

INSTALLATION RESTORATION PROGRAM

FINAL

SITE INVESTIGATION REPORT VOLUME I

182 Airlift Wing
Illinois Air National Guard, Greater Peoria Airport
Peoria, Illinois

June 1996

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Environmental Restoration and Waste Management Programs

Oak Ridge, Tennessee 37831-7606

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FINAL

INSTALLATION RESTORATION PROGRAM
SITE INVESTIGATION REPORT
VOLUME I

182 AIRLIFT WING
ILLINOIS AIR NATIONAL GUARD, GREATER PEORIA AIRPORT
PEORIA, ILLINOIS

Submitted to:

AIR NATIONAL GUARD READINESS CENTER
ANDREWS AFB, MARYLAND

Submitted by:

HAZARDOUS WASTE REMEDIAL ACTIONS PROGRAM
LOCKHEED MARTIN ENERGY SYSTEMS, INC.
Oak Ridge, Tennessee 37831

for the:

U.S. DEPARTMENT OF ENERGY

Prepared by:

THE EARTH TECHNOLOGY CORPORATION
Oak Ridge, Tennessee 37830

JUNE 1996

TABLE OF CONTENTS

SITE INVESTIGATION REPORT
182 AIRLIFT WING
ILLINOIS AIR NATIONAL GUARD, GREATER PEORIA AIRPORT
PEORIA, ILLINOIS

<u>Section</u>	<u>Page</u>
LIST OF TABLES	v
LIST OF FIGURES	vii
ACRONYMS AND ABBREVIATIONS	ix
EXECUTIVE SUMMARY	S-1
1.0 INTRODUCTION	1-1
1.1 PURPOSE OF THE INSTALLATION RESTORATION PROGRAM	1-1
1.2 PURPOSE OF THE SITE INVESTIGATION	1-3
1.3 REPORT ORGANIZATION	1-4
1.4 FACILITY BACKGROUND	1-5
1.4.1 Facility History	1-6
1.4.2 Site Descriptions	1-6
1.4.2.1 Site 1 - Septic System Filter Beds	1-8
1.4.2.2 Site 2 - Grassy Area Along Facility Boundary East of Aircraft Apron	1-8
1.4.2.3 Site 3 - Grass Area West of Aircraft Apron and East of Fuel Truck Parking (and area adjacent to Building 23 and 6)	1-12
1.5 PREVIOUS PROGRAM ACTIVITIES	1-14
1.6 ENVIRONMENTAL SETTING	1-15
1.6.1 Physiography	1-15
1.6.2 Climate	1-15
1.6.3 Soils	1-16
1.6.4 Surface Water Hydrology	1-16
1.6.5 Regional Hydrogeologic Setting	1-18
1.6.5.1 Regional Geology	1-18
1.6.5.2 Regional Hydrogeology	1-21
1.6.6 Local Geologic Setting	1-21
1.6.6.1 Local Geology	1-24
1.6.6.2 Local Hydrogeology	1-25
1.7 Ecology	1-25
1.8 Water Resources	1-26
2.0 FIELD PROGRAM	2-1
2.1 FIELD PROGRAM SUMMARY	2-1
2.2 GEOLOGIC AND HYDROGEOLOGIC INVESTIGATIONS	2-1

2.2.1	Static Groundwater Measurements	2-1
2.2.2	Aquifer Testing	2-3
2.2.3	Piezometer Installation	2-4
2.3	FIELD SCREENING ACTIVITIES	2-5
2.3.1	Initial Site Screening Activities	2-5
2.3.1.1	Sampling Methods	2-5
2.3.1.2	Analytical Methods - Soil Gas and Groundwater Screening	2-7
2.3.2	On-Site GC Screening of Soil Samples	2-9
2.4	DECONTAMINATION PROCEDURES	2-10
2.5	CONFIRMATION ACTIVITIES	2-11
2.5.1	Soil Sampling Activities	2-12
2.5.1.1	Soil Sampling (Drill Rig)	2-12
2.5.1.2	Hand-augured Soil Sampling	2-14
2.5.3	Monitoring Well Installation, Development and Sampling	2-14
2.5.3.1	Monitoring Well Installation	2-15
2.5.3.2	Monitoring Well Development	2-15
2.5.3.3	Groundwater Sampling and Analysis	2-16
2.6	BACKGROUND SAMPLING	2-17
2.7	SURVEYING	2-17
2.8	DISPOSAL OF WASTES AND SOIL CUTTINGS FROM FIELD ACTIVITIES ...	2-17
3.0	SIGNIFICANCE OF RESULTS	3-1
3.1	FACILITY GEOLOGY AND HYDROGEOLOGY	3-1
3.1.1	Facility Geology	3-2
3.1.2	Facility Hydrogeology	3-2
3.2	DATA QUALITY ASSESSMENT	3-6
3.2.1	Data Quality Objectives	3-6
3.2.1.1	Precision	3-6
3.2.1.2	Accuracy	3-10
3.2.1.3	Representativeness	3-12
3.2.1.4	Comparability	3-13
3.2.1.5	Completeness	3-14
3.3	FIELD QUALITY CONTROL ASSESSMENT	3-14
3.3.1	Trip Blanks	3-14
3.3.2	Field Blanks	3-15
3.3.3	Equipment Rinseates	3-15
3.3.4	Field Replicates	3-15
3.4	LABORATORY QUALITY CONTROL ASSESSMENT	3-16
3.5	BACKGROUND SAMPLING	3-17
3.5.1	Soils	3-19
3.5.2	Groundwater	3-22
3.6	SITE 1: SEPTIC SYSTEM FILTER BEDS	3-25
3.6.1	Site Geology and Hydrogeology	3-26
3.6.2	Screening Activity Results	3-31

3.6.2.1	Soil Gas and Groundwater Screening Results	3-31
3.6.2.2	Field GC Screening Results	3-34
3.6.3	Confirmation and Delineation Results	3-34
3.6.3.1	Surface Soil Samples	3-36
3.6.3.2	Subsurface Soil Samples	3-36
3.6.3.3	Groundwater Samples	3-49
3.6.3.4	Conclusions	3-52
3.7	SITE 2 - GRASSY AREA ALONG FACILITY BOUNDARY EAST OF THE AIRCRAFT APRON	3-53
3.7.1	Site Geology and Hydrogeology	3-54
3.7.2	Screening Activity Results	3-58
3.7.2.1	Soil Gas and Groundwater Screening Results	3-58
3.7.2.2	Field GC Screening Results	3-60
3.7.3	Confirmation and Delineation Results	3-60
3.7.3.1	Surface Soils	3-60
3.7.3.2	Subsurface Soil Samples	3-63
3.7.4	Conclusions	3-67
3.8	SITE 3: GRASS AREA WEST OF AIRCRAFT APRON AND EAST OF FUEL TRUCK PARKING (and area adjacent to Facilities 23 and 6)	3-69
3.8.1	Site Geology and Hydrogeology	3-70
3.8.2	Screening Activity Results	3-76
3.8.2.1	Soil Gas and Groundwater Screening Results	3-76
3.8.2.2	Field GC Screening Results	3-77
3.8.3	Confirmation and Delineation Results	3-77
3.8.3.1	Surface Soil Samples	3-80
3.8.3.2	Subsurface Soil Samples	3-85
3.8.3.3	Groundwater Samples	3-92
3.8.4	Conclusions	3-104
4.0	PRELIMINARY RISK EVALUATION	4-1
4.1	PRELIMINARY HUMAN HEALTH EVALUATION	4-1
4.1.1	Identification of Chemicals of Potential Concern	4-1
4.1.1.1	Site 1: Septic System Filter Beds	4-2
4.1.1.2	Site 2 - Grass Area Along the facility Boundary East of Aircraft Apron	4-5
4.1.1.3	Site 3 - Grass Area West of Aircraft Apron and East of Fuel Truck Parking Area	4-8
4.1.2	Exposure Assessment	4-17
4.1.2.1	Characterization of Exposure Setting	4-17
4.1.2.2	Exposure Pathways	4-19
4.1.3	Toxicity Assessment	4-22
4.1.4	Risk Screening	4-23

4.1.4.1	Site 1 - Septic System Filter Beds	4-24
4.1.4.2	Site 2 - Grass Area Along the Base Boundary East of Aircraft Parking Apron	4-26
4.1.4.3	Site 3 - Grass Area West of Aircraft Apron and East of Fuel Truck Parking (and area adjacent to Facilities 6 and 23)	4-26
4.2	ECOLOGICAL RISK EVALUATION	4-26
4.2.1	Summary of Analytical Data Used in the Ecological PRE	4-27
4.2.2	Identification of Potential Receptors	4-28
4.2.2.1	Site 1 - Septic System Filter Beds	4-28
4.2.2.2	Site 2 - Grass Area Along the Base Boundary East of Aircraft Parking Apron	4-28
4.2.2.3	Site 3 - Grass Area West of Aircraft Apron and East of Fuel Truck Parking (and area adjacent to Facilities 6 and 23)	4-29
4.2.3	Ecological Exposure Pathways	4-29
4.2.3.1	Site 1 - Septic System Filter Beds	4-29
4.2.3.2	Site 2 - Grass Area Along the Base Boundary East of Aircraft Parking Apron	4-30
4.2.3.3	Site 3 - Grass Area West of Aircraft Apron and East of Fuel Truck Parking (and area adjacent to Facilities 6 and 23)	4-30
4.2.4	Ecological Hazard Assessment	4-30
4.3	SUMMARY OF THE PRELIMINARY HUMAN HEALTH AND ECOLOGICAL EVALUATION	4-32
5.0	SUMMARY, CONCLUSIONS AND RECOMMENDATIONS	5-1
5.1	SUMMARY AND CONCLUSIONS	5-1
5.1.1	Facility Geology and Hydrogeology	5-2
5.1.2	Quality Assurance/Quality Control	5-2
5.1.3	Site 1: Septic System Filter Beds	5-2
5.1.4	Site 2: Grassy Area Along the Base Boundary East of Aircraft Apron	5-3
5.1.5	Site 3: Grass Area West of Aircraft Apron and East of Fuel Truck Parking Area (and area adjacent to Facility 23 and 6)	5-4
5.2	RECOMMENDATIONS	5-7
6.0	BIBLIOGRAPHY	6-1

LIST OF TABLES

SITE INVESTIGATION REPORT 182 AIRLIFT WING ILLINOIS AIR NATIONAL GUARD, GREATER PEORIA AIRPORT PEORIA, ILLINOIS

<u>Table</u>	<u>Page</u>
2-1 Summary of Site Investigation Field Program	2-2
2-2 Container, Preservation, and Holding Time Requirements	2-13
3-1 Well Construction and Water Level Elevations	3-3
3-2 Hydraulic Conductivity, Gradients, Groundwater Velocity, and Transmissivity Values For the Shallow Aquifer	3-7
3-3 Data Summary Table: Soils - Background	3-20
3-4 Data Summary Table: Groundwater - Background	3-23
3-5 Data Summary Table: Subsurface Soils, Site 1 - Septic Filter Beds	3-37
3-6 Site 1: TAL Metals Summary - Subsurface Soil	3-48
3-7 Data Summary Table: Groundwater, Site 1 - Septic Filter Beds	3-50
3-8 Site 1: TAL Metals Summary - Groundwater	3-51
3-9 Data Summary Table: Surface Soil, Site 2 - Facility Boundary East of Aircraft Apron	3-61
3-10 Site 2: Inorganic Contaminant Summary - Surface Soils	3-64
3-11 Data Summary Table: Subsurface Soils, Site 2- Facility Boundary East of Aircraft Apron	3-65
3-12 Site 2 Contaminant Summary - Subsurface Soil	3-68
3-13 Surficial Aquifer Properties	3-76
3-14 Data Summary Table: Surface Soils, Site 3 - Grass Area West of Aircraft Apron East of Fuel Truck Parking area (and Area Adjacent to Facilities 6 and 23) Section 3B	3-81
3-15 Site 3 Section 3B Contaminant Summary - Surface Soil	3-84
3-16 Data Summary Table: Subsurface Soils, Site 3 - Grass Area West of Aircraft Apron East of Fuel Truck Parking area (and Area Adjacent to Facilities 6 and 23) Section 3A	3-86
3-17 Data Summary Table: Subsurface Soils, Site 3 - Grass Area West of Aircraft Apron East of Fuel Truck Parking area (and Area Adjacent to Facilities 6 and 23) Section 3B	3-88
3-18 Data Summary Table: Subsurface Soils, Site 3 - Grass Area West of Aircraft Apron East of Fuel Truck Parking area (and Area Adjacent to Facilities 6 and 23) Section 3C	3-89
3-19 Site 3, Section 3A Contaminant Summary - Subsurface Soil	3-93
3-20 Site 3, Section 3B Contaminant Summary - Subsurface Soil	3-94
3-21 Site 3, Section 3C Contaminant Summary - Subsurface Soil	3-95

3-22	Data Summary Table: Groundwater, Site 3 - Grass Area West of Aircraft Apron East of Fuel Truck Parking area (and Area Adjacent to Facilities 6 and 23) Section 3A	3-96
3-23	Data Summary Table: Groundwater, Site 3 - Grass Area West of Aircraft Apron East of Fuel Truck Parking area (and Area Adjacent to Facilities 6 and 23) Section 3B	3-97
3-24	Data Summary Table: Groundwater, Site 3 - Grass Area West of Aircraft Apron East of Fuel Truck Parking area (and Area Adjacent to Facilities 6 and 23) Section 3C	3-98
3-25	Site 3, Section 3A Contaminant Summary - Groundwater	3-101
3-26	Site 3, Section 3B Contaminant Summary - Groundwater	3-102
3-27	Site 3, Section 3C Contaminant Summary - Groundwater	3-103
4-1	Site 1 Contaminant Summary - Subsurface Soil	4-3
4-2	Site 1 Contaminant Summary - Groundwater	4-4
4-3	Site 2 Contaminant Summary - Surface Soils	4-6
4-4	Site 2 Contaminant Summary - Subsurface Soil	4-7
4-5	Site 3, Section 3A Contaminant Summary - Subsurface Soil	4-9
4-6	Site 3, Section 3A Contaminant Summary - Groundwater	4-10
4-7	Site 3, Section 3B Contaminant Summary - Surface Soil	4-12
4-8	Site 3, Section 3B Contaminant Summary - Subsurface Soil	4-13
4-9	Site 3, Section 3B Contaminant Summary - Groundwater	4-14
4-10	Site 3, Section 3C Contaminant Summary - Subsurface Soil	4-15
4-11	Site 3, Section 3C Contaminant Summary - Groundwater	4-16
4-12	Carcinogenic Classifications and Intake Estimates - Groundwater	4-24
4-13	Intake Estimates and Cancer Classifications - Soil	4-25

LIST OF FIGURES

SITE INVESTIGATION REPORT 182 AIRLIFT WING ILLINOIS AIR NATIONAL GUARD, GREATER PEORIA AIRPORT PEORIA, ILLINOIS

<u>Figure</u>	<u>Page</u>
1-1 General Site Map	1-7
1-2 IRP Site Location Map	1-9
1-3 Site 1: Septic System Filter Beds - Site Plan	1-10
1-4 Site 2: Grassy Area Along Facility Boundary East of the Aircraft Apron - Site Plan ..	1-11
1-5 Site 3: Sections 3A, 3B, and 3C; Grass Area West of Aircraft Apron and East of Truck Parking and Area Adjacent to Facilities 6 and 23 - Site Plan	1-13
1-6 Facility Soils Map	1-17
1-7 Surface Water Drainage	1-19
1-8 Regional Surface Drainage Map	1-20
1-9 Generalized Geologic Column of Bedrock Formations Above the Lower Ordovician in the Peoria Region	1-22
1-10 Generalized Geologic Column of the Glacial Deposits in the Peoria Region	1-23
1-11 Groundwater Use Map	1-27
3-1 Facility Groundwater Elevation Map April 18, 1993	3-5
3-2 Facility Background Sampling Locations	3-18
3-3 Site 1: Septic System Filter Beds - Sample Location Map	3-27
3-4 Site 1: Septic System Filter Beds - Lines of Cross Section	3-28
3-5 Site 1: Septic System Filter Beds - Cross Section A-A'	3-29
3-6 Site 1: Septic System Filter Beds - Cross Section B-B'	3-30
3-7 Site 1: Septic System Filter Beds - VOCs in Soil Gas Samples Isoconcentration Map	3-32
3-8 Site 1: Septic System Filter Beds - TCE in Soil Gas Samples Isoconcentration Map	3-33
3-9 Site 1: Septic System Filter Beds - Subsurface Soil Analytical Data Summary (PNA and TPH)	3-45
3-10 Site 1: Septic System Filter Beds - Cross Section B-B' PNA and TPH Concentrations	3-46
3-11 Site 2: Grassy Area Along Facility Boundary East of the Aircraft Apron Sample Location Map	3-55
3-12 Site 2: Grassy Area Along Facility Boundary East of the Aircraft Apron Line of Cross Section	3-56
3-13 Site 2: Grassy Area Along Facility Boundary East of the Aircraft Apron Cross Section	3-57
3-14 Site 2: Grassy Area Along Facility Boundary East of the Aircraft Apron Total VOCs in Soil Gas Samples Isoconcentration Map	3-59

3-15	Site 2: Grassy Area Along Facility Boundary East of the Aircraft Apron Surface Soil Analytical Data Summary (PNA and TPH)	3-62
3-16	Site 2: Grassy Area Along Facility Boundary east of the Aircraft Apron Subsurface Soil analytical Data Summary (PNA and TPH)	3-66
3-17	Site 3: Sections 3A, 3B, and 3C; Grass Area West of Aircraft Apron and East of Truck Parking and Area Adjacent to Facilities 6 and 23 SOV Location Map	3-71
3-18	Site 3: Sections 3A, 3B, and 3C; Grass Area West of Aircraft Apron and East of Truck Parking and Area Adjacent to Facilities 6 and 23 Sample Location Map	3-72
3-19	Site 3: Sections 3A, 3B, and 3C; Grass Area West of Aircraft Apron and East of Truck Parking and Area Adjacent to Facilities 6 and 23 Lines of Cross Section	3-73
3-20	Site 3: Cross Section 3B Cross Section	3-74
3-21	Site 3: Cross Section 3C Cross Section	3-75
3-22	Site 3: Sections 3A, 3B, and 3C; Grass Area West of Aircraft Apron and East of Truck Parking and Area Adjacent to Facilities 6 and 23 Groundwater Screening Results ($\mu\text{g}/\ell$)	3-78
3-23	Site 3: Sections 3A, 3B, and 3C; Grass Area West of Aircraft Apron and East of Truck Parking and Area Adjacent to Facilities 6 and 23 SOV Screening Results ($\mu\text{g}/\ell$)	3-79
3-24	Site 3: Sections 3A, 3B, and 3C; Grass Area West of Aircraft Apron and East of Truck Parking and Area Adjacent to Facilities 6 and 23 Surface Soil Analytical Data Summary	3-82
3-25	Site 3: Sections 3A, 3B, and 3C; Grass Area West of Aircraft Apron and East of Truck Parking and Area Adjacent to Facilities 6 and 23 Subsurface Soil Analytical Data Summary	3-91
3-26	Site 3: Sections 3A, 3B, and 3C; Grass Area West of Aircraft Apron and East of Truck Parking and Area Adjacent to Facilities 6 and 23 Analytical Data Summary	3-99

ACRONYMS AND ABBREVIATIONS

SITE INVESTIGATION REPORT 182 AIRLIFT WING ILLINOIS AIR NATIONAL GUARD, GREATER PEORIA AIRPORT PEORIA, ILLINOIS

ANG	Air National Guard
ANGRC	Air National Guard Readiness Center
ARARs	Applicable or Relevant and Appropriate Requirements
ASTM	American Standards Test Methods
AWQC	Ambient Water Quality Criteria
B	Blank Contamination
BCE	Base Civil Engineer
BEHP	Bis (2 ethylehexyl) Phthalate
bgs	Below Ground Surface
BTEX	Benzene, Toluene, Ethylbenzene, Xylene
CE	Civil Engineering
CEC	Cation Exchange Capacity
CLP	Contract Lab Program
COPC	Chemical of Potential Concern
CRDL	Contract Required Detection Limits
CRQL	Contract Required Quantitation Limits
DCE	Dichloroethylene
DD	Decision Document
DL	Detection Limits
DOD	Department of Defense
DOE	U.S. Department of Energy
DQOs	Data Quality Objectives
Earth Technology	The Earth Technology Corporation
ECD	Electron Capture Detector
EPA	Environmental Protection Agency
FFS	Focused Feasibility Study
FID	Flame Ionization Detector
FG	Fighter Group
FS	Feasibility Study
FSP	Field Sampling Plan
FTA	Fire Training Area

GC	Gas Chromatograph
GPRA	Greater Peoria Regional Airport
GC/MS	Gas Chromatography/Mass Spectrometry
HARM	Hazardous Assessment Rating Methodology
HAZWAP	Hazardous Waste Remedial Actions Program
Hg	Inches of Mercury
HMTC	Hazardous Materials Technical Center
ID	Inner Diameter
ILANG	Illinois Air National Guard
ILEPA	Illinois Environmental Protection Agency
IRP	Installation Restoration Program
JP-4	Petroleum Jet Fuel #4
K	Hydraulic Conductivity
LCS	Laboratory Control Sample
LQL	Lower Quantitifiable Limit
MCL	Maximum Contaminant Level
MDL	Method Detection Limit
mg/L	milligrams/liter
mg/kg	milligrams/kilogram
ml	milliliter
MS/MSD	Matrix Spike/Matrix Spike Duplicate
MSL	Mean Sea Level
NCP	National Contingency Plan
NOAA	National Oceanic and Atmospheric Administration
PA	Preliminary Assessment
PNA	Polynuclear Aromatic Hydrocarbons
PARCC	Precision, Accuracy, Representativeness, Comparability, and Completeness
PCB	Polychlorinated Biphenyl
PCE	Tetrachloroethene
PD-680	Petroleum Distillate 680
PID	Photo Ionization Detector
POL	Petroleum, Oil, and Lubricant
PP	Priority Pollutant
ppb	parts per billion
PRE	Preliminary Risk Evaluation
PS-661	Petroleum Solvent 661
PVC	Polyvinyl Chloride

QA	Quality Assurance
QA/QC	Quality Assurance\Quality Control
QAPP	Quality Assurance Project Plan
QC	Quality Control
RCRA	Resource Conservation Recovery Act
RD	Remedial Design
RF	Response Factor
RI	Remedial Investigation
RM	Remedial Measure
RPD	Relative Percent Difference
SAP	Sampling and Analysis Plan
SARA	Superfund Amendments and Reauthorization Act
Sci-Tek	Science and Technology
SI	Site Investigation
SOP	Standard Operating Procedure
SOV	Soil Organic Vapor
SOW	Statement of Work
SVOCs	Semivolatile Organic Compounds
T	Transmissivity Values
TAL	Target Analyte List
TCA	Trichloroethane
TCE	Trichloroethene
TCLP	Toxicity Characteristic Leaching Procedure
TPH	Total Petroleum Hydrocarbons
TVOC	Total Volatile Organic Compound
$\mu\text{g}/\ell$	Micrograms per liter
$\mu\text{g}/\text{kg}$	Micrograms per kilogram
USAF	U.S. Air Force
USCS	Unified Soil Classification System
USEPA	United States Environmental Protection Agency
UST	Underground Storage Tank
v	Groundwater Velocity
VOCs	Volatile Organic Compounds
WP	Work Plan

EXECUTIVE SUMMARY

This Site Investigation (SI) Report documents activities The Earth Technology Corporation performed at the Illinois Air National Guard (ILANG), 182 Airlift Wing, Greater Peoria Regional Airport (GPRA), Peoria, Illinois under the U.S. Department of Defense Installation Restoration Program. Three sites were identified at ILANG, GPRA during the Preliminary Assessment completed by Engineering-Science: Site 1 - Septic System Filter Beds, Site 2 - Grassy Area Along Facility Boundary East of the Aircraft Apron, and Site 3 - Grass Area West of Aircraft Apron and East of Fuel Truck Parking (and area adjacent to Buildings 23 and 6). The SI was conducted to:

- Confirm or deny the presence of contamination at the sites
- Identify the sources and nature of contamination at the sites
- Provide an assessment of the extent, magnitude, and movement of contamination
- Identify the potential threat of contamination to human health or the environment.

Site 1, Septic System Filter Beds, was located along the east portion of the facility. Discharge from the septic tank entered the open filter beds, permeating the sand and gravel subbase and the surrounding soil. Solvents were reportedly disposed of in the septic system, and wastes from routine Motor Pool activities may have been discharged into the system. Site 2, Grassy Area Along Facility Boundary East of Aircraft Apron, was a grass-covered area south of Building 3 along the existing property fence line. Solvents were reportedly used along the fence line for weed control. Site 3, Grass Area West of Aircraft Apron and East of Fuel Truck Parking (and area adjacent to Buildings 23 and 6), consisted of three areas where solvents may have been disposed of on the ground.

FIELD PROGRAM

The major portion of the field effort, including soil gas sampling, drilling soil borings, installing monitoring wells, soil and groundwater sampling, and aquifer testing was conducted from November to December 1992. The second round of groundwater sampling was conducted from April 12 to April 21, 1993. Laboratory analyses of soil and groundwater samples included analysis for volatile organic compounds (VOCs), semivolatile organic compounds (SVOCs), total petroleum hydrocarbons (TPH), and target analyte list (TAL) metals.

SIGNIFICANCE OF RESULTS AND PRELIMINARY RISK EVALUATION (PRE)

The data collected during the field program was interpreted and a preliminary risk evaluation performed for each site. This risk evaluation is a preliminary screening of the data to evaluate the potential for adverse effects to human health or the environment.

SITE 1

SI results for Site 1 indicated that the soils and fill materials within and adjacent to the old septic filter beds contains organic compounds indicative of waste fuels and oils. Soil borings drilled around the perimeter of the filter beds contained SVOCs in the shallow subsurface soil samples. Minor amounts of the VOC 2-butanone were detected in the soil samples. Cadmium, lead, and silver were detected in at least one sample in concentrations greater than two times the maximum background concentration.

One hydraulically down-gradient groundwater monitoring well was installed at Site 1. No organic compounds were detected above the Illinois Environmental Protection Agency (IEPA) Class I groundwater standards. Total lead was detected in one round of sampling at 13 $\mu\text{g}/\ell$. This concentration is above the Class I standard (7.5 $\mu\text{g}/\ell$) and below the federal maximum contaminant level (MCL) (15 $\mu\text{g}/\ell$). No dissolved lead was detected in the filtered sample.

The PRE at Site 1 indicated that no immediate endangerment to human health or the environment exists from contaminants present at Site 1. The site is asphalt-covered and no current exposure to contaminated soils is possible. Future exposure could occur during excavation activities at the site. Vinyl chloride, a Class A carcinogen, was detected in the groundwater at concentrations below IEPA Class I groundwater standards but above the calculated groundwater intake concentrations considered acceptable for cancer risk. The hydraulically down-gradient well was installed adjacent to the facility boundary. The nearest hydraulically down-gradient off-site well was identified 1.1 miles from the facility.

SITE 2

No VOCs indicative of past solvent disposal were detected in the soils at Site 2. SI results for Site 2 indicate that the surface and subsurface soils contain low levels of SVOCs [polynuclear aromatic hydrocarbons (PNAs)] and TPH. No TAL metals were detected at elevated levels. A groundwater monitoring well was not installed at Site 2 because permission was not obtained to cross the county right-of-way beyond the fence line at Site 2.

The initial PRE at Site 2 indicated that no immediate endangerment to human health or the environment exists from the presence of chemicals in the soils. Exposure to soils may occur during vegetation control; however, the extent of the exposure was likely minimal. The concentrations of carcinogenic PNA compounds were below the concentration which would indicate the potential for an unacceptable 10^{-6} health risk should exposure occur, with the exception of one detection of benzo(a)pyrene. No groundwater samples were collected at Site 2, therefore, no risk evaluation was performed for the groundwater exposure pathway. The PNA compounds and metals detected in the soil will likely remain adsorbed to the soil rather than leach to the groundwater.

SITE 3

Site 3 consists of three distinct areas (Section 3A, 3B, and 3C). These areas were investigated as separate areas and are discussed separately.

Section 3A

Initial soil gas and groundwater screening results suggested the presence of toluene in the soil and chlorinated VOCs in the groundwater. Subsequent laboratory analysis showed no VOCs in the soil. One subsurface soil sample contained low concentrations of PNAs detected below the method detection limit (MDL). No TAL metals were detected above two times the background concentration. Trichloroethene (TCE) ($8.1 \mu\text{g}/\ell$) was detected above IEPA Class I groundwater standard of $5 \mu\text{g}/\ell$ but was not detected in the subsequent sampling round. Low concentrations of VOCs (ethylbenzene, 1,2 transdichloroethene (DCE), and benzoic acid) were also detected only in the initial sampling round. No dissolved TAL metals were detected above two times the background concentration.

The PRE for Section 3A indicated that no immediate endangerment to human health or the environment exists due to the presence of chemicals in the soil or groundwater at the site. The concentration of TCE detected in the groundwater ($8.1 \mu\text{g}/\ell$) was above Class I groundwater standards of $5 \mu\text{g}/\ell$ and above the intake concentration for unacceptable cancer risk for residential use of groundwater.

Section 3B

Initial soil gas and groundwater screening results suggested the presence of toluene (soils only) and chlorinated VOCs in the soil and groundwater. Subsequent laboratory analysis indicated the presence of arsenic and SVOCs (PNAs, and bis 2ethylhexyl phthalate) in the soil. Low concentrations of VOCs (chlorinated VOCs, ethylbenzene and benzoic acid) were detected in the groundwater.

The PRE for Section 3B indicated that no immediate endangerment to human health or the environment exists due to the presence of chemicals in the soil or groundwater at the site. Current exposure to surface soils was possible during vegetative control activities; however, the extent of exposure was minimal since the area was grass-covered. The concentrations present in the soil were below the concentrations which would indicate a 10^{-6} unacceptable

cancer risk should exposure occur, with the exception of two detections of benzo(a)pyrene in the surface soil. The low concentrations of VOCs present in the groundwater were below IEPA Class I standards and below levels considered unacceptable for cancer risk from residential use of the groundwater.

Section 3C

Initial soil gas and groundwater screening suggested the presence of TCE in the soil gas. Laboratory analysis indicated no VOCs present in the soil for Section 3C. PNAs were identified in only one soil sample. Concentrations of PNAs were below the MDL. One occurrence of silver was identified above two times the background concentration. Low concentrations of VOCs (TCE, ethylbenzene, and toluene) were detected in the initial round of groundwater sampling but were not confirmed in the second round. The VOC 1,2 DCE was detected at concentrations below the MDL in the second sampling round. All detections were well below the IEPA Class I groundwater criteria.

The PRE for Section 3C indicated that no immediate endangerment to human health or the environment exists due to the presence of chemicals in the soil or groundwater at the sites. The low concentrations of SVOCs (PNAs) detected in the subsurface soil did not pose a health or ecological risk to receptors. The concentrations of VOCs detected in the groundwater were well below the concentrations which would suggest an unacceptable cancer risk or a noncarcinogenic risk from exposure to the groundwater.

RECOMMENDATIONS

The limited groundwater investigation indicates the presence of low concentrations of VOCs (vinyl chloride, 1,2 trans DCE) confirmed in two rounds of sampling. Other VOCs (including TCE, ethylbenzene, toluene) were detected in the initial round but were not confirmed in the second round. A third round of groundwater sampling is recommended to confirm the compounds present in the groundwater. Source areas should be identified and the vertical and lateral extent of any related soil and/or groundwater contamination should be determined.

A Remedial Investigation is recommended for the Site 1 soils based on concern regarding the depth to groundwater in the Site 1 area and the presence of high concentrations of the more carcinogenic PNA compounds. While PNA compounds as a class are generally immobile, the depth to groundwater in the Site 1 area (approximately 2 feet below ground surface) suggests that the compounds would not have to be extremely mobile to affect the groundwater. The high concentrations of PNA compounds in the soil could pose a health threat from the direct contact pathway if the soils became exposed in the future. Additional soils data should be collected in order to fully define the extent of contamination around the filter bed. Additional investigations are recommended to determine the source area of the vinyl chloride detected in 1MW1.

No additional investigation activities are recommended for the soils at Site 2. PNA compounds were detected above the method detection limit in one surface soil sample at Site 2. Overall, concentrations of both carcinogenic and noncarcinogenic PNA compounds are below the concentration which would indicate a potential health threat.

Concentrations of PNA compounds detected in the surface or subsurface soils at Site 3 (Sections 3A, 3B, and 3C) are below the concentration which would indicate a potential health threat, with the exception of two detections of benzo(a)pyrene in the surface soil in Section 3B. No PNA compounds were detected in the subsurface soil in Section 3B. No further investigation activities are recommended for the soils at Site 3 - Section 3A, 3B, and 3C.

1.0 INTRODUCTION

This report documents the Site Investigation (SI) activities The Earth Technology Corporation (Earth Tech) performed at the 182 Airlift Wing (AW), Greater Peoria Regional Airport (GPRA), Illinois Air National Guard (ILANG), under the U.S. Department of Defense (DOD) Installation Restoration Program (IRP). The field activities were conducted between November 1992 and April 1993. The SI activities were performed in accordance with the SI Work Plan (WP) and Sampling and Analysis Plan (SAP) (Earth Technology, Sept. 1992).

1.1 PURPOSE OF THE INSTALLATION RESTORATION PROGRAM

DOD has initiated the IRP to identify, evaluate, and remediate suspected environmental problems associated with past usage, storage, handling, and disposal of hazardous substances at DOD facilities. Section 120 of the Superfund Amendments and Reauthorization Act (SARA) of 1986 requires that IRP activities adhere to procedures specified in the National Oil and Hazardous Substances Contingency Plan (NCP) Final Rule [55 FR 8666]. The NCP details a sequence of steps to be followed when investigating and cleaning up suspected hazardous waste sites. This sequence begins with the discovery of a suspected hazardous waste release or threat of release, and ends with a permanent remedy to eliminate or minimize the environmental impact and long-term monitoring of the remediation effort. The five phases that constitute the IRP process and the purpose and activities associated with each phase are presented below:

- **Preliminary Assessment** – A Preliminary Assessment (PA) is performed to identify the location of suspected problems associated with past hazardous waste handling procedures, disposal sites, and spill sites. This is accomplished through interviews with past and present base employees, historical records searches, and visual site inspections. Detailed geologic, hydrogeologic, meteorologic, land use, and environmental data for the area of study are also gathered. A detailed analysis of all information obtained identifies sites of concern. The PA for ILANG,

GPRA, was completed by Engineering-Science, Inc. in 1990 (Engineering-Science (ES), 1990).

- **Site Investigation** – The purpose of an SI is to acquire the necessary data to either confirm or deny the existence of contamination at each identified site of concern and to preliminarily evaluate the potential risks to human health, welfare, or the environment. The SI includes identifying specific chemical contaminants and their concentrations in environmental media and determining the potential for contaminant migration through site-specific hydrogeologic investigations. Earth Technology performed the SI for ILANG, GPRA, between November 1992 and April 1993.
- **Remedial Investigation** – During a Remedial Investigation (RI), necessary data are acquired to define the extent of confirmed contamination and to further assess the associated potential risks to human health, welfare, or the environment. The RI quantifies the magnitude and extent of contamination at the sites under investigation and identifies the specific chemical contaminants present and their concentrations in environmental media. A determination also is made as to the potential for contaminant migration by assessing site-specific hydrogeologic and contaminant characteristics.
- **Feasibility Study** – A Feasibility Study (FS) is performed to develop the remedial action alternative that mitigates confirmed environmental contamination at each site and meets the applicable or relevant and appropriate requirements (ARARs). The FS considers risk assessments and cost benefits analyses in providing the necessary data, direction, and documented supportive rationale to acquire regulatory concurrence (federal, state, and local) with the recommended remedial alternative. During the FS, recommendations are evaluated, developed, and provided for remedial actions at each site where remediation is required.

- **Remedial Design** – The purpose of Remedial Design (RD) is to provide engineering design drawings and construction specifications required to implement the recommended remedial action selected through the FS process.
- **Remedial Action** – The Remedial Action (RA) is the implementation of the RD. A RA plan requires appropriate regulatory acceptance prior to implementation.

The IRP requires the identification and evaluation of environmentally deleterious sites on DOD installations and the control of adverse effects on human health or the environment from those sites. The Air National Guard Readiness Center (ANGRC), through a U.S. Air Force (USAF) interagency technical support agreement with the U.S. Department of Energy (DOE), uses Martin Marietta Energy Systems, Inc. (Energy Systems) to provide technical assistance for the implementation of the Air National Guard (ANG) IRP. Earth Technology has been retained by Energy Systems under the Hazardous Waste Remedial Actions Program (HAZWRAF) to conduct the IRP SI at ILANG, GPRA.

1.2 PURPOSE OF THE SITE INVESTIGATION

This SI was conducted to determine whether environmental contamination is present at ILANG, GPRA and to characterize the nature of any identified contamination. If the presence of contaminants in the groundwater and soils at the sites was confirmed, the impacts and risks of confirmed contamination to the environment and surrounding populations were evaluated during the SI based on the limited data obtained. Contaminated sites may require additional field investigative efforts (RIs) to characterize completely the magnitude and extent of any confirmed contamination. The objectives of the SI at ILANG, GPRA were:

- Determine the chemical nature and magnitude of identified contaminants
- Evaluate the potential for contaminant release and migration

- Conduct a preliminary risk evaluation addressing ARARs for remediating confirmed contamination at each site
- Prepare recommendations for broader investigative activities (RIs) to determine the magnitude and extent of contamination, if necessary
- Evaluate the need for immediate response actions
- Support no further action decisions and the completion of Decision Documents (DD) if appropriate.

1.3 REPORT ORGANIZATION

This SI report contains the following sections:

- **Section 1.0 Introduction** – The remainder of this section summarizes the history of the facility, the specifics of each individual site, previous studies conducted at the facility, an overview of the regional demographics and regional geology and hydrogeology.
- **Section 2.0 Field Program** – This section describes the activities, methods, and procedures used for determining the presence or absence of environmental contamination and the hydrogeologic conditions at the facility. This section addresses background sampling and the disposal of wastes generated during the SI field program. Variances between the proposed work plan activities and the field work performed are also discussed.

- **Section 3.0 Significance of Results** – This section provides the geologic, hydrogeologic, and chemical results obtained during the SI program along with the significance of the results. Facility background data are presented in this section.
- **Section 4.0 Preliminary Risk Evaluation (PRE)** – In this section, the sampling results are compared to the ARARs, and a preliminary qualitative human health and ecological risk evaluation is presented.
- **Section 5.0 Conclusions and Recommendations** – This section presents a site-by-site results summary, conclusions of the SI findings, and recommendations of the SI for any future IRP activities.
- **Section 6.0 Bibliography** - This section provides the references noted in the report.

A list of acronyms and abbreviations is included in this SI report. A separate appendix volume is provided, and contains monitoring well installation and soil boring, field logs, soil gas and groundwater screening surveys, surveying data, chemical analytical results, aquifer test methods, and a detailed data quality discussion.

1.4 FACILITY BACKGROUND

The history of ILANG, GPRA and a description of each of the SI sites that were investigated are presented in the following sections.

1.4.1 Facility History

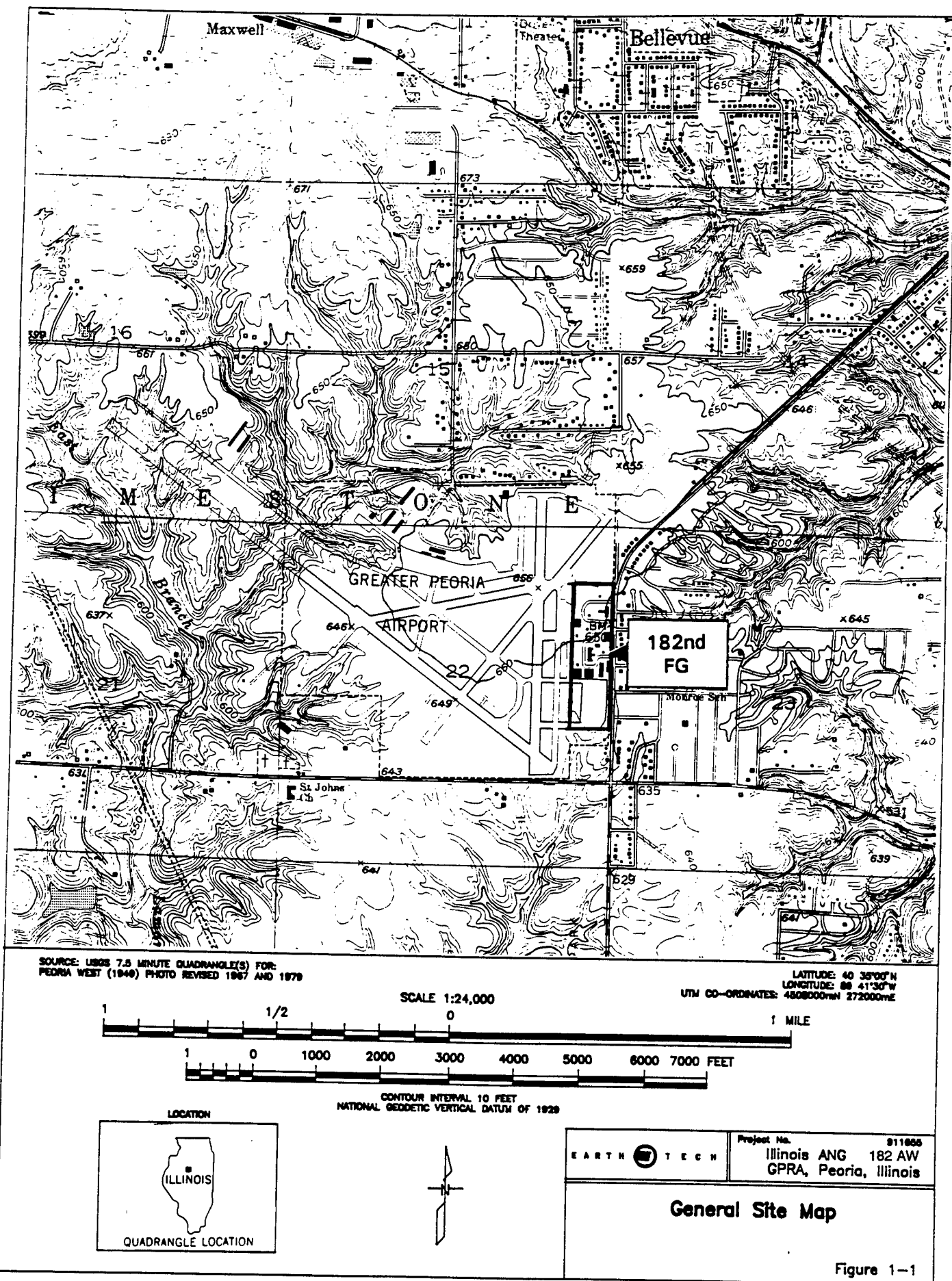
The facility (Figure 1-1) encompasses approximately 47 acres and is situated on the east side of the GPRA property. The facility is located approximately 5 miles southwest of the Peoria central business district and less than 1 mile northwest of Bartonville, Illinois. Land use surrounding the facility is predominantly residential and commercial. The facility was used by the ANG from 1947 to 1995. A new facility has been constructed for the ANG west of the airport. The ANG has vacated the majority of the previous facility and the Army National Guard is now the host organization. The ANG will remain responsible for IRP activities at the facility.

1.4.2 Site Descriptions

The field portion of the PA was conducted by Engineering-Science in 1988 and the final report completed in 1990. Activities included a detailed review of pertinent installation records, a field survey, and sampling and analysis at two sites. Three sites were identified and evaluated using the Air Force's Hazardous Assessment Rating Methodology (HARM). These three sites are listed below:

- Site 1: Septic System Filter Beds
- Site 2: Grass Area Along the Facility Boundary East of Aircraft Apron
- Site 3: Grass Area West of Aircraft Apron and East of Fuel Truck Parking Area (and area adjacent to Building 23 and 6).

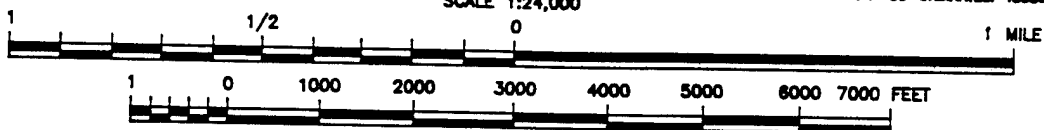
In 1991, a site visit was performed during the kick-off meeting for the SI and two additional areas near Site 3 were identified as potential areas of contamination. Site 3 was subsequently



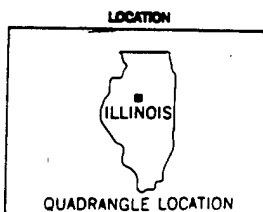
SOURCE: USGS 7.5 MINUTE QUADRANGLE(S) FOR:
PEORIA WEST (1949) PHOTO REVISED 1967 AND 1979

SCALE 1:24,000

LATITUDE: 40 35'00"N
LONGITUDE: 89 41'30"W
UTM CO-ORDINATES: 4808000mE 272000mN



CONTOUR INTERVAL 10 FEET
NATIONAL GEODETIC VERTICAL DATUM OF 1929



expanded to include these areas. The expanded Site 3 consists of the original Site 3 Grass Area West of Aircraft Apron and East of Fuel Truck Parking Area (now designated Section 3B); Section 3C Grassy Area South of Section 3B, and Section 3A: Gravel Area between Buildings 23 and 6. Figure 1-2 shows the location of all sites. Descriptions of the sites investigated during the SI program are provided below.

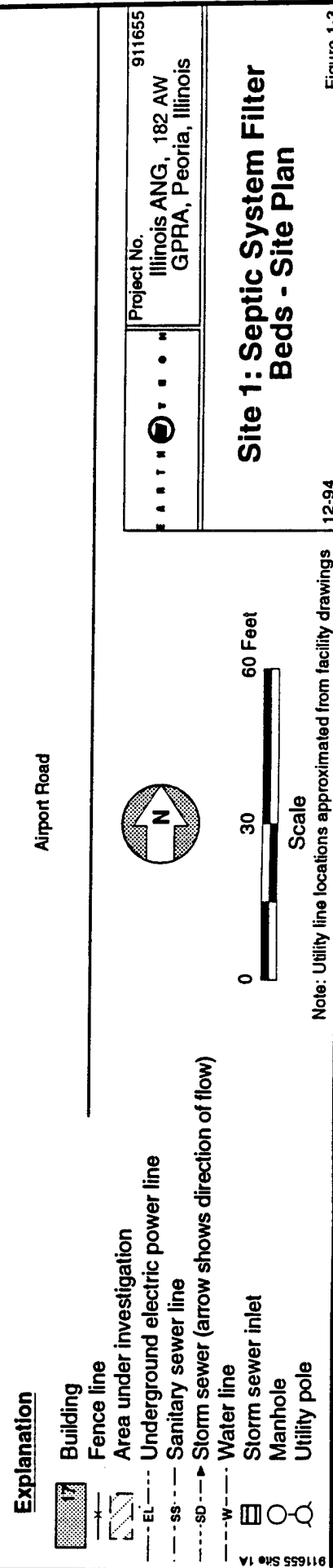
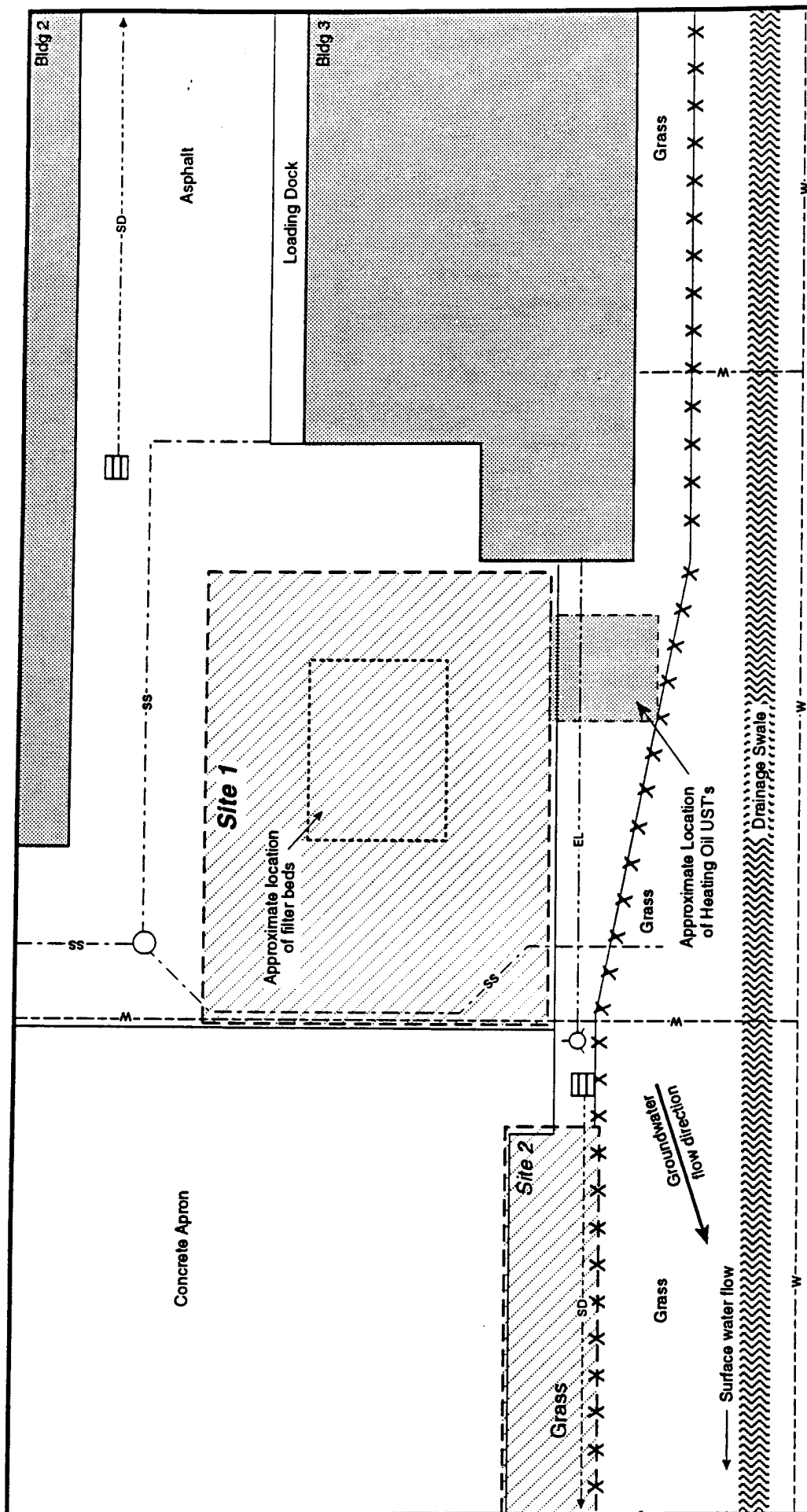
1.4.2.1 Site 1 - Septic System Filter Beds

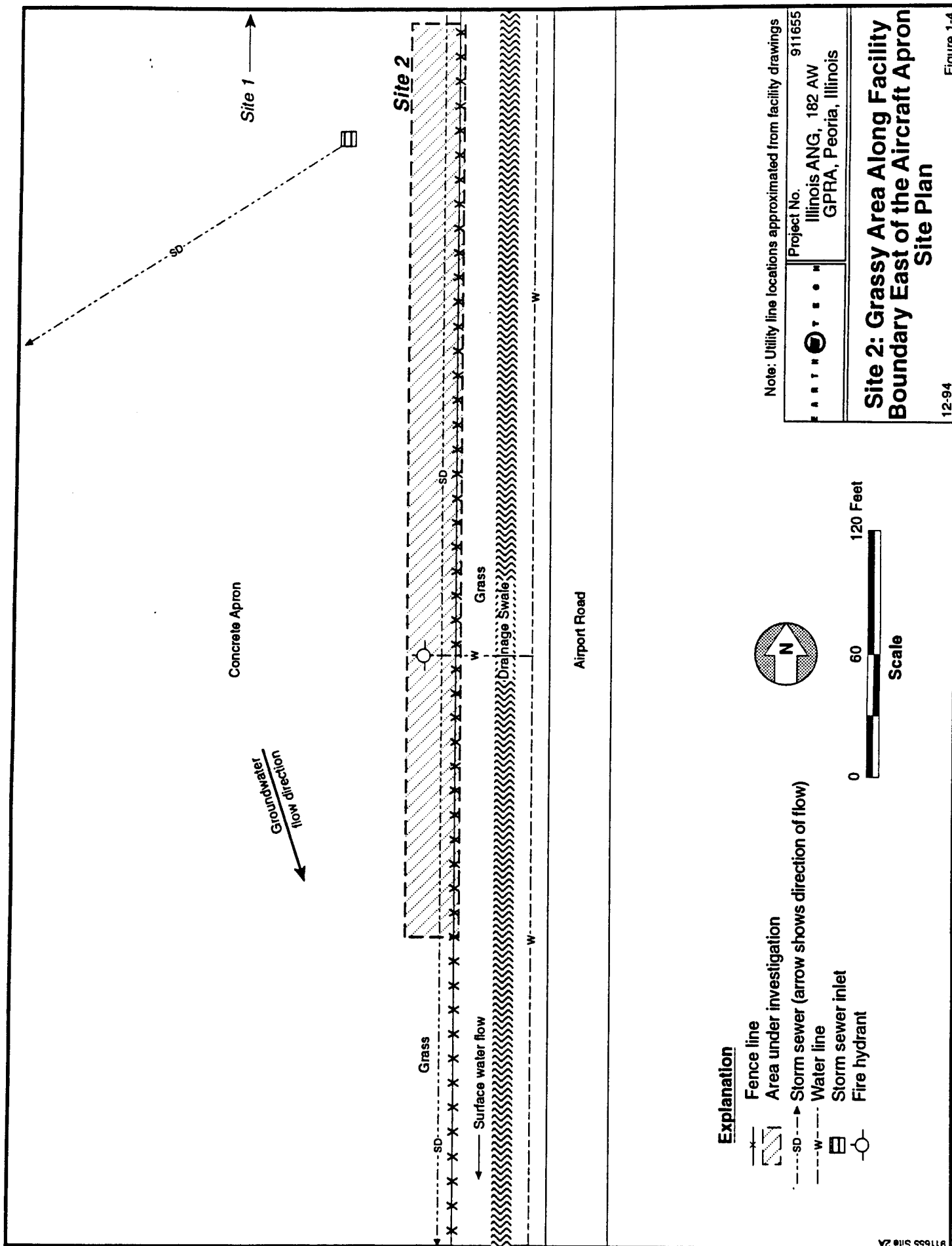
The former septic system filter bed is located south of Building 3 along the southeast portion of the facility. A storm drain and two underground storage tanks (USTs) are also located in the vicinity of Site 1 (Figure 1-3) but are not part of the site.

The filter bed and septic tank system were in use between 1950 to the mid 1960s and according to available drawings consisted of an area approximately 30 ft by 40 ft underlain with sand and gravel. Discharge from the septic tank entered into the open (exposed to the surface) filter beds, permeated through the sand and gravel sub-base, and into the surrounding soil. As reported in the PA, solvents were poured into the septic system and allowed to discharge into the filter bed. The septic system was also reportedly connected to the Motor Pool facility and it is suspected that waste generated by routine Motor Pool activities, such as waste oils and solvents, were discharged into the septic system and subsequently flowed into the filter bed. The facility was connected to the Greater Peoria Sanitary District in the mid-1960s. The filter bed was subsequently backfilled and paved over with asphalt; as a result, there is no remaining surface evidence of the filter bed at the surface of Site 1.

1.4.2.2 Site 2 - Grassy Area Along Facility Boundary East of Aircraft Apron

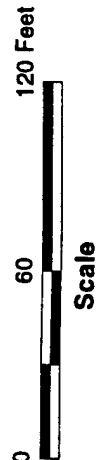
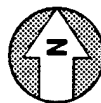
Site 2 consists of a grass-covered area approximately 25 ft by 340 ft adjacent to the existing property fence line south of Building 3. A map of Site 2 is presented as Figure 1-4. Reportedly, solvents such as trichloroethene (TCE), petroleum distillate - 680 (PD-680), and





Explanation

- Fence line
- Area under investigation
- Storm sewer (arrow shows direction of flow)
- Water line
- Storm sewer inlet
- Fire hydrant



Note: Utility line locations approximated from facility drawings

	Project No. 911655 Illinois ANG, 182 AW GPRA, Peoria, Illinois
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Site 2: Grassy Area Along Facility Boundary East of the Aircraft Apron Site Plan

12-94

Figure 1-4

petroleum solvent - 661 (PS-661) were poured onto the ground surface at Site 2 as a means of weed control, along the portion of the property fence line nearest Building 3. Weed control reportedly did not occur along the entire fence line. This activity reportedly occurred from the late 1940s until the 1970s.

1.4.2.3 Site 3 - Grass Area West of Aircraft Apron and East of Fuel Truck Parking (and area adjacent to Facilities 23 and 6)

Site 3 consists of three sections (Sections 3A, 3B, and 3C) where spent solvents, including TCE, PS-661, and PD-680 may have been poured onto the ground surface. Each section of Site 3 is presented in Figure 1-5 and is discussed below.

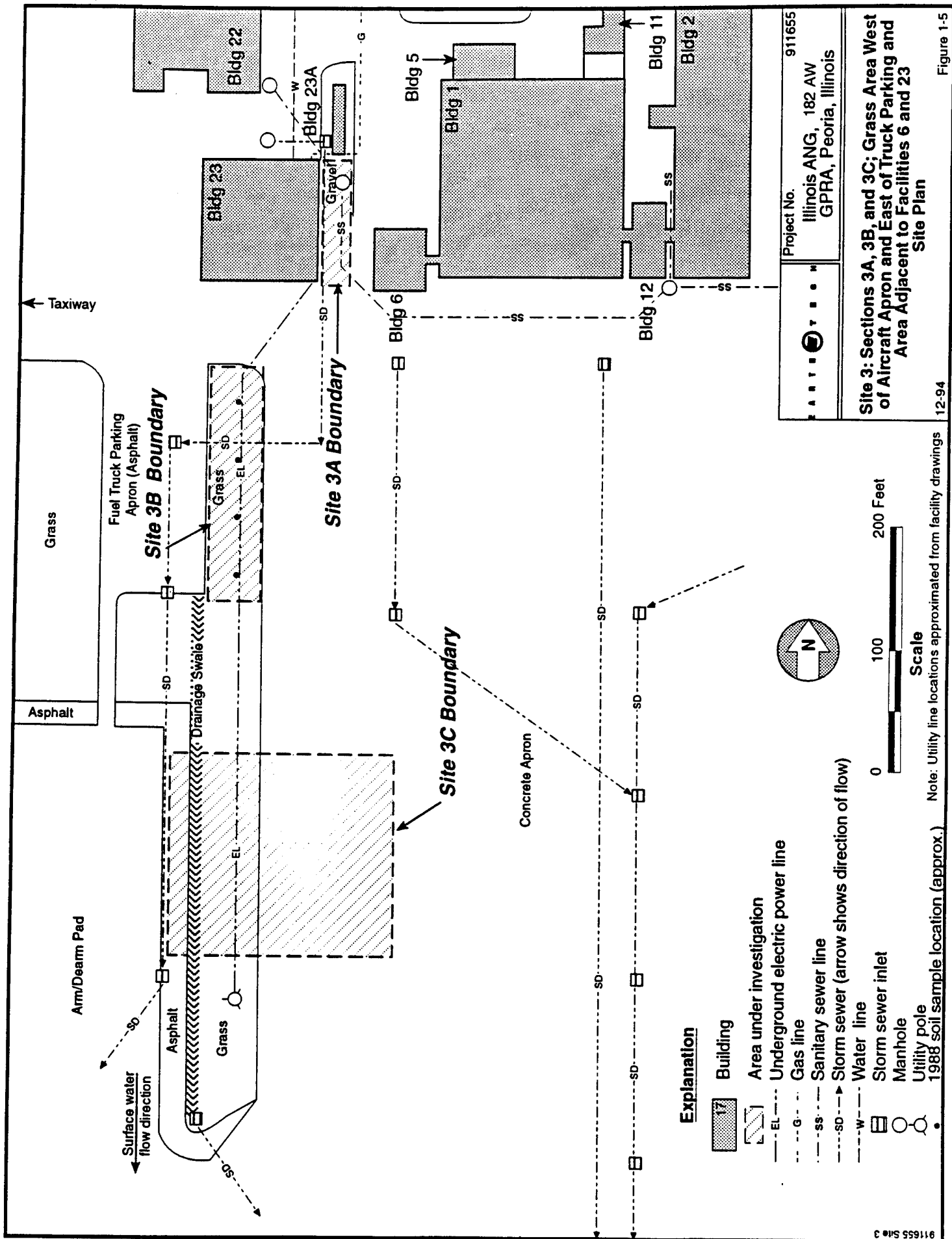
Section 3A - Gravel Area Between Facilities 23 and 6

As previously mentioned, Section 3A was one of two sites which was added to the SI during an initial site visit performed after the PA. According to facility records, Section 3A consisted of an area of approximately 90 ft by 20 ft. Solvents were reportedly poured onto the ground surface as a form of weed control along the fence line that traversed Section 3A, located midway between Buildings 23 and 6. This activity supposedly occurred between 1947 and 1960.

Presently, the area is covered with gravel and asphalt. Several subgrade utility conduits have been installed within the immediate area of Site 3A, which resulted in areas of reworked soils.

Section 3B - Grassy Area West of Aircraft Apron and East of Fuel Truck Parking Area

Section 3B, identified during the PA, consists of a grass-covered area approximately 200 ft by 50 ft, situated west of the aircraft parking apron and east of the fuel truck parking area. Reportedly, from the late 1940s until the 1970s, solvents were poured onto the ground surface as a means of weed control.



Section 3C - Grassy Area South of Site 3B

Section 3C originally consisted of a grass-covered area approximately 180 ft by 160 ft located behind two T-shaped hangers which have since been removed. According to aerial photographs from the 1950s, Section 3C may have been used as a storage area for debris such as drums and unidentified trash. Presently, the majority of the site is part of the facility aircraft apron, with only a small portion grass-covered.

1.5 PREVIOUS PROGRAM ACTIVITIES

A PA was performed in December 1988 by Engineering-Science. The final PA report was completed in June 1990 and recommended that further IRP action be implemented at three sites at the facility.

During the PA, hand auger soil samples were collected from approximately 2.5 ft below the ground surface (bgs) at five locations at Site 2. These samples were analyzed for volatile organic compounds (VOCs). TCE, the primary target compound, was not detected in any of the samples analyzed. Laboratory results did not indicate the presence of any other contaminant compounds, with the exception of 2-hexanone, which was found in two samples at concentrations of 68 parts per billion (ppb). Results from laboratory method blanks indicate that the 2-hexanone did not originate from the laboratory.

During the PA, four hand auger soil samples were collected from 1.5 to 2 ft bgs at Site 3, (Section 3B), and analyzed for VOCs. Figure 1-5 shows the sampling locations. Laboratory analytical results indicated no detected VOCs.

Site 4, Firefighting Training Area, was investigated in 1988 in an Immediate Response Investigation (ES, 1988). This action was required because of new facility construction activities. Contaminants were detected and remedial activities were conducted. A Final Closure Report was submitted to the Illinois Environmental Protection Agency (IEPA) and was accepted in February of 1989.

1.6 ENVIRONMENTAL SETTING

This section includes a description of the physiography, climate, soils, surface water hydrology, and regional and local geologic and hydrogeologic settings for the facility. A majority of the environmental setting presented here was taken from the PA report (ES, 1990).

1.6.1 Physiography

The facility is located on the east side of the GPRA property. Located in Section 22 of Township 8 North, Range 7 East, the airport property is 2 miles west of Peoria and 3.5 miles west of the Illinois River. The airport occupies a mature, dissected plateau between the East Branch Lamarsh Creek and Kickapoo Creek in the Central Glaciated Plains physiographic province. The local topographic map presented in Figure 1-1 displays the gentle slopes of the plateaus and the moderate to severe slopes transitioning to the creek and river bottoms. Facility elevations range from 653 to 630 ft above mean sea level (MSL). Most of the facility's slopes range from 1 to 3%.

According to Engineering-Science (1990), the topography and physiography represent a western forest prairie associated with a border ecosystem. Development for commercial and agricultural purposes has cleared the gentle slopes and allowed the moderate and steeper slopes to remain as forest.

1.6.2 Climate

Climatological data, unless otherwise noted, are summarized from the Local Climatological Data, Narrative Climatological Summary, National Oceanic and Atmospheric Administration (NOAA). The climate of the Peoria, Illinois area is continental. The average annual temperature is 51.1 degrees Fahrenheit (° F), with mean monthly temperatures ranging from

24 ° F during January to 75 ° F during July. The average annual precipitation is 35.06 inches. The average annual lake evaporation is approximately 33 inches (NOAA, 1977). Net precipitation (rainfall minus evaporation) is approximately 2 inches. Precipitation is heaviest from April to September and is lightest in mid-winter. The estimated one year, maximum 24-hour rainfall event for the area is 2.75 inches (NOAA, 1977). The recorded maximum 24-hour rainfall event at the installation is 5.06 inches.

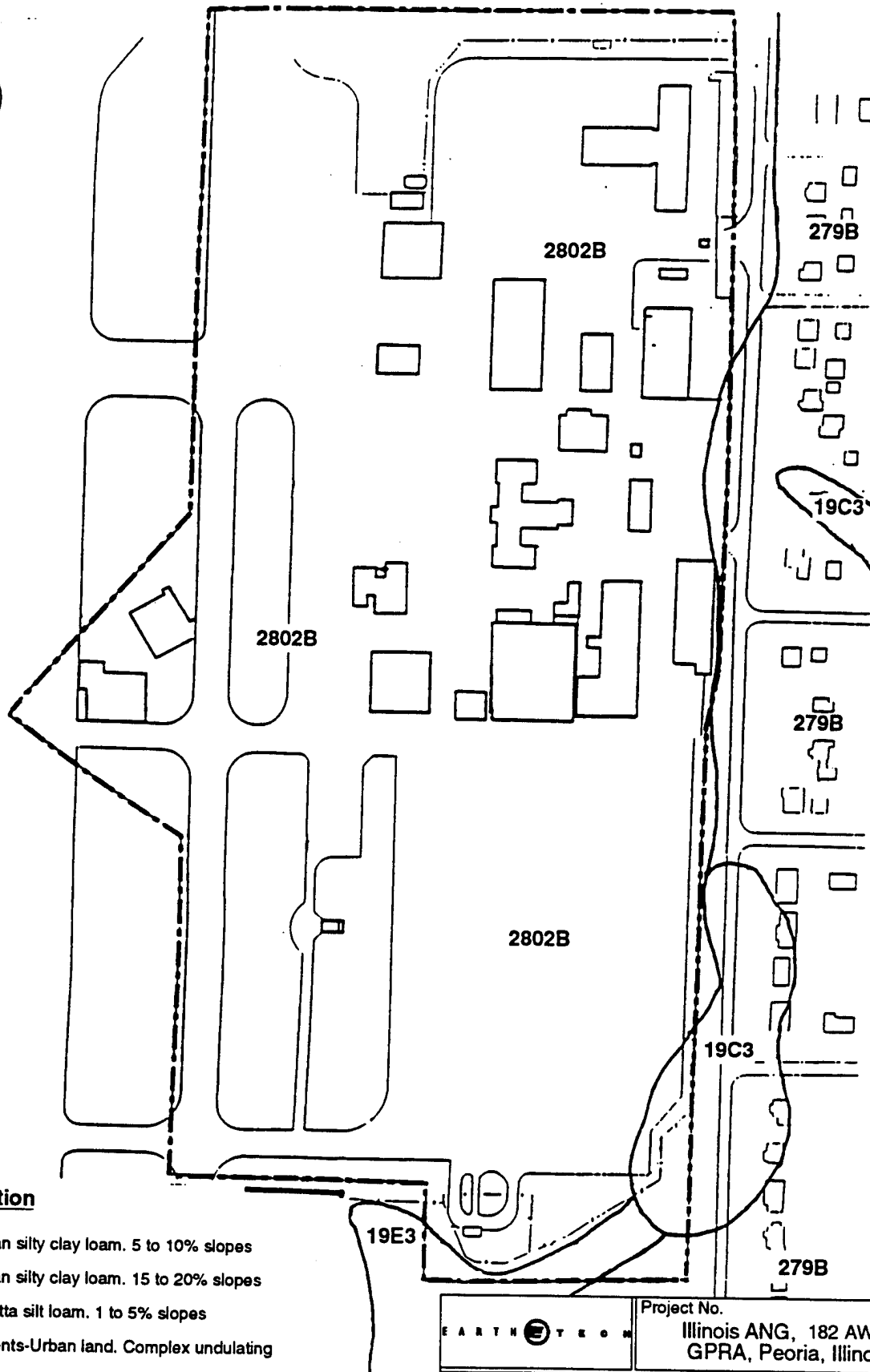
1.6.3 Soils

All soils on the facility are derived from the Pleistocene-aged glacial deposits of the Peoria Loess (U.S. Soil Conservation Service, 1977). Figure 1-6 illustrates the distribution of the soil types across the base. Soil types represented include the Sylvan silty clay loam, the Rozetta silt loam, and Orthents soils (the predominant soil type).

Sylvan and Rozetta series soils contain up to 35 % silt, are moderately permeable, susceptible to erosion, and well-drained. Infiltration rates are moderate, ranging from 1×10^{-4} to 1×10^{-6} cm/sec. Orthents are soils which have been disturbed by cut and fill type construction activities. The Orthent soils which exist on the facility are considered to have highly variable physical properties, depending on the degree to which they have been altered by construction activities. These soils consist predominantly of silt, are moderately- to poorly-drained, and have infiltration rates which vary according to the degree of compaction of the original soil texture.

1.6.4 Surface Water Hydrology

The facility is located on a plateau west of the Illinois River Valley and approximately 200 ft above the Illinois River. The facility is not located within 100 year flood plain (ES, 1990). The facility land surface slopes gently to the south and east in the area of the flight line apron (southern portion of the facility) and to the north and east away from the apron (northern



Explanation

- 19C3 Sylvan silty clay loam. 5 to 10% slopes
- 19E3 Sylvan silty clay loam. 15 to 20% slopes
- 279B Rozetta silt loam. 1 to 5% slopes
- 2802B Orthents-Urban land. Complex undulating

----- Installation boundary

0 250 500 Feet

Scale

Source: Engineering-Science, 1990 12-94

EARTH SYSTEM

Project No. 911655
Illinois ANG, 182 AW
GPRA, Peoria, Illinois

Facility Soils Map

Figure 1-6

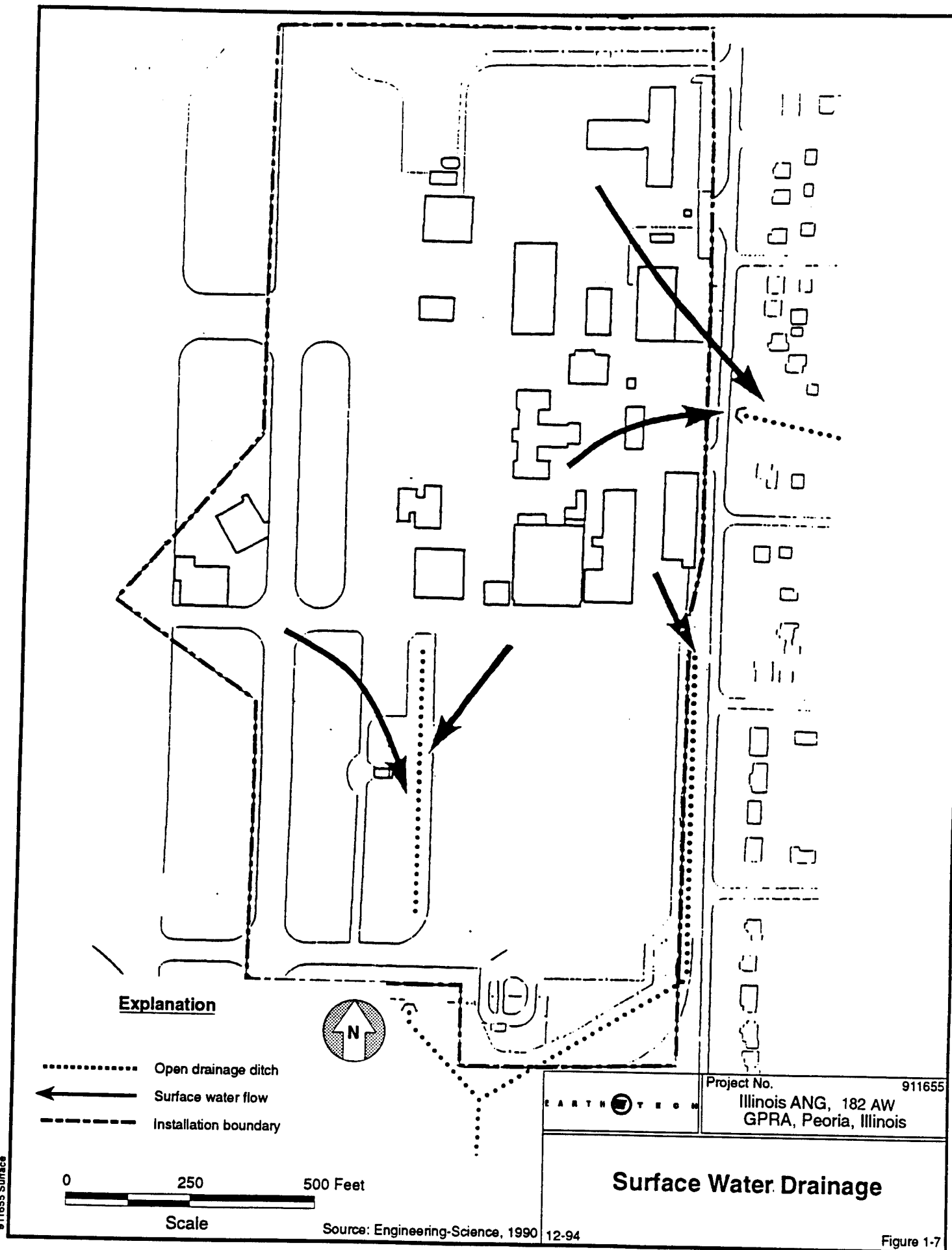
portion of the facility). Numerous drainage ditches and storm sewers exist on the facility to collect and channel surface water either southward towards the East Branch of Lamarsh Creek or eastward towards Kickapoo Creek. Figure 1-7 presents the facility storm sewer system and surface drainage routes. Figure 1-8 presents the regional surface drainage map in the vicinity of the airport. The Lamarsh and Kickapoo Creeks ultimately flow into the Illinois River (approximately 7 and 3.5 miles, respectively), south and southeast of the facility.

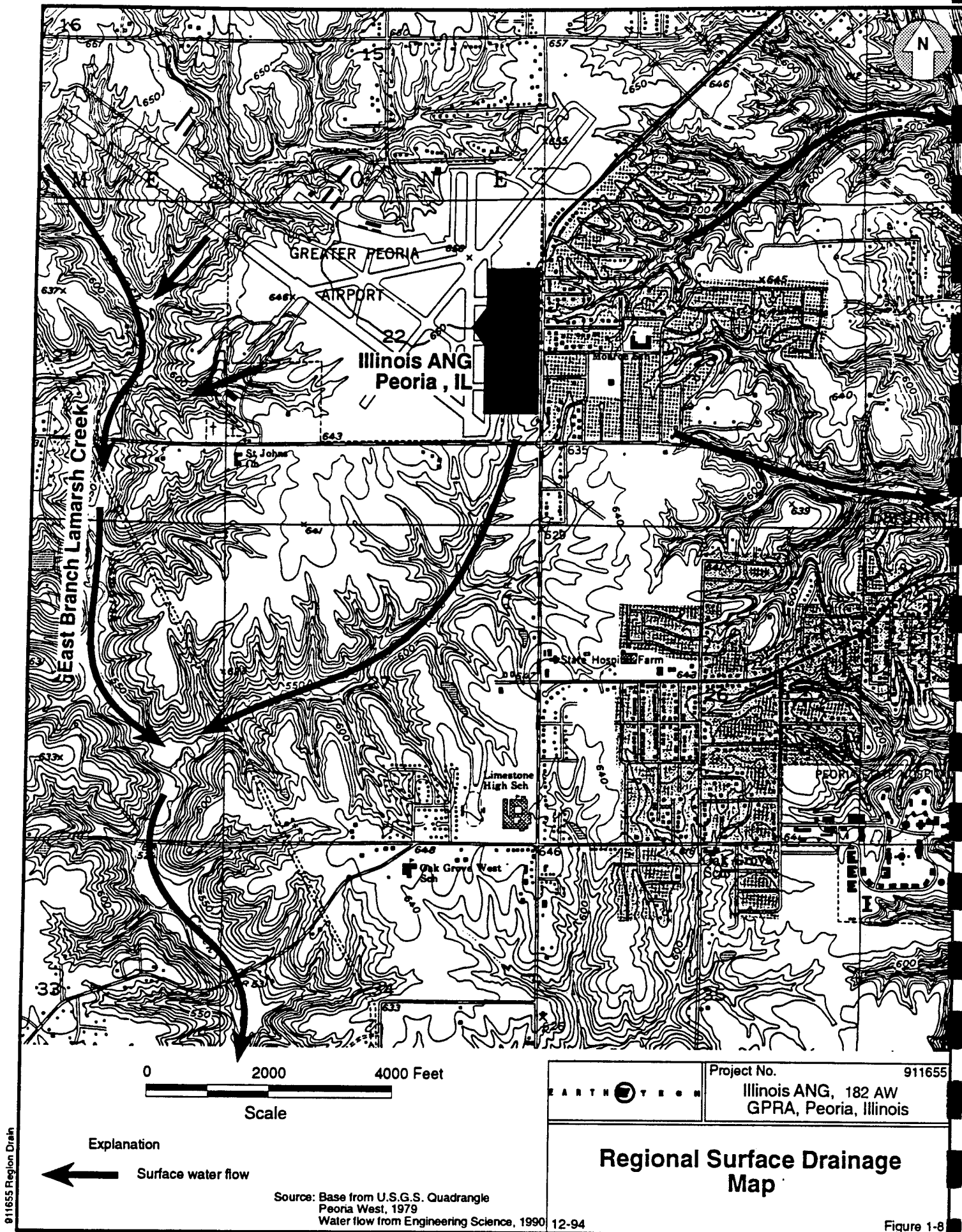
1.6.5 Regional Hydrogeologic Setting

Discussions of the geology and aquifer systems underlying the Peoria, Illinois area are presented in the following subsections.

1.6.5.1 Regional Geology

Regionally, central Illinois is located in an area underlain at the surface by unconsolidated Pleistocene-aged (Cenozoic era) glacial and glacio-fluvial sediments. These sediments vary in total thickness from 0 to 500-ft across central Illinois. The thickness and sediment types encountered in the Pleistocene section are highly variable and are location-specific. Locations in valleys contain relatively thick sequences of glacial and glacio-fluvial sediments, while locations on the plateaus contain thinner sequences of principally glacial tills and loess. Underlying the younger glacial sediments are relatively flat-lying sedimentary rocks of the Paleozoic era. The uppermost (youngest) bedrock units in the area are Pennsylvanian-aged rocks of the McLeansboro Group, Carbondale Formation, and Tradewater Formation. These rocks typically consist of interbedded sandstones, shales and limestones. Thin coal seams are common within these strata. The total thickness of Pennsylvanian-aged rocks beneath the region is estimated to range from 150 to 525 ft. In central Illinois, Pennsylvanian-aged rocks





911655 Region Drain

are underlain by regional unconformity, which overlies Mississippian- to Ordovician-aged shale, limestone, and dolostone. A description of the entire geologic column found in the area is included in Figure 1-9 (Horberg, et al. 1950).

Structurally, this region of central Illinois is located on the northwestern flank of the Illinois Basin, an intra-cratonic basin which was active during the Paleozoic era. The basin was eventually filled with Paleozoic-aged sediments. Sedimentary bedrock units in the Peoria area dip gently to the south-southeast. No structural features, such as faults or small-scale folds, have been mapped in the bedrock in the Peoria area (Horberg, et al. 1950).

1.6.5.2 Regional Hydrogeology

Regionally in central Illinois, groundwater occurs in both Pleistocene- and Paleozoic-aged aquifers. The most important aquifer for municipal and industrial use in Peoria County is the pre-Kansan Sankoty Sand (Figure 1-10) (Horberg, et al. 1950). This sand forms a 50 to 150 ft thick, semi-confined aquifer in portions of the Illinois River and Kickapoo Creek Valleys. Younger glacial outwash deposits which overlie the Sankoty Sand along river valleys are an additional source of water supply in shallower wells.

Groundwater can also be obtained from Pennsylvanian-aged sandstone, coal, and fractured shale in wells as deep as 350 ft. Older (deeper) Mississippian-, Devonian-, and Silurian-aged strata (Figure 1-9) contain increasingly saline water of poor quality (Horberg, et al. 1950), and are not used as regional groundwater sources. The Ordovician-aged Glenwood-St. Peter sandstone is the oldest and deepest aquifer penetrated for water supply in Peoria County.

1.6.6 Local Geologic Setting

Discussions regarding the geology and aquifer systems underlying the facility are presented in the following subsections.

Era	Sys-tem	Series, Group or Formation	Feet Min. Max.	Graphic Column	Composition	Groundwater Possibilities		
Ceno-zoic	Quar-ternary	Pleistocene	0-500		Alluvium till, sand, gravel, soils	The only large source of satisfactory groundwater. Supplies vary widely depending on local conditions		
	Tertiary?		0-10		Chert, gravel	Unimportant		
Paleozoic	Pennsylvanian	McLeansboro	150-525		Shale, sandstone, limestone, coal	Small supplies obtainable from thin limestones and sandstone at depths of less than 300 feet. Utilized in areas where bedrock is high and glacial deposits are thin. May or may not be highly mineralized		
		Carbondale				Unimportant		
		Tradewater						
	Mississ-ippian	Keokuk-New Albany	0-210		Dolomite, very cherty, fossiliferous, white to brown. Some limestone	Unsatisfactory quality because of high chloride content occurs in solution openings and in fractured cherty beds. Wells formerly flowed		
	Devonian-Mississippian	Kinderhook-Burlington	70-250		Shale, green to brown, pyritic, sporangites, some sandstone and dolomite	Unimportant		
	Devon-ian	Cedar Valley-Wapsipinicon	225-550		Limestone and dolomite, silty, cherty, fine, gray to buff, pyritic in part	Unsatisfactory quality because of high chloride and high hydrogen sulphide content. Abundant supplies from solution openings. Wells flowing or formerly flowed.		
		Niagaron			Dolomite, crystalline, vesicular, white to gray, partly cherty			
		Alexandrian			Dolomite, dense to vesicular, silty and sandy in lower parts			
	Silurian							
		Ordovician	Maquoketa		150-235	Shale, dolomite, green to gray, some dolomite	Unimportant	
			Galena-Platteville		280-305	Dolomite, crystalline, buff, partly vesicular	Unsatisfactory quality. Mineral content similar to St. Peter waters abundant supplies from solution openings. Wells flowing or formerly flowed.	
Glenwood-St. Peter			150-250	Sandstone, medium grained, friable, white	Unsatisfactory because of high chloride and hydrogen sulphide. Although total minerals are less than in higher Silurian and Keokuk-burlington aquifers. Abundant supplies.			

Note: An uneven contact within the graphic column indicates an unconformity.

EARTH SYSTEMS	Project No.	911655
	Illinois ANG, 182 AW GPRA, Peoria, Illinois	

Generalized Geologic Column of Bedrock Formations Above the Lower Ordovician in the Peoria Region

Source: Harberg, et al (1950) 12-94

Figure 1-9

Stage	Thickness Min. Max.	Graphic Column	Composition	Groundwater Possibilities	
Recent	0 50		Silt, sand, clay, soils	Unimportant	
Wisconsin	0 250		Loess, sand, gravel, silt	Large supplies along Illinois Valley: small supplies elsewhere in restricted areas	
			Till, associated sand and gravel deposits	Small to large supplies	
			Loess		
Sangamon	0 20		Soil and Loess, contains some gas	Unimportant	
Illinoian	0 150		Till, associated sand and gravel deposits	Small to large supplies in southeast part of region where "Middle" sand is widespread	
Yarmouth?	0 10		Silt	Unimportant	
Kansan?	0 30		Till	Unimportant	
Sankoty Sand	0 250		Sand, gravel, silt with pink, rounded and polished sand grains	The most extensive glacial aquifer in the region; Large undeveloped reserves along the Buried Valley of the Ancient Mississippi: Large additional supplies along the Perkin-Sankoty Buried Channel	
Bedrock					

EARTH TECHNICAL	Project No.	911655
	Illinois ANG, 182 AW GPRA, Peoria, Illinois	

Generalized Geologic Column of the Glacial Deposits in the Peoria Region

Source: Harberg, et al (1940) 12-94

Figure 1-10

1.6.6.1 Local Geology

Subsurface information regarding the geology of the facility was obtained from the results of previous drilling activities. These activities include: 1) the drilling and completion of a 520 ft water well at the remote Facility 80 (Munitions Maintenance and Storage Facility) (facility 80 is located approximately 1.5 miles east of the facility) 2) geotechnical drilling by Professional Services, Inc. (PSI) (1986) and Engineering-Science (1988), during the investigation of the former fire training area (FTA), and 3) during drilling this SI.

In general, the results of previous drilling activities on the facility have shown that the unconsolidated Pleistocene-aged glacial sediments consist of approximately 30 ft of fine-grained clastic sediment (silt, silty clay, and clay) interbedded with thin silty sand zones. Thick water-bearing sands which could be associated with the Sankoty Sand aquifer were not observed in the subsurface beneath the facility. PSI reported occurrences of interbedded sandstone and shale (probably of the Pennsylvanian-aged Carbondale Group) below the unconsolidated strata (PSI, 1986).

Soils, as described during the SI, are of similar consistency among the sites. The near-surface soils are derived from Pleistocene-aged glacial deposits of the Peoria Loess and are organic-rich clays with variable amounts of silt and fine-grained sand. This clay unit is underlain at depth by a sandy clay/clayey sand unit extending to a depth of approximately 25 ft bgs. This sand and clay unit is of variable thickness, up to 15 ft, and contains thin clay lenses that occur sporadically within the unit. A clay or weathered shale layer is present extending to depths of approximately 28 to 30 ft on top of what has been logged as bedrock. Drilling or sampling refusal was encountered at 28 to 30 ft bgs and is interpreted as being Pennsylvanian-age Carbondale Formation (Berg, R.C. et al 1984, p2).

1.6.6.2 Local Hydrogeology

Two aquifer systems reportedly occur within the subsurface beneath the facility. According to the PA (ES, 1990) an upper unconfined aquifer occurs within the Pleistocene-aged sediments, and a lower, confined aquifer occurs within the consolidated Pennsylvanian-aged (and older) bedrock. The PA further states that it has not been demonstrated that the two aquifers are connected.

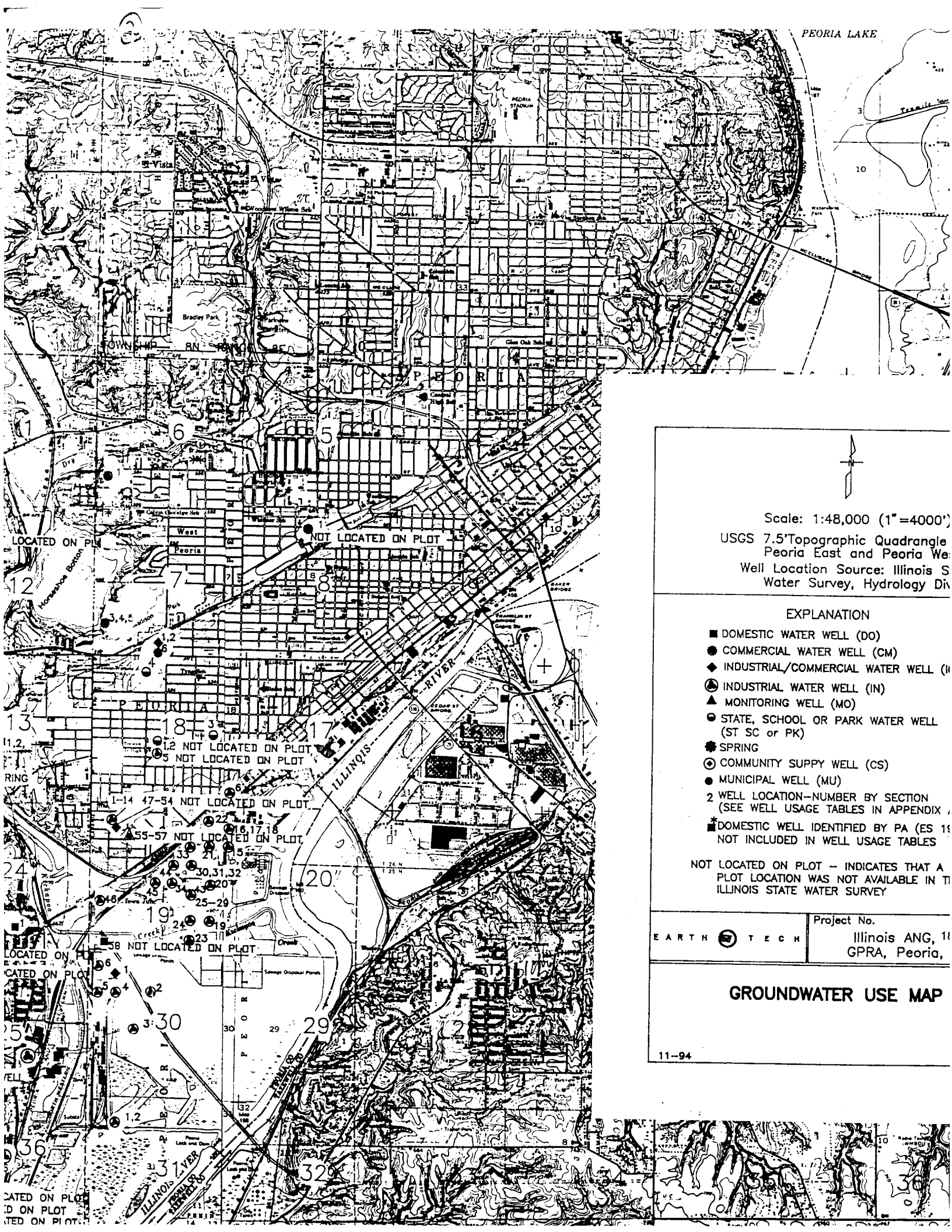
Previous investigations have reported groundwater occurring within the Pleistocene-aged glacial sediments beneath the facility. In the vicinity of the former FTA, PSI (1986) completed 22 borings. Groundwater conditions were reported by PSI as being variable. Groundwater-bearing zones, attributed to thin sand and silt layers existing in the subsurface, were reported by PSI in an unspecified number of the borings. Similarly, one of four boreholes drilled by Engineering-Science (1988), to depths of 30 ft at the former FTA, intersected water-bearing strata.

Data collected during the SI regarding the occurrence and flow of groundwater in the shallow aquifer included installation of four piezometers and six monitoring wells. Based on this data, groundwater occurs in the shallow, near surface sediments at depths ranging from approximately 2 to 7.5 feet bgs. The shallow aquifer ranges in thickness from approximately 20 to 25 ft, assuming bedrock occurs at the refusal depths encountered and exists under water table conditions. The groundwater flow direction across the facility is to the southeast at an average hydraulic gradient of 0.013 ft/ft.

1.7 Ecology

The facility has limited habitat available for wildlife. The facility consists mainly of cultivated lawns, building sites, and paved areas which offer minimal shelter for animals. Small tracts of unmowed brush and grass may provide forage and cover for small mammals and birds. No critical environments occur within one mile of the facility.





PEORIA LAKE

10



Scale: 1:48,000 (1"=4000')

USGS 7.5' Topographic Quadrangle

Peoria East and Peoria West

Well Location Source: Illinois State

Water Survey, Hydrology Division

EXPLANATION

- DOMESTIC WATER WELL (DO)
- COMMERCIAL WATER WELL (CM)
- ◆ INDUSTRIAL/COMMERCIAL WATER WELL (IC)
- ⊙ INDUSTRIAL WATER WELL (IN)
- ▲ MONITORING WELL (MO)
- STATE, SCHOOL OR PARK WATER WELL (ST SC or PK)
- SPRING
- ⊙ COMMUNITY SUPPLY WELL (CS)
- MUNICIPAL WELL (MU)
- 2 WELL LOCATION—NUMBER BY SECTION (SEE WELL USAGE TABLES IN APPENDIX)
- * DOMESTIC WELL IDENTIFIED BY PA (ES 11) NOT INCLUDED IN WELL USAGE TABLES

NOT LOCATED ON PLOT — INDICATES THAT A PLOT LOCATION WAS NOT AVAILABLE IN THE ILLINOIS STATE WATER SURVEY

EARTH TECH

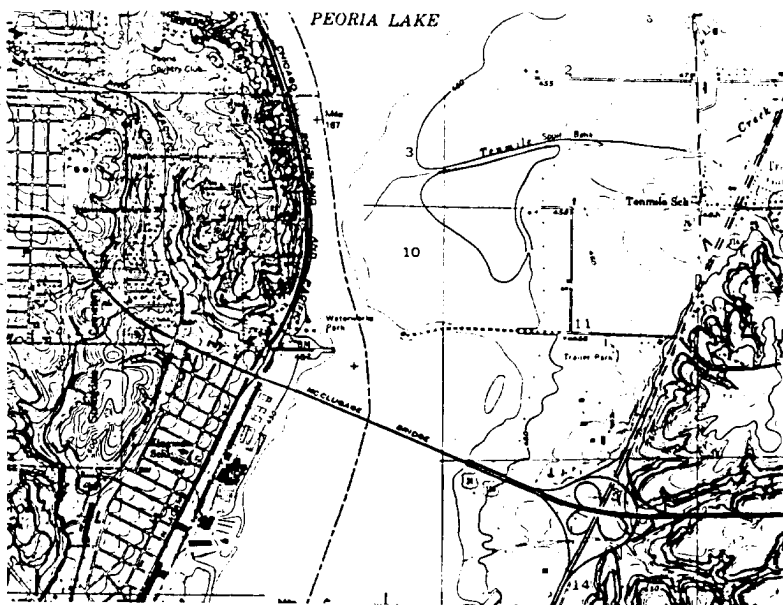
Project No.

Illinois ANG, 11

GPRA, Peoria,

GROUNDWATER USE MAP

11-94



3



Scale: 1:48,000 (1"=4000')

USGS 7.5' Topographic Quadrangle Maps for
Peoria East and Peoria West

Well Location Source: Illinois State
Water Survey, Hydrology Division

EXPLANATION

- DOMESTIC WATER WELL (DO)
- COMMERCIAL WATER WELL (CM)
- ◆ INDUSTRIAL/COMMERCIAL WATER WELL (IC)
- ⊙ INDUSTRIAL WATER WELL (IN)
- ▲ MONITORING WELL (MO)
- STATE, SCHOOL OR PARK WATER WELL
(ST SC or PK)
- ✱ SPRING
- ⊕ COMMUNITY SUPPLY WELL (CS)
- MUNICIPAL WELL (MU)
- 2 WELL LOCATION—NUMBER BY SECTION
(SEE WELL USAGE TABLES IN APPENDIX A)
- DOMESTIC WELL IDENTIFIED BY PA (ES 1990)
NOT INCLUDED IN WELL USAGE TABLES

NOT LOCATED ON PLOT — INDICATES THAT A (10 ACRE)
PLOT LOCATION WAS NOT AVAILABLE IN THE
ILLINOIS STATE WATER SURVEY

EARTH TECH

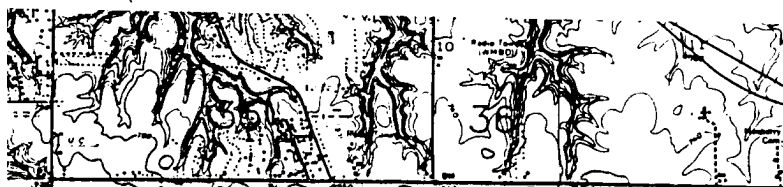
Project No. 911655

Illinois ANG, 182 AW
GPRA, Peoria, Illinois

GROUNDWATER USE MAP

11-94

Figure 1-11



1.8 Water Resources

The water supply for the facility is provided by the Illinois American Water Company. The source for this water is the Pleistocene-aged Sankoty Sand. The majority of the residential population surrounding the facility purchases water from the Illinois American Water Company. Information on groundwater usage was obtained from Illinois State Water Survey, Hydrology Division. Based on this information, wells located within a minimum of 2.5 miles of the facility are indicated in Figure 1-11. Descriptions of these wells are listed in Tables A-1 through A-2 of Appendix A. According to the data, most wells are shallow and withdraw or monitor water from either the Sankoty Sand or Alluvium at depths of 15 to 120 ft bgs. The nearest groundwater well is a commercial well located 1.1 miles to the south. This well draws groundwater from a depth of 73 ft bgs.

The largest surface water body is the Illinois River, located more than 3 miles east of the facility. This river is used for recreation and for propagation of fish and wildlife.

2.0 FIELD PROGRAM

2.1 FIELD PROGRAM SUMMARY

The SI field program activities that Earth Tech implemented at ILANG, GPRA during 1992-1993 are described in this section. These activities included soil gas and groundwater screening, installation of soil borings and monitoring wells, soil and groundwater sampling, and aquifer testing. Sections 2.2 through 2.6 describe the methods, procedures, and purpose for performing these activities. The field program is summarized in Table 2-1.

Original plans for the SI field effort called for drilling soil borings and installing a monitoring well in Site 2 beyond the fence line, along a county right-of-way. Difficulty in obtaining permission to cross the right-of-way resulted in the cancellation of one boring and the proposed well for Site 2. All other changes to the field program were minor. These changes are documented in Appendix B, Field Change Requests.

2.2 GEOLOGIC AND HYDROGEOLOGIC INVESTIGATIONS

A number of techniques were used at ILANG, GPRA to provide geologic and hydrogeologic data. Subsurface drilling of soil borings and monitoring wells provided geologic information about the facility and the sites; hydrologic data were obtained through static groundwater elevation measurements and aquifer slug testing. These activities and the procedures used are described in the following sections.

2.2.1 Static Groundwater Measurements

Groundwater elevation measurements were collected at ILANG, GPRA to estimate groundwater flow directions and to help estimate groundwater flow rates. Measurements

Table 2-1 Summary of Site Investigation Field Program
ILANG, 182 Airlift Wing, GPRA, Peoria, Illinois

	Total Planned	Total Actual	Site 1	Site 2	Site 3	Back- ground
Screening Activity						
Soil Gas Samples (screening)	67	67	27	7	33	0
Groundwater Samples (screening)	18	18	2	4	12	0
Borings						
Soil Borings/Drilling	18	17	5	3 ^(a)	7	2 ^(b)
Soil Borings/Hand-Augered	3	3	0	0	1	3
Piezometer Installation	4	4	0	0	0	4
Monitoring Well Installation	7	6	1	0 ^(a)	3	2
Aquifer Slug Tests	7	5 ^(c)	1	0	1	2
Analytical Samples ^(d)						
Soil Samples from Soil Borings - Field Gas Chromatograph	51	51	26	8	12	0
Soil Samples from Soil Borings/ Hand-Augered Samples	43 ^(e)	58	22	6	20	10
Laboratory Analysis						
Geotechnical						
Groundwater - Laboratory Analysis	14	12	2	0	6	4

(a) The well and one soil boring planned for Site 2 could not be installed because of right-of-way difficulties.

(b) The background soil borings were converted to monitoring wells.

(c) All wells were not slug tested due to the hydrological similarity between the sites.

(d) Analysis included volatile organic compounds (VOCs), semivolatile organic compounds (SVOCs), target analyte list (TAL) metals, and total petroleum hydrocarbons (TPH).

(e) Several laboratory samples that were placed on hold were inadvertently analyzed for VOCs, SVOCs, TPH or TAL metals. This data is included in the report.

were taken following piezometer installation to establish a general flow direction and to enable strategic placement of monitoring wells. A final round of water level measurements was taken after groundwater sampling had occurred to establish an accurate water table contour map.

The groundwater level measurements were recorded at each piezometer and monitoring well with an electric water level indicator. A surveyed notch on the top of the monitoring well and piezometer casing served as the reference point. Measurements were recorded to the nearest 0.01 ft. These data are presented in Appendix C.

2.2.2 Aquifer Testing

Both rising head (slug-out) and falling head (slug-in) aquifer tests were performed in April 1993. The sites were determined to be hydrologically similar and therefore only four of the six monitoring wells installed during the fall of 1992 were slug tested. These wells (BGMW1, BGMW2, 1MW1, and 3CMW1) were selected to provide facility-wide information on groundwater parameters. These tests were short-duration, single-well tests conducted by displacing the water level in a well and then recording the water level response in the well as it recovered to static conditions. This testing was conducted to determine the hydraulic conductivity of the natural formations and materials in the localized area surrounding the well. Extended periods of rain occurred during the April 1993 field event. This created rising water levels in the unconfined aquifer. Because of the rising water table conditions, both slug-in (falling head) and slug-out (rising-head) tests were conducted in each well. The hydraulic conductivities calculated for each well were averaged to compensate for the changing hydraulic conditions.

The water levels were displaced by using a 3 ft long, 1.66 in. outside diameter (OD) solid stainless steel cylinder. The cylinder was used to lower or raise the water level in the well and the static water level allowed to return to equilibrium. A Terra-Systems Model SCCE-036 Data Logger was the recording device used to collect the data from each well. Water levels were

measured at selected time intervals translated from a pressure transducer set in the well. Before the start of each test, the date, internal clock, test number, sampling rate (timed intervals), and initial static recorder reading were checked and adjusted, if necessary. After approximately 20 minutes, the data were reviewed and the tests stopped after the water level had recovered to at least 95% of the initial drawdown. The data were reviewed in the field to ensure data quality.

The data collected during the aquifer tests were analyzed using the aquifer test solving computer program, AQTESOLV™, designed by Geraghty & Miller, Inc. (1991). AQTESOLV™ uses analytical solutions developed by Bouwer and Rice (1976). In turn, transmissivities and Darcy flow velocities were calculated. Site-specific results are discussed in Section 3. Aquifer test field data and time-drawdown curves are also provided in Appendix C.

2.2.3 Piezometer Installation

Four piezometers (PZ1 through PZ4) were installed into the shallow aquifer during the December 1992 drilling program. Soil samples were collected from each piezometer boring for geological logging to aid in determining the screened interval at each location. Detailed lithologic and construction logs are included in Appendix D.

The piezometers were constructed of 2 in. diameter, flush-joint, threaded, Schedule 40 polyvinyl chloride (PVC) screen and riser pipe. Slot size for the piezometer screens was 0.010 in. Ten feet screen sections were selected for all piezometers. Ten feet screened intervals were selected based on depth to the water table and the anticipated extent of the seasonal water table fluctuations.

Piezometers were backfilled using 20/40 grade silica sand to a depth approximately 1 to 2 ft above the top of the screen. A 1 to 2 ft layer of pelletized bentonite was placed on top of the sand pack and hydrated. The remaining annular space was filled with a cement/bentonite mixture. An expandable cap was placed on top of the PVC casing and locked. All locks

placed on the piezometers were keyed alike. A duplicate of the well lock key was left with the facility environmental coordinator. The piezometers were finished by installing flushmount 9 in. diameter steel drive over boxes on top of the piezometers. The drive boxes were cemented in place and finished, where necessary, with 2 ft x 2 ft concrete pads.

2.3 FIELD SCREENING ACTIVITIES

Field screening activities consisted of 1) initial site screening; on-site field gas chromatograph (GC) analysis of soil-gas and grab-type groundwater samples, and 2) on-site field GC analysis of soil samples collected from the confirmation-round borings. Target compounds during each type of screening activity included benzene, toluene, ethylbenzene, and xylene (BTEX), VOCs, and common chlorinated aliphatic compounds (i.e. TCE).

2.3.1 Initial Site Screening Activities

During November 1992 Tracer Research Corporation was subcontracted by Earth Tech to conduct initial characterization of the extent of VOCs at Sites 1, 2, and 3. This initial phase of fieldwork was conducted to assist in the placement of the confirmation-round soil borings and the monitoring wells. These activities consisted of the collection and analysis of soil gas and grab-type groundwater samples.

2.3.1.1 Sampling Methods

In general, all sampling conducted during the initial field event was done using a truck-mounted hydraulic unit capable of driving 7 to 14 ft length sections of hollow 3/4 in. diameter stainless steel rods into the soil. Modifications of the hardware attached to the probes allowed the collection of either soil gas or groundwater samples. The specific methods used to collect each medium are discussed below.

Soil Gas Sampling

Sixty-seven soil gas samples were collected and screened for total VOCs, BTEX, and chlorinated solvents. Soil gas samples were initially taken in a fixed grid pattern. No vertical profiling of soil gas was performed because the high clay content of the soil made it difficult to extract any soil gas from the soils. As the on-site mobile laboratory results became available, subsequent sampling locations were modified based on these results. Locations of all soil gas points are discussed and presented in Section 3, Significance of Results.

Soil gas sampling probes consisted of 7 and 14 ft lengths of 3/4 in. diameter hollow steel pipe. The probes were fitted with detachable drive tips and pushed or hydraulically hammered to depths of approximately 1 to 10 ft bgs.

The aboveground end of each probe was fitted with an aluminum reducer (manifold) and a length of polyethylene tubing leading to a vacuum pump. Soil gas was pulled by the vacuum pump into the probe. Samples were collected in a glass syringe by inserting a syringe needle through a silicone rubber segment in the evacuation line and down into the steel probe. The vacuum was monitored by a gauge to ensure an adequate gas flow from the vadose zone was maintained. The volume of air within the probe was purged by evacuating 2 to 5 probe volumes of gas. The evacuation time in minutes versus the vacuum in inches of mercury was used to calculate the necessary evacuation time.

Groundwater Sampling

Eighteen groundwater samples were collected and analyzed for total VOCs, BTEX, and chlorinated hydrocarbons using an on-site GC. Sampling probes consisted of 7 and 14 ft lengths of 3/4 in. diameter hollow steel pipe. Groundwater samples were collected at depths of approximately 5 to 11 ft bgs.

The hollow probes with detachable drive points were advanced below the water table. Once at the desired depth, the probes were withdrawn several inches to permit water to flow into the resulting hole. The aboveground end of the sampling probes were fitted with a vacuum adaptor (metal reducer) and a length of polyethylene tubing leading to a vacuum pump. A

vacuum was applied to the interior of the probe for 10 to 15 minutes or until water was drawn up the probe. The water accumulated in the hole was removed by vacuum through a 1/4 in. polyethylene tube inserted down into the probe to the bottom of the hole. Because the water was induced to flow into a very narrow hole, it could be sampled with little exposure to air and, consequently, the loss of VOCs by evaporation was reduced. The polyethylene tubing was used only once and discarded to avoid cross contamination. Groundwater samples were collected in 40 ml VOC vials that were filled to exclude air and capped with Teflon-lined septa caps.

2.3.1.2 Analytical Methods - Soil Gas and Groundwater Screening

The soil gas and groundwater samples collected during the initial site screening activities were analyzed for the same target compounds, using the same field GC, and using similar methods (direct injection of soil gas or headspace). Target compounds and their detection limits (DL) for soil gas and groundwater are presented below.

Compound	DL (mg/l)	DL (µg/l)
	Soil Gas Compounds	Groundwater Compounds
Total dichloroethene (DCE)	0.01	0.06
Trichloroethane (TCA)	0.0004	0.004
Benzene	0.04	0.5
Trichloroethene (TCE)	0.0003	0.004
Toluene	0.05	1.0
Tetrachloroethene (PCE)	0.0003	0.003
Ethylbenzene	0.1	2.0
Total Xylenes	0.2	5.0
Total Volatile Organic Compounds (VOCs)	0.3	6.0

This section provides a general description of the analytical instrumentation and target compounds for the headspace method, as well as a summary of analytical methods specific to the soil gas and groundwater samples. Quality Assurance(QA)/Quality Control (QC) was HAZWRAP Level B. Details regarding field GC methodologies and analytical results are included in Appendix E.

Instrumentation

A Hewlett-Packard Model 5890, Series II GC, equipped with a flame ionization detector (FID), an electron capture detector (ECD), and two computing integrators were used for the soil gas and groundwater headspace analyses. Hydrocarbons and chlorinated hydrocarbons were separated in the GC on two 6 ft by 1/8 in. OD packed analytical columns in a temperature controlled oven. Nitrogen was used as the carrier gas.

Three to 10 ml of soil gas and 40 ml of groundwater were collected for immediate analyses. Analytical instruments were calibrated daily using fresh working standards made from National Institute of Sciences and Technology traceable standards and reagent blanked solvents. At the beginning of the field event, a three point calibration was performed on the GC. The data are presented in Appendix E.

The GC was calibrated for headspace analysis by decanting 20 ml of the known standard, leaving approximately the same amount of headspace as in the water headspace samples. The standard bottle was resealed and shaken vigorously for 30 seconds. An analysis of the headspace in the bottle determined the response factor which was then used to accurately estimate the sample concentrations.

Halocarbon and hydrocarbon compounds detected in the samples were identified by chromatographic retention time. Quantification of compounds was achieved by comparison of the detector response of the sample with the response measured for the mid-point standard of the three point external calibration.

The DL for the compounds were a function of the injection volume as well as the detector sensitivity for individual compounds. DL were calculated from the current response factor, the sample size, and the estimated minimum peak area that would have been visible under the conditions of the measurement.

2.3.2 On-Site GC Screening of Soil Samples

Soil samples were collected from the confirmation-round soil borings and screened on-site for their VOC content using a field GC. The field GC analysis of soil samples was conducted by Bingham Environmental. These data were collected to assist the field team in selecting the soil samples to be shipped for analysis in a fixed-base laboratory. All samples collected for field GC analysis were collected from slit-spoon samples and analyzed for the compounds listed below. The estimated method detection limits (MDL) are listed below:

Compound	MDL (mg/kg)
Benzene	0.12
Toluene	0.12
Ethylbenzene	0.12
O-Xylene	0.12
M, P-Xylene	0.12
Trichloroethane	0.12
Tetrachloroethene	0.12
Dichloroethene	0.12

The on-site screening of the soil samples was completed following HAZWRAP Level B QC protocols. A description of the sampling and analytical methods is described in the following paragraphs.

Soils were collected from the split-spoon samples and placed in pre-cleaned, 40 ml VOC vials. The vials were filled so that there was as little air space as possible, sealed air tight, labeled, and delivered to the field GC analyst.

A Hewlett Packard 5890 with capillary split flow injection was used for the analysis. Analysis was conducted by headspace screening of the soils. Five grams of soil sample were added to 10 ml of saturated Na_2SO_4 solution. The vial was shaken vigorously several times and placed in a 90 degrees Celsius ($^{\circ}\text{C}$) water bath. The sample was allowed to equilibrate in the bath for more than 1 hour before sampling. The headspace in the vial was withdrawn and injected into the GC.

QA/QC procedures included a daily three-point calibration and the analysis of blank and duplicate samples. The analytical results are included in Appendix F.

2.4 DECONTAMINATION PROCEDURES

Major equipment such as the drill rig, augers, and rods were decontaminated prior to beginning work at the facility. Decontamination consisted of washing the equipment with high pressure hot water containing a laboratory grade detergent (Liqu-nox) and rinsing the equipment with water. Wastewater generated during the decontamination process was collected in large polyethylene tanks and Department of Transportation (DOT) certified drums. All wastewater generated during the decontamination procedures was containerized and disposed of as described in Section 2.8.

Downhole drilling equipment such as augers, bits, and rods were decontaminated prior to each use as described above. The drill rig was cleaned between sites and at the discretion of the field team leader. Sampling equipment, such as split spoons, bailers, stainless steel liners, etc. was decontaminated as follows:

- Washed with potable water/laboratory grade detergent (Liqu-nox)
- Rinsed with potable water
- Rinsed with American Society for Testing and Materials (ASTM) Type II water
- Rinsed with pesticide-grade methanol
- Rinsed with ASTM Type II water
- Air dry
- Wrapped in aluminum foil.

The hydraulic unit, rods, and sampling equipment used to collect the soil gas samples were decontaminated by washing the probes and other sampling equipment in a water/laboratory grade detergent and rinsing with water.

2.5 CONFIRMATION ACTIVITIES

The SI conducted at ILANG, GPRA was based primarily on the collection and laboratory analysis of selected soil and groundwater samples. CompuChem Environmental of Chapel Hill, North Carolina analyzed all samples submitted for laboratory analysis. Laboratory analyses included the following methods: VOCs in soil according to Environmental Protection Agency (EPA) SW-846 Method 8240 (EPA 1986); VOCs in groundwater according to EPA SW-846 Methods 8010 and 8020 (EPA 1986); semivolatile organic compounds (SVOCs) in soil and groundwater according to EPA SW-846 Method 8270 (EPA 1986); and target analyte list (TAL) metals in soil and groundwater according to EPA Contract Lab Program (CLP) February 1988 Methods. Sampling was conducted according to HAZWRAP QC Level C guidelines. QA/QC evaluation and analytical laboratory data and validation summaries are presented in Appendix G and H, respectively. Established chain-of-custody (COC) procedures were followed during sampling activities. Field data sheets, COC records, and analytical request forms were completed by the appropriate sampling and laboratory personnel for each sample. Custody seals were used to seal the coolers when samples were shipped to the laboratory to ensure that no sample violations occurred during transportation. HAZWRAP specifications for shipping and packing requirements (DOE/HWP-69/R1) were followed.

2.5.1 Soil Sampling Activities

Soil sampling was conducted using either a truck-mounted drill rig to collect samples from soil borings or a hand auger to collect surface soil samples. Procedures for both types of sampling are described below.

2.5.1.1 Soil Sampling (Drill Rig)

Thirty-three soil samples were collected from 15 soil borings drilled at Sites 1, 2, and 3. All borings were advanced with a truck-mounted drilling rig (Diedrich D50 or CME 75) using continuous-flight hollow stem augers. Samples were collected at selected intervals from these borings using 3 in. diameter, 2 ft long stainless steel split spoons. The inside of the split spoon contained 6 in. long stainless steel liners. Soil samples were collected by driving the samplers into the soil using a 140 pound hammer. Standard Penetration Test (SPT - ASTM, 1987) data were recorded during drilling. Once filled, the split spoons were retrieved and opened. Immediately upon opening the split spoon the liners were split apart either by hand or by using a decontaminated stainless steel knife. The end of each liner was scanned with a Photo Ionization Detector (PID) meter and the reading recorded. The liner (within each sampling interval) with the highest PID reading was selected for potential laboratory analyses for VOCs. The selected liner was capped to prevent VOC loss. Capping consisted of a 4 in. wide section of Teflon® tape between the liner and a tightly-fitting plastic end cap. Samples were labeled and placed on ice per sample handling protocols listed in Table 2-2.

A sample from each sampling interval was submitted for on-site GC analyses. The results from the field GC analyses were used to select the sampling intervals that would be shipped for analytical laboratory analyses. A minimum of two sampling intervals from each boring

Table 2-2 Container, Preservation, and Holding Time Requirements
ILANG, 182 Airlift Wing, GPRA, Peoria, Illinois

Parameter	Analytical Method	Matrix	Holding Time (From time of Collection)	Container	Preservative	Minimum Sample size
Volatile Organics	SW ¹ 8010 and 8020 SW ¹ 8240	Water Soil	14 days 14 days	Two 40-mL vials with Teflon-lined caps, Stainless Steel core tube sealed on both ends	4 drops conc. HCL 4° C 4° C	40 mL 10 g
Extractable Organics (SVOCs)	SW 8270	Water Soil	7 d extraction 40 d analysis 14 d extraction 40 d analysis	1-L glass with Teflon Liner Stainless Steel core tube sealed on both ends	4° C 4° C	1000 mL 50g
Metals (other than mercury)	EPA ³ CLP	Water Soil	180 d 180 d	1-L Plastic Stainless Steel core tube sealed on both ends	HNO ₃ to pH < 2 4° C	100 mL 10 g
Mercury	EPA ³ CLP	Water Soil	28 d 28 d	1-L Plastic Stainless Steel core tube sealed on both ends	HNO ₃ to pH < 2 4° C	100 mL 10 g
Petroleum hydrocarbons	TPH 418.1	Water Soil	28 d 28 d	1-L glass Stainless Steel Teflon core tube sealed on both ends	4° C HCl to pH < 2 4° C	1000 mL 50 g

Notes:

SW¹ refers to United States Environmental Protection Agency (USEPA) "Test Methods for Evaluating Solid Waste - Physical/Chemical Methods", SW-846, 3rd Edition, November 1986.
EPA² refers to "USEPA Contract Laboratory Program (CLP), Statement of Work (SOW) for Organics Analysis, Multi-Media, Multi-Concentration", Document No. OLM01.8, March 1990.
EPA³ refers to "USEPA CLP, SOW for Inorganics Analysis, Multi-Media, Multi-Concentration", Document No. ILM03.0, February 1988.

°C - degrees centigrade

g - grams

HCL - hydrochloric acid

HNO₃ - nitric acid

L - liter

mL - milliliter

PCBs - polychlorinated biphenyls

SVOCs - Semi-volatile Organic Compounds

d - days

pH - Hydrogen Power, measurement of acidity or alkalinity

were selected for laboratory analyses. For borings which indicated no contaminants according to the field GC results, the sampling interval closest to the surface and the interval directly above the water table were selected for laboratory analyses.

Field descriptions were logged according to the Unified Soil Classifications System (USCS). Prior to leaving the field, all borings were backfilled with a cement/bentonite mixture and the locations were surveyed by a land surveyor registered in the state of Illinois. Borehole logs for each boring are included in Appendix D. Sample locations and a discussion of the significance of the analytical results are included in Section 3.

2.5.1.2 Hand-augured Soil Sampling

In April 1993 three hand-augured soil samples were collected from three locations at the facility. All hand-augured soil samples were used for determination of chemical background levels present at the facility. The hand-augured samples were collected using soil recovery auger which accommodates 2 in. x 8 in. stainless steel sleeves. Once the desired sampling depth was reached, a decontaminated liner and auger head were used to collect an undisturbed soil sample. Prior to capping the liner a PID reading was taken and recorded to assure that no obvious contamination existed in the soils. As with the split spoon samples, 4 in. Teflon® tape was placed between the liner and a tightly-fitting plastic end cap. These samples were labeled and immediately placed on ice per sample handling requirements listed in Table 2-2. Soil sampling forms are included in Appendix I of this report.

2.5.3 Monitoring Well Installation, Development and Sampling

The procedures used for monitoring well installation, development, and sampling are included in the following subsections.

2.5.3.1 Monitoring Well Installation

Optimal monitoring well locations were determined after a round of groundwater elevation measurements were obtained from the piezometers and the hydraulic gradient determined for the facility. The wells were installed using the hollow stem auger method of drilling. Auger holes were drilled to a depth approximately 1 to 2 ft deeper than the proposed bottom of the well cap. Because of the relatively high clay content in the soils, the boreholes were relatively stable. The augers were removed from the hole and the wells constructed in open hole. Monitoring well casing screen and end caps were constructed of threaded, flush joint, 2 in. diameter Schedule 304 stainless steel. Screen lengths were 10 ft continuous sections of slotted screen containing 0.010 in. openings. Prior to placement of the well materials in the hole, the screen, cap, and riser were steam cleaned.

Once the well materials were positioned in the borehole such that the screened interval was intersecting the water table, 20/40 graded Colorado silica sand was placed in the annular space to a height approximately 2 ft above the top of the screen. A 2-ft thick bentonite pellet layer was placed above the sand and hydrated to form a seal. The remaining annular space was filled with a Type I Portland cement/bentonite mixture (approximately 95% cement to 5% bentonite) to a depth approximately 0.5 ft below grade. The wells were finished by installing 9 in. diameter flush-mount drive over boxes set in concrete. Locking expandable caps were placed on each well casing. Each well casing had a small notch cut in the top (for a survey reference marker) prior to well installation. Monitoring well construction forms are included in Appendix D.

2.5.3.2 Monitoring Well Development

After installation, all six of the monitoring wells were developed to remove fine-grained sediments from the filter pack and to repair damage done to the formation by the drilling operations to restore the natural hydraulic properties of the formation. A minimum of 24 hours was allowed to pass after the wells were installed and before development began. A

Teflon® bailer was used to purge the wells and remove stagnant water from the wells. Development proceeded until: the groundwater removed from the wells became noticeably less turbid and the turbidity showed no signs of decreasing further; a minimum volume of 15 gallons of water was removed from each well; and measurement of pH, temperature and conductivity, incrementally recorded during development, remained stable within 10% for three consecutive measurements. Color, turbidity, odor, and other physical characteristics of the water were recorded during development. All water removed from the wells during development was stored in polyethylene tanks and disposed of as stated in Section 2.8. Well development forms are included in Appendix I.

2.5.3.3 Groundwater Sampling and Analysis

After waiting for at least 24 hours after development, the monitoring wells were allowed to recharge to within 30% of the original static water level, were purged, and then sampled. The volume of water in each well casing was calculated prior to purging. As required in the Field Sampling Plan (FSP) - (Earth Technology, 1992), from 4 to 5 casing volumes were removed from each well during the purging process. A decontaminated Teflon® bailer was used to remove the stagnant groundwater from each well. Color, degree of turbidity, odor, and other physical properties of the water were recorded during development. Additionally, measurements of the pH, temperature, and conductivity of the groundwater were obtained periodically throughout purging and prior to sampling. These data were collected to ensure a representative groundwater sample was being collected. After purging, and before sampling, the wells were allowed to recharge to greater than 80% of their pre-purging volume.

Samples were collected using a Teflon® bailer in the following order: VOCs first, followed by the other volumes required for organic analysis, and finally metals. Dissolved metals were collected by positioning a disposable 0.45 μ m pore size filter on the end of the bailer and using a hand pump assembly to move the water through the filter. The samples were labeled and

immediately placed on ice per sample handling procedures detailed in Table 2-2. Preservatives were then added to each sample as required according to the SAP. Preservative types are also listed on Table 2-2. Groundwater sampling forms are included in Appendix I.

2.6 BACKGROUND SAMPLING

Background surface and subsurface soil and groundwater samples were collected at the facility. Three surface soil and seven subsurface soil samples were collected from the locations determined by 182 Airlift Wing (AW) Civil Engineering (CE) personnel to be either relatively undisturbed by human activity or away from known waste handling areas. In addition, two background monitoring wells were installed and two rounds of groundwater samples collected from each of the wells. The locations of these soil and groundwater samples, their relationship to the sites under investigation, and the background analytical results are discussed in Section 3.5. Soil sampling forms are included in Appendix I.

2.7 SURVEYING

The horizontal locations in Illinois State Plane Coordinates and elevations in feet above MSL were determined for all soil borings, piezometers, monitoring wells, and surface soil samples. The top of the monitoring well and piezometer casings were notched to provide a reference point for the land surveyors and for subsequent water level elevation measurements. All surveying information is provided in Appendix J.

2.8 DISPOSAL OF WASTES AND SOIL CUTTINGS FROM FIELD ACTIVITIES

Soil cuttings and development, purge, and decontamination water were generated during the field activities. All soil cuttings were placed in drums until the completion of field activities. The wastewater was placed in 500 gallon polyethylene tanks. Soil cuttings which indicated the

presence of elevated concentrations of contaminants, as determined by laboratory analysis of soil samples from each borehole, were submitted for EPA SW-846 toxicity characteristic leaching procedure (TCLP) analyses (EPA 1986). TCLP analytical results are included in Appendix K. All cuttings were determined to be non-hazardous according to Resource Conservation Recovery Act (RCRA) guidelines (EPA 1991). Since all borings showed detectable levels of contaminants of concern, all cuttings were recommended for disposal as special waste, per IEPA recommendations.

A composite sample of the wastewater was submitted for analysis of compounds requested by the Greater Peoria Sanitary and Sewage Disposal District authorities (VOCs, pH, total suspended solids, metals, ammonia, and BOD). The results were submitted to the district and approval was granted for disposal of the water into the sewer system. Results are included in Appendix K.

3.0 SIGNIFICANCE OF RESULTS

The results of the 1992 - 1993 SI program conducted at ILANG, GPRA are discussed in this section. The SI program consisted of soil gas and groundwater screening; drilling soil borings; installing monitoring wells; soil and groundwater sampling; and aquifer slug testing.

Section 3.1 addresses the general geology and hydrogeology of the facility. Section 3.2 through 3.4 summarizes the QA/QC results for the program. Section 3.5 discusses the results of the background soil sampling. Sections 3.6, 3.7, and 3.8 provide site-specific information on the screening, sampling, and analytical results.

The data interpretations presented in this section are based on data collected during this investigation and previous investigations where applicable. The data tables included in this section present only those compounds and analytes for which a positive result was detected in at least one sample. The complete listing of analytical results is contained in Appendix H.

3.1 FACILITY GEOLOGY AND HYDROGEOLOGY

A general description of the geology and hydrogeology of the facility under investigation is presented in the following sections. The geology and hydrogeology of each site is discussed in detail in the Sections 3.6.1, 3.7.1, and 3.8.1. Information regarding site-specific soil types was obtained by field description of split-spoon samples collected during drilling operations. Soil borings 1SB4 (Site 1), 2SB2 (Site 2) and 3BSB3 (Site 3, Section 3B) were continuously sampled until bedrock (refusal) was encountered. Subsequent borings were continuously sampled or sampled at selected intervals until the water table was reached. Borings were generally advanced only a few feet below the water table before they were abandoned. Hydrogeologic data obtained during the investigation includes groundwater elevation data and aquifer slug tests.

3.1.1 Facility Geology

The regional geologic setting in the vicinity of GPRA was previously presented in Section 1.6 of this report. Subsurface soils, as described in the field, are of similar consistency among the sites. In general, the near-surface soils in the area are organic-rich clays with variable amounts of silt and fine-grained sand. This surficial clay unit is underlain at depth by a sandy clay/clayey sand unit extending to a depth of approximately 25 ft bgs. Thin clay lenses occur sporadically within this layer. Beneath the sandy clay/clayey sand unit a clay or weathered shale layer is generally present on top of what has been logged as bedrock. The hollow stem augers encountered bedrock (refusal) at depths of 28.5, 29.5, and 28 ft bgs in borings 1SB4, 2SB2, and 3BSB3, respectively. Refusal probably represents the top of the Pennsylvanian bedrock (Horberg et al, 1950).

3.1.2 Facility Hydrogeology

Data regarding the occurrence and flow of groundwater in the shallow aquifer were collected for the facility and at the specific sites of interest. During the initial stages of the confirmation activities (December 6 through 14, 1992) four piezometers PZ1 through PZ4 were installed across the facility. The piezometers were installed to provide an overall groundwater flow direction for the facility. Based partially on these results, two background and four site-specific down-gradient monitoring well locations were selected for the facility. Construction details and measured static water levels (January 21, 1993, and April 18, 1993) for the piezometers and monitoring wells installed during the field investigations are presented in Table 3-1. Discussions regarding groundwater flow directions, hydraulic conductivity, transmissivity, and velocity for the surficial aquifer will be presented in this section and in the site-specific discussions in Sections 3.6.1, 3.7.1, and 3.8.1. From the data presented in Table 3-1, groundwater occurs in the shallow, near-surface sediments at depths ranging from approximately 2 to 7.5 ft bgs. A comparison of water level elevations to the elevations of the top and base of the well screen shows that all wells except 1MW1, BGMW1, and BGMW2 are constructed with their screened interval intersecting the water table. This shallow aquifer

Table 3-1 Well Construction and Water Level Elevations
ILANG, 182 Airlift Wing, GPRA, Peoria, Illinois

Measurement Location	Elevation in feet (toc) (MSL)	Elevation of Screened interval (feet bgs) (top - bottom)	Depth to water (btoc) in feet 12-13-92	Elevation of groundwater (MSL) 12-13-92	Depth to water (btoc) in feet 01-21-93	Elevation of groundwater (MSL) 01-21-93	Depth to water (btoc) in feet 04-18-93	Elevation of groundwater (MSL) 04-18-93
PZ1	643.10	638.40 - 628.40	3.72	639.35	2.69	640.41	2.71	640.39
PZ2	645.06	640.36 - 630.36	3.8	641.26	3.84	641.22	3.48	641.58
PZ3	638.97	634.27 - 624.27	7.3	631.67	7.49	631.48	7.59	631.38
PZ4	639.56	634.86 - 624.86	3.6	635.96	3.10	636.46	3.04	636.52
S1MW1	642.93	640.40 - 630.40	NA	NA	2.50	640.43	2.13	640.8
3AMW1	645.40	643.00 - 633.00	NA	NA	3.65	641.75	3.66	641.74
3BMW1	644.47	642.00 - 632.00	NA	NA	4.44	640.03	3.96	640.51
3CMW1	641.76	639.30 - 629.30	NA	NA	5.13	636.63	3.58	638.18
BGMW1	647.35	641.90 - 631.90	6.9	640.45	6.24	641.11	5.28	642.07
BGMW2	647.36	642.90 - 632.90	NA	NA	2.54	644.82	2.25	645.11

Notes:

toc - top of casing
 btoc - below top of casing
 bgs - below ground surface
 MSL - mean sea level
 NA - Not Applicable (well not established on this date)
 All wells are flush-mounted, elevations of toc should be approximately 0.2 - 0.4 ft bgs (See Appendix J Surveying).

ranges in thickness from approximately 20 to 25 ft assuming bedrock occurs at the refusal depths noted for each site, and exists under water table conditions. A basewide groundwater elevation map constructed from groundwater elevation data collected on April 18, 1993 is included as Figure 3-1. As illustrated on Figure 3-1 groundwater flow is to the southeast across the facility at an average hydraulic gradient of 0.013 ft/ft. Groundwater elevation maps (Appendix C) for the December 1992 and January 1993 data also show southeastward groundwater flow.

Aquifer slug test data obtained in April 1993 were used to determine hydraulic conductivity (K) values for the shallow aquifer. The procedure used for aquifer testing was previously described in Section 2.2. K values were used in combination with porosity, hydraulic gradients, and aquifer thicknesses to determine average groundwater velocity (v) and transmissivity (T) values. The average v provides insight on the rate at which groundwater may be moving beneath a site, while T values provide an estimate of the amount of water that can be transmitted horizontally by the full saturated thickness of the aquifer. Data sources and the equations used in calculating v and T were either measured in the field or obtained from Freeze and Cherry (1979). The equation used to calculate v is:

$$v = \frac{k}{n} \times \frac{dh}{dl}$$

where:

K = hydraulic conductivity

n = porosity (assumed to be 35% for sandy clay)

dh = hydraulic gradient

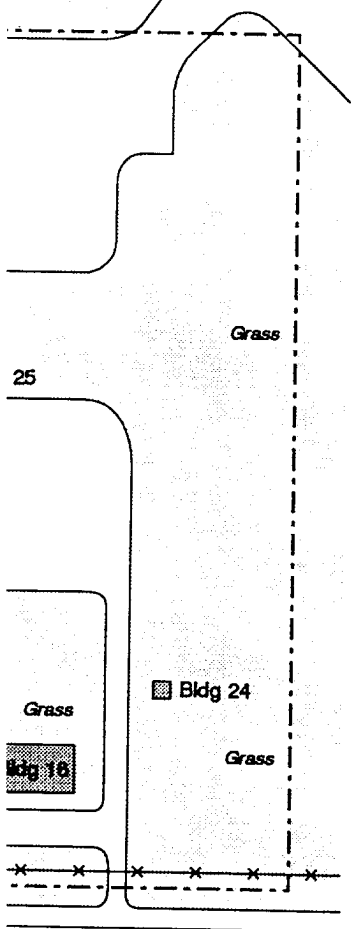
dl

v = velocity

while for T it is:

$$T = K (b)$$

3



EARTH TECH	Project No.	911655
	Illinois ANG, 182 AW GPRA, Peoria, Illinois	

**Facility Groundwater
Elevation Map
April 18, 1993**

12-94

Figure 3-1

where:

T = transmissivity

K = hydraulic conductivity

b = thickness of aquifer

Average v and T calculations are provided in Table 3-2.

3.2 DATA QUALITY ASSESSMENT

A standardized QA/QC program was followed during the SI at ILANG, GPRA to ensure that analytical results accurately represent the environmental conditions at the sites. The SI was conducted using HAZWRAP Level C (i.e., United States Environmental Protection Agency [USEPA] Level III) QC requirements as described in *Requirements For Quality Control of Analytical Data* (DOE/HWP-65/RI, July 1990), and the guidelines and specifications described in the SI WP.

The number of soil samples collected and selected laboratory QC (i.e., matrix spikes and duplicates) samples analyzed are summarized in Table G-1 of Appendix G. The QC checks and results are summarized below.

3.2.1 Data Quality Objectives

The following sections summarize the data quality objectives (DQOs) for precision, accuracy, representativeness, comparability, and completeness (PARCC) obtained during the SI.

3.2.1.1 Precision

Precision is defined as the reproducibility, or degree of agreement, among replicate measurements of the same quantity. The closer the numerical values of the measurements

**Table 3-2 Hydraulic Conductivity, Gradients, Groundwater Velocity, and Transmissivity
Values For the Shallow Aquifer
ILANG, 182 AW, GPRA, Peoria, Illinois**

Well Number	Average Hydraulic Conductivity (K) (cm/sec)	Gradient (dh/dl) in Vicinity of Well (April 18, 1993)	Groundwater Velocity (ft/year) ^(a)	Average Aquifer Thickness (ft)(b)	Transmissivity - (T ft ² /day)
BGMW1	5.22 x 10 ⁻⁵	0.012	1.85	21	3.11
BGMW2	2.71 x 10 ⁻⁵	0.012	0.96	25	1.92
SIMW1	3.27 x 10 ⁻⁵	0.007	0.68	23.5	2.18
3CMW1	3.47 x 10 ⁻⁵	0.013	1.33	25	2.45

Notes:

(a) Hydraulic conductivity values presented in cm/sec were converted to ft/year by multiplying by a factor of 1,034,645.7 before being used to calculate V.

(b) Aquifer thicknesses were approximated by subtracting the water level in each well from the average depth to bedrock (28').

(c) Hydraulic conductivity values presented in cm/sec were converted to ft/day by multiplying by a factor of 2,834.6 before being used to calculate T.

are to each other, the more precise the measurement. Analytical precision is expressed as the percentage of the difference between results of duplicate samples for a given compound or element.

Precision is determined using matrix spike/matrix spike duplicate (MS/MSD) and duplicate sample analyses conducted on samples collected for VOCs, SVOCs, TAL metals, and total petroleum hydrocarbons (TPH) analyses during the ILANG GPRA SI. During sampling, 5% of the samples were identified to be used as the MS/MSD, during laboratory analysis. The MS/MSD samples were prepared by splitting the selected samples into 2 aliquots. The 1st aliquot was analyzed for target analytes. The 2nd aliquot was spiked with known quantities of the target analytes. The spiked aliquot was then analyzed twice. The results were then used to calculate percent recovery and relative percent differences (RPDs). The calculations were based on the amount of spike added and the concentration in the unspiked aliquot. The RPD between the spike results was calculated and used as an indication of the analytical precision for the VOCs, SVOCs, and TPH analyses performed. Duplicate samples for TAL

metal analyses were prepared by subdividing 1 sample of every 20 samples received and analyzing both samples of the duplicate pair. The RPD between the two detected concentrations was calculated and used as an indication of the analytical precision for the analyses performed.

Twenty-six of the 234 RPD values calculated from the aqueous VOC analyses and none of the RPD values calculated from the soil VOC analyses were outside the 20% soil advisory control limits for analytical precision. A detailed summary of the VOCs MS/MSD results and the control limits for the VOCs MS/MSD are presented in Tables G-2 and G-3 of Appendix G. None of the 22 water or 77 soil RPD values calculated from the SVOCs analyses exceeded the advisory control limit. A detailed summary of the SVOCs MS/MSD results and the control limits for the SVOCs MS/MSD are presented in Tables G-4 and G-5 of Appendix G. None of the 5 water or 8 soil RPD values calculated for the TPH analysis were outside the advisory limits. A detailed summary of the TPH MS/MSD results and the control limits for the TPH MS/MSD are presented in Tables G-6 and G-7 of Appendix G. Since each analysis was evaluated according to the required QC criteria and all criteria were met for the environmental samples analyzed, these RPD values are considered to be a representative reflection of the variability characteristic of the environmental condition at the facility. As a result of meeting the QC criteria for VOCs, SVOCs, and TPH, the DQOs for analytical precision are considered to have been met for VOCs, SVOCs, and TPH. Thirteen of the 47 water and 10 of the 83 soil RPD values calculated from TAL metals analyses were outside the advisory control limits of 20% for water and 35% for soils. A detailed summary of the TAL metals spike and duplicate results and the control limits for the TAL spike and duplicates are presented in Tables G-8 and G-9 of Appendix G. These results are considered to have little impact on the environmental data quality and considered more likely to be the result of the regional matrix variability, since all other required analytical precision DQOs for priority pollutant metals (PPM) analyses were met.

Field Replicates

Sample collection reproducibility and media variability were measured in the laboratory by the analysis of field replicates. One sample in ten, similar matrices were collected, and sample collection reproducibility and media variability were evaluated based on RPD values between the two duplicate samples.

Field RPD values were calculated only for compounds and elements detected above the contract required detection limits (CRDL) in both replicate pair samples and only for those compounds and elements not considered to be common laboratory contaminants (e.g., methylene chloride). Increased percent differences were expected for all analytes detected in soil samples, since all samples remained in stainless sleeves (i.e., not mixed) after the sampling equipment was retrieved from the borehole. The field replicate for each analyses was obtained from the adjacent sleeve. SVOC and VOC were not detected above the CRDL in the replicate soil and water samples collected for these analysis. Therefore, RPD values were not calculated for these analysis. TPH above the CRDL were detected in all three replicate soil pairs. Three of the four calculated values for TPH exceeded the RPD limit of 35% for soil. TPH above the CRDL was detected in one of the two replicate groundwater samples. The RPD value for the duplicate TPH aqueous was within the aqueous RPD control limit of 25%. Three replicate soil pairs and four duplicate water samples, two non-filtered and two filtered, were used to evaluate PPM concentrations and to evaluate sample collection reproducibility and matrix variability at ILANG. Four of the twenty-nine calculated soil RPD values were greater than 35%. One of the thirteen calculated RPD values for aqueous samples was greater than 25%. These results are considered to have little impact on the environmental data quality and considered more likely to be the result of the regional matrix variability.

Based on these RPD results and the acceptable laboratory QC results, the sample collection DQO for reproducibility has been met. No corrective action was taken based on RPD values.

3.2.1.2 Accuracy

Accuracy is defined as the degree of difference between measured or calculated values and the true value. The closer the numerical value of the measurement approaches the true value, or actual concentration, the more accurate the measurement. Analytical accuracy is expressed as the percent recovery of a compound or element that has been added to the environmental sample at a known concentration before analysis.

Laboratory accuracy is qualitatively assessed by evaluating the following laboratory QC information: surrogate recovery (GC/MS only), internal standard (GC/MS only), Laboratory Control Sample (LCS) and method blank spike recovery.

Percent Recoveries

None of the 50 soil and 11 of the 468 water percent recoveries were outside the control limits for MS/MSD analyses conducted on the samples collected and analyzed for VOC. Tables G-2 and G-3 of Appendix G report percent recoveries and control limits for VOCs. Four aqueous percent recoveries reported zero percent recovery for 2-chloroethylvinyl ether (2-CEVE). The zero percent recovery for the aqueous sample delivery groups is not considered to have effected overall laboratory accuracy for VOCs. These results are not considered to have any adverse impact on the environmental VOC data quality.

Seven of 44 water and 3 of the 154 percent recoveries were outside the control limits for the MS/MSD analyses conducted on the aqueous samples collected and analyzed for SVOCs. Tables G-4 and G-5 of Appendix G report SVOCs percent recoveries and control limits. All supporting SVOCs QC information cited above was also qualitatively evaluated with respect to the analytical accuracy DQO. Two samples within an aqueous sample delivery group reported poor surrogate recoveries, less than 10%, for acid fraction compounds. Reanalysis of the samples reported identical results. The compounds corresponding to the acid fraction

were qualified "R" for unusable due to failing required surrogate requirements. One aqueous sample reported low surrogate recoveries for all surrogates. Reanalysis of the sample reported acceptable surrogate recoveries indicating possible laboratory control problems. These results are considered to have some impact on the environmental data quality.

None of the 10 water or 16 soil percent recoveries calculated for the TPH MS/MSD exceeded recovery limits. Established control limits for TPH percent recoveries are presented in Tables G-6 and G-7 of Appendix G. Twenty-two of the 85 soil and 14 of the 76 water metals percent recovery values from the matrix spike exceeded recovery limits. Metals percent recoveries are presented in Tables G-8 and G-9 of Appendix G. These percent recovery values are considered to be a characteristic of the environmental matrix conditions at the facility. All supporting TAL QA information cited above were also qualitatively evaluated with respect to the analytical accuracy DQO. These results are not considered to have any adverse impact on the environmental data quality.

Sampling accuracy was maximized by adherence to the strict QA program presented in the SI Quality Assurance Project Plan (QAPP). All procedures (i.e., soil boring installation, soil samples collection procedures, and health monitoring equipment calibration and operation) used during the SI were documented as standard operating procedures (SOPs). Field QA blanks (i.e., trip blanks, field blanks, and equipment rinseates) were prepared such that all samples represented the particular site from which they were collected and were assessed for any cross-contamination that may have occurred. The environmental samples associated with the appropriate field QA samples were qualified based on the potential contaminants contained in the field QA samples.

Trip blanks

Methylene chloride was detected in 11 of 28 trip blanks analyzed. Low levels of toluene, chloroform, bromoform, 2-chlorotoluene, 1,3 and 1,2 dimethylbenzene, bromobenzene, 1,1,1,2-tetrachloroethene, and trichloroethene were also detected in most of the trip blanks at levels below the Contract Required Quantitation Limits (CRQL).

Field Blank

Low levels of chloroform, bromoform, bromodichloromethane, methylene chloride, toluene, copper, lead, and zinc were detected in selected field blanks prepared during the SI. The brominated compounds are attributed to the potable water source. TPH was detected in one field blank at low concentration. The low levels detected in the field blanks are not considered to have contributed to any levels seen in the associated environmental samples.

Equipment Rinseates.

Equipment rinseates collected during the SI indicated low levels of chloroform, bromoform, and TPH. No SVOCs except for low concentrations of phthalate esters were detected in equipment rinseates. Based on an evaluation of the compounds detected in the field QC blanks overall field accuracy is deemed acceptable, except where noted.

3.2.1.3 Representativeness

Representativeness is defined as the degree to which the data accurately and precisely represent a characteristic of a population, parameter variations at a sampling location, a process condition, or an environmental condition. Sample representativeness was ensured during the SI by collecting sufficient samples of a population medium, properly distributed with respect to location and time.

Representativeness was assessed by reviewing the drilling and sample collection methods used during the ILANG, SI, and evaluating the RPD values calculated from the duplicate samples and the concentrations of interferents detected in the field and laboratory QC blanks. The reproducibility of a representative set of samples reflects the degree of heterogeneity of the sampled medium, as well as the effectiveness of the sampling techniques.

Soil samples were collected from three sites (Sites 1, 2, and 3[A,B, & C]). All borings were advanced with a truck-mounted drilling rig using continuous-flight hollow stem augers. A minimum of two soil samples were collected for laboratory analysis from each soil boring.

One sample was collected from just below the ground surface and the second from unsaturated soils just above the water table. A third and fourth sample were sometimes collected based on PID results and lithology. Samples were obtained using a split-spoon sampler equipped with stainless steel liners. Blow counts recording relative soil density were noted. Split-spoon samples were field-logged according to the USCS and field-screened with a PID meter and field GC for VOC concentrations. The boring was backfilled with a cement/bentonite slurry. The borings were marked at the surface and surveyed. Soil cuttings were placed in 55-gallon drums for later analysis as required for disposal of the soil.

3.2.1.4 Comparability

Comparability is a qualitative parameter expressing the confidence with which one data set can be compared to another and is limited to the other PARCC parameters, because only when precision and accuracy are known can one data set be compared to another. To optimize comparability, only the specific methods and protocols that were specified in the SI QAPP were used to collect and analyze samples during the SI. By using consistent sampling and analysis procedures, all data sets are comparable within the three sites at ILANG, between the three sites, or among ANG facilities nationwide. This consistency ensures that remedial action decision and priorities are based on a consistent data base. Comparability also was ensured by the analysis of EPA reference material, establishing that the analytical procedures used were generating valid data.

All samples collected for VOCs and SVOCs analysis were analyzed using the SW-846 8010/8020 (aqueous) VOCs, SW-846 8240 (soil) VOCs and SW-846 8270 SVOCs. Samples collected for metals were analyzed using CLP methods. Samples were analyzed for TPH by 418.1.

Based on the precision and accuracy assessment presented above, the data collected during the SI are considered to be comparable with the data collected during previous investigations.

3.2.1.5 Completeness

Completeness was defined as the percentage of useable data obtained from a measurement system. Useable data are data that have not been rejected after the data validation process. Based on the evaluation of the laboratory QA results presented in Appendix G, these data were considered equal to 99.5%, and as such, were used as the basis of all recommendations presented in this report.

Twenty-seven SVOC data points were rejected for use because the data was qualified "R" indicating unreliable results due to surrogate or internal standard recoveries. Based on the evaluation of the laboratory QC results, 99.7% of the total environmental data collected during the SI were used as the basis of all recommendations presented in this report. A complete list of all data points obtained during the SI are included in Appendix G.

3.3 FIELD QUALITY CONTROL ASSESSMENT

Twenty-eight trip blanks, six field blanks, seven equipment rinseates, and five field replicates were collected and analyzed by the same SOPs and methods used for the 58 soil and twelve water samples. Table G-11 of Appendix G contains a cross-reference of the associated field QC blank samples.

3.3.1 Trip Blanks

Trip blanks were prepared by CompuChem Laboratory in North Carolina. The blanks were prepared in the lab using ASTM Type II water. The trip blanks were stored with the unused sample bottles and returned to the laboratory with each cooler containing environmental samples to be analyzed for VOCs. Appendix G summarizes the concentrations of the VOCs detected in the trip blanks collected during the SI field effort.

3.3.2 Field Blanks

Field blanks were collected to provide baseline analytical data for the water used for equipment decontamination. Field blanks were taken for the ASTM Type II water used and the potable water used in the steam cleaner and as decontamination water. Field blanks were collected by randomly selecting sample containers from the supply, filling them with water from the sample source, and then preserving as appropriate for the required analysis. The blanks were analyzed in the same manner as the associated environmental samples. Appendix G summarizes the concentrations of elements detected in the field blanks collected at ILANG GPRA.

3.3.3 Equipment Rinseates

Equipment rinseates were prepared from rinseates of equipment used to obtain environmental samples. The equipment rinseates were prepared by pouring ASTM Type II water through or over sampling equipment which had been decontaminated. The equipment rinseates were preserved as appropriate for the required analysis and analyzed using the same methods as the associated environmental samples. Appendix G summarizes the concentrations of elements detected in the equipment rinseates collected at ILANG GPRA.

3.3.4 Field Replicates

Initially, one replicate environmental sample was collected for every ten environmental samples, as required by DOE/HWP-65. The laboratory analyzed several soil samples, that were placed on hold and were not to be analyzed based on field GC results. The samples placed on hold were analyzed after the field effort had been completed and additional replicate

samples could not be obtained. The data for the additional soil samples have been included in the data evaluation since it provides additional information regarding status of the sites at the ILANG. The lack of the required number field replicates is not deemed to have effected overall data quality.

Field RPD values were calculated only for compounds and elements detected above the CRDLs in both replicate pair samples and only for those compounds and elements not considered to be common laboratory contaminants (e.g., methylene chloride). The RPD value of the detected compound or parameter was reviewed to assess the sample collection reproducibility and matrix variability. A total of sixty soil samples, twelve water samples, three soil replicate samples and two replicate water samples were collected. Appendix G summarizes the concentrations of elements detected in the replicate environmental samples collected at the ILANG.

3.4 LABORATORY QUALITY CONTROL ASSESSMENT

All environmental samples collected at GPRA were analyzed using the 3/90 EPA CLP Statement of Work (SOW) for GC/MS analyses, EPA solid waste test methods and general chemical methodology from the following references:

- ***SOW For In Organic Analysis***, , EPA CLP, 2/88 (metals)

- ***Test Methods for Evaluating Solid Waste, Physical/ Chemical Methods***, SW- 846, Third Edition, September 1986, with 1989 revisions (VOC and SVOC)

- ***Methods for Chemical Analyses of Water and Wastes***, EPA 600/4-79-020, EPA 1983, with revisions (TPH)

HAZWRAP Level C documentation was required and submitted by the laboratory for all analyses. All data were validated and qualified using the guidelines and specifications described in the following documents:

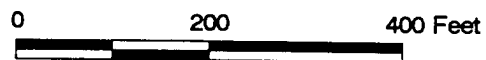
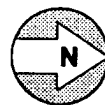
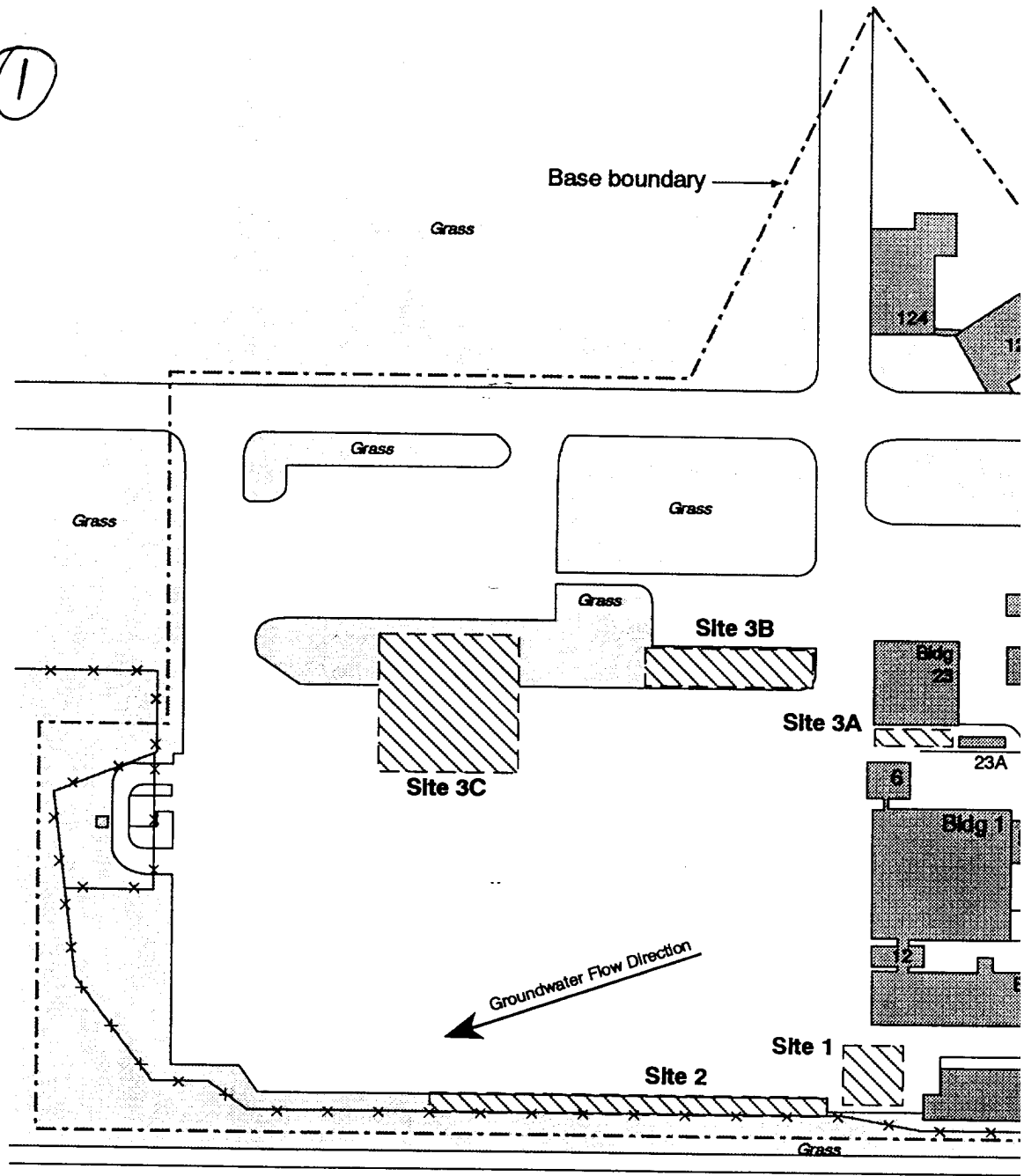
- ***Laboratory Data Validation Functional Guidelines for Evaluating Organic Analyses***, EPA CLP, June 1991, (Region III modifications. June 1992) (VOC and SVOC by GC/MS)
- ***Laboratory Data Validation Functional Guidelines for Evaluating Inorganic Analyses***, EPA CLP, February 1988 (target analyte metals) (Region III modifications, 1988)
- ***Requirements for Quality Control of Analytical Data***, HAZWRAP (DOE/HWP-65/R1), July 1990 (VOC by GC with modifications to qualification of blank contamination)

All data validation qualifiers used were applied to the data as required by the aforementioned guidelines. A complete summary of all data obtained and the qualifiers applied to that data are presented in Appendix H.

3.5 BACKGROUND SAMPLING

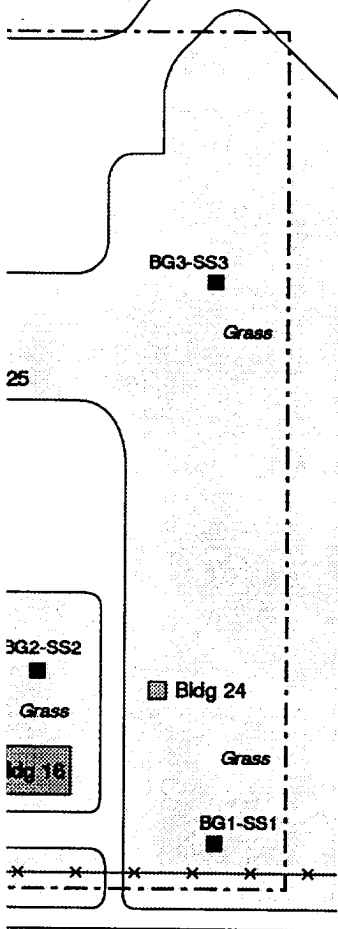
Background surface and subsurface soil samples were collected on facility property, and submitted for laboratory analysis of VOCs, SVOCs, TPH, and TAL metals. The resulting analytical data were principally used to determine concentrations of inorganics in the native or undisturbed soils on base. Groundwater monitoring wells were installed in two of the background borings, hydraulically up-gradient of the sites of interest, and sampled for VOCs, SVOCs, TPH, and TAL metals. Groundwater concentrations from these wells were used as the facility background for groundwater in the shallow aquifer. Figure 3-2 presents the background sampling locations. The background soil and groundwater analytical results were

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Scale -

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EARTH TECH	Project No. 911655 Illinois ANG, 182 AW GPRA, Peoria, Illinois
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Facility Background Sampling Locations

compared to site-specific detections. The comparison of the two data sets provides an indication of whether past, site-specific releases of hazardous materials to the environment have resulted in elevated concentrations of contaminants in the soils or groundwater.

3.5.1 Soils

During December 1992, subsurface (greater than 1 ft bgs) soil samples were collected from borings used to install the two background monitoring wells, BGMW1 and BGMW2. Because the borings were located in an area covered by asphalt pavement, no surface soil samples were collected from these locations. In April 1993, three background surface (0 to 1 ft) soil samples were obtained from non-asphalt covered areas. The resulting analytical data were used to determine concentrations of inorganics in the native or undisturbed soils on the facility. The background surface soil samples were collected from areas on the facility, which, according to Base Civil Engineering (BCE) personnel, have been relatively undisturbed by construction activities and have no history of being used as waste storage or handling areas.

Background soil samples were collected according to procedures described in Sections 2.4.2.1 and 2.4.2.2 and were analyzed for VOCs, SVOCs, TPH, and TAL metals. The analytical results for the surface and subsurface soil samples are presented in Table 3-3. Boring logs are included in Appendix D, and soil sampling forms are included in Appendix I.

As presented in Table 3-3, no VOCs were detected in the background soil samples. SVOCs from the polynuclear aromatic hydrocarbon (PNA) family were detected in two of the surface soil samples (BG-SS1, BG-SS2) at concentrations below the MDL. Individual PNA compounds were detected in concentrations ranging from 49 to 170 $\mu\text{g/kg}$, while total PNA ranged from 319 to 727 $\mu\text{g/kg}$. TPH was detected in all surface soils at concentrations ranging from 14.15 to 97.9 mg/kg. Aircraft normally generate residue from the incomplete combustion of aviation fuels, which subsequently gets deposited in and around the airport grounds. The detection

Table 3-3 Data Summary Table: Background
ILANG, 182 AW, GPRA, Peoria, Illinois

LOCATOR: BG-SS3
 SAMPLE ID: GPA-SBG-SS3-O-1
 COLLECTION DATE: 04/18/93
 ASSOCIATED FIELD QC: TB31,FB10, FB11,EB11

LOCATOR: BG-SS1
 SAMPLE ID: GPA-SBG-SS1-O-1
 COLLECTION DATE: 04/18/93
 ASSOCIATED FIELD QC: TB31,FB10, FB11,EB11

LOCATOR: BG-SS2
 SAMPLE ID: GPA-SBG-SS2-O-1
 COLLECTION DATE: 04/18/93
 ASSOCIATED FIELD QC: TB31,FB10, FB11,EB11

LOCATOR: BG-SS2 *
 SAMPLE ID: GPA-SBG-SS2-O-2
 COLLECTION DATE: 04/18/93
 ASSOCIATED FIELD QC: TB31,FB10, FB11,EB11

LOCATOR: BG-MW2
 SAMPLE ID: GPA-SBG-MW2-SS02-O4
 COLLECTION DATE: 01/19/93
 ASSOCIATED FIELD QC: TB31,FB10, FB11,EB11

LOCATOR: BG-MW2
 SAMPLE ID: GPA-SBG-MW2-SS04-O6
 COLLECTION DATE: 01/19/93
 ASSOCIATED FIELD QC: TB31,FB10, FB11,EB11

UNITS:		RESULT	QUAL	RESULT	QUAL	RESULT	QUAL	RESULT	QUAL	RESULT	QUAL	RESULT	QUAL
Criteria ⁽¹⁾													
SEMI-VOLATILES (8270)													
Benzo(a)anthracene	ug/kg	480	U	50		82	-			440	U	410	U
Benzo(b)fluoranthene	ug/kg	480	U	480	U	61				440	U	410	U
Benzo(k)fluoranthene	ug/kg	480	U	480	U	100		J		440	U	410	U
Chrysene	ug/kg	480	U	480	U	89				440	U	410	U
Fluoranthene	ug/kg	480	U	110		170				440	U	410	U
Phenanthrene	ug/kg	480	U	49		55				440	U	410	U
Pyrene	ug/kg	480	U	110	J	170		J		440	U	410	U
METALS - (CLP)													
Aluminum	mg/kg	13100	J	8890		8680				11900		2230	
Arsenic	mg/kg	9.20	J	6.60	J	8.70		J		23.10		10.90	
Barium	mg/kg	137	J	111	J	198		J		121		16.50	()
Beryllium	mg/kg	1	()	0.59	U	0.62		()		0.80	U	0.75	U
Calcium	mg/kg	4090		2730		2510				6050		146000	
Chromium	mg/kg	17.50		12.40		11.60				15.50		7.90	
Cobalt	mg/kg	8.40	()	2.80	()	12.50		()		7.80	()	4.80	()
Copper	mg/kg	16.40		12.10		9.20				15.80		8.80	
Iron	mg/kg	17200		10500		13800				17400		10500	
Lead	mg/kg	45.50	J	40.80	J	33.90		J		19.90	L	21.40	L
Magnesium	mg/kg	2770		1750		1740				5220		57600	
Manganese	mg/kg	753		414		1510				611		654	
Nickel	mg/kg	14.80		14.10		9.90		()		19.60		10.90	
Potassium	mg/kg	1590		1290	()	913		()		1650		1380	
Sodium	mg/kg	174	(K)	180	(K)	113		(B)		246	()	290	()
Vanadium	mg/kg	33.80		19.60		34.30				23.60		9	()
Zinc	mg/kg	81	J	74.80	J	43		J		62.20		40.90	
TPH - (418.1)													
Total Petroleum Hydrocarbons	mg/kg	97.90		74		20.20			8.10	19		19.10	

(I) Result is between the detection limit and the quantitation limit
 B Possible blank contamination
 J Reported value is estimated
 L Reported value is biased low
 U Compound analyzed but not detected

K Reported value is biased high
 R Data is unreliable
 (1) No MCL or action level available for soils
 - Analysis not performed
 * field duplicate of GPA-SBG-SS1-O-1

CLP MCL
 Contract Lab Program
 Maximum Contaminant Level

Table 3-3 Data Summary Table: Background
ILANG, 182 AW , GPRA, Peoria, Illinois

LOCATOR:	BG-SB1	BG-SB1	BG-SB1	BG-SB1	BG-SB1	BG-SB1	BG-SB1
SAMPLE ID:	GPA-SBG-SB1-SS0-2	GPA-SBG-SB1-SS2-4	GPA-SBG-SB1-SS4-6	GPA-SBG-SB1-SS6-8	GPA-SBG-SB1-SS8-10		
COLLECTION DATE:	12/10/92	12/10/92	12/10/92	12/10/92	12/10/92		
ASSOCIATED FIELD QC:	TB11,FB1, FB2,EB3	TB11,FB1, FB2,EB3	TB11,FB1, FB2,EB3	TB11,FB1,FB2,EB3	TB11,FB1, FB2,EB3		
UNITS:	RESULT	QUAL	RESULT	QUAL	RESULT	QUAL	QUAL

Criteria ⁽¹⁾

SEMI-VOLATILES (8270)

Benzo(a)anthracene	ug/kg	-	420	U	420	U	400	U	-
Benzo(b)fluoranthene	ug/kg	-	420	U	420	U	400	U	-
Benzo(k)fluoranthene	ug/kg	-	420	U	420	U	400	U	-
Chrysene	ug/kg	-	420	U	420	U	400	U	-
Fluoranthene	ug/kg	-	420	U	420	U	400	U	-
Phenanthrene	ug/kg	-	420	U	420	U	400	U	-
Pyrene	ug/kg	-	420	U	420	U	400	U	-

METALS - (CLP)

Aluminum	mg/kg	-	21300	J	14800	J	9190	J	6800
Arsenic	mg/kg	-	116	J	148	J	158	J	1.30
Barium	mg/kg	-	0.66	()	0.71	()	0.49	U	61.10
Beryllium	mg/kg	-	2890		3510		37800	U	0.49
Calcium	mg/kg	-	23.50		20.30		13.80	U	50900
Chromium	mg/kg	-	5.80	()	4	()	6.40	()	10.30
Cobalt	mg/kg	-	23.10		13.20		9.50		4.80
Copper	mg/kg	-	26400		16500		12000		9.70
Iron	mg/kg	-	13.70	J	8	J	8	J	8850
Lead	mg/kg	-	4400		3970		24000	J	6.80
Magnesium	mg/kg	-	309		273		352		31600
Manganese	mg/kg	-	24.10		19.60		15.10		243
Nickel	mg/kg	-	1470		1390		1180	U	10.50
Potassium	mg/kg	-	561	()	348	()	234	()	1200
Sodium	mg/kg	-	40.80		22.80		20.50		219
Vanadium	mg/kg	-	74.10	L	59.70	L	34.40	L	19.30
Zinc	mg/kg	-							28

TPH - (481.1)

Total Petroleum Hydrocarbons	mg/kg	289	79.7	33.6	40.8	50.2
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- (1) Result is between the detection limit and the quantitation limit
 B Possible blank contamination
 J Reported value is estimated
 L Reported value is biased low
 U Compound analyzed but not detected
- K Reported value is biased high
 R Data is unreliable
 (1) No MCL or action level available for soils
 - Analysis not performed
 * field duplicate of GPA-SBG-SS1-0-1
- CLP Contract Lab Program
 MCL Maximum Contaminant Level

of these organic compounds in the background soil samples should not disqualify these samples from being considered representative of background conditions in the vicinity of an airport.

Concentrations of TAL metals were detected in the soils, and these data also presented in Table 3-3. The detections of TAL metals are assumed to represent the range of background concentrations at the facility and were used for comparison with site-specific TAL metal detections.

3.5.2 Groundwater

Background groundwater data were collected from two wells: BGMW1 and BGMW2. Samples were collected and analyzed according to procedures described in Section 2.5.3 and were analyzed for VOCs, SVOCs, TPH, and TAL metals (total and dissolved).

The analytical results obtained from two rounds of groundwater sampling are presented in Table 3-4. Sample GPA-SBG-MW3-GW2 is a blind field duplicate of GPA-SBG-MW2-GW2 (both samples were obtained from BGMW2).

Trace concentrations of 1,1,1 TCA, 1,2, DCE, and 1,4 DCB were detected in BGMW1-GW1 at concentrations between the MDL and the instrument detection limit (IDL), but they were not detected in the second round (BGMW1-GW2). TCE was detected in BGMW1 in the first round of groundwater sampling at a concentration of 3.6 $\mu\text{g/l}$ and was confirmed in the second round (1.4 J $\mu\text{g/l}$). Because of the presence of VOCs in BGMW1, the results for this well were not used to determine the TAL metals background concentration because the presence of VOCs indicated that the well was not representative of facility background conditions.

Table 3-4 Data Summary Table: Groundwater - Background
ILANG, 182 AW , GPRA, Peoria, Illinois

LOCATOR: BG-MW1 BG-MW1 BG-MW2 BG-MW2 BG-MW3 *
SAMPLE ID: GPA-SBG-MW1-GW1 GPA-SBG-MW1-GW2 GPA-SBG-MW2-GW1 GPA-SBG-MW2-GW2 GPA-SBG-MW3-GW2
COLLECTION DATE: 01/20/93 04/17/93 01/20/93 04/18/93 04/18/93
ASSOCIATED FIELD QC: TB21,FB3,FB4,EB4 TB30,FB10,FB11,EB10 TB20,FB3,FB4,EB4 TB31,FB10,FB11,EB10 TB31,FB10,FB11,EB10

UNITS:		RESULT	QUAL	RESULT	QUAL	RESULT	QUAL	RESULT	QUAL	RESULT	QUAL
IEPA Class I											
VOLATILES (8010)											
1,1,1-Trichloroethane	200 ug/l	0.10		0.35	U	0.35	U	0.35	U	0.35	U
1,2-trans-Dichloroethylene	100 ug/l	0.07		0.30	U	0.30	U	0.30	U	0.30	U
Trichloroethylene	5 ug/l	3.60		1.40	B	0.30	U	0.30	U	0.30	U
VOLATILES (8020)											
1,2-Dichlorobenzene	600 ug/l	0.15	U	0.10	U	0.09		0.15	U	0.15	U
1,4-Dichlorobenzene	75 ug/l	0.07		0.15	U	0.15	U	0.15	U	0.15	U
Ethylbenzene	700 ug/l	0.25		0.20	U	0.22		0.20	U	0.20	U
Toluene	100 ug/l	0.25		0.72	B	0.32	B	0.83	B	0.29	B
SEMI-VOLATILES (8270)											
Benzoic Acid	ug/l	100	U	1	R	8	J	100	UJ	100	U
bis(2-Ethylhexyl)phthalate	ug/l	1				10	U	10	U	10	U
METALS (CLP)											
Aluminum	ug/l	24100		1120	J	42800		2470	J	6070	J
Aluminum, Dissolved	ug/l	212	B	103	(B)	58.10	(B)	1110		98.90	(B)
Antimony, Dissolved	6** ug/l	52	U	42	(I)	52	U	36	U	36	U
Arsenic	50 ug/l	5.30	(B)	6.80	(I)	7.20	(I)	8.80	(I)	4.10	(I)
Arsenic, Dissolved	ug/l	4.20	(I)	4.70	(I)	3.40	(I)	3	U	3	U
Barium	2000 ug/l	245	B	124	(B)	543		184	(B)	274	
Beryllium	4** ug/l	1.40	(B)	1	U	2.70	(I)	1	U	1.50	(I)
Chromium	100 ug/l	48.70		8	U	41.50		8	U	11.10	
Chromium, Dissolved	ug/l	6	U	8	U	6	U	30.90		8	U
Cobalt	ug/l	13.60	(I)	8	U	12.40	(I)	8	U	10.10	(I)
Copper	650 ug/l	32.10		7.60	(B)	36.50	B	8.10	(B)	16.80	(B)
Iron	5000 ug/l	30800		1090	J	14300	K	1300	J	4130	J
Iron, Dissolved	ug/l	165		41	U	13	U	848		41	U

(I) Result is between the detection limit and the quantitation limit
B Possible blank contamination
J Reported value is estimated
L Reported value is biased low
U Compound analyzed but not detected

K Reported value is biased high
R Data is unreliable
* Field duplicate of GPA-SBG-MW2-GW2
** No IEPA criteria available. Federal MCL used

CLP Contract Lab Program
MCL Maximum Contaminant Level
IEPA Illinois Environmental Protection Agency

Table 3-4 Data Summary Table: Groundwater - Background
ILANG, 182 AW, GPRA, Peoria, Illinois

LOCATOR:	BG-MW1	BG-MW1	BG-MW2	BG-MW2	BG-MW3
SAMPLE ID:	GPA-SBG-MW1-GW1	GPA-SBG-MW1-GW2	GPA-SBG-MW2-GW1	GPA-SBG-MW2-GW2	GPA-SBG-MW3-GW2
COLLECTION DATE:	01/20/93	04/17/93	01/20/93	04/18/93	04/18/93
ASSOCIATED FIELD QC:	TB21,FB3,FB4,EB4	TB30,FB10,FB11,EB10	TB20,FB3,FB4,EB4	TB31,FB10,FB11,EB10	TB31,FB10,FB11,EB10

UNITS: RESULT QUAL RESULT QUAL RESULT QUAL RESULT QUAL

IEPA Class I

METALS (CLP) (Contd)

Lead	7.5 ug/l	11	L	174000	2.70	(B)	16.80	L	99400	3.20	B	12.30	B
Magnesium	ug/l	173000	B	137000			121000	B	65200		B	149000	
Magnesium, Dissolved	ug/l	139000		2370		B	57800	B	400		B	61900	B
Manganese	150 ug/l	2290	L	2010			806	L	131			656	
Manganese, Dissolved	ug/l	2150		25.40		(I)	280		17		U	117	
Nickel	100** ug/l	39.70	(I)	17		U	23.50	(I)	17		U	17	U
Nickel, Dissolved	ug/l	24.70	(I)	1350		U	13	U	1610		(B)	2010	(B)
Potassium	ug/l	4490	(I)	78700		B	11600	B	33500		B	32300	B
Sodium, Dissolved	ug/l	76100		6		U	22600	(I)	6		U	14.30	(I)
Vanadium	ug/l	67					6.30						
TPH - (418.1)													
Total Petroleum Hydrocarbons	mg/l	0.25	U	0.70		B	0.80	B	0.70			0.30	

(I) Result is between the detection limit and the quantitation limit
 B Possible blank contamination
 J Reported value is estimated
 L Reported value is biased low
 U Compound analyzed but not detected

K Reported value is biased high
 R Data is unreliable
 * Field duplicate of GPA-SBG-MW2-GW2
 ** No IEPA criteria available. Federal MCL used

CLP
 MCL
 IEPA

Contract Lab Program
 Maximum Contaminant Level
 Illinois Environmental Protection Agency

Analytical results for BGMW2 indicate no significant concentrations of organic compounds in both rounds of groundwater sampling. Concentrations of total and dissolved metals present in BGMW2 were assumed to be representative of naturally occurring concentrations and were used for background comparison.

3.6 SITE 1: SEPTIC SYSTEM FILTER BEDS

The following investigation activities were performed at Site 1:

- Twenty-nine samples (27 soil gas and 2 groundwater samples) were collected using a Geoprobe® unit, and analyzed using a field GC.
- Six soil borings were drilled at the site.
 - One boring was completed as a monitoring well (S1MW1)
 - Five borings were completed as soil borings
- Twenty-nine soil samples were collected using a drilling rig and split-spoon samplers, and were screened for selected VOCs using a field GC.
- Twenty-two split-spoon soil samples were collected and shipped to an analytical laboratory for analysis of VOCs, SVOCs, TPH, and TAL metals.
- Two rounds of groundwater samples from 1MW1 were collected from one monitoring well, and shipped to an analytical laboratory for analysis of VOCs, SVOCs, TPH, and TAL metals (total and dissolved).
- Two rounds of groundwater elevation measurements were collected.
- Monitoring well 1MW1 was slug tested for determination of aquifer parameters.

Figure 3-3 presents a site map of the Septic System Filter Beds illustrating the SI sampling, boring, and monitoring well locations.

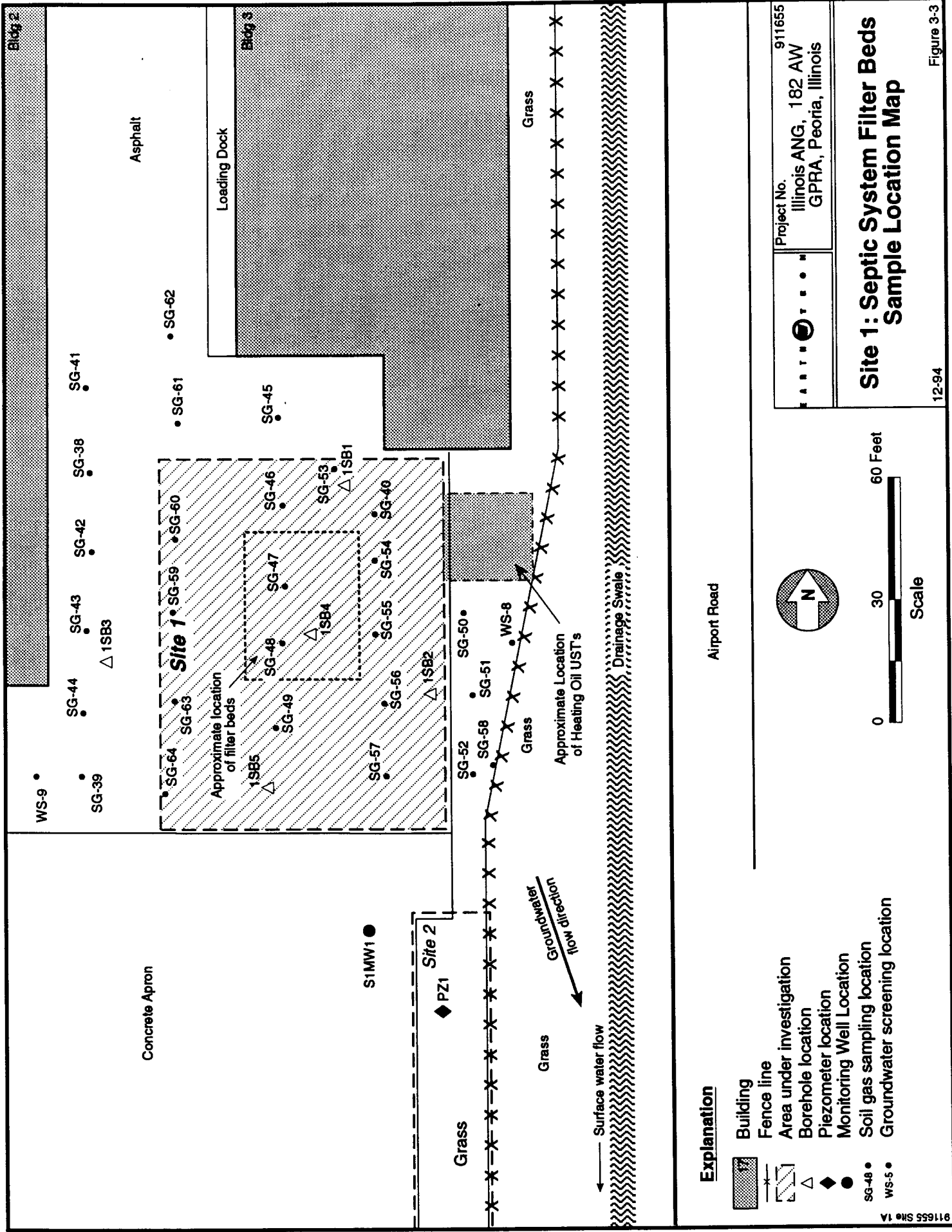
3.6.1 Site Geology and Hydrogeology

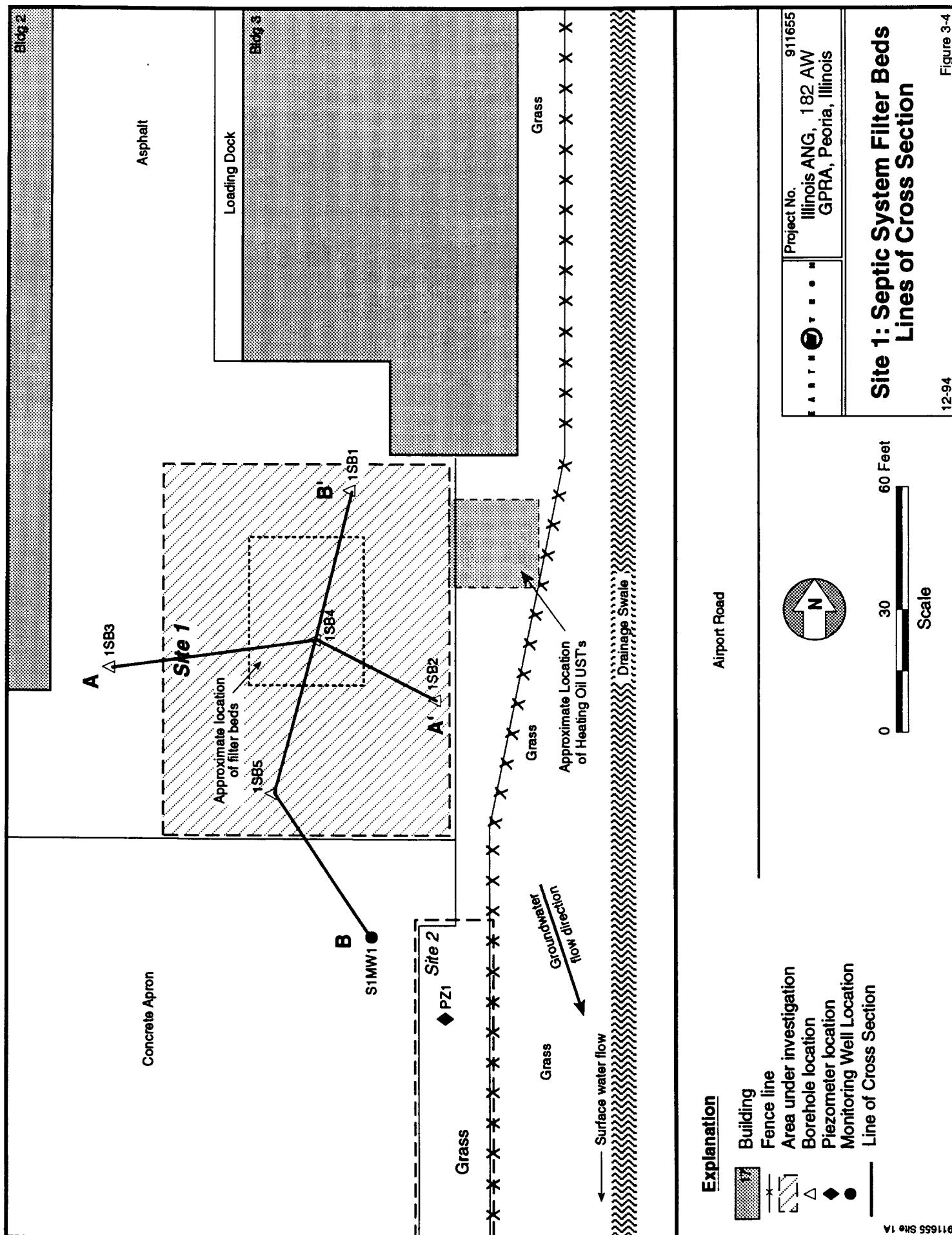
Geology

As discussed in Section 3.1, soils underlying the facility range in composition from clay to clayey sand. The locations of geologic profiles A-A' and B-B' are shown in Figure 3-4. These profiles are presented as Figures 3-5 and 3-6 and were constructed based on the field observations obtained during drilling operations. Horizontal distances are not drawn to scale on the profiles. As presented on the two profiles, all boring and monitoring well locations were drilled through asphalt and through a layer of fill or reworked native soil. The fill material is generally very similar to the native clay soils. It was differentiated, however, from the native soils based on the presence of man-made objects (brick fragments, nails, etc), or the occurrence of gravel. Soil boring 1SB4 was drilled through a gravel section interpreted to be the old septic system filter bed. The depth to the base of the filter bed is estimated to be approximately 12 ft bgs. Beneath the fill unit, or clay-rich native soils, a sandy clay layer is present in the subsurface. 1SB4 was continuously sampled until refusal, interpreted to represent bedrock, was encountered at 28.5 ft bgs.

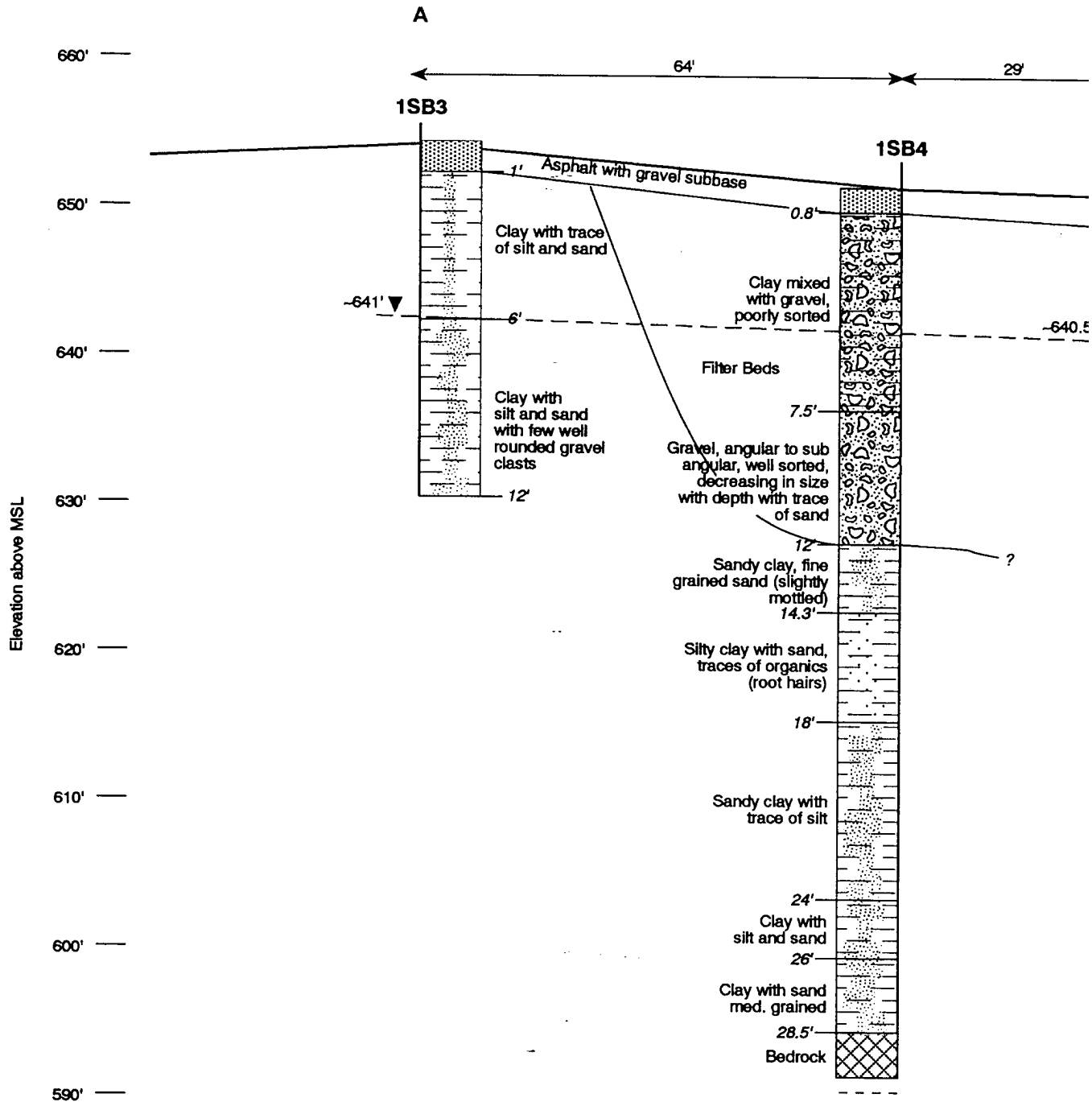
Hydrogeology

Groundwater elevation measurements were obtained from the four piezometers on December 13, 1992 and were used to create a facility-wide groundwater elevation map. These data were also used to select a down-gradient monitoring well location for Site 1 (Figure 3-1). After the installation of all SI monitoring wells, groundwater elevation measurements were obtained again on January 21, 1993 and April 18, 1993. The three rounds of groundwater elevation data all show similar flow directions. As illustrated on Figure 3-1, groundwater flow is to the southeast across Site 1 at an average hydraulic gradient of 0.007 ft/ft, and 1MW1 is located hydraulically down-gradient from the filter bed. Groundwater beneath Site 1 occurs at approximately 2 ft bgs. The average K value calculated

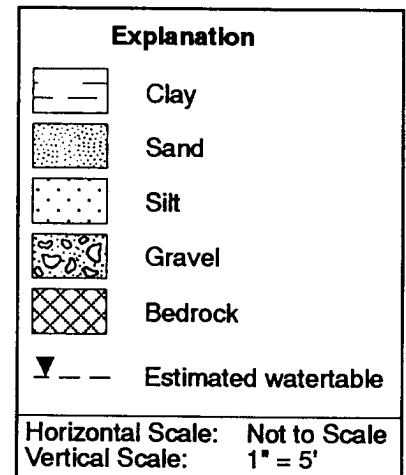
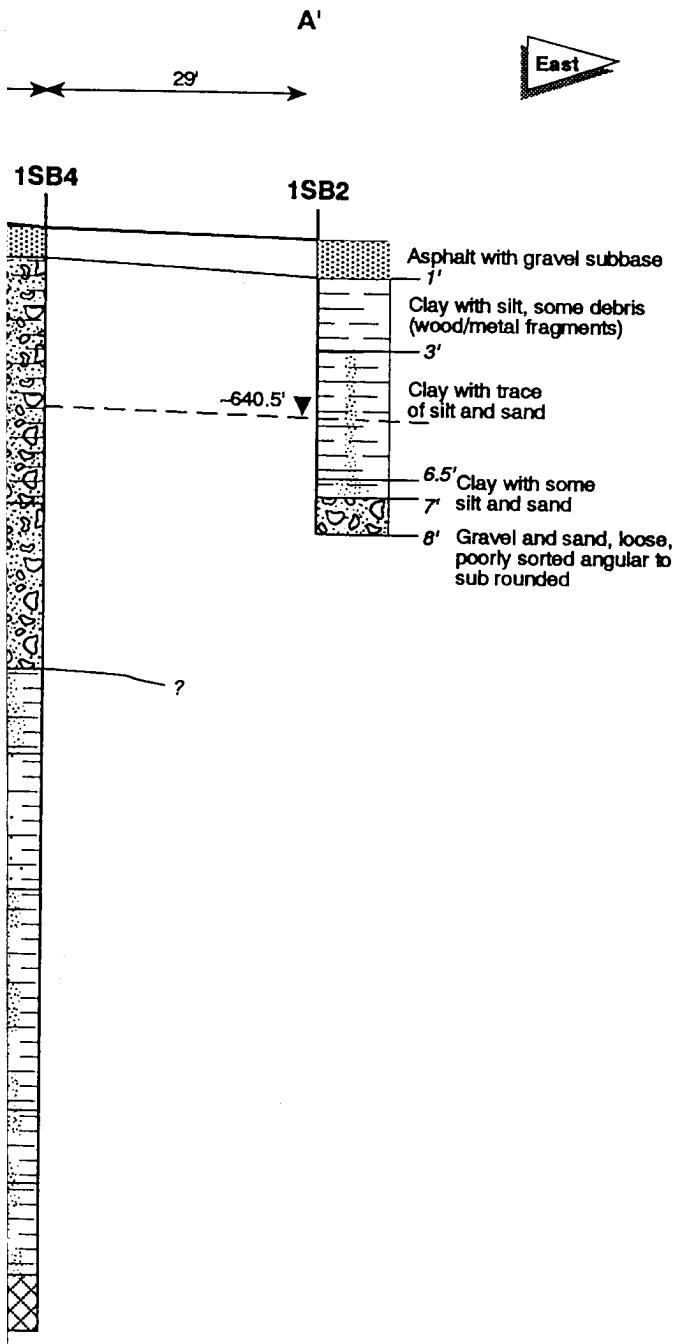




1



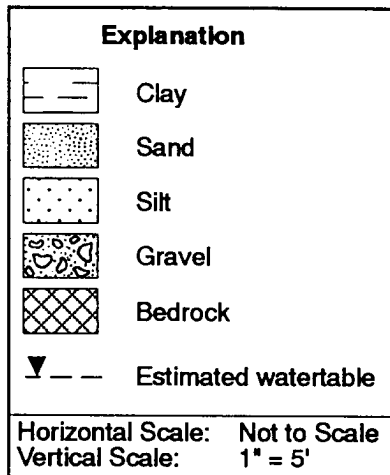
2



• Soil borings were continuously sampled for lithology from 2' BGS to total depth

	Project No. 91-
	Illinois ANG, 182 AW GPRA, Peoria, Illinois
Site 1: Septic System Filter Beds Cross Section A-A'	
12-94	Fig

3

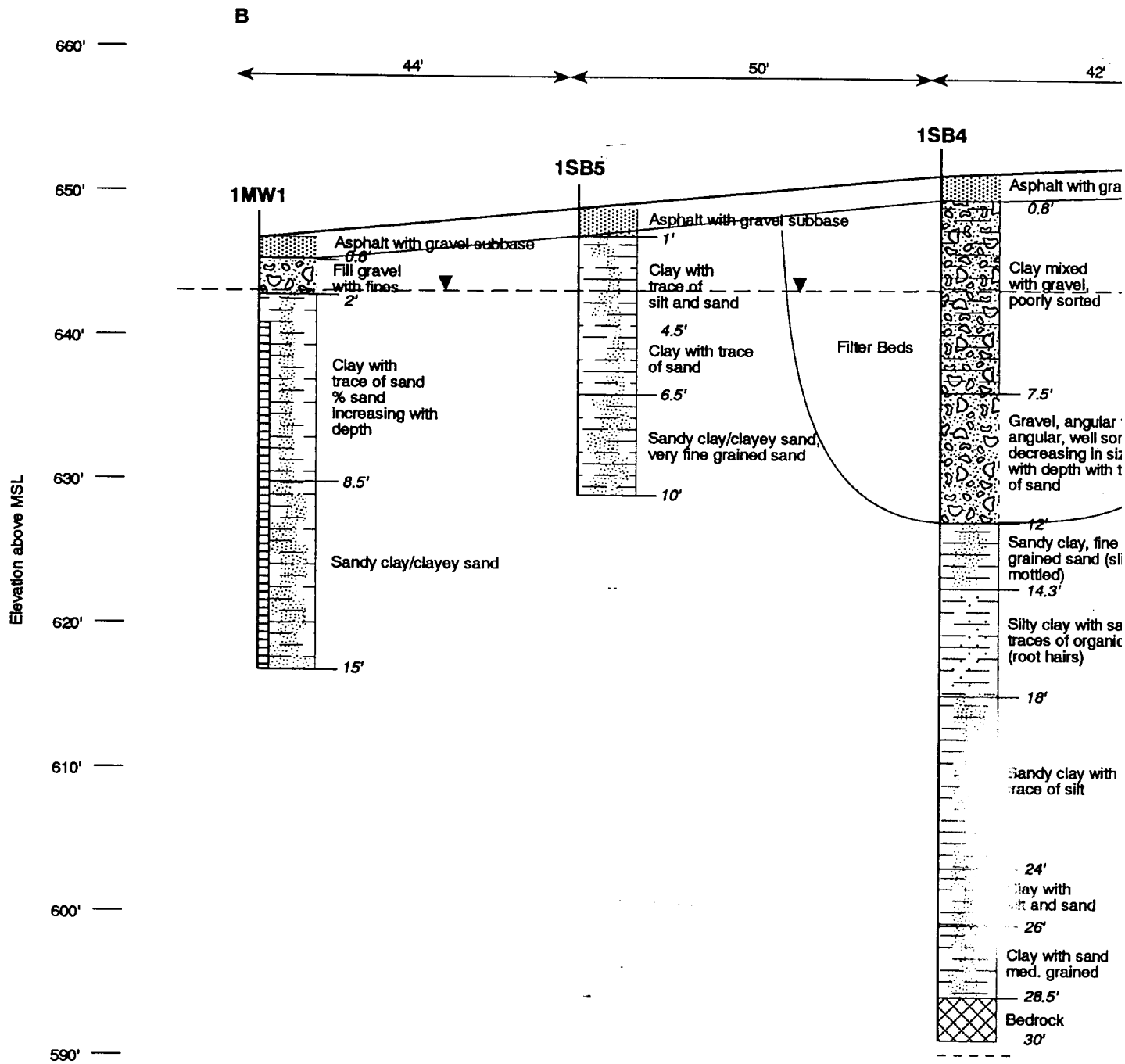


• Soil borings were continuously sampled for lithology from 2' BGS to total depth

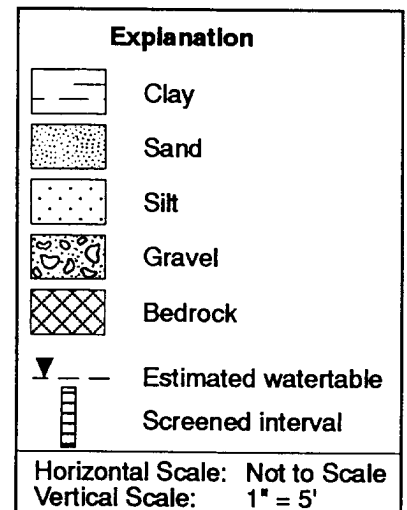
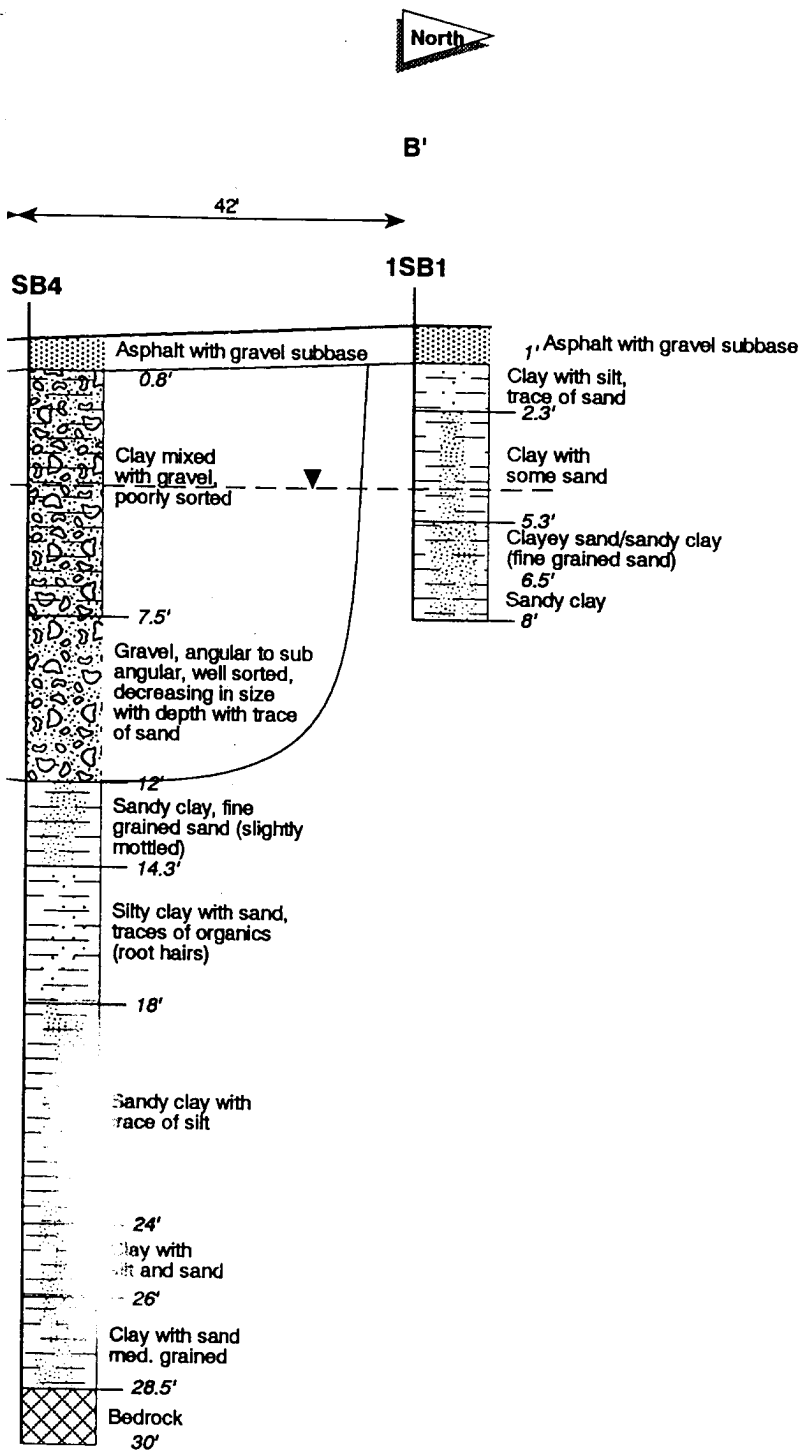
EARTH TECH	Project No. 91-1655 Illinois ANG, 182 AW GPRA, Peoria, Illinois
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**Site 1: Septic System Filter Beds
Cross Section A-A'**

1



2



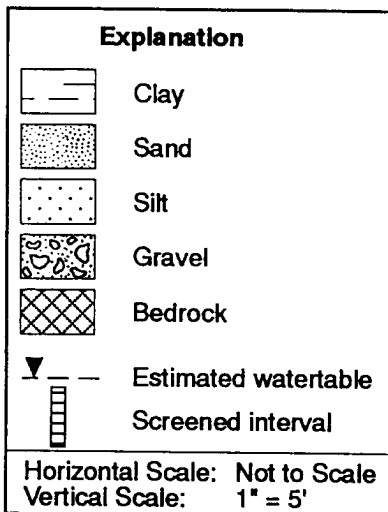
• Soil borings were continuously sampled for lithology from 2' BGS to total depth

• 1MW1 was sampled for lithology at 3'-5' BGS and 8'-10' BGS

EARTH SYSTEM	Project No.	91-
	Illinois ANG, 182 AW GPRA, Peoria, Illinois	

Site 1: Septic System Filter Beds Cross Section B-B'

3



- Soil borings were continuously sampled for lithology from 2' BGS to total depth
- 1MW1 was sampled for lithology at 3'-5' BGS and 8'-10' BGS

from slug test data obtained from 1MW1 is 3.27×10^{-5} cm/sec, indicative of low permeability. Groundwater velocity and T, as calculated by the methods described in Section 3.1.2, are 0.68 ft/yr and 2.18 ft²/day, respectively.

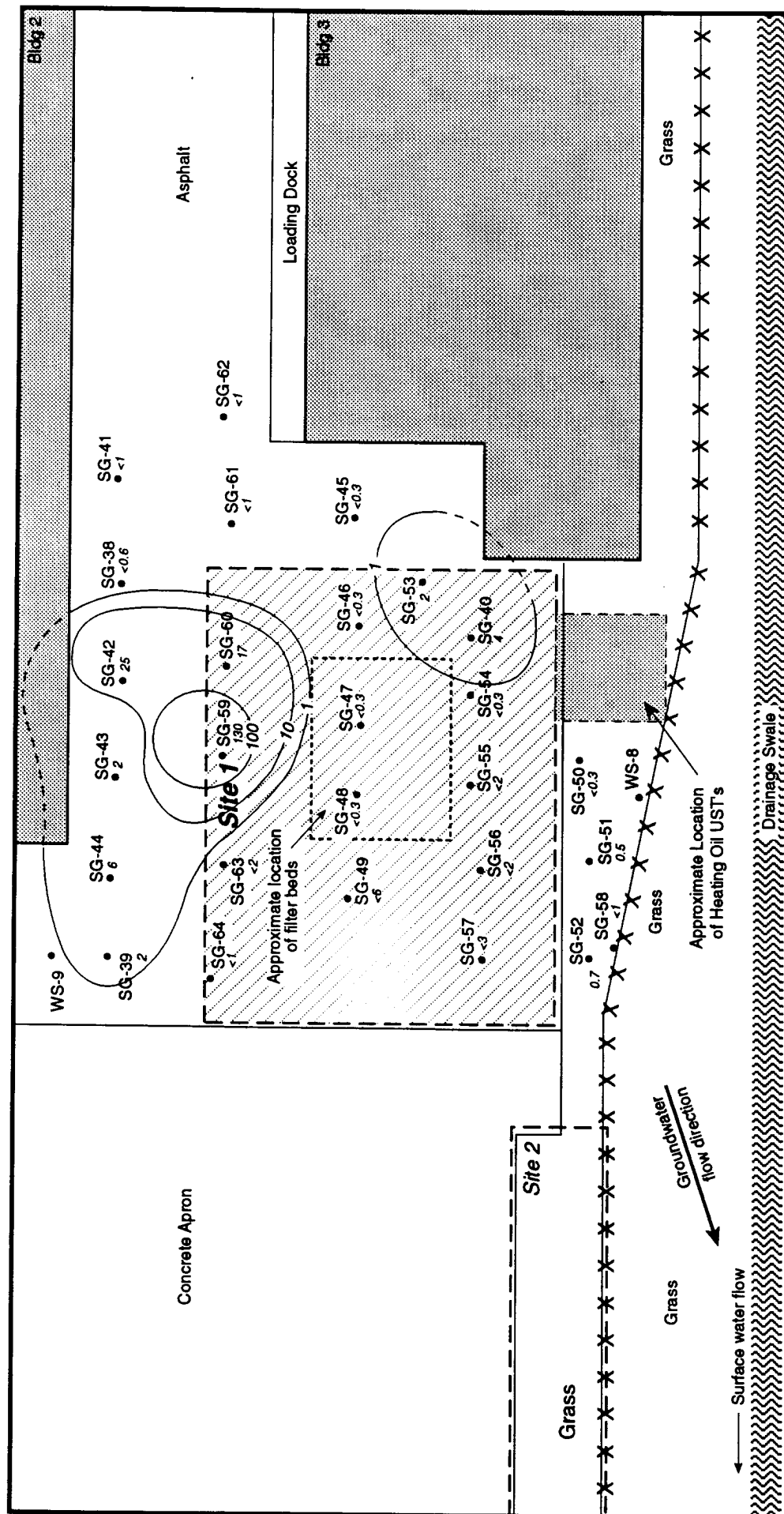
3.6.2 Screening Activity Results

Screening activity results include the soil organic vapor (SOV) survey (soil gas sampling and groundwater sampling) performed in November 1992 by Tracer Research Corporation, and the field GC screening by Bingham Environmental of soil samples collected during the soil boring program.

3.6.2.1 Soil Gas and Groundwater Screening Results

Soil gas and groundwater samples were collected and analyzed by Tracer Research Corporation during the initial stages of this investigation using hydraulically driven sampling probes and a field GC. Twenty seven soil gas samples were collected from 27 locations, and 2 groundwater samples were collected from 2 locations. The soil gas and groundwater sampling locations are presented on Figure 3-3. The complete data set are included in Appendix E of this report.

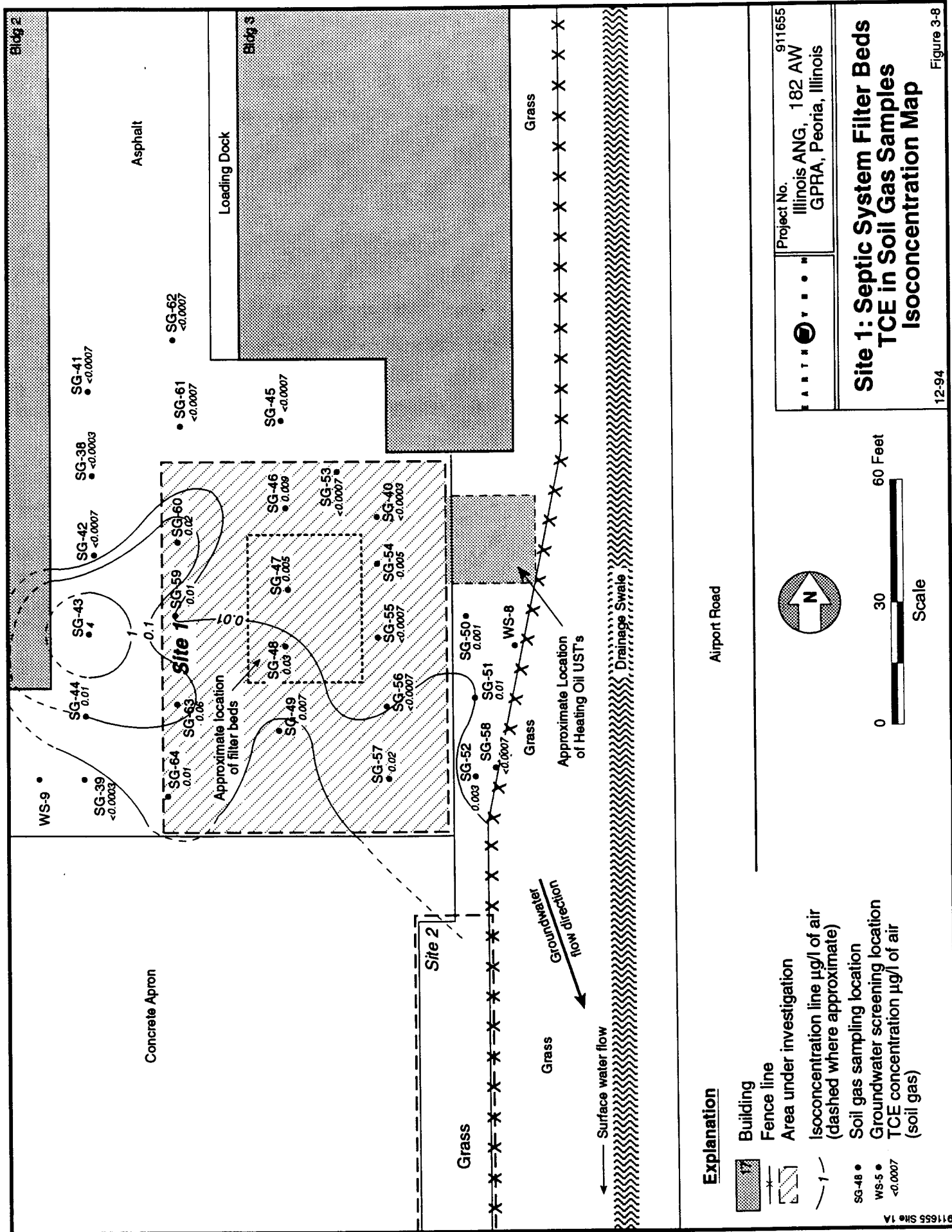
The soil-gas and groundwater screening samples were collected near the filter bed and around the perimeter of the site to screen for the presence of VOCs in the subsurface environment. In general, VOCs were detected to the east and south of Building 2. Isoconcentration maps illustrating the extent of total VOCs and TCE in the Site 1 screening data are presented as Figures 3-7 and 3-8. Soil gas sample location SG-59 contained the highest concentration of total VOCs (130 $\mu\text{g}/\ell$). Lower levels of total VOCs were detected in soil gas samples located south of Building 3, near the USTs. The highest TCE concentration was detected in soil gas



Site 1: Septic System Filter Beds VOCs in Soil Gas Samples Isoconcentration Map

12-94

Figure 3-7



sample SG-43 ($4\ \mu\text{g}/\ell$). Detected soil gas concentrations of TCE extend east of Building 2 and south along the concrete apron. No target compounds were detected in the two groundwater screening samples.

3.6.2.2 Field GC Screening Results

During the drilling and sampling of soil borings 1SB1 through 1SB5, soil samples were collected and analyzed for selected VOCs using a field GC to select samples for analyses. The methods used were described in Section 2.3.2. Field GC results and chromatograms are presented in Appendix E. No target VOCs were detected during field GC screening of Site 1 soil samples.

3.6.3 Confirmation and Delineation Results

The soil gas and groundwater screening data were used to guide the placement of the soil borings. Soil borings 1SB1, 1SB2, 1SB3, and 1SB5 were located around the perimeter of the filter beds to provide data for the characterization of the perimeter of the site, while soil boring 1SB4 was drilled within the filter beds to provide data on the suspected source area. 1SB3 was placed in the area of the highest TCE soil gas result (SG43). As mentioned previously, 1SB4 was continuously sampled to bedrock to provide lithologic descriptions of the shallow soils and aquifer underlying the site.

Twenty-two soil samples and 2 groundwater samples were selected as described in Section 2.5, and were analyzed by CompuChem Laboratories for VOCs, SVOCs, TAL metals, and TPH. A discussion of the analytical results obtained from the samples collected and analyzed during the investigation are included in the following sections. Many of the organic compounds detected at the sites occur as members of a group of compounds. Where practical, discussions regarding the occurrence of the chemical group have been chosen over the

occurrence of specific chemicals. If an ARAR is exceeded for a specific compound, then the compound will be noted separately. The following lists the specific analyzed compounds included in each of the chemical groups referred to in the text.

Carcinogenic PNAs

Benzo (k) fluoranthene	Benzo (a) pyrene
Benzo (b) fluoranthene	Benzo (a) anthracene
Chrysene	Dibenzo (a,h) anthracene
Indeno (1,2,3-cd) pyrene	

Non-carcinogenic PNAs

Acenaphthene	Acenaphthylene
Anthracene	Benzo (g,h,i) perylene
2-Chloronaphthalene	Fluoranthene
Fluorene	2-Methylnaphthalene
Naphthalene	Phenanthrene
Pyrene	

Phthalate Esters

Butylbenzylphthalate	Dimethylphthalate
Di-n-butylphthalate	Di-n-octylphthalate
Diethylphthalate	bis-2-Ethylhexyl phthalate

BTEX

Benzene	Toluene
Ethylbenzene	Xylene

3.6.3.1 Surface Soil Samples

No surface soil samples were collected from boring 1SB1 through 1SB5 because Site 1 is covered by asphalt with a gravel sub-base. Shallow subsurface samples labeled 0 to 2 ft were collected immediately below the gravel sub-base and are discussed in Section 3.6.3.2.

3.6.3.2 Subsurface Soil Samples

Twenty-two subsurface soil samples were selected from Site 1 and submitted for laboratory analysis: three each from borings 1SB1 and 1SB2, five each from 1SB3 and 1SB5, four from 1SB4, and two from 1MW1. These sampling locations are in Figure 3-3, and the analytical results are presented in Table 3-5.

Volatile Organic Compounds

Low concentrations of 2-butanone were detected in the subsurface soils (from depths of 2 ft and greater) collected from Site 1. Results from 1SB4, drilled in the center of the filter beds, indicate only one detection of 2-butanone (11 J $\mu\text{g/kg}$) above the MDL (10 $\mu\text{g/kg}$). All other detections of 2-butanone in 1SB4 are between the MDL and IDL. No significant concentrations of VOC appear to be present in the filter bed. The remaining borings were drilled around the perimeter of the filter bed. 2-butanone was detected at concentrations above the MDL (10 $\mu\text{g/kg}$) in the remaining borings. The maximum detected concentration of 2-butanone around the perimeter of the filter bed was 18 J $\mu\text{g/kg}$.

Semi-volatile Organic Compounds

SVOCs identified in the analytical results obtained from Site 1 soils include dibenzofuran and compounds from the PNA and phthalate ester families. Figures 3-9 and 3-10 present summary diagrams of the distribution of total PNAs within the subsurface soils at the site.

From the data presented in Table 3-4 and Figure 3-9, SVOC are most prevalent in samples collected from borings 1SB2 and 1SB4. These borings were located within the previously

Table 3-5 Data Summary Table: Subsurface Soils, Site 1 - Septic Filter Beds
ILANG, 182 AW , GPRA, Peoria, Illinois

LOCATOR: 1-MW1 1-MW1 1-SB1 1-SB1 * 1-SB1
SAMPLE ID: GPA-S1-MW1-SS04-05 GPA-S1-MW1-SS08-09 GPA-S1-SB1-SS2-4 GPA-S1-SB1-SS4-6 GPA-S1-SB1-SS10-12
COLLECTION DATE: 01/17/93 01/17/93 12/10/92 12/10/92 12/10/92
ASSOCIATED FIELD QC: TB17,FB3, FB4,EB3A TB17,FB3, FB4,EB3A TB7,FB1, FB2,EB2 TB7,FB1, FB2,EB2 TB7,FB1, FB2,EB2

UNITS:	RESULT	QUAL	RESULT	QUAL	RESULT	QUAL	RESULT	QUAL	RESULT	QUAL
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Criteria ⁽¹⁾

VOLATILES (8240)

2-Butanone	ug/kg	7					13	U	12	U	12	U
2-Propanone	ug/kg	79	B				19	B	14	B	10	B
Chloroform	ug/kg	6	U				6	U	6	U	1	B
Methylene chloride	ug/kg	21	B				41	B	41	B	33	B
Toluene	ug/kg	6	U				6	U	6	U	6	U

SEMI-VOLATILES (8270)

2-Methylnaphthalene	ug/kg	410	U				410	U	410	U	400	U
Acenaphthene	ug/kg	410	U				410	U	410	U	400	U
Anthracene	ug/kg	410	U				410	U	410	U	400	U
Benzo(a)anthracene	ug/kg	410	U				410	U	410	U	400	U
Benzo(a)pyrene	ug/kg	410	U				410	U	410	U	400	U
Benzo(b)fluoranthene	ug/kg	410	U				410	U	410	U	400	U
Benzo(ghi)perylene	ug/kg	410	U				410	U	410	U	400	U
Benzo(k)fluoranthene	ug/kg	410	U				410	U	410	U	400	U
Butyl benzyl phthalate	ug/kg	410	U				410	U	410	U	400	U
Chrysene	ug/kg	410	U				410	U	410	U	400	U
Di-n-butyl phthalate	ug/kg	410	U				410	U	410	U	400	U
Di-n-octyl phthalate	ug/kg	410	U				410	U	410	U	400	U
Dibenzo(a,h)anthracene	ug/kg	410	U				410	U	410	U	400	U
Dibenzofuran	ug/kg	410	U				410	U	410	U	400	U
Fluoranthene	ug/kg	410	U				410	U	410	U	400	U
Fluorene	ug/kg	410	U				410	U	410	U	400	U
Indeno(1,2,3-c,d)pyrene	ug/kg	410	U				410	U	410	U	400	U
Naphthalene	ug/kg	410	U				410	U	410	U	400	U
Phenanthrene	ug/kg	410	U				410	U	410	U	400	U
Pyrene	ug/kg	410	U				410	U	410	U	400	U
bis(2-Ethylhexyl)phthalate	ug/kg	410	U				130	J	49		64	52

(1) Result is between the detection limit and the quantitation limit

B Possible blank contamination

J Reported value is estimated

L Reported value is biased low

U Compound analyzed for but not detected

K Reported value is biased high

R Data is unreliable

* Field duplicate of GPA-S1-SB1-SS4-6

(1) No MCLs or action levels available for soils

. Analysis not performed

CLP

MCL

Contract Lab Program

Maximum Contaminant Level

Table 3-5 Data Summary Table: Subsurface Soils, Site 1 - Septic Filter Beds
ILANG, 182 AW , GPRA, Peoria, Illinois

LOCATOR:		1-MW1		1-MW1		1-SB1		1-SB1		1-SB1 *		1-SB1	
SAMPLE ID:		GPA-S1-MW1-SS04-05		GPA-S1-MW1-SS08-09		GPA-S1-SB1-SS2-4		GPA-S1-SB1-SS4-6		GPA-S1-SB1-SS10-12		GPA-S1-SB1-SS6-8	
COLLECTION DATE:		01/17/93		01/17/93		12/10/92		12/10/92		12/10/92		12/10/92	
ASSOCIATED FIELD QC:		TB17,FB3, FB4,EB3A		TB17,FB3, FB4,EB3A		TB7,FB1, FB2,EB2		TB7,FB1, FB2,EB2		TB7,FB1, FB2,EB2		TB7,FB1, FB2,EB2	
UNITS:		RESULT	QUAL	RESULT	QUAL	RESULT	QUAL	RESULT	QUAL	RESULT	QUAL	RESULT	QUAL

Criteria ⁽¹⁾

METALS (CLP)

Aluminum	mg/kg	15600	11500	16700	6400	9190	9700			
Arsenic	mg/kg	10.10	4.30	4.20	5.20	8.30	2.70			
Barium	mg/kg	105	105	142	79.60	106	70			
Beryllium	mg/kg	0.86	0.76	1	0.42	0.51	0.57			
Cadmium	mg/kg	1.30	1.30	1.30	1.20	1.20	1.20			
Calcium	mg/kg	2520	19100	2870	185000	42600	38700			
Chromium	mg/kg	22.20	19.50	22.50	6.80	15.90	15.50			
Cobalt	mg/kg	9.20	11.60	9.30	4.20	6.40	9.10			
Copper	mg/kg	17.40	14.30	19.30	8.30	12.40	10.40			
Iron	mg/kg	24000	16500	25300	6940	18300	11000			
Lead	mg/kg	16.60	7.60	15.40	7.90	4.70	12.10			
Magnesium	mg/kg	3390	12200	3890	18900	24800	24200			
Manganese	mg/kg	330	420	407	262	376	212			
Nickel	mg/kg	20.10	14.20	20.10	11	14.80	13.10			
Potassium	mg/kg	1460	1700	979	640	1100	1170			
Silver	mg/kg	2.60	2.50	1.50	1.50	1.50	1.50			
Sodium	mg/kg	220	232	296	261	276	285			
Vanadium	mg/kg	32.90	32.10	29.90	12	23.10	20.30			
Zinc	mg/kg	57.10	65.80	60.30	29.80	48	41			

TPH (418.1)

Total Petroleum Hydrocarbons	mg/kg	17.90	50.20	46.9	11.30	19.20	46.10			
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- (1) Result is between the detection limit and the quantitation limit
 B Possible blank contamination
 J Reported value is estimated
 L Reported value is biased low
 U Compound analyzed for but not detected

- K Reported value is biased high
 R Data is unreliable
 * Field duplicate of GPA-S1-SB1-SS4-6
 (1) No MCLs or action levels available for soils
 Analysis not performed

CLP Contract Lab Program
 MCL Maximum Contaminant Level

Table 3-5 Data Summary Table: Subsurface Soils, Site 1 - Septic Filter Beds
ILANG, 182 AW, GPRA, Peoria, Illinois

LOCATOR:		1-SB2		1-SB2		1-SB2		1-SB2		1-SB3		1-SB3		1-SB3	
SAMPLE ID:		GPA-S1-SB2-SS0.2		GPA-S1-SB2-SS2.4		GPA-S1-SB2-SS4.6		GPA-S1-SB3-SS2.4		GPA-S1-SB3-SS4.6		GPA-S1-SB3-SS6.8			
COLLECTION DATE:		12/10/92		12/10/92		12/10/92		12/10/92		12/10/92		12/10/92			
ASSOCIATED FIELD QC:		TB7,FB1, FB2,EB2		TB7,FB1, FB2,EB2		TB7,FB1, FB2,EB2		TB8,FB1, FB2,EB2		TB8,FB1, FB2,EB2		TB8,FB1, FB2,EB2			
UNITS:		RESULT	QUAL	RESULT	QUAL	RESULT	QUAL	RESULT	QUAL	RESULT	QUAL	RESULT	QUAL	RESULT	QUAL
Criteria ⁽¹⁾															
VOLATILES (8240)															
2-Butanone	ug/kg	12	U	11	J	18	J	12	U	3	J	14	U		
2-Propanone	ug/kg	33	B	64	B	73	B	32	B	54	B	67	B		
Chloroform	ug/kg	2	B	1	B	6	U	2	B	6	U	2	B		
Methylene chloride	ug/kg	19	B	21	B	20	B	38	B	58	B	54	B		
Toluene	ug/kg	6	U	6	U	6	U	6	U	6	U	7	U		
SEMI-VOLATILES (8270)															
2-Methylnaphthalene	ug/kg	150		-		390	U	410	U	410	U	440	U		
Acenaphthene	ug/kg	280		-		390	U	410	U	410	U	440	U		
Anthracene	ug/kg	700		-		44		410	U	410	U	440	U		
Benzo(a)anthracene	ug/kg	2900		-		210		110		410	U	440	U		
Benzo(a)pyrene	ug/kg	2600		-		260		120		410	U	440	U		
Benzo(b)fluoranthene	ug/kg	3500		-		300		190		410	U	440	U		
Benzo(ghi)perylene	ug/kg	1900		-		220		70		410	U	440	U		
Benzo(k)fluoranthene	ug/kg	1700		-		150		85		410	U	440	U		
Butyl benzyl phthalate	ug/kg	770	U	-		390	U	410	U	410	U	440	U		
Chrysene	ug/kg	3100		-		310		160		410	U	440	U		
Di-n-butyl phthalate	ug/kg	770	U	-		390	U	410	U	410	U	440	U		
Di-n-octyl phthalate	ug/kg	770	U	-		390		410		410	U	440	U		
Dibenzo(a,h)anthracene	ug/kg	590		-		45		410		410	U	440	U		
Dibenzofuran	ug/kg	210		-		390	U	410	U	410	U	440	U		
Fluoranthene	ug/kg	4700		-		390		410		410	U	440	U		
Fluorene	ug/kg	430		-		540		250		410	U	440	U		
Indeno(1,2,3-c,d)pyrene	ug/kg	2300		-		390	U	410	U	410	U	440	U		
Naphthalene	ug/kg	770	U	-		190		79		410	U	440	U		
Phenanthrene	ug/kg	3400		-		390	U	410	U	410	U	440	U		
Pyrene	ug/kg	4900		-		320		160		410	U	440	U		
bis(2-Ethylhexyl)phthalate	ug/kg	80		-		460		240		410	U	440	U		
						83		410	U	410	U	440	U		

(1) Result is between the detection limit and the quantitation limit
 B Possible blank contamination
 J Reported value is unreliable
 L Reported value is estimated
 U Reported value is biased low
 U Compound analyzed for but not detected

K Reported value is biased high
 R Data is unreliable
 * Field duplicate of GPA-S1-SB1-SS4-6
 (1) No MCLs or action levels available for soils
 . Analysis not performed

CLP
 MCL
 Contract Lab Program
 Maximum Contaminant Level

Table 3-5 Data Summary Table: Subsurface Soils, Site 1 - Septic Filter Beds
ILANG, 182 AW, GPRA, Peoria, Illinois

LOCATOR:		1-SB2	1-SB2	1-SB2	1-SB3	1-SB3	1-SB3	1-SB3
SAMPLE ID:	GPA-S1-SB2-SS0-2	GPA-S1-SB2-SS2-4	GPA-S1-SB2-SS4-6	GPA-S1-SB3-SS2-4	GPA-S1-SB3-SS4-6	GPA-S1-SB3-SS4-6	GPA-S1-SB3-SS4-6	GPA-S1-SB3-SS6-8
COLLECTION DATE:	12/10/92	12/10/92	12/10/92	12/10/92	12/10/92	12/10/92	12/10/92	12/10/92
ASSOCIATED FIELD QC:	TB7,FB1, FB2,EB2	TB7,FB1, FB2,EB2	TB7,FB1, FB2,EB2	TB7,FB1, FB2,EB2	TB8,FB1, FB2,EB2	TB8,FB1, FB2,EB2	TB8,FB1, FB2,EB2	TB8,FB1, FB2,EB2
UNITS:	RESULT	QUAL	RESULT	QUAL	RESULT	QUAL	RESULT	QUAL

Criteria ⁽¹⁾

METALS (CLP)

Aluminum	mg/kg	14300	-	13300	21400	9150	-	-
Arsenic	mg/kg	12	-	8.40	7.40	5.80	-	-
Barium	mg/kg	139	-	129	201	207	-	-
Beryllium	mg/kg	0.94	-	0.64	1	0.78	-	-
Cadmium	mg/kg	2	-	4.70	1.30	1.20	-	-
Calcium	mg/kg	19900	-	18100	14200	1620	-	-
Chromium	mg/kg	25	-	19	25.10	12.20	-	-
Cobalt	mg/kg	9.60	-	7.60	11.40	11.80	-	-
Copper	mg/kg	20.80	-	14.70	21.60	8.70	-	-
Iron	mg/kg	20500	-	18800	28800	11200	-	-
Lead	mg/kg	67.40	-	33.50	48.50	18.60	-	-
Magnesium	mg/kg	9070	-	6910	8630	1740	-	-
Manganese	mg/kg	728	-	516	502	849	-	-
Nickel	mg/kg	16.70	-	15.70	19.10	15.10	-	-
Potassium	mg/kg	1970	-	1150	1270	1380	-	-
Silver	mg/kg	2.40	UL	2.40	2.50	2.50	UL	-
Sodium	mg/kg	227	-	215	198	149	-	-
Vanadium	mg/kg	39	-	33.70	53.70	26.90	-	-
Zinc	mg/kg	130	-	77.20	70.80	51.80	-	-
TPH (418.1)								

Total Petroleum Hydrocarbons	mg/kg	231	31	211	126	84.50	17.40
------------------------------	-------	-----	----	-----	-----	-------	-------

- () Result is between the detection limit and the quantitation limit
 B Possible blank contamination
 J Reported value is estimated
 L Reported value is biased low
 U Compound analyzed for but not detected

- K Reported value is biased high
 R Data is unreliable
 • Field duplicate of GPA-S1-SB1-SS4-6
 (1) No MCLs or action levels available for soils
 . Analysis not performed

CLP Contract Lab Program
MCL Maximum Contaminant Level

Table 3-5 Data Summary Table: Subsurface Soils, Site 1 - Septic Filter Beds
ILANG, 182 AW , GPRA, Peoria, Illinois

LOCATOR:		1-SB3		1-SB3		1-SB4		1-SB4		1-SB5 *		1-SB4		1-SB4	
SAMPLE ID:		GPA-S1-SB3-SS8-10		GPA-S1-SB3-SS10-12		GPA-S1-SB4-SS0-2		GPA-S1-SB4-SS2-4		GPA-S1-SB5-SS12-14		GPA-S1-SB4-SS4-6		GPA-S1-SB4-SS4-6	
COLLECTION DATE:		12/10/92		12/10/92		12/10/92		12/10/92		12/12/92		12/12/92		12/12/92	
ASSOCIATED FIELD QC:		TB8,FB1, FB2,EB2		TB8,FB1, FB2,EB2		TB9,FB1, FB2,EB3		TB9,FB1, FB2,EB3		TB9,FB1, FB2,EB3		TB9,FB1, FB2,EB3		TB9,FB1, FB2,EB3	
UNITS:		RESULT	QUAL	RESULT	QUAL	RESULT	QUAL	RESULT	QUAL	RESULT	QUAL	RESULT	QUAL	RESULT	QUAL
Criteria ⁽¹⁾															
VOLATILES (8240)															
2-Butanone	ug/kg	11	U	13	U	12	U	3	J	11	U	7	J		
2-Propanone	ug/kg	35	B	30	B	47	B	66	B	11	U	100	B		
Chloroform	ug/kg	5	U	1	B	2	B	2	B	6	U	2	B		
Methylene chloride	ug/kg	29	B	42	B	45	B	54	B	21	B	38	B		
Toluene	ug/kg	5	U	6	U	6	U	3	B	6	U	6	U		
SEMI-VOLATILES (8270)															
2-Methylnaphthalene	ug/kg	350	U	410	U	400	U	96	U	380	U	390	U		
Acenaphthene	ug/kg	350	U	410	U	97	U	180	U	110	U	390	U		
Anthracene	ug/kg	350	U	410	U	370	J	620	J	260	U	390	U		
Benzo(a)anthracene	ug/kg	350	U	410	U	1300	U	2200	U	1100	U	130	U		
Benzo(a)pyrene	ug/kg	350	U	410	U	1400	U	1700	U	990	U	100	U		
Benzo(b)fluoranthene	ug/kg	350	U	410	U	2000	U	2800	U	1400	U	180	U		
Benzo(ghi)perylene	ug/kg	350	U	410	U	830	U	810	U	570	U	390	U		
Benzo(k)fluoranthene	ug/kg	350	U	410	U	1400	U	1300	U	580	U	55	U		
Butyl benzyl phthalate	ug/kg	350	U	410	U	400	U	400	U	380	U	390	U		
Chrysene	ug/kg	350	U	410	U	1700	U	2400	U	1300	U	130	U		
Di-n-butyl phthalate	ug/kg	350	U	410	U	96	J	64	J	380	U	390	U		
Di-n-octyl phthalate	ug/kg	350	U	410	U	130	J	120	J	380	U	390	U		
Dibenzo(a,h)anthracene	ug/kg	350	U	410	U	150	J	230	J	200	U	390	U		
Dibenzofuran	ug/kg	350	U	410	U	150	J	370	J	79	U	390	U		
Fluoranthene	ug/kg	350	U	410	U	3600	U	5500	U	2600	U	270	U		
Fluorene	ug/kg	350	U	410	U	77	U	170	U	110	U	390	U		
Indeno(1,2,3-c,d)pyrene	ug/kg	350	U	410	U	730	U	810	U	590	U	390	U		
Naphthalene	ug/kg	350	U	410	U	64	U	140	U	380	U	390	U		
Phenanthrene	ug/kg	350	U	410	U	2500	U	4400	U	1500	U	180	U		
Pyrene	ug/kg	350	U	410	U	2800	U	4300	J	2000	J	220	J		
bis(2-Ethylhexyl)phthalate	ug/kg	350	U	71	U	160	J	160	J	73	B	150	J		

(1) Result is between the detection limit and the quantitation limit
 B Possible blank contamination
 J Reported value is estimated
 L Reported value is biased low
 U Compound analyzed for but not detected

K Reported value is biased high
 R Data is unreliable
 * Field duplicate of GPA-S1-SB4-SS2-4
 (1) No MCLs or action levels available for soils
 - Analysis not performed

CLP Contract Lab Program
 MCL Maximum Contaminant Level

Table 3-5 Data Summary Table: Subsurface Soils, Site 1 - Septic Filter Beds
ILANG, 182 AW , GPRA, Peoria, Illinois

LOCATOR:		1-SB3		1-SB3		1-SB4		1-SB4		1-SB5 *		1-SB4	
SAMPLE ID:		GPA-S1-SB3-SS8-10		GPA-S1-SB3-SS10-12		GPA-S1-SB4-SS0-2		GPA-S1-SB4-SS2-4		GPA-S1-SB5-SS12-14		GPA-S1-SB4-SS4-6	
COLLECTION DATE:		12/10/92		12/10/92		12/12/92		12/12/92		12/12/92		12/12/92	
ASSOCIATED FIELD QC:		TB8,FB1, FB2,EB2		TB8,FB1, FB2,EB2		TB9,FB1, FB2,EB3		TB9,FB1, FB2,EB3		TB9,FB1, FB2,EB3		TB9,FB1, FB2,EB3	
UNITS:		RESULT	QUAL	RESULT	QUAL	RESULT	QUAL	RESULT	QUAL	RESULT	QUAL	RESULT	QUAL
Criteria ⁽¹⁾													
METALS (CLP)													
Aluminum	mg/kg	-	-	-	-	9080	-	-	-	10100	-	13800	-
Arsenic	mg/kg	-	-	-	-	8	-	-	-	6.30	-	6.40	-
Barium	mg/kg	-	-	-	-	207	-	-	-	70.90	-	188	-
Beryllium	mg/kg	-	-	-	-	0.82	-	-	-	0.94	-	0.89	-
Cadmium	mg/kg	-	-	-	-	1.20	-	-	-	1.10	-	1.20	-
Calcium	mg/kg	-	-	-	-	4170	-	-	-	51700	-	6120	-
Chromium	mg/kg	-	-	-	-	12	-	-	-	16.30	-	19.80	-
Cobalt	mg/kg	-	-	-	-	10.10	-	-	-	8.80	-	10.70	-
Copper	mg/kg	-	-	-	-	9.10	-	-	-	19.10	-	15.50	-
Iron	mg/kg	-	-	-	-	13900	-	-	-	28900	-	18400	-
Lead	mg/kg	-	-	-	-	29.10	-	-	-	19	-	33	-
Magnesium	mg/kg	-	-	-	-	2260	-	-	-	21500	-	3440	-
Manganese	mg/kg	-	-	-	-	1270	-	-	-	607	-	711	-
Nickel	mg/kg	-	-	-	-	11.90	-	-	-	18.40	-	17.10	-
Potassium	mg/kg	-	-	-	-	1180	-	-	-	1120	-	1170	-
Silver	mg/kg	-	-	-	-	2.40	-	-	-	2.30	-	2.40	-
Sodium	mg/kg	-	-	-	-	181	-	-	-	247	-	302	-
Vanadium	mg/kg	-	-	-	-	34.50	-	-	-	32.20	-	37.30	-
Zinc	mg/kg	-	-	-	-	71.30	-	-	-	86.60	-	83.80	-
TPH (418.1)													
Total Petroleum Hydrocarbons	mg/kg	42		94.50		376		14800		4860		295	

(1) Result is between the detection limit and the quantitation limit
 B Possible blank contamination
 J Reported value is estimated
 L Reported value is biased low
 U Compound analyzed for but not detected

Reported value is biased high
 Data is unreliable
 Field duplicate of GPA-S1-SB4-SS2-4
 No MCLs or action levels available for soils
 Analysis not performed

CLP
 MCL
 Contract Lab Program
 Maximum Contaminant Level

Table 3-5 Data Summary Table: Subsurface Soils, Site 1 - Septic Filter Beds
ILANG, 182 AW , GPRA, Peoria, Illinois

LOCATOR:		1-SB4		1-SB5		1-SB5		1-SB5		1-SB5		1-SB5	
SAMPLE ID:		GPA-S1-SB4-SS6-8		GPA-S1-SB5-SS0-2		GPA-S1-SB5-SS2-4		GPA-S1-SB5-SS4-6		GPA-S1-SB5-SS6-8		GPA-S1-SB5-SS8-10	
COLLECTION DATE:		12/12/92		12/12/92		12/12/92		12/12/92		12/12/92		12/12/92	
ASSOCIATED FIELD QC:		TB9,FB1, FB2,EB3		TB9,FB1, FB2,EB3		TB9,FB1, FB2,EB3		TB9,FB1, FB2,EB3		TB9,FB1, FB2,EB3		TB9,FB1, FB2,EB3	
UNITS:		RESULT	QUAL	RESULT	QUAL	RESULT	QUAL	RESULT	QUAL	RESULT	QUAL	RESULT	QUAL
Criteria ⁽¹⁾													
VOLATILES (8240)													
2-Butanone	ug/kg	11	J	12	U	12	U	4	J	12	U	12	U
2-Propanone	ug/kg	72	B	38	B	39	B	45	B	9	B	8	B
Chloroform	ug/kg	2	B	6	U	1	B	2	B	1	B	6	U
Methylene chloride	ug/kg	28	B	34	B	32	B	33	B	25	B	26	B
Toluene	ug/kg	7	U	6	U	6	U	6	U	6	U	6	U
SEMI-VOLATILES (8270)													
2-Methylnaphthalene	ug/kg	430	U	400	U	400	U	420	U	400	U	410	U
Acenaphthene	ug/kg	430	U	440	U	400	U	420	U	400	U	410	U
Anthracene	ug/kg	430	U	120	U	400	U	420	U	400	U	410	U
Benzo(a)anthracene	ug/kg	210		500	U	400	U	420	U	400	U	410	U
Benzo(a)pyrene	ug/kg	280		520	U	400	U	420	U	400	U	410	U
Benzo(b)fluoranthene	ug/kg	650		1100	U	400	U	420	U	400	U	410	U
Benzo(ghi)perylene	ug/kg	410		410	U	400	U	420	U	400	U	410	U
Benzo(k)fluoranthene	ug/kg	650		1100	U	400	U	420	U	400	U	410	U
Butyl benzyl phthalate	ug/kg	120	J	400	U	400	U	420	U	400	U	410	U
Chrysene	ug/kg	330		670	U	400	U	420	U	400	U	410	U
Di-n-butyl phthalate	ug/kg	430	U	400	U	400	U	420	U	400	U	410	U
Di-n-octyl phthalate	ug/kg	430	U	400	U	400	U	420	U	400	U	410	U
Dibenzo(a,h)anthracene	ug/kg	430	U	66	U	400	U	420	U	400	U	410	U
Dibenzofuran	ug/kg	430	U	230	U	400	U	420	U	400	U	410	U
Fluoranthene	ug/kg	490		1300	U	400	U	420	U	400	U	410	U
Fluorene	ug/kg	430	U	400	U	400	U	420	U	400	U	410	U
Indeno(1,2,3-c,d)pyrene	ug/kg	330		400	U	400	U	420	U	400	U	410	U
Naphthalene	ug/kg	430	U	400	U	400	U	420	U	400	U	410	U
Phenanthrene	ug/kg	220		680	U	400	U	420	U	400	U	410	U
Pyrene	ug/kg	430	J	1200	U	400	U	420	U	400	U	410	U
bis(2-Ethylhexyl)phthalate	ug/kg	160	J	90	B	44	B	420	U	53	B	410	U

(1) Result is between the detection limit and the quantitation limit
 B Possible blank contamination
 J Reported value is estimated
 L Reported value is biased low
 U Compound analyzed for but not detected

K R
 Reported value is biased high
 Data is unreliable
 Analysis not performed
 No MCLs or action levels available for soils
 (1)

CLP MCL
 Contract Lab Program
 Maximum Contaminant Level

Table 3-5 Data Summary Table: Subsurface Soils, Site 1 - Septic Filter Beds
ILANG, 182 AW , GPRA, Peoria, Illinois

LOCATOR: SAMPLE ID: COLLECTION DATE: ASSOCIATED FIELD QC:	1-SB4	1-SB5	1-SB5	1-SB5	1-SB5	1-SB5	1-SB5	1-SB5
	GPA-S1-SB4-SS6-8	GPA-S1-SB5-SS0-2	GPA-S1-SB5-SS2-4	GPA-S1-SB5-SS4-6	GPA-S1-SB5-SS6-8	GPA-S1-SB5-SS8-10		
	12/12/92	12/12/92	12/12/92	12/12/92	12/12/92	12/12/92		
	TB9,FB1, FB2,EB3	TB9,FB1, FB2,EB3	TB9,FB1, FB2,EB3	TB9,FB1, FB2,EB3	TB9,FB1, FB2,EB3	TB9,FB1, FB2,EB3		
UNITS:	RESULT	QUAL	RESULT	QUAL	RESULT	QUAL	RESULT	QUAL

Criteria ⁽¹⁾

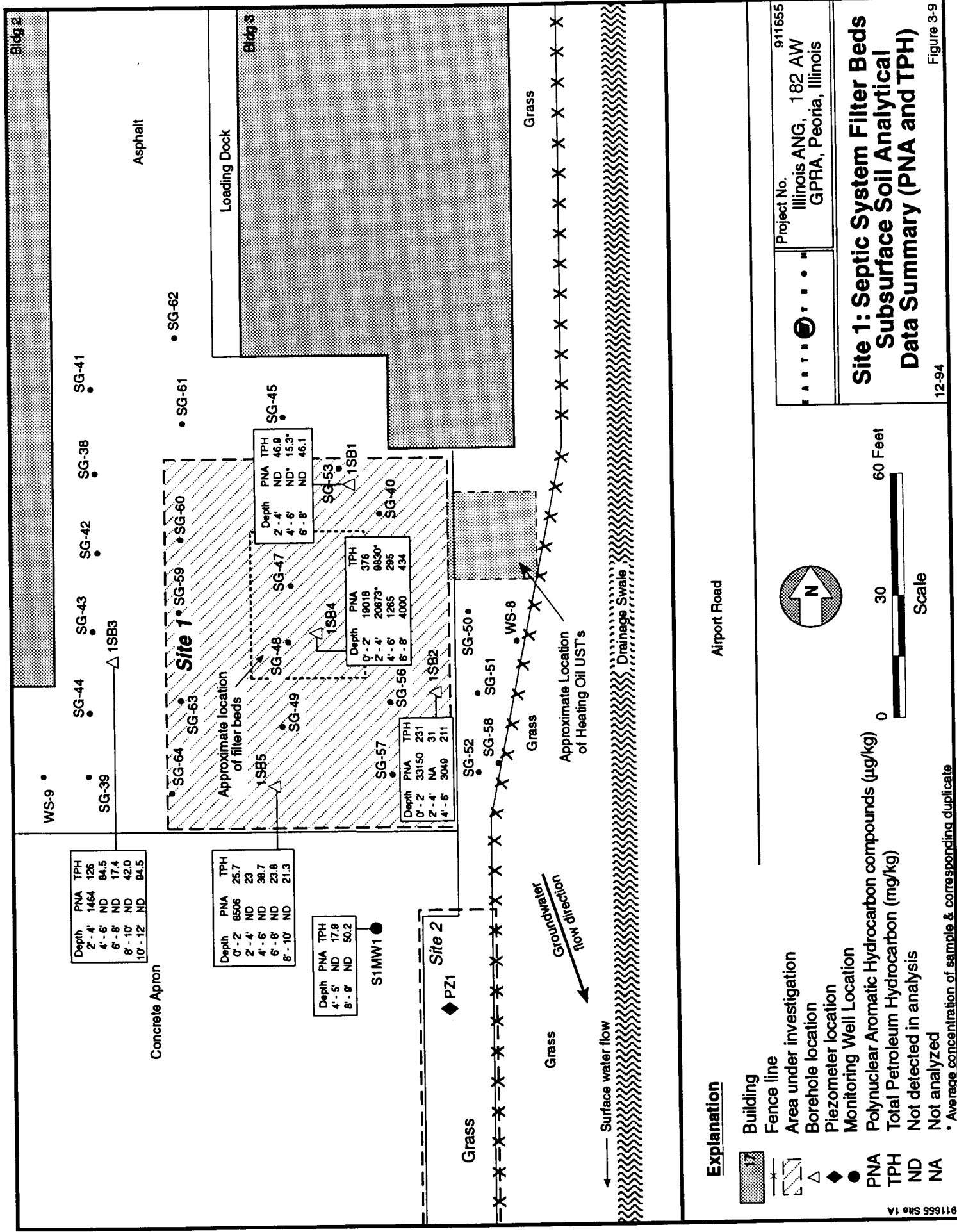
METALS (CLP)

Aluminum	mg/kg	2750					11100	-	-
Arsenic	mg/kg	8.70	K				5	-	-
Barium	mg/kg	29.60	()				124	-	-
Beryllium	mg/kg	0.52	U				0.49	()	-
Cadmium	mg/kg	1.80					1.20	U	-
Calcium	mg/kg	158000					1860	-	-
Chromium	mg/kg	9.90					15.50	-	-
Cobalt	mg/kg	2.90	U				8.70	()	-
Copper	mg/kg	19.70					13.40	-	-
Iron	mg/kg	10700	L				13600	-	-
Lead	mg/kg	31.50					14.70	-	-
Magnesium	mg/kg	78200					2080	-	-
Manganese	mg/kg	348	K				465	K	-
Nickel	mg/kg	10.50	U				13.30	-	-
Potassium	mg/kg	1270	U				1150	U	-
Silver	mg/kg	8.90					2.40	UL	-
Sodium	mg/kg	323	()				156	()	-
Vanadium	mg/kg	9.10	()				26.70	-	-
Zinc	mg/kg	112					44.90	-	-

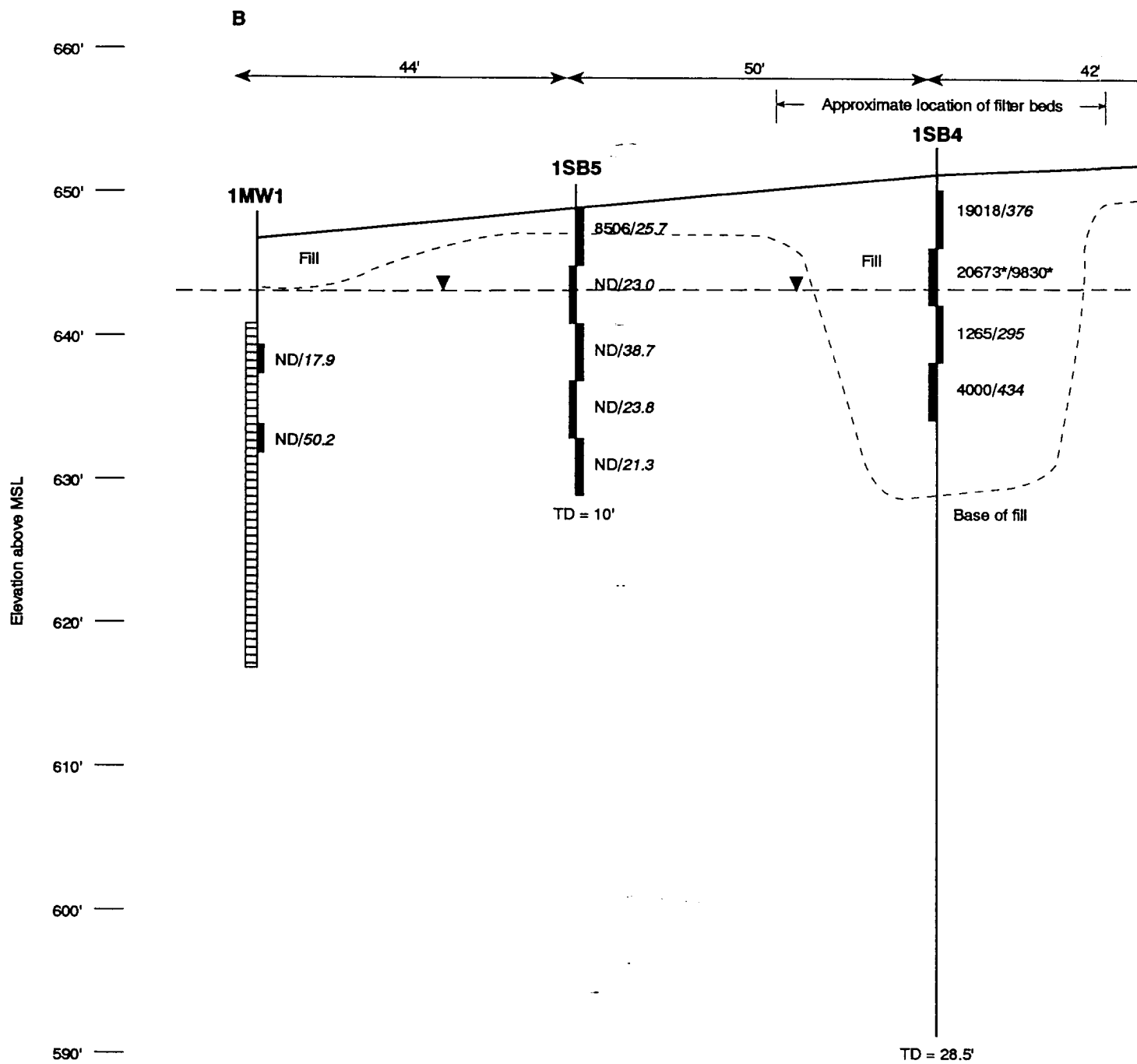
TPH (418.1)

Total Petroleum Hydrocarbons	mg/kg	434					23		23.8		21.30
------------------------------	-------	-----	--	--	--	--	----	--	------	--	-------

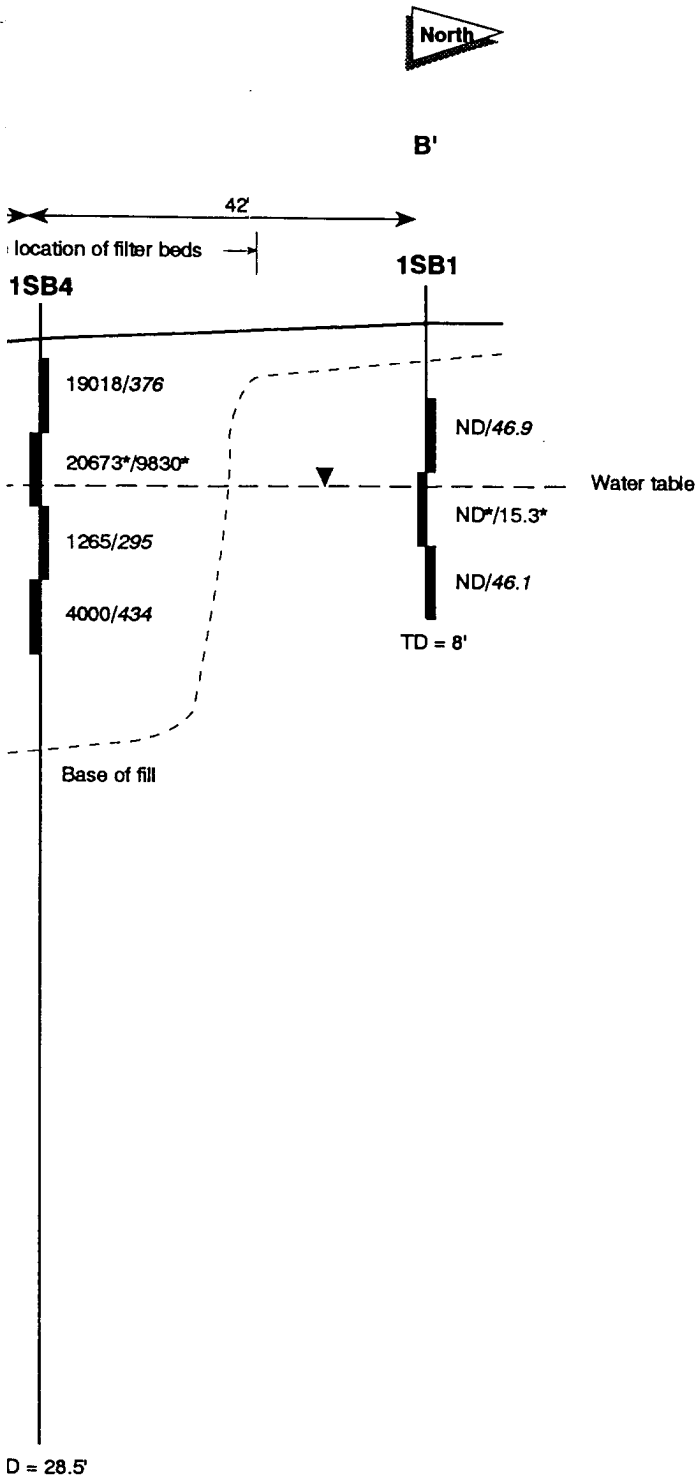
(I)	Result is between the detection limit and the quantitation limit	K	Reported value is biased high	CLP	Contract Lab Program
B	Possible blank contamination	R	Data is unreliable	MCL	Maximum Contaminant Level
J	Reported value is estimated	-	Analysis not performed		
L	Reported value is biased low	(1)	No MCLs or action levels available for soils		
U	Compound analyzed for but not detected				



11



2



Explanation	
	Soil sample interval
4000/434	PNA concentration (µg/kg)/TPH concentration (mg/kg)
PNA	Polynuclear Aromatic Hydrocarbon compounds (µg/kg)
TPH	Total Petroleum Hydrocarbon (mg/kg)
ND	Not detected
NA	Not analyzed
* Averaged concentration of sample and representative duplicate	
	Water table
	Screened interval
Vertical exaggeration 4:1	

	Project No. 9
	Illinois ANG, 182 AW GPRA, Peoria, Illinois
Site 1: Septic System Filter Beds Cross Section B-B' PNA and TPH Concentrations	
12-94	Figure

5

Explanation	
	Soil sample interval
4000/434	PNA concentration ($\mu\text{g/kg}$)/TPH concentration (mg/kg)
PNA	Polynuclear Aromatic Hydrocarbon compounds ($\mu\text{g/kg}$)
TPH	Total Petroleum Hydrocarbon (mg/kg)
ND	Not detected
NA	Not analyzed
* Averaged concentration of sample and representative duplicate	
 — —	Water table
	Screened interval
Vertical exaggeration 4:1	

Project No. 91-1655
Illinois ANG, 182 AW
GPRA, Peoria, Illinois

**Site 1: Septic System Filter Beds
Cross Section B-B'
PNA and TPH Concentrations**

identified boundaries of Site 1. Dibenzofuran was detected in 4 samples in concentrations ranging from 150 to 230 $\mu\text{g/kg}$ at depths of 1 to 4 ft. One or more compounds from the phthalate ester group, primarily bis 2-ethylhexyl phthalate, were detected at low concentrations in 18 samples. Concentrations detected range from 52 to 390 $\mu\text{g/kg}$. As presented on Figure 3-9, the extent of PNA compounds on the northern and southern boundaries of the site is defined by non-detects in soil samples from 1MWI and 1SB1. On the western edge of the site, PNA compounds were detected at 1,464 $\mu\text{g/kg}$ (carcinogenic PNAs- 744 $\mu\text{g/kg}$; noncarcinogenic PNA- 720 $\mu\text{g/kg}$) in the shallowest soil sample obtained from 1SB3; additional subsurface soils from 1SB3 were free of PNAs. Soils collected from 1SB2, located along the eastern margin of the site, had relatively high concentrations of PNA compounds (carcinogenic PNAs- 16,690 $\mu\text{g/kg}$; noncarcinogenic PNAs- 16,640 $\mu\text{g/kg}$) in 1SB2 (0 to 2 ft). All four soil samples collected from 1SB4 (drilled within the filter beds) contained PNA. The maximum occurrence of carcinogenic PNAs (8,800 $\mu\text{g/kg}$) occurred at a depth of 2 to 4 ft.

TPH

TPH was detected in all subsurface soil samples obtained from Site 1 in concentrations ranging from 15.25 to 9,830 mg/kg (average of duplicate samples). High TPH concentrations are found in the soil samples collected from boring 1SB4, which was drilled through the filter beds at concentrations ranging from 295 to 9,830 mg/kg. The highest TPH concentration in 1SB4 occurred at a depth of 2 to 4 ft. High TPH values appear to correlate positively with the high PNA concentrations detected in the samples from 1SB4 and from the other samples collected from the site.

Inorganics

The analytical results for the TAL metals are also presented in Table 3-5. Additionally, Table 3-6 presents a comparison of site-specific concentrations to the background subsurface results. Discussions regarding the presence or absence of contamination by inorganics will be limited to compounds that exhibit appreciable toxicity and elevated concentrations. As presented in Table 3-6, a majority of the inorganics detected at the site were quantified at

Table 3-6 Site 1 TAL Metals Summary - Subsurface Soil
ILANG, 182 Airlift Wing, GPRA, Peoria, Illinois

	Frequency of Detection ¹⁾	Range of Detected Concentrations (mg/kg)	Range of Background Concentrations (mg/kg)
TAL Metals			
by CLP Methods (mg/kg)			
Aluminum	15 / 15	2750.00 - 21400.00	2230.00 - 21300.00
Arsenic	15 / 15	2.70 - 12.00	1.30 - 23.10
Barium	15 / 15	29.60 - 207.00	16.50 - 158.00
Beryllium	13 / 15	0.47 - 1.00	0.66 - 0.71
Cadmium	3 / 15	1.80 - 4.70	1 U - 2 U
Calcium	15 / 15	1620.00 - 158000.00	2890.00 - 146000.00
Chromium	15 / 15	9.90 - 25.10	7.90 - 23.50
Cobalt	14 / 15	5.30 - 11.80	4.00 - 7.80
Copper	15 / 15	8.70 - 21.60	8.80 - 23.10
Iron	15 / 15	10700.00 - 28900.00	8850.00 - 26400.00
Lead	15 / 15	6.30 - 67.40	6.80 - 21.40
Magnesium	15 / 15	1740.00 - 78200.00	3970.00 - 57600.00
Manganese	15 / 15	212.00 - 1270.00	243.00 - 654.00
Nickel	14 / 15	11.90 - 20.10	10.50 - 24.10
Potassium	9 / 15	870.00 - 1970.00	1380.00 - 1650.00
Silver	1 / 15	8.90 - 8.90	2 U - 3 U
Sodium	13 / 15	149.00 - 323.00	219.00 - 561.00
Vanadium	15 / 15	9.10 - 53.70	9.00 - 40.80
Zinc	15 / 15	38.90 - 130.00	28.00 - 74.10

No state or federal criteria available

ND - Not detected. Compound was not expected to be present; therefore, no background concentration was calculated.

U - Analyte was not detected. Value is quantitation limit.

1) - Number of detections/number of samples collected.

TAL - Target Analyte List

CLP - Contract Lab Program

levels ranging from 1 to 2 times the maximum background concentration. Analytes whose concentrations have exceeded two times the maximum background concentrations include cadmium, lead, and, silver.

Cadmium was detected in three samples at a maximum concentration of 4.7 mg/kg (2.3 times maximum background concentration). The 4 to 6 ft sample collected from 1SB2 contained the highest concentration of cadmium. Lead was detected in two samples in concentrations exceeding two times the maximum background concentration; the 0 to 2 ft sample from boring 1SB2 and the 2 to 4 ft sample from boring 1SB3. Both samples contained PNA compounds in excess of 1,000 $\mu\text{g/kg}$. Silver was detected in the 6 to 8 ft sample from 1SB4 at a concentration of 8.90 $\mu\text{g/kg}$ (3.3 times the maximum background concentration).

3.6.3.3 Groundwater Samples

Monitoring well 1MW1 was installed down-gradient of the filter beds (Figure 3-1) and sampled for VOCs, SVOCs, TPH, and TAL metals (total and dissolved) in January 1993 and April 1993 to provide data regarding the presence or absence of groundwater contamination. The analytical results are presented in Table 3-7.

Organic Compounds

Minor detections of VOCs (vinyl chloride and 1,2 trans-DCE), and SVOCs (butylbenzyl phthalate and benzoic acid) were quantified in the groundwater. Only vinyl chloride (1.2 $\mu\text{g/l}$ -April 1993) and benzoic acid (17 J $\mu\text{g/l}$ - January 1993), were detected at concentrations above the MDLs. None of the compounds were detected in both rounds of sampling. TPH was detected in the April 1993 sampling at a concentration of 1.1 mg/l.

Inorganics

The analytical results for the groundwater samples collected from 1MW1 are included in Table 3-7. A comparison of these results to the background inorganic groundwater concentrations is included in Table 3-8. Eleven inorganics were detected in the Site 1

Table 3-7 Data Summary Table: Groundwater, Site 1 - Septic Filter Beds
 ILANG, 182 AW, GPRA, Peoria, Illinois

LOCATOR: 1-MW1
 SAMPLE ID: GPA-S1-MW1-GW1 1-MW1
 COLLECTION DATE: 01/20/93 GPA-S1-MW1-GW2
 ASSOCIATED FIELD QC: TB23,FB3, FB4,EB4 TB30,FB10, FB11,EB10

		UNITS:	RESULT	QUAL	RESULT	QUAL
IEPA Class I						
VOLATILE (8010)						
1,2-trans-Dichloroethylene	100 ug/l		0.30	U	0.28	J
Chloroform	ug/l		0.34	B	0.35	U
Vinyl chloride	2 ug/l		0.55	U	1.20	J
SEMI-VOLATILES (8270)						
Benzoic Acid	ug/l	17	J			R
Butyl benzyl phthalate	ug/l	10	U		1	
METALS (CLP)						
Aluminum	ug/l	25500			1730	J
Barium	2000 ug/l	391			161	(B)
Beryllium	4** ug/l	1.90	(I)		1	U
Chromium	100 ug/l	32			8	U
Cobalt	ug/l	12	(I)		8	U
Iron	5000 ug/l	28200	K		2010	J
Iron, Dissolved	ug/l	147			41	U
Lead	7.5 ug/l	13	L		3	B
Manganese	150 ug/l	1430	L		1410	
Manganese, Dissolved	ug/l	1130			1440	
Mercury, Dissolved	ug/l	0.20	U		0.47	
Nickel	100** ug/l	24	(I)		19.20	(I)
Vanadium	ug/l	41.90	(I)		6	U
TPH (418.1)						
Total Petroleum Hydrocarbons	mg/l	0.25	U		1.10	

(I) Result is between the detection limit and the quantitation limit
 B Possible blank contamination
 J Reported value is estimated
 L Reported value is biased low

U Compound analyzed for but not detected
 K Reported value is biased high
 R Data is unreliable
 ** No IEPA criteria available - Federal MCL used

CLP
 MCL
 IEPA
 Contract Lab Program
 Maximum Contaminant Level
 Illinois Environmental Protection Agency

Table 3-8 Site 1 TAL Metals Summary - Groundwater
ILANG, 182 AW , GPRA, Peoria, Illinois

Metals by CLP Methods (µg/l)	1MW1 Frequency of Detection *	Range of Detected Concentrations (µg/l)	Range of Background Concentrations (BG-MW2) (µg/l)	IEPA Class I Groundwater Standards (µg/l)	Federal Drinking Water MCL (µg/l)
Aluminum	2 / 2	1730.00 - 25500.00	4270.00 - 42800.00	-	-
Barium	1 / 2	391.00 - 391.00	274.00 - 543.00	2000.00	2000
Beryllium	1 / 2	1.90 - 1.90	1.00 - 2.70	-	4
Chromium	1 / 2	32.00 - 32.00	9.55 - 41.50	100.00	100
Cobalt	1 / 2	12.00 - 12.00	7.05 - 12.40	-	-
Iron	2 / 2	2010.00 - 28200.00	2715.00 - 14300.00	5000.00	300
Iron, Dissolved	1 / 2	147.00 - 147.00	434.25 - 434.25	-	-
Lead	1 / 2	13.00 - 13.00	16.80 - 16.80	7.50	15
Manganese	2 / 2	1410.00 - 1430.00	528.00 - 806.00	150.00	-
Manganese, Dissolved	2 / 2	1130.00 - 1440.00	124.00 - 280.00	-	-
Mercury, Dissolved	1 / 2	0.47 - 0.47	.2 U	2.00	2
Nickel	2 / 2	19.20 - 24.00	23.50 - 23.50	-	100
Vanadium	1 / 2	41.90 - 41.90	6.30 - 8.65	-	-

¹No chronic criteria available. Value listed is acute criteria.

ND - Not detected. Compound was not expected to be present; therefore, no background concentration was calculated.

U - Analyte not detected. Value is quantitation limit.

- - Not available

µg/l - micrograms/liter

* - Number of detections/number of samples collected.

CLP - Contract Lab Program

MCL - Maximum Contaminant Level

IEPA - Illinois Environmental Protection Agency

monitoring well samples. Discussions regarding the presence or absence of contamination by inorganics will be limited to compounds that exhibit appreciable toxicity and elevated concentrations. In general, the groundwater samples contain significantly lower concentrations of dissolved metals than of total metals indicating that the majority of the chemical is not dissolved in the groundwater. Manganese is the exception to this general trend as total and dissolved manganese concentrations are comparable. In addition, manganese was the only metal detected in both rounds of sampling in the filtered and unfiltered samples. Dissolved manganese concentrations ranged from 1130 to 1440 $\mu\text{g}/\ell$. In all cases, manganese was quantified above the IEPA Class I groundwater standard of 150 $\mu\text{g}/\ell$ and above 2 times the local background concentration. Total iron was detected in both rounds at concentrations of 2010 and 28,200 $\mu\text{g}/\ell$. Dissolved iron (147 $\mu\text{g}/\ell$) was detected in the first sampling round only. All detections were quantified at less than two times maximum background concentration.

Total aluminum and nickel were detected at concentrations comparable to background concentration. Total barium, beryllium, chromium, cobalt, and lead were detected in the January 1993 round of sampling in concentrations comparable to background concentrations. The total lead concentration of 13 $\mu\text{g}/\ell$ detected in the January 1993 samples, although comparable to background concentration, exceeds the IEPA Class I groundwater standard of 7.5 $\mu\text{g}/\ell$. Neither total nor dissolved lead was detected in the second round of sampling. Dissolved mercury was detected during the April 1993 sampling round at a concentration of 0.47 $\mu\text{g}/\ell$; the IEPA Class I groundwater standard is 0.2 $\mu\text{g}/\ell$.

3.6.3.4 Conclusions

The material within the old septic filter beds (as logged in 1SB4) was sampled and contains evidence of organic compounds, particularly PNAs and TPH. Borings 1SB1, 1SB2, 1SB3, and 1SB5 were drilled through a section of native soils around the perimeter of the old filter beds. PNAs were detected in the soil samples from borings 1SB2, 1SB3, and 1SB5. No significant concentrations of VOCs were detected from site soil samples. Cadmium, lead, and silver were

detected in the soils around the perimeter of the filter bed in at least one sample in concentrations greater than two times the maximum concentration of each analyte in the facility-wide background samples.

Depth to groundwater occurs at approximately 2 ft in the Site 1 area. Groundwater samples from S1MW1, located down-gradient of Site 1, indicate the presence of low concentrations of vinyl chloride ($1.20 \mu\text{g}/\ell$) and benzoic acid ($17 \text{ J } \mu\text{g}/\ell$). Vinyl chloride was detected in the second round of sampling, while benzoic acid was detected in the first sampling round. 1,2 DCE was detected at concentrations below the MDLs. No source of the VOCs detected in the groundwater were identified from Site 1 soil sampling. No PNA compounds, which were detected within the filter bed soils, were detected in the groundwater. TPH ($1.1 \text{ mg}/\ell$) was detected in the second sampling round. Elevated concentrations of manganese (total and dissolved) were detected in both rounds of groundwater sampling.

In conclusion, the soils at Site 1 appear to have been impacted by past disposal activities. The source of the groundwater contamination detected at Site 1 was not identified and does not correlate with the soil contaminants detected at Site 1.

3.7 SITE 2 - GRASSY AREA ALONG FACILITY BOUNDARY EAST OF THE AIRCRAFT APRON

The following investigation activities were conducted at Site 2:

- Eleven samples (7 soil gas and 4 groundwater) were collected using a Geoprobe® and analyzed using a field GC.
- Three soil borings were drilled at the site.

- Eight soil samples from these borings were collected and screened for selected VOC using a field GC.
- Six soil samples were collected and submitted for analysis of VOCs, SVOCs, TPH, and TAL metals.

No groundwater monitoring wells were installed at Site 2. Surface soil, soil boring, and piezometer locations are presented in Figure 3-11.

3.7.1 Site Geology and Hydrogeology

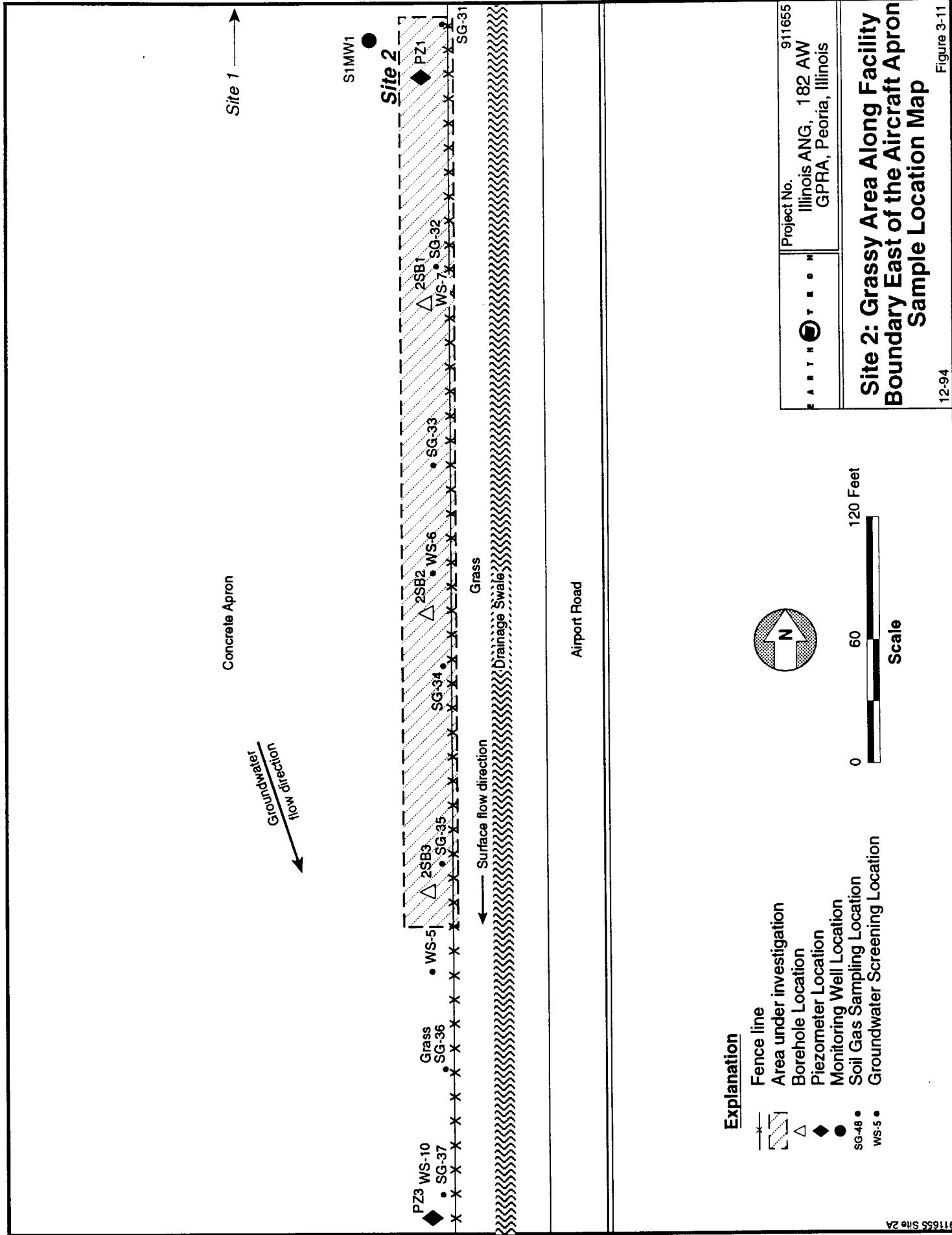
Geology

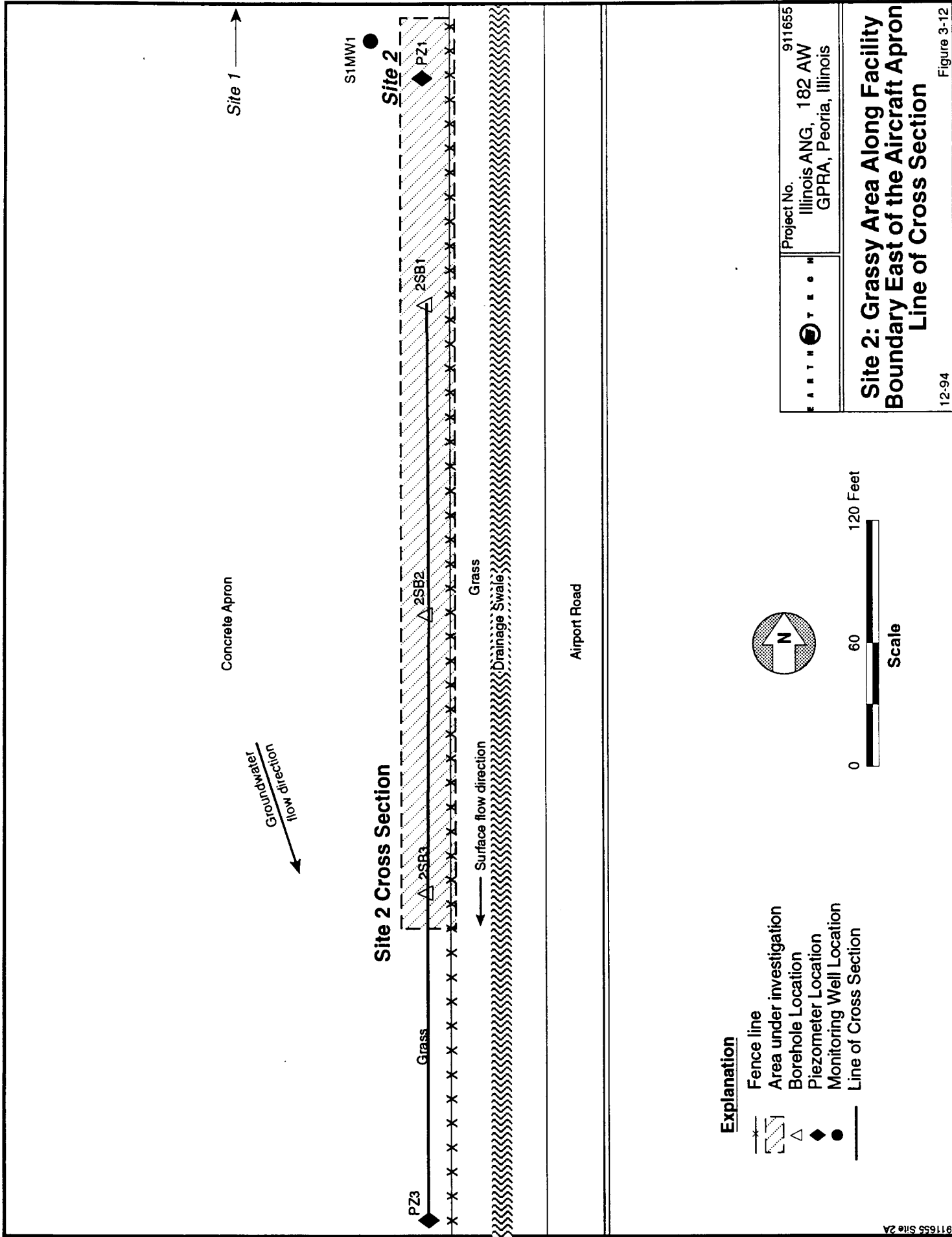
As discussed in Section 1.6, soils underlying the facility range in composition from clay to clayey sand. A geologic profile was constructed to illustrate the site-specific soil types encountered beneath Site 2. This profile is located on Figure 3-12, and is presented in Figure 3-13. Horizontal distances are not drawn to scale in Figure 3-13. Possible fill material predominates in the upper few feet of the site soil profile. Fill material was differentiated from native soils by the presence of brick fragments, sticks, and/or gravel. Fill thickness ranges from 0 to 6 ft at the site. The sequence of soil types encountered at Site 2 is similar to the sequence of soils drilled and logged at Site 1. Fill material, where present, overlies native clay soils.

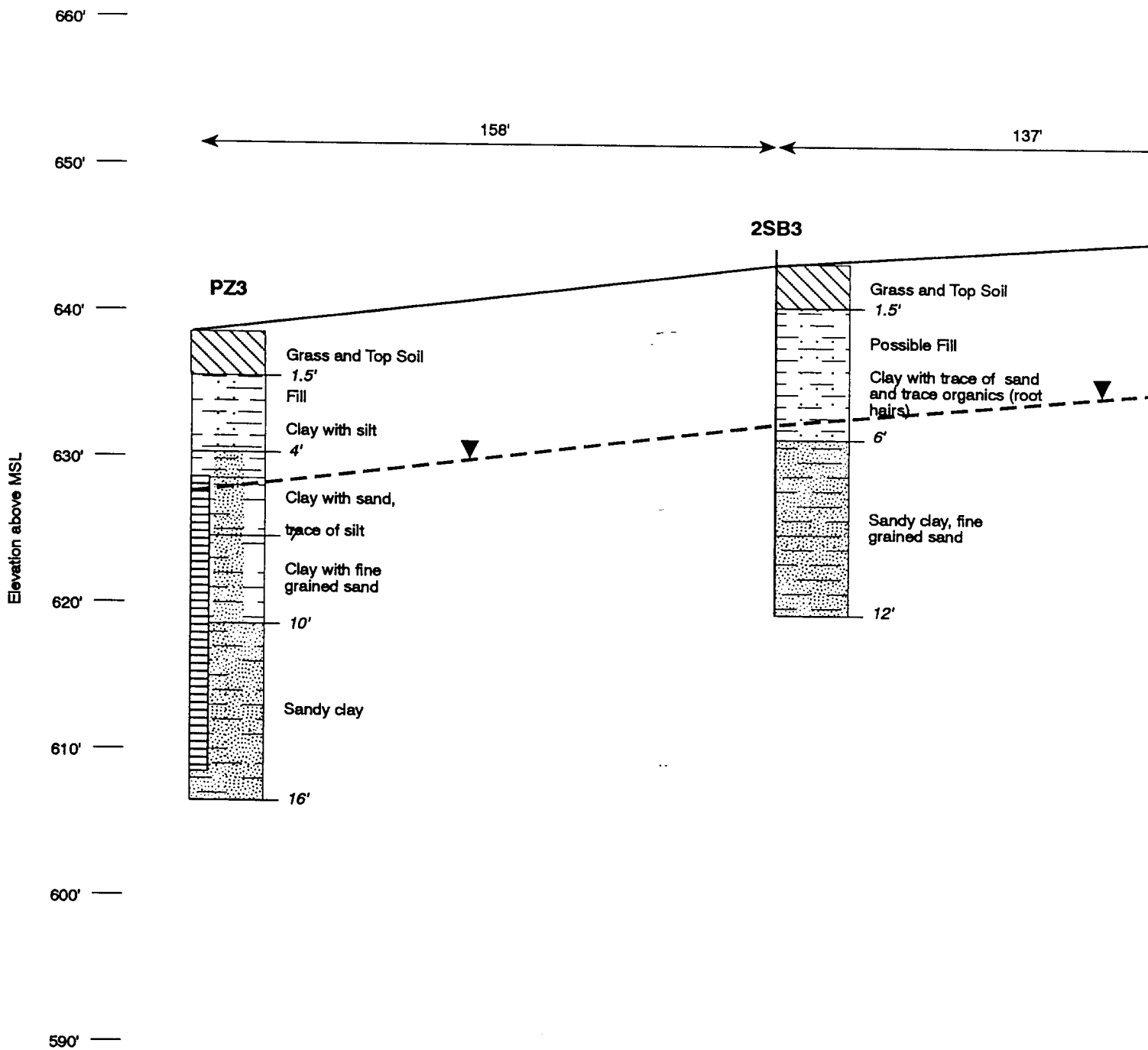
A clay with silt layer, as described in soil borings 2SB1, 2SB2, and PZ3, exists in the northern and southern portions of the site, and is underlain by additional clay-rich sediments. 2SB2 was sampled until refusal, interpreted to represent bedrock, was encountered at 29 ft bgs.

Hydrogeology

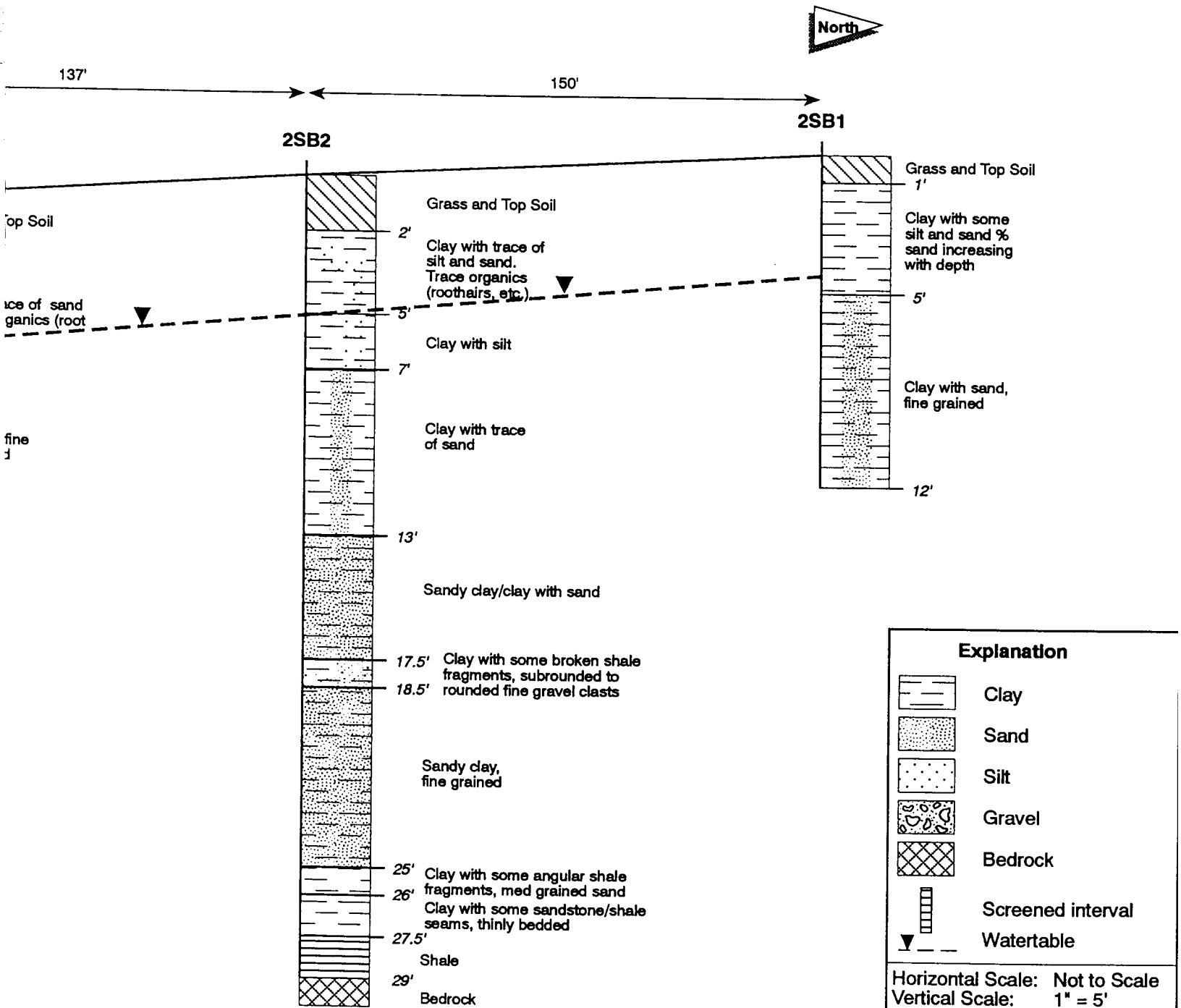
No monitoring wells were installed as part of the Site 2 investigations due to difficulties in obtaining right-of-way access. PZ1 and PZ3 were installed on the northern and southern boundaries of the site and provide data regarding the site-specific hydrogeology. Groundwater







2

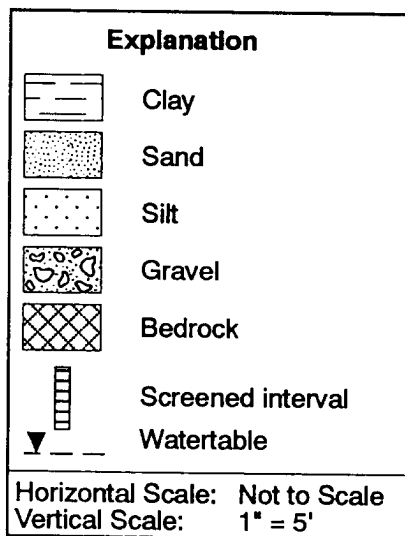
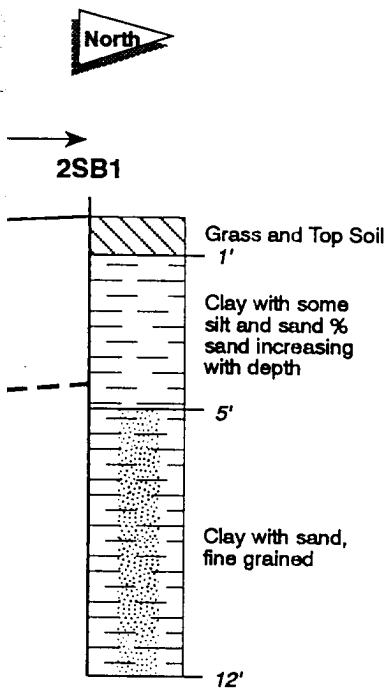


- Soil borings to SB1 and 2SB3 were sampled for lithology at 0' to 2', 5' to 7' and 10' to 12'.
- 2SB2 was continuously sampled for lithology from 2' BGS to total depth
- Piezometer PZ3 was sampled for lithology at 5' to 7' and 10' to 12'

Project No. Illinois ANG, 182 GPRA, Peoria, Illinois

Site 2: Grassy Area Along Facility Boundary East of the Aircraft Apron Cross Section

3



- Soil borings to SB1 and 2SB3 were sampled for lithology at 0' to 2', 5' to 7' and 10' to 12'
- 2SB2 was continuously sampled for lithology from 2' BGS to total depth
- Piezometer PZ3 was sampled for lithology at 5' to 7' and 10' to 12'

EARTH TECH	Project No. 91-1655
	Illinois ANG, 182 AW GPRA, Peoria, Illinois

**Site 2: Grassy Area Along Facility
Boundary East of the
Aircraft Apron
Cross Section**

occurs at depths ranging from approximately 2.5 to 7.5 ft bgs and flows towards the south/southeast beneath the site. No site-specific hydraulic conductivity testing was done at Site 2.

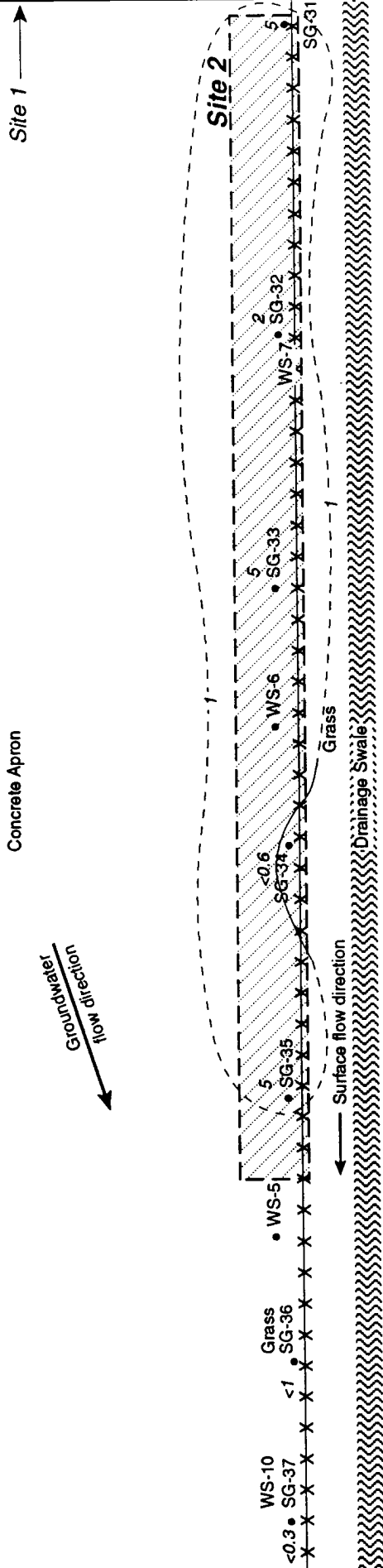
3.7.2 Screening Activity Results

Screening activity results include the soil organic vapor (SOV) survey (soil gas sampling and groundwater sampling) performed in November 1992 by Tracer Research Corporation, and the field GC screening by Bingham Environmental of soil samples collected during the soil boring program.

3.7.2.1 Soil Gas and Groundwater Screening Results

Tracer Research Corporation conducted a soil gas and groundwater screening survey at the site. All samples were collected and analyzed using hydraulically driven sampling probes and a field GC. Seven soil gas samples were collected from 7 locations, and 4 groundwater samples were collected from 2 locations. The screening locations were presented previously in Figure 3-11. The complete data set are included in Appendix E.

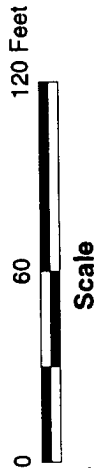
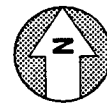
These screening data indicate that relatively low levels of VOCs and the chlorinated solvents TCE, DCE, and PCE are present in the subsurface soils and groundwater. Figure 3-14 presents an isoconcentration map of the total VOCs detected in the soil and groundwater samples. As illustrated in Figure 3-14, minor amounts of total VOCs were detected in the soil gas samples in concentrations ranging from 2 to 8 $\mu\text{g}/\ell$. Chlorinated hydrocarbons, including TCE, were detected in soil gas samples SG-31, -32, -34, and -35 and in water samples WS-5, -6, and -7.



Airport Road

Explanation

- x — Fence line
- ▨ Area under investigation
- Isoconcentration Line $\mu\text{g/l}$ of air in soil gas (dashed where approximate)
- SG-48 • Soil Gas Sampling Location
- WS-5 • Groundwater Screening Location
- 5 Total Volatile Hydrocarbons concentration- $\mu\text{g/l}$ of air (soil gas)



	Project No. 911655 Illinois ANG, 182 AW GPRA, Peoria, Illinois
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Site 2: Grassy Area Along Facility Boundary East of the Aircraft Apron Total VOCs in Soil Gas Samples Isoconcentration Map

12-94

Figure 3-14

3.7.2.2 Field GC Screening Results

Field GC Results

During the drilling and sampling of the soil borings at Site 2, eight soil samples were collected and screened in the field for VOCs by methods described in Section 2 of this report. Field GC results and chromatograms are presented in Appendix F. Soil samples were typically collected within the 0 to 2 ft interval, and at or near the water table. The samples collected and screened from Site 2 soil borings did not contain detectable amounts of VOCs.

3.7.3 Confirmation and Delineation Results

Soil boring locations were selected to provide data to confirm the absence or presence of environmental contamination. The soil gas data were used to select locations at Site 2. Soil boring 2SB2 was continuously sampled to obtain site-specific lithologic data.

Six soil samples were selected as described in section 2.5, and were analyzed by CompuChem Laboratories for VOCs, SVOCs, TPH, and TAL metals. A discussion of the analytical results for the surface and subsurface soil samples is included in the following sections. Classes of chemicals are discussed, when appropriate, as described previously in section 3.6.3.

3.7.3.1 Surface Soils

Three surface soil samples (one from each soil boring) were selected from Site 2 and submitted for laboratory analysis. The surface soil analytical results are presented in Table 3-9. Figure 3-15 presents a summary of the analytical results for PNAs and TPH for the Site 2 surface soils.

Table 3-9 Data Summary Table: Surface Soil, Site 2 - Facility Boundary East of Aircraft Apron
ILANG, 182 AW , GPRA, Peoria, Illinois

LOCATOR: 2-SB1 2-SB2 2-SB3
SAMPLE ID: GPA-S2-SB1-SS0-2 GPA-S2-SB2-SS0-2 GPA-S2-SB3-SS0-2
COLLECTION DATE: 12/08/92 12/08/92 12/08/92
ASSOCIATED FIELD QC: TB4,FB1, FB2,EB1 TB4,FB1, FB2,EB1 TB4,FB1, FB2,EB1

UNITS: RESULT QUAL RESULT QUAL RESULT QUAL

Criteria ⁽¹⁾

VOLATILES (8240)	ug/kg	89	J		54	B	26	B	
Methylene chloride									
SEMI-VOLATILES (8270)	ug/kg	400	U		180		420	U	
Benzo(a)anthracene	ug/kg	400	U		220		420	U	
Benzo(a)pyrene	ug/kg	400	U		430		420	U	
Benzo(b)fluoranthene	ug/kg	400	U		430		420	U	
Benzo(k)fluoranthene	ug/kg	400	U		210		420	U	
Chrysene	ug/kg	400	U		360		420	U	
Fluoranthene	ug/kg	400	U		160		420	U	
Phenanthrene	ug/kg	400	U		340		420	U	
Pyrene	ug/kg	400	U						
METALS (CLP)	mg/kg	14900			15500		2710		
Aluminum	mg/kg	9.20			9.60		12.50		
Arsenic	mg/kg	125			158		20.50		
Barium	mg/kg	0.76			0.96		0.31		
Beryllium	mg/kg	3600	J		4520	J	66500	J	
Calcium	mg/kg	20.70	J		20.60	J	6.50	J	
Chromium	mg/kg	11			10.90		4.50		
Cobalt	mg/kg	18.90			18.40		13.10		
Copper	mg/kg	22300	J		25100	J	11200	J	
Iron	mg/kg	18.10	K		25.10	K	15	K	
Lead	mg/kg	3290			3620		37900		
Magnesium	mg/kg	541	J		931	J	459	J	
Manganese	mg/kg	17.60			18.90		10.40		
Nickel	mg/kg	1080			1050		731		
Potassium	mg/kg	31.50			35.90		10.60		
Vanadium	mg/kg	63.90			68		50		
Zinc	mg/kg	22.0			32.9		18.1		
TPH (418.1)	mg/kg								
Total Petroleum Hydrocarbons	mg/kg								

() Result is between the detection limit and the quantitation limit
B Possible blank contamination
J Reported value is estimated
L Reported value is biased low
U Compound analyzed but not detected
K Reported value is biased high
R Data is unreliable
(1) No MCLs or action levels available for soils

CLP
MCL

Contract Lab Program
Maximum Contaminant Level

Volatile Organic Compounds

No VOCs, other than one detection of methylene chloride, were detected in the Site 2 surface soils. These data are consistent with the low PID readings recorded during drilling and the lack of VOCs detected during the field GC analysis.

Semi-volatile Organic Compounds

SVOCs detected from Site 2 surface soils are limited to compounds of the PNA family (Section 3.6.3). The surface soil sample from location 2SB2 detected PNA compounds at a concentration of 1470 $\mu\text{g}/\text{kg}$ carcinogenic PNA and 860 $\mu\text{g}/\text{kg}$ noncarcinogenic PNA. No other SVOCs were detected in the surface soils.

Total Petroleum Hydrocarbons

TPH was detected at relatively low concentrations from the Site 2 surface soil samples. The three surface soil samples collected from the site contained TPH at concentrations ranging from 18.1 to 32.9 $\mu\text{g}/\text{kg}$.

Inorganics

Table 3-10 presents a comparison of Site 2 surface soil inorganic concentrations to the background surface soil inorganic concentrations. In general, concentrations of inorganics at Site 2 were relatively low and do not appear to be significantly elevated above background concentrations. Other than magnesium and calcium, which are considered to be essential elements (low toxicity), no inorganics were detected in concentrations above two times the maximum background concentrations.

3.7.3.2 Subsurface Soil Samples

Three subsurface soil samples were collected from Site 2. Analytical results from these samples are presented in Table 3-11. The distribution of PNAs and TPH is illustrated on Figure 3-16.

Table 3-10 Site 2 Contaminant Summary - Surface Soils
ILANG, 182 AW , GPRA, Peoria, Illinois

	Frequency of Detection ¹⁾	Range of Detected Concentrations (mg/kg)	Range of Background Concentrations (mg/kg)
Metals			
by CLP Methods (mg/kg)			
Aluminum	3 / 3	2710.00 - 15500.00	8680.00 - 13100.00
Arsenic	3 / 3	9.20 - 12.50	6.60 - 9.20
Barium	3 / 3	20.50 - 158.00	111.00 - 198.00
Beryllium	3 / 3	0.31 - 0.96	0.62 - 1.00
Calcium	3 / 3	3600.00 - 66500.00	2510.00 - 4090.00
Chromium	3 / 3	6.50 - 20.70	11.60 - 17.50
Cobalt	3 / 3	4.50 - 11.00	2.80 - 12.50
Copper	3 / 3	13.10 - 18.90	9.20 - 16.40
Iron	3 / 3	11200.00 - 25100.00	10500.00 - 17200.00
Lead	3 / 3	15.00 - 25.10	33.90 - 45.50
Magnesium	3 / 3	3290.00 - 37900.00	1740.00 - 2770.00
Manganese	3 / 3	459.00 - 931.00	414.00 - 1510.00
Nickel	3 / 3	10.40 - 18.90	9.90 - 14.80
Potassium	3 / 3	731.00 - 1080.00	913.00 - 1590.00
Vanadium	3 / 3	10.60 - 35.90	19.60 - 34.30
Zinc	3 / 3	50.00 - 68.00	43.00 - 81.00

No state or federal criteria available

ND - Not detected. Compound was not expected to be present; therefore, no background concentration was calculated.

U - Analyte was not detected. Value is quantitation limit.

CLP - Contract Lab Program

1) - Number of detections/number of samples collected.

Table 3-11 Data Summary Table: Subsurface Soils, Site 2 - Facility Boundary East of Aircraft Apron
ILANG, 182 AW , GPRA, Peoria, Illinois

LOCATOR: 2-SB1 2-SB2 2-SB3
SAMPLE ID: GPA-S2-SB1-SS5-7 GPA-S2-SB2-SS4-6 GPA-S2-SB3-SS5-7
COLLECTION DATE: 12/08/92 12/08/92 12/08/93
ASSOCIATED FIELD QC: TB4,FB1, FB2,EB1 TB4,FB1, FB2,EB1 TB4,FB1, FB2,EB1

UNITS: RESULT QUAL RESULT QUAL RESULT QUAL

Criteria ⁽¹⁾

SEMI-VOLATILES (8270)

Benzo(b)fluoranthene	ug/kg	48		420	U	400	U
Benzo(k)fluoranthene	ug/kg	48		420	U	400	U
Phenanthrene	ug/kg	49		420	U	400	U

METALS (CLP)

Aluminum	mg/kg	8540		12800		7160	
Arsenic	mg/kg	9.40		9.60		9.10	
Barium	mg/kg	61.80		147		81.90	
Beryllium	mg/kg	0.51	()	0.80	()	0.51	()
Calcium	mg/kg	46600	J	2210	J	37800	J
Chromium	mg/kg	14.30	J	16.20	J	13	J
Cobalt	mg/kg	4.50	()	10.90	()	10.60	()
Copper	mg/kg	14		13.80		16.40	
Iron	mg/kg	14800	J	20600	J	13300	J
Lead	mg/kg	9.40	K	13.70	K	8.40	K
Magnesium	mg/kg	29000		2890		23500	
Manganese	mg/kg	186	J	922	J	534	J
Nickel	mg/kg	14.40		15.30		21.50	
Potassium	mg/kg	963	()	1070		568	()
Vanadium	mg/kg	23.90		30.90		21.20	
Zinc	mg/kg	38.40		52.30		39.20	

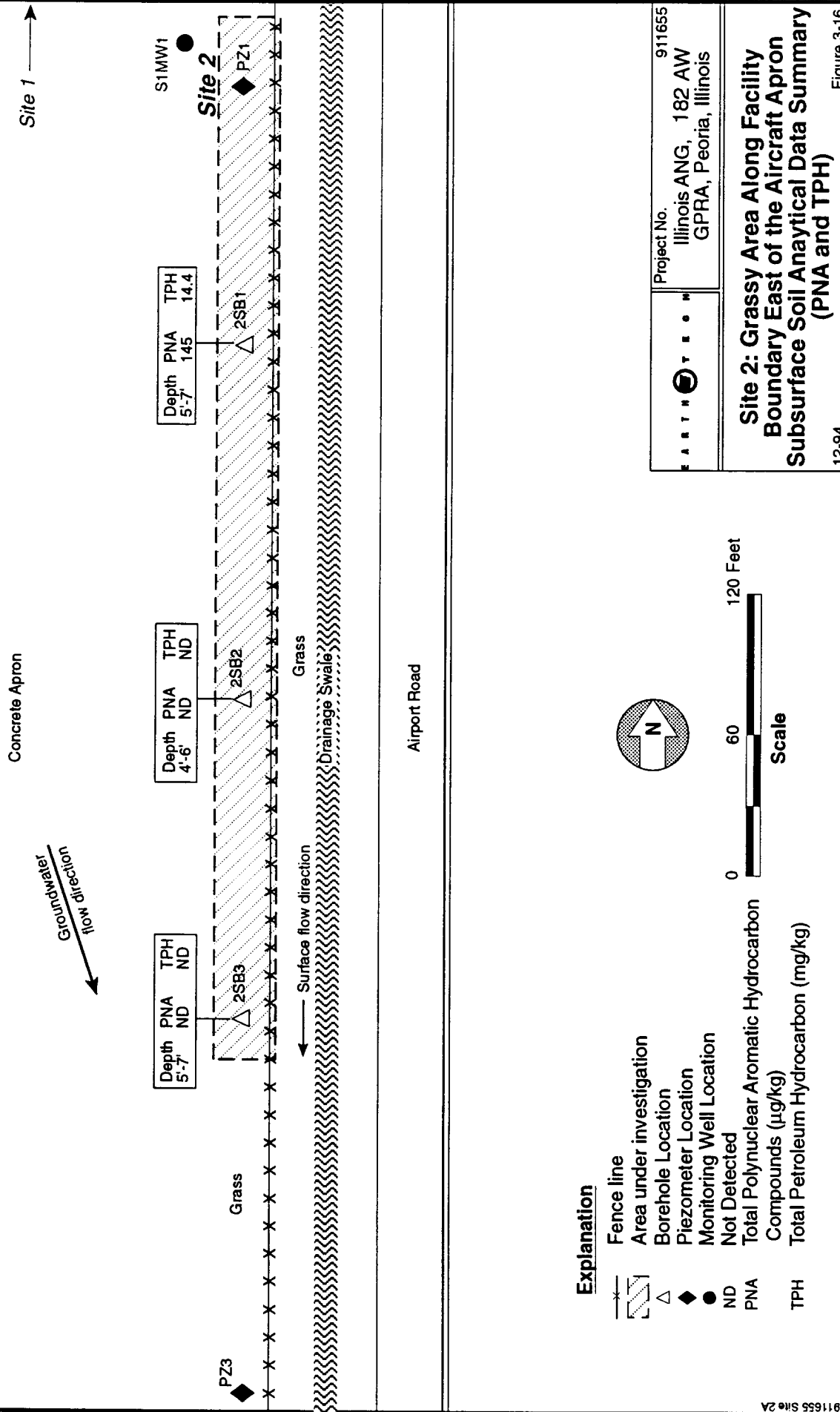
TPH (418.1)

Total Petroleum Hydrocarbons	mg/kg	14.4		6.3	U	6.3	U
------------------------------	-------	------	--	-----	---	-----	---

() Result is between the detection limit and the quantitation limit
B Possible blank contamination
J Reported value is estimated
L Reported value is biased low
U Compound analyzed but not detected
K Reported value is biased high
R Data is unreliable
(1) No MCLs or action levels available for soils

CLP
MCL

Contract Lab Program
Maximum Contaminant Level



Volatile Organic Compounds

Subsurface soil samples collected and analyzed contained no detectable VOCs. In general, these data are consistent with the low PID readings recorded during drilling and the lack of VOCs detected during the field GC analysis.

Semi-volatile Organic Compounds

SVOCs detected in the Site 2 subsurface soils are limited to compounds from the PNA group. Low concentrations of PNA compounds were quantified in the 5 to 7 ft sample collected from 2SB1 (96 $\mu\text{g/kg}$ carcinogenic PNAs and 49 $\mu\text{g/kg}$ noncarcinogenic PNAs).

Total Petroleum Hydrocarbons

TPH was detected in the subsurface soil in sample 2SB1 (5 to 7 ft sample) at 14.4 $\mu\text{g/kg}$. 2SB2 and 2SB3 contained no detectable TPH.

Inorganics

The analytical results for the inorganic analytes are also presented in Table 3-11. Table 3-12 compares these data to the background subsurface soil inorganic concentrations. The inorganic analytes in the Site 2 subsurface soils are not significantly elevated above the background concentration. All of the inorganics were detected in Site 2 subsurface soils at concentrations ranging from 0.3 to 1.4 times the maximum background concentrations.

3.7.4 Conclusions

Site 2 was suspected of being a petroleum and chlorinated solvent disposal area. Solvents were reportedly poured on the ground along the fence line at Site 2. The data collected during the SI do not indicate that the soil at Site 2 has been impacted by past waste disposal activities. The soil gas and groundwater screening results collected during this investigation suggested the presence of very low levels of total VOCs and chlorinated solvents within the subsurface at the site. These data were used to guide the placement of the soil borings. Surface and subsurface soils at Site 2 contained low levels of PNA compounds and TPH. TCE

Table 3-12 Site 2 Contaminant Summary - Subsurface Soil
ILANG, 182 AW , GPRA, Peoria, Illinois

	Frequency of Detection ¹⁾	Range of Detected Concentrations (mg/kg)	Range of Background Concentrations (mg/kg)
Metals by CLP Methods (mg/kg)			
Aluminum	3 / 3	7160.00 - 12800.00	2230.00 - 21300.00
Arsenic	3 / 3	9.10 - 9.60	1.30 - 23.10
Barium	3 / 3	61.80 - 147.00	16.50 - 158.00
Beryllium	3 / 3	0.51 - 0.80	0.66 - 0.71
Calcium	3 / 3	2210.00 - 46600.00	2890.00 - 146000.00
Chromium	3 / 3	13.00 - 16.20	7.90 - 23.50
Cobalt	3 / 3	4.50 - 10.90	4.00 - 7.80
Copper	3 / 3	13.80 - 16.40	8.80 - 23.10
Iron	3 / 3	13300.00 - 20600.00	8850.00 - 26400.00
Lead	3 / 3	8.40 - 13.70	6.80 - 21.40
Magnesium	3 / 3	2890.00 - 29000.00	3970.00 - 57600.00
Manganese	3 / 3	186.00 - 922.00	243.00 - 654.00
Nickel	3 / 3	14.40 - 21.50	10.50 - 24.10
Potassium	3 / 3	568.00 - 1070.00	1380.00 - 1650.00
Vanadium	3 / 3	21.20 - 30.90	9.00 - 40.80
Zinc	3 / 3	38.40 - 52.30	28.00 - 74.10

No state or federal criteria available

ND - Not detected. Compound was not expected to be present; therefore, no background concentration was calculated.

U - Analyte was not detected. Value is quantitation limit.

CLP - Contract Lab Program

1) - Number of detections/number of samples collected.

or other common chlorinated solvents were not detected during either the field GC analysis or the laboratory analyses of soil samples collected during the confirmation-round drilling. Additionally, no inorganics other than essential elements were detected in concentrations greater than two times the maximum concentration detected in the background samples. From the data presented here, Site 2 surface and subsurface soils do not appear to have been adversely impacted by past waste disposal practices.

3.8 SITE 3: GRASS AREA WEST OF AIRCRAFT APRON AND EAST OF FUEL TRUCK PARKING (and area adjacent to Facilities 23 and 6)

The following investigation activities were performed at Site 3:

- Forty-five screening samples (33 soil gas and 12 groundwater samples) were collected and analyzed with a field GC.
- Eleven soil borings were advanced at the site.
 - Three of these borings were completed as monitoring wells
 - Eight of these borings were completed as soil borings
- Fourteen soil samples were collected and screened for selected VOCs using a field GC.
- Twenty soil samples (including surface soil samples) were collected and shipped to an analytical laboratory for analysis of VOCs, SVOCs, TPH, and TAL metals.
- Six groundwater samples were collected and shipped to a fixed-base laboratory for analysis of VOCs, SVOCs, TPH, and TAL metals (total and dissolved).

- Two rounds of groundwater elevation measurements were collected.
- One aquifer slug test was conducted in 3CMW1.

Figures 3-17 and 3-18 present site maps of Site 3 illustrating the SI sampling, boring, piezometer, and monitoring well locations.

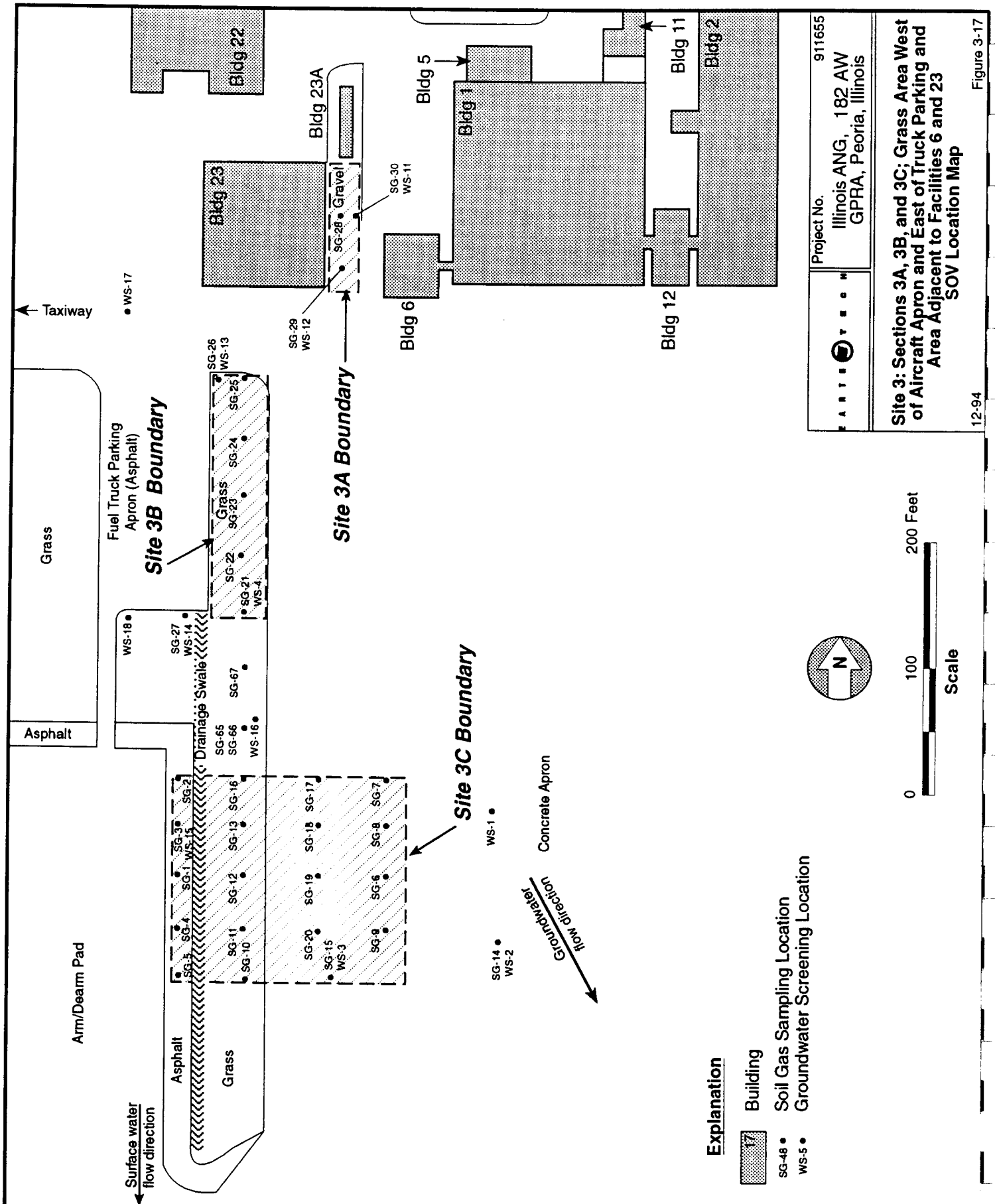
3.8.1 Site Geology and Hydrogeology

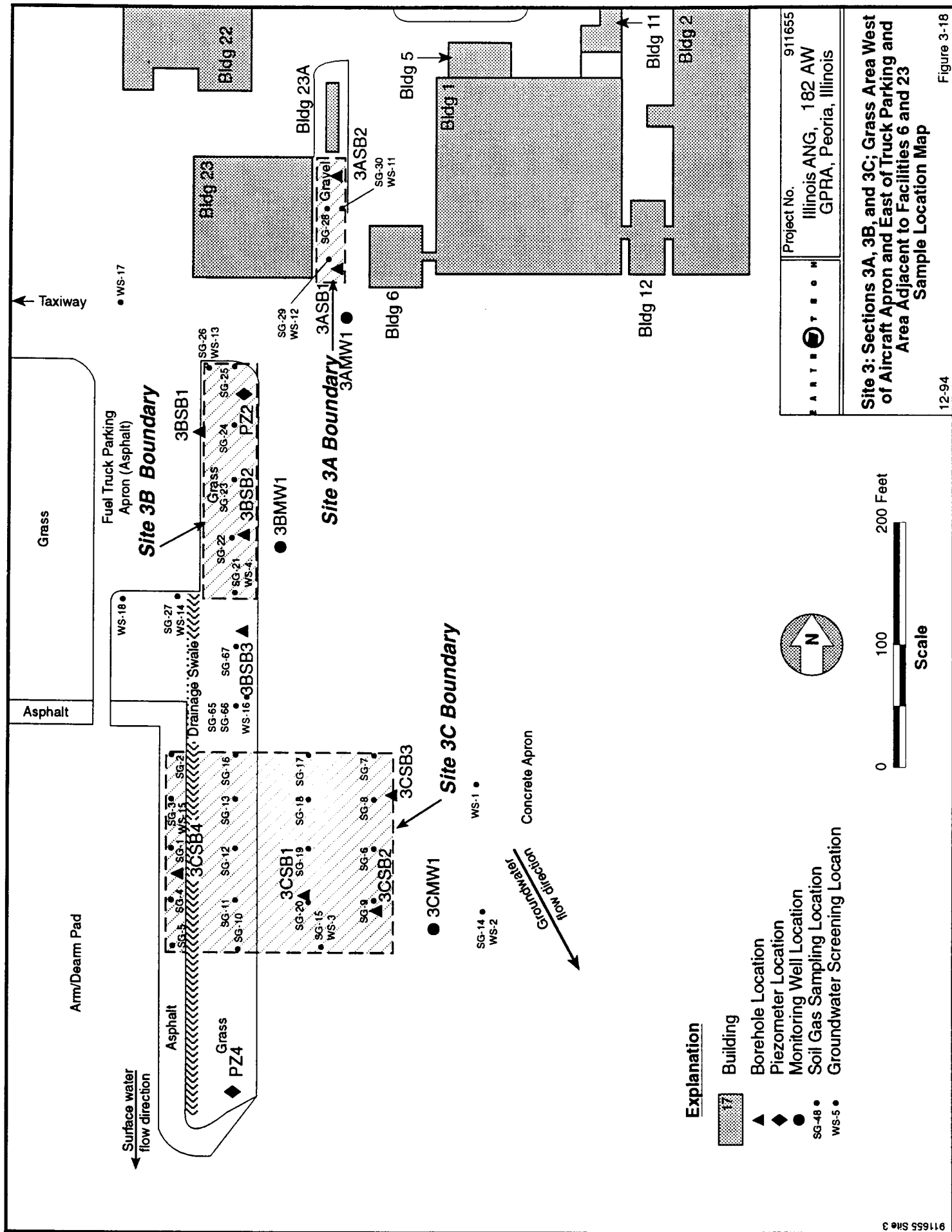
Geology

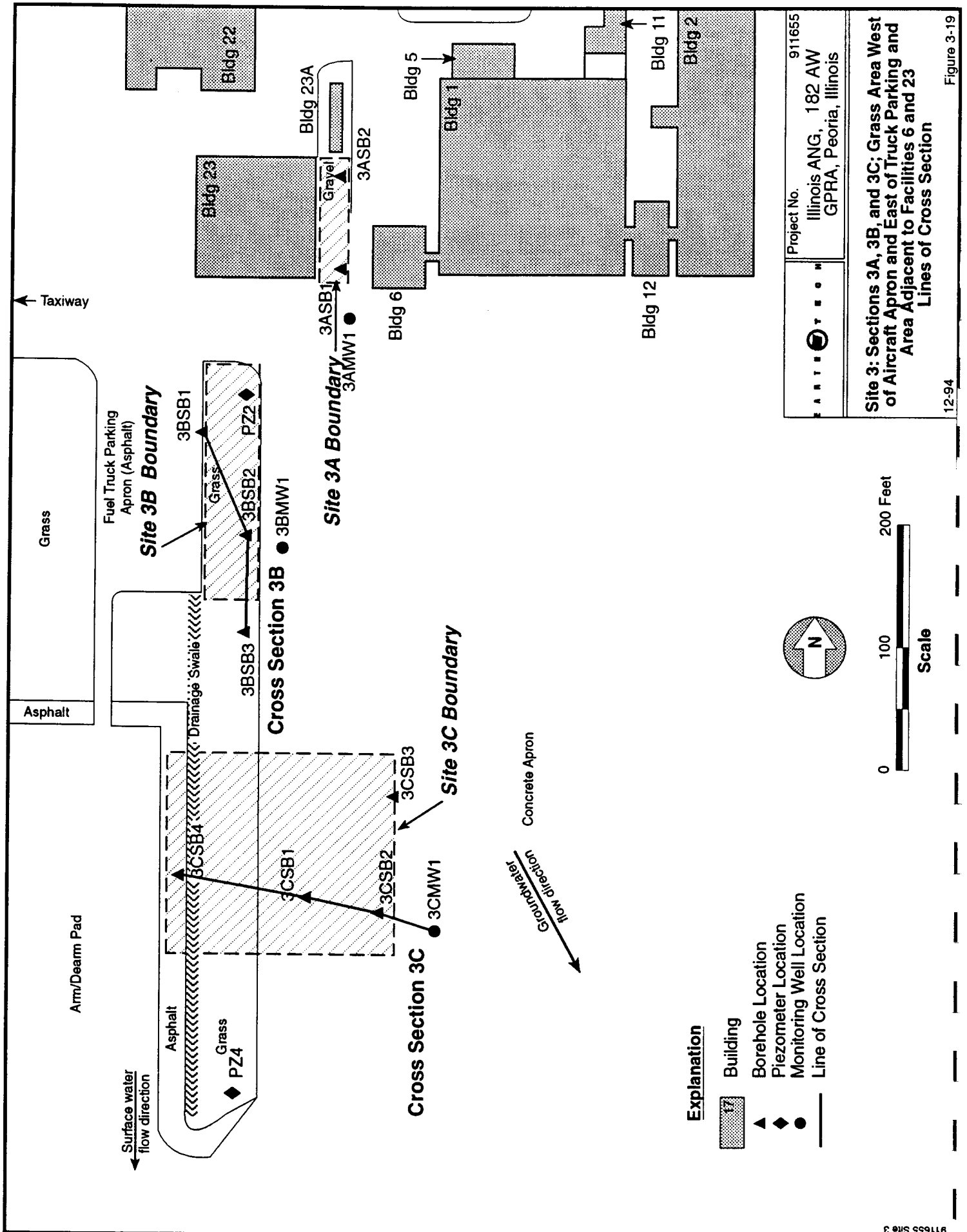
As discussed in Section 1.6 and 3.1, soils underlying the facility range in composition from clay to clayey sand. The locations of geologic profiles 3B and 3C are shown in Figure 3-19. These profiles are presented as Figures 3-20 and 3-21 and were constructed based on the field observations obtained during drilling operations. Horizontal distances are not drawn to scale on the profiles. A majority of the borings and monitoring wells were drilled through asphalt and/or concrete and through a thin layer of fill or reworked native soils. As described previously in Section 3.6.1 and 3.7.1, native soils across the base range from clays to clayey sands. As illustrated on the cross sections, the soils across Site 3 are of similar composition. Soil boring 3BSB3 encountered refusal, interpreted to represent bedrock, at a depth of 28 ft bgs.

Hydrogeology

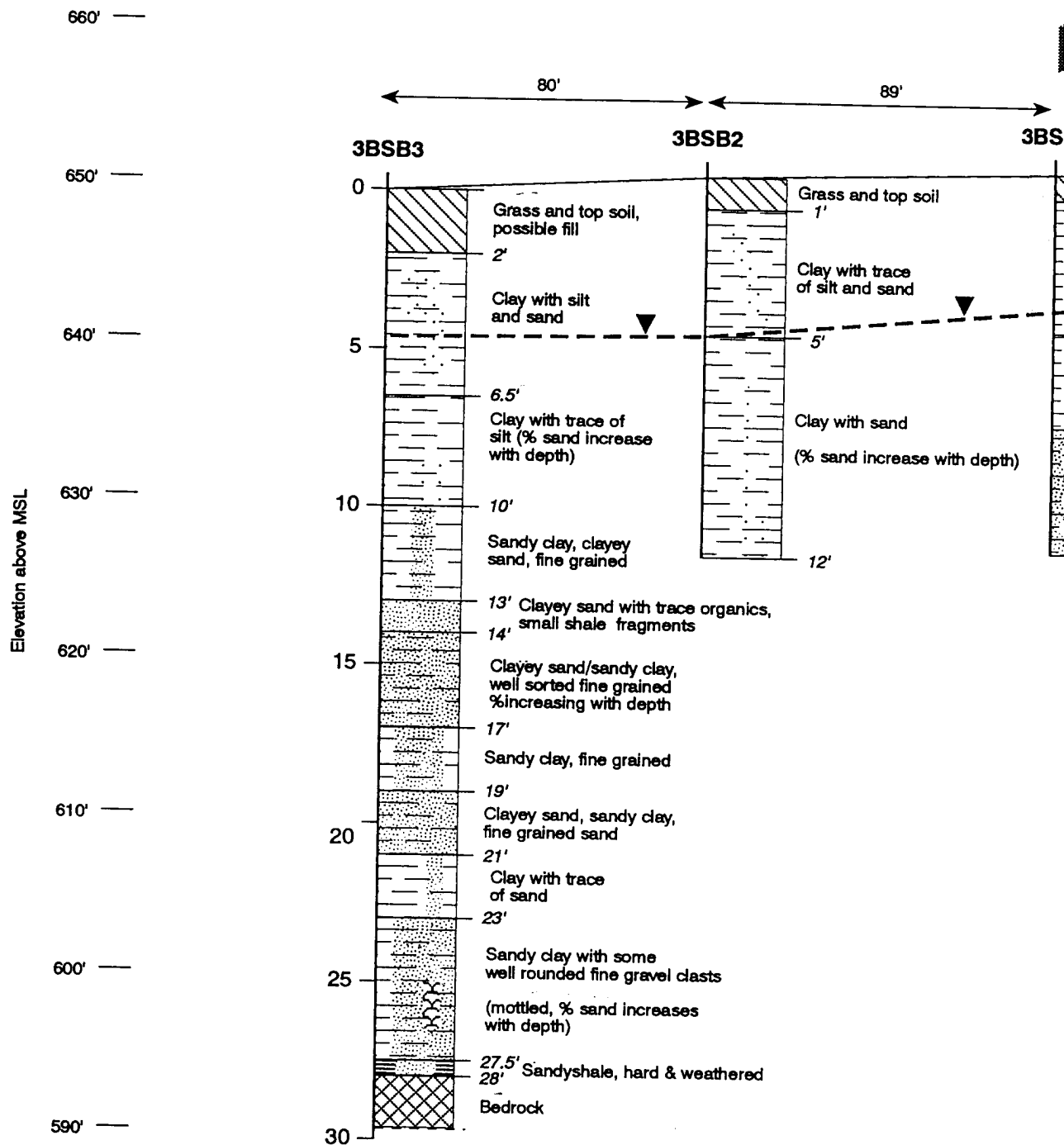
Groundwater elevation measurements were obtained from the four facility-wide piezometers on December 13, 1992 and were used to create a facility-wide groundwater elevation map. These data were also used to select down-gradient monitoring well locations for Sections 3A, 3B, and 3C of Site 3 (Figure 3-1). After the installation of monitoring wells 3AMW1, 3BMW1, and 3CMW1, groundwater elevation measurements were obtained again on January 21, 1993 and April 18, 1993. In general, groundwater occurs within the surficial sediments at depths ranging from approximately 3.5 to 5 ft bgs. As illustrated in Figure 3-1, groundwater flow is



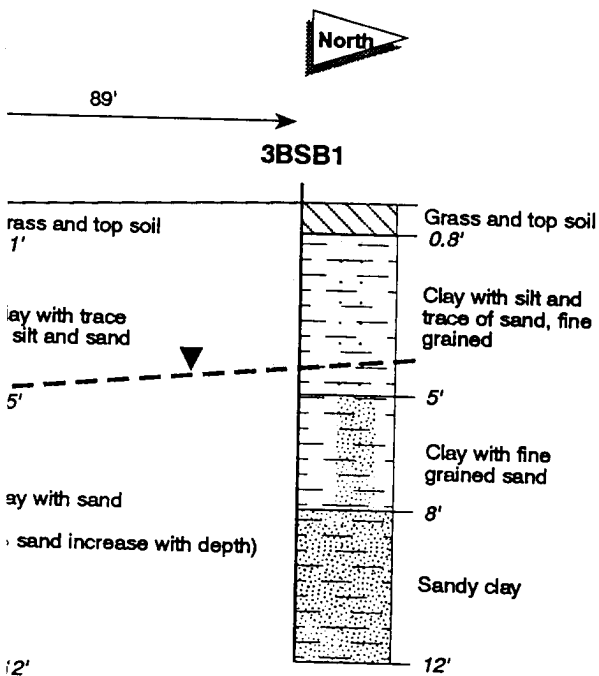




11



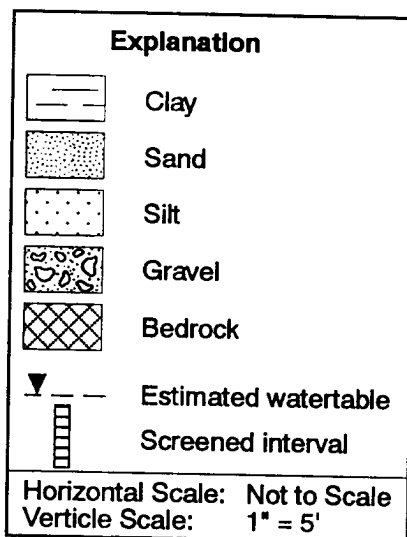
2



Explanation	
	Clay
	Sand
	Silt
	Gravel
	Bedrock
	Estimated water table
	Screened interval
Horizontal Scale: Not to Scale	
Vertical Scale: 1" = 5'	

- Soil borings to 3BSB1 and 3BSB2 were sampled for lithology at 0' to 2', 5' to 10' to 12'
- Soil boring 3BSB3 was continuously sampled to total depth

13



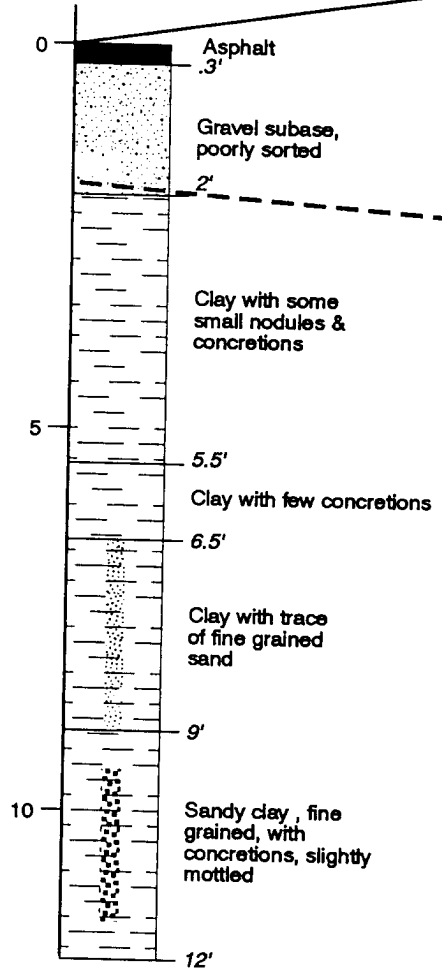
- Soil borings to 3BSB1 and 3BSB2 were sampled for lithology at 0' to 2', 5' to 7' and 10' to 12'
- Soil boring 3BSB3 was continuously sampled to total depth

	Project No. 91-1655
	Illinois ANG, 182 AW GPRA, Peoria, Illinois
Site 3: Section 3B Cross Section	
12-94	Figure 3-20

645' —
 642.5' —
 640' —
 637.5' —
 635' —
 632.5' —
 630' —
 627.5' —

Elevation above MSL

3CSB4



117'

3CSB1



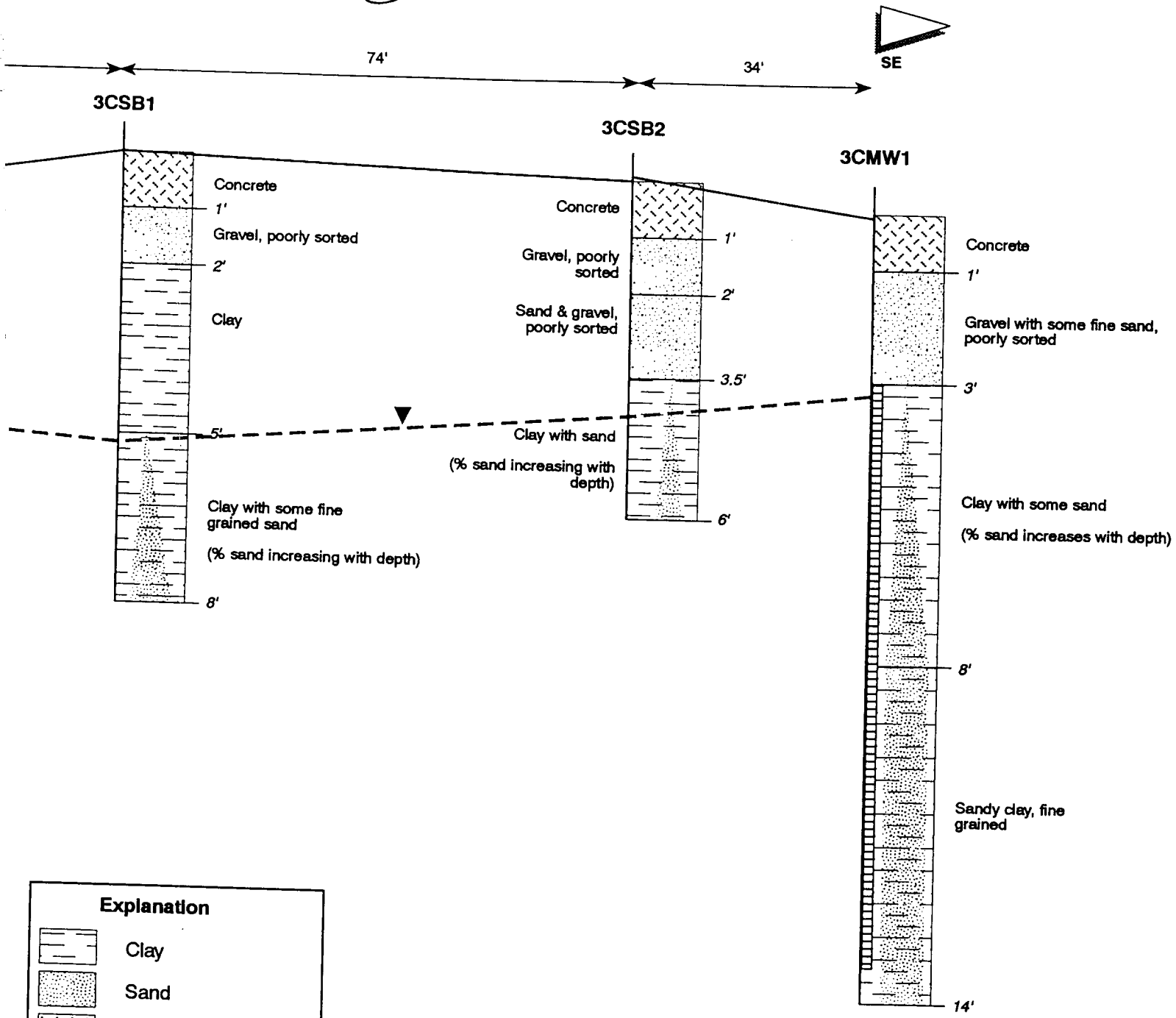
Explanatio

	Clay
	Sand
	Silt
	Gravel
	Bedrock
	Screened
	Estimate

Horizontal Scale:
 Vertical Scale:

911655 X-SEC 3C-B

(2)



Explanation

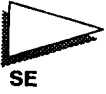
	Clay
	Sand
	Silt
	Gravel
	Bedrock
	Screened interval
	Estimated water table

Horizontal Scale: Not to Scale
Vertical Scale: 1" = 2.5'

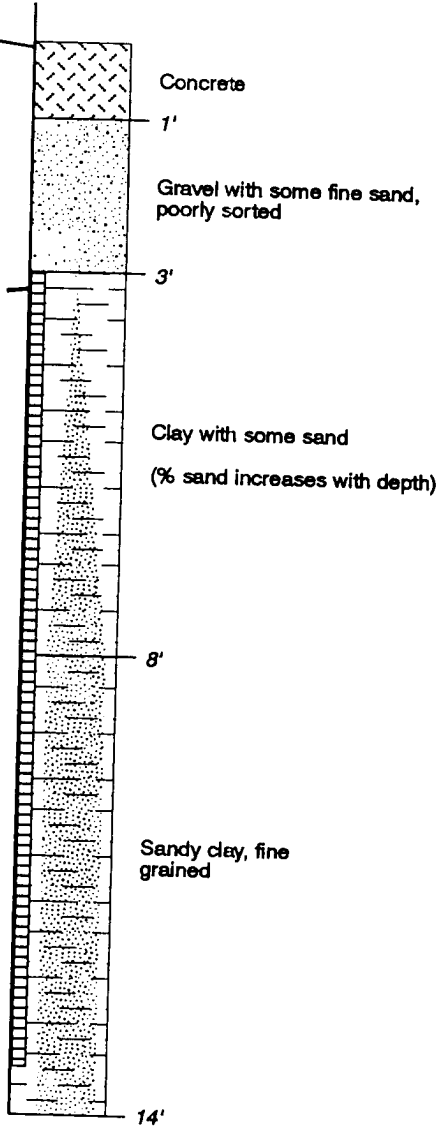
- Soil borings were continuously sampled from 2' BGS to total depth
- Monitoring well 3CMW1 was sampled for lithology at 3' to 5' and 8' to 10' BGS

	Project No.
	Illinois ANG, 182 GPRA, Peoria, IL
Site 3: Section 3C Cross Section	
12-94	

3



3CMW1



	Project No. 91-1655
	Illinois ANG, 182 AW GPRA, Peoria, Illinois
Site 3: Section 3C Cross Section	
12-94	Figure 3-21

directed southeastward beneath the sites. Average hydraulic gradients, groundwater flow velocities, hydraulic conductivity (average values from the slug test conducted in 3CMW1) and transmissivities are presented in Table 3-13.

Table 3-13 Surficial Aquifer Properties
ILANG, 182nd FG, GPRA, Peoria, Illinois

	Hydraulic Gradient (ft/ft)	Hydraulic Conductivity (cm/sec)	Transmissivity (ft ² /day)	Groundwater flow velocities (ft/year)
Section 3A	0.010	---	---	---
Section 3B	0.006	---	---	---
Section 3C	0.009	3.47×10^{-5}	2.45	1.33

3.8.2 Screening Activity Results

Screening activity results include the soil organic vapor (SOV) survey (soil gas sampling and groundwater sampling) performed in November 1992 by Tracer Research Corporation, and the field GC screening by Bingham Environmental of soil samples collected during the soil boring program.

3.8.2.1 Soil Gas and Groundwater Screening Results

Soil gas and groundwater samples were collected and analyzed by Tracer Research Corporation during the initial stages of this investigation using hydraulically driven sampling probes and a field GC. The soil gas and groundwater sampling locations are presented on Figure 3-17. Soil gas locations were included in the area between Section 3B and 3C to verify the boundaries for these sections. The complete data set is included in Appendix E of this report.

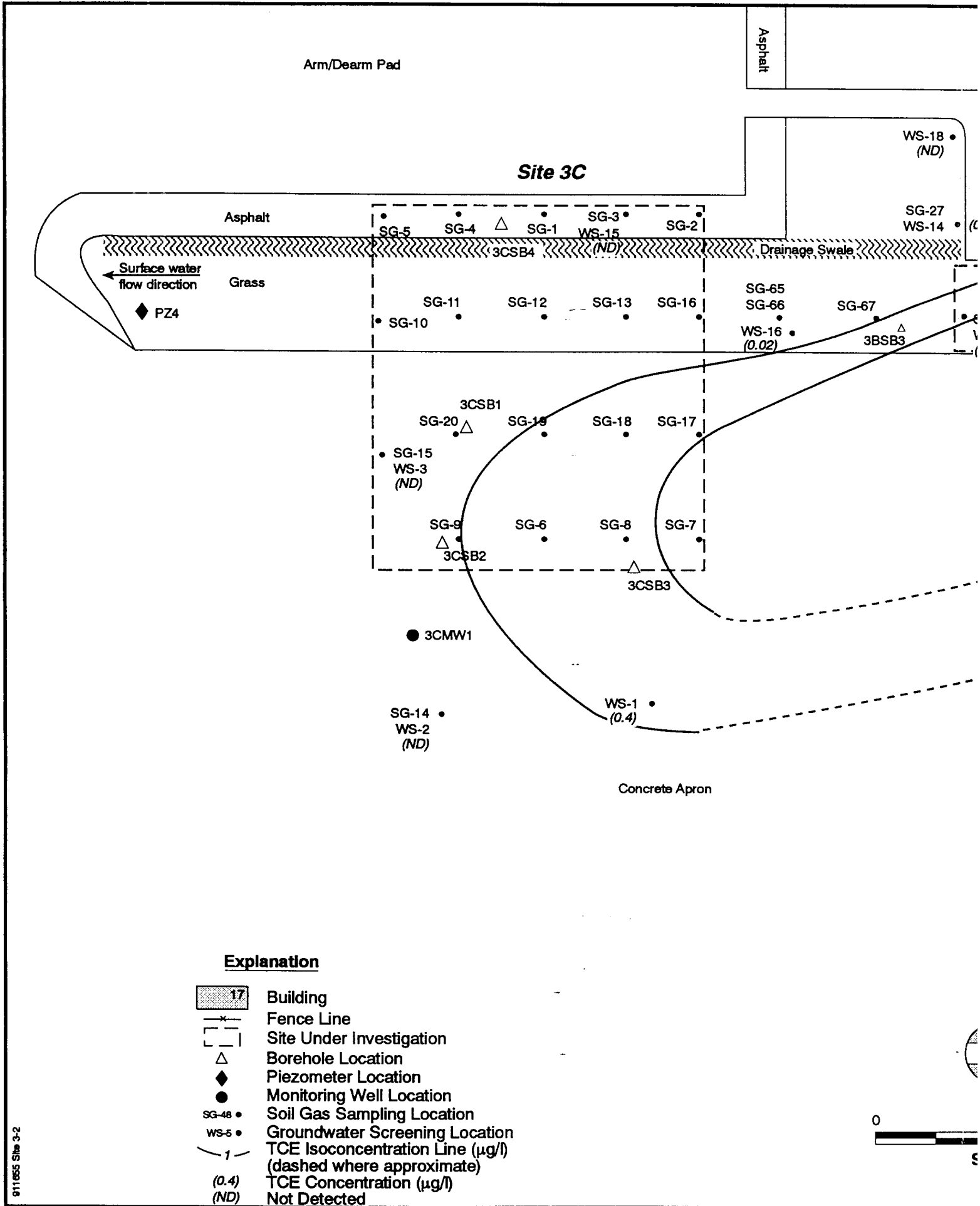
The 33 soil gas and 12 groundwater screening locations were selected based on the areas identified during the PA (ES, 1990) that were most likely impacted by past solvent handling. The screening data from these locations suggested that chlorinated compounds exist in the subsurface beneath Site 3. Figure 3-22 illustrates the extent of TCE in the groundwater screening samples collected and analyzed from the site. The TCE concentrations in the groundwater range from 0.02 to 30 $\mu\text{g}/\ell$. The TCE groundwater screening data are contoured to show an area of contamination beneath the site that is elongated parallel to the groundwater flow direction. The area containing TCE is bound by non-detects on the southern, northern, and western edges. To the east (beneath the apron) the extent of TCE is not determined. Relatively low levels of toluene were also detected during the screening analysis. No other BTEX compounds were quantified. Total VOC concentrations range from 1 to 83 $\mu\text{g}/\ell$. TCE concentrations for soil gas samples are shown on Figure 3-23. The highest soil gas concentration of TCE was detected in SG-9 (0.03 $\mu\text{g}/\ell$).

3.8.2.2 Field GC Screening Results

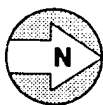
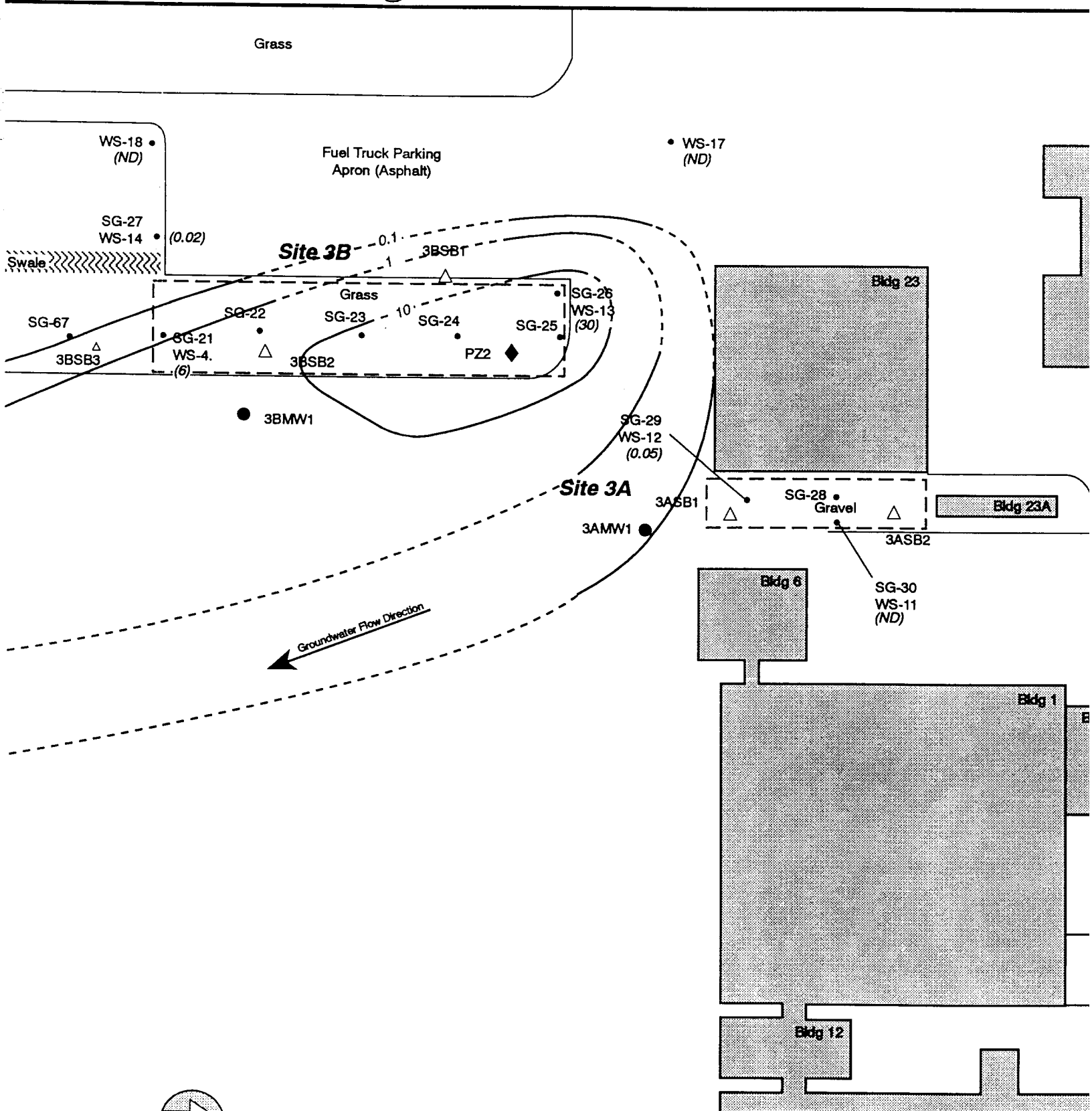
During the drilling and sampling of soil borings 3ASB1, 3BSB1 through 3BSB3, and 3CSB1 through 3CSB4 soil samples were collected and analyzed in the field for selected VOC by the methods described in Section 2.3.2 of this report. Field GC results and chromatograms are presented in Appendix F. No target VOCs were detected by the field laboratory during screening of the Site 3 soil samples.

3.8.3 Confirmation and Delineation Results

In general, soil borings were placed within suspected site boundaries to investigate areas of potential soil contamination. The screening data were used to guide placement of the soil borings. Boring 3ASB1 (located in Section 3A) was drilled within the site in the only area where access for the drill rig was available. Section B soil borings were drilled within the grassy areas alongside the concrete apron. Boring 3BSB3 was installed outside the site



2



0 60 120 Feet

Scale

EARTH TECH

Project No.

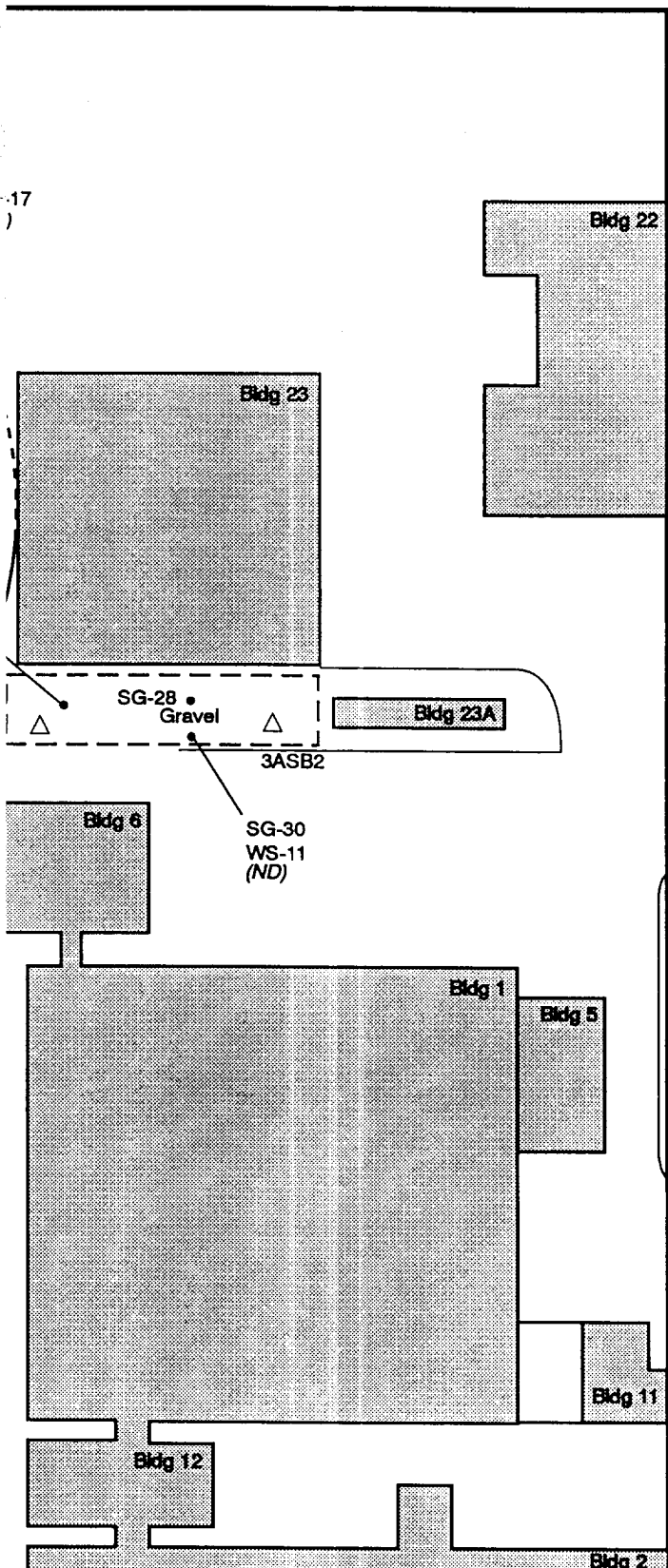
Illinois ANG, 182
GPRA, Peoria, Ill

Site 3: Sections 3A, 3B, and 3C; Grass A
of Aircraft Apron and East of Truck Park
Area Adjacent to Facilities 6 and 12
Groundwater Screening Results (μg/L)

12-94

5

-17
)



EARTH TECH

Project No. 911655
Illinois ANG, 182 AW
GPRA, Peoria, Illinois

Site 3: Sections 3A, 3B, and 3C; Grass Area West
of Aircraft Apron and East of Truck Parking and
Area Adjacent to Facilities 6 and 23
Groundwater Screening Results ($\mu\text{g/l}$)

1

Arm/Dearm Pad

Asphalt

Site 3C

WS-18 •

SG-27 •
WS-14 •

Asphalt

Surface water
flow direction

Grass

◆ PZ4

SG-5 SG-4 △ SG-1 SG-3 SG-2
WS-15
3CSB4

Drainage Swale

SG-11 SG-12 SG-13 SG-16
SG-10 (0.008)
WS-16 • SG-67 △
3BSB3

(0.02)
SG-65
SG-66
WS-16 •

Sample No.	TCE (µg/l)
SG1	ND
SG2	ND
SG3	ND
SG4	ND
SG5	ND
SG6	0.003
SG7	0.008
SG8	ND
SG9	0.03
SG10	0.008
SG11	ND
SG12	ND
SG13	ND
SG14	ND
SG15	0.001
SG16	ND
SG17	ND
SG18	ND
SG19	ND
SG20	ND
SG21	ND
SG22	ND
SG23	ND
SG24	0.001
SG25	0.0009
SG26	ND
SG27	ND
SG28	ND
SG29	ND
SG30	ND
SG65	0.02
SG66	ND
SG67	ND

3CSB1
SG-20 △ SG-19 SG-18 SG-17
SG-15
WS-3 (0.001)
(0.03) (0.003) (0.008)
SG-9 SG-6 SG-8 SG-7
△ 3CSB2
3CSB3

● 3CMW1

SG-14 •
WS-2

WS-1 •

Concrete Apron

Explanation

17 Building

—*— Fence Line

[] Site Under Investigation

△ Borehole Location

◆ Piezometer Location

● Monitoring Well Location

SG-48 • Soil Gas Sampling Location

WS-5 • Groundwater Screening Location

—0.01— TCE Isoconcentration Line µg/l of air (Soil Gas), dashed where approximate

0.03 TCE Concentration µg/l of air (Soil Gas)

ND Not Detected

0

1

Grass

WS-18 •

Fuel Truck Parking
Apron (Asphalt)

• WS-17

SG-27
WS-14 •

Site 3B

3BSB1

Grass Swale

SG-67
3BSB3

SG-21
WS-4 •

SG-22

SG-23

Grass
(0.001)
SG-24

PZ2

SG-25

SG-26
WS-13
(0.0009)

● 3BMW1

SG-29
WS-12

Site 3A

3ASB1

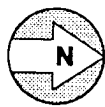
● 3AMW1

SG-28
Gravel

3ASB2

SG-30
WS-11

Groundwater Flow Direction



0 60 120 Feet
Scale

Bldg 23

Bldg 23A

Bldg 6

Bldg 1

Bldg 12

EARTH TECH

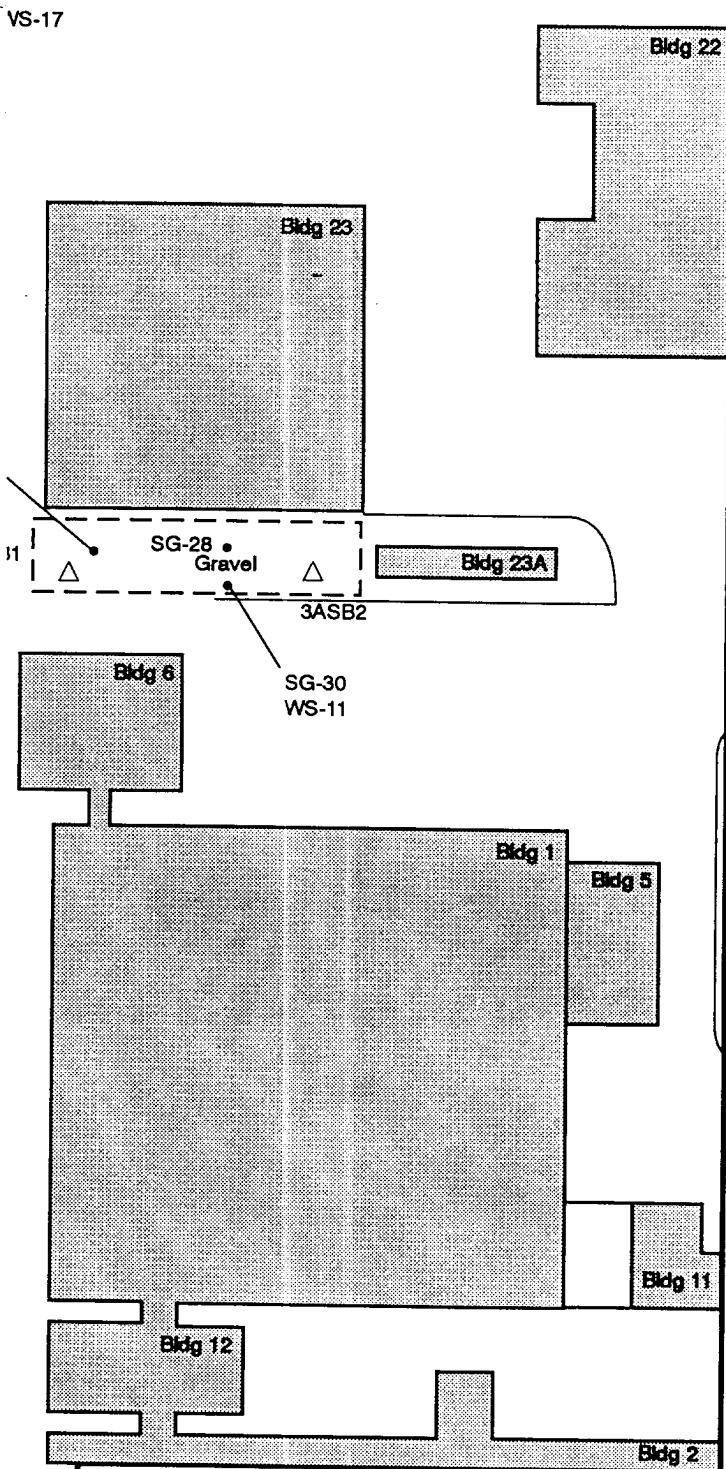
Project No.

Illinois ANG, 182
GPRA, Peoria, IL

Site 3: Sections 3A, 3B, and 3C; Grass /
of Aircraft Apron and East of Truck Par
Area Adjacent to Facilities 6 and
SOV Screening Results ($\mu\text{g/l}$)

12-94

3



	Project No. 911655
	Illinois ANG, 182 AW GPRA, Peoria, Illinois
Site 3: Sections 3A, 3B, and 3C; Grass Area West of Aircraft Apron and East of Truck Parking and Area Adjacent to Facilities 6 and 23 SOV Screening Results (µg/l)	
12-94	Figure 3-23

boundary to confirm the absence of contamination in the area between Section 3B and 3C. Section 3C soil borings were located on the concrete apron and along the Arm/Dearm pad. 3CSB2 was drilled next to soil gas sample SG-9. SG-9 contained the highest total VOCs and TCE concentrations in any of the soil gas samples collected at Site 3. 3CSB1 and 3CSB3 were located to delineate the extent of suspected contamination around 3CSB2, while 3CSB4 was drilled alongside the Arm/Dearm pad, near where minor amounts of total VOCs were detected in soil gas samples SG -1, -3, and -4.

Twenty soil and 6 groundwater samples were selected as described in Section 2.5 and were analyzed by CompuChem Laboratories for VOCs, SVOCs, TAL metals, and TPH. A discussion of the analytical results obtained from the samples collected and analyzed during the investigation is included in the following sections. Classes of chemicals are discussed, when appropriate, as described previously in Section 3.6.3.

3.8.3.1 Surface Soil Samples

Three surface soil samples were collected from Section 3B borings 3BSB1 through 3BSB3. Because Section 3A is gravel-covered and Section 3C boring locations were covered by concrete, no surface soil samples were collected from Section 3A or 3C borings. One shallow subsurface sample labeled 0 to 2 ft was collected immediately below the gravel in Section 3A and is discussed in Section 3.8.3.2. The analytical results for the Site 3 surface soil samples are presented in Table 3-14. Figure 3-24 was constructed to illustrate the analytical results found within the surface soil samples.

Volatile Organic Compounds

Surface soil samples were collected from all Section 3B soil borings. No VOCs were detected in these samples.

**Table 3-14 Data Summary Table: Surface Soils, Site 3 - Grass Area West of Aircraft Apron
East of Fuel Truck Parking Area (and area adjacent to Facilities 6 and 23) Section 3B**
ILANG, 182 AW , GPRA, Peoria, Illinois

LOCATOR: 3B-SB1 3B-SB2 3B-SB3
SAMPLE ID: GPA-S3B-SB1-SS0-2 GPA-S3B-SB2-SS0-2 GPA-S3B-SB3-SS0-2
COLLECTION DATE: 12/08/92 12/08/92 12/10/92
ASSOCIATED FIELD QC: TB4,FB1, FB2,EB1 TB4,FB1, FB2,EB1 TB7,FB1, FB2,EB2

UNITS: RESULT QUAL RESULT QUAL RESULT QUAL

Criteria ⁽¹⁾

SEMI-VOLATILES (8270)

Acenaphthene	ug/kg	430	U	370	U	48
Anthracene	ug/kg	430	U	52		130
Benzo(a)anthracene	ug/kg	430	U	380		560
Benzo(a)pyrene	ug/kg	430	U	240		560
Benzo(b)fluoranthene	ug/kg	430	U	800		1200
Benzo(ghi)perylene	ug/kg	430	U	300		440
Benzo(k)fluoranthene	ug/kg	430	U	800		1200
Chrysene	ug/kg	430	U	390		700
Fluoranthene	ug/kg	430	U	790		1300
Fluorene	ug/kg	430	U	370	U	52
Indeno(1,2,3-c,d)pyrene	ug/kg	430	U	310	J	400
Phenanthrene	ug/kg	430	U	440		770
Pyrene	ug/kg	430	U	680		990
bis(2-Ethylhexyl)phthalate	ug/kg	120	B	200	B	96

METALS (CLP)

Aluminum	mg/kg	13800		11700		10300
Arsenic	mg/kg	8.90		21.10	()	5.90
Barium	mg/kg	101		114		174
Beryllium	mg/kg	0.85	()	0.71	()	0.72
Calcium	mg/kg	2820	J	8790	J	17900
Chromium	mg/kg	19.90	J	16.70	J	14.80
Cobalt	mg/kg	15.60		10.60	()	11.40
Copper	mg/kg	24.60		15.60		14.20
Iron	mg/kg	24200	J	19300	J	18400
Lead	mg/kg	20.40	K	22.80	K	24.90
Magnesium	mg/kg	3540		3570		7940
Manganese	mg/kg	996	J	697	J	1240
Nickel	mg/kg	25.40		17.50		16.10
Potassium	mg/kg	1160	()	1010	()	992
Vanadium	mg/kg	35.20		27.50		27.30
Zinc	mg/kg	75		71		74.50

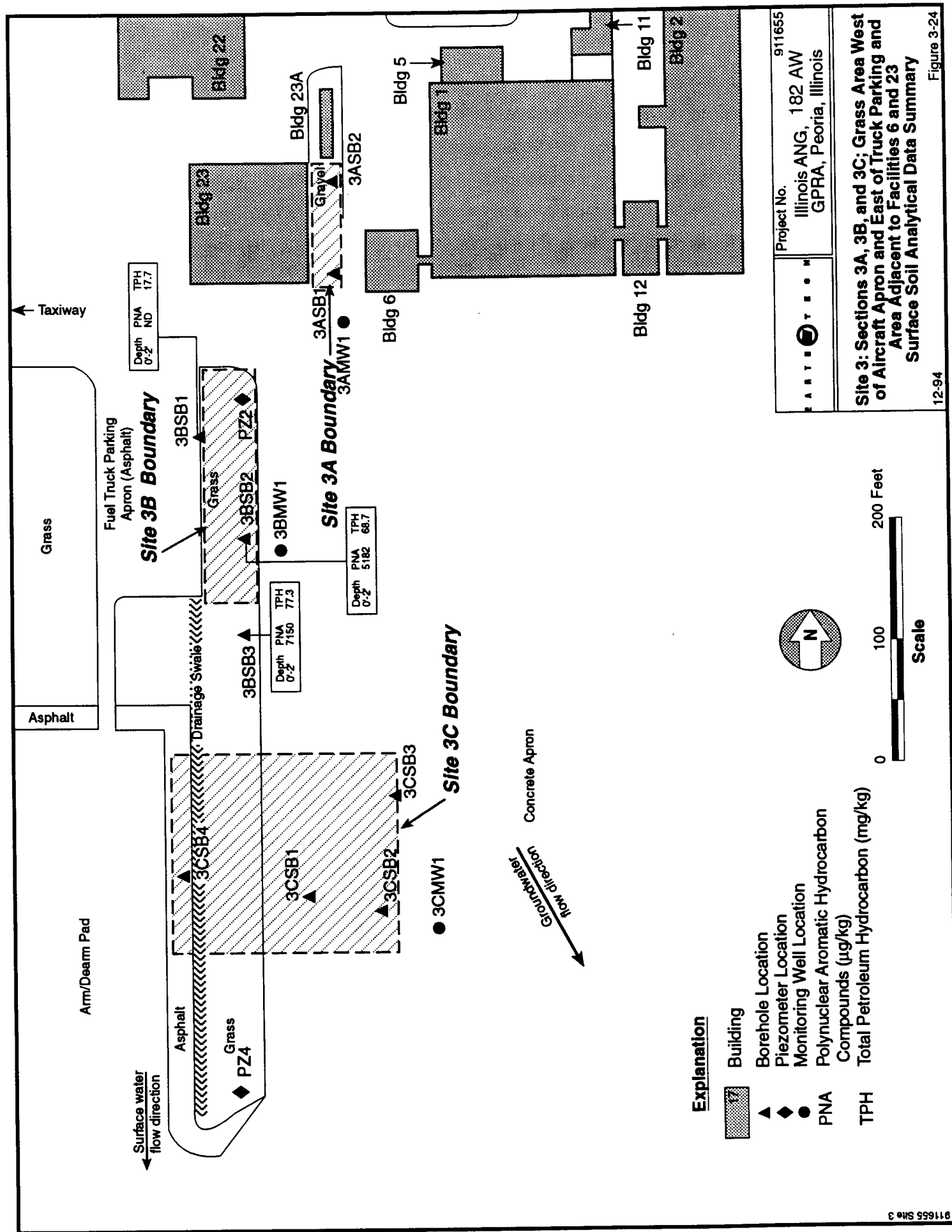
TPH (418.1)

Total Petroleum Hydrocarbons	mg/kg	17.7		68.7		77.3
------------------------------	-------	------	--	------	--	------

() Result is between the detection limit and the quantitation limit
 B Possible blank contamination
 J Reported value is estimated
 L Reported value is biased low
 U Compound analyzed but not detected
 K Reported value is biased high
 R Data is unreliable
 (1) No MCLs or action levels available for soils

CLP
MCL

Contract Lab Program
Maximum Contaminant Level



Semi-volatile Organic Compounds

PNA compounds were detected in two of the three surface soil samples collected at Section 3B. Sample 3BSB1 was free of PNAs, while samples from borings 3BSB2 and 3BS3 contained carcinogenic PNA compounds at 2920 and 3420 $\mu\text{g/kg}$, respectively. Noncarcinogenic PNA compounds were detected at 2262 and 3730 $\mu\text{g/kg}$, respectively. Additionally, the surface soil sample from 3BSB3 contained bis (2-ethylhexyl) phthalate at 96 $\mu\text{g/kg}$.

Total Petroleum Hydrocarbons

TPH was detected in all three of the surface soil samples collected from Section 3B at concentrations ranging from 17.7 to 77.3 mg/kg. A positive correlation is suggested when TPH concentrations are compared to PNA concentrations. Boring 3BSB1 contained TPH at 17.7 mg/kg and no PNAs, while the surface soil samples from 3BSB2 and 3BSB3 which contained higher levels of TPH (68.7 and 77.3 mg/kg, respectively) contained relatively high levels of PNAs.

Inorganics

A comparison of the background surface soil inorganic concentrations to the Section 3B surface soil inorganic concentrations is presented in Table 3-15. Discussions regarding the presence or absence of contamination by inorganics will be limited to compounds that exhibit appreciable toxicity and elevated concentrations. A majority of the analytes were detected in concentrations less than 2 times the maximum background concentration for a particular analyte. Arsenic, calcium, and magnesium were detected in Section 3B surface soils in concentrations greater than two times the maximum background concentrations. Because calcium and magnesium are essential elements (low toxicity) they will not be considered further. Arsenic was detected in 3BSB2 at a concentration of 21.1 mg/kg (2.3 times maximum background). Arsenic was quantified at less than two times maximum background concentration in 3BSB1 and 3BSB2.

Table 3-15 Site 3, Section 3B Contaminant Summary - Surface Soil
ILANG, 182 AW, GPRA, Peoria, Illinois

	Frequency of Detection ¹⁾	Range of Detected Concentrations (mg/kg)	Range of Background Concentrations (mg/kg)
Metals			
by CLP Methods (mg/kg)			
Aluminum	3 / 3	10300.00 - 13800.00	8680.00 - 13100.00
Arsenic	3 / 3	5.90 - 21.10	6.60 - 9.20
Barium	3 / 3	101.00 - 174.00	111.00 - 198.00
Beryllium	3 / 3	0.71 - 0.85	0.62 - 1.00
Calcium	3 / 3	2820.00 - 17900.00	2510.00 - 4090.00
Chromium	3 / 3	14.80 - 19.90	11.60 - 17.50
Cobalt	3 / 3	10.60 - 15.60	2.80 - 12.50
Copper	3 / 3	14.20 - 24.60	9.20 - 16.40
Iron	3 / 3	18400.00 - 24200.00	10500.00 - 17200.00
Lead	3 / 3	20.40 - 24.90	33.90 - 45.50
Magnesium	3 / 3	3540.00 - 7940.00	1740.00 - 2770.00
Manganese	3 / 3	697.00 - 1240.00	414.00 - 1510.00
Nickel	3 / 3	16.10 - 25.40	9.90 - 14.80
Potassium	3 / 3	992.00 - 1160.00	913.00 - 1590.00
Vanadium	3 / 3	27.30 - 35.20	19.60 - 34.30
Zinc	3 / 3	71.00 - 75.00	43.00 - 81.00

No state or federal criteria available

ND - Not detected. Compound was not expected to be present; therefore, no background concentration was calculated.

U - Analyte was not detected. Value is quantitation limit.

CLP - Contract Lab Program

1) - number of detections/number of samples collected

3.8.3.2 Subsurface Soil Samples

Seventeen subsurface soil samples were collected and analyzed for VOCs, SVOCs, TPH, and TAL metals from Section 3A (3 samples), 3B (5 samples), and 3C (9 samples). The analytical data are presented in Tables 3-16, 3-17, and 3-18. Sampling locations were presented previously in Figures 3-17 and 3-18. Figure 3-25 illustrates the distribution of subsurface soil analytical results.

Volatile Organic Compounds

No VOCs were detected in the Site 3 subsurface soil samples.

Semi-volatile Organic Compounds

Low concentrations of bis(2-ethylhexyl) phthalate (BEHP) were commonly detected in the subsurface soil samples at Site 3. All detections were below the MDL.

Noncarcinogenic PNA compounds were detected at concentrations below the MDL in 3ASB2 (3 to 4 ft) and 3CSB3 (2 to 4 ft). Noncarcinogenic PNA concentrations totaled 659 $\mu\text{g/kg}$ in 3ASB2 and 85 $\mu\text{g/kg}$ in 3CSB3. No carcinogenic PNAs were detected. No PNA compounds were detected in samples from Section 3B.

Total Petroleum Hydrocarbons

TPH was detected in the three soil samples collected from Section 3A at concentrations ranging from 13.9 to 50.9 mg/kg. TPH was also quantified in all five subsurface soil samples collected from Section 3B in concentrations ranging from 13.2 to 116 mg/kg (depths of 4 to 10 ft). TPH was detected in all nine subsurface soil samples (depths of 2 to 10 ft) collected and analyzed from Section 3C. Concentrations are all relatively low, ranging from 12.3 to 50.9 mg/kg.

Inorganics

Inorganic analytical results are presented in Table 3-16, 3-17, and 3-18. Discussions regarding the presence or absence of contamination by inorganics will be limited to compounds that exhibit appreciable toxicity and elevated concentrations.

**Table 3-16 Data Summary Table: Subsurface Soils, Site 3 - Grass Area West of Aircraft Apron
East of Fuel Truck Parking Area (and area adjacent to Facilities 6 and 23) Section 3A**
ILANG, 182 AW, GPRA, Peoria, Illinois

LOCATOR: 3A-SB1 3A-SB1 3A-SB2
SAMPLE ID: GPA-S3A-SB1-SS0-2 GPA-S3A-SB1-SS5-7 GPA-S3A-SB2-SS03-04
COLLECTION DATE: 12/09/92 01/16/93
ASSOCIATED FIELD QC: TB5,FB1, FB2,EB1 TB5,FB1, FB2,EB1 TB16,FB3, FB4,EB3A

UNITS: RESULT QUAL RESULT QUAL RESULT QUAL

Criteria ⁽¹⁾

SEMI-VOLATILES (8270)

Benzo(a)anthracene	ug/kg	400	U	410	U	73
Benzo(a)pyrene	ug/kg	400	U	410	U	57
Benzo(b)fluoranthene	ug/kg	400	U	410	U	130
Benzo(k)fluoranthene	ug/kg	400	U	410	U	130
Chrysene	ug/kg	400	U	410	U	59
Fluoranthene	ug/kg	400	U	410	U	110
Pyrene	ug/kg	400	U	410	U	100
bis(2-Ethylhexyl)phthalate	ug/kg	47	U	410	U	410

METALS (CLP)

Aluminum	mg/kg	21600		15100		13100
Arsenic	mg/kg	3.70		3.90		10
Barium	mg/kg	114		103		105
Beryllium	mg/kg	0.85	()	0.75	()	0.75
Cadmium	mg/kg	1.20	U	1.20	U	1.30
Calcium	mg/kg	3950	J	21300	J	34000
Chromium	mg/kg	26.70	J	25.50	J	20.40
Cobalt	mg/kg	5.60	()	7.40	()	6.40
Copper	mg/kg	20.40		17.20		17.70
Iron	mg/kg	26000	J	22900	J	19200
Lead	mg/kg	30.90	K	12.80	K	23.20
Magnesium	mg/kg	4430		14500		16500

(1) Result is between the detection limit and the quantitation limit
B Possible blank contamination
J Reported value is estimated
L Reported value is biased low
U Compound analyzed but not detected
K Reported value is biased high
R Data is unreliable
(1) No MCLs or action levels available for soils

CLP
MCL

Contract Lab Program
Maximum Contaminant Level

**Table 3-16 Data Summary Table: Subsurface Soils, Site 3 - Grass Area West of Aircraft Apron
East of Fuel Truck Parking Area (and area adjacent to Facilities 6 and 23) Section 3A
ILANG, 182 AW , GPRA, Peoria, Illinois**

LOCATOR: 3A-SB1 3A-SB1 3A-SB2
SAMPLE ID: GPA-S3A-SB1-SS0-2 GPA-S3A-SB1-SS5-7 GPA-S3A-SB2-SS03-04
COLLECTION DATE: 12/09/92 12/09/92 01/16/93
ASSOCIATED FIELD QC: TB5,FB1, FB2,EB1 TB5,FB1, FB2,EB1 TB16,FB3, FB4,EB3A

UNITS: RESULT QUAL RESULT QUAL RESULT QUAL

Criteria ⁽¹⁾

METALS (CLP) (Cont.)

Manganese	mg/kg	194	J	326	J	399
Nickel	mg/kg	17.60		17.40		20.30
Potassium	mg/kg	1560		1530		1570
Sodium	mg/kg	199	(B)	244	(B)	237 (I)
Vanadium	mg/kg	42.10		39.10		28.20
Zinc	mg/kg	66.90		55.50		64.90

TPH (418.1)

Total Petroleum Hydrocarbons	mg/kg	13.9		17.7		50.90
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(I) Result is between the detection limit and the quantitation limit
(B) Possible blank contamination
(J) Reported value is estimated
(L) Reported value is biased low
(U) Compound analyzed but not detected
(K) Reported value is biased high
(R) Data is unreliable
(1) No MCLs or action levels available for soils

CLP
MCL
Contract Lab Program
Maximum Contaminant Level

**Table 3-17 Data Summary Table: Subsurface Soils, Site 3 - Grass Area West of Aircraft Apron
East of Fuel Truck Parking Area (and area adjacent to Facilities 6 and 23) Section 3B
ILANG, 182 AW , GPRA, Peoria, Illinois**

LOCATOR:	3B-SB1		3B-SB1 *		3B-SB2		3B-SB2		3B-SB3		3B-SB3	
SAMPLE ID:	GPA-S3B-SB1-SS5-7		GPA-S3B-SB1-SS10-12		GPA-S3B-SB2-SS5-7		GPA-S3B-SB2-SS10-12		GPA-S3B-SB3-SS4-6		GPA-S3B-SB3-SS8-10	
COLLECTION DATE:	12/08/92		12/08/92		12/08/92		12/08/92		12/10/92		12/10/92	
ASSOCIATED FIELD QC:	TB4,FB1, FB2,EB1		TB5,FB1, FB2,EB1		TB4,FB1, FB2,EB1		TB4,FB1, FB2,EB1		TB7,FB1, FB2,EB2		TB7,FB1, FB2,EB2	
UNITS:	RESULT	QUAL	RESULT	QUAL	RESULT	QUAL	RESULT	QUAL	RESULT	QUAL	RESULT	QUAL

Criteria ⁽¹⁾

SEMI-VOLATILES (8270)

bis(2-Ethylhexyl)phthalate

METALS (CLP)

Aluminum	ug/kg	83	B	44	400	430	55	B	50
Arsenic	mg/kg	6510		7770	10800	6330	16200		10800
Barium	mg/kg	4		9.20	20.30	2.90	9.80		6.90
Beryllium	mg/kg	49.60		58.50	158	46.60	122		79.20
Calcium	mg/kg	0.47		0.50	0.64	0.41	0.79		0.50
Chromium	mg/kg	47200	J	47100	38700	42400	2370	J	43500
Cobalt	mg/kg	12.30	J	12.80	16.70	13	19.30	J	19
Copper	mg/kg	4.30		6.70	10.70	5.40	7.60		6.40
Iron	mg/kg	9.30		10.90	14.30	9.90	15.90		14.10
Lead	mg/kg	10600	J	14400	19300	9720	22000	J	15700
Magnesium	mg/kg	9.10	K	9.10	11.60	7.20	26.10	K	7.10
Manganese	mg/kg	27900		29200	24300	25200	3410		26400
Nickel	mg/kg	235	J	433	1170	341	530	J	486
Potassium	mg/kg	10.10		16.40	25.30	14.10	15.70		14.90
Sodium	mg/kg	619		958	1260	528	1030		1210
Vanadium	mg/kg	254	(B)	241	236	272	194	(B)	227
Zinc	mg/kg	16.30		19.70	28	19.70	31.40		31.30
	mg/kg	27.60		31.40	43	33.20	62.20		32.20

TPH (418.1)

Total Petroleum Hydrocarbons	µg/kg	43.40		20.60	23.0	116	13.20		62.30
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(1) Result is between the detection limit and the quantitation limit
 B Possible blank contamination
 J Reported value is estimated
 L Reported value is biased low
 U Compound analyzed but not detected

K Reported value is biased high
 R Data is unreliable
 (1) No MCLs or action levels available for soils
 * Field duplicate of GPA-53B-SB1-SS5-7

CLP Contract Lab Program
 MCL Maximum Contaminant Level

**Table 3-18 Data Summary Table: Subsurface Soils, Site 3 - Grass Area West of Aircraft Apron
East of Fuel Truck Parking Area (and area adjacent to Facilities 6 and 23) Section 3C
ILANG, 182 AW, GPRA, Peoria, Illinois**

LOCATOR:		3C-SB1		3C-SB1		3C-SB1		3C-SB2		3C-SB2		3C-SB3	
SAMPLE ID:		GPA-S3C-SB1-SS02-04		GPA-S3C-SB1-SS04-06		GPA-S3C-SB1-SS08-10		GPA-S3C-SB2-SS02-04		GPA-S3C-SB2-SS04-06		GPA-S3C-SB3-SS02-04	
COLLECTION DATE:		01/15/93		01/15/93		01/15/93		01/15/93		01/15/93		01/15/93	
ASSOCIATED FIELD QC:		TB14,FB3, FB4,EB3A		TB14,FB3, FB4,EB3A		TB14,FB3, FB4,EB3A		TB14,FB3, FB4,EB3A		TB14,FB3, FB4,EB3A		TB14,FB3, FB4,EB3A	
UNITS:		RESULT	QUAL	RESULT	QUAL	RESULT	QUAL	RESULT	QUAL	RESULT	QUAL	RESULT	QUAL

Criteria ⁽¹⁾

SEMI-VOLATILES (8270)

Fluoranthene	ug/kg	390	U	420	U	390	U	350	U	450	U	37	
Phenanthrene	ug/kg	390	U	420	U	390	U	350	U	450	U	48	
bis(2-Ethylhexyl)phthalate	ug/kg	390	U	420	U	390	U	36		450	U	350	U

METALS (CLP)

Aluminum	mg/kg	13000		11000		13200		9100		10300		2910	
Arsenic	mg/kg	8.20		9		5.70		4.50		8.40		7.90	
Barium	mg/kg	131		119		191		71.90		108		17.30	()
Beryllium	mg/kg	0.82	()	0.78	U	0.72	U	0.64	U	0.82	U	0.64	U
Calcium	mg/kg	2700		3400		2420		25000		2780		78400	
Chromium	mg/kg	21.60		18.20		14.90		14		16.90		7.40	
Cobalt	mg/kg	8.30	()	8.40	()	12	()	4.70	()	10	B	3.70	()
Copper	mg/kg	17.60		18.80		13.10		9.50		19.90		13	
Iron	mg/kg	23300		18800		16700		13000		21600		15900	
Lead	mg/kg	16	L	25.60	L	19.80	L	10.60	L	14	L	11.40	L
Magnesium	mg/kg	3230		3430		2810		16000		3100		35600	
Manganese	mg/kg	654		357		617		319		967		457	
Nickel	mg/kg	23.90		28.50		11		11.60		37.10		8.10	U
Potassium	mg/kg	1490		1360		1350		1080		1980		1300	
Silver	mg/kg	2.40	U	2.60	U	2.40	U	2.10	U	2.70	U	2.10	U
Sodium	mg/kg	170	()	216	()	173	()	208	()	208	()	241	()
Vanadium	mg/kg	28.90		29.90		31.30		19.90		28.60		9.60	()
Zinc	mg/kg	63.10		54.50		56.20		36.60		51.80		69	

TPH (418.1)

Total Petroleum Hydrocarbons	mg/kg	12.30		13.40		16.80		16		19.70		50.90	
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() Result is between the detection limit and the quantitation limit
 B Possible blank contamination
 J Reported value is estimated
 L Reported value is biased low
 U Compound analyzed but not detected
 K Reported value is biased high
 R Data is unreliable
 (1) No MCLs or action levels available for soils

**Table 3-18 Data Summary Table: Subsurface Soils, Site 3 - Grass Area West of Aircraft Apron
East of Fuel Truck Parking Area (and area adjacent to Facilities 6 and 23) Section 3C
ILANG, 182 AW, GPRA, Peoria, Illinois**

LOCATOR: 3C-SB3 3C-SB4 3C-SB4
SAMPLE ID: GPA-S3C-SB3-SS04.06 GPA-S3C-SB4-SS02.04 GPA-S3C-SB4-SS06.08
COLLECTION DATE: 01/15/94 01/16/94 01/16/94
ASSOCIATED FIELD QC: TB14,FB3, FB4,EB3A TB16,FB3, FB4,EB3A TB16,FB3, FB4,EB3A

UNITS: RESULT QUAL RESULT QUAL RESULT QUAL

Criteria ⁽¹⁾

SEMI-VOLATILES (8270)

Fluoranthene	ug/kg	410	U	410	U	420	U
Phenanthrene	ug/kg	410	U	410	U	420	U
bis(2-Ethylhexyl)phthalate	ug/kg	97		410	U	60	

METALS (CLP)

Aluminum	mg/kg	10200		17300		15500	
Arsenic	mg/kg	9.60		12.80		6.40	
Barium	mg/kg	84.70		130		132	
Beryllium	mg/kg	0.76	U	0.81	()	0.76	U
Calcium	mg/kg	2350		3030		3300	
Chromium	mg/kg	17.30		21.60		18.70	
Cobalt	mg/kg	5.50	()	10.30	()	13.10	
Copper	mg/kg	17.90		18		18	
Iron	mg/kg	20200		25200		20700	
Lead	mg/kg	14	L	26.70	L	18.90	L
Magnesium	mg/kg	2800		3580		3530	
Manganese	mg/kg	254		635		622	
Nickel	mg/kg	19.20		19.80		22.30	
Potassium	mg/kg	1000	U	1410		1330	
Silver	mg/kg	2.50	U	2.50	U	6.20	
Sodium	mg/kg	193	()	140	()	183	()
Vanadium	mg/kg	25.40		34.30		28.90	
Zinc	mg/kg	51.20		69.30		65.80	

TPH (418.1)

Total Petroleum Hydrocarbons	mg/kg	22.20		26.70		26.60	
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(1) Result is between the detection limit and the quantitation limit
B Possible blank contamination
J Reported value is estimated
L Reported value is biased low
U Compound analyzed but not detected
K Reported value is biased high
R Data is unreliable
(1) No MCLs or action levels available for soils

CLP
MCL

Contract Lab Program
Maximum Contaminant Level

A data summary table comparing the Site 3 Section 3A subsurface soil inorganic results to the background concentrations is presented as Table 3-19. No inorganics were detected in the subsurface soils at concentrations above two times the maximum background concentration for each particular analyte.

A data summary table comparing the Site 3 Section 3B subsurface soil inorganic results to the background concentrations is presented as Table 3-20. No inorganics were detected in the subsurface above two times the maximum background concentration for each particular analyte.

A data summary table comparing the Site 3 Section 3C subsurface soil inorganic results to the background concentrations is presented as Table 3-21. Silver was the only inorganic detected in the Section 3C subsurface soil samples at concentrations exceeding two times the maximum background concentrations. Silver was detected in only the 6 to 8 ft sample collected from 3CSB4 at 6.2 mg/kg (2.3 times the background sample detection limit; assumed background concentration).

3.8.3.3 Groundwater Samples

Based upon the groundwater flow directions determined during December 1992, down-gradient monitoring well locations were selected for each section of Site 3. The wells were installed and initially sampled in January 1993. An additional round of sampling was conducted during April 1993. The analytical results from this sampling are presented in Tables 3-22, 3-23, and 3-24. The analytical data are also presented on Figure 3-26.

Volatile Organic Compounds

VOCs detected in Site 3 monitoring wells include TCE, 1,1,1-TCA, trans-1,2-DCE, dichlorobenzenes, ethylbenzene, and toluene. As illustrated in Figure 3-26 and presented on Tables 3-22, 3-23, and 3-24, a majority of the VOCs detections are at relatively low levels

Table 3-19 Site 3, Section 3A Contaminant Summary - Subsurface Soil
ILANG, 182 AW, GPRA, Peoria, Illinois

	Frequency of Detection ¹⁾	Range of Detected Concentrations (mg/kg)	Range of Background Concentrations (mg/kg)
Metals			
by CLP Methods (mg/kg)			
Aluminum	3 / 3	13100.00 - 21600.00	2230.00 - 21300.00
Arsenic	3 / 3	3.70 - 10.00	1.30 - 23.10
Barium	3 / 3	103.00 - 114.00	16.50 - 158.00
Beryllium	2 / 3	0.75 - 0.85	0.66 - 0.71
Cadmium	1 / 3	1.30 - 1.30	1 U - 2 U
Calcium	3 / 3	3950.00 - 34000.00	2890.00 - 146000.00
Chromium	3 / 3	20.40 - 26.70	7.90 - 23.50
Cobalt	3 / 3	5.60 - 7.40	4.00 - 7.80
Copper	3 / 3	17.20 - 20.40	8.80 - 23.10
Iron	3 / 3	19200.00 - 26000.00	8850.00 - 26400.00
Lead	3 / 3	12.80 - 30.90	6.80 - 21.40
Magnesium	3 / 3	4430.00 - 16500.00	3970.00 - 57600.00
Manganese	3 / 3	194.00 - 399.00	243.00 - 654.00
Nickel	3 / 3	17.40 - 20.30	10.50 - 24.10
Potassium	3 / 3	1530.00 - 1570.00	1380.00 - 1650.00
Sodium	1 / 3	237.00 - 237.00	219.00 - 561.00
Vanadium	3 / 3	28.20 - 42.10	9.00 - 40.80
Zinc	3 / 3	55.50 - 66.90	28.00 - 74.10

No state or federal criteria available

ND - Not detected. Compound was not expected to be present; therefore, no background concentration was calculated.

U - Analyte was not detected. Value is quantitation limit.

CLP - Contract Lab Program

1) - Number of detections/number of samples collected

Table 3-20 Site 3, Section 3B Contaminant Summary - Subsurface Soil
ILANG, 182 AW , GPRA, Peoria, Illinois

	Frequency of Detection 1)	Range of Detected Concentrations(mg/kg)	Range of Background Concentrations (mg/kg)
Metals			
by CLP Methods (mg/kg)			
Aluminum	5 / 5	6330.00 - 16200.00	2230.00 - 21300.00
Arsenic	5 / 5	2.90 - 20.30	1.30 - 23.10
Barium	5 / 5	46.60 - 158.00	16.50 - 158.00
Beryllium	4 / 5	0.41 - 0.79	0.66 - 0.71
Calcium	5 / 5	2370.00 - 47150.00	2890.00 - 146000.00
Chromium	5 / 5	12.55 - 19.30	7.90 - 23.50
Cobalt	5 / 5	5.40 - 10.70	4.00 - 7.80
Copper	5 / 5	9.90 - 15.90	8.80 - 23.10
Iron	5 / 5	9720.00 - 22000.00	8850.00 - 26400.00
Lead	5 / 5	7.10 - 26.10	6.80 - 21.40
Magnesium	5 / 5	3410.00 - 28550.00	3970.00 - 57600.00
Manganese	5 / 5	334.00 - 1170.00	243.00 - 654.00
Nickel	5 / 5	13.25 - 25.30	10.50 - 24.10
Potassium	4 / 5	528.00 - 1260.00	1380.00 - 1650.00
Sodium	1 / 5	227.00 - 227.00	219.00 - 561.00
Vanadium	5 / 5	18.00 - 31.40	9.00 - 40.80
Zinc	5 / 5	29.50 - 62.20	28.00 - 74.10

No state or federal criteria available

ND - Not detected. Compound was not expected to be present; therefore, no background concentration was calculated.

U - Analyte was not detected. Value is quantitation limit.

CLP - Contract Lab Program

1) - Number of detections/number of samples collected

Table 3-21 Site 3, Section 3C Contaminant Summary - Subsurface Soil
ILANG, 182 AW, GPRA, Peoria, Illinois

	Frequency of Detection ¹⁾	Range of Detected Concentrations (mg/kg)	Range of Background Concentrations (mg/kg)
Metals by CLP Methods (mg/kg)			
Aluminum	9 / 9	2910.00 - 17300.00	2230.00 - 21300.00
Arsenic	9 / 9	4.50 - 12.80	1.30 - 23.10
Barium	9 / 9	17.30 - 191.00	16.50 - 158.00
Beryllium	2 / 9	0.81 - 0.82	0.66 - 0.71
Calcium	9 / 9	2350.00 - 78400.00	2890.00 - 146000.00
Chromium	9 / 9	7.40 - 21.60	7.90 - 23.50
Cobalt	8 / 9	3.70 - 13.10	4.00 - 7.80
Copper	9 / 9	9.50 - 19.90	8.80 - 23.10
Iron	9 / 9	13000.00 - 25200.00	8850.00 - 26400.00
Lead	9 / 9	10.60 - 26.70	6.80 - 21.40
Magnesium	9 / 9	2800.00 - 35600.00	3970.00 - 57600.00
Manganese	9 / 9	254.00 - 967.00	243.00 - 654.00
Nickel	8 / 9	11.00 - 37.10	10.50 - 24.10
Potassium	8 / 9	1080.00 - 1980.00	1380.00 - 1650.00
Silver	1 / 9	6.20 - 6.20	2.5 U - 2.7 U
Sodium	9 / 9	140.00 - 241.00	219.00 - 561.00
Vanadium	9 / 9	9.60 - 34.30	9.00 - 40.80
Zinc	9 / 9	36.60 - 69.30	28.00 - 74.10

No state or federal criteria available

ND - Not detected. Compound was not expected to be present; therefore, no background concentration was calculated.

U - Analyte was not detected. Value is quantitation limit.

CLP - Contract Lab Program

1) - Number of detections/number of samples collected.

**Table 3-22 Data Summary Table: Groundwater, Site 3 - Grass Area West of Aircraft Apron
East of Fuel Truck Parking Area (and area adjacent to Facilities 6 and 23) Section 3A**
ILANG, 182 AW , GPRA, Peoria, Illinois

LOCATOR: 3A-MW1 3A-MW1
SAMPLE ID: GPA-S3A-MW1-GW1 GPA-S3A-MW1-GW2
COLLECTION DATE: 01/21/93 04/18/93
ASSOCIATED FIELD QC: TB25,FB3, FB4,EB4 TB31,FB10, FB11,EB10

		UNITS:	RESULT	QUAL	RESULT	QUAL
IEPA Class I						
VOLATILES (8010)						
1,2-trans-Dichloroethylene	100 ug/l	0.22			0.30	U
Trichloroethylene	5 ug/l	8.10			0.30	U
VOLATILES (8020)						
Ethylbenzene	700 ug/l	0.20			0.20	U
SEMI-VOLATILES (8270)						
Benzoic Acid	ug/l	7			100	UJ
Pyrene	ug/l	10	U		1	J
METALS (CLP)						
Aluminum	ug/l	67100			313	B
Arsenic	50 ug/l	5.50	()		3	U
Barium	2000 ug/l	733			180	()B
Beryllium	4** ug/l	4.60	()		1	U
Chromium	100 ug/l	69.60			8	U
Cobalt	ug/l	26.40	()		8	U
Iron	5000 ug/l	71600	K		253	B
Iron, Dissolved	ug/l	174			50.50	()B
Lead	7.5 ug/l	37.10	L		2	UL
Manganese	150 ug/l	1460	L		306	
Manganese, Dissolved	ug/l	279			327	
Nickel	100** ug/l	52.80			17	U
Vanadium	ug/l	116			6	U
TPH (418.1)						
Total Petroleum Hydrocarbons	mg/l	0.25	U		0.80	

(I) Result is between the detection limit and the quantitation limit
 B Possible blank contamination
 J Reported value is estimated
 L Reported value is biased low
 U Compound analyzed but not detected
 K Reported value is biased high
 R Data is unreliable
 ** No IEPA criteria available, Federal MCL used
 CLP Contract Lab Program
 MCL Maximum Contaminant Level
 IEPA Illinois Environmental Protection Agency

**Table 3-23 Data Summary Table: Groundwater, Site 3 - Grass Area West of Aircraft Apron
East of Fuel Truck Parking Area (and area adjacent to Facilities 6 and 23) Section 3B**
ILANG, 182 AW, GPRA, Peoria, Illinois

LOCATOR: 3B-MW1 3B-MW1
SAMPLE ID: GPA-S3B-MW1-GW1 GPA-S3B-MW1-GW2
COLLECTION DATE: 01/20/93 04/18/93
ASSOCIATED FIELD QC: TB19,FB3,FB4,EB4 TB31,FB10,FB11,EB10

		UNITS:		RESULT	QUAL	RESULT	QUAL		
IEPA Class I									
VOLATILES (8010)									
1,1,1-Trichloroethane	200 ug/l			0.35	U	0.03	J		
1,2-trans-Dichloroethylene	100 ug/l			2.20		1.40	J		
Trichloroethylene	5 ug/l			0.31		0.01	J		
VOLATILES (8020)									
1,2-Dichlorobenzene	600 ug/l			0.27		0.15	U		
1,3-Dichlorobenzene	600 ug/l			0.02		0.20	U		
Ethylbenzene	700 ug/l			0.37		0.20	U		
SEMI-VOLATILES (8270)									
Benzoic Acid	ug/l			32	J	100	UJ		
METALS (CLP)									
Aluminum	ug/l			14500		973	J		
Arsenic	50 ug/l			3.30	()	3.20	()		
Barium	2000 ug/l			376		223	B		
Beryllium	4** ug/l			1.20	()	1	U		
Chromium	100 ug/l			19		8	U		
Copper	650 ug/l			8.90	()B	7	()L		
Copper, Dissolved	ug/l			4	U	4.60	()		
Iron	5000 ug/l			9940	K	671	J		
Lead	7.5 ug/l			4.90	L	2	UL		
Manganese	150 ug/l			507	L	385			
Manganese, Dissolved	ug/l			418		416			
Vanadium	ug/l			15.90	()	6	U		
TPH (418.1)									
Total Petroleum Hydrocarbons	mg/l			0.70		1			
1	Result is between the detection limit and the quantitation limit			U	Compound analyzed but not detected			CLP	Contract Lab Program
3	Possible blank contamination			K	Reported value is biased high			MCL	Maximum Contaminant Level
4	Reported value is estimated			R	Data is unreliable			IEPA	Illinois Environmental Protection Agency
7	Reported value is biased low			**	No IEPA criteria available. Federal MCL used				

() Result is between the detection limit and the quantitation limit
B Possible blank contamination
J Reported value is estimated
L Reported value is biased low
U Compound analyzed but not detected
K Reported value is biased high
R Data is unreliable
** No IEPA criteria available. Federal MCL used
CLP Contract Lab Program
MCL Maximum Contaminant Level
IEPA Illinois Environmental Protection Agency

**Table 3-24 Data Summary Table: Groundwater , Site 3 - Grass Area West of Aircraft Apron
East of Fuel Truck Parking Area (and area adjacent to Facilities 6 and 23) Section 3C
ILANG, 182 AW , GPRA, Peoria, Illinois**

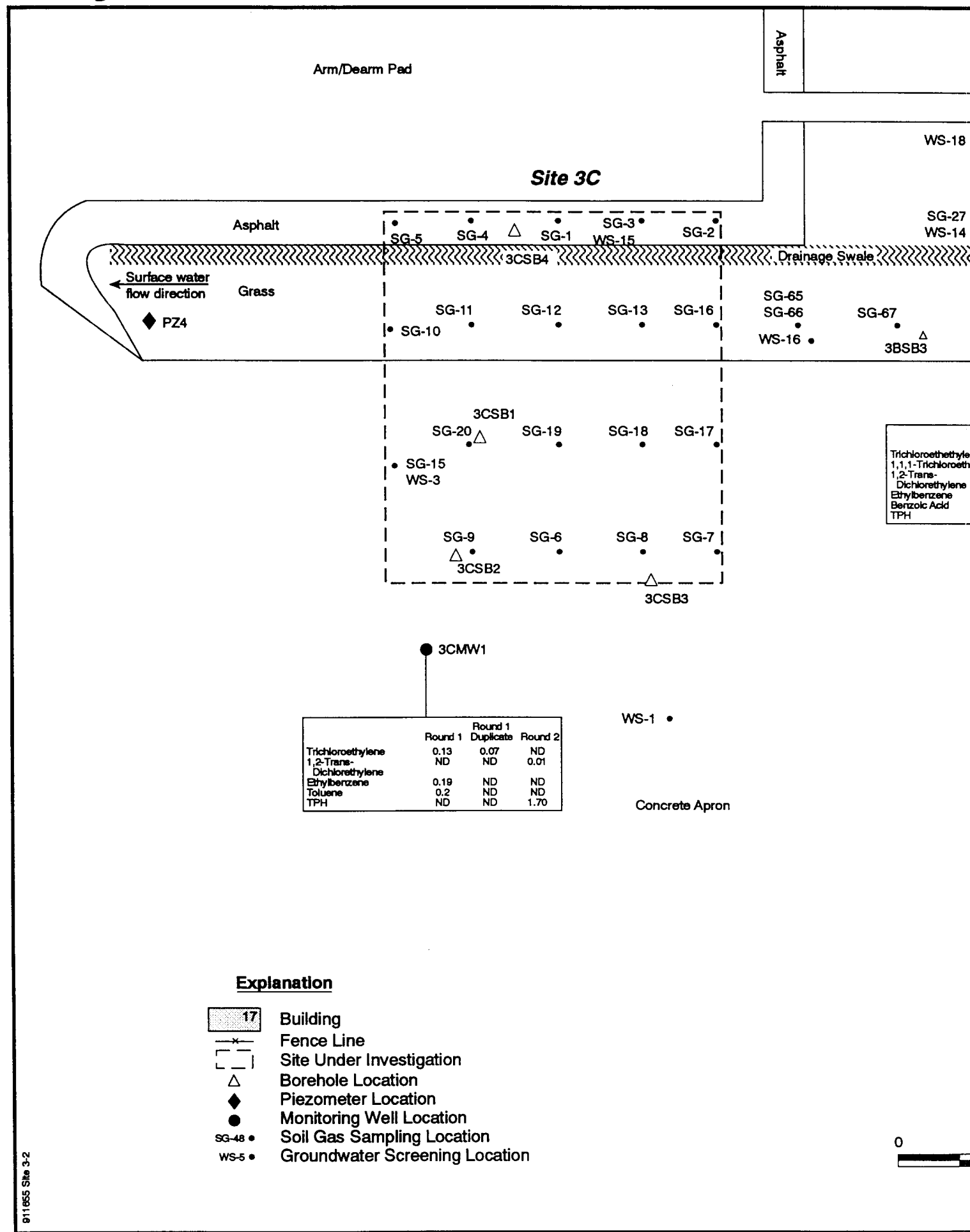
LOCATOR:		3C-MW1		3C-MW1		3C-MW4 *		
SAMPLE ID:		GPA-S3C-MW1-GW1		GPA-S3C-MW1-GW2		GPA-SBG-MW4-GW1		
COLLECTION DATE:		01/20/93		04/18/93		01/20/93		
ASSOCIATED FIELD QC:		TB18,FB3, FB4,EB4		TB31,FB10, FB11,EB10		TB22,FB3, FB4,EB4		
TYPE	CRITERIA	UNITS:	RESULT	QUAL	RESULT	QUAL	RESULT	QUAL
VOLATILES (8010)								
	1,2-trans-Dichloroethylene	100 ug/l	0.30	U	0.01	J	0.30	U
	Trichloroethylene	5 ug/l	0.13		8	B	0.07	
VOLATILES (8020)								
	Ethylbenzene	700 ug/l	0.19		0.20	U	0.20	U
	Toluene	100 ug/l	0.20		0.27	B	0.25	U
METALS (CLP)								
	Aluminum	ug/l	14300		6090	J	12000	
	Arsenic	50 ug/l	3	U	4.10	U	3	U
	Arsenic, Dissolved	ug/l	3	U	3	U	4.60	U
	Barium	2000 ug/l	300		735		338	
	Beryllium	ug/l	1	U	4.20	U	1	U
	Cadmium	5 ug/l	5	U	5.50	U	5	U
	Chromium	100 ug/l	6.30	U	8	U	8.70	U
	Cobalt	ug/l	9	U	19.20	U	9	U
	Iron	5000 ug/l	9750	K	1700	J	8040	K
	Lead	7.5 ug/l	6.20	L	29.60	L	6.20	L
	Manganese	150 ug/l	522	L	1380		604	L
	Manganese, Dissolved	ug/l	442		157		485	
	Nickel	ug/l	13	U	17	U	17.80	U
	Vanadium	ug/l	13.70	U	10.40	U	12.10	U
TPH (418.1)								
	Total Petroleum Hydrocarbons	mg/l	0.50	B	1.70		0.70	B

U Result is between the detection limit and the quantitation limit
 B Possible blank contamination
 J Reported value is estimated
 L Reported value is biased low
 U Compound analyzed but not detected
 K Reported value is biased high
 R Data is unreliable
 * Field duplicate of GPA-S3C-MW1-GW1

CLP

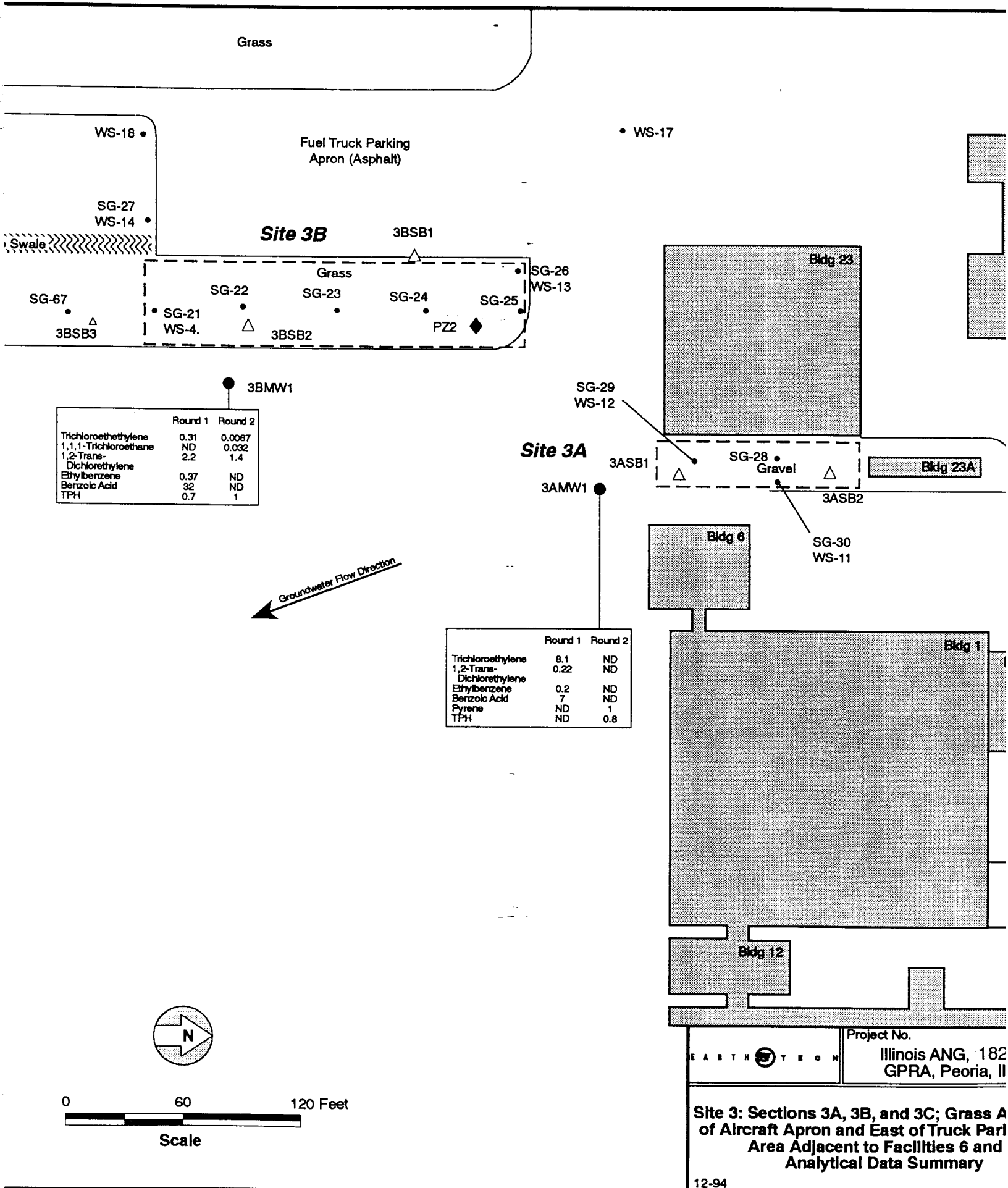
Contract Lab Program

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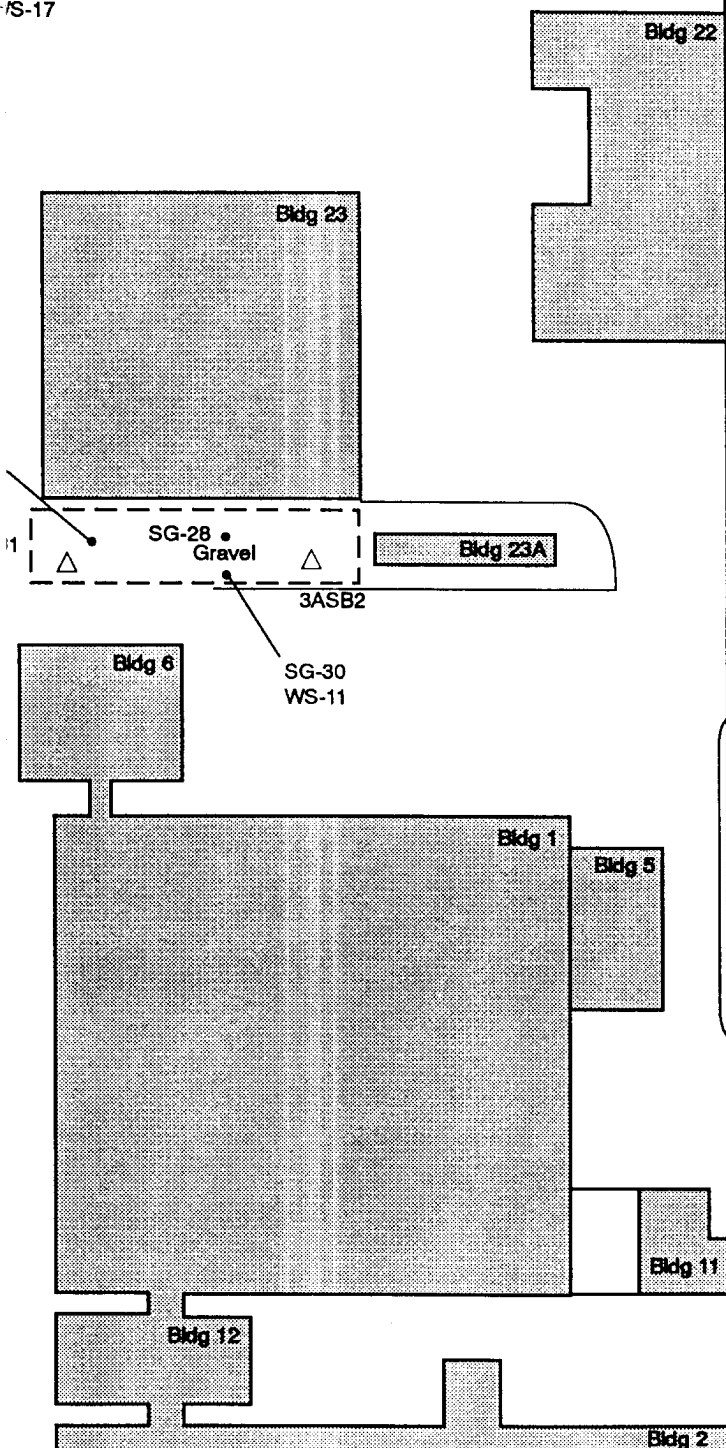
911855 Site 3-2

(2)



3

TS-17



	Project No. 911655
	Illinois ANG, 182 AW GPRA, Peoria, Illinois
Site 3: Sections 3A, 3B, and 3C; Grass Area West of Aircraft Apron and East of Truck Parking and Area Adjacent to Facilities 6 and 23 Analytical Data Summary	
12-94	Figure 3-26

and were not confirmed by a second round of sampling. TCE was detected in all Site 3 wells in concentrations ranging from 0.13 to 8.10 $\mu\text{g}/\ell$ during the initial sampling event but was not confirmed by a second round of sampling. Ethylbenzene was also detected in all Site 3 wells during initial sampling but was not confirmed by a second round. 1,1,1-TCA was detected in groundwater collected from 3BMW1 during the second round of sampling at a concentration of 0.032 J $\mu\text{g}/\ell$. No 1,1,1-TCA was quantified during the initial sampling event.

1,2-trans-DCE was detected during both rounds of sampling. 1,2-trans-DCE was found in the January and April 1993 sampling events in samples collected from 3BMW1 at 2.2 and 1.4 J $\mu\text{g}/\ell$, respectively. 1,2-trans-DCE was also detected in the January sampling of 3AMW1 (0.22 $\mu\text{g}/\ell$) and from the April 1993 sampling of 3CMW1 at (0.01 $\mu\text{g}/\ell$).

Semi-volatile Organic Compounds

Low concentrations of SVOCs were obtained during the sampling and analysis of Site 3 groundwater. Pyrene was detected in groundwater collected from 3AMW1 during the second round of sampling at 1 J $\mu\text{g}/\ell$. Additionally, benzoic acid was found in two samples at concentrations ranging from 7 to 32 $\mu\text{g}/\ell$ in the initial round of sampling.

Total Petroleum Hydrocarbons

TPH was quantified in three of the six Site 3 groundwater samples in concentrations ranging from 0.80 to 1.10 mg/ ℓ .

Inorganics

The analytical results for the filtered and unfiltered groundwater samples are presented in Tables 3-22, 3-23, and 3-24. In general, the filtered samples (dissolved metals) contain lower concentrations of inorganic analytes than were detected in the unfiltered samples indicating the majority of the chemical is not dissolved in the groundwater. As presented in Tables 3-25, 3-26, and 3-27, a majority of the inorganics were detected in concentrations ranging from less than one to two times the maximum background concentrations. Manganese was the only analyte detected in all the site monitoring wells.

Table 3-25 Site 3, Section 3A Contaminant Summary - Groundwater
ILANG, 182 AW, GPRA, Peoria, Illinois

Metals by CLP Methods (µg/l)	3AMW1 Frequency of Detection *		Range of Detected Concentrations (µg/l)		Range of Background Concentrations (BG-MW2) (µg/l)		IEPA Class I Groundwater Standards (µg/l)	Federal Drinking Water MCL (µg/l)
Aluminum	1	/ 2	67100.00	- 67100.00	4270.00	- 42800.00		
Arsenic	1	/ 2	5.50	- 5.50	6.45	- 7.20	50.00	50
Barium	1	/ 2	733.00	- 733.00	274.00	- 543.00	2000.00	2000
Beryllium	1	/ 2	4.60	- 4.60	1.00	- 2.70		4
Chromium	1	/ 2	69.60	- 69.60	9.55	- 41.50	100.00	100
Cobalt	1	/ 2	26.40	- 26.40	7.05	- 12.40		
Iron	1	/ 2	71600.00	- 71600.00	2715.00	- 14300.00	5000.00	300
Iron, Dissolved	1	/ 2	174.00	- 174.00	434.25	- 434.25		
Lead	1	/ 2	37.10	- 37.10	16.80	- 16.80	7.50	15
Manganese	2	/ 2	306.00	- 1460.00	528.00	- 806.00	150.00	
Manganese, Dissolved	2	/ 2	279.00	- 327.00	124.00	- 280.00		
Nickel	1	/ 2	52.80	- 52.80	23.50	- 23.50		100
Vanadium	1	/ 2	116.00	- 116.00	6.30	- 8.65		

*No chronic criteria available. Value listed is acute criteria.

ND - Not detected. Compound was not expected to be present; therefore, no background concentration was calculated.

U - Analyte not detected. Value is quantitation limit.

CLP - Contract Lab Program

MCL - Maximum Contaminant Level

IEPA - Illinois Environmental Protection Agency

* - Number of detections/number of samples collected

Table 3-26 Site 3, Section 3B Contaminant Summary - Groundwater
ILANG, 182 AW, GPRA, Peoria, Illinois

Metals by CLP Methods (µg/l)	Frequency of Detection*	Range of Detected Concentrations (µg/l)	Range of Background Concentrations (BG-MW2) (µg/l)	IEPA Class I Groundwater Standards (µg/l)	Federal Drinking Water MCL (µg/l)
Aluminum	2 / 2	973.00 - 14500.00	4270.00 - 42800.00		
Arsenic	2 / 2	3.20 - 3.30	6.45 - 7.20	50.00	50
Barium	1 / 2	376.00 - 376.00	274.00 - 543.00	2000.00	2000
Beryllium	1 / 2	1.20 - 1.20	1.00 - 2.70		4
Chromium	1 / 2	19.00 - 19.00	9.55 - 41.50	100.00	100
Copper	1 / 2	7.00 - 7.00	4 U - 4 U	650.00	1300
Copper, Dissolved	1 / 2	4.60 - 4.60	4 U - 4 U		
Iron	2 / 2	671.00 - 9940.00	2715.00 - 14300.00	5000.00	300
Lead	1 / 2	4.90 - 4.90	16.80 - 16.80	7.50	15
Manganese	2 / 2	385.00 - 507.00	528.00 - 806.00	150.00	
Manganese, Dissolved	2 / 2	416.00 - 418.00	124.00 - 280.00		
Vanadium	1 / 2	15.90 - 15.90	6.30 - 8.65		

*No chronic criteria available. Value listed is acute criteria.

ND - Not detected. Compound was not expected to be present; therefore, no background concentration was calculated.

U - Analyte not detected. Value is quantitation limit.

CLP - Contract Lab Program

MCL - Maximum Contaminant Level

IEPA - Illinois Environmental Protection Agency

* - Number of detections/number of samples collected

Table 3-27 Site 3, Section 3C Contaminant Summary - Groundwater
ILANG, 182 AW , GPRA, Peoria, Illinois

Metals by CLP Methods (µg/l)	Frequency of Detection *	Range of Detected Concentrations (µg/l)	Range of Background Concentrations (BG-MW2) (µg/l)	ILEPA Class I Groundwater Standards (µg/l)	Federal Drinking Water MCL (µg/l)
Aluminum	2 / 2	9045.00 - 14300.00	4270.00 - 42800.00	50.00	50
Arsenic	1 / 2	3.55 - 3.55	6.45 - 7.20		
Arsenic, Dissolved	1 / 2	3.55 - 3.55	3.40 - 3.40		
Barium	2 / 2	300.00 - 536.50	274.00 - 543.00	2000.00	2000
Beryllium	1 / 2	2.60 - 2.60	1.00 - 2.70		4
Cadmium	1 / 2	5.25 - 5.25	U - U	5.00	5
Chromium	2 / 2	6.30 - 6.35	9.55 - 41.50	100.00	100
Cobalt	1 / 2	14.10 - 14.10	7.05 - 12.40		
Iron	2 / 2	4870.00 - 9750.00	2715.00 - 14300.00	5000.00	300
Lead	2 / 2	6.20 - 17.90	16.80 - 16.80	7.50	15
Manganese	2 / 2	522.00 - 992.00	528.00 - 806.00	150.00	
Manganese, Dissolved	2 / 2	321.00 - 442.00	124.00 - 280.00		
Nickel	1 / 2	13.15 - 13.15	23.50 - 23.50		
Vanadium	2 / 2	11.25 - 13.70	6.30 - 8.65		

*No chronic criteria available. Value listed is acute criteria.

ND - Not detected. Compound was not expected to be present; therefore, no background concentration was calculated.

U - Analyte not detected. Value is quantitation limit.

CLP - Contract Lab Program

MCL - Maximum Contaminant Level

IEPA - Illinois Environmental Protection Agency

* - Number of detections/number of samples collected.

Total cobalt, lead, vanadium, and nickel were detected in the January 1993 rounds of sampling from 3AMW1 in concentrations between two and three times the maximum background concentration but were nondetect in the April 1993 round of sampling. No inorganics were detected in 3BMW1 or in 3CMW1 groundwater samples in concentrations above two times their maximum concentrations in the background samples.

3.8.4 Conclusions

Initial site screening activities, consisting of soil gas and groundwater sample collection and field GC analysis, suggested the presence of toluene, chlorinated hydrocarbons, and total VOCs in the subsurface beneath the site. Subsequent confirmation analytical samples collected for the groundwater, surface, and subsurface soil showed the soil to be relatively free of VOCs, while the presence of VOCs were confirmed in the groundwater. PNA compounds were detected in two of the three surface soil samples collected and analyzed from Section 3B, but no PNAs were detected in the subsurface soil samples. Minor amounts of PNAs were detected in the subsurface soil from Section 3A and 3C. Inorganic analytes above two times the maximum background concentration were detected infrequently in the surface and subsurface soil samples.

The data presented here suggest the previously described waste handling and disposal activities have not had an adverse impact on the surface and subsurface soils at Site 3. In particular, TCE was not quantified during the screening or fixed-based laboratory analysis of the soil samples collected during this investigation. The origin of the PNAs detected within Site 3B surface soils, but not in the subsurface soils, can only be speculated upon. The apron aircraft maintenance or refueling operations are located in close proximity to Section 3B and appear to have had an impact on the area surface soils.

The groundwater analytical data show Site 3 to be underlain by a shallow aquifer containing relatively low levels of trans-1,2-DCE. The lateral distribution and the up-gradient source of

the compounds has not been determined. As illustrated by the soil analytical data, the soils beneath Site 3 do not appear to be the source of the organic compounds detected in the groundwater.

4.0 PRELIMINARY RISK EVALUATION

The PRE was conducted to qualitatively assess potential public health and environmental threats associated with exposure to contaminants identified as part of the IRP being conducted at ILANG, GPRA.

The objectives of the PRE are to identify chemicals of potential concern, potential exposure pathways, potential human and ecological receptors, and any imminent threats posed to receptors by releases of hazardous materials at the sites. The PRE will be used to assist in the determination of the need for corrective action or any further investigative efforts at the sites.

Section 4.1 presents the preliminary human health evaluation and Section 4.2 presents a preliminary ecological evaluation. Summaries and conclusions of the risk evaluation are presented in Section 4.3.

4.1 PRELIMINARY HUMAN HEALTH EVALUATION

The preliminary human health evaluation consists of identification of chemicals of potential concern (COPC), exposure assessment, toxicity assessment, and risk screening.

4.1.1 Identification of Chemicals of Potential Concern

This section evaluates the results of the sampling and analysis of environmental media at Site 1, Site 2, and Site 3 at ILANG, GPRA for use in the PRE. Analytical data from the fixed-base laboratory have undergone QA/QC evaluation and summary statistics have been prepared using the validated data.

COPC were identified using the following criteria:

- The compound is above two times soil or groundwater (dissolved phase for inorganics) background concentrations.
- The compound was detected in the groundwater (dissolved or total concentration for inorganics) above human health ARARs.

In comparing inorganic groundwater concentrations with background concentrations, only the dissolved phase is considered because total inorganic concentrations are not considered indicative of concentrations which would be encountered under use of the groundwater. In comparing inorganic groundwater concentrations to human health ARARs, the total concentration was considered as the Illinois Groundwater Standard IAC 620 calls for the use of unfiltered groundwater samples.

TPH is not included in the discussion of COPC. The data indicate a correlation between the SVOCs detected at the sites and the corresponding TPH concentrations. Since the IEPA does not recognize TPH analysis and no health effects data are available, it is appropriate to limit the evaluation to the individual compounds detected at each site.

4.1.1.1 Site 1: Septic System Filter Beds

Table 4-1 presents the detected contaminant concentration summary for Site 1 subsurface soils (2 to 14 ft). The distribution is compared to local background levels obtained at the facility during the SI. The contaminant distribution for groundwater is presented in Table 4-2. COPC were identified based on the information contained in these tables and are discussed below. Identified ARARs are included on the tables for use in Section 4.3, Risk Screening. The ARARs were not, however, used to reduce the number of COPC.

Table 4-1 Site 1 Contaminant Summary - Subsurface Soil
ILANG, 182 AW, GPRA, Peoria, Illinois

	Frequency of Detection	Range of Detected Concentrations	Range of Background Concentrations
Volatile Organic Compounds by SW-846 Method 8240 (µg/kg)			
2-Butanone	10 / 22	3.00 - 18.00	ND
Semi-volatile Organic Compounds by SW-846 Method 8270 (µg/kg)			
2-Methylnaphthalene	2 / 21	143.00 - 150.00	ND
Acenaphthene	4 / 21	97.00 - 440.00	ND
Anthracene	5 / 21	44.00 - 700.00	ND
Benzo(a)anthracene	8 / 21	110.00 - 2900.00	ND
Benzo(a)pyrene	8 / 21	100.00 - 2600.00	ND
Benzo(b)fluoranthene	8 / 21	180.00 - 3500.00	ND
Benzo(ghi)perylene	7 / 21	70.00 - 1900.00	ND
Benzo(k)fluoranthene	8 / 21	55.00 - 1700.00	ND
Butyl benzyl phthalate	1 / 21	120.00 - 120.00	ND
Chrysene	8 / 21	130.00 - 3100.00	ND
Di-n-butyl phthalate	2 / 21	96.00 - 127.00	ND
Di-n-octyl phthalate	3 / 21	130.00 - 390.00	ND
Dibenzo(a,h)anthracene	5 / 21	45.00 - 590.00	ND
Dibenzofuran	4 / 21	150.00 - 230.00	ND
Fluoranthene	8 / 21	250.00 - 4700.00	ND
Fluorene	3 / 21	77.00 - 430.00	ND
Indeno(1,2,3-c,d)pyrene	7 / 21	79.00 - 2300.00	ND
Naphthalene	2 / 21	64.00 - 165.00	ND
Phenanthrene	8 / 21	160.00 - 3400.00	ND
Pyrene	8 / 21	220.00 - 4900.00	ND
bis(2-Ethylhexyl)phthalate	11 / 21	52.00 - 182.50	ND
Metals by CLP Methods (mg/kg)			
Aluminum	15 / 15	2750.00 - 21400.00	2230.00 - 21300.00
Arsenic	15 / 15	2.70 - 12.00	1.30 - 23.10
Barium	15 / 15	29.60 - 207.00	16.50 - 158.00
Beryllium	13 / 15	0.47 - 1.00	0.66 - 0.71
Cadmium	3 / 15	1.80 - 4.70	1 U - 2 U
Calcium	15 / 15	1620.00 - 158000.00	2890.00 - 146000.00
Chromium	15 / 15	9.90 - 25.10	7.90 - 23.50
Cobalt	14 / 15	5.30 - 11.80	4.00 - 7.80
Copper	15 / 15	8.70 - 21.60	8.80 - 23.10
Iron	15 / 15	10700.00 - 28900.00	8850.00 - 26400.00
Lead	15 / 15	6.30 - 67.40	6.80 - 21.40
Magnesium	15 / 15	1740.00 - 78200.00	3970.00 - 57600.00
Manganese	15 / 15	212.00 - 1270.00	243.00 - 654.00
Nickel	14 / 15	11.90 - 20.10	10.50 - 24.10
Potassium	9 / 15	870.00 - 1970.00	1380.00 - 1650.00
Silver	1 / 15	8.90 - 8.90	2 U - 3 U
Sodium	13 / 15	149.00 - 323.00	219.00 - 561.00
Vanadium	15 / 15	9.10 - 53.70	9.00 - 40.80
Zinc	15 / 15	38.90 - 130.00	28.00 - 74.10
TPH by Method 418.1 (mg/kg)			
Total Petroleum Hydrocarbons	22 / 22	15.25 - 9830.00	19.00 - 79.70

No state or federal criteria available

ND - Not detected. Compound was not expected to be present; therefore, no background concentration was calculated.

U - Analyte was not detected. Value is quantitation limit.

CLP - Contract Lab Program

Table 4-2 Site 1 Contaminant Summary - Groundwater
ILANG, 182 AW, GPRA, Peoria, Illinois

Volatile Organic Compounds by SW-846 Method 8010 (µg/l)									
Frequency of Detection	Range of Detected Concentrations		Range of Background Concentrations (BG-MW2)		IEPA Class I Groundwater Standards (µg/l)	Federal Drinking Water MCL (µg/l)	AWQC Ingestion of fish (µg/l)	AWQC Freshwater Chronic Criteria (µg/l)	
1 / 2	0.28	-	0.28	ND	100.00	100	0.00185	11600	
1 / 2	1.20	-	1.20	ND	2.00	2	525		
Semi-volatile Organic Compounds by SW-846 Method 8270 (µg/l)									
1 / 2	17.00	-	17.00	8.00 -					
1 / 2	1.00	-	1.00	ND		100			
Metals by CLP Methods (µg/l)									
2 / 2	1730.00	-	25500.00	4270.00 -	42800.00				
1 / 2	391.00	-	391.00	274.00 -	543.00	2000			
1 / 2	1.90	-	1.90	1.00 -	2.70	4	0.117	5.3	
1 / 2	32.00	-	32.00	9.55 -	41.50	100	3433000	210	
1 / 2	12.00	-	12.00	7.05 -	12.40				
2 / 2	2010.00	-	28200.00	2715.00 -	14300.00	300		1000	
1 / 2	147.00	-	147.00	434.25 -	434.25				
1 / 2	13.00	-	13.00	16.80 -	16.80	15	50	3.2	
2 / 2	1410.00	-	1430.00	528.00 -	806.00		100		
2 / 2	1130.00	-	1440.00	124.00 -	280.00				
1 / 2	0.47	-	0.47	.2 U		2	0.146	0.012	
2 / 2	19.20	-	24.00	23.50 -	23.50	100	100	160	
1 / 2	41.90	-	41.90	6.30 -	8.65				
TPH by Method 418.1 (mg/l)									
1 / 2	1.10	-	1.10	0.50 -	0.50				

¹⁾No chronic criteria available. Value listed is acute criteria.

ND - Not detected. Compound was not expected to be present; therefore, no background concentration was calculated.

U - Analyte not detected. Value is quantitation limit.

CLP - Contract Lab Program

IEPA - Illinois Environmental Protection Agency

MCL - Maximum Contaminant Level

AWQC - Ambient Water Quality Criteria

2-butanone was detected at low levels in the soil. Cadmium and lead were detected at levels greater than two times background concentrations. PNA compounds and phthalate compounds were detected and are considered COPC.

Vinyl chloride was detected in the second round of groundwater sampling. 1,2 DCE and benzoic acid were also detected in the groundwater. Concentrations of total lead and vanadium were elevated above background in one unfiltered groundwater sample. The corresponding filtered samples contained no detectable concentrations. Dissolved manganese and mercury were detected above background concentrations in the filtered samples. Total iron, lead, and manganese were detected above the IEPA Class I groundwater standards.

COPC for Site 1 include cadmium, lead, mercury, manganese, 2-butanone, all PNA compounds detected in the soil, all phthalate compounds detected in the soil, vinyl chloride, 1,2 DCE, and benzoic acid.

4.1.1.2 Site 2 - Grass Area Along the facility Boundary East of Aircraft Apron

Tables 4-3 and 4-4 present the detected contaminant concentration summary for Site 2 surface (less than 0.05 ft bgs) and subsurface soil (greater than 0.05 ft bgs). The range of detected concentrations is compared to local background levels obtained at the facility during the SI. No groundwater samples were collected at Site 2 due to the access restrictions. COPC were identified based on the information contained in these tables and are discussed below. Identified ARARs are included on the tables for use in Section 4.3, Risk Screening. The ARARs were not, however, used to reduce the number of COPC.

Methylene chloride was detected in one surface soil sample. No VOCs were detected in the subsurface soils. Calcium and magnesium were detected at levels greater than two times the background concentration in the surface soil. All metal analytes were within two times the background concentration in the subsurface soil. Low concentrations of PNA compounds, commonly associated with fuels, were present in both the surface and subsurface soils. All

Table 4-3 Site 2 Contaminant Summary - Surface Soils
ILANG, 182 AW, GPRA, Peoria, Illinois

	Frequency of Detection	Range of Detected Concentrations	Range of Background Concentrations
Volatile Organic Compounds by SW-846 Method 8240 (µg/kg)			
Methylene chloride	1 / 3	89.00 - 89.00	ND
Semi-volatile Organic Compounds by SW-846 Method 8270 (µg/kg)			
Benzo(a)anthracene	1 / 3	180.00 - 180.00	50.00 - 82.00
Benzo(a)pyrene	1 / 3	220.00 - 220.00	ND
Benzo(b)fluoranthene	1 / 3	430.00 - 430.00	61.00 - 61.00
Benzo(k)fluoranthene	1 / 3	430.00 - 430.00	100.00 - 100.00
Chrysene	1 / 3	210.00 - 210.00	89.00 - 89.00
Fluoranthene	1 / 3	360.00 - 360.00	110.00 - 170.00
Phenanthrene	1 / 3	160.00 - 160.00	49.00 - 55.00
Pyrene	1 / 3	340.00 - 340.00	110.00 - 170.00
Metals by CLP Methods (mg/kg)			
Aluminum	3 / 3	2710.00 - 15500.00	8680.00 - 13100.00
Arsenic	3 / 3	9.20 - 12.50	6.60 - 9.20
Barium	3 / 3	20.50 - 158.00	111.00 - 198.00
Beryllium	3 / 3	0.31 - 0.96	0.62 - 1.00
Calcium	3 / 3	3600.00 - 66500.00	2510.00 - 4090.00
Chromium	3 / 3	6.50 - 20.70	11.60 - 17.50
Cobalt	3 / 3	4.50 - 11.00	2.80 - 12.50
Copper	3 / 3	13.10 - 18.90	9.20 - 16.40
Iron	3 / 3	11200.00 - 25100.00	10500.00 - 17200.00
Lead	3 / 3	15.00 - 25.10	33.90 - 45.50
Magnesium	3 / 3	3290.00 - 37900.00	1740.00 - 2770.00
Manganese	3 / 3	459.00 - 931.00	414.00 - 1510.00
Nickel	3 / 3	10.40 - 18.90	9.90 - 14.80
Potassium	3 / 3	731.00 - 1080.00	913.00 - 1590.00
Vanadium	3 / 3	10.60 - 35.90	19.60 - 34.30
Zinc	3 / 3	50.00 - 68.00	43.00 - 81.00
TPH by Method 418.1 (mg/kg)			
Total Petroleum Hydrocarbons	3 / 3	18.10 - 32.90	14.15 - 97.90

No state or federal criteria available

ND - Not detected. Compound was not expected to be present; therefore, no background concentration was calculated.

U - Analyte was not detected. Value is quantitation limit.

CLP - Contract Lab Program

Table 4-4 Site 2 Contaminant Summary - Subsurface Soil
ILANG, 182 AW , GPRA, Peoria, Illinois

	Frequency of Detection	Range of Detected Concentrations	Range of Background Concentrations
Semi-volatile Organic Compounds by SW-846 Method 8270 (µg/kg)			
Benzo(b)fluoranthene	1 / 3	48.00 - 48.00	ND
Benzo(k)fluoranthene	1 / 3	48.00 - 48.00	ND
Phenanthrene	1 / 3	49.00 - 49.00	ND
Metals by CLP Methods (mg/kg)			
Aluminum	3 / 3	7160.00 - 12800.00	2230.00 - 21300.00
Arsenic	3 / 3	9.10 - 9.60	1.30 - 23.10
Barium	3 / 3	61.80 - 147.00	16.50 - 158.00
Beryllium	3 / 3	0.51 - 0.80	0.66 - 0.71
Calcium	3 / 3	2210.00 - 46600.00	2890.00 - 146000.00
Chromium	3 / 3	13.00 - 16.20	7.90 - 23.50
Cobalt	3 / 3	4.50 - 10.90	4.00 - 7.80
Copper	3 / 3	13.80 - 16.40	8.80 - 23.10
Iron	3 / 3	13300.00 - 20600.00	8850.00 - 26400.00
Lead	3 / 3	8.40 - 13.70	6.80 - 21.40
Magnesium	3 / 3	2890.00 - 29000.00	3970.00 - 57600.00
Manganese	3 / 3	186.00 - 922.00	243.00 - 654.00
Nickel	3 / 3	14.40 - 21.50	10.50 - 24.10
Potassium	3 / 3	568.00 - 1070.00	1380.00 - 1650.00
Vanadium	3 / 3	21.20 - 30.90	9.00 - 40.80
Zinc	3 / 3	38.40 - 52.30	28.00 - 74.10
TPH by Method 418.1 (mg/kg)			
Total Petroleum Hydrocarbons	1 / 3	14.40 - 14.40	19.00 - 79.70

No state or federal criteria available

ND - Not detected. Compound was not expected to be present; therefore, no background concentration was calculated.

U - Analyte was not detected. Value is quantitation limit.

CLP - Contract Lab Program

organics detected in the soil are considered COPC. Calcium and magnesium are essential elements and are not retained as COPC for this evaluation.

4.1.1.3 Site 3 - Grass Area West of Aircraft Apron and East of Fuel Truck Parking Area

Site 3 is divided into three sections and COPC are discussed separately for each section. The range of concentrations detected in the soil are compared to local soil background levels obtained at the facility during the SI. Groundwater concentrations are compared to up-gradient groundwater background concentrations. COPC were identified based on the information contained in these tables and are discussed below. Identified ARARs are included on the tables for use in Section 4.3, Risk Screening. The ARARs were not, however, used to reduce the number of COPC.

Section 3A

Tables 4-5 and 4-6 present the detected contaminant concentration summaries for Section 3A. No surface soil samples were collected from Section 3A because the area is gravel covered.

No VOCs were detected in the subsurface soil samples. All metal concentrations were less than two times background levels. BEHP and numerous PNA compounds were detected in one soil sample below the MDL and are not considered COPC. No COPC were identified for soil at Site 3A.

TCE was detected above Class I groundwater standards in the initial round of groundwater sampling, but was not detected in the subsequent sampling round. Low concentrations of ethylbenzene and 1,2,-t-DCE were also detected in the initial round but not in the following round. Low concentrations of benzoic acid and pyrene but were detected in the groundwater.

Table 4-5 Site 3, Section 3A Contaminant Summary - Subsurface Soil
ILANG, 182 AW , GPRA, Peoria, Illinois

	Frequency of Detection	Range of Detected Concentrations	Range of Background Concentrations
Semi-volatile Organic Compounds by SW-846 Method 8270 (µg/kg)			
Benzo(a)anthracene	1 / 3	73.00 - 73.00	ND
Benzo(a)pyrene	1 / 3	57.00 - 57.00	ND
Benzo(b)fluoranthene	1 / 3	130.00 - 130.00	ND
Benzo(k)fluoranthene	1 / 3	130.00 - 130.00	ND
Chrysene	1 / 3	59.00 - 59.00	ND
Fluoranthene	1 / 3	110.00 - 110.00	ND
Pyrene	1 / 3	100.00 - 100.00	ND
bis(2-Ethylhexyl)phthalate	1 / 3	47.00 - 47.00	ND
Metals by CLP Methods (mg/kg)			
Aluminum	3 / 3	13100.00 - 21600.00	2230.00 - 21300.00
Arsenic	3 / 3	3.70 - 10.00	1.30 - 23.10
Barium	3 / 3	103.00 - 114.00	16.50 - 158.00
Beryllium	2 / 3	0.75 - 0.85	0.66 - 0.71
Cadmium	1 / 3	1.30 - 1.30	1 U - 2 U
Calcium	3 / 3	3950.00 - 34000.00	2890.00 - 146000.00
Chromium	3 / 3	20.40 - 26.70	7.90 - 23.50
Cobalt	3 / 3	5.60 - 7.40	4.00 - 7.80
Copper	3 / 3	17.20 - 20.40	8.80 - 23.10
Iron	3 / 3	19200.00 - 26000.00	8850.00 - 26400.00
Lead	3 / 3	12.80 - 30.90	6.80 - 21.40
Magnesium	3 / 3	4430.00 - 16500.00	3970.00 - 57600.00
Manganese	3 / 3	194.00 - 399.00	243.00 - 654.00
Nickel	3 / 3	17.40 - 20.30	10.50 - 24.10
Potassium	3 / 3	1530.00 - 1570.00	1380.00 - 1650.00
Sodium	1 / 3	237.00 - 237.00	219.00 - 561.00
Vanadium	3 / 3	28.20 - 42.10	9.00 - 40.80
Zinc	3 / 3	55.50 - 66.90	28.00 - 74.10
TPH by Method 418.1 (mg/kg)			
Total Petroleum Hydrocarbons	3 / 3	13.90 - 50.90	19.00 - 79.70

No state or federal criteria available

ND - Not detected. Compound was not expected to be present; therefore, no background concentration was calculated.

U - Analyte was not detected. Value is quantitation limit.

CLP - Contract Lab Program.

Table 4-6 Site 3, Section 3A Contaminant Summary - Groundwater
ILANG, 182 AW, GPRA, Peoria, Illinois

	Frequency of Detection	Range of Detected Concentrations	Range of Background Concentrations (BG-MW2)	IEPA Class I Groundwater Standards (µg/l)	Federal Drinking Water MCL (µg/l)	AWQC Ingestion of fish (µg/l)	AWQC Freshwater Chronic Criteria (µg/l)
Volatile Organic Compounds by SW-846 Method 8010 (µg/l)							
1,2-trans-Dichloroethylene	1 / 2	0.22 -	0.22	100.00	100	0.00185	11600 ¹⁾
Trichloroethylene	1 / 2	8.10 -	8.10	5.00	5	80.7	21900
Volatile Organic Compounds by SW-846 Method 8020 (µg/l)							
Ethylbenzene	1 / 2	0.20 -	0.22	700.00	700	3260	32000 ²⁾
Semi-volatile Organic Compounds by SW-846 Method 8270 (µg/l)							
Benzoic Acid	1 / 2	7.00 -	7.00				
Pyrene	1 / 2	1.00 -	1.00				
Metals by CLP Methods (µg/l)							
Aluminum	1 / 2	67100.00 -	67100.00	4270.00		0.0175	
Arsenic	1 / 2	5.50 -	5.50	6.45	50		
Barium	1 / 2	733.00 -	733.00	274.00	2000		
Beryllium	1 / 2	4.60 -	4.60	1.00	4	0.117	5.3
Chromium	1 / 2	69.60 -	69.60	41.50	100	3433000	210
Cobalt	1 / 2	26.40 -	26.40	12.40			
Iron	1 / 2	71600.00 -	71600.00	2715.00	300		1000
Iron, Dissolved	1 / 2	174.00 -	174.00	434.25			
Lead	1 / 2	37.10 -	37.10	16.80	15	50	3.2
Manganese	2 / 2	306.00 -	1460.00	528.00		100	
Manganese, Dissolved	2 / 2	279.00 -	327.00	124.00			
Nickel	1 / 2	52.80 -	52.80	23.50	100	100	160
Vanadium	1 / 2	116.00 -	116.00	6.30			
TPH by Method 418.1 (mg/l)							
Total Petroleum Hydrocarbons	1 / 2	0.80 -	0.80	0.30			

¹⁾No chronic criteria available. Value listed is acute criteria.

ND - Not detected. Compound was not expected to be present; therefore, no background concentration was calculated.

U - Analyte not detected. Value is quantitation limit.

CLP - Contract Lab Program

IEPA - Illinois Environmental Protection Agency

MCL - Maximum Contaminant Level

AWQC - Ambient Water Quality Criteria

Total iron, lead, and vanadium were detected above two times background concentrations but were not above background in the dissolved phase. Total iron, lead, and manganese were detected above IEPA Class I groundwater standards. All the organics detected in the groundwater are considered COPC for this evaluation.

Section 3B

Surface, subsurface, and groundwater samples were collected for Section 3B. Tables 4-7 through 4-9 present the detected contaminant concentration summaries for Section 3B.

Arsenic, calcium, and magnesium were detected in the surface soils at levels greater than two times the background levels. PNA compounds were detected in the surface soil, in addition to one detection of BEHP. No metals were detected above two times background in the subsurface soils. BEHP was detected in the subsurface soils. All organic compounds and arsenic detected in the soils are considered COPC. Calcium and magnesium are considered essential elements and are not retained as COPC for this evaluation.

Low concentrations of chlorinated VOCs (organic compounds), including TCA, 1,2 t-DCE, dichlorobenzene isomers, and TCE were detected in the groundwater. Ethylbenzene and benzoic acid were also detected in the groundwater. Metals were detected at concentrations below two times background concentrations. Total iron and manganese were detected above IEPA Class I groundwater standards. All organic compounds detected in the groundwater are considered COPC.

Section 3C

Subsurface and groundwater samples were collected for Section 3C. The area is asphalt covered, therefore, no subsurface soil samples were collected. Tables 4-10 and 4-11 present contaminant concentration summaries for Section 3C.

PNA compounds and BEHP were detected at low concentrations in the subsurface soil and are considered COPC. Silver was detected at concentrations greater than two times the background concentration and is retained as a COPC.

Table 4-7 Site 3, Section 3B Contaminant Summary - Surface Soil
ILANG, 182 Airlift Wing, GPRA, Peoria, Illinois

	Frequency of Detection		Range of Detected Concentrations	Range of Background Concentrations
Semi-volatile Organic Compounds by SW-846 Method 8270 (µg/kg)				
Acenaphthene	1 / 3	48.00 - 48.00	ND	
Anthracene	2 / 3	52.00 - 130.00	ND	
Benzo(a)anthracene	2 / 3	380.00 - 560.00	50.00 - 82.00	
Benzo(a)pyrene	2 / 3	240.00 - 560.00	ND	
Benzo(b)fluoranthene	2 / 3	800.00 - 1200.00	61.00 - 61.00	
Benzo(ghi)perylene	2 / 3	300.00 - 440.00	ND	
Benzo(k)fluoranthene	2 / 3	800.00 - 1200.00	100.00 - 100.00	
Chrysene	2 / 3	390.00 - 700.00	89.00 - 89.00	
Fluoranthene	2 / 3	790.00 - 1300.00	110.00 - 170.00	
Fluorene	1 / 3	52.00 - 52.00	ND	
Indeno(1,2,3-c,d)pyrene	2 / 3	310.00 - 400.00	ND	
Phenanthrene	2 / 3	440.00 - 770.00	49.00 - 55.00	
Pyrene	2 / 3	680.00 - 990.00	110.00 - 170.00	
bis(2-Ethylhexyl)phthalate	1 / 3	96.00 - 96.00	ND	
Metals by CLP Methods (mg/kg)				
Aluminum	3 / 3	10300.00 - 13800.00	8680.00 - 13100.00	
Arsenic	3 / 3	5.90 - 21.10	6.60 - 9.20	
Barium	3 / 3	101.00 - 174.00	111.00 - 198.00	
Beryllium	3 / 3	0.71 - 0.85	0.62 - 1.00	
Calcium	3 / 3	2820.00 - 17900.00	2510.00 - 4090.00	
Chromium	3 / 3	14.80 - 19.90	11.60 - 17.50	
Cobalt	3 / 3	10.60 - 15.60	2.80 - 12.50	
Copper	3 / 3	14.20 - 24.60	9.20 - 16.40	
Iron	3 / 3	18400.00 - 24200.00	10500.00 - 17200.00	
Lead	3 / 3	20.40 - 24.90	33.90 - 45.50	
Magnesium	3 / 3	3540.00 - 7940.00	1740.00 - 2770.00	
Manganese	3 / 3	697.00 - 1240.00	414.00 - 1510.00	
Nickel	3 / 3	16.10 - 25.40	9.90 - 14.80	
Potassium	3 / 3	992.00 - 1160.00	913.00 - 1590.00	
Vanadium	3 / 3	27.30 - 35.20	19.60 - 34.30	
Zinc	3 / 3	71.00 - 75.00	43.00 - 81.00	
TPH by Method 418.1 (mg/kg)				
Total Petroleum Hydrocarbons	3 / 3	17.70 - 77.30	14.15 - 97.90	

No state or federal criteria available

ND - Not detected. Compound was not expected to be present; therefore, no background concentration was calculated.

U - Analyte was not detected. Value is quantitation limit.

CLP - Contract Lab Program

Table 4-8 Site 3, Section 3B Contaminant Summary - Subsurface Soil
ILANG, 182 Airlift Wing, GPRA, Peoria, Illinois

	Frequency of Detection	Range of Detected Concentrations	Range of Background Concentrations
Semi-volatile Organic Compounds by SW-846 Method 8270 (µg/kg)			
bis(2-Ethylhexyl)phthalate	2 / 5	50.00 - 122.00	ND
Metals by CLP Methods (mg/kg)			
Aluminum	5 / 5	6330.00 - 16200.00	2230.00 - 21300.00
Arsenic	5 / 5	2.90 - 20.30	1.30 - 23.10
Barium	5 / 5	46.60 - 158.00	16.50 - 158.00
Beryllium	4 / 5	0.41 - 0.79	0.66 - 0.71
Calcium	5 / 5	2370.00 - 47150.00	2890.00 - 146000.00
Chromium	5 / 5	12.55 - 19.30	7.90 - 23.50
Cobalt	5 / 5	5.40 - 10.70	4.00 - 7.80
Copper	5 / 5	9.90 - 15.90	8.80 - 23.10
Iron	5 / 5	9720.00 - 22000.00	8850.00 - 26400.00
Lead	5 / 5	7.10 - 26.10	6.80 - 21.40
Magnesium	5 / 5	3410.00 - 28550.00	3970.00 - 57600.00
Manganese	5 / 5	334.00 - 1170.00	243.00 - 654.00
Nickel	5 / 5	13.25 - 25.30	10.50 - 24.10
Potassium	4 / 5	528.00 - 1260.00	1380.00 - 1650.00
Sodium	1 / 5	227.00 - 227.00	219.00 - 561.00
Vanadium	5 / 5	18.00 - 31.40	9.00 - 40.80
Zinc	5 / 5	29.50 - 62.20	28.00 - 74.10
TPH by Method 418.1 (mg/kg)			
Total Petroleum Hydrocarbons	5 / 5	13.20 - 116.00	19.00 - 79.70

No state or federal criteria available

ND - Not detected. Compound was not expected to be present; therefore, no background concentration was calculated.

U - Analyte was not detected. Value is quantitation limit.

CLP - Contract Lab Program

Table 4-9 Site 3, Section 3B Contaminant Summary - Groundwater
ILANG, 182 Airlift Wing, GPRA, Peoria, Illinois

	Frequency of Detection	Range of Detected Concentrations	Range of Background Concentrations (BG-MW2)	IEPA Class I Groundwater Standards (µg/l)	Federal Drinking Water MCL (µg/l)	AWQC Ingestion of fish (µg/l)	AWQC Freshwater Chronic Criteria (µg/l)
Volatile Organic Compounds by SW-846 Method 8010 (µg/l)							
1,1,1-Trichloroethane	1 / 2	0.03 -	0.03	200.00	200	1030	11600
1,2-trans-Dichloroethylene	2 / 2	1.40 -	2.20	100.00	100	0.00185	21900
Trichloroethylene	1 / 2	0.31 -	0.31	5.00	5	80.7	
Volatile Organic Compounds by SW-846 Method 8020 (µg/l)							
1,2-Dichlorobenzene	1 / 6	0.27 -	0.27		600	26000	763
1,3-Dichlorobenzene	1 / 6	0.02 -	0.02	600.00	600	763	26000
Ethylbenzene	1 / 2	0.37 -	0.37	700.00	700	3260	32000
Semi-volatile Organic Compounds by SW-846 Method 8270 (µg/l)							
Benzoic Acid	1 / 2	32.00 -	32.00				
Metals by CLP Methods (µg/l)							
Aluminum	2 / 2	973.00 -	14500.00	4270.00 -		42800.00	
Arsenic	2 / 2	3.20 -	3.30	6.45 -	50	0.0175	
Barium	1 / 2	376.00 -	376.00	274.00 -	2000		
Beryllium	1 / 2	1.20 -	1.20	1.00 -	4	0.117	5.3
Chromium	1 / 2	19.00 -	19.00	9.55 -	100	3433000	210
Copper	1 / 2	7.00 -	7.00	4 U -	1300		12
Copper, Dissolved	1 / 2	4.60 -	4.60	4 U -			
Iron	2 / 2	671.00 -	9940.00	2715.00 -	300		1000
Lead	1 / 2	4.90 -	4.90	16.80 -	15	50	3.2
Manganese	2 / 2	385.00 -	507.00	528.00 -		100	
Manganese, Dissolved	2 / 2	416.00 -	418.00	124.00 -			
Vanadium	1 / 2	15.90 -	15.90	6.30 -			
TPH by Method 418.1 (mg/l)							
Total Petroleum Hydrocarbons	1 / 2	1.00 -	1.00	0.30 -			

¹No chronic criteria available. Value listed is acute criteria.

ND - Not detected. Compound was not expected to be present; therefore, no background concentration was calculated.

U - Analyte not detected. Value is quantitation limit.

CLP - Contract Lab Program

IEPA - Illinois Environmental Protection Agency

MCL - Maximum Contaminant Level

AWQC - Ambient Water Quality Criteria

Table 4-10 Site 3, Section 3C Contaminant Summary - Subsurface Soil
ILANG, 182 Airlift Wing, GPRA, Peoria, Illinois

	Frequency of Detection	Range of Detected Concentrations	Range of Background Concentrations
Semi-volatile Organic Compounds by SW-846 Method 8270 (µg/kg)			
Fluoranthene	1 / 9	37.00 - 37.00	ND
Phenanthrene	1 / 9	48.00 - 48.00	ND
bis(2-Ethylhexyl)phthalate	3 / 9	36.00 - 97.00	ND
Metals by CLP Methods (mg/kg)			
Aluminum	9 / 9	2910.00 - 17300.00	2230.00 - 21300.00
Arsenic	9 / 9	4.50 - 12.80	1.30 - 23.10
Barium	9 / 9	17.30 - 191.00	16.50 - 158.00
Beryllium	2 / 9	0.81 - 0.82	0.66 - 0.71
Calcium	9 / 9	2350.00 - 78400.00	2890.00 - 146000.00
Chromium	9 / 9	7.40 - 21.60	7.90 - 23.50
Cobalt	8 / 9	3.70 - 13.10	4.00 - 7.80
Copper	9 / 9	9.50 - 19.90	8.80 - 23.10
Iron	9 / 9	13000.00 - 25200.00	8850.00 - 26400.00
Lead	9 / 9	10.60 - 26.70	6.80 - 21.40
Magnesium	9 / 9	2800.00 - 35600.00	3970.00 - 57600.00
Manganese	9 / 9	254.00 - 967.00	243.00 - 654.00
Nickel	8 / 9	11.00 - 37.10	10.50 - 24.10
Potassium	8 / 9	1080.00 - 1980.00	1380.00 - 1650.00
Silver	1 / 9	6.20 - 6.20	2.5 U - 2.7 U
Sodium	9 / 9	140.00 - 241.00	219.00 - 561.00
Vanadium	9 / 9	9.60 - 34.30	9.00 - 40.80
Zinc	9 / 9	36.60 - 69.30	28.00 - 74.10
TPH by Method 418.1 (mg/kg)			
Total Petroleum Hydrocarbons	9 / 9	12.30 - 50.90	19.00 - 79.70

No state or federal criteria available

ND - Not detected. Compound was not expected to be present; therefore, no background concentration was calculated.

U - Analyte was not detected. Value is quantitation limit.

CLP - Contract Lab Program

Table 4-11 Site 3, Section 3C Contaminant Summary - Groundwater
ILANG, 182 Airlift Wing, GPRA, Peoria, Illinois

	Frequency of Detection	Range of Detected Concentrations	Range of Background Concentrations (BG-MW2)	IEPA Class I Groundwater Standards (µg/l)	Federal Drinking Water MCL (µg/l)	AWQC Ingestion of fish (µg/l)	AWQC Freshwater Chronic Criteria (µg/l)
Volatile Organic Compounds by SW-846 Method 8010 (µg/l)							
1,2-trans-Dichloroethylene	1 / 2	0.08 -	0.08	100.00	100	0.00185	11600
Trichloroethylene	1 / 2	0.13 -	0.13	5.00	5	80.7	21900
Volatile Organic Compounds by SW-846 Method 8020 (µg/l)							
Ethylbenzene	1 / 2	0.19 -	0.19	700.00	700	3260	32000 ¹⁾
Toluene	1 / 2	0.20 -	0.20	100.00	1000	424000	17500 ¹⁾
Metals by CLP Methods (µg/l)							
Aluminum	2 / 2	9045.00 -	14300.00	4270.00 -	42800.00		
Arsenic	1 / 2	3.55 -	3.55	6.45 -	7.20	0.0175	
Arsenic, Dissolved	1 / 2	3.55 -	3.55	3.40 -	3.40		
Barium	2 / 2	300.00 -	536.50	274.00 -	543.00		
Beryllium	1 / 2	2.60 -	2.60	1.00 -	2.70	0.117	5.3
Cadmium	1 / 2	5.25 -	5.25	U -	U	5	1.1
Chromium	2 / 2	6.30 -	6.35	9.55 -	41.50	100	3433000
Cobalt	1 / 2	14.10 -	14.10	7.05 -	12.40		
Iron	2 / 2	4870.00 -	9750.00	2715.00 -	14300.00	300	1000
Lead	2 / 2	6.20 -	17.90	16.80 -	16.80	15	3.2
Manganese	2 / 2	522.00 -	992.00	528.00 -	806.00	50	
Manganese, Dissolved	2 / 2	321.00 -	442.00	124.00 -	280.00	100	
Nickel	1 / 2	13.15 -	13.15	23.50 -	23.50		
Vanadium	2 / 2	11.25 -	13.70	6.30 -	8.65		
TPH by Method 418.1 (mg/l)							
Total Petroleum Hydrocarbons	1 / 2	1.10 -	1.10	0.30 -	0.70		

¹⁾No chronic criteria available. Value listed is acute criteria.

ND - Not detected. Compound was not expected to be present; therefore, no background concentration was calculated.

U - Analyte not detected. Value is quantitation limit.

CLP - Contract Lab Program

IEPA - Illinois Environmental Protection Agency

MCL - Maximum Contaminant Level

AWQC - Ambient Water Quality Criteria

Low concentrations of TCE, 1,2 t-DCE, ethylbenzene, and toluene were detected in the groundwater and are considered COPC. Total vanadium was detected above two times background concentrations but was nondetect in the dissolved phase. Total lead was detected below two times the background concentration, but above ARARs. Dissolved lead and beryllium were nondetect. Total cadmium, iron, and manganese were detected above IEPA Class I groundwater standards. No SVOCs were detected in the groundwater.

4.1.2 Exposure Assessment

This exposure assessment evaluates the potential for human exposure to contaminants present at, or released from, Sites 1, 2, and 3. An overview of general site conditions are presented, potentially exposed populations are discussed, and potential complete exposure pathways are identified.

4.1.2.1 Characterization of Exposure Setting

Site 1- Septic System Filter Beds

Site 1 is the former septic system filter bed for the facility. The site is located south of Building 3, approximately 75 ft west of the eastern facility boundary (see Figure 1-3). The filter beds were used between 1950 to the mid 1960s. The beds consisted of a 30 ft by 40 ft open bed underlain with sand and gravel. The effluent from a septic tank entered the open filter beds, filtered through the sand and gravel, and leached into the soil. In the mid 1960s, the open filter beds were filled and the area paved over. The site is now part of an asphalt parking area. The site is located in a secured area with limited access.

Site 2 - Grass Area Along the facility Boundary East of Aircraft Parking Apron

Site 2 is located along the fence line which marks the eastern boundary of the facility (see Figure 1-4). Solvents were reportedly used for weed control along this fence line. The

immediate area is vegetated with a thick stand of grass. A concrete aircraft parking apron is west of the site. A drainage ditch is east of the site between the facility boundary and a county road.

Site 3 - Grass Area West of Aircraft Apron and East of Fuel Truck Parking (and Area Adjacent to Facilities 6 and 23)

Site 3 (see Figure 1-5) consists of three separate sections where solvents may have been used for weed control. All of Site 3 is within facility boundaries where access is restricted. Section 3A is the location of a former fence line between Building 6 and a municipal hangar (now Building 23). The area was formerly grass-covered but is now gravel. Underground utilities run through Section 3A and there has obviously been excavation in this section. Section 3B is the grass area located west of the aircraft apron. Section 3B is located east of a vegetated drainage swale. The section is grass-covered and receives surface water runoff from the parking apron. Section 3C was originally a grass-covered area located behind two T hangars which were municipal property at the time. The section now consists of a grass-covered area, a portion of a concrete apron, and an asphalt shoulder. The ground surface surrounding Section 3C is paved primarily with concrete.

Drinking Water Supply and Site Groundwater

The water supply for the facility is provided by the Illinois American Water Company. The source for this water is the Sankoty Sand aquifer tapped by wells more than three miles east and southeast of the facility. Based on information in the PA and geologic information collected during this SI, the aquifer does not underlie the facility. (Engineering-Science, 1990)

The depth to shallow groundwater at the facility is 2- to 7- ft bgs. Groundwater flow direction is south-southeast. The majority of the residential population surrounding the facility purchase water from the Illinois American Water Company for domestic use. One private residential well was noted on the southern side of the GPRA (ES, 1990). According to the Illinois State Water Survey, the nearest down-gradient groundwater well is a commercial well located 1.1 miles to the south. This well draws groundwater from a depth of 73 ft bgs. The water from

the well is used during weekend recreation 6 months of the year. (P. Rabe, 1994) Municipal and industrial supply wells are located within three miles of the facility. The majority of these wells withdraw water from either the Sankoty Sand or alluvium within the Illinois River Valley at a depth of 60 to 90 ft below land surface. According to the PA, the relationship between the municipal wells and the surficial aquifer at the facility has not been established.

Surface Waters

The largest surface water body is the Illinois River, located three miles down-gradient of the facility. The Illinois River is used for recreation and for propagation of fish and wildlife.

A drainage swale is located east of Site 2 between the facility boundary and the county road. This swale collects runoff from both the facility and the county road. Section 3B of Site 3 is located adjacent to a drainage swale which receives runoff from the aircraft parking apron. Both swales discharge to the east branch of Lamarsh Creek, which eventually flows 7.5 miles until discharging into the Illinois River. Figure 1-8, Section One, shows the surface water flow on the facility.

4.1.2.2 Exposure Pathways

Exposure pathways are evaluated based on COPC, migration pathways of COPC, and location of potential receptors. A summary of identified exposure pathways is presented in the following paragraphs.

Site 1 - Septic System Filter Beds

Exposure to Contaminated Soil

Access to the facility is controlled and restricted to facility personnel and maintenance workers. The entire site is paved. No exposure to surface soils is anticipated unless construction activities occur in the future which expose surface soil for receptor contact.

Workers may be exposed to subsurface soils in the future should any excavation activities take place at the site. Exposure durations are expected to be brief and infrequent. Exposure pathways of COPC include dermal absorption and incidental ingestion of COPC from subsurface soil and inhalation of contaminated dust and low levels of VOCs.

Exposure to Contaminated Groundwater

The facility receives drinking water from the Illinois American Water Company and there is no groundwater use on the facility. Commercial and residential wells are located hydraulically down-gradient of the site. The down-gradient monitoring well S1MW1 is located adjacent to the facility boundary. Vinyl chloride, dichlorobenzene, and benzoic acid were detected in this well. If off-site down-gradient wells were impacted, potential routes of exposure would include ingestion of drinking water contaminated with COPC, dermal absorption of COPC through washing and bathing, and inhalation of VOCs while showering.

Exposure to Surface Water Contamination

Surface water runoff of surface soils at Site 1 is not a potential migration pathway, since the site is paved. A potential exposure route from Site 1 is via water seeps (shallow groundwater breakout) outside of the facility boundaries. This SI did not include any off-site observations or sampling, therefore, the presence or absence of such seeps cannot be verified.

Site 2 - Grass Area Along the Base Boundary East of Aircraft Parking Apron

Exposure to Soil Contamination

Site 2 is a grass-covered area. Workers may be exposed to surface soil during vegetation control activities at the site. Exposure frequency would be seasonal and infrequent. Exposure pathways include incidental ingestion of contaminated surface soil and dermal absorption of COPC from surface soils. Inhalation of contaminated surface soil dust is expected to be minimal. Inhalation of VOCs is expected to be minimal because of low detection and frequency of VOCs (i.e., methylene chloride).

Exposure to subsurface soil contamination could occur during any excavation activities in the area. Exposure would be brief and infrequent. Exposure pathways are similar to those identified for surface soil exposure (ingestion, dermal absorption, and dust inhalation).

Exposure to Groundwater Contamination

There is no groundwater use on the facility. A commercial and residential well are located down-gradient of the site. If off-site down-gradient wells were impacted, potential routes of exposure would include ingestion of drinking water contaminated with COPC, dermal absorption of COPC through washing and bathing, and inhalation of VOCs while showering.

Exposure to Surface Water Contamination

A drainage swale is located adjacent to Site 2. This swale collects runoff from the facility and the county road. Surface water runoff from the soils at Site 2 may impact the drainage swale. The contaminants present in the surface soils, primarily PNA compounds, are likely to remain in the soils, based on the TCLP analysis performed on soil cuttings from borings and the characteristics of the contaminants. Eroded contaminated soil may be deposited downstream.

Site 3 - Grass Area West of Aircraft Apron and East of Fuel Truck Parking (and area adjacent to Facilities 6 and 23)

Section 3A is covered by gravel and workers will not normally be exposed to surface soil. Workers may be exposed to surface soils at Section 3B and a portion of Section 3C during control of vegetation at the site. Exposure is seasonal and infrequent at this site. Inhalation of contaminated surface soil dust at Section 3B is expected to be minimal.

Workers may be exposed to subsurface soils in the future should any excavation activities take place at the site. Exposure durations are expected to be brief and infrequent. Exposure pathways of COPC include dermal absorption and incidental ingestion of COPC from subsurface soil and inhalation of contaminated dust or VOCs.

Exposure to Contaminated Groundwater

The facility receives drinking water from the Illinois American Water Company and there is no groundwater use on the facility. While the majority of residences receive water from the municipal supply, at least one commercial well is located down-gradient of the site. Exposure to groundwater contaminants could occur if contaminated groundwater migrates off-site and impacts down-gradient potable wells or discharges to a nearby surface water body. 1,2 t-DCE, TCE, ethylbenzene, and toluene were detected in well 3CMW1, which is most down-gradient from the site.

Exposure to Contaminated Surface Water

A drainage swale is present at Site 3. This swale receives the runoff from the parking apron, in addition to runoff from the grass-covered areas of Site 3. Surface water runoff from the soils at Site 3 may impact the drainage swale. The contaminants present in the surface soils, primarily PNA compounds, will likely remain in the soils, based on contaminant characteristics. Eroded contaminated soil may be deposited downstream.

Surface water seeps from the groundwater may be an additional source of surface water contamination. This SI did not include any off-site observation or sampling, therefore, the presence or absence of such seeps cannot be verified.

4.1.3 Toxicity Assessment

Because no quantitation of risk is being performed as part of this SI, no toxicity values have been included.

Although many chemicals are either known or suspected to cause cancer in humans, there are varying degrees of confidence in the weight of evidence for carcinogenicity of a given chemical. The USEPA's weight of evidence classification includes the following five categories:

Group A - Known Human Carcinogen

Group B - Probable Human Carcinogen, based on human epidemiological studies (Group B1) or evidence of carcinogenicity in animals (Group B2)

Group C - Possible Human Carcinogen

Group D - Not Classified

Group E - Evidence of Non-Carcinogenicity to Humans

The weight of evidence classification for carcinogenicity for the COPC identified as Group A, B, or C has been included in Tables 4-12 and 4-13.

4.1.4 Risk Screening

For this PRE, the screening consists of a comparison of environmental concentrations with existing state and federal criteria and standards, a screening of risk based on potentially complete exposure pathways, and the toxicity of the COPC. No ARARs for soil have been promulgated by the IEPA. Therefore, a screening using ARARs comparisons cannot be completed for soils. Concentrations which would cause a 10^{-6} cancer risk or a noncarcinogenic risk of 1 were calculated using default equations and parameters from Volume 1 Part B Risk Assessment Guidance for Superfund (EPA, 1991). The equations are designed to allow a quick determination of concentrations which could pose a health threat under standard scenarios. The pathways screened include ingestion and inhalation of groundwater by residential receptors and ingestion of soil by residential receptors. Residential receptors provide the most conservative health screening.

Table 4-12 Carcinogenic Classifications and Intake Estimates - Groundwater
ILANG, 182 Airlift Wing, GPRA, Peoria, Illinois

Compound/Analyte	Cancer Group	Ingestion and Inhalation	
		Cancer Intake ¹⁾ ($\mu\text{g}/\ell$)	Non Carcinogenic ²⁾ Intake ($\mu\text{g}/\ell$)
Cadmium	B1	ND	4
1,2, t DCE			-
vinyl chloride	A	.028	-
benzoic acid			31,000
butyl benzyl phthalate			
manganese			363,500
mercury			5.84×10^7
trichlorethene	B2	1.62	1.045×10^6
ethylbenzene			30,740
pyrene			1.14×10^6
1,1,1 TCE			30,040
1,2 dichlorobenzene			152,000
1,3 dichlorobenzene			152,000
toluene			59,340
lead	B2	ND	ND
iron			ND

Notes:

- RfD (Reference dose) not available.

1) Intake = $(1.7 \times 10^{-4}) / \{2(\text{oral slope factor}) + 7.5(\text{inhalation slope factor})\}$

2) Intake = $73 / \{12(\text{oral chronic RfD}) + 7.5(\text{inhalation chronic RfD})\}$

DCE - Dichloroethylene

TCE - Trichloroethene

ND - no data

ARARs for this PRE include: National Drinking Water Regulations, USEPA Health Advisories, Illinois EPA Class I Groundwater Standards, and Ambient Water Quality Criteria (AWQC) for ingestion of fish and protection of aquatic life. A comparison of contaminant concentrations with existing standards was presented earlier in Tables 4-1 through 4-11. Intake estimates were presented previously in Tables 4-12 and 4-13.

Table 4-13 Intake Estimates and Cancer Classifications - Soil
ILANG, 182 Airlift Wing, GPRA, Peoria, Illinois

Compound/Analyte	Cancer Group	Soil Ingestion	
		Cancer Intake ¹⁾ (mg/kg)	Non Carcinogenic ²⁾ Intake (mg/kg)
arsenic	A	.355	81
2-butanone			
cadmium	B1	ND	135
lead	B2	ND	
acenaphthene			16,200
anthracene			81,000
benzo (a) anthracene	B2	0.88	8,100
benzo (b) fluoranthene	B2	0.88	8,100
benzo (a) pyrene	B2	0.088	8,100
benzo (g,h,i) perylene			8,100
benzo (k) fluoranthene	B2	8.8	8,100
chrysene	B2	8.8	8,100
di-n-octyl phthalate			5,400
dibenzo (a,h) anthracene	B2	0.088	8,100
dibenzo furan			-
fluoranthene			10,800
fluorene			10,800
indeno (1,2,3-c,d) pyrene	B2	.88	8,100
phenanthrene			8,100
pyrene			1,163
2-methylnaphthalene			8,100
butyl-benzyl-phthalate			54,000
di-n-butyl-phalate			27,000
naphthalene			8,100

Notes:

ND - no data

- RfD (Reference dose) not available.

1) Intake = 0.64/(oral slope factor × EPP)

2) Intake = 2.7×10^5 (oral chronic reference dose)

EPP = potential potency of PAHs relative to benzo(a)pyrene

EPP benzo(a)anthracene = 0.1 chrysene = 0.001
 benzo(b)fluoranthene = 0.1 dibenz(a,h)anthracene = 1.0
 benzo(k)fluoranthene = 0.01 indeno(1,2,3-c,d)pyrene = 0.1

4.1.4.1 Site 1 - Septic System Filter Beds

Metals present in the soil will tend to remain adsorbed to the soil, rather than leaching to the groundwater, as based on the TCLP results of soil cuttings from borings. PNA compounds, based on their chemical characteristics, will also tend to remain adsorbed to the soil. No current soil exposure pathways are complete, since the site is asphalt-covered. Should the pathway become complete in the future, a health risk could occur through contact with carcinogenic PNA compounds.

Two rounds of groundwater sampling were performed at the site. VOC and SVOC concentrations present in groundwater do not exceed IEPA or federal groundwater standards. Vinyl Chloride, a Class A carcinogen, was detected above the level contributing to a 10^{-6} cancer risk but below the IEPA Class I groundwater standard of $2.0 \mu\text{g}/\ell$. Total iron, lead, and manganese were detected above the IEPA Class I groundwater standards.

4.1.4.2 Site 2 - Grass Area Along the Base Boundary East of Aircraft Parking Apron

The PNA compounds detected in the soils are expected to adsorb into the soil and not leach significantly to the groundwater. No groundwater was collected from this site, however, groundwater data from Sites 1 and 3 confirms the lack of PNA compounds mobility in the soils at the facility.

The concentrations of carcinogenic PNA compounds are below the concentration which would indicate the potential for a 10^{-6} health risk should exposure occur, with the exception of one detection of benzo(a)pyrene in the surface soil.

4.1.4.3 Site 3 - Grass Area West of Aircraft Apron and East of Fuel Truck Parking (and area adjacent to Facilities 6 and 23)

Metals present in the soil will tend to remain adsorbed to the soil, rather than leaching to the groundwater. PNA compounds detected in the soil are also expected to remain adsorbed to the soil. No PNA compounds were detected in the groundwater at the site, confirming this lack of mobility.

Two rounds of groundwater sampling were performed at the site. TCE was detected above IEPA Class I groundwater standards (5 ppb) in 3AMW1. The level of TCE detected is above the concentration of 1.62 ppb which is the level for unacceptable cancer risk for residential use of groundwater. No other VOCs were detected above ARARs. No SVOCs were detected above ARARs in Site 3 monitoring wells. Total cadmium, iron, lead, and manganese were detected in one or more of the Site 3 wells at concentrations above IEPA Class I groundwater standards.

4.2 ECOLOGICAL RISK EVALUATION

This subsection provides a preliminary evaluation of risks to the natural environment posed by chemicals in environmental media at Site 1, Site 2, and Site 3. This information, in conjunction with the preliminary human health evaluation and other information presented in the SI report, will be used to assist in the determination of appropriate future action at the facility.

This qualitative ecological PRE includes a summary of analytical data used in the evaluation, identification of potential ecological receptors and pathways, ecotoxicity assessment, and an ecological hazard assessment.

4.2.1 Summary of Analytical Data Used in the Ecological PRE

Site 1 - Septic System Filter Beds

Subsurface and groundwater samples were collected at Site 1. PNA compounds and metals are the primary contaminants in the subsurface soil. VOCs, SVOCs, and metals were detected in the groundwater. The contaminant frequency was presented previously in Tables 4-1 through 4-2.

Site 2 - Grass Area Along the Base Boundary East of Aircraft Parking Apron

Surface and subsurface soil samples were collected at Site 2. PNA compounds are the primary contaminants for both. No groundwater samples were collected at Site 2. The contaminant frequency was presented earlier in Tables 4-3 and 4-4.

Site 3: Grass Area West of Aircraft Apron and East of Fuel Truck Parking Area (and area adjacent to Facilities 6 and 23)

Surface, subsurface, and groundwater samples were collected at Site 3. Contaminant frequencies were presented previously in Tables 4-5 through 4-11. The surface soils in Section 3B contain primarily PNA compounds. Subsurface soils in Section 3A contain no COPC. COPC for Section 3B subsurface soils include BEHP. Section 3C COPC includes silver, PNA compounds, and BEHP.

4.2.2 Identification of Potential Receptors

Much of the facility is developed and consists of parking areas, runways, clear zones for the runways, equipment storage areas, and buildings. These areas either have very little vegetation or are maintained as lawns.

The only surface water bodies present on the facility are drainage swales which receive runoff from the facility. These swales provide no significant ecological habitat.

4.2.2.1 Site 1 - Septic System Filter Beds

No surface water bodies exist at Site 1. Surface drainage flows into a normally wet drainage swale, which ultimately discharges into the east branch of Lamarsh Creek, more than three miles from the facility. The ground surface in the immediate area of Site 1 is paved with asphalt. No vegetation is present at the site. The swale provides no significant habitat for macroinvertebrates, amphibians, or fish. The presence of a well traveled road limits the number of terrestrial organisms associated with the swale. Ecological receptors are expected to include terrestrial anthropods such as insects and spiders and small mammals such as the meadow mole. Migratory birds may be occasional visitors to the site.

4.2.2.2 Site 2 - Grass Area Along the Base Boundary East of Aircraft Parking Apron

A drainage swale is located adjacent to Site 2. Ground cover in the immediate area surrounding Site 2 is mowed turf grass. A concrete parking apron is adjacent to the site. The area has limited habitat for wildlife. Terrestrial organisms which may use the area include primary consumers, such as mice, predators such as lizards or hawks, and omnivores, such as crows.

4.2.2.3 Site 3 - Grass Area West of Aircraft Apron and East of Fuel Truck Parking (and area adjacent to Facilities 6 and 23)

A drainage swale is located adjacent to Section 3B. The swale is wet only during periods of rain. This swale collects runoff from the parking apron. The swale provides no significant habitat for aquatic organisms. The majority of the area surrounding Site 3 is a concrete parking apron. There is limited grass in the area for wildlife. Ecological receptors are expected to include terrestrial anthropods such as insects and spiders and small mammals such as the meadow mole. Migratory birds may be occasional visitors to the site.

4.2.3 Ecological Exposure Pathways

Aquatic and terrestrial organisms may be exposed to chemicals in environmental media via several pathways. Aquatic organisms may be exposed via direct contact with, including ingestion of, surface water and sediment, as well as consumption of contaminated aquatic plants. Terrestrial organisms may be exposed to chemicals via ingestion of and/or dermal contact with surface soils, as well as through the food chain.

4.2.3.1 Site 1 - Septic System Filter Beds

The site is paved; therefore, no pathway is present for exposure by environmental receptors to surface or subsurface soils unless the land use changes. No surface water bodies are present at the facility, other than two drainage swales and no known aquatic receptors exist. No potential exists for exposure to the groundwater.

4.2.3.2 Site 2 - Grass Area Along the Base Boundary East of Aircraft Parking Apron

Terrestrial organisms may come into contact with surface soils at Site 2 through ingestion of and dermal contact with surface soils. Contact with subsurface contaminants may occur through the consumption of contaminated vegetation and burrowing. The PNA compounds present in the soil will tend to adsorb strongly to the soils and not leach to a significant extent.

4.2.3.3 Site 3 - Grass Area West of Aircraft Apron and East of Fuel Truck Parking (and area adjacent to Facilities 6 and 23)

Terrestrial organisms may come into contact with surface soils at Site 3 through ingestion of contaminated soil and dermal contact with surface soils. Contact with subsurface

contaminants may occur through the consumption of contaminated vegetation and burrowing. There is no potential for exposure to groundwater other than through discharge of groundwater to the swale via seeps. No surface water bodies, other than a drainage swale, exist at the facility and no known aquatic receptors are present.

4.2.4 Ecological Hazard Assessment

This section qualitatively characterizes the risk to aquatic and terrestrial receptors potentially exposed to chemicals at Sites 1, 2, and 3. The concentrations detected in the groundwater at each site have been compared to the AWQC protection of aquatic life. Only the dissolved analyte concentrations were used in the hazard assessment. The soil concentrations detected at the sites have been compared to the available TCLP data from cuttings of soil borings as an indication of the concentration available for plant uptake.

Site 1 - Septic System Filter Beds

The ecological hazard associated with the soils at Site 1 is considered small. The site is paved; therefore, exposure is limited to subsurface soils. No significant exposure to subsurface soils is likely.

The potential risk to plants and animals from the groundwater is also considered to be low because the pathway is probably incomplete. Contaminants present in the groundwater are within levels considered protective of aquatic life. If they were released to surface water in an undiluted form they would not present a threat to aquatic organisms.

Site 2 - Grass Area Along the Base Boundary East of Aircraft Parking Apron

The hazard associated with the soils at Site 2 is considered minimal. The contaminants present will not readily leach and become available for plant uptake. No groundwater samples were collected from Site 2, however the PNA compounds present in the soils at Site 2 will likely remain adsorbed to the soil.

Site 3 - Grass Area West of Aircraft Apron and East of Fuel Truck Parking (and area adjacent to Facilities 6 and 23)

The ecological hazard associated with Site 3 is considered minimal. The area is covered with gravel; therefore, no direct surface exposure pathway is available. No significant exposure to subsurface soils is likely. The potential risk to plants and animals from the groundwater is minimal because the pathway is probably incomplete.

4.3 SUMMARY OF THE PRELIMINARY HUMAN HEALTH AND ECOLOGICAL EVALUATION

Site 1 - Septic System Filter Beds

Contaminants detected at Site 1 and considered to be of potential concern include cadmium, lead, mercury, 2-butanone, and SVOCs(PNA compounds). The contaminants present in the groundwater are at low concentrations which do not exceed ARARs. Vinyl chloride, a Class A carcinogen, was detected below ARARs but above the level contributing to a 10^{-6} cancer risk. The contaminants present in the subsurface soils are primarily PNA compounds which have not migrated to the groundwater. TCLP results from soil cuttings during drilling of Site 1 borings indicate the metals present in the soil will tend to remain adsorbed to the soil rather than leaching to the groundwater. Based on this evaluation, there does not appear to be any immediate threats to human health.

The risk to terrestrial ecological receptors is considered minimal since the majority of pathways are incomplete. The levels of contaminants detected in the groundwater (dissolved phase for inorganics) are within the range considered to be protective of aquatic life if discharged directly to surface waters.

Future exposure of human receptors to contaminated groundwater may occur if contaminants migrate to off-site wells. The monitoring well at Site 1 is located in close proximity to the facility boundary. The nearest down-gradient well is a commercial well used during weekend recreation. This well is located 1.1 miles to the south of the facility.

Site 2 - Grass Area Along the Base Boundary East of Aircraft Parking Apron

Contaminants detected at Site 2 and considered to be COPC are SVOCs (i.e., PNA compounds). While no groundwater samples were obtained from Site 2, information from Sites 1 and 3 indicate that the PNA compounds present in the soils throughout the facility show little potential for migration to the groundwater. Based on this evaluation, there does not appear to be any immediate threats to human health or the environment from the contaminants present at Site 2.

Site 3 - Grass Area West of Aircraft Apron and East of Fuel Truck Parking (and area adjacent to Facilities 6 and 23)

Contaminants present at Site 3 and considered to be COPC include arsenic, silver, and SVOCs in the soil, and total lead, manganese, iron, cadmium, and VOCs in the groundwater. SVOCs, primarily PNA compounds, were detected in the soil, but not in the groundwater. Chlorinated VOCs were detected in the groundwater, but not in the soil. The surface soils in Section 3B contain elevated levels of PNA compounds. Current exposure to the PNA compounds is possible through ingestion, absorption, or inhalation pathways, although the extent of exposure is likely minimal because the area is grass-covered and receptor exposure is infrequent. Some of the detected PNA compounds in the surface soil are carcinogens; however, the concentrations are below that which would cause a 10^{-6} cancer risk from incidental ingestion, with the exception of two detections of benzo(a)pyrene in Section 3C. Based on this evaluation, there does not appear to be a health threat from the soils which would require immediate action.

TCE was detected in all Site 3 groundwater monitoring wells. TCE detections from Section 3A (first round) were above IEPA Class I groundwater standards and above screening concentrations considered unacceptable for cancer risk from ingestion and inhalation of contaminants from groundwater. There is no groundwater use at the facility. Based on the Illinois State Water Survey, the nearest down-gradient well is located 1.1 miles south of the facility. The groundwater flow velocity at Site 3 is an estimated 1.33 ft per year; therefore, no immediate threat to down-gradient wells appears to be present.

The levels of contaminants detected in the groundwater are within the range considered to be protective of aquatic life if discharged directly to surface waters (based on AWQC Fresh Water Chronic Criteria), with the exception of the total cadmium and lead. The corresponding dissolved metals are below the MDL.

5.0 SUMMARY, CONCLUSIONS AND RECOMMENDATIONS

An SI has been conducted under the IRP at the 182nd FG, Illinois Air National Guard, GPRA, Peoria, Illinois. Field investigations supporting the SI ran from November 1992 to April 1993 and consisted of data gathering to:

- Confirm or deny the existence of suspected environmental contamination at the sites under investigation, and if possible, or necessary, define the nature and extent of the environmental contaminants
- Qualitatively evaluate the potential risks to human health and the environment.

Field screening and confirmation/delineation activities included analysis of soil gas, surface and subsurface soils, groundwater samples, and the collection of geologic and hydrogeologic descriptions and measurements. The summary, conclusions, and recommendations obtained from the SI activities are included in the following sections.

5.1 SUMMARY AND CONCLUSIONS

Three sites were investigated during this SI; Site 1: Septic System Filter Beds, Site 2: Grass Area Along the Facility Boundary East of Aircraft Apron, and Site 3: Grass Area West of Aircraft Apron and East of Fuel Truck Parking Area (and area adjacent to Building 23 and 6). This section presents a summary of the data collected for each site and the conclusions reached during the investigation. The results of the qualitative risk evaluation are included in this summary.

5.1.1 Facility Geology and Hydrogeology

The geologic units investigated during the field activities are the clay-rich sediments of the Pleistocene-aged glacial tills underlying central Illinois. Bedrock beneath the facility consists of Pennsylvanian-aged sedimentary rock. The glacial sediments are from 28 to 29.5 ft thick and range in composition from clay to clayey sand. Groundwater occurs within the shallow aquifer at depths ranging from approximately 2 to 7.5 ft bgs. Groundwater flow is to the south beneath the facility.

5.1.2 Quality Assurance/Quality Control

A detailed QA/QC program was instituted to ensure the sampling and analysis conducted during the SI were representative of the sites under investigation. A review of these procedures and the control data indicate, in general, the objectives outlined by the PARCC parameters have been met. However, some samples failed to meet required QA criteria. Several samples failed the required laboratory QC requirements which resulted in the validation of affected compounds as R, indicating unreliable data. Several compounds detected in trip, equipment, and laboratory blanks may be attributed to sample handling, transportation, storage or analytical procedures. The presence of these compounds does not adversely affect the usefulness of the associated analytical data.

5.1.3 Site 1: Septic System Filter Beds

Activities at Site 1 consisted of soil gas and groundwater screening, drilling of 5 soil borings with the submittal of 22 soil samples for laboratory analysis, the installation of 1 groundwater monitoring well and collection of 2 rounds of groundwater samples (January 1992 and April 1993).

Results for Site 1 indicate that the material within the septic filter beds contains organic compounds (PNAs) indicative of waste fuels and oils. Soil borings drilled around the perimeter of the filter beds also contained PNAs in the shallow subsurface soil samples. 2-butanone was the only VOC detected in the soil samples. Cadmium, lead, and silver were detected in the soils around the perimeter of the filter bed at concentrations greater than two times the maximum background concentration.

No organic compounds were detected above the IEPA Class I groundwater standards in samples collected from the down-gradient monitoring well installed at Site 1. Low concentrations of vinyl chloride ($1.2 \mu\text{g}/\ell$ Round II only) and benzoic acid ($1.7 \mu\text{g}/\ell$ Round I only) were detected. No source for the organics were identified from Site 1 soils. Total lead ($13 \mu\text{g}/\ell$) was detected in the first round of sampling. This concentration is above the Class I standard ($7.5 \mu\text{g}/\ell$) and below the federal MCL ($15 \mu\text{g}/\ell$). No dissolved lead was detected in any of the filtered samples.

The PRE at Site 1 indicates that no immediate endangerment to human health or the environment exists from contaminants present at Site 1. The site is asphalt-covered and no current exposure to contaminated soils is possible. A future health risk could occur during excavation activities at the site through possible contact with soils containing carcinogenic PNA compounds. Vinyl chloride was detected above the calculated groundwater intake concentration considered unacceptable for cancer risk, but below the IEPA Class I groundwater standard. The down-gradient well is adjacent to the facility boundary and it is possible that the contaminants have migrated off-site. According to Illinois State Water Survey data, the nearest water supply well is a commercial well (used for recreational activities) located 1.1 miles to the south.

5.1.4 Site 2: Grassy Area Along the Base Boundary East of Aircraft Apron

Activities at Site 2 consisted of soil gas and groundwater screening, and drilling of 3 soil borings with submittal of 6 soil samples for laboratory analysis. No groundwater monitoring wells were installed at Site 2 due to difficulties in obtaining right-of-way access.

The data collected during the SI indicate that past waste disposal practices do not appear to have adversely impacted the surface and subsurface soils at Site 2. No VOCs were detected in the surface or subsurface soils, other than methylene chloride. Surface soils from 2SB2 contained PNA compounds at concentrations of 1470 $\mu\text{g}/\text{kg}$ (carcinogenic PNA) and 860 $\mu\text{g}/\text{kg}$ (noncarcinogenic PNA). Concentrations of PNA compounds were detected below MDLs in the subsurface soils. No inorganics other than magnesium and calcium, which are commonly occurring elements in soils, were detected in soil samples at concentrations greater than two times the background concentration.

The PRE indicates that the PNA compounds present in the soil at Site 2 would pose little health threat if exposure occurred. The detected concentrations of carcinogenic PNA compounds are below the concentration which would indicate a 10^{-6} health risk under a residential exposure (worst case) scenario, with the exception of one detection of benzo(a)pyrene.

The PNA compounds detected in the soils are expected to adsorb to the soil and not leach significantly to the groundwater. Although no groundwater was collected from Site 2, nearby groundwater data from Sites 1 and 3 suggests the lack of PNA mobility in all soils at the facility.

5.1.5 Site 3: Grass Area West of Aircraft Apron and East of Fuel Truck Parking Area (and area adjacent to Facility 23 and 6)

Three areas (Sections 3A, 3B, and 3C) within Site 3 were investigated to determine the environmental impact of past waste disposal practices on the soil and groundwater occurring beneath the site. Activities included drilling of 8 soil borings with the submittal of 20 soil samples for laboratory analyses, the installation of 3 monitoring wells and collection of two rounds (January 1992 and April 1993) of samples from each well.

Section 3A

No significant soil contamination was detected at Site 3 Section 3A. Initial soil gas results suggested the presence of toluene, but no VOCs were detected in the analytical laboratory samples. Concentrations of PNAs below the MDLS were detected in one surface soil sample. No priority pollutant metals were detected at concentrations greater than two times the background concentration.

Two rounds of groundwater sampling and analysis indicated the presence of organic compounds in the Section 3A monitoring well, the source of which does not appear to have originated from Section 3A, based on the soil analytical results.

TCE (8 $\mu\text{g}/\ell$) was detected above IEPA Class I groundwater standard of 5 $\mu\text{g}/\ell$, but it was not detected in the subsequent sampling round. Low concentrations of ethylbenzene, 1,2 DCE, and benzoic acid were also detected in the initial sampling round only. No dissolved metals were detected at concentrations greater than two times the background concentration.

The PRE for Section 3A indicates that no immediate endangerment to human health or the environment exists due to the presence of chemicals in the soil or groundwater. The concentration of TCE detected in the initial sampling round is above the intake concentration

indicative of a 10^{-6} cancer risk for residential use (worst case) of groundwater; however, TCE was not detected in the subsequent sampling round.

Based on the results outlined above, past disposal practices do not appear to have impacted the soil in Section 3A. The organic compounds detected in the groundwater were not tied to a source during the SI and do not appear to have originated from Section 3A.

Section 3B

Initial soil gas results suggested the presence of organic compounds in the soil. No VOCs were confirmed in laboratory analysis of soils. Laboratory analysis of soils indicated the presence of PNAs, bis 2-ethylhexyl phthalate, and arsenic.

Groundwater screening results suggested the presence of chlorinated organic compounds in the groundwater. Low concentrations of chlorinated organics, ethylbenzene, and benzoic acid were confirmed in the laboratory analysis of groundwater samples. The source of the organic compounds does not appear to have originated from Section 3A, based on the soil analytical results.

The PRE at Section 3B indicates that no immediate endangerment to human health or the environment exists due to the presence of chemicals in the soil or groundwater at the site. Current exposure to surface soils is possible during vegetative control activities; however, the extent of exposure is minimal since the area is grass-covered. The concentrations detected in the soil are below concentrations indicative of a 10^{-6} unacceptable cancer risk (should exposure occur) with the exception of two detections of benzo(a)pyrene. The low concentrations of VOCs present in the groundwater are below IEPA Class I standards and below levels considered unacceptable for cancer risk from residential use (worst case) of the groundwater.

Based on the data collected during the SI, Section 3B soils do not appear to have been impacted by past disposal activities. The source of the organic compounds detected in the groundwater was not identified during the SI, but apparently is not located in Section 3B.

Section 3C

Initial soil gas screening suggested the presence of TCE in the soil gas. Laboratory analysis indicated no detected VOCs in soils from Section 3C. PNA compounds below the MDL were identified in one soil sample. One occurrence of silver was identified above two times the background soil concentration.

Low concentrations of TCE, ethylbenzene, and toluene were detected in the initial round of groundwater sampling, but were not detected in the second round. 1,2 DCE was detected at concentrations below the MDL in the second sampling round. All detections were well below the IEPA Class I groundwater criteria.

The PRE for Section 3C indicates that no immediate endangerment to human health or the environment exists due to the presence of chemicals in the soil or groundwater at the site. The low concentrations of PNA present in the subsurface soil do not pose a health or ecological risk to receptors. The concentrations of VOCs detected in the groundwater are well below the concentrations which would suggest unacceptable carcinogenic or noncarcinogenic risks from exposure to the groundwater.

Previous activities at Section 3C do not appear to have impacted the soil. No source was identified for the VOCs present in the groundwater, but Section 3C does not appear to be the source location.

5.2 RECOMMENDATIONS

The limited groundwater investigation, consisting of two rounds of groundwater sampling, indicates the presence of low concentrations of VOCs (vinyl chloride, 1,2 trans DCE) in the groundwater. Other VOCs (including TCE, ethylbenzene, toluene) were detected in the initial round but were not detected in the second round. A third round of groundwater sampling is recommended to further characterize the compounds present in the groundwater. No source of the VOCs was identified during the SI. Potential source areas should be investigated, and the vertical and lateral extent of apparent soil and/or groundwater contamination should be determined.

A RI is recommended for the Site 1 soils. This recommendation is based on the presence of high concentrations of the more carcinogenic PNA compounds in the subsurface soil and the shallow (2 to 7.5 ft) depth to groundwater at the facility. While PNA compounds as a class are generally immobile, the depth to groundwater in the Site 1 area (approximately 2 ft bgs) suggests that the compounds would not have to be extremely mobile to adversely affect the groundwater. Additionally, the high concentrations of PNA compounds in the soil could pose a health threat from the direct contact pathway if the soils became exposed in the future. Additional soil analytical data should be collected in order to better define the extent of contamination around the filter bed. Additional investigation is recommended to determine the source area of the vinyl chloride detected in 1MW1.

No additional investigation activities are recommended for the soils at Site 2. PNA compounds were detected above the MDL in one surface soil sample at Site 2. Overall, the concentrations of both carcinogenic and noncarcinogenic PNA compounds are below the concentrations indicative of a potential health risk.

Concentrations of PNA compounds detected in the surface or subsurface soils at Site 3 (Sections 3A, 3B, and 3C) are below the concentrations indicative of a potential health risk with the exception of two detections of benzo(a)pyrene in the surface soil of Section 3B. No

PNA compounds were detected in the subsurface oil of Section 3B. No further investigation activities are recommended for the soils at Site 3 - Section 3A, 3B, and 3C.

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