3
Selenium	1.0U	1.0U	1.1U	U
Silver	1.1U	0.94U	1.1U	U
Sodium	210U	184U	210U	U
Thallium	1.0U	1.0U	1.1U	U
Vanadium	9.8B	4.0B	3.2B	5.7
Zinc	25.1	17.4	194	78.8
Cyanide	0.44U	0.42U	0.66	0.66

ft BLS - feet Below Land Surface.

BG - Background Sample.

BH - Borehole.

mg/kg - milligrams per kilogram.

U - Analyte was analyzed for but not detected.
 Detection limit is shown.

B - Reported value was less than the Contract
 Required Detection Limit (CRDL) but greater
 than or equal to the Instrument Detection Limit
 (IDL).

Bold - Presence of analyte confirmed above
 detection limit.

5.2.2.3 Groundwater Sampling Results

Monitoring well 01-001MW was completed on 6 May 1994 and sampled on 16 May and 18 May 1994. Monitoring well 01-001MW was drilled to a depth of 155.7 feet BLS with groundwater encountered at a depth of 142 feet BLS. The screened interval was set at 151 feet BLS to 141 feet BLS. Subsurface soil conditions indicated an unstratified, poorly sorted, glacial material ranging from boulders to silty clay throughout the drilling interval becoming mostly medium and fine sand near and below the water table. A complete description of subsurface geological conditions are shown on the well boring log diagrams included in Appendix A.

Two rounds of groundwater sampling were obtained from 01-001MW, the background monitoring well. The first round of sampling was conducted on 16 May 1994 and the second round of sampling was conducted on 18 May 1994.

No holding times were exceeded for the background groundwater samples and no problems that affected analytical results were encountered. VOC and SVOC surrogate recoveries were within acceptable limits meeting QC criteria. All spike recoveries and RPD values were within acceptable limits. A complete listing of analysis summary narratives outlining equipment calibrations, internal standards, surrogates, laboratory blanks, and sample preparations are listed in the SDG Narratives presented as Appendix H. This appendix also includes QA/QC analyses results for all other analytical parameters.

VOCs were not detected above method detection limits in groundwater samples from the background monitoring well, however methylene chloride and 1,1,1-trichloroethane were detected at estimated concentrations less than the detection limit ($10 \mu\text{g/L}$) in both rounds of groundwater sampling. SVOCs, pesticides/PCBs, and TPH were not detected in any of the samples from the background location.

The TAL for metals included 23 metals and cyanide, and the background concentrations obtained from the background monitoring well are listed in Table 5.4. Also listed are the maximum concentrations detected from the two sampling rounds. The maximum concentration for each analyte detected will be used to determine if water samples collected from 02-001MW or 03-001MW exceed background groundwater conditions.

Table 5.4
TAL Metals and Cyanide Analytical Results in
Background Groundwater Samples
Roslyn ANGS, Roslyn, New York

Monitoring Well Number: Sampling Round: Concentration:	01-001MW Round 1 (mg/L)	01-001MW Round 2 (mg/L)	Maximum Concentrations (mg/L)
Aluminum	1,310	10,500	10,500
Antimony	26U	26U	U
Arsenic	5U	12.2	12.2
Barium	47.5B	122B	122B
Beryllium	1U	1U	U
Cadmium	4U	4U	U
Calcium	27,500	29,100	29,100
Chromium	9.0U	42.6	42.6
Cobalt	11U	24B	24B
Copper	6.8B	35	35.0
Iron	8,740	46,300	46,300
Lead	3.5	35.9	35.9
Magnesium	9,460	12,400	12,400
Manganese	931	948	948
Mercury	0.20U	0.35	0.35
Nickel	23U	27.2B	27.2B
Potassium	1,720B	3,520	3,520
Selenium	5U	5U	U
Silver	5U	5U	U
Sodium	17,100	16,000	17,100
Thallium	5U	5U	U
Vanadium	11.6B	39.6B	39.6B
Zinc	26.3	88.8	88.8
Cyanide	10U	10U	U

Note: Numbers in bold indicate the presence of analyte confirmed above detection limit.
mg/L - milligrams per liter.
U - Analyte was analyzed for but not detected. Detection limit is shown.
B - reported value was less than the CRDL but greater than the IDL.
Round 1 - Groundwater samples collected 16 May 1994.
Round 2 - Groundwater samples collected 18 May 1994.

5.3 SITE FINDINGS

5.3.1 IRP Site No. 1 - Access Road to the AGE Shop

5.3.1.1 Soil Gas Survey Results

The soil gas survey at IRP Site No. 1 was conducted on 13 and 14 September 1993. The survey covered the entire length of the access road and the immediate adjacent area. A total of 31 sampling points formed a base grid with a distance of no more than 25 feet between sampling

points. The grid pattern consisted of three rows of soil gas points to cover the study area. The location of sampling points are illustrated on Figure 5.8.

Soil gas samples were obtained from a depth of five feet BLS. Thirty-one investigative samples and four air blank samples were collected. Table 5.5 summarizes the maximum concentrations of BTEX and TVHC detected and the target detection limit for each analytical parameter.

Table 5.5
Maximum Concentrations Detected in Soil Gas Survey
IRP Site No. 1 - Access Road to the AGE Shop
Roslyn ANGS, Roslyn, New York

Analytical Parameter	Maximum Concentration Detected	Detection Limit
Benzene ($\mu\text{g/L}$)	0.1	0.01
Toluene ($\mu\text{g/L}$)	0.2	0.02
Ethylbenzene ($\mu\text{g/L}$)	ND	0.03
Total Xylenes ($\mu\text{g/L}$)	0.2	0.05
Total Volatile Hydrocarbons ($\mu\text{g/L}$)	30,000*	0.05

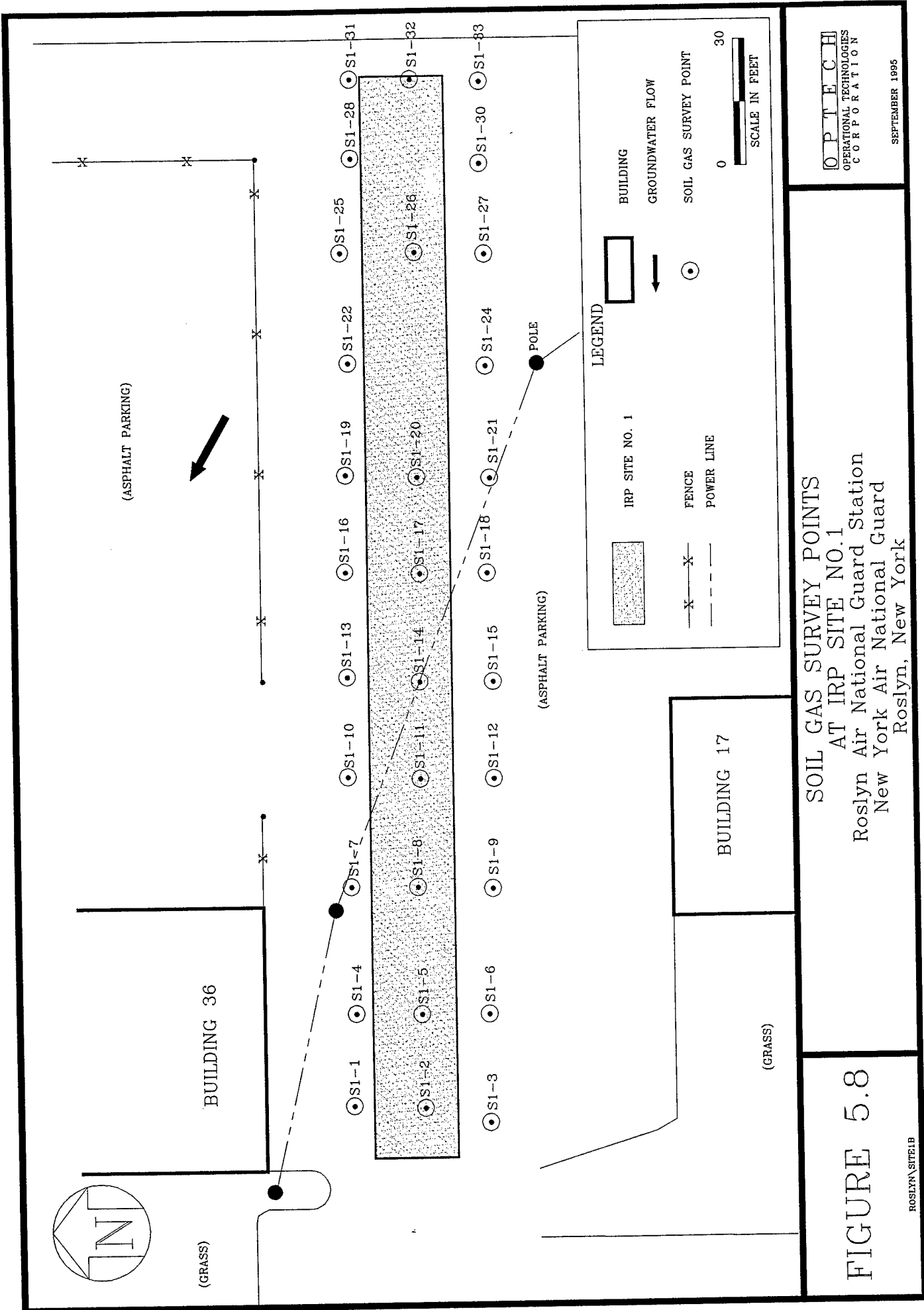
$\mu\text{g/L}$ - micrograms per liter.

ND - not detected.

* - TVHC may contain elevated levels of nonaromatic compounds.

Benzene was detected at concentrations ranging from 0.01 to 0.1 $\mu\text{g/L}$ in 16 of the 31 samples analyzed, toluene from 0.02 to 0.2 $\mu\text{g/L}$ in 14 samples, and total xylenes from 0.1 to 0.2 $\mu\text{g/L}$ in 5 samples. Ethylbenzene was not detected in any sample at the site. TVHC was detected in all samples at concentrations ranging from 0.3 to 30,000 $\mu\text{g/L}$. The highest TVHC concentrations were detected in samples collected from S1-10, S1-15, S1-14, and S1-12 (see Figure 5.8), however, some readings may contain elevated concentrations of nonaromatic compounds. The areal extent of TVHC contamination detected by the soil gas survey is illustrated in Figure 5.9.

Results obtained from the soil gas survey resulted in the relocation of one soil boring (01-003BH) in order to insure a sample was obtained for laboratory analysis at the location of highest TVHC contamination. A complete listing of the soil gas survey results for IRP Site No. 1 is given in Appendix B.



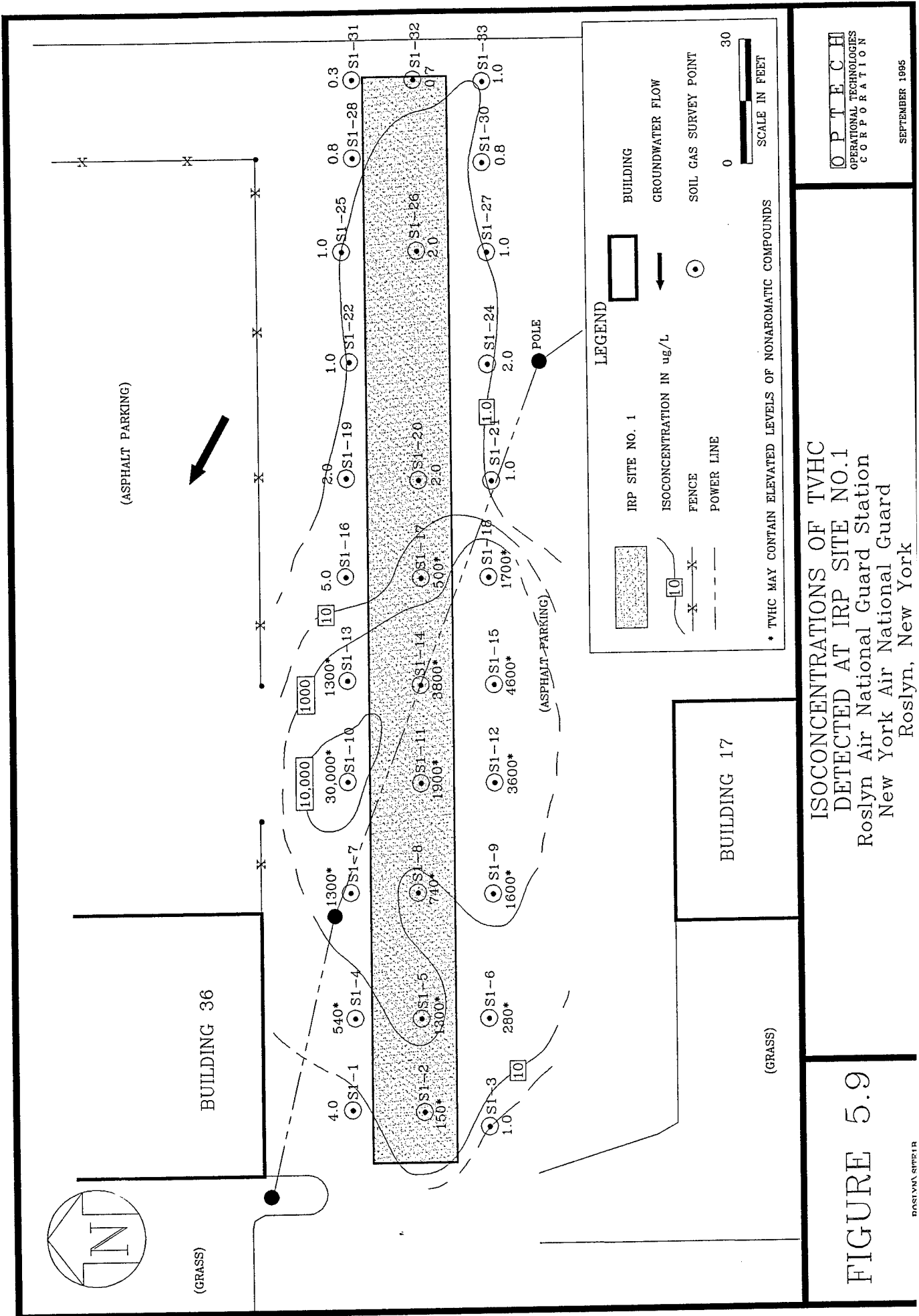
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SOIL GAS SURVEY POINTS
 AT IRP SITE NO. 1
 Roslyn Air National Guard Station
 New York Air National Guard
 Roslyn, New York

FIGURE 5.8

ROSLYN SITE 1.B



5.3.1.2 Field GC Screening Results

Twelve soil samples and one duplicate sample were collected from 4 soil borings at the site that were screened with the field GC. The field GC had been calibrated to screen for BTEX (and for MTBE at 01-002BH). Table 5.6 summarizes the maximum concentrations detected in soil samples screened. Complete field GC data is included in Appendix D.

BTEX compounds were detected in three soil samples. Soil sample 01-001BH (10.0 - 11.5) contained only toluene at 169.9 ppb, 01-004BH (0.0 - 1.5) contained benzene at 37.73 ppb and o-xylene at 26.52 ppb, and 01-004BH (10.0 - 11.5) contained only toluene at 2.73 ppb. Soil sample 01-002BH was screened for MTBE and was detected at interval 0.5 - 1.5 feet BLS at 26.36 ppb.

5.3.1.3 Soil Investigation Findings

Soil samples collected from four soil borings, one monitoring well, and one piezometer were used to provide geologic information for describing the subsurface geology at the site. Twelve investigative soil samples were submitted for laboratory analysis.

Table 5.6
Maximum Field GC Concentrations Detected in Soil
IRP Site No. 1 - Access Road to the AGE Shop
Roslyn ANGS, Roslyn, New York

Compound	Maximum Concentrations Detected in Soil (ppb)
Benzene	35.73
Toluene	169.9
Ethylbenzene, m,p-xylene	ND
o-xylene	26.52
MTBE ¹	26.36

GC - Gas Chromatograph.
ppb - parts per billion.
ND - Not Detected.

¹MTBE analysis conducted on 01-002BH only.

5.3.1.3.1 Soil Boring Locations

Four soil borings were advanced at the site to obtain soil samples for analytical analysis, for defining any existing soil contamination, and to aid in defining the vertical and horizontal extent of contamination. Soil samples were also used for characterizing site geology and subsurface soil conditions. The location of one of the four soil borings originally proposed in the Work Plan was

changed after a review of soil gas survey results of the site. Soil boring 01-003BH was moved approximately 80 feet west and 15 feet south to investigate relatively high BTEX and TVHC contamination detected during the soil gas survey. The soil boring locations for IRP Site No. 1 are indicated on Figure 5.10.

5.3.1.3.2 Subsurface Geology

Soil samples collected from the four soil borings, one monitoring well, and one piezometer were used to provide geologic information for describing the subsurface geology at the site. Soil borings were sampled to a total depth of approximately 11.5 feet BLS. 01-001MW and PS-2 were drilled to a total depth of approximately 160 feet BLS. Complete lithologic logs for the borings and wells drilled at IRP Site No. 1 are presented in Appendix A.

The entire site is presently covered by asphalt and used as a parking area for military wheeled vehicles. Road base material and fill are present to a depth from 2.0 to 5.0 feet BLS. The fill material appears to be composed of nearby soils having similar lithologic characteristics. The fill material is very poorly sorted, dry, light brown sand, silt, and gravel with some coal or charcoal and wood fragments. The soil material in the boreholes to a depth of 11.5 feet BLS was composed of a dry, light brown to brown, very poorly sorted silt, sand, and gravel. During drilling for PS-2 (piezometer) and 01-001MW (monitoring well) at the east end of the site, subsurface geology typified glacial terminal moraine deposits. Drill cuttings consisted of very poorly sorted medium to fine sand, silt, and gravel with intervals of mostly gravel and boulders encountered at varying depths below the surface as shown in Appendix A. Medium to fine sand was encountered near 135 feet BLS becoming a medium sand with rounded gravel from the water table (encountered at 142 feet BLS) to the total depth of 160 feet BLS.

5.3.1.3.3 Nature and Extent of Soil Contamination

Four soil borings were drilled at IRP Site No. 1 from which 12 investigative and two duplicate soil samples were collected for laboratory analysis. Soil samples 01-001BH, 01-003BH, and 01-004BH were drilled and soil samples collected on 21 September 1993. Boring 01-002BH was drilled and soil samples collected on 7 April 1994. The analytical program for soil analyses was discussed in Subsection 4.5.3.1.

No holding times were exceeded for the soil samples collected and no problems that affected analytical results were encountered. VOC and SVOC surrogate recoveries were within acceptable limits meeting QC criteria. All spike recoveries and RPD values were within

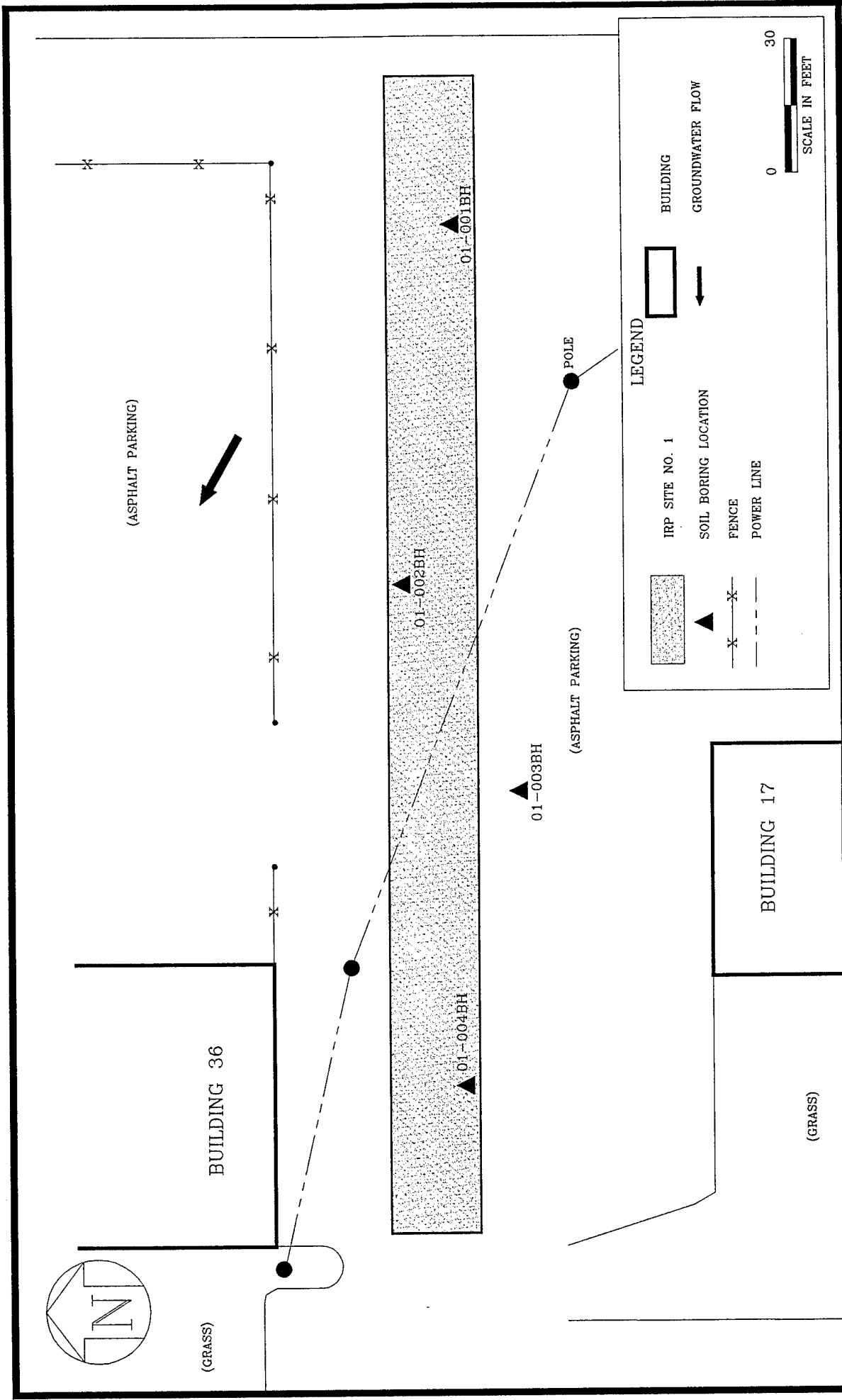


FIGURE 5.10
 BORING LOCATIONS
 AT IRP SITE NO.1
 Roslyn Air National Guard Station
 New York Air National Guard
 Roslyn, New York

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ROSLYN SITE 1B

acceptable limits. One sample required reanalysis and one required dilutions due to VOC surrogate recoveries for toluene-d8 and bromofluorobenzene outside QC limits. A complete listing of analysis summary narratives outlining equipment calibrations, internal standards, surrogates, laboratory blanks, and sample preparations are listed in the SDG Narratives presented as Appendix H. This appendix also includes QA/QC analyses results for all other analytical parameters.

VOCs detected in soil samples collected at IRP Site No. 1 are shown in Table 5.7. The volatile organic analyses detected two common laboratory and method contaminants in the soil samples collected. These included methylene chloride (2 to 200 $\mu\text{g}/\text{kg}$) and acetone (3 to 110 $\mu\text{g}/\text{kg}$). Methylene chloride was detected in associated quality control blanks invalidating detections in all of the soil samples. Acetone is a common laboratory solvent and was detected in several associated quality control blanks, thus indicating the analyte may be laboratory induced.

The VOC, 2-butanone was detected above detection limits in one sample, 01-004BH (5.0 - 6.5), at 24 $\mu\text{g}/\text{kg}$. 2-butanone was detected at estimated concentrations less than the detection limit in one sample collected from boring 01-003BH. Benzene was detected above detection limits in one sample, 01-003BH (0.0 - 1.5), at 23 $\mu\text{g}/\text{kg}$. Benzene was detected at estimated concentrations less than the detection limit in one sample collected from boring 01-004BH. Toluene was detected above detection limits in one sample, 01-003BH (0.0 - 1.5), at 70 $\mu\text{g}/\text{kg}$. Toluene was detected at estimated concentrations less than the detection limit in one sample collected from boring 01-004BH. Ethylbenzene was not detected above detection limits in any samples at the site, however, it was detected at estimated concentrations less than the detection limit in one sample collected from boring 01-003BH. Xylene was detected above detection limits in one sample, 01-003BH (0.0 - 1.5), at 39 $\mu\text{g}/\text{kg}$. Xylene was detected at estimated concentrations less than the detection limit in one sample collected from boring 01-004BH.

SVOCs detected in soil samples collected at IRP Site No. 1 are shown in Table 5.8. The SVOC bis-(2 ethylhexyl)phthalate was detected above detection limits in three samples which were detected in associated quality control blanks invalidating detections of this analyte in all of the soil samples. Bis-(2 ethylhexyl)phthalate was detected at estimated concentrations less than the detection limit in eight samples at the site. No other SVOCs were detected above detection limits in any samples at IRP Site No. 1. Methylnaphthalene (at 01-004BH) and phenanthrene, fluoranthene, pyrene, and chrysene were detected at estimated concentrations less than the detection limit in 01-003BH.

Table 5.7
 VOCs Detected in Soil at IRP Site No. 1
 Roslyn ANGS, Roslyn, New York

Sample ID/Interval (feet BLS)	VOCs							
	Methylene Chloride ($\mu\text{g}/\text{kg}$)	Acetone ($\mu\text{g}/\text{kg}$)	2-Butanone ($\mu\text{g}/\text{kg}$)	Benzene ($\mu\text{g}/\text{kg}$)	Toluene ($\mu\text{g}/\text{kg}$)	Ethylbenzene ($\mu\text{g}/\text{kg}$)	Xylenes ($\mu\text{g}/\text{kg}$)	
RSCO	100	200	300	60	1,500	5500	1,200	
01-001BH 0.0 - 1.5	7BJ	9J	10U	10U	10U	10U	10U	
01-001BH 5.0 - 6.5	8BJ	7J	11U	11U	11U	11U	11U	
01-001BH 10.0 - 11.5	8BJ	9J	13U	13U	13U	13U	13U	
01-002BH 0.5 - 2.0	2BJ	29	11U	11U	11U	11U	11U	
01-002BH 5.0 - 6.5	3BJ	18	11U	11U	11U	11U	11U	
01-002BH 10.0 - 11.5	2BJ	11U	11U	11U	11U	11U	11U	
01-002BH 11.5 - 13.0 Dup	2BJ	11U	11U	11U	11U	11U	11U	
01-003BH 0.0 - 1.5+	4BJ	11B	11U	23	70	8J	39	
01-003BH 6.5 - 8.0	12BJ	25	8J	14U	14U	14U	14U	
01-003BH 10.0 - 11.5	8BJ	12	12U	12U	12U	12U	12U	
01-003BH 11.5 - 13.0 Dup	7BJ	13	12U	12U	12U	12U	12U	
01-004BH 0.0 - 1.5*	18BDJ	44BDJ	53U	15DJ	52DJ	53U	26DJ	
01-004BH 5.0 - 6.5	200B	110	24	12U	12U	12U	12U	
01-004BH 10.0 - 11.5	7BJ	3J	10U	10U	10U	10U	10U	

Note: Numbers in Bold indicate the presence of an analyte confirmed above detection limit.
 VOCs - Volatile Organic Compounds.
 ID - Identification.
 BLS - Below Land Surface.
 + - Sample reported as a reanalysis.
 * - Sample reported as a dilution.
 $\mu\text{g}/\text{kg}$ - micrograms per kilogram.

BH - Borehole.
 Dup - Duplicate.
 B - Analyte was found in the associated blank as well as the sample.
 J - Estimated concentration. Compound meets the identification criteria but the result is less than the sample quantitation limit but greater than zero.

D - Compound was identified in an analysis at a secondary dilution factor.
 U - Compound was analyzed for by was not detected. Detection limit is shown.
 RSCO - Recommended Soil Cleanup Objective

Table 5.8
SVOCs Detected in Soil at IRP Site No. 1
Roslyn ANGS, Roslyn, New York

Sample ID/Interval (feet BLS)	SVOCs							
	Naphthalene ($\mu\text{g}/\text{kg}$)	Methylnaphthalene ($\mu\text{g}/\text{kg}$)	Phenanthrene ($\mu\text{g}/\text{kg}$)	Fluoranthene ($\mu\text{g}/\text{kg}$)	Pyrene ($\mu\text{g}/\text{kg}$)	Chrysene ($\mu\text{g}/\text{kg}$)	B-(2E)-P ($\mu\text{g}/\text{kg}$)	
RSCO	13,000	36,400	50,000	50,000	50,000	400	50,000	
01-001BH 5.0 - 6.5	350U	350U	350U	350U	350U	350U	45BJ	
01-001BH 10.0 - 11.5	430U	430U	430U	430U	430U	430U	68BJ	
01-002BH 0.5 - 2.0	360U	360U	360U	360U	360U	360U	46J	
01-002BH 5.0 - 6.5	350U	350U	350U	350U	350U	350U	96J	
01-002BH 10.0 - 11.5	350U	350U	350U	350U	350U	350U	160J	
01-002BH 11.5 - 13.0 Dup	350U	350U	350U	350U	350U	350U	110J	
01-003BH 0.0 - 1.5	3,600U	3,600U	1,300J	1,100J	600J	420J	3,600U	
01-003BH 6.5 - 8.0	450U	450U	450U	450U	450U	450U	1,100B	
01-003BH 10.0 - 11.5	390U	390U	390U	390U	390U	390U	1,000B	
01-004BH 5.0 - 6.5	410U	53J	410U	410U	410U	410U	76BJ	
1-004BH 10.0 - 11.5	340U	340U	340U	340U	340U	340U	2,300B	

Note: Numbers in bold indicate presence of analyte confirmed above detection limit.
 ID - Identification.
 BLS - Below Land Surface.
 B-(2E)-P - bis(2 ethylhexyl)phthalate.
 $\mu\text{g}/\text{kg}$ - micrograms per kilogram.
 BH - Borehole.
 Dup - Duplicate.
 B - Analyte was found in the associated blank as well as the sample.
 J - Estimated concentration. Compound meets the identification criteria but the result is less than the sample quantitation limit but greater than zero.
 U - Compound was analyzed for but was not detected. Detection limit is shown.

No PCBs were detected in soil analyzed at IRP Site No. 1. Pesticides detected in soil samples collected at IRP Site No. 1 are shown in Table 5.9. Pesticides were detected above detection limits in two boring locations. Soil sample 01-003BH (0.0 - 1.5) contained 4,4'-DDE, alpha-chlordane, and gamma-chlordane at concentrations of 37 $\mu\text{g}/\text{kg}$, 34 $\mu\text{g}/\text{kg}$, and 32 $\mu\text{g}/\text{kg}$, respectively, however, the analytes identified had a greater than 25% difference for detected concentrations between the two GC columns used. The lower value was reported. Heptachlor was also detected, but at estimated concentrations less than the detection limit. Soil sample 01-004BH (5.0 - 6.5) contained endrin aldehyde at a concentration of 10 $\mu\text{g}/\text{kg}$. 4,4'-DDD was detected, but at estimated concentrations less than the detection limit at 01-002BH.

Table 5.9
Pesticides Detected in Soil at IRP Site No. 1
Roslyn ANG, Roslyn, New York

Sample ID/Interval (feet BLS)	Pesticides					
	Heptachlor ($\mu\text{g}/\text{kg}$)	4,4'-DDE ($\mu\text{g}/\text{kg}$)	4,4'-DDD ($\mu\text{g}/\text{kg}$)	Alpha Chlordane ($\mu\text{g}/\text{kg}$)	Gamma Chlordane ($\mu\text{g}/\text{kg}$)	Endrin Aldehyde ($\mu\text{g}/\text{kg}$)
RSCO	100	2,100	2,900	540	540	100
01-002BH 0.5 - 2.0	1.8U	3.6U	1.6JP	1.8U	1.8U	3.6U
01-003BH 0.0 - 1.5	8.3JP	37P	36U	34P	32P	36U
01-004BH 5.0 - 6.5	2.1U	4.1U	4.1U	2.1U	2.1U	10

Note: Numbers in bold indicate the presence of analyte above detection limit.
 ID - Identification.
 BLS - Below Land Surface.
 $\mu\text{g}/\text{kg}$ - micrograms per kilogram.
 BH - Borehole.
 Dup - Duplicate.
 J - Estimated concentration. Compound meets the identification criteria but the result is less than the sample quantitation limit but greater than zero.

U - Compound was analyzed for by was not detected. Detection limit is shown.
 P - Target analyte had greater than 25% difference for detected concentrations between the two GC columns. Lower values were reported.
 RSCO - Recommended soil cleanup objective.

TPH as #6 Fuel Oil was detected in soil sample 01-003BH (6.5 - 8.0) at a concentration of 18.0 ppm.

TAL metals and cyanide concentrations detected at IRP Site No. 1 are listed in Table 5.10 and the highest concentration per analyte per borehole (above RSCO's or site background) are shown in Figure 5.11. Metals and cyanide concentrations were compared against mean values obtained from the background sampling location (listed next to the inorganic analyte in Table 5.10) to determine if analyte concentrations significantly exceeded naturally occurring concentrations.

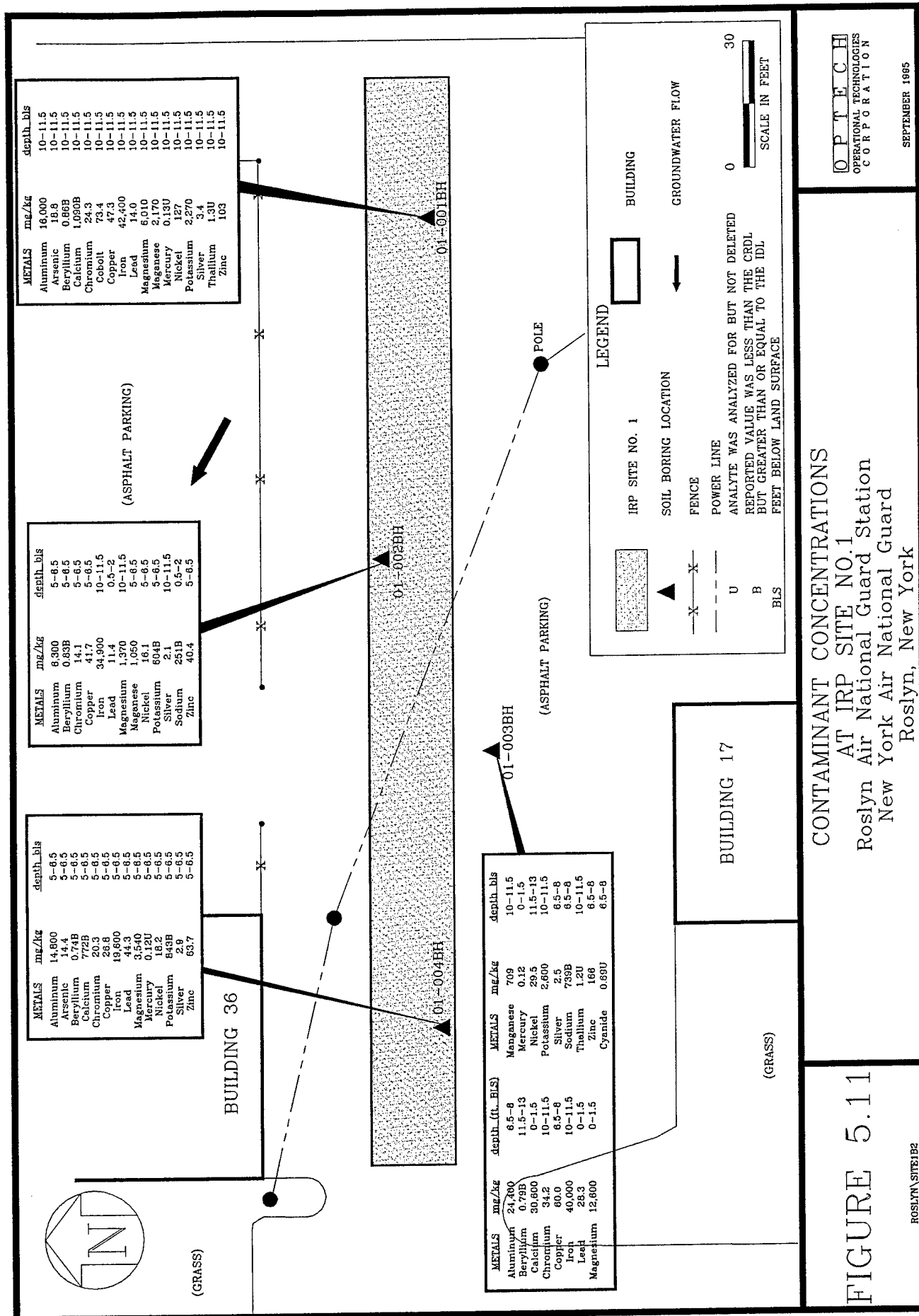
Table 5.10
TAL Metals and Cyanide Analytical Results for Soil at IRP Site No. 1
Roslyn ANGS, Roslyn, New York

Metals	Location: Interval (ft BLS): Concentration:	RSCO (mg/kg)	01-002BH 0.5 - 2.0 (mg/kg)	01-002BH 5.0 - 6.5 (mg/kg)	01-002BH 10.0 - 11.5 (mg/kg)	01-001BH 0.0 - 1.5 (mg/kg)	01-001BH 5.0 - 6.5 (mg/kg)	01-001BH 10.0 - 11.5 (mg/kg)	01-003BH 0.0 - 1.5 (mg/kg)
Aluminum	(3,707)	SB	6,100	6,300	4,280	4,690	5,340	16,000	2,220
Antimony	(7.8B)	SB	5.5U	5.3U	5.2U	6.4U	6.3U	7.3U	6.4U
Arsenic	(1.8B)	7.5 or SB	3.6	2.2	2.0	1.6B	1.4B	18.8	6.6
Barium	(15.3B)	300 or SB	20.3B	57.8	24.2B	22.3B	26B	158	46.0
Beryllium	(0.42B)	0.16 ^a or SB	0.41B	0.83B	0.41B	0.17B	0.10B	0.86B	0.22B
Cadmium	0.86	1 or SB	0.84U	0.82U	0.80U	0.79U	0.78U	0.90U	0.79U
Calcium	(299B)	SB	289B	181U	178U	225B	526B	1,090B	30,600
Chromium	(6.2)	10 or SB	7.5	14.1	8.1	7.2	8.3	24.3	6.3
Cobalt	(4.1B)	30 or SB	4.0B	9.6B	6.9B	4.1B	4.6B	73.4	2.9B
Copper	(41.6B)	25 or SB	11.4	41.7	27.5	10.0	13.3	47.3	18.3
Iron	(7,477)	2,000 or SB	8,390	53,100	34,900	9,180	9,950	42,400	5,680
Lead	(2.8)	SB*	11.4	3.1	3.0	3.4	3.0	14.0	28.3
Magnesium	(882.3)	SB	964B	1,200	1,370	978B	1,290	6,010	12,600
Manganese	(148.6)	SB	121	1,050	338	226	259	2,170	88.2
Mercury	(U)	0.1	0.11U	0.11U	0.11U	0.10U	0.11U	0.13U	0.12
Nickel	(12.8)	13 or SB	7.2B	16.1	12.8	4.0U	5.3B	127	4.8B
Potassium	(431.3)	SB	277B	604B	425B	592B	545B	2,270	634B
Selenium	(U)	2 or SB	1.1U	1.0U	0.95U	0.99U	1.0U	1.3U	1.1U
Silver	(U)	SB	1.1U	1.9B	2.1	0.87U	0.87U	3.4	0.87U
Sodium	(U)	SB	257B	199U	196U	144B	141B	195B	155B
Thallium	(U)	SB	1.1U	1.0U	0.95U	0.99U	1.0U	1.3U	1.1U
Vanadium	(5.7)	150 or SB	8.2B	1.8U	1.8U	10.4	12.6	33.4	17.0
Zinc	(78.8)	20 or SB	19.2	40.4	29.9	16.1	20.5	103	28.7
Cyanide	(0.66)	**	0.60U	0.33U	0.47U	0.49U	0.54U	0.65U	0.45U

Table 5.10 (Concluded)
TAL Metals and Cyanide Analytical Results for Soil at IRP Site No. 1
Roslyn ANGS, Roslyn, New York

Metals	Location: Interval (ft BLS): Concentration:	01-003BH (mg/kg)	01-003BH 10.0 - 11.5 (mg/kg)	01-003BH Dup 11.5 - 13.0 (mg/kg)	01-004BH 0.0 - 1.5 (mg/kg)	01-004BH 5.0 - 6.5 (mg/kg)	01-004BH 10.0 - 11.5 (mg/kg)
	Background						
Aluminum	(3,707)	24,400	17,500	14,900	6,640	14,800	2,410
Antimony	(7.8B)	7.6U	6.4U	6.8U	6.0U	6.7U	5.5U
Arsenic	(1.8B)	2.1U	5.1	3.0	2.4	14.4	2.3
Barium	(15.3B)	115	138	73.0	31.2B	73.7	7.6B
Beryllium	(0.42B)	1.1B	1.3	0.79B	0.26B	0.74B	0.09U
Cadmium	(U)	0.94U	0.79U	0.83U	0.74U	0.83U	0.68U
Calcium	(299B)	1,420	1,960	757B	683B	772B	131B
Chromium	(6.2)	21.0	34.2	22.2	13.2	20.3	5.0
Cobalt	(4.1B)	9.1B	18.6	11.5	4.6B	8.9B	1.9B
Copper	(41.6B)	60.0	20.2	12.5	14.6	26.8	2.7B
Iron	(7,477)	18,100	40,000	22,000	14,600	19,600	7,040
Lead	(2.8)	11.3	10	7.2	6.9	44.3	1.5
Magnesium	(882.3)	2,750	5,790	4,060	1,890	3,540	515B
Manganese	(445.9)	314	709	542	221	416	139
Mercury	(U)	0.13U	0.12U	0.12U	0.11U	0.12U	0.10U
Nickel	(8.5)	20.7	29.0	29.5	15.2	18.2	3.5U
Potassium	(431.3)	943B	2,600	2,230	606B	843B	389B
Selenium	(U)	1.0U	1.2U	0.92U	1.0U	1.1U	1.0U
Silver	(U)	2.5	1.9B	0.92U	1.9B	2.9	0.75U
Sodium	(U)	739B	200B	244B	167B	73.5B	54.2B
Thallium	(U)	1.0U	1.2U	0.92U	1.0U	1.1U	1.0U
Vanadium	(5.7)	31.5	55.3	34.2	15.9	25.7	5.3B
Zinc	(78.8)	166	80.8	57.0	26.0	63.7	11.3
Cyanide	(0.66)	0.69U	0.40U	0.51U	0.37U	0.53U	0.45U

Note: Numbers in bold indicate presence of analyte confirmed above detection limit.
ft BLS - feet Below Land Surface.
BH - Borehole.
mg/kg - milligrams per kilogram.
U - Analyte was analyzed for but not detected. Detection limit is shown.
B - Reported value was less than the CRDL but greater than or equal to the IDL.
* Background levels for lead vary widely. Average levels in suburban areas or near highways range from 200 - 500 ppm.
† This level contained in USEPA Health Effects Assessment Summary Tables.
** - Site-specific forms of cyanide should be considered when establishing soil cleanup objectives.
RSC0 - Recommended Soil Cleanup Objectives.



CONTAMINANT CONCENTRATIONS
AT IRP SITE NO. 1
 Roslyn Air National Guard Station
 New York Air National Guard
 Roslyn, New York

FIGURE 5.11

ROSLYN SITE 1B2

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Most inorganic analytes at the Site exceeded concentrations detected at the background sampling location. The highest concentrations were detected in aluminum, iron, magnesium, and potassium with maximum concentrations at 24,000 mg/kg, 53,100 mg/kg, 12,600 mg/kg, and 2,600 mg/kg, respectively. These elements are common earth materials and may reflect elevated concentrations of naturally occurring concentrations. Other metals were detected in high concentrations in only a few samples and include arsenic, barium, calcium, chromium, cobalt, copper, lead, manganese, nickel, and vanadium. There were no single boring locations where consistently higher concentrations were detected. Mercury was detected at 0.12 mg/kg at 01-003BH (0.0 - 1.5) only and cyanide was not detected in any samples from IRP Site No. 1.

5.3.2 IRP Site No. 2 - Old Waste Holding Area No. 1

5.3.2.1 Soil Gas Survey Results

The soil gas survey was conducted at IRP Site No. 2 on 14 and 15 September 1993. The survey covered the entire area of the Old Waste Holding Area as outlined in the Work Plan and the immediate adjacent area. A total of 16 sampling points formed a base grid with a distance of no more than 20 feet between sampling points. The grid pattern consisted of roughly three rows of soil gas points to cover the study area with some modifications of the grid due to obstructions at the site. The location of sampling points are illustrated on Figure 5.12.

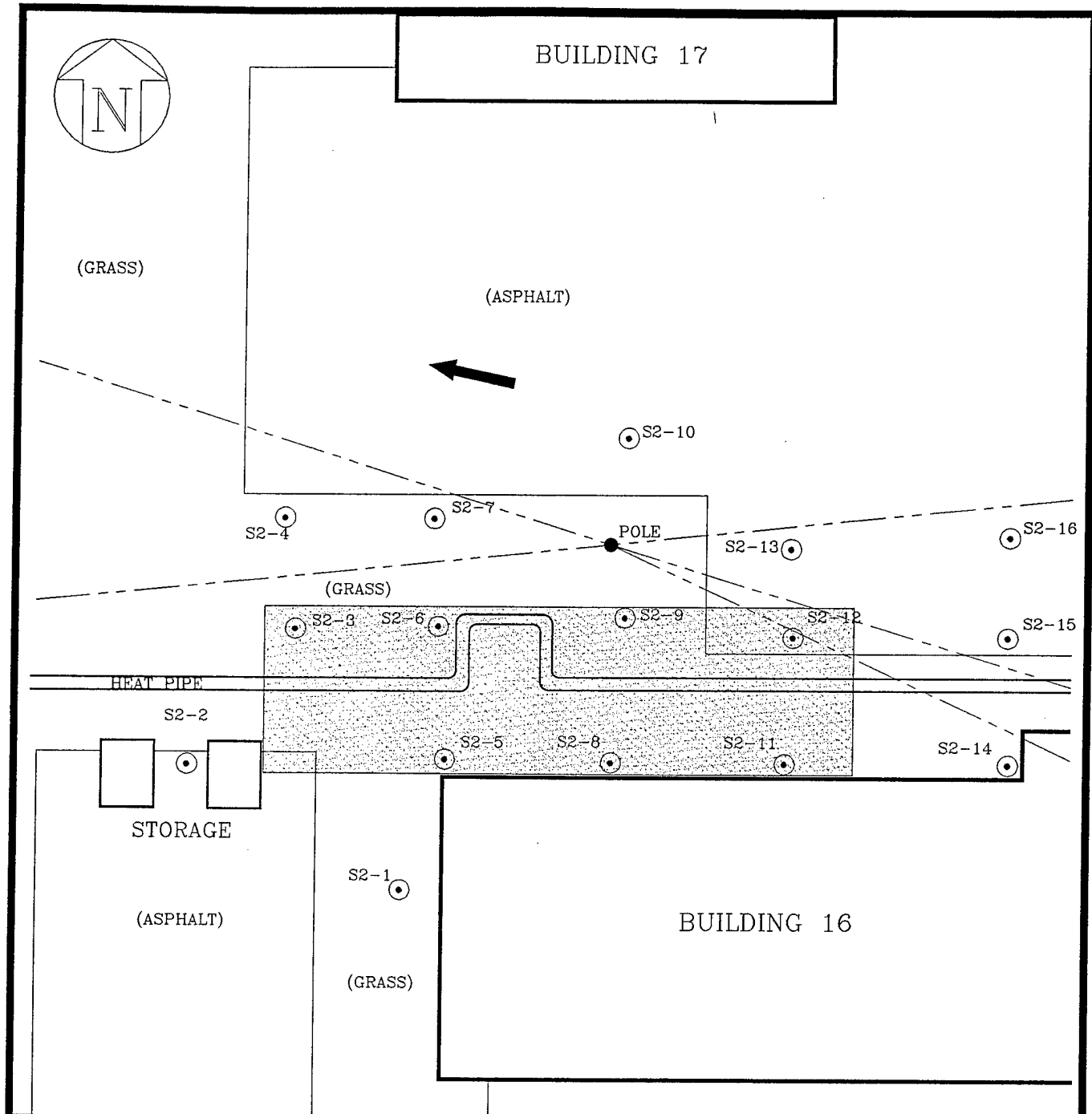
Soil gas samples were obtained from a depth of five feet BLS. Sixteen investigative samples and two air blank samples were collected. Table 5.11 summarizes the maximum concentrations of BTEX and TVHC detected and the detection limit for each analytical parameter.

Table 5.11
Maximum Concentrations Detected in Soil Gas Survey
IRP Site No. 2 - Old Waste Holding Area No. 1
Roslyn ANGS, Roslyn, New York

Analytical Parameter	Maximum Concentration Detected	Detection Limit
Benzene ($\mu\text{g/L}$)	0.4	0.01
Toluene ($\mu\text{g/L}$)	110	0.02
Ethylbenzene ($\mu\text{g/L}$)	ND	0.03
Total Xylenes ($\mu\text{g/L}$)	0.2	0.05
Total Volatile Hydrocarbons ($\mu\text{g/L}$)	18,000*	0.05

$\mu\text{g/L}$ - micrograms per liter.

* - TVHC may contain elevated concentrations of nonaromatic compounds.



LEGEND

IRP SITE NO.2	GROUNDWATER FLOW DIRECTION
OVERHEAD POWERLINE	SOIL GAS SURVEY POINT
BUILDING	

SCALE IN FEET

FIGURE 5.12

SOIL GAS SURVEY POINTS
AT IRP SITE NO.2
Roslyn Air National Guard Station
New York Air National Guard
Roslyn, New York

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ROSLYN\TVHC

SEPTEMBER 1995

Benzene was detected at concentrations ranging from 0.01 to 0.4 $\mu\text{g/L}$ in nine of the 16 samples analyzed, toluene from 0.02 to 110.0 $\mu\text{g/L}$ in 11 samples, and total xylenes from 0.1 to 0.2 $\mu\text{g/L}$ in three samples. Ethylbenzene was not detected in any samples at the site. TVHC was detected in all samples ranging from 0.3 to 18,000 $\mu\text{g/L}$. The highest toluene concentrations were detected at sampling locations S2-9 and S2-13. The highest TVHC concentrations were detected at sampling locations S2-12, S2-9, S2-7, and S2-13 (see Figure 5.12), however, some readings may contain elevated concentrations of nonaromatic compounds. The areal extent of TVHC contamination detected by the soil gas survey is illustrated in Figure 5.13.

Results obtained from the soil gas survey resulted in the relocation of three soil borings (02-001BH, 02-002BH, and 02-003BH) in order to insure samples were obtained for laboratory analysis at the location of highest BTEX and/or TVHC contamination. A complete listing of the soil gas survey results for IRP Site No. 2 is presented in Appendix B.

5.3.2.2 Field GC Screening Results

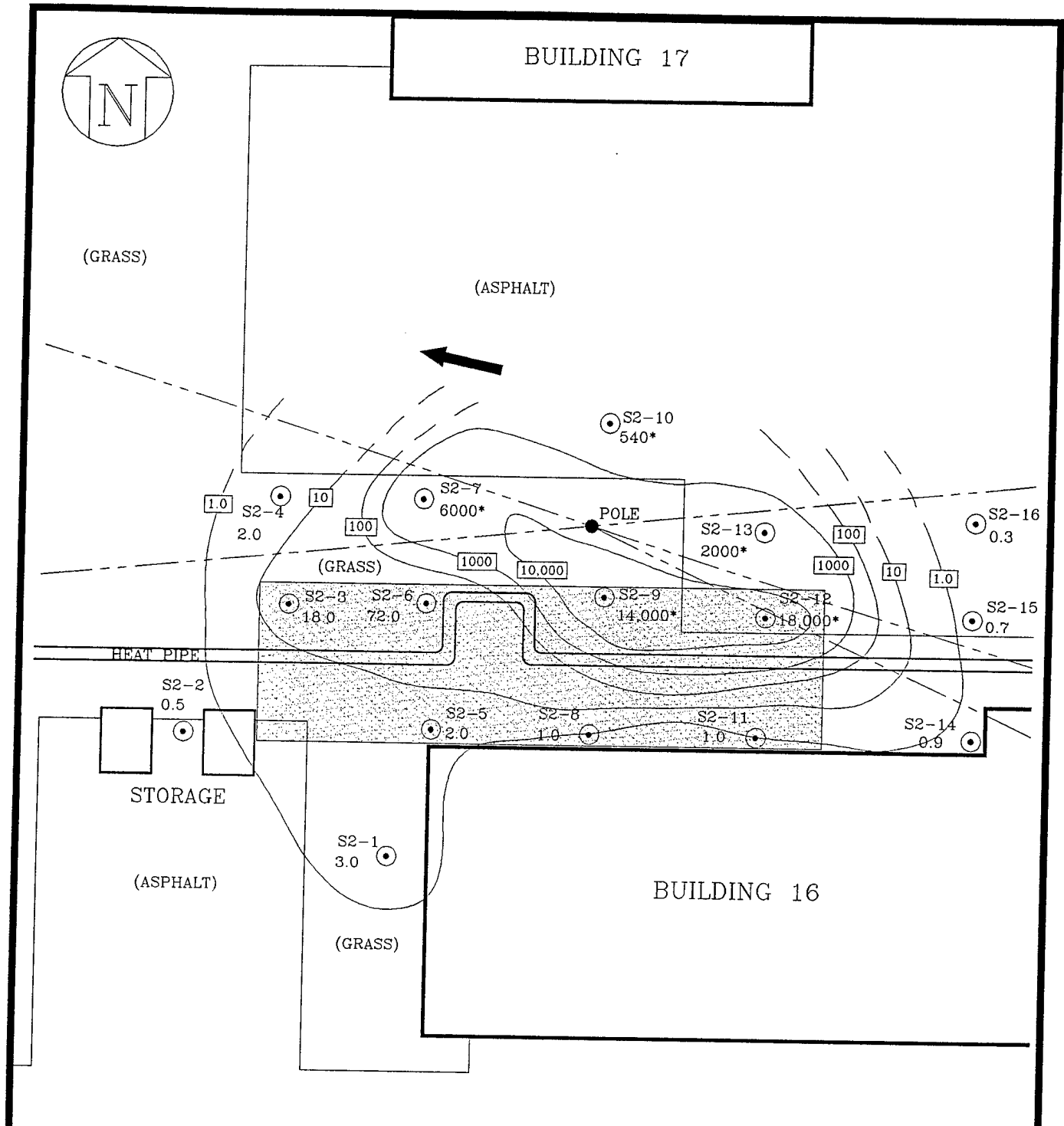
Nineteen soil samples collected from 8 soil borings were field screened with a field GC. The GC had been calibrated to screen for BTEX (and MTBE for boring 02-003BH). Table 5.12 summarizes the maximum concentrations detected in soil samples. Complete field GC data is included in Appendix D.

Table 5.12
Maximum Field GC Concentrations Detected in Soil
IRP Site No. 2 - Old Waste Holding Area No. 1
Roslyn ANGS, Roslyn, New York



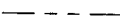



Compound	Maximum Concentrations Detected in Soil (ppb)
Benzene	276.63
Toluene	7,713.0
Ethylbenzene, m,p-xylene	1,098.0
o-xylene	9,635.0
MTBE ¹	ND

GC - Gas Chromatograph.
 ppb - parts per billion.
 ND - Not Detected.
¹MTBE analysis conducted on 02-003BH only.

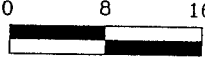
BTEX was detected in 14 of the 19 soil samples at IRP Site No. 2. Benzene was detected in five samples and ranged from 0.72 ppb to 276.6 ppb at 02-005BH (5.0 - 5.5). Toluene was



LEGEND

	IRP SITE NO.2		GROUNDWATER FLOW DIRECTION
	OVERHEAD POWERLINE		SOIL GAS SURVEY POINT
	BUILDING		ISOCONCENTRATION IN ug/L

* TVHC MAY CONTAIN ELEVATED LEVELS OF NONAROMATIC COMPOUNDS



SCALE IN FEET

FIGURE 5.13

ROSLYN\TVHC

**ISOCONCENTRATIONS OF TVHC
 DETECTED AT IRP SITE NO.2**
 Roslyn Air National Guard Station
 New York Air National Guard
 Roslyn, New York

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SEPTEMBER 1995

detected in 13 samples and ranged from 1.5 ppb to 7,713 ppb at 02-004BH (5.0 - 5.5). Ethylbenzene and m,p-xylene were detected in five samples and ranged from 1.2 ppb to 1,098 ppb at 02-002BH (0.0 - 1.5). O-xylene was detected in seven samples and ranged from 3.5 ppb to 9,635 ppb at 02-002BH (0.0 - 1.5). MTBE was not detected at boring 02-003BH.

5.3.2.3 Soil Investigation Findings

Soil samples collected from eight soil borings, one monitoring well, and one piezometer were used to provide geologic information for describing the subsurface geology at the site. Nineteen investigative soil samples were submitted for laboratory analysis.

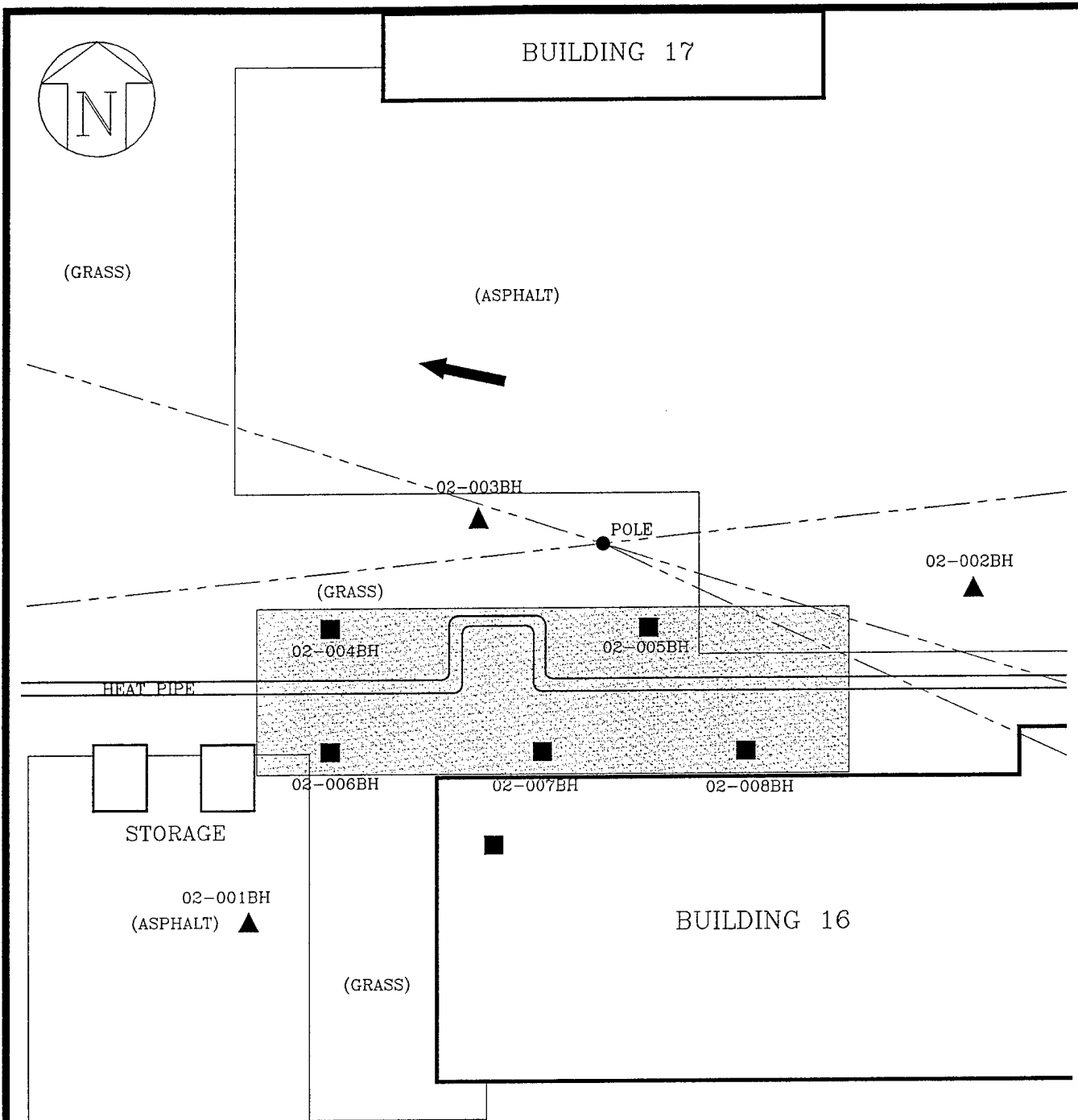
5.3.2.3.1 Soil Boring Locations

Eight soil borings were installed at the site to obtain soil samples for analytical analysis for defining any existing soil contamination, and to aid in defining the vertical and horizontal extent of contamination. Three boring locations (02-001BH, 02-002BH, and 02-003BH) were drilled using a HSA to 10 feet BLS with three samples collected for analytical analysis and the five remaining boring locations (02-004BH to 02-008BH) were drilled using a hand auger to a depth of 5 feet BLS with two samples collected for analytical analysis. The location of the three HSA soil borings originally proposed in the Work Plan were changed after a review of soil gas survey results of the site and obstructions noted during field work. The hand auger borings were drilled in their originally proposed locations. The soil boring locations for IRP Site No. 2 are indicated on Figure 5.14.







5.3.2.3.2 Subsurface Geology

Soil samples collected from eight soil borings, one monitoring well, and one piezometer were used to provide geologic information for describing the subsurface geology at the site. Soil borings from the HSA locations were sampled to a total depth of approximately 11.5 feet BLS while borings from the hand auger locations were sampled to a total depth of approximately 5 feet BLS. 02-001MW and PS-3 were drilled to a total depth of approximately 160 feet BLS. Complete lithologic logs for the borings and wells drilled at IRP Site No. 1 are presented in Appendix A.

A majority of the site is presently covered by grass near Building 16 and gravel along the west edge of the site. An asphalt parking area borders the north and northeast portion of the site.



LEGEND

	IRP SITE NO.2		GROUNDWATER FLOW DIRECTION
	OVERHEAD POWERLINE		SOIL BORING LOCATION (HAND AUGER)
	BUILDING		SOIL BORING LOCATION (HSA)

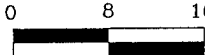

 SCALE IN FEET

FIGURE 5.14
 ROSLYN\TVHC

**SOIL BORING LOCATIONS
 AT IRP SITE NO.2**
 Roslyn Air National Guard Station
 New York Air National Guard
 Roslyn, New York

Soil encountered during drilling at the boreholes to a depth of 11.5 feet BLS was composed of a dry, very dark brown to black, very poorly sorted silt, sand, and gravel near the surface becoming moist, light brown sand, silt, and gravel near the bottom. During drilling for PS-3 and 01-002MW immediately west of the site, subsurface geology typified glacial terminal moraine deposits. Drill cuttings consisted of very poorly sorted medium to fine sand, silt, and gravel with intervals of mostly gravel and boulders encountered at varying depths below the surface as shown in Appendix A. Medium to fine sand was encountered near 135 feet BLS becoming a medium sand with rounded gravel from the water table (encountered at 141.5 feet BLS) to the total depth of 160 feet BLS.

5.3.2.3.3 Nature and Extent of Soil Contamination

Eight soil borings were drilled at IRP Site No. 2 from which 19 investigative and one duplicate soil samples were collected for laboratory analysis. Borings 02-001BH and 02-003BH were drilled and soil samples collected on 21 September 1993. Borings 02-004BH through 02-008BH were drilled and soil samples collected on 22-23 September 1993. Boring 02-002BH was drilled and soil samples collected on 7 April 1994. The analytical program for soil analyses was discussed in Subsection 4.5.3.1.

No holding times were exceeded for the soil samples collected and no problems that affected analytical results were encountered. A number of VOC and SVOC surrogate recoveries were outside QC criteria requiring reanalysis. These were conducted and reported. All spike recoveries and RPD values were within acceptable limits. Other samples required dilutions due to VOC surrogate recoveries being outside QC limits. All dilutions were conducted and reported. All other criteria met QC criteria and sample validity was not compromised. A complete listing of analysis summary narratives outlining equipment calibrations, internal standards, surrogates, laboratory blanks, and sample preparations are listed in the SDG Narratives presented as Appendix H. This appendix also includes QA/QC analyses results for all other analytical parameters.

VOCs detected in soil samples collected at IRP Site No. 2 are shown in Table 5.13. The volatile organic analyses detected two common laboratory and method contaminants in the soil samples collected. These were methylene chloride (2 to 29 $\mu\text{g}/\text{kg}$) and acetone (5 to 560 $\mu\text{g}/\text{kg}$). Methylene chloride was detected in associated quality control blanks invalidating detections in all of the soil samples. Acetone is a common laboratory solvent and was detected in several associated quality control blanks, thus indicating the contaminant may be laboratory induced.

Table 5.13
 VOCs Detected in Soil at IRP Site No. 2
 Roslyn ANGS, Roslyn, New York

Sample ID/Interval (feet BLS)	VOCs									
	Methylene Chloride ($\mu\text{g}/\text{kg}$)	Acetone ($\mu\text{g}/\text{kg}$)	1,2-Dichloroethene ($\mu\text{g}/\text{kg}$)	2-Butanone ($\mu\text{g}/\text{kg}$)	Trichloroethene ($\mu\text{g}/\text{kg}$)	Benzene ($\mu\text{g}/\text{kg}$)	Toluene ($\mu\text{g}/\text{kg}$)	Ethylbenzene ($\mu\text{g}/\text{kg}$)	Xylenes ($\mu\text{g}/\text{kg}$)	
RSCO	100	200	300	300	700	60	1,500	5,500	1,200	
02-001BH 0.0 - 1.5	3BJ	11U	11U	11U	11U	11U	11U	11U	11U	
02-001BH 5.0 - 6.5	2BJ	5BJ	11U	11U	11U	11U	11U	11U	11U	
02-001BH 11.5 - 13.0	3BJ	5BJ	10U	10U	10U	10U	10U	10U	10U	
02-002BH 0.0 - 1.5	4BJ	17B	140	4J	100	12U	12U	12U	2J	
02-002BH 5.0 - 6.5	20B	16	11U	11U	11U	11U	11U	11U	11U	
02-002BH 10.0 - 11.5	29B	28	150	4J	120	11U	2J	11U	11U	
02-002BH 11.5 - 13.0	3BJ	5BJ	11U	11U	11U	11U	11U	11U	11U	
02-003BH 0.5 - 2.0	3JB	11U	11U	11U	11U	11U	11U	11U	11U	
02-003BH 5.0 - 6.5	2JB	12U	12U	12U	12U	12U	12U	12U	12U	
02-003BH 10.0 - 11.5	2JB	10U	10U	10U	10U	10U	10U	10U	10U	
02-004BH 0.0 - 0.5	4BJ	9J	11U	11U	11U	11U	11U	11U	11U	
02-004BH 5.0 - 5.5	4BJ	74	11U	33	11U	2J	11U	49	260	
02-005BH 0.0 - 0.5	9BJ	17	11U	11U	11U	11U	5J	11U	5J	
02-005BH 5.0 - 5.5	7BJ	81	12U	48	12U	2J	3J	27	140	
02-006BH 0.0 - 0.5	18B	11U	11U	11U	11U	11U	11U	11U	11U	
02-006BH 5.0 - 5.5	8BJ	14	11U	11U	11U	11U	11U	11U	11U	
02-007BH 0.0 - 0.5+	25B	12U	12U	12U	12U	12U	4J	12U	3J	
02-007BH 5.0 - 5.5	17B	11U	11U	11U	11U	11U	11U	11U	11U	
02-008BH 0.0 - 0.5	8BJ	10J	12U	12U	13	12U	12U	12U	12U	
02-008BH 5.0 - 5.5+	9BJ	560E	12U	300E	12U	12U	12U	12U	12U	

VOCs - Volatile Organic Compounds.

ID - Identification.

BLS - Below Land Surface.

$\mu\text{g}/\text{kg}$ - micrograms per kilogram.

BH - Borehole.

+ - Sample reported as a reanalysis.

Note: Numbers bolded indicate the presence of analyte confirmed above detection limit.

B - Analyte was found in the associated blank as well as the sample.

E - Identified analyte whose concentrations exceeded the calibration range for the GC/MS instrument for that specific analysis.

J - Estimated concentration. Compound meets the identification criteria but the result is less than the sample quantitation limit but greater than zero.

U - Compound was analyzed for by was not detected. Detection limit is shown.

RSCO - Recommended soil cleanup objective.

The VOC, 1,2-dichloroethene was detected above detection limits in two samples; 02-002BH (0.0 - 1.5) and 02-002BH (10.0 - 11.5) at 140 $\mu\text{g}/\text{kg}$ and 150 $\mu\text{g}/\text{kg}$, respectively. 2-butanone was detected above detection limits in two samples; 02-004BH (5.0 - 6.5) and 02-005BH (5.0-5.5) at 33 $\mu\text{g}/\text{kg}$ and 48 $\mu\text{g}/\text{kg}$, respectively. 2-butanone was detected at estimated concentrations less than the detection limit in two samples collected from 02-002BH and one sample collected from 02-008BH. Trichloroethene was detected above detection limits in three samples; 02-002BH (0.0 - 1.5), 02-002BH (10.0 - 11.5), and 02-008BH (0.0 - 0.5) at 100 $\mu\text{g}/\text{kg}$, 120 $\mu\text{g}/\text{kg}$, and 13 $\mu\text{g}/\text{kg}$, respectively. Ethylbenzene was detected above detection limits in two samples; 02-004BH (5.0 - 5.5) and 02-005BH (5.0 - 5.5) at 49 $\mu\text{g}/\text{kg}$ and 27 $\mu\text{g}/\text{kg}$, respectively. Total xylenes were detected above detection limits in two sample; 02-004BH (5.0 - 5.5) and 02-005BH (5.0 - 5.5) at 260 $\mu\text{g}/\text{kg}$ and 140 $\mu\text{g}/\text{kg}$, respectively. Total xylenes were detected at estimated concentrations less than the detection limit in one sample collected from 02-002BH, 02-005BH, and 02-007BH. Benzene was detected at estimated concentrations less than the detection limit in one sample collected from boring 02-004BH and 02-005BH. Toluene was detected at estimated concentrations less than the detection limit in two samples from 02-005BH and one sample collected from 02-002BH and 02-007BH.

SVOCs detected in soil samples collected at IRP Site No. 2 are shown in Table 5.14. The SVOC, 2-methylnaphthalene was detected above detection limits in two samples; 02-004BH (5.0 - 5.5) and 02-005BH (5.0 - 5.5) at 380 $\mu\text{g}/\text{kg}$ and 540 $\mu\text{g}/\text{kg}$, respectively. No other SVOCs were detected above detection limits in any samples at IRP Site No. 2. Phenol, naphthalene, 2-methylnaphthalene, phenanthrene, anthracene, carbazole, fluoranthene, pyrene, benzo(a)anthracene, chrysene, bis(2-ethylhexyl)phthalate, di-n-octylphthalate, benzo(b)fluoranthene, benzo(k)fluoranthene, benzo(a)pyrene, di-n-butylphthalate, acenaphthene, and fluorene were detected at estimated concentrations less than the detection limit at the site and are listed in Table 5.14. Additionally, 14 other SVOCs were detected in 02-007BH (0.0 - 1.5) at estimated concentrations less than the detection limit that are not listed on Table 5.14. A complete listing of analytical parameters for the samples is presented in Appendix I.

Pesticides and PCBs detected in soil samples collected at IRP Site No. 2 are shown in Table 5.15. The PCB aroclor-1260 was detected above detection limits in four samples; 02-004BH (0.0 - 0.5) and 02-008BH (0.0 - 0.5) at 120 $\mu\text{g}/\text{kg}$ and 160 $\mu\text{g}/\text{kg}$, respectively and in 02-006BH (0.0 - 1.5) and 02-007BH (0.0 - 1.5) at 62 $\mu\text{g}/\text{kg}$ and 81 $\mu\text{g}/\text{kg}$, respectively, but where the analyte had greater than 25% difference between the detected concentrations for the two GC columns the lower value is reported. Aroclor-1260 was detected at estimated concentrations less than the detection limit in one sample from 02-002BH and 02-005BH.

Table 5.14
 SVOCs Detected in Soil at IRP Site No. 2
 Roslyn ANGS, Roslyn, New York

Sample ID/Interval (feet-BLS)	SVOCs									
	Phenol ($\mu\text{g}/\text{kg}$)	Naphthalene ($\mu\text{g}/\text{kg}$)	2-Methylnaphthalene ($\mu\text{g}/\text{kg}$)	Phenanthrene ($\mu\text{g}/\text{kg}$)	Anthracene ($\mu\text{g}/\text{kg}$)	Carbazole ($\mu\text{g}/\text{kg}$)	Fluoranthene ($\mu\text{g}/\text{kg}$)	Pyrene ($\mu\text{g}/\text{kg}$)	Benzo(a) Anthracene ($\mu\text{g}/\text{kg}$)	
RSCO	CRQL	13,000	36,400	50,000	50,000	CRQL	50,000	50,000	CRQL	
02-001BH 0.0 - 1.5+	360U	360U	360U	360U	360U	360U	360U	360U	360U	
02-001BH 5.0 - 6.5	350U	350U	350U	330J	350U	350U	300J	170J	86J	
02-001BH 11.5 - 13.0	340U	340U	340U	340U	340U	340U	340U	340U	340U	
02-002BH 0.0 - 1.5	380U	40J	380U	380U	380U	380U	41J	380U	380U	
02-002BH 5.0 - 6.5	40J	370U	370U	49J	370U	370U	74J	51J	370U	
02-002BH 10.0 - 11.5	350U	350U	350U	350U	350U	350U	350U	350U	350U	
02-002BH 11.5 - 13.0	360U	360U	360U	360U	360U	360U	360U	360U	360U	
02-003BH 10.0 - 11.5	350U	350U	350U	350U	350U	350U	350U	350U	350U	
02-004BH 0.0 - 0.5+	350U	350U	350U	350U	350U	350U	350U	350U	350U	
02-004BH 5.0 - 5.5+	370U	370U	380	170J	130J	58J	370U	41J	370U	
02-005BH 0.0 - 0.5+	370U	370U	370U	110J	370U	370U	250J	200J	130J	
02-005BH 5.0 - 5.5+	400U	400U	540	400U	400U	400U	400U	400U	400U	
02-006BH 5.0 - 5.5	360U	360U	360U	360U	360U	360U	360U	360U	360U	
02-007BH 0.0 - 0.5+	380U	380U	48J	81J	57J	380U	100J	71J	63J	
02-007BH 5.0 - 5.5	370U	370U	370U	370U	370U	370U	370U	370U	370U	
02-008BH 0.0 - 0.5+	770U	190J	220J	220J	770U	770U	400J	450J	190J	
02-008BH 5.0 - 5.5+	390U	390U	390U	390U	390U	390U	390U	390U	390U	

Table 5.14 (Continued)
 SVOCs Detected in Soil at IRP Site No. 2
 Roslyn ANGS, Roslyn, New York

Sample ID/Interval (feet BLS)	SVOCs							
	Chrysene ($\mu\text{g}/\text{kg}$)	B-(2E)-P ($\mu\text{g}/\text{kg}$)	Di-n- Octylphthalate ($\mu\text{g}/\text{kg}$)	Benzo(b) Fluoranthene ($\mu\text{g}/\text{kg}$)	Benzo(k) Fluoranthene ($\mu\text{g}/\text{kg}$)	Benzo(a) Pyrene ($\mu\text{g}/\text{kg}$)	Di-n- Butylphthalate ($\mu\text{g}/\text{kg}$)	
RSCO	400	50,000	50,000	1,100	1,100	CRQL	8,100	
02-001BH 0.0 - 1.5+	43J	360U	360U	360U	360U	360U	360U	
02-001BH 5.0 - 6.5	100J	970B	350U	70J	59J	350U	350U	
02-001BH 11.5 - 13.0	340U	640B	340U	340U	340U	340U	340U	
02-002BH 0.0 - 1.5	380U	380U	380U	380U	380U	380U	380U	
02-002BH 5.0 - 6.5	48J	1,000B	370U	370U	370U	370U	53J	
02-002BH 10.0 - 11.5	350U	55BJ	350U	350U	350U	350U	350U	
02-002BH 11.5 - 13.0	360U	2,300B	360U	360U	360U	360U	37J	
02-003BH 10.0 - 11.5	350U	69J	350U	350U	350U	350U	350U	
02-004BH 0.0 - 0.5+	350U	350U	350U	350U	350U	350U	350U	
02-004BH 5.0 - 5.5+	370U	47J	370U	370U	370U	370U	370U	
02-005BH 0.0 - 0.5+	160J	710B	370U	120J	120J	370U	370U	
02-005BH 5.0 - 5.5+	400U	400U	400U	400U	400U	400U	400U	
02-006BH 5.0 - 5.5	360U	110J	360U	360U	360U	360U	360U	
02-007BH 0.0 - 0.5+	76J	83BJ	42J	52J	60J	380U	55J	
02-007BH 5.0 - 5.5	370U	370U	93J	370U	370U	370U	370U	
02-008BH 0.0 - 0.5+	300J	3,900B	770U	260J	220J	230J	770U	
02-008BH 5.0 - 5.5+	390U	140BJ	390U	390U	390U	390U	390U	

Table 5.14 (Concluded)
SVOCs Detected in Soil at IRP Site No. 2
Roslyn ANGS, Roslyn, New York

Sample ID/Interval (feet BLS)	SVOCs	
	Acenaphthene ($\mu\text{g}/\text{kg}$)	Fluorene ($\mu\text{g}/\text{kg}$)
RSCO	50,000	50,000
02-001BH 0.0 - 1.5+	360U	360U
02-001BH 5.0 - 6.5	39J	50J
02-001BH 11.5 - 13.0	340U	340U
02-002BH 0.0 - 1.5	380U	380U
02-002BH 5.0 - 6.5	370U	370U
02-002BH 10.0 - 11.5	350U	350U
02-002BH 11.5 - 13.0	360U	360U
02-003BH 10.0 - 11.5	350U	350U
02-004BH 0.0 - 0.5+	350U	350U
02-004BH 5.0 - 5.5+	370U	370U
02-005BH 0.0 - 0.5+	370U	370U
02-005BH 5.0 - 5.5+	400U	400U
02-006BH 5.0 - 5.5	360U	360U
02-007BH 0.0 - 0.5+	52J	57J
02-007BH 5.0 - 5.5	370U	370U
02-008BH 0.0 - 0.5+	770U	770U
02-008BH 5.0 - 5.5+	390U	390U

Note: Numbers in bold indicate presence of analyte confirmed above detection limit.
 ID - Identification.
 BLS - Below Land Surface.
 $\mu\text{g}/\text{kg}$ - micrograms per kilogram.
 BH - Borehole.
 RSCO - Recommended soil cleanup objective.

+ - Sample reported as a reanalysis.
 J - Estimated concentration. Compound meets the identification criteria but the result is less than the sample quantitation limit but greater than zero.
 U - Compound was analyzed for but was not detected. Detection limit is shown.
 B - Analyte found in associated blank as well as the sample.
 CRQL - Contract required quantitation limit is shown where higher than RSCO.

The pesticide endrin aldehyde was detected above detection limits in eight samples; 02-002BH (5.0 - 6.5) and 02-004BH (5.0 - 5.5) at 4.3 $\mu\text{g}/\text{kg}$ and 10 $\mu\text{g}/\text{kg}$, respectively and in 02-004BH (0.0 - 0.5), 02-005BH (0.0 - 0.5 and 5.0 - 5.5), 02-006BH (0.0 - 0.5), 02-007BH (0.0 - 0.5), and 02-008BH (0.0 - 0.5) at 9.1 $\mu\text{g}/\text{kg}$, 17.0 $\mu\text{g}/\text{kg}$, 20.0 $\mu\text{g}/\text{kg}$, 7.5 $\mu\text{g}/\text{kg}$, 9.9 $\mu\text{g}/\text{kg}$, and 41.0 $\mu\text{g}/\text{kg}$, respectively, but where the analyte had greater than 25% difference between the detected concentrations for the two GC columns the lower values were reported. Dieldrin was detected in soil sample 02-007BH (0.0 - 0.5) at 6.3 $\mu\text{g}/\text{kg}$ and 02-008BH (0.0 - 0.5) at 17.0 $\mu\text{g}/\text{kg}$, 4,4'-DDD in 02-005BH (5.0 - 5.5) at 8.4 $\mu\text{g}/\text{kg}$, 4,4'-DDT in 02-006BH (0.0 - 0.5) at 8.1 $\mu\text{g}/\text{kg}$ and 02-007BH (0.0 - 0.5) at 4.6 $\mu\text{g}/\text{kg}$, and alpha chlordane and gamma chlordane in

02-004BH (0.0 - 0.5) at 22 $\mu\text{g}/\text{kg}$ and 24 $\mu\text{g}/\text{kg}$, but again the analyte had greater than 25% difference between the detected concentrations for the two GC columns the lower values were reported. Other pesticides, alpha-BHC, heptachlor epoxide, dieldrin, 4,4'-DDE, endosulfan II, 4,4'-DDD, 4,4'-DDT, endrin aldehyde, alpha chlordane, gamma chlordane and endrin were detected at estimated concentrations less than the detection limit at the site and are listed in Table 5.15.

TPH was detected at IRP Site No. 2 at six boring locations and is shown in Table 5.16. TPH as #6 fuel oil was detected in soil sample 02-001BH (0.0 - 1.5), 02-002BH (0.0 - 1.5), and 02-006BH (0.0 - 0.5) at 14.0 ppm, 130 ppm, and 33 ppm, respectively. Soil sample 02-004BH (0.0 - 0.5) contained concentrations of TPH as gasoline at 12,000 ppm and TPH as lubricant oil at 1,900 ppm and 02-004BH (5.0 - 5.5) contained concentrations of TPH as gasoline at 10,000 ppm. Soil sample 02-005BH (0.0 - 0.5) contained concentrations of TPH as gasoline at 6,600 ppm and 02-005BH (5.0 - 5.5) contained concentrations of TPH as gasoline at 5,100 ppm and #2 fuel oil at 32 ppm. Soil sample 02-008BH contained concentrations of gasoline at 62 ppm and TPH as #6 fuel oil at 330 ppm.

TAL metals and cyanide concentrations detected at IRP Site No. 2 are listed in Table 5.17 with the highest concentration per analyte per borehole (above RSCO's or site background) are shown in Figure 5.11. Metals and cyanide concentrations were compared against mean values obtained from the background sampling location to determine if analyte concentrations exceeded naturally occurring concentrations.

Most inorganic analytes exceeded background mean values for those elements detected at the background sampling location. The highest concentrations were detected for aluminum, calcium, iron, and magnesium where the maximum concentrations detected were 17,400 mg/kg, 88,100 mg/kg, 25,200 mg/kg, and 48,800 mg/kg, respectively. These four elements are common earth materials and may reflect elevated concentrations of naturally occurring concentrations. Other metals were detected in high concentrations in only a few samples and include antimony, arsenic, barium, chromium, cobalt, copper, lead, manganese, nickel, potassium, vanadium, and zinc. There were no single boring locations where consistently higher concentrations were detected. Mercury was detected at 0.13 mg/kg at 02-008BH (0.0 - 0.5) only and cyanide was not detected above background concentrations in any samples from IRP Site No. 2.

Table 5.15
Pesticides/PCBs Detected in Soil at IRP Site No. 2
Roslyn ANGS, Roslyn, New York

Sample ID/Interval (feet BLS)	Pesticides/PCBs						
	Alpha-BHC ($\mu\text{g}/\text{kg}$)	Heptachlor Epoxide ($\mu\text{g}/\text{kg}$)	Dieldrin ($\mu\text{g}/\text{kg}$)	4,4'-DDE ($\mu\text{g}/\text{kg}$)	Endrin ($\mu\text{g}/\text{kg}$)	Endosulfan II ($\mu\text{g}/\text{kg}$)	
RSCO	110	20	40	2,100	100	900	
02-001BH 0.0 - 1.5	1.9U	1.9U	3.6U	3.6U	3.6U	3.6U	
02-002BH 5.0 - 6.5	1.9U	1.9U	3.7U	3.7U	3.7U	3.7U	
02-004BH 0.0 - 0.5	3.7U	3.7U	7.1U	7.1U	7.1U	7.1U	
02-004BH 5.0 - 5.5	1.3JP	1.9U	3.7U	2.5J	3.7U	3.7U	
02-005BH 0.0 - 0.5	1.9U	1.9U	3.7U	3.7U	3.7U	3.7U	
02-005BH 5.0 - 5.5	2.1U	1.4JP	4.0U	4.0U	4.0U	3.4JP	
02-006BH 0.0 - 0.5	1.8U	1.8U	2.4JP	3.6U	3.6U	3.6U	
02-007BH 0.0 - 0.5+	2.0U	2.0U	6.3P	3.8U	3.8U	3.8U	
02-008BH 0.0 - 0.5	5.9U	5.9U	17P	12U	11JP	12U	
Sample ID/Interval (feet BLS)	Pesticides/PCBs						
	4,4'-DDD ($\mu\text{g}/\text{kg}$)	4,4'-DDT ($\mu\text{g}/\text{kg}$)	Endrin Aldehyde ($\mu\text{g}/\text{kg}$)	Alpha Chlordane ($\mu\text{g}/\text{kg}$)	Gamma Chlordane ($\mu\text{g}/\text{kg}$)	Aroclor 1260 ($\mu\text{g}/\text{kg}$)	
RSCO	2,900	2,100	100	540	540	1000	
02-001BH 0.0 - 1.5	3.6U	2.4J	3.6U	1.9U	1.9U	36U	
02-002BH 5.0 - 6.5	3.7U	3.7U	4.3	1.9U	1.9U	23JP	
02-004BH 0.0 - 0.5	7.1U	7.1U	9.1P	22P	24P	120	
02-004BH 5.0 - 5.5	2.2JP	2.8JP	10	1.9U	1.9U	37U	
02-005BH 0.0 - 0.5	3.7U	3.0JP	17P	1.9U	1.9U	19JP	
02-005BH 5.0 - 5.5	8.4P	4.0U	20P	1.4JP	1.4JP	40U	

Table 5.15 (Concluded)
Pesticides/PCBs Detected in Soil at IRP Site No. 2
Roslyn ANGS, Roslyn, New York

Sample ID/Interval (feet BLS)	Pesticides/PCBs					
	4,4'-DDD ($\mu\text{g}/\text{kg}$)	4,4'-DDT ($\mu\text{g}/\text{kg}$)	Endrin Aldehyde ($\mu\text{g}/\text{kg}$)	Alpha Chlordane ($\mu\text{g}/\text{kg}$)	Gamma Chlordane ($\mu\text{g}/\text{kg}$)	Aroclor 1260 ($\mu\text{g}/\text{kg}$)
02-006BH 0.0 - 0.5	3.6U	8.1P	7.5P	1.8JP	1.8U	62P
02-007BH 0.0 - 0.5+	3.8U	4.6P	9.9P	1.9J	2.0U	81P
02-008BH 0.0 - 0.5	12U	8.8JP	41P	5.9U	5.9U	160

PCBs - Polychlorinated Biphenyls.
ID - Identification.
BLS - Below Land Surface.
 $\mu\text{g}/\text{kg}$ - micrograms per kilogram.
RSC0 - Recommended site cleanup objective.
Note: Numbers in bold indicate the presence of analytes confirmed above the detection limit.

BH - Borehole.

+ - Sample reported as a reanalysis.

J - Estimated concentration. Compound meets the identification criteria but the result is

less than the sample quantitation limit but greater than zero.

U - Compound was analyzed for but was not detected. Detection limit is shown.

P - Target analyte had greater than 25% difference for detected concentrations between the two GC columns. Lower values were reported.

Table 5.16
TPH Detected in Soil at IRP Site No. 2
Roslyn ANGS, Roslyn, New York

Sample ID/Interval (feet BLS)	TPH									
	Gasoline ($\mu\text{g}/\text{kg}$)	TPH as Gasoline (ppm)	#2 Fuel Oil ($\mu\text{g}/\text{kg}$)	TPH as #2 Fuel Oil (ppm)	#6 Fuel Oil ($\mu\text{g}/\text{kg}$)	TPH as #6 Fuel Oil (ppm)	Lube Oil ($\mu\text{g}/\text{kg}$)	TPH as Lube Oil (ppm)	Kerosene ($\mu\text{g}/\text{kg}$)	TPH as Kerosene (ppm)
02-001BH 0.0 - 1.5	500U	ND	10U	ND	10U	14.0	10U	ND	10U	ND
02-002BH 0.0 - 1.5	500U	ND	10U	ND	10U	130	10U	ND	10U	ND
02-004BH 0.0 - 0.5	500U	12,000	100U	ND	100U	ND	100U	1,900	100U	ND
02-004BH 5.0 - 5.5	500U	10,000	1,600U	ND	1,000U	ND	1,000U	ND	1,000U	ND
02-005BH 0.0 - 0.5	500U	6,600	100U	ND	100U	ND	100U	ND	100U	ND
02-005BH 5.0 - 5.5	500U	5,100	3,200	ND	500U	ND	500U	ND	500U	ND
02-006BH 0.0 - 0.5	500U	ND	20U	ND	20U	33.0	20U	ND	20U	ND
02-008BH 5.0 - 5.5	6,200	ND	10U	ND	10U	330	10U	ND	10U	ND

TPH - Total Petroleum Hydrocarbons. $\mu\text{g}/\text{kg}$ - micrograms per kilogram.
 ID - Identification. BH - Borehole.
 BLS - Below Land Surface. + - Sample reported as a reanalysis.
 Note: Numbers in bold indicate the presence of analyte confirmed above detection limit. ppm - parts per million.

U - Compound was analyzed for but was not detected. Detection limit is shown.
 ND - Not Detected.

Table 5.17
TAL Metals and Cyanide Analytical Results for Soil at IRP Site No. 2
Roslyn ANGS, Roslyn, New York

Location: Interval (ft BLS): Concentration:	RSCO (mg/kg)	02-001BH 0.0 - 1.5 (mg/kg)	02-001BH 5.0 - 6.5 (mg/kg)	02-001BH 11.5 - 13.0 (mg/kg)	02-002BH 0.0 - 1.5 (mg/kg)	02-002BH 5.0 - 6.5 (mg/kg)	02-002BH 10.0 - 11.5 (mg/kg)	02-002BH Dup 11.5 - 13.0 (mg/kg)	02-003BH 0.5 - 2.0 (mg/kg)	02-003BH 5.0 - 6.5 (mg/kg)	02-003BH 10.0 - 11.5 (mg/kg)
Metals/Background											
Aluminum (3,707)	SB	9,820	4,130	1,660	16,200	17,400	6,620	9,230	843	14,400	8,960
Antimony (7.8B)	SB	5.5U	5.6U	6.2U	7.1U	6.2U	6.2U	5.3U	12.6B	6.1U	5.5U
Arsenic (1.8B)	7.5 or SB	8.1	1.8B	2.5	3.7B	3.8	1.5B	3.4	6.6	9.6	3.2
Barium (15.3B)	300 or SB	34.5B	21.7B	17.4B	61.0	90.7	23.7B	44.0	19.4B	71.8	22.4B
Beryllium (0.42B)	0.16 ^b or SB	0.51B	0.36B	0.11B	0.5B	1.0	0.34B	0.48B	0.26B	0.92B	0.42B
Cadmium (U)	1 or SB	0.68U	0.69U	0.77U	0.87U	0.76U	0.77U	0.65U	0.85U	0.94U	0.84U
Calcium (299B)	SB	959	1,010	384B	814B	7,770	622B	429B	88,100	990B	384B
Chromium (6.2)	10 or SB	12.8	13.1	5.3	18.7	14.9	10.3	11.7	3.4	12.6	10.5
Cobalt (4.1B)	30 or SB	6.4B	5.0B	2.5B	7.3B	6.5B	3.8B	8.0B	2.3U	4.8B	9.3B
Copper (41.6B)	25 or SB	14.4	23.0	32.6	4.1B	26.0	26.0	10.6	25.7	43.6	48.2
Iron (7,477)	2,000 or SB	16,500	16,300	11,400	18,700	18,100	11,400	17,000	3,360	18,600	21,000
Lead (2.8)	SB ^a	45.7	3.2	2.6	20.3	19.2	5.7	5.2	31.6	12.2	5.6
Magnesium(882.3)	SB	2,640	1,690	662B	2,900	6,080	1,920	2,450	48,800	1,770	3,430
Manganese(148.6)	SB	488	242	182	209	639	140	430	79.2	147	352
Mercury (U)	0.1	0.11U	0.11U	0.11U	0.12U	0.11U	0.11U	0.11U	0.11U	0.12U	0.11U
Nickel (12.8)	13 or SB	14.8	11.8	8.0B	15.0	13.6	9.9	15.1	5.8B	15.9	23.7
Potassium (431.3)	SB	423B	501B	393U	900B	441B	916B	992	237U	355B	766B
Selenium (U)	2 or SB	0.93U	1.0U	0.99U	1.2U	1.1U	0.98U	0.95U	1.1U	1.2U	1.0U
Silver (U)	SB	0.94B	1.4B	1.2B	1.4B	0.84U	1.3B	0.72U	2.0B	1.2U	1.1U
Sodium (U)	SB	67.6B	77.6B	28.2B	110B	96.6B	48.6B	46.2B	335B	228U	205U
Thallium (U)	SB	0.93U	1.0U	0.99U	1.2U	1.1U	0.98U	0.95U	1.1U	1.2U	1.0U
Vanadium (5.7)	150 or SB	16.0	12.2	5.3B	30.7	29.0	13.4	21.7	17.3	15.0	4.6B
Zinc (78.8)	20 or SB	46.6	29.5	30.2	39.5	63.1	33.7	32.4	31.8	81.4	54.1
Cyanide (0.66)	**	0.47U	0.52U	0.42U	0.49U	0.63U	0.35U	0.52U	0.40U	0.50U	0.33U

Table 5.17 (Concluded)
TAL Metals and Cyanide Analytical Results for Soil at IRP Site No. 2
Roslyn ANGS, Roslyn, New York

Location: Interval (ft BLS): Concentration:	RSCO (mg/kg)	02-004BH 0.0 - 0.5 (mg/kg)	02-004BH 5.0 - 5.5 (mg/kg)	02-005BH 0.0 - 0.5 (mg/kg)	02-005BH 5.0 - 5.5 (mg/kg)	02-006BH 0.0 - 0.5 (mg/kg)	02-006BH 5.0 - 5.5 (mg/kg)	02-007BH 0.0 - 0.5 (mg/kg)	02-007BH 5.0 - 5.5 (mg/kg)	02-008BH 0.0 - 0.5 (mg/kg)	02-008BH 5.0 - 5.5 (mg/kg)
Metals Background	SB										
Aluminum (3,707)	7.5 or SB	5,540	9,950	8,440	12,100	11,600	11,700	3,240	5,620	8,410	16,700
Antimony (7.8B)	300 or SB	17.6	6.4U	6.3U	7.5U	6.7U	6.6U	7.1U	6.8U	7.0U	7.3U
Arsenic (1.8B)	0.16' or SB	3.0	6.6	8.6	6.8	4.4	4.5	18.7	3.0	23.0	4.0B
Barium (15.3B)	1 or SB	61.7	46.6	51.2	57.1	61.7	40.1B	137	24B	153	75.9
Beryllium (0.42B)	SB	0.42B	0.48B	0.47B	0.63B	0.65B	0.61B	0.30B	0.28B	0.53B	0.92B
Cadmium (U)	10 or SB	1.0	0.83U	0.81U	0.97U	0.86U	0.85U	0.92U	0.88U	1.5	0.94U
Calcium (299B)	30 or SB	27,400	604B	1,700	1,140B	6,390	650B	3,570	475B	3,080	1,020B
Chromium (6.2)	25 or SB	54.0	11.6	15.2	14.5	31.8	16.4	6.0	7.6	22.9	16.7
Cobalt (4.1B)	2,000 or SB	5.9B	5.9B	6.2B	5.3B	12.8	7.8B	3.8B	5.1B	5.9B	6.5B
Copper (41.6B)	SB	27.4	4.2B	3.3B	3.1B	25.9	4.1B	6.2	1.8U	32.5	5.7B
Iron (7,477)	SB ¹	12,400	16,100	13,000	13,300	25,200	21,500	20,000	10,200	17,900	16,600
Lead (2.8)	SB	406	53.0	24.5	28.0	224	6.3	20.4	6.6	236	18.7
Magnesium (882.3)	SB	17,000	1,710	2,130	1,630	5,660	3,020	722B	1,300	2,040	2,360
Manganese (148.6)	0.1	219	364	193	115	397	390	29.6	199	163	161
Mercury (U)	13 or SB	0.11U	0.11U	0.11U	0.12U	0.11U	0.11U	0.12U	0.11U	0.13	0.12U
Nickel (12.8)	SB	10.5	10.2	14.4	15.9	27.4	16.3	9.7	8.0B	16.0	15.1
Potassium (431.3)	2 or SB	454B	530B	821B	467U	465B	410U	445U	426U	437U	556B
Selenium (U)	SB	1.1U	1.1U	0.98U	1.2U	1.1U	0.93U	1.3	1.1U	3.5	1.2U
Silver (U)	SB	0.83U	1.4B	0.81U	1.9B	0.86U	0.85U	0.92U	0.88U	0.91U	1.5B
Sodium (U)	SB	176B	48.5B	95.1B	63.1B	155B	60.1B	133B	27.8B	105B	97.5B
Thallium (U)	150 or SB	1.1U	1.1U	0.98U	1.2U	1.1U	0.93U	1.1U	1.1U	1.1U	1.2U
Vanadium (5.7)	20 or SB	26.3	17.7	17.2	18.6	41.6	19.2	10.6B	10.4B	20.6	26.9
Zinc (78.8)	**	304	32.5	34.2	29.4	123	37.5	37.8	15.1	168	31.3
Cyanide (0.66)		0.49U	0.45U	0.57U	0.59U	0.39U	0.36U	0.52U	0.47U	0.50U	0.53U

Note: Numbers in bold indicate presence of analyte confirmed above detection limit.

ft BLS - feet Below Land Surface.

BH - Borehole.

B - Reported value was less than the CRDL but greater than the IDL.

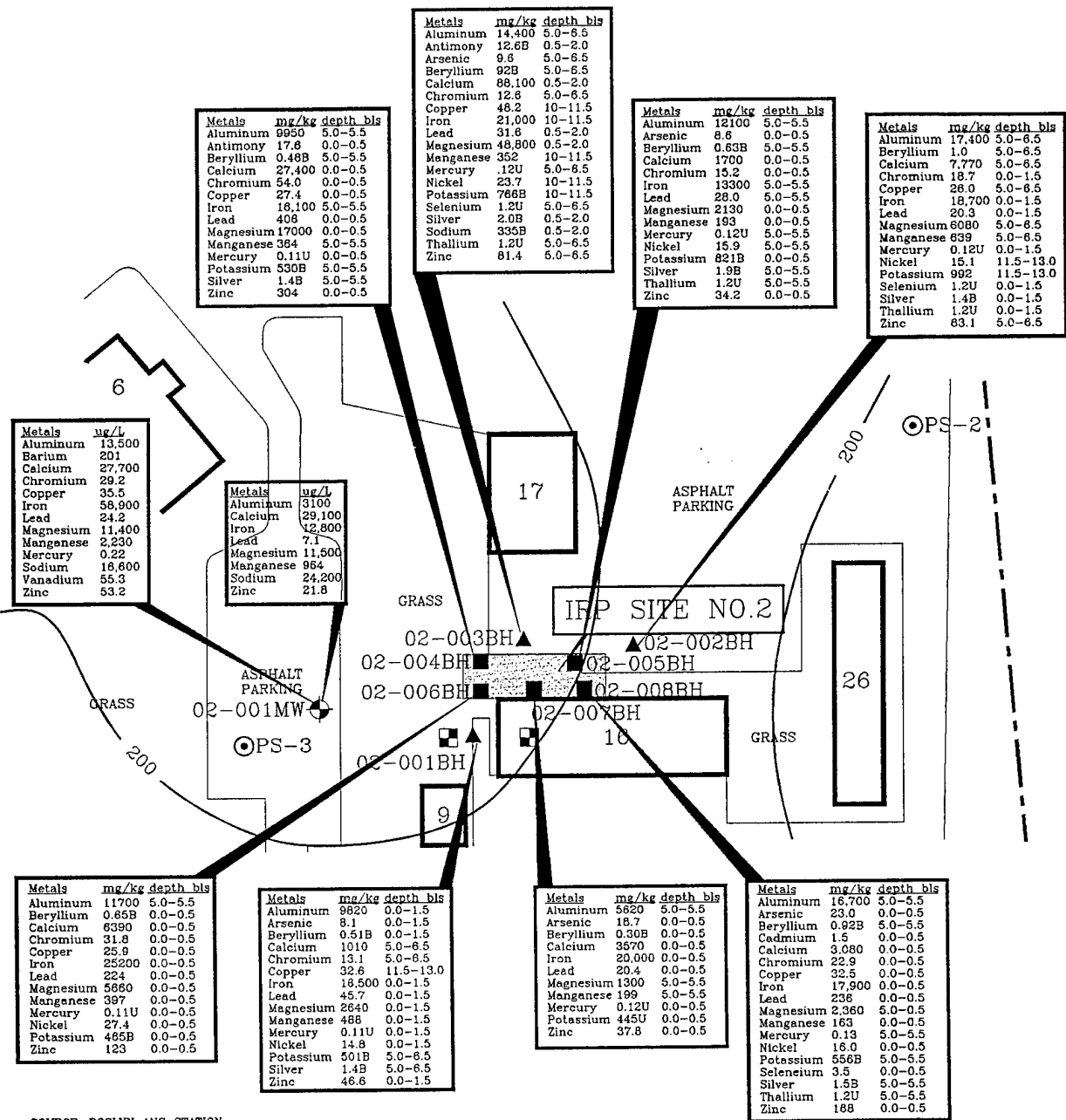
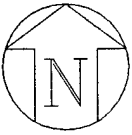
U - Analyte was analyzed for but was not detected. Detection limit is shown.

RSCO - Recommended Soil Cleanup Objectives.

*Background levels for lead vary widely. Average levels in suburban areas or near highways range from 200 - 500 ppm.

¹This level contained in USEPA Health Effects Assessment Summary Tables.

** - Site-specific forms of cyanide should be considered when establishing soil cleanup objectives.



SOURCE: ROSLYN ANG STATION.

LEGEND

Current Site	Monitoring Well Location	Soil Boring Location (Hand Auger)
Building	Dry Well	Soil Boring Location (HSA)
Station Boundary	Piezometer	bls Below land surface
Fence	Background Borehole Location	
Topographic Contour Line (Ft. Abv. Mean Sea Level)		

0 75
SCALE IN FEET

FIGURE 5.15

**CONTAMINANT CONCENTRATIONS
AT IRP SITE NO.2
106th CEF, Roslyn ANGS
Roslyn, New York**



SEPTEMBER 1995

ROSLYN\METALS-2

5.3.3 IRP Site No. 3 - Old Waste Holding Area No. 2

5.3.3.1 Soil Gas Survey Results

The soil gas survey was conducted at IRP Site No. 3 on 13 and 14 September 1993. The survey covered the entire Old Waste Holding Site as outlined in the Work Plan and the immediate adjacent area. A total of 11 sampling points formed a base grid with a distance of no more than 20 feet between sampling points. The grid pattern consisted of two rows of soil gas points around the north and east corner of Building 36 to cover the study area with some modifications of the grid due to the shape of the site. Two sampling points were added to the southern portion of the site during the soil gas survey to determine the areal extent of relatively high BTEX and TVHC contamination at survey point S3-9. The location of sampling points are illustrated on Figure 5.16.

Soil gas samples were obtained from a depth of five feet BLS. Eleven investigative samples and two air blank samples were collected. Table 5.18 summarizes the maximum concentrations of BTEX and TVHC detected and the detection limit for each analytical parameter.

Table 5.18
Maximum Concentrations Detected in Soil Gas Survey
IRP Site No. 3 - Old Waste Holding Area No. 3
Roslyn ANGS, Roslyn, New York

Analytical Parameter	Maximum Concentration Detected	Detection Limit
Benzene ($\mu\text{g/L}$)	<10.0	0.01
Toluene ($\mu\text{g/L}$)	19.0	0.02
Ethylbenzene ($\mu\text{g/L}$)	2.0	0.03
Total Xylenes ($\mu\text{g/L}$)	12.0	0.05
Total Volatile Hydrocarbons ($\mu\text{g/L}$)	27,000	0.05

$\mu\text{g/L}$ - micrograms per liter.

Benzene was detected at concentrations ranging from 0.01 to 0.05 $\mu\text{g/L}$ in seven samples, and toluene from 0.02 to 19.0 $\mu\text{g/L}$ in four samples. Ethylbenzene and total xylenes were detected in only one sample (S3-9) at 2.0 $\mu\text{g/L}$ and 12.0 $\mu\text{g/L}$, respectively. TVHC was detected at concentrations ranging from 0.4 to 27,000 $\mu\text{g/L}$, but some results may contain elevated concentrations of nonaromatic compounds. The highest BTEX and TVHC concentrations were detected in soil gas samples collected from sampling location S3-9 (see Figure 5.16). The areal extent of TVHC contamination detected by the soil gas survey is illustrated in Figure 5.17.

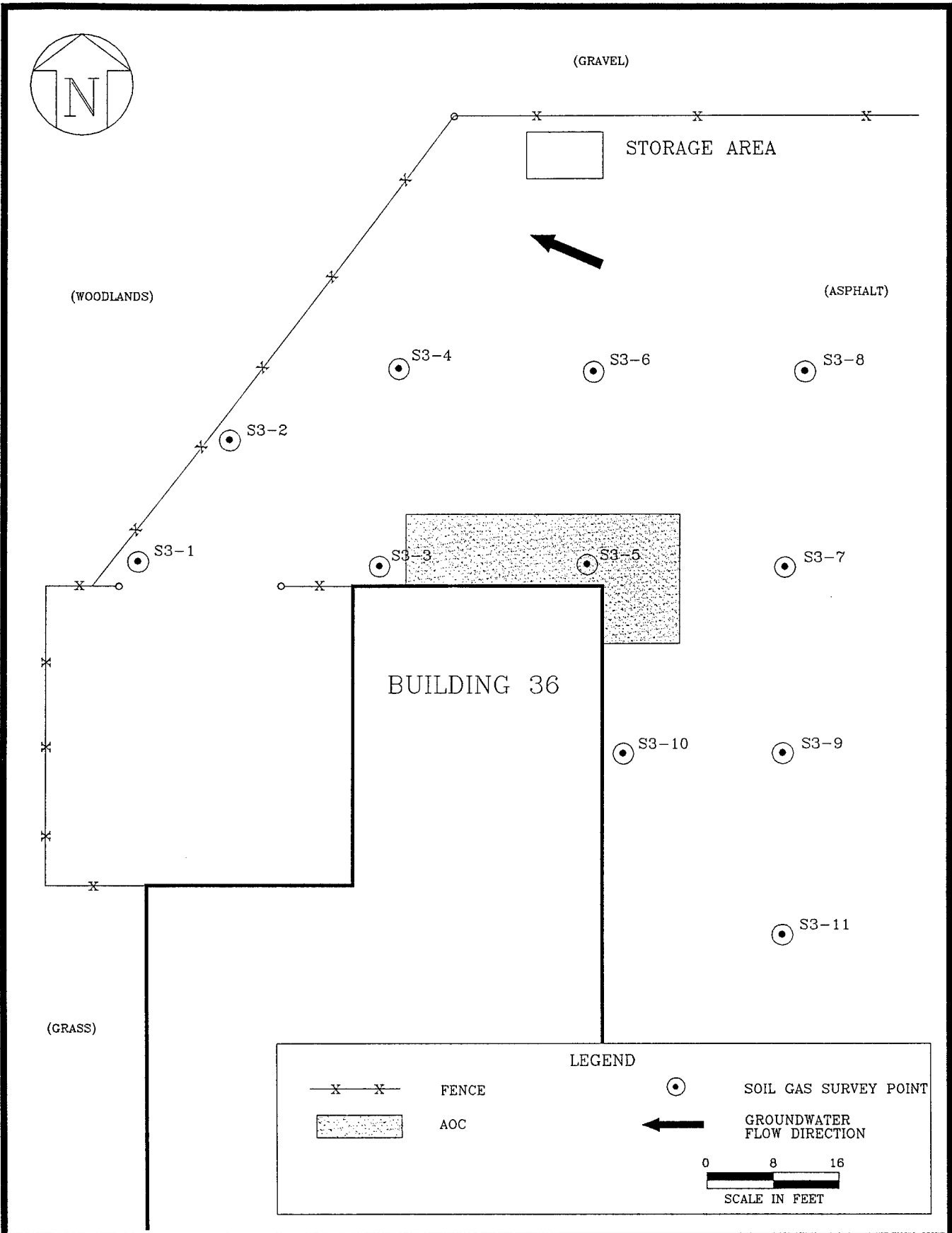


FIGURE 5.16

SOIL GAS SURVEY POINTS
 AT IRP SITE NO.3
 Roslyn Air National Guard Station
 New York Air National Guard
 Roslyn, New York

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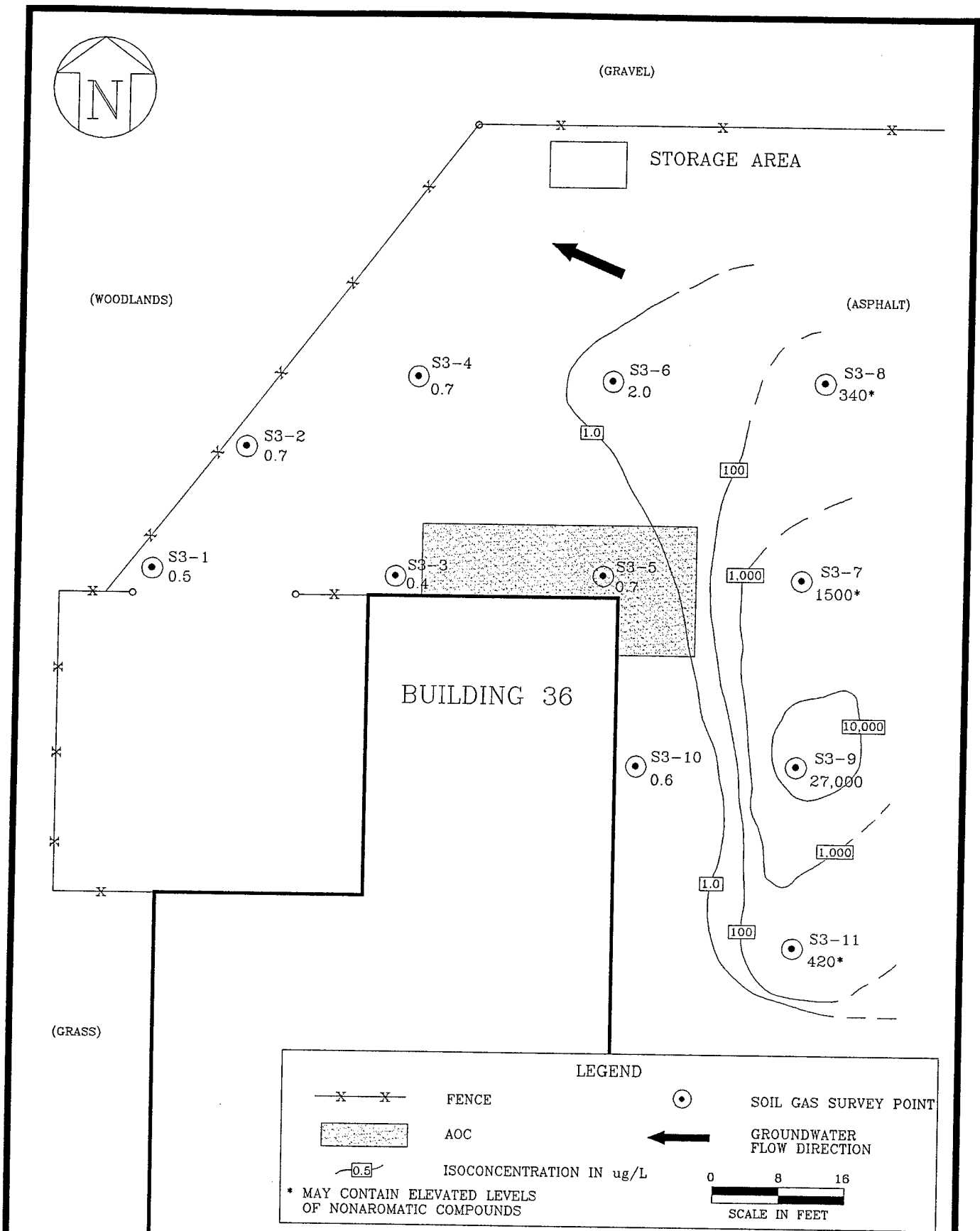


FIGURE 5.17

ROSLYN\SGSSIT3

ISOCONCENTRATIONS OF TVHC DETECTED AT IRP SITE NO.3
Roslyn Air National Guard Station
New York Air National Guard
Roslyn, New York

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SEPTEMBER 1995

Results obtained from the soil gas survey resulted in the relocation of two soil borings (03-002BH, and 03-003BH) in order to insure samples were obtained for laboratory analysis at the location of highest BTEX and/or TVHC contamination. A complete listing of the soil gas survey results for IRP Site No. 3 is given in Appendix B.

5.3.3.2 Field GC Screening Results

Eighteen soil samples and one duplicate collected from 6 soil borings were field screened with the field GC. The field GC had been calibrated to screen for BTEX (and MTBE for boring 03-005BH). Table 5.19 summarizes the maximum concentrations detected in soil samples. Complete field GC data is included in Appendix D. BTEX compounds were detected in nine of the 19 soil samples at IRP Site No. 3. Benzene was detected in one sample, 03-001BH (0.0-1.5) at 3.0 ppb. Toluene was detected in four samples and ranged from 3.2 ppb to 164.2 ppb at 03-004BH (10.0 - 11.5, duplicate). Ethylbenzene and m,p-xylene were detected in six samples and ranged from 2.5 ppb to 17.1 ppb at 03-006BH (0.0 - 1.5). O-xylene was detected in three samples and ranged from 4.8 ppb to 37.6 ppb at 03-006BH (0.0 - 1.5). MTBE was not detected in soil samples from boring 03-005BH.

Table 5.19
Maximum Field GC Concentrations Detected in Soil
IRP Site No. 3 - Old Waste Holding Area No. 2
Roslyn ANGS, Roslyn, New York

Compound	Maximum Concentrations Detected in Soil (ppb)
Benzene	3.0
Toluene	164.2
Ethylbenzene, m,p-xylene	17.1
o-xylene	37.6
MTBE ¹	ND

GC - Gas Chromatograph.
 ppb - parts per billion.

ND - Not Detected.
¹MTBE analysis conducted on 03-005BH only.

5.3.3.3 Soil Investigation Findings

Soil samples collected from six soil borings, one monitoring well, and one piezometer were used to provide geologic information for describing the subsurface geology at the site. Eighteen investigative soil samples and two duplicates were submitted for laboratory analysis.

5.3.3.3.1 Soil Boring Locations

Six soil borings were installed at the site to obtain soil samples for analytical analysis for defining any existing soil contamination, and to aid in defining the vertical and horizontal extent of contamination. The drilled soil boring locations for IRP Site No. 3 are indicated on Figure 5.18.

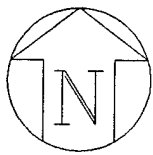
5.3.3.3.2 Subsurface Geology

Soil samples collected from the eight soil borings, one monitoring well, and one piezometer were used to provide geologic information for describing the subsurface geology at the site. Soil borings were sampled to a total depth of approximately 11.5 feet BLS. 03-001MW and PS-1 were drilled to a total depth of approximately 160 feet BLS. Complete lithologic logs for the borings and wells drilled at IRP Site No. 3 are presented in Appendix A.

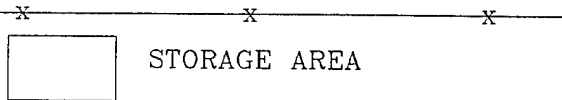
The entire site and the immediate vicinity is presently covered by asphalt and used as a parking area and an accessway into the back of the maintenance shop in Building 36. Soil encountered during drilling at the boreholes to a depth of 11.5 feet BLS was composed of a road base material and fill to a depth from below asphalt to 4.0 feet BLS. The fill material appears to be composed of nearby soils having similar lithologic characteristics. The fill material is very poorly sorted, dry, dark to light brown sand, silt, and gravel. The soil material in the boreholes to a depth of 11.5 feet BLS was composed of a moist, light brown to brown, very poorly sorted silt, sand, and gravel. During drilling for the piezometer and monitoring well immediately northeast of the site, subsurface geology typified glacial terminal moraine deposits. Drill cuttings consisted of very poorly sorted medium to fine sand, silt, and gravel with intervals of mostly gravel and boulders encountered at varying depths below the surface as shown in Appendix A. Medium to fine sand was encountered near 100 feet BLS becoming a medium sand with rounded gravel from the water table (encountered at 139.6 feet BLS) to the total depth of 160 feet BLS.

5.3.3.3.3 Nature and Extent of Soil Contamination

Six soil borings were drilled at IRP Site No. 3 from which 18 investigative and two duplicate soil samples were collected for laboratory analysis. Borings 03-001BH, 03-002BH, 03-003BH, 03-004BH, and 03-006BH were drilled and soil samples collected on 20 September 1993. Boring 03-005BH was drilled and soil samples collected on 7 April 1994. The analytical program for soil analyses was discussed in Subsection 4.5.3.1.



(GRAVEL)



STORAGE AREA

(WOODLANDS)

(ASPHALT)

03-005BH

03-002BH

03-001BH

03-004BH

03-006BH

BUILDING 36

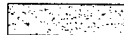
03-003BH

(GRASS)

LEGEND



FENCE



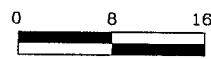
AOC



SOIL BORING



GROUNDWATER FLOW DIRECTION



SCALE IN FEET

FIGURE 5.18

SOIL BORING LOCATIONS
AT IRP SITE NO.3
Roslyn Air National Guard Station
New York Air National Guard
Roslyn, New York

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No holding times were exceeded for the soil samples collected and no problems that affected analytical results were encountered. Spike recoveries and RPD values were within acceptable limits. A complete listing of analysis summary narratives outlining equipment calibrations, internal standards, surrogates, laboratory blanks, and sample preparations are listed in the SDG Narratives presented as Appendix H. This appendix also includes QA/QC analyses results for all other analytical parameters.

VOCs detected in soil samples collected at IRP Site No. 3 are shown in Table 5.20. The volatile organic analyses detected two common laboratory and method contaminants in the soil samples collected. These were methylene chloride (2 to 10 $\mu\text{g}/\text{kg}$) and acetone (3 to 86 $\mu\text{g}/\text{kg}$). Methylene chloride was detected in associated quality control blanks invalidating detections in all of the soil samples. Acetone is a common laboratory solvent and was detected in several associated quality control blanks, thus indicating the analyte may be laboratory induced.

Table 5.20
VOCs Detected in Soil at IRP Site No. 3
Roslyn ANGS, Roslyn, New York

Sample ID/Interval (feet BLS)	VOCs		
	Methylene Chloride ($\mu\text{g}/\text{kg}$)	Acetone ($\mu\text{g}/\text{kg}$)	2-Butanone ($\mu\text{g}/\text{kg}$)
RSCO	100	200	300
03-001BH 0.0 - 1.5	5BJ	7J	11U
03-001BH 5.0 - 6.5	6BJ	11U	11U
03-001BH 10.0 - 11.5	6BJ	4J	11U
03-002BH 0.0 - 1.5	7BJ	29	6J
03-002BH 5.0 - 6.5	8BJ	24	5J
03-002BH 10.0 - 11.5	8BJ	7J	11U
03-003BH 0.0 - 1.5	10BJ	71	16
03-003BH 5.0 - 6.5	10BJ	86	18
03-003BH 10.0 - 11.5	7BJ	4J	10U
03-003BH 11.5 - 13.0	7BJ	5J	11U
03-004BH 0.0 - 1.5	4BJ	37B	9J
03-004BH 5.0 - 6.5+	10BJ	15	11U
03-004BH 10.0 - 11.5	3BJ	4BJ	11U
03-004BH 11.0 - 12.5 Dup	4BJ	3BJ	11U

Table 5.20 (Concluded)
VOCs Detected in Soil at IRP Site No. 3
Roslyn ANGS, Roslyn, New York

Sample ID/Interval (feet BLS)	VOCs		
	Methylene Chloride ($\mu\text{g}/\text{kg}$)	Acetone ($\mu\text{g}/\text{kg}$)	2-Butanone ($\mu\text{g}/\text{kg}$)
RSCO	100	200	300
03-005BH 0.5 - 2.0	<i>2BJ</i>	10U	10U
03-005BH 5.0 - 6.5	<i>5BJ</i>	80	11U
03-005BH 10.0 - 11.5	<i>3BJ</i>	11U	11U
03-006BH 0.0 - 1.5	<i>4BJ</i>	28	11U
03-006BH 5.0 - 6.5	<i>4BJ</i>	<i>2BJ</i>	11U
03-006BH 10.0 - 11.5	<i>9BJ</i>	<i>4J</i>	10U

VOCs - Volatile Organic Compounds.

ID - Identification.

BLS - Below Land Surface.

+ - Sample reported as a reanalysis.

$\mu\text{g}/\text{kg}$ - micrograms per kilogram.

BH - Borehole.

Dup - Duplicate.

Note: Numbers in bold indicate the presence of analyte confirmed above detection limit.

B - Analyte found in associated blank as well as the sample.

J - Estimated concentration. Compound meets the identification criteria but the result is less than the sample quantitation limit but greater than zero.

U - Compound was analyzed for but was not detected. Detection limit is shown.

RSCO - Recommended soil cleanup objective.

No other VOCs were detected above detection limits at IRP Site No. 3. 2-butanone was detected at estimated concentrations less than the detection limit in three samples; 03-002BH (0.0 - 1.5), 03-002BH (5.0 - 6.5), and 03-004 (0.0 - 1.5).

SVOCs detected in soil samples collected at IRP Site No. 3 are shown in Table 5.21 and highest concentration per analyte per borehole (above RSCO's) are shown in Figure 5.19. Soil sample 03-002BH (0.0 - 1.5) contained fluoranthene detected above detection limits at 380 $\mu\text{g}/\text{kg}$. Soil sample 03-004BH (5.0 - 5.5) contained 2-methylnaphthalene and phenanthrene at 650 $\mu\text{g}/\text{kg}$ and 500 $\mu\text{g}/\text{kg}$, respectively. Soil sample 03-006BH (0.0 - 1.5) contained naphthalene (16,000 $\mu\text{g}/\text{kg}$), 2-methylnaphthalene (3,700 $\mu\text{g}/\text{kg}$), acenaphthene (5,300 $\mu\text{g}/\text{kg}$), dibenzofuran (4,400 $\mu\text{g}/\text{kg}$), fluorene (6,400 $\mu\text{g}/\text{kg}$), phenanthrene (21,000 $\mu\text{g}/\text{kg}$), anthracene (8,200 $\mu\text{g}/\text{kg}$), fluoranthene (17,000 $\mu\text{g}/\text{kg}$), pyrene (18,000 $\mu\text{g}/\text{kg}$), benzo(a)anthracene (4,900 $\mu\text{g}/\text{kg}$), chrysene (5,000 $\mu\text{g}/\text{kg}$), and benzo(a)pyrene (4,100 $\mu\text{g}/\text{kg}$) at concentration above detection limits. No other SVOCs were detected above detection limits in any samples at IRP Site No. 3. Phenol, naphthalene, acenaphthylene, acenaphthene, dibenzofuran, fluorene, phenanthrene, anthracene, carbazole, fluoranthene, pyrene, benzo(a)anthracene, chrysene, benzo(b)fluoranthene, benzo(k)fluoranthene, benzo(a)pyrene, indeno(1,2,3-cd)pyrene,

Table 5.21
 SVOCs Detected in Soil at IRP Site No. 3
 Roslyn ANGS, Roslyn, New York

Sample ID/Interval (feet BLS)	BNAs									
	Naphthalene ($\mu\text{g}/\text{kg}$)	2-Methylnaphthalene ($\mu\text{g}/\text{kg}$)	Acenaphthene ($\mu\text{g}/\text{kg}$)	Dibenzofuran ($\mu\text{g}/\text{kg}$)	Fluorene ($\mu\text{g}/\text{kg}$)	Phenanthrene ($\mu\text{g}/\text{kg}$)	Anthracene ($\mu\text{g}/\text{kg}$)	Fluoranthene ($\mu\text{g}/\text{kg}$)	Pyrene ($\mu\text{g}/\text{kg}$)	Benzo(a) Anthracene ($\mu\text{g}/\text{kg}$)
RSCO	13,000	36,400	50,000	6,200	50,000	50,000	50,000	50,000	50,000	CRQL
03-001BH 0.0 - 1.5	1,400U	1,400U	1,400U	1,400U	1,400U	420J	1,400U	680J	530J	240J
03-001BH 5.0 - 6.5	360U	360U	360U	360U	360U	360U	360U	360U	360U	360U
03-001BH 10.0 - 11.5	360U	360U	360U	360U	360U	360U	360U	360U	360U	360U
03-002BH 0.0 - 1.5	370U	370U	370U	370U	370U	170J	50J	380	330J	250J
03-002BH 5.0 - 6.5	390U	390U	390U	390U	390U	390U	390U	390U	390U	390U
03-002BH 10.0 - 11.5	350U	350U	350U	350U	350U	350U	350U	350U	350U	350U
03-003BH 0.0 - 1.5	370U	370U	370U	370U	370U	87J	370U	140J	97J	79J
03-003BH 5.0 - 6.5	380U	380U	380U	380U	380U	160J	380U	360J	320J	87J
03-003BH 10.0 - 11.5	340U	340U	340U	340U	340U	340U	340U	340U	340U	340U
03-003BH 11.5 - 13.0	370U	370U	370U	370U	370U	370U	370U	370U	370U	370U
03-004BH 0.0 - 1.5	3,500U	3,500U	3,500U	3,500U	3,500U	1,200J	3,500U	1,700J	1,500J	580J
03-004BH 5.0 - 6.5	730J	650	120J	110J	290J	500	53J	95J	120J	76J
03-004BH 10.0 - 11.5	350U	350U	350U	350U	350U	350U	350U	350U	350U	350U
03-004BH 11.0 - 12.5	370U	370U	370U	370U	370U	370U	370U	370U	370U	370U
Dup										
03-005BH 0.5 - 2.0	340U	340U	340U	340U	340U	340U	340U	340U	44J	340U
03-005BH 5.0 - 6.5	380U	380U	380U	380U	380U	380U	380U	380U	380U	380U
03-005BH 10.0 - 11.5	360U	360U	360U	360U	360U	360U	360U	360U	360U	360U
03-006BH 0.0 - 1.5	16,000	3,700	5,300	4,400	6,400	21,000	8,200	17,000	18,000	4,900
03-006BH 5.0 - 6.5	350U	350U	350U	350U	350U	350U	350U	350U	350U	350U
03-006BH 10.0 - 11.5	340U	340U	340U	340U	340U	340U	340U	340U	340U	340U

Table 5.21 (Concluded)
SVOCs Detected in Soil at IRP Site No. 3
Roslyn ANGS, Roslyn, New York

Sample ID/Interval (feet BLS)	BNAs										
	Chrysene ($\mu\text{g}/\text{kg}$)	B-(2E)-P ($\mu\text{g}/\text{kg}$)	Benzo(b) Fluoranthene ($\mu\text{g}/\text{kg}$)	Benzo(k) Fluoranthene ($\mu\text{g}/\text{kg}$)	Benzo(a) Pyrene ($\mu\text{g}/\text{kg}$)	Indeno(1,2,3) Pyrene ($\mu\text{g}/\text{kg}$)	Dibenzo(a,h) Anthracene ($\mu\text{g}/\text{kg}$)	Benzo(g,h,i) Perylene ($\mu\text{g}/\text{kg}$)	Acenaphthylene ($\mu\text{g}/\text{kg}$)	Carbazole ($\mu\text{g}/\text{kg}$)	Phenol ($\mu\text{g}/\text{kg}$)
RSCO	400	50,000	1,100	1,100	CRQL	3,200	NSL	50,000	41,000	NSL	CRQL
03-001BH 0.0 - 1.5	350J	270BJ	330J	240J	350J	270J	1,400U	230J	1,400U	1,400U	1,400U
03-001BH 5.0 - 6.5	360U	100BJ	360U	360U	360U	360U	360U	360U	360U	360U	360U
03-001BH 10.0 - 11.5	360U	130BJ	360U	360U	360U	360U	360U	360U	360U	360U	360U
03-002BH 0.0 - 1.5	320J	87BJ	300J	290J	320J	260J	65J	170J	56J	370U	370U
03-002BH 5.0 - 6.5	390U	42BJ	390U	390U	390U	390U	390U	390U	390U	390U	390U
03-002BH 10.0 - 11.5	350U	110BJ	350U	350U	350U	350U	350U	350U	350U	350U	350U
03-003BH 0.0 - 1.5	110J	54BJ	89J	71J	67J	53J	370U	45J	370U	370U	370U
03-003BH 5.0 - 6.5	170J	57BJ	110J	74J	95J	75J	380U	76J	380U	380U	380U
03-003BH 10.0 - 11.5	340U	98BJ	340U	340U	340U	340U	340U	340U	340U	340U	340U
03-003BH 11.5 - 13.0	370U	100BJ	370U	370U	370U	370U	370U	370U	370U	370U	370U
03-004BH 0.0 - 1.5	800J	410BJ	530J	3,500U	500J	3,500U	3,500U	370J	3,500U	3,500U	3,500U
03-004BH 5.0 - 6.5	110J	390B	84J	38J	64J	43J	370U	370U	370U	370U	370U
03-004BH 10.0 - 11.5	350U	95BJ	350U	350U	350U	350U	350U	350U	350U	350U	350U
03-004BH 11.0 - 12.5	370U	73BJ	370U	370U	370U	370U	370U	370U	370U	370U	370U
Dup											
03-005BH 0.5 - 2.0	340U	120J	340U	340U	340U	340U	340U	340U	340U	340U	340U
03-005BH 5.0 - 6.5	380U	180J	380U	380U	380U	380U	380U	380U	380U	380U	380U
03-005BH 10.0 - 11.5	360U	150J	360U	360U	360U	360U	360U	360U	360U	360U	360U
03-006BH 0.0 - 1.5	5,000	390BJ	2,700J	2,800J	4,100	2,200J	390J	1,900J	1,800J	2,100J	580J
03-006BH 5.0 - 6.5	350U	71BJ	350U	350U	350U	350U	350U	350U	350U	350U	350U
03-006BH 10.0 - 11.5	340U	130BJ	340U	340U	340U	340U	340U	340U	340U	340U	340U

BNAs - Base/Neutral/Acids.

ID - Identification.

BLS - Below Land Surface.

$\mu\text{g}/\text{kg}$ - micrograms per kilogram.

B-(2E)-P - bis(2 ethylhexyl)phthalate.

BH - Borehole.

RSCO - Recommended soil cleanup objective.

NSL - No samples listed.

Dup - Duplicate.

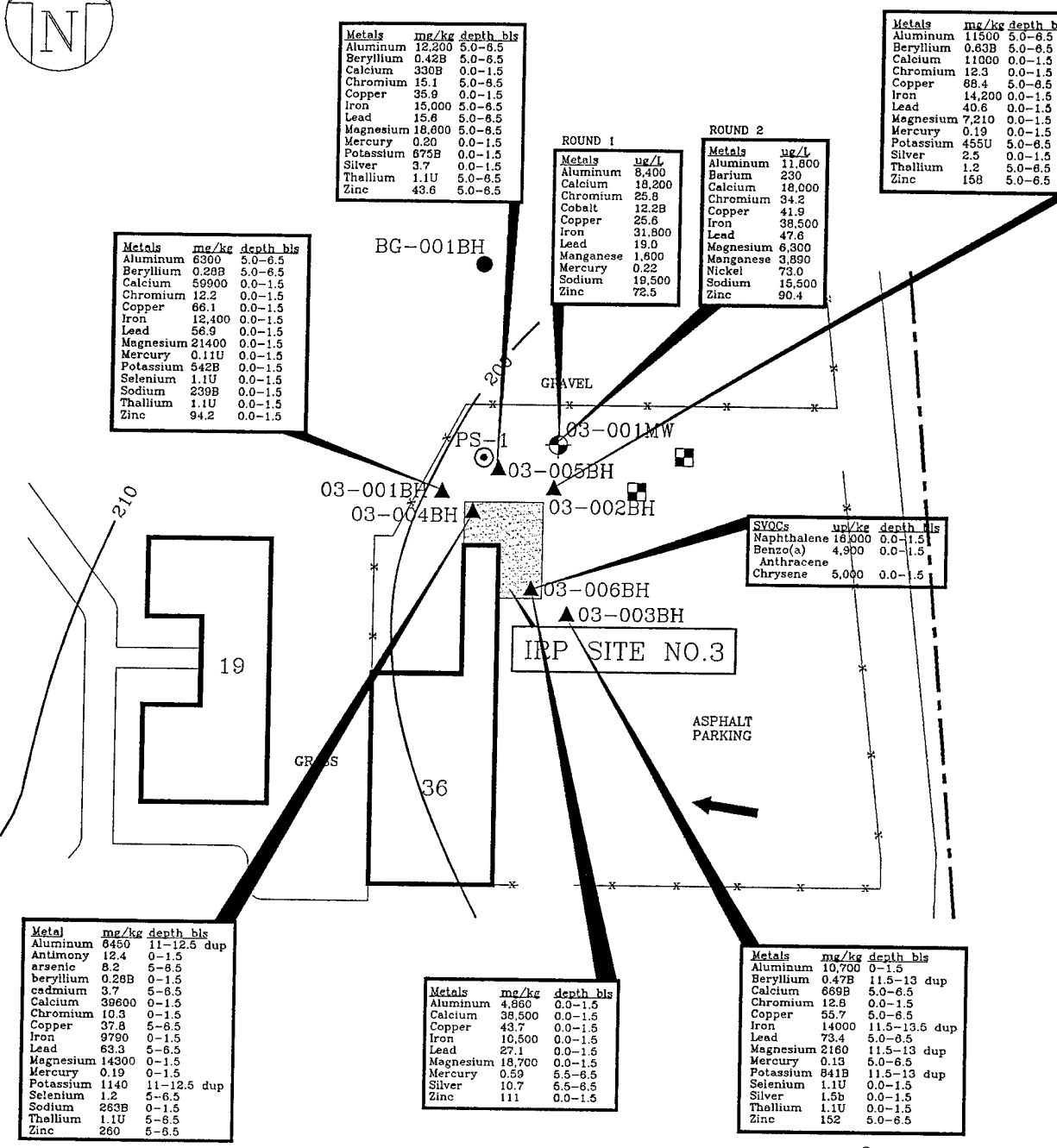
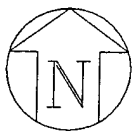
B - Analyte found in associated blank as well as the sample.

J - Estimated concentration. Compound meets the identification criteria but the result is less than the sample quantitation limit but greater than zero.

U - Analyte was analyzed for but was not detected. Detection limit is shown.

CRQL - Contract required quantitation limit is shown where higher than RSCO.

Note: Numbers in bold indicate the presence of analyte confirmed above detection unit.



SOURCE: ROSLYN ANG STATION.

0 75
SCALE IN FEET

LEGEND

	Current Site		Monitoring Well Location		Soil Boring Location (Hand Auger)
	Building		Dry Well		Soil Boring Location (HSA)
	Station Boundary		Piezometer	bls	Below land surface
	Fence		Background Borehole Location	u	Analyte was analyzed for but not deleted
	Topographic Contour Line (Ft. Abv. Mean Sea Level)			b	Reported value was less than the CRDL but greater than or equal to the IDL

FIGURE 5.19

CONTAMINANT CONCENTRATIONS
AT IRP SITE NO.3
Roslyn Air National Guard Station
New York Air National Guard
Roslyn, New York

OPTECH
OPERATIONAL TECHNOLOGIES
CORPORATION

ROSLYN\METALS-3

SEPTEMBER 1995

dibenzo(a,h)anthracene, and benzo(g,h,i)perylene were detected at estimated concentrations less than the detection limit at the site and are also listed in Table 5.21.

Pesticides detected in soil samples collected at IRP Site No. 3 are shown in Table 5.22. The pesticide heptachlor was detected above detection limits in two samples; 03-001BH (0.0 - 1.5) and 03-004BH (0.0 - 1.5) at 54 $\mu\text{g}/\text{kg}$ and 39 $\mu\text{g}/\text{kg}$, respectively. 4,4'-DDE was detected above detection limits in three samples; 03-001BH (0.0 - 1.5), 03-005BH (0.0 - 1.5), and 03-006BH (5.0 - 6.5) at 24 $\mu\text{g}/\text{kg}$, 5.0 $\mu\text{g}/\text{kg}$, and 8.2 $\mu\text{g}/\text{kg}$, respectively. 4,4'-DDD was detected above detection limits in 03-003BH (5.0 - 6.5) at 7.1 $\mu\text{g}/\text{kg}$. 4,4'-DDT was detected above detection limits in two samples; 03-005BH (0.0 - 1.5) at 5.2 $\mu\text{g}/\text{kg}$ and 03-006BH (5.0-6.5) at 7.5 $\mu\text{g}/\text{kg}$ but where the target analyte had greater than 25% difference for the detected concentration between the two GC columns, the lower value is reported. Gamma chlordane was detected above detection limits in four samples; 03-001BH (0.0 - 1.5), 03-004BH (0.0 - 1.5), 03-004BH (5.0 - 6.5), and 03-006BH (5.0 - 6.5) at 120 $\mu\text{g}/\text{kg}$, 91 $\mu\text{g}/\text{kg}$, 4.3 $\mu\text{g}/\text{kg}$, and 3.3 $\mu\text{g}/\text{kg}$, respectively. Additional pesticides detected above detection limits but with a greater than 25% difference for the detected concentration between the two GC columns were delta-BHC in 03-001BH (0.0 - 1.5) at 11.0 $\mu\text{g}/\text{kg}$, 4,4'-DDD and 4,4'-DDT in 03-006BH (5.0 - 6.5) at 8.2 $\mu\text{g}/\text{kg}$ and 7.5 $\mu\text{g}/\text{kg}$, and alpha chlordane in 03-001BH (0.0 - 1.5), 03-004BH (0.0 - 1.5 and 5.0 - 6.5), and 03-006BH (5.0 - 6.5) at 130 $\mu\text{g}/\text{kg}$, 94 $\mu\text{g}/\text{kg}$, 4.7 $\mu\text{g}/\text{kg}$, and 2.5 $\mu\text{g}/\text{kg}$, respectively. Other pesticides, heptachlor, heptachlor epoxide, 4,4'-DDE, 4,4'-DDD, 4,4'-DDT, alpha chlordane, and gamma chlordane were detected at estimated concentrations less than the detection limit at the site and are also listed in Table 5.22.

TPH was detected at IRP Site No. 3 at five boring locations and is shown in Table 5.23 and highest hits are shown on Figure 5.19. Soil sample 03-001BH (0.0 - 1.5), 03-004BH (0.0 - 1.5), and 03-004BH (5.0 - 6.5) contained concentrations of TPH as #6 lube oil detected at 680 ppm, 740 ppm, and 700 ppm, respectively. 03-002BH (0.0 - 0.5), 03-003BH (0.0 - 1.5), and 03-003BH (5.0 - 6.5) contained concentrations of TPH as #6 fuel oil at 49 ppm, 19 ppm, and 80 ppm, respectively. 03-006BH (0.0 - 1.5) contained concentrations of TPH as #2 fuel oil at 5,200 ppm and 03-004BH (5.0 - 5.5) contained concentrations of #2 fuel oil at 750 $\mu\text{g}/\text{L}$.

TAL metals and cyanide concentrations detected at IRP Site No. 3 are listed in Table 5.24 with the highest concentration per analyte per borehole (above RSCO's or site background) are shown in Figure 5.19. Metals and cyanide concentrations were compared against mean values obtained from the background sampling location to determine if analyte concentrations exceeded naturally occurring concentrations.

Table 5.22
Pesticides Detected in Soil at IRP Site No. 3
Roslyn ANGS, Roslyn, New York

Sample ID/Interval (feet BLS)	Pesticides							
	Delta-BHC ($\mu\text{g}/\text{kg}$)	Heptachlor ($\mu\text{g}/\text{kg}$)	Heptachlor Epoxide ($\mu\text{g}/\text{kg}$)	4,4'-DDE ($\mu\text{g}/\text{kg}$)	4,4'-DDD ($\mu\text{g}/\text{kg}$)	4,4'-DDT ($\mu\text{g}/\text{kg}$)	Alpha Chlordane ($\mu\text{g}/\text{kg}$)	Gamma Chlordane ($\mu\text{g}/\text{kg}$)
RSCO	300	100	20	2,100	2,900	2,100	540	540
03-001BH 0.0 - 1.5	11P	54	8.9P	24	21U	14JP	130P	120
03-002BH 0.0 - 1.5	5.7U	5.7U	5.7U	5.7JP	3.6J	3.0J	5.7U	5.7U
03-003BH 5.0 - 6.5	2.0U	2.0U	2.0U	3.8U	7.1	3.8U	2.0U	2.0U
03-004BH 0.0 - 1.5	36U	39	36U	70U	70U	70U	94P	91
03-004BH 5.0 - 6.5	1.9U	1.4J	1.9U	2.8J	3.7U	2.7JP	4.7P	4.3
03-005BH 0.5 - 2.0	1.8U	1.8U	1.8U	5.0	2.6JP	5.2	1.1JP	1.4J
03-006BH 5.0 - 6.5	1.8U	1.8U	1.8U	8.2	8.2P	7.5P	2.5P	3.3

PCBs - Polychlorinated Biphenyls.

ID - Identification.

BLS - Below Land Surface.

$\mu\text{g}/\text{kg}$ - micrograms per kilogram.

BH - Borehole.

Dup - Duplicate.

J - Estimated concentration. Compound meets the identification criteria but the result is less than the sample quantitation limit but greater than zero.

P - Target analyte had greater than 25% difference for detected concentrations between the two GC columns. Lower values were reported.

U - Compound was analyzed for but was not detected. Detection limit is shown.

RSCO - Recommended soil cleanup objective.

Note: Numbers in bold indicate the presence of analyte confirmed above detection limit.

Table 5.23
 TPH Detected in Soil at IRP Site No. 3
 Roslyn ANGS, Roslyn, New York

Sample ID/Interval (feet BLS)	TPH										
	Gasoline ($\mu\text{g}/\text{kg}$)	TPH as Gasoline (ppm)	#2 Fuel Oil ($\mu\text{g}/\text{kg}$)	TPH as #2 Fuel Oil (ppm)	#6 Fuel Oil ($\mu\text{g}/\text{kg}$)	TPH as #6 Fuel Oil (ppm)	Lube Oil ($\mu\text{g}/\text{kg}$)	TPH as Lube Oil (ppm)	Kerosene ($\mu\text{g}/\text{kg}$)	TPH as Kerosene (ppm)	
03-001BH 0.0 - 1.5	500U	ND	50U	ND	50U	ND	50U	680	50U	50U	ND
03-002BH 0.0 - 1.5	500U	ND	10U	ND	10U	49.0	10U	ND	10U	10U	ND
03-003BH 0.0 - 1.5	500U	ND	10U	ND	10U	19.0	10U	ND	10U	10U	ND
03-003BH 5.0 - 6.5	500U	ND	10U	ND	10U	80.0	10U	ND	10U	10U	ND
03-004BH 0.0 - 1.5	500U	ND	50U	ND	50U	ND	50U	740.0	50U	50U	ND
03-004BH 5.0 - 6.5	500U	ND	750.0	ND	100U	ND	100U	700.0	100U	100U	ND
03-006BH 0.0 - 1.5	500U	ND	200U	5,200	200U	ND	200U	ND	200U	200U	ND

Note: Numbers in bold indicate the presence of analyte confirmed above detection limit.
 ppm - parts per million.
 TPH - Total Petroleum Hydrocarbons.
 ID - Identification.
 BLS - Below Land Surface.
 $\mu\text{g}/\text{kg}$ - micrograms per kilogram.
 BH - Borehole.
 Dup - Duplicate.
 ND - Not Detected.
 U - Analyte was analyzed for but was not detected.
 Detection limit was shown.

Table 5.24
TAL Metals and Cyanide Analytical Results for Soil at IRP Site No. 3
Roslyn ANG, Roslyn, New York

Metals	Location: Interval (ft BLS): Concentration:	RSCO (mg/kg)	03-001BH 0.0 - 1.5 (mg/kg)	03-001BH 5.0 - 6.5 (mg/kg)	03-001BH 10.0 - 11.5 (mg/kg)	03-002BH 0.0 - 1.5 (mg/kg)	03-002BH 5.0 - 6.5 (mg/kg)	03-002BH 10.0 - 11.5 (mg/kg)	03-003BH 0.0 - 1.5 (mg/kg)	03-003BH 5.0 - 6.5 (mg/kg)	03-003BH 10.0 - 11.5 (mg/kg)	03-003BH Dup 11.5 - 13.0 (mg/kg)
Aluminum	(3.707)	SB	5,330	6,300	3,190	8,990	11,500	2,360	10,700	5,150	6,140	9,710
Antimony	(7.8B)	SB	6.2U	6.0U	6.7U	6.3U	7.2U	6.0U	7.0U	6.7U	6.3U	6.2U
Arsenic	(1.8B)	7.5 or SB	4.2	2.6	1.1U	4.6	3.8	1.0B	3.5	6.9	1.5B	1.7B
Barium	(15.3B)	300 or SB	27.7B	27.9B	13.9B	28.2B	62.3	14.9B	48.7	45.8	22.7B	34.2B
Beryllium	(0.42B)	0.16 ^c or SB	0.15B	0.28B	0.19B	0.35B	0.63B	0.10U	0.46B	0.25B	0.30B	0.47B
Cadmium	(U)	1 or SB	0.76U	0.74U	0.82U	0.77U	0.89U	0.74U	0.86U	0.83U	0.78U	0.76U
Calcium	(299B)	SB	59,900	394B	242B	11,000	545B	343B	642B	669B	268B	307B
Chromium	(6.2)	10 or SB	12.2	9.8	4.7	12.3	10.4	3.9	12.8	7.7	8.6	12.4
Cobalt	(4.1B)	30 or SB	5.7B	5.8B	4.2B	4.1B	3.2B	1.9U	5.7B	2.4B	4.7B	7.3B
Copper	(41.6B)	25 or SB	66.1	9.7	10.7	26.4	68.4	1.5U	11.3	55.7	1.6U	4.0B
Iron	(7.477)	2,000 or SB	12,400	12,000	8,580	14,200	12,600	4,200	12,800	9,030	9,040	14,000
Lead	(2.8)	SB*	56.9	5.9	1.8	40.6	21.5	2.5	15.0	73.4	3.6	4.4
Magnesium	(882.3)	SB	21,400	1,160	805B	7,210	1,360	662B	2,040	920B	1,120	2,160
Manganese	(445.9)	SB	188	152	209	143	190	288	149	120	79.4	200
Mercury	(U)	0.1	0.11U	0.11U	0.11U	0.19	0.12U	0.11U	0.11U	0.13	0.10U	0.11U
Nickel	(8.5)	13 or SB	8.6	4.1B	4.2U	7.5B	4.6U	4.3B	9.3	4.3U	6.0B	11.4
Potassium	(431.3)	SB	542B	378U	420U	395U	455U	380U	439U	425U	399U	841B
Selenium	(U)	2 or SB	1.1U	1.1U	1.1U	1.1U	1.2U	1.0U	1.1U	0.91U	1.0U	1.0U
Silver	(U)	SB	0.84U	0.82U	0.91U	2.5	1.7B	0.82U	1.5B	0.92U	1.3B	0.84U
Sodium	(U)	SB	239B	48.8B	54.7B	94.8B	116B	68.9B	64.7B	37.1B	70.0B	76B
Thallium	(U)	SB	1.1U	1.1U	1.1U	1.1U	1.2U	1.0U	1.1U	0.91U	1.0U	1.0U
Vanadium	(5.7)	150 or SB	27.8	14.8	7.5B	22.2	15.7	4.4B	20.5	10.6B	13.2	18.5
Zinc	(78.8)	20 or SB	94.2	23.9	28.3	52.7	158	10.7	43.9	20.5	20.5	40.4
Cyanide	(0.66)	**	0.51U	0.53U	0.45U	0.47U	0.65U	0.43U	0.56U	0.51U	0.39U	0.50U

Table 5.24 (Concluded)
TAL Metals and Cyanide Analytical Results for Soil at IRP Site No. 3
Roslyn ANGS, Roslyn, New York

Location: Interval (ft BLS): Concentration:	RSCO (mg/kg)	03-004B H 0.0 - 1.5 (mg/kg)	03-004BH 5.0 - 6.5 (mg/kg)	03-004BH 10.0 - 11.5 (mg/kg)	03-004BH Dup 11.0 - 12.5 (mg/kg)	03-005BH 0.0 - 1.5 (mg/kg)	03-005BH 5.0 - 6.5 (mg/kg)	03-005BH 10.0 - 11.5 (mg/kg)	03-006BH 0.0 - 1.5 (mg/kg)	03-006BH 5.0 - 6.5 (mg/kg)	03-006BH 10.0 - 11.5 (mg/kg)
Metals											
Aluminum	SB	5,550	3,380	3,240	6,450	4,440	12,200	3,070	4,860	1,460	3,100
Antimony	SB	12.4	7.0U	5.8U	6.4U	5.0U	5.7U	5.6U	6.7U	5.9U	6.3U
Arsenic	7.5 or SB	3.7	8.2	1.0U	1.1B	1.3B	2.7B	1.2B	3.9	0.82U	1.0B
Barium	300 or SB	23.7B	123	10.4B	25.6B	19.2B	30.8B	21.8B	22.7B	8.1B	9.5B
Beryllium	0.16 ^b or SB	0.26B	0.19B	0.22B	0.10U	0.38B	0.42B	0.21U	0.11U	0.10U	0.10U
Cadmium	1 or SB	0.74U	3.7	0.71U	0.79U	0.78U	0.88U	0.86U	0.83U	0.73U	0.78U
Calcium	SB	39,600	6,300	2,89B	2,96B	3,30B	1,95U	1,91U	38,500	121U	2,00B
Chromium	10 or SB	10.3	6.2	7.2	8.5	8.7	15.1	7.3	7.1	6.7	6.1
Cobalt	30 or SB	3.1B	3.3B	4.6B	4.1B	3.7B	4.1B	4.7B	4.0B	1.9U	2.6B
Copper	25 or SB	20.0	37.8	21.9	10.2	35.9	24.3	13.4	43.7	37.0	13.4
Iron	2,000 or SB	9,790	5,430	7,000	8,450	10,400	15,000	6,980	10,500	5,540	6,290
Lead	SB*	35.9	63.3	2.2	3.6	6.5	15.6	2.6	27.1	12.9	2.1
Magnesium	SB	14,300	2,610	998	1,510	1,180	1,860	829B	18,700	352B	993B
Manganese	SB	152	241	108	129	139	77.9	182	149	17.7	111
Mercury	0.1	0.19	0.16	0.11U	0.11U	0.20	0.11	0.11U	0.11U	0.59	0.10U
Nickel	13 or SB	6.6B	10.5	6.8B	8.3B	10.3	6.5B	10.0	7.6B	3.8U	4.5B
Potassium	SB	376U	438U	365U	1,140	675B	562B	360B	422U	375U	397U
Selenium	2 or SB	1.0U	1.2	1.0U	1.1U	1.0U	1.1U	1.1U	1.0U	0.82U	1.0U
Silver	SB	0.81U	0.95U	0.79U	0.87U	3.7	1.1U	1.5B	0.91U	10.7	0.86U
Sodium	SB	263B	94.3B	73.5B	66.9B	189U	214U	209U	203B	19.2U	65.2B
Thallium	SB	1.0U	1.1U	1.0U	1.1U	1.0U	1.1U	1.1U	1.0U	0.82U	1.0U
Vanadium	150 or SB	26.8	12.5	7.6B	11.4	7.8B	20.7	6.5B	28.3	5.0B	6.7B
Zinc	20 or SB	37.4	260	46.7	35.5	31.6	43.6	25.0	111	22.7	19.3
Cyanide	**	0.61U	0.43U	0.45U	0.69U	0.87	0.53U	0.59U	0.58U	0.56U	0.39U

ft BLS - feet Below Land Surface.

BH - Borehole.

mg/kg - milligrams per kilogram.

B - Reported value was less than the CRDL but greater than the IDL.

U - Analyte was analyzed for but was not detected. Detection limit is shown.

Bold - Presence of analyte confirmed above detection limit.

*Background levels for lead vary widely. Average levels in suburban areas or near highways range from 200 - 500 ppm.

^bThis level contained in USEPA Health Effects Assessment Summary Tables.

** - Site-specific forms of cyanide should be considered when establishing soil cleanup objectives.

Most inorganic analytes exceeded background mean values for those elements detected at the background sampling location. The highest concentrations were detected in aluminum, calcium, iron, and magnesium where the maximum concentrations detected were 12,200 mg/kg, 59,900 mg/kg, 15,000 mg/kg, and 21,400 mg/kg, respectively. These elements are common earth materials and may reflect elevated concentrations of naturally occurring concentrations. Other metals were detected in high concentrations in only a few samples and include barium, cobalt, copper, lead, potassium, vanadium, and zinc. There were no single boring locations where consistently higher concentrations were detected. Mercury was detected in six soil samples at a maximum concentration of 0.59 mg/kg at 03-006BH (5.0 - 6.5) and cyanide was detected in only one sample at 0.87 mg/kg in 03-005BH (0.0 - 1.5) from IRP Site No. 3.

5.3.4 Groundwater Findings at Roslyn ANGS

5.3.4.1 Nature and Extent of Groundwater Contamination

Two groundwater samples were collected from monitoring wells at the Station. 01-001MW was used to obtain background groundwater samples at the Station as outlined in Subsection 5.2.1. Two additional monitoring wells were located downgradient from the dry wells at IRP Sites No. 2 (02-001MW) and No. 3 (03-001MW) to investigate potential contamination as outlined in Section 2.2. Monitoring well locations are indicated in Figure 5.4. One investigative water sample from each well, one matrix spike sample, one matrix spike duplicate, and one equipment (rinseate) blank were collected for laboratory analysis during the first round of sampling. A water sample from the Station water supply was analyzed since it was introduced to the well during construction as outlined in Subsection 4.5.2. A water sample from each well was field screened using the field GC and is included in Appendix D. During the second round of sampling, one investigative water sample was collected from each monitoring well for laboratory analysis. The analytical program for groundwater sampling was outlined in Subsection 4.5.3.2 and background conditions from 01-001MW were described in Subsection 5.2.2.3.

The holding times for VOCs, SVOCs, pesticides/PCBs, metals/cyanide, and TPH were not exceeded. VOC and SVOC surrogate recoveries were within acceptable limits meeting quality control (QC) criteria. All spike recoveries and relative percent difference (RPD) values were within QC limits. A complete listing of the results for all analytical parameters for each sample is given in Appendix H.

VOCs detected in groundwater samples collected from 02-001MW and 03-001MW are shown in Table 5.25. The volatile organic analyses detected methylene chloride, a common laboratory solvent, in the groundwater samples collected and may indicate laboratory induced contamination. Five additional VOCs; 1,1,1-trichloroethane, trichloroethene, 1,1-dichloroethene, tetrachloroethene, and benzene were detected at estimated concentrations less than the detection limit in groundwater and are also listed in Table 5.25.

Table 5.25
VOCs Detected in Groundwater at Roslyn ANGS
Roslyn ANGS, Roslyn, New York

Monitoring Well Number	Methylene Chloride μg/L	1,1,1-Tri-chloroethan μg/L	Tri-chloroethen e μg/L	1,1-Di-chloroethen e μg/L	Tetra-chloroethene μg/L	Benzene μg/L
NYSDEC	5	5	5	5	5	0.7
MCL		200	5	7		5
01-001MW1	4J	10U	10U	10U	10U	10U
02-001MW1	4J	9J	2J	10U	10U	10U
03-001MW1	4J	10U	10U	10U	10U	3J
Station Water Sample	4J	10U	10U	10U	10U	10U
01-001MW2	3J	1J	10U	10U	10U	10U
02-001MW2	3J	8J	2J	2J	6J	10U
03-001MW2	3J	10U	10U	10U	10U	4J

MW1 - Round 1 groundwater sampling. Conducted 16 May 1994.

MW2 - Round 2 groundwater sampling. Conducted 18 May 1994.

J - Estimated concentration. Compound meets the identification criteria but the result is less than the sample quantitation limit but greater than zero.

U - Analyte was analyzed for but was not detected. Detection limit is shown.

NYSDEC - Ambient water quality standard.

MCL - Federal Maximum Contaminant Level.

Note: Both NYSDEC and Federal standards are based on an assumption that the groundwater is a drinking water source.

No SVOCs were detected in groundwater samples collected from 02-001MW. Monitoring well 03-001MW (round one) contained fluorene, phenanthrene, and fluoranthene detected above detection limits at 14 μg/L, 20 μg/L, and 11 μg/L, respectively, as indicated in Table 5.26. No other SVOCs were detected above detection limits in any groundwater samples. Naphthalene, 2-methylnaphthalene, acenaphthylene, fluorene, phenanthrene, fluoranthene, pyrene, benzo(a)anthracene, chrysene, benzo(b)fluoranthene, and benzo(k)fluoranthene, were detected at estimated concentrations less than the detection limit in groundwater and are also listed in Table 5.26.

Table 5.26
SVOCs Detected in Groundwater at Roslyn ANGS
Roslyn ANGS, Roslyn, New York

Monitoring Well Number	Naphthalene <i>μg/L</i>	2-Methylnaphthalene <i>μg/L</i>	Acenaphthylene <i>μg/L</i>	Fluorene <i>μg/L</i>
NYSDEC	10	NSL	NSL	50 ^a
03-001MW1	6J	2J	9J	14
03-001MW2	5J	10U	5J	4J
Monitoring Well Number	Phenanthrene <i>μg/L</i>	Anthracene <i>μg/L</i>	Fluoranthene <i>μg/L</i>	Pyrene <i>μg/L</i>
NYSDEC	50 ^a	50 ^a	50 ^a	50 ^a
03-001MW1	20	6J	11	6J
03-001MW2	8J	3J	9J	5J
Monitoring Well Number	Benzo(a) Anthracene <i>μg/L</i>	Chrysene <i>μg/L</i>	Benzo(b) Fluoranthene <i>μg/L</i>	Benzo(k) Fluoranthene <i>μg/L</i>
NYSDEC	0.002 ^a	0.002 ^a	0.002 ^a	0.002 ^a
03-001MW1	5J	8J	3J	3J
03-001MW2	4J	7J	10U	10U

MW1 - Round 1 groundwater sampling. Conducted 16 May 1994.

MW2 - Round 2 groundwater sampling. Conducted 18 May 1994.

J - Estimated concentration. Compound meets the identification criteria but the result is less than the sample quantitation limit but greater than zero.

U - Analyte was analyzed for but was not detected. Detection limit is shown.

μg/L - Micrograms per liter.

NYSDEC - Ambient water quality standard.

NSL - No standard listed.

^aNYSDEC Water quality guidance value.

Note: NYSDEC water quality standards and guidance values assume use of groundwater as a drinking water source.

Note: Federal standards have not been promulgated for these substances.

Note: Numbers bolded indicate the presence of analyte confirmed above detection limit.

The pesticide endrin aldehyde was detected in groundwater samples collected at 03-001MW at 0.14 *μg/L* (round one), and 0.13 *μg/L* (round two). These values are slightly above the method detection limit of 10 *μg/L* and the analyses indicated the target analyte had a greater than 25% difference for detected concentrations between the two laboratory GC columns used. No other pesticides were detected in groundwater samples from the Station.

PCBs and TPH were not detected in any monitoring wells from either sampling round at the Station.

TAL metals and cyanide concentrations detected in groundwater from 02-001MW and 03-001MW are listed in Table 5.27 with its highest concentration per analyte per borehole (above RSCO's or site background) are shown in Figures 5.15 and 5.19. Metals and cyanide concentrations were compared against mean values obtained from the background sampling location to determine if analyte concentrations exceeded naturally occurring concentrations.

Table 5.27
TAL Metals and Cyanide Analytical Results for Groundwater at Roslyn ANGS
Roslyn ANGS, Roslyn, New York

Monitoring Well Number: Concentration:		02-001MW1 ($\mu\text{g/L}$)	03-001MW1 ($\mu\text{g/L}$)	Station Water Sample ($\mu\text{g/L}$)	02-001MW2 ($\mu\text{g/L}$)	03-001MW2 ($\mu\text{g/L}$)
<u>Metals</u>	<u>Background</u>					
Aluminum	(5,905)	13,500	8,400	34U	3,100	11,800
Antimony	(U)	26U	26U	26U	26U	27B
Arsenic	(12.2)	5U	5U	5U	5U	6.5B
Barium	(85B)	201	139B	17U	115B	230
Beryllium	(U)	1.2B	1U	1U	1U	1U
Cadmium	(U)	4U	4U	4U	4U	4U
Calcium	(28,300)	27,700	18,200	4,180B	29,100	18,000
Chromium	(42.6)	29.2	25.8	9U	9U	34.2
Cobalt	(24B)	18.4B	12.2B	11U	14.4B	25.5B
Copper	(20.9)	35.5	25.6	5U	10.3B	41.9
Iron	(27,520)	58,900	31,800	28U	12,800	38,500
Lead	(19.7)	24.2	19.0	6.4	7.1	47.6
Magnesium	(10,930)	11,400	4,430B	1,720B	11,500	6,300
Manganese	(940)	2,230	1,600	2U	964	3,890
Mercury	(0.35)	0.22	0.22	0.20U	0.20U	0.20U
Nickel	(27.2B)	23U	39.2B	23U	23.0U	73.0
Potassium	(2,620)	3,170B	2,250B	1,120U	2,780B	2,610B
Selenium	(U)	5U	5U	5U	5U	5U
Silver	(U)	5U	5U	5U	5U	5U
Sodium	(16,550)	16,600	19,500	15,000	24,200	15,500
Thallium	(U)	5U	5U	5U	5U	5U
Vanadium	(25.6)	55.3	20.1B	9U	11.9B	25.3B
Zinc	(58)	53.2	72.5	6U	21.8	90.4
Cyanide	(U)	10U	10U	10U	10U	10U

Note: Numbers in bold indicate the presence of analyte confirmed above detection limit.

MW1 - Round 1 groundwater sampling. Conducted 16 May 1994.

MW2 - Round 2 groundwater sampling. Conducted 18 May 1994.

U - Analyte was analyzed for but was not detected. Detection limit is shown.

B - Reported value was less than the CRDL but greater than the IDL.

Some TAL metals exceeded background concentrations as observed in 01-001MW but none where significantly exceeded. Aluminum, barium, iron, lead, manganese, nickel, sodium, and vanadium were detected in maximum concentrations only slightly above maximum background concentrations and do not indicate Station-associated contamination. Lead was detected at a maximum concentration of 47.6 $\mu\text{g/L}$ in 03-001MW (round 2) and compares to a maximum

background level of 35.9 $\mu\text{g/L}$ 01-001MW (round 2). Mercury and cyanide were not detected in groundwater samples from 02-001MW or 03-001MW.

5.4 INVESTIGATION DERIVED WASTE DISPOSITION

During the SI, a certain amount of waste material (drill cuttings, decontamination water, and development/purge water) were produced as a result of investigation activities. All soil cuttings from each boring location and aquifer material from monitoring well locations were drummed in steel, 55-gallon drums. All drums were properly marked to indicate their contents, the collection date, and borehole/monitoring well ID numbers.

There was no miscellaneous derived wastes produced during the SI. PPE was decontaminated and maintained. Latex gloves, visqueen sheeting, and other disposable items that came in contact with soils or groundwater (no soil or groundwater sample screened greater than 100 ppm) were decontaminated and discarded in a general refuse container. Decontamination water was drummed and labeled. Guidance for the final disposition of drummed materials is provided in this section.

5.4.1 Drums Containing Soil

Soil cuttings for each IRP site and monitoring well location were drummed separately and soil cutting drums were labeled to identify the soil boring location. Table 5.28 lists the drums for which are marked "Soil Cuttings," the recommended disposition of those drums, and the rationale for each recommendation.

5.4.2 Drums Containing Non-Potable Water

Development and purge water from each well location were drummed separately. Table 5.29 lists the well locations for which drums have been marked "Non-Potable Water," the recommended disposition for those drums, and the rationale for each recommendation.

**Table 5.28
Recommended Disposition of Soil Drums
Roslyn ANGS, Roslyn, New York**

Boring ID Number	Recommended Disposition	Rationale
01-001BH	Station personnel will dispose of soil on-site.	Soil sample analyses did not detect contamination exceeding State action levels.
01-002BH	Station personnel will dispose of soil on-site.	Soil sample analyses did not detect contamination exceeding State action levels.
01-003BH 01-004BH	Station personnel will dispose of soil on-site.	Soil sample analyses did not detect contamination exceeding State action levels.
02-001BH 02-002BH	Station personnel will dispose of soil on-site.	Soil sample analyses did not detect contamination exceeding State action levels.
02-003BH	Station personnel will dispose of soil on-site.	Soil sample analyses did not detect contamination exceeding State action levels.
02-004BH 02-005BH 02-006BH 02-007BH 02-008BH	Station personnel will dispose of soil on-site.	Soil sample analyses did not detect contamination exceeding State action levels.
03-001BH 03-004BH	Obtain waste classification from NYSDEC and dispose as per State of New York requirements.	Soil sample analyses detected SVOC and pesticide compounds in excess of State of New York recommended soil cleanup objectives.
03-002BH 03-006BH	Obtain waste classification from NYSDEC and dispose as per State of New York requirements.	Soil sample analyses detected SVOC and pesticide compounds in excess of State of New York recommended soil cleanup objectives.
03-003BH	Station personnel will dispose of soil on-site.	Soil sample analyses did not detect contamination exceeding State action levels.
03-005BH	Station personnel will dispose of soil on-site.	Soil sample analyses did not detect contamination exceeding State action levels.
BG-001BH	Station personnel will dispose of soil on-site.	Soil sample analyses did not detect contamination exceeding State action levels.
02-001MW	Station personnel will dispose of soil on-site.	Soil sample analyses did not detect contamination exceeding State action levels.
02-001MW	Station personnel will dispose of soil on-site.	Soil sample analyses did not detect contamination exceeding State action levels.
03-001MW	Station personnel will dispose of soil on-site.	Soil sample analyses did not detect contamination exceeding State action levels.
03-001MW	Station personnel will dispose of soil on-site.	Soil sample analyses did not detect contamination exceeding State action levels.

ID - Identification.
BH - Borehole.
BG - Background Sample.

MW - Monitoring Well.
NYSDEC - New York State Department of Environmental Conservation.

Table 5.29
Recommended Disposition of Non-Potable Water Drums
Roslyn ANGS, Roslyn, New York

Drum ID Number	Recommended Disposition	Rationale
Decontamination Water	Analytical analysis should be conducted to determine waste classification.	Potential contaminants in contact with sampling equipment may be present in decontamination water.
Decontamination Water	Analytical analysis should be conducted to determine waste classification.	Potential contaminants in contact with sampling equipment may be present in decontamination water.
Development/Purge Water (01-001MW)	Obtain approval from NYSDEC to dispose of water on-site.	Groundwater sample analyses did not detect contamination exceeding State or Federal action levels.
Development/Purge Water (01-001MW)	Obtain approval from NYSDEC to dispose of water on-site.	Groundwater sample analyses did not detect contamination exceeding State or Federal action levels.
Development/Purge Water (02-001MW)	Obtain approval from NYSDEC to dispose of water on-site.	Groundwater sample analyses did not detect contamination exceeding State or Federal action levels.
Development/Purge Water (02-001MW)	Obtain approval from NYSDEC to dispose of water on-site.	Groundwater sample analyses did not detect contamination exceeding State or Federal action levels.
Development/Purge Water (03-001MW)	Obtain approval from NYSDEC to dispose of water on-site.	Groundwater sample analyses did not detect contamination exceeding State or Federal action levels.
Development/Purge Water (03-001MW)	Obtain approval from NYSDEC to dispose of water on-site.	Groundwater sample analyses did not detect contamination exceeding State or Federal action levels.

ID - Identification.
 MW - Monitoring Well.

NYSDEC - New York State Department of
 Environmental Conservation.

SECTION 6.0 CONCLUSIONS

6.1 SUMMARY

The purpose of the SI at Roslyn ANGS was to confirm, through field activities, the presence or absence of contamination at IRP Sites No. 1, No. 2, and No. 3, to attempt to determine the areal extent of any contaminants detected, and to provide data needed to reach a decision point for each site. Included was a groundwater investigation to determine, through the collection and analysis of groundwater samples, if dry wells within close proximity to IRP Sites No. 2 and No. 3 have impacted groundwater conditions.

Field activities at Roslyn ANGS began on 10 September 1993 and were conducted in two separate phases. During the initial groundwater investigation, the depth to the water table at the Station required drilling techniques not possessed by the contractor currently performing the work. An additional drilling contractor was needed to install the wells required to conduct the groundwater investigation. Therefore the majority of the soil investigation at the IRP sites, which commenced on 10 September 1993, was completed on 24 September 1993. The second phase, consisting of the groundwater investigation and final soil sampling began on 5 April 1994 and was completed on 18 May 1994.

SI screening activities included the use of a soil gas survey at the three IRP sites to screen for BTEX and TVHC contamination in order to optimize borehole locations and the installation of a three-well piezometer network to confirm groundwater monitoring well locations. SI confirmation activities included 19 soil borings and three monitoring wells to determine background soil and groundwater conditions, screen soil and groundwater for contamination, and determine subsurface soil and geological conditions at the sites.

Past activities at the IRP sites indicate that suspected contamination includes waste and product oil, paint thinners, solvents (PD-680), JP-4, diesel fuel, and leaded MOGAS. Therefore, the primary analytical program of the SI focused on the detection of VOCs, SVOCs, TPH and lead. The NYSDEC required baseline analysis using NYSDEC-ASP parameters for soil and groundwater. These additional parameters included an analysis for selected metals/cyanide and pesticides/PCBs.

In determining the significance of analyte concentrations detected in soil at the IRP sites, NYSDEC Memorandum HWR-94-4046, Revised TAGM - Determination of Soil Cleanup

Objectives and Cleanup Levels were used. Obtained from Mr. Jim Harrington of the NYSDEC, this Memorandum revises the Division Technical and Administrative Guidance Memorandum (TAGM) on Determination of Soil Cleanup Objectives and Cleanup Levels and provides a basis and procedure to determine soil cleanup levels at individual Federal Superfund, State Superfund, and Responsible Party sites. The Memorandum outlines, in table form, the Recommended Soil Cleanup Objectives (RSCO) for VOCs, SVOCs, Pesticides/PCBs, and TAL Metals and Cyanide. The NYSDEC uses the RSCO to assist in determining if sites investigated requires further investigation or cleanup or if no further action is required. It is the policy of the NYSDEC to assess sites and make final determinations if additional work is required on a case-by-case basis.

The NYSDEC Memorandum, Ambient Water Quality Standards and Guidance Values, October 1993 from the Division of Water Technical and Operation Guidance Series (1.1.1) was used in comparing Station groundwater findings with State ARARs. This Memorandum provides a compilation of ambient water quality standards and guidance values for toxic and non-conventional pollutants for use in NYSDEC programs.

The NYSDEC does not consider TPH analytical findings in assessing sites when the NYSDEC-ASP is used. TPH analysis was conducted at Roslyn ANGS as additional information to supplement NYSDEC-ASP sampling and will not be discussed in this section.

In reviewing TAL metals results of the IRP sites, the one background boring location chosen did not adequately establish background conditions for the Station. Taking this into account, the mean background values obtained from BG-001BH were used as a general indicator as to the range of possible metals concentrations to be found at the sites. In reviewing and assessing TAL metals and cyanide, site concentrations were compared against Eastern USA Background and the RSCOs (when not designated as site background (SB)) provided in the TAGM Memorandum.

In assessing the three IRP sites at Roslyn ANGS, only those parameters reported at greater than the sample Contract Required Quantitation Limits (CRQL) using the NYSDEC-ASP as outlined in Subsection 4.5.3, are addressed in this section. Analyte concentrations in excess of CRQLs were compared against background and/or RSCOs (New York State ARARs) provided by the NYSDEC to determine if additional assessments of the site may be required. This section compares analyte concentrations detected at greater than CRQLs to background/RSCOs, concludes the significance of contamination detected.

6.2 CONCLUSIONS

6.2.1 IRP Site No. 1 - Access Road to the AGE Shop

6.2.1.1 Summary

The site was a dirt road located on the east side of Roslyn ANGS used as an access route to the AGE Shop. It extends from the entrance to the AGE Shop (Building 36) parking area to the perimeter fence. The site was completely covered with asphalt as the motor pool/parking lot was expanded.

Soil gas survey results did not indicate any areas of significant BTEX contamination. High TVHC concentrations were due to elevated levels of nonaromatic compounds. Soil vapor survey results were used in the final selection of borehole locations as outlined in Subsection 5.3.1.1.

Five VOCs were detected in soil samples obtained from IRP Site No. 1 above CRQLs. Acetone, 2-butanone, benzene, toluene, and xylenes were detected at maximum concentrations as reported in Subsection 5.3.1.3.3 and outlined in Table 6.1. These findings, as compared against RSCOs, indicate no VOC contamination exceeded State recommended cleanup objectives.

Table 6.1
Maximum Concentrations of VOCs
Detected at IRP Site No. 1
Roslyn ANGS, Roslyn, New York

Analyte	Site Concentration ($\mu\text{g}/\text{kg}$)	NYSDEC/RSCO ($\mu\text{g}/\text{kg}$)
Acetone	110	200
2-Butanone	24	300
Benzene	23	60
Toluene	70	1,500
Xylenes	39	1,200

NYSDEC/RSCO - New York State Department of
Environmental Conservation Recommended Soil
Cleanup Objectives.
 $\mu\text{g}/\text{kg}$ - micrograms per kilogram.

No SVOCs were detected in soil samples from IRP Site No. 1 at concentrations greater than CRQLs.

Four pesticides were detected in soil samples obtained from IRP Site No. 1 above CRQLs. 4,4'-DDE, alpha chlordane, gamma chlordane, and endrin aldehyde were detected at maximum concentrations as reported in Subsection 5.3.1.3.3 and outlined in Table 6.2. The NYSDEC Memorandum did not list the pesticides alpha chlordane and endrin aldehyde, therefore RSCOs for chlordane and endrin were used in comparison, respectively. These findings, as compared against RSCOs, indicate no pesticide contamination exceeded State recommended cleanup objectives at IRP Site No. 1.

Table 6.2
Maximum Concentrations of Pesticides
Detected at IRP Site No. 1
Roslyn ANGS, Roslyn, New York

Analyte	Site Concentration ($\mu\text{g}/\text{kg}$)	NYSDEC/RSCO ($\mu\text{g}/\text{kg}$)
4,4'-DDE	37P	2,100
Alpha Chlordane	34P	540 ^a
Gamma Chlordane	32P	540
Endrin Aldehyde	10	100 ^b

NYSDEC/RSCO - New York State Department of Environmental Conservation Recommended Soil Cleanup Objectives.

^aRSCO for Chlordane.

^bRSCO for Endrin.

P - Target analyte had greater than 25% difference for detected concentrations between the two GC columns. Lower values were used.

Fourteen TAL metals exceeded data collected from background samples at various soil sampling locations at IRP Site No. 1. Table 6.3 lists the maximum concentrations of TAL metals/cyanide from soil samples obtained at the site and eastern USA background concentrations and RSCO values as provided in the TAGM Memorandum.

Six TAL metals exceeded eastern USA background/RSCO concentrations in various samples. Site concentrations, as listed in Table 5.10, indicates cobalt and copper were exceeded in one soil sample, arsenic in two, nickel in three, zinc in five, and beryllium in six soil samples. None of these TAL metals are directly attributed to potential contaminants at the site and may represent elevated levels of naturally occurring earth materials.

The asphalt cover over the entire site prevents exposure to soil and significantly decreases the possibility of metals migrating. Groundwater at this location is over 140 feet BLS. Therefore, TAL metals and cyanide concentrations should not be considered significant at the site.

Table 6.3
Maximum Concentrations of TAL Metals and Cyanide
Detected in Soil at IRP Site No. 1
Roslyn ANGS, Roslyn, New York

TAL Metals	Maximum Site Concentration (mg/kg)	Station Background Data (mg/kg)	NYSDEC Memorandum	
			Background Eastern USA (mg/kg)	RSCO (mg/kg)
Aluminum	24,400	3,707	33,000	SB
Antimony	U	7.8B	N/A	SB
Arsenic	18.8	1.8B	3 - 12*	7.5 or SB
Barium	158	15.3B	15 - 600	300 or SB
Beryllium	1.3	0.42B	0 - 1.75	0.16 ^b or SB
Cadmium	U	U	0.1 - 1	1 or SB
Calcium	30,600	299B	130 - 35,000*	SB
Chromium	34.2	6.2	1.5 - 40*	10 or SB
Cobalt	73.4	4.1B	2.5 - 60*	30 or SB
Copper	60.0	41.6B	1 - 50	25 or SB
Iron	53,100	7,477	2,000 - 550,000	2,000 or SB
Lead	44.3	2.8	200 - 500 ^a	SB ^a
Magnesium	12,600	882.3	100 - 5,000	SB
Manganese	2,170	148.6	50 - 5,000	SB
Mercury	0.12	U	0.001 - 0.2	0.1
Nickel	127	12.8	0.2 - 25	13 or SB
Potassium	2,600	431.3	8,500 - 43,000*	SB
Selenium	U	U	0.1 - 3.9	2 or SB
Silver	3.4	U	N/A	SB
Sodium	739B	U	6,000 - 8,000	SB
Thallium	U	U	N/A	SB
Vanadium	55.3	5.7	1 - 300	150 or SB
Zinc	166	78.8	9 - 50	20 or SB
Cyanide	U	0.66	N/A	**

TAL - Target Analyte List.
NYSDEC - New York State Department of Environmental Conservation.
RSCO - Recommended Soil Cleanup Objectives.
ft BLS - feet Below Land Surface.
BH - Borehole.
SB - Site Background.
N/A - Information is not available.
mg/kg - milligrams per kilogram.
U - Analyte was analyzed for but not detected.
Bold - Analyte detected above site background and RSCO.

B - Reported value was less than the CRDL but greater than or equal to the IDL.
^aBackground levels for lead vary widely. Average levels in suburban areas or near highways range from 200 - 500 ppm.
^bThis level contained in USEPA Health Effects Assessment Summary Tables.
* - Specifically designated as New York State background levels.
** - Site-specific forms of cyanide should be considered when establishing soil cleanup objectives.

6.2.1.2 Conclusions

No VOCs, SVOCs, Pesticides/PCBs, or cyanide were detected in soil from IRP Site No. 1 that exceeded NYSDEC RSCOs. Six TAL metals exceeded State and Eastern USA background concentrations, but are not related to site potential contaminants of concern and may reflect elevated background levels.

Considering the Roslyn ANGS has restricted access and the entire site is covered by asphalt, further site-specific investigations are not required.

6.2.2 IRP Site No. 2 - Old Waste Holding Area No. 1

6.2.2.1 Summary

This site was an old waste holding area for the Vehicle Maintenance Shop. It is located adjacent to the north wall of the Vehicle Maintenance Shop (Building 16) and was once used for waste oil storage.

Soil gas survey results indicated only one area (around S2-9 as indicated in Figure 5.12) where toluene was detected above 0.1 ppm. High TVHC concentrations were due to elevated levels of nonaromatic compounds. Soil vapor survey results were used in the final selection of borehole locations as outlined in Subsection 5.3.2.1.

Six VOCs were detected in soil samples obtained from IRP Site No. 2 above CRQLs. Acetone, 1,2-dichloroethene, 2-butanone, trichloroethene, ethylbenzene, and xylenes were detected at maximum concentrations as reported in Subsection 5.3.2.3.3 and outlined in Table 6.4. These findings, as compared against RSCOs, indicate no VOC contamination exceeded State recommended cleanup objectives.

One SVOC, 2-methylnaphthalene, was detected at IRP Site No. 2 at a concentration greater than CRQLs. This compound was detected at a maximum concentration of 540 $\mu\text{g}/\text{kg}$. The RSCO for 2-methylnaphthalene is 36,400 $\mu\text{g}/\text{kg}$. These findings, as compared against RSCOs, indicate no SVOC contamination exceeded State recommended cleanup objectives.

Six pesticides and one PCB compound were detected in soil samples obtained from IRP Site No. 2 above CRQLs. The pesticides dieldrin, 4,4'-DDD, 4,4'-DDT, endrin aldehyde, alpha

Table 6.4
Maximum Concentrations of VOCs
Detected at IRP Site No. 2
Roslyn ANGS, Roslyn, New York

Analyte	Site Concentration ($\mu\text{g}/\text{kg}$)	NYSDEC/RSCO ($\mu\text{g}/\text{kg}$)
Acetone	81	200
1,2-Dichloroethene	150	300
2-Butanone	48	300
Trichloroethene	120	700
Ethylbenzene	49	5,500
Xylenes	260	1,200

NYSDEC/RSCO - New York State Department of Environmental Conservation Recommended Soil Cleanup Objectives. $\mu\text{g}/\text{kg}$ - micrograms per kilogram.

chlordane, and gamma chlordane and the PCB Aroclor 1260 were detected at maximum concentrations as reported in Subsection 5.3.2.3.3 and outlined in Table 6.5. The NYSDEC Memorandum did not list the pesticides alpha chlordane and endrin aldehyde, therefore RSCOs for chlordane and endrin were used, respectively. These findings, as compared against RSCOs, indicate no pesticide or PCB contamination exceeded State recommended cleanup objectives.

Table 6.5
Maximum Concentrations of Pesticides/PCBs
Detected at IRP Site No. 2
Roslyn ANGS, Roslyn, New York

Analyte	Site Concentration ($\mu\text{g}/\text{kg}$)	NYSDEC/RSCO ($\mu\text{g}/\text{kg}$)
Dieldrin	17P	44
4,4'-DDD	8.4P	2,900
4,4'-DDT	8.1P	2,100
Endrin Aldehyde	41P	100
Alpha Chlordane	22P	540
Gamma Chlordane	24P	540
Aroclor 1260	160	1,000*

NYSDEC/RSCO - New York State Department of Environmental Conservation Recommended Soil Cleanup Objectives.

$\mu\text{g}/\text{kg}$ - micrograms per kilogram.
 * - RSCO for surface contamination, 10,000 $\mu\text{g}/\text{kg}$ for subsurface.

P - Target analyte had greater than 25% difference for detected concentrations between the two GC columns. Lower values were used.

Maximum concentrations of TAL metals detected in soil samples from IRP Site No. 2 exceeded data collected from background samples in all analytes tested with the exception of thallium and cyanide. Table 6.6 lists the maximum concentrations of TAL metals/cyanide from soil samples from the site and lists eastern USA background concentrations and RSCO values as provided in the TAGM Memorandum.

Seven TAL metals exceeded Eastern USA/RSCO concentrations in various samples. Site concentrations, as listed in Table 5.17, indicates calcium, chromium, and nickel were exceeded in one soil sample, arsenic and cadmium in two, and magnesium and zinc in four soil samples. Most of these metals can not be directly attributed to potential contaminants at the site and may represent elevated levels of naturally occurring earth materials.

The site is only partially covered by asphalt that prevents exposure to soil and significantly decreases the possibility of metals migrating. With the exception of calcium and magnesium, all maximum concentrations of TAL metals mentioned above were found in surface samples from the grass covered areas. All soil analyzed from the 5-foot BLS interval was below State background/RSCO concentrations and groundwater is over 140 feet BLS at this location.

6.2.2.2 Conclusions

No VOCs, SVOCs, Pesticides/PCBs, or cyanide were detected in soil from IRP Site No. 2 that exceeded NYSDEC RSCOs. Seven TAL metals exceeded State and Eastern USA background concentrations. These TAL metals are not directly attributed to potential contaminants at the site and may represent elevated levels of naturally occurring earth materials.

Although the Roslyn ANGS has restricted access and part of the site is covered by asphalt, additional investigation concerning naturally occurring concentrations of TAL metals at the Station is required since contact with the soil at this site is possible.

6.2.3 IRP Site No. 3 - Old Waste Holding Area No. 2

6.2.3.1 Summary

This site was the old waste holding area for the AGE Shop located along the north wall of Building 36 (AGE shop). The site was in operation as a waste holding area for the AGE Shop from 1971 to 1989. This area is now paved with asphalt and there is no visible indication that a waste holding area existed at the site.

Table 6.6
Maximum Concentrations of TAL Metals and Cyanide
Detected in Soil at IRP Site No. 2
Roslyn ANGS, Roslyn, New York

TAL Metals	Maximum Site Concentration (mg/kg)	Station Background Data (mg/kg)	NYSDEC Memorandum	
			Background Eastern USA (mg/kg)	RSCO (mg/kg)
Aluminum	17,400	3,707	33,000	SB
Antimony	12.6B	7.8B	N/A	SB
Arsenic	23	1.8B	3 - 12*	7.5 or SB
Barium	153	15.3B	15 - 600	300 or SB
Beryllium	1.0	0.42B	0 - 1.75	0.16 ^b or SB
Cadmium	1.5	U	0.1 - 1	1 or SB
Calcium	88,100	299B	130 - 35,000*	SB
Chromium	54	6.2	1.5 - 40*	10 or SB
Cobalt	12.8	4.1B	2.5 - 60*	30 or SB
Copper	48.2	41.6B	1 - 50	25 or SB
Iron	25,200	7,477	2,000 - 550,000	2,000 or SB
Lead	406	2.8	200 - 500 ^a	SB ^a
Magnesium	48,800	882.3	100 - 5,000	SB
Manganese	639	148.6	50 - 5,000	SB
Mercury	0.13	U	0.001 - 0.2	0.1
Nickel	27.4	12.8	0.2 - 25	13 or SB
Potassium	992	431.3	8,500 - 43,000*	SB
Selenium	3.5	U	0.1 - 3.9	2 or SB
Silver	2.0B	U	N/A	SB
Sodium	335B	U	6,000 - 8,000	SB
Thallium	U	U	N/A	SB
Vanadium	41.6	5.7	1 - 300	150 or SB
Zinc	304	78.8	9 - 50	20 or SB
Cyanide	U	0.66	N/A	**

TAL - Target Analyte List.
 NYSDEC - New York State Department of Environmental Conservation.
 RSCO - Recommended Soil Cleanup Objectives.
 ft BLS - feet Below Land Surface.
 BH - Borehole.
 SB - Site Background.
 N/A - Information is not available.
 mg/kg - milligrams per kilogram.
 U - Analyte was analyzed for but not detected.
 Bold - Analyte detected above site background and RSCO.

B - Reported value was less than the CRDL but greater than or equal to the IDL.
^aBackground levels for lead vary widely. Average levels in suburban areas or near highways range from 200 - 500 ppm.
^bThis level contained in USEPA Health Effects Assessment Summary Tables.
 * - Specifically designated as New York State background levels.
 ** - Site-specific forms of cyanide should be considered when establishing soil cleanup objectives.

Soil gas survey results did not indicate any areas of BTEX contamination over 50 µg/L. High TVHC concentrations were detected at S3-9 as shown on Figure 5.17 and may be due to elevated levels of nonaromatic compounds. Soil vapor survey results were used in the final selection of borehole locations as outlined in Subsection 5.3.3.1.

Two VOCs, Acetone and 2-butanone, were detected at IRP Site No. 3 at concentrations greater than CRQLs. These compounds were detected at a maximum concentration of 86 $\mu\text{g}/\text{kg}$ and 18 $\mu\text{g}/\text{kg}$, respectively. The RSCO for acetone and 2-butanone are 200 $\mu\text{g}/\text{kg}$ and 300 $\mu\text{g}/\text{kg}$, respectively. These findings, as compared against RSCOs, indicate no VOC contamination exceeded State recommended cleanup objectives.

Twelve SVOCs were detected at IRP Site No. 3 at concentrations greater than CRQLs. 2-methylnaphthalene, acenaphthene, dibenzofuran, fluorene, phenanthrene, anthracene, and pyrene were detected at maximum concentrations as reported in Subsection 5.3.3.3.3 and outlined in Table 6.7. These eight SVOCs, as compared against RSCOs, indicate concentrations below State recommended cleanup objectives. Four additional SVOCs, naphthalene, benzo(a)anthracene, benzo(b)pyrene, and chrysene, also listed in Table 6.7, have concentrations in excess of State RSCO concentrations. All SVOCs in excess of State RSCOs were detected in soil from 03-006BH (0.0 - 1.5). SVOC analysis from the next interval, 03-006BH (5.0 - 6.5), indicated all compounds were below CRQLs.

Seven pesticides were detected in soil samples obtained from IRP Site No. 3 above CRQLs. Delta-BHC, heptachlor, 4,4'-DDE, 4,4'-DDD, 4,4'-DDT, alpha chlordane, and gamma chlordane were detected at maximum concentrations as reported in Subsection 5.3.3.3.3 and outlined in Table 6.8. The NYSDEC Memorandum did not list the pesticides alpha chlordane, therefore the RSCO for chlordane was used. These findings, as compared against RSCOs, indicate no pesticide contamination exceeded State recommended cleanup objectives.

Maximum concentrations of TAL metals detected in soil samples from IRP Site No. 3 exceeded data collected from background sampling in 14 analytes tested. Table 6.9 lists the maximum concentrations of TAL metals/cyanide from soil samples from the site and lists eastern USA background concentrations and RSCO values as provided in the TAGM Memorandum.

Eight TAL metals exceeded Eastern USA/RSCO concentrations in various samples. Site concentrations, as listed in Table 5.24 indicates antimony, calcium, and mercury were exceeded in one soil sample, calcium, copper, and silver in three, magnesium in four, and zinc in five soil samples. These TAL metals cannot be directly attributed to potential contaminants at the site and may represent elevated levels of naturally occurring earth materials. Cyanide was detected in only one soil sample at IRP Site No. 3 at 0.87 mg/kg. This only slightly exceeds a tentative Station background concentration of 0.66 mg/kg.

Table 6.7
Maximum Concentrations of SVOCs
Detected at IRP Site No. 3
Roslyn, ANGS, Roslyn, New York

Analyte	Site Concentration ($\mu\text{g}/\text{kg}$)	NYSDEC/RSCO ($\mu\text{g}/\text{kg}$)
Naphthalene	16,000	13,000
2-Methylnaphthalene	3,700	36,300
Acenaphthene	5,300	50,000*
Dibenzofuran	4,400	6,200
Fluorene	6,400	50,000*
Phenanthrene	21,000	50,000*
Anthracene	8,200	50,000*
Fluoranthene	17,000	50,000*
Pyrene	18,000	50,000*
Benzo(a)Anthracene	4,900	224 or MDL
Chrysene	5,000	400
Benzo(a)pyrene	4,100	61 or MDL

NYSDEC/RSCO - New York State Department of Environmental Conservation Recommended Soil Cleanup Objectives.
 TAL - Target Analyte List.

$\mu\text{g}/\text{kg}$ - micrograms per kilogram.
 * - As per TAGM#4046, total VOCs < 10 ppm, total SVOCs < 500 ppm, and individual SVOCs < 50 ppm.
 Bold - Analyte detected above RSCO.

Table 6.8
Maximum Concentrations of Pesticides
Detected at IRP Site No. 3
Roslyn, ANGS, Roslyn, New York

Analyte	Site Concentration ($\mu\text{g}/\text{kg}$)	NYSDEC/RSCO ($\mu\text{g}/\text{kg}$)
Delta-BHC	11P	300
Heptachlor	54	100
4,4'-DDE	24	2,100
4,4'-DDD	8.2P	2,900
4,4'-DDT	7.5P	2,100
Alpha Chlordane	130P	540
Gamma Chlordane	120	540

NYSDEC/RSCO - New York State Department of Environmental Conservation Recommended Soil Cleanup Objectives.
 $\mu\text{g}/\text{kg}$ - micrograms per kilogram.

P - Target analyte had greater than 25% difference for detected concentrations between the two GC columns. Lower values were used.

Table 6.9
Maximum Concentrations of TAL Metals and Cyanide
Detected in Soil at IRP Site No. 3
Roslyn ANGS, Roslyn, New York

TAL Metals	Maximum Site Concentration (mg/kg)	Station Background Data (mg/kg)	NYSDEC Memorandum	
			Background Eastern USA (mg/kg)	RSCO (mg/kg)
Aluminum	12,200	3,707	33,000	SB
Antimony	12.4	7.8B	N/A	SB
Arsenic	8.2	1.8B	3 - 12*	7.5 or SB
Barium	123	15.3B	15 - 600	300 or SB
Beryllium	0.63B	0.42B	0 - 1.75	0.16 ^b or SB
Cadmium	3.7	U	0.1 - 1	1 or SB
Calcium	59,900	299B	130 - 35,000*	SB
Chromium	15.1	6.2	1.5 - 40*	10 or SB
Cobalt	7.3B	4.1B	2.5 - 60*	30 or SB
Copper	68.4	41.6B	1 - 50	25 or SB
Iron	15,000	7,477	2,000 - 550,000	2,000 or SB
Lead	73.4	2.8	200 - 500 ^a	SB ^a
Magnesium	21,400	882.3	100 - 5,000	SB
Manganese	288	148.6	50 - 5,000	SB
Mercury	0.59	U	0.001 - 0.2	0.1
Nickel	11.4	12.8	0.2 - 25	13 or SB
Potassium	1,140	431.3	8,500 - 43,000*	SB
Selenium	1.2	U	0.1 - 3.9	2 or SB
Silver	10.7	U	N/A	SB
Sodium	263B	U	6,000 - 8,000	SB
Thallium	U	U	N/A	SB
Vanadium	27.8	5.7	1 - 300	150 or SB
Zinc	260	78.8	9 - 50	20 or SB
Cyanide	0.87	0.66	N/A	**

TAL - Target Analyte List.
 NYSDEC - New York State Department of Environmental Conservation.
 RSCO - Recommended Soil Cleanup Objectives.
 ft BLS - feet Below Land Surface.
 BH - Borehole.
 SB - Site Background.
 N/A - Information is not available.
 mg/kg - milligrams per kilogram.
 U - Analyte was analyzed for but not detected.
 Bold - Analyte detected above site background and RSCO.

B - Reported value was less than the CRDL but greater than or equal to the IDL.
 *Background levels for lead vary widely. Average levels in suburban areas or near highways range from 200 - 500 ppm.
^bThis level contained in USEPA Health Effects Assessment Summary Tables.
 * - Specifically designated as New York State background levels.
 ** - Site-specific forms of cyanide should be considered when establishing soil cleanup objectives.

The site is completely covered by asphalt that prevents exposure to soil and significantly decreases the possibility of metals migrating. Groundwater at this location is over 139 feet BLS. Therefore, TAL metals and cyanide concentrations should not be considered significant at the site.

6.2.3.2 Conclusions

No VOCs or Pesticides/PCBs were detected in soil from IRP Site No. 3 that exceeded NYSDEC RSCOs. Four SVOCs, naphthalene, benzo(a)anthracene, benzo(b)pyrene, and chrysene have concentrations in excess of State RSCO concentrations. These compounds were detected in soil from 03-006BH (0.0 - 1.5). SVOC analysis from the 5-foot BLS sample interval at that location indicated all concentrations were below CRQLs. Seven TAL metals exceeded State and Eastern USA background concentrations. These TAL metals are not directly attributed to potential contaminants at the site and may represent elevated levels of naturally occurring earth materials. Cyanide was detected in one sample slightly above background levels.

Considering Roslyn ANGS has restricted access and the entire site is covered by asphalt, further site-specific investigations are not recommended.

6.2.4 Groundwater Findings

Two dry wells are located in close proximity to IRP Site No. 2. The first dry well is located under the western portion of the Vehicle Maintenance Shop (Building 16) and the second dry well is located west of the Vehicle Maintenance Shop and north of the Vehicle Paint Shop (Building 9). Floor drains in the Vehicle Maintenance Shop and Vehicle Paint Shop discharge directly into the respective dry wells. These dry wells were included in the investigation to determine if maintenance and painting activities in close proximity and the floor drains connected to the dry wells has affected groundwater. Two additional dry wells are located approximately 35 feet to the northeast of IRP Site No. 3. These dry wells receive precipitation runoff channeled through ditches, catch basins, and surface flows from the northeast portion of the Station. As with IRP Site No. 2, these sites were added to the investigation to attempt to determine if contamination from surface runoff has affected the groundwater.

Station potable water used during construction of the monitoring wells did not contain detectable levels of organic contamination, pesticides or PCBs. All TAL metals/cyanide were within established drinking water standards. The use of Station potable water had no effect on sampling or analytical findings.

Two rounds of water samples were collected and analyzed as outlined in Subsection 4.5.3.2. No VOCs or PCBs were detected above NYSDEC-ASP CRQLs in any groundwater samples collected at the Station.

Three SVOCs were detected in groundwater from 03-001MW in round 1 sampling only. The SVOCs fluorene, phenanthrene, and fluoranthene were detected at 14 $\mu\text{g/L}$, 21 $\mu\text{g/L}$, and 11 $\mu\text{g/L}$, respectively. Groundwater standards for these compounds, as outlined in the NYSDEC Ambient Water Quality Standards and Guidance Values are all 50 $\mu\text{g/L}$, therefore, SVOCs in groundwater are below Guidance Values.

The pesticide endrin aldehyde was detected in groundwater samples collected from 03-001MW at 0.14 $\mu\text{g/L}$ (round 1), and 0.13 $\mu\text{g/L}$ (round 2) slightly above the MDL of 0.10 $\mu\text{g/L}$. There are no Guidance Values for endrin promulgated in the NYSDEC Memorandum for groundwater. However, the standard for endrin in surface water classified as "Protected for Source for Drinking Water" is 0.20 $\mu\text{g/L}$. No other pesticides were detected in groundwater samples collected at the Station.

TAL metals/cyanide levels found in groundwater samples from 02-001MW and 03-001MW are listed on Table 6.10 and compared against the maximum values obtained from the background sampling location (01-001MW) to determine if analyte levels exceeded naturally occurring concentrations. Thirteen TAL metals slightly exceeded maximum background levels in at least one sampling round. Only manganese and nickel were detected in excess of maximum background levels from the same well (03-001MW) in both sampling rounds. Due to the location of the background monitoring well (immediately downgradient of the Station boundary), background levels are indicative of water quality entering the Station. Lead was detected at a maximum concentration of 47.6 $\mu\text{g/L}$ in 03-001MW (round 2) and compares to a maximum background level of 35.9 $\mu\text{g/L}$. Mercury and cyanide were not detected in groundwater samples from 02-001MW or 03-001MW.

Table 6.10
TAL Metals and Cyanide Analytical Results for Groundwater at Roslyn ANGS
Roslyn ANGS, Roslyn, New York

Monitoring Well Number: Concentration:	01-001MW (Background*) µg/L	02-001MW1 (µg/L)	03-001MW1 (µg/L)	02-001MW2 (µg/L)	03-001MW2 (µg/L)
<u>Metals</u>					
Aluminum)	(10,500)	13,500	8,400	3,100	11,800
Antimony	(U)	26U	26U	26U	27B
Arsenic	(12.2)	5U	5U	5U	6.5B
Barium	(122B)	201	139B	115B	230
Beryllium	(U)	1.2B	1U	1U	1U
Cadmium	(U)	4U	4U	4U	4U
Calcium	(29,100)	27,700	18,200	29,100	18,000
Chromium	(42.6)	29.2	25.8	9U	34.2
Cobalt	(24B)	18.4B	12.2B	14.4B	25.5B
Copper	(35.0)	35.5	25.6	10.3B	41.69
Iron	(46,300)	58,900	31,800	12,800	38,500
Lead	(35.9)	24.2	19.0	7.1	47.6
Magnesium	(12,400)	11,400	4,430B	11,500	6,300
Manganese	(948)	2,230	1,600	964	3,890
Mercury	(0.35)	0.22	0.22	0.20U	0.20U
Nickel	(27.2B)	23U	39.2B	23.0U	73.0
Potassium	(3,520)	3,170B	2,250B	2,780B	2,610B
Selenium	(U)	5U	5U	5U	5U
Silver	(U)	5U	5U	5U	5U
Sodium	(17,100)	16,600	19,500	24,200	15,500
Thallium	(U)	5U	5U	5U	5U
Vanadium	(39.6B)	55.3	20.1B	11.9B	25.3B
Zinc	(88.8)	53.2	72.5	21.8	90.4
Cyanide	(U)	10U	10U	10U	10U

TAL - Target Analyte List.

*Background values represent the maximum concentrations detected at 01-001MW from both sampling rounds.

MW1 - Round 1 groundwater sampling. Conducted 16 May 1994.

MW2 - Round 2 groundwater sampling. Conducted 18 May 1994.

U - Analyte was analyzed for but was not detected. Detection limit is shown.

B - Reported value was less than the CRDL but greater than the IDL.

Bold - Presence of analyte confirmed above detection limit.

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SECTION 7.0 RECOMMENDATIONS

The following recommendations have been reviewed by the NYDEC. On 12 October 1995 the NYDEC submitted a letter, included in Appendix J, to the ANGRC/CEVR stating they agree with the recommendations. In addition the agency has removed the Roslyn ANGTS from any further investigation consideration.

7.1 IRP Site No. 1

Based on the results of the SI conducted, it is recommended that a No Further Action Decision Document be generated for IRP Site No. 1.

7.2 IRP Site No. 2

Based on the results of the SI conducted, it is recommended that additional soil sampling be conducted to establish background concentrations of TAL metals in soils to determine if levels detected at IRP Site No. 2 exceed naturally occurring conditions.

7.3 IRP Site No. 3

Based on the results of the SI conducted, it is recommended that a No Further Action Decision Document be generated for IRP Site No. 3.

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