Addendum to the ESI Field Sampling Plan, Health and Safety Plan, and Quality Assurance Project Plan for the Parcel F9 Investigation Former Griffiss Air Force Base, Rome, New York

Contract No. DACW41-99-D-0005
Work Authorization Directive 07

July 1999

Prepared for:

U.S. ARMY CORPS OF ENGINEERS
Kansas City District
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Response to New York State Department of Environmental Conservation
Comments Dated June 16, 1999
for the Parcel F9 Tables and Figures
Former Griffiss Air Force Base
Rome, New York

1. **Comment:** General: The cover letter accompanying the transmittal of this document states that the tables represent "*...the work required in order to alleviate all regulatory sampling concerns*"; however, as stated during the May 26th meeting, it is impossible to predict accurately the final number of samples which will be necessary to characterize the site, as future sampling may be indicated depending upon the results of this round of analysis. It is our sincere hope and intent that the requested number of samples is adequate to fully characterize any potential contamination at the transfer parcel

   Response: Comment noted.

2. **Comment:** General: Item three of your cover letter states that a revised FOST will be issued which will "*...restrict access and prohibit disturbance in the sampling areas until the evaluation of these sites is complete.*" While I understand the need to transfer the parcel, I am at a loss to understand how this can be accomplished under the existing laws and guidance which govern such actions. Please clarify if the whole parcel is to be included in the forthcoming revision, or will it be only for those areas which have not been identified as requiring sampling?

   Response: This comment will be responded to in the F9 FOST.

3. **Comment:** Please affirm that the sampling and analysis to be conducted will follow the same protocols used under the Areas of Interest investigations (e.g., tentatively identified compounds will be provided, etc.).

   Response: The sampling and analysis will follow the same protocols used under the Areas of Interest investigations and tentatively identified compounds will be provided.

4. **Comment:** AOI 53 and AOI 70: Please include total cyanide amongst the compounds to be assessed at these two former coal storage areas.

   Response: As requested, total cyanide analysis will be conducted on soil samples collected from the two former coal storage areas (AOI 53 and AOI 70). The table has been revised accordingly.

5. **Comment:** AOI 69/448 (OTH 440): While the number and type of samples is consistent with what was discussed during the May 26th meeting, the location does not appear

appropriate for assessing the whole site. I suggest moving three of the boring locations to the current track and field area, as this is the actual location of the former storage pad.

Response: As requested, three of the borings proposed at AOI 69/448 have been relocated to the current track and field area. Their specific locations were determined upon further review of aerial photographs depicting the former use of this area as a storage pad. The figure has been revised accordingly.

6. **Comment:** Two other issues discussed at the meeting, but not able to be presented in the tables, were UXO clearance and petroleum release sites:

A: A request was made that a more affirmative statement be offered regarding the level of effort which went into the determination that the area had never been associated with the use, storage or disposal of any explosive ordnance or nuclear, biological or chemical weaponry/testing and training materials.

Response: This comment will be responded to in the F9 FOST.

B: Petroleum concerns are to be better delineated on the parcel, inclusive of a depiction of known or suspected contamination in soils and groundwater.

Response: This comment will be responded to in the F9 FOST.

Response to U.S. Environmental Protection Agency Comment
for the Parcel F9 Tables and Figures
Former Griffiss Air Force Base
Rome, New York

1. **Comment:** Currently, 10 samples are located uniformly over the entire length of track located in F-9 and 2 additional samples are located in what was the loading/unloading are. I recommend the Air Force review any previous information regarding the use and operation of the railroad in F-9. If any other areas can be identified which were heavily used (i.e., railroad cars were parked, washed, repaired or loaded/unloaded other than the area currently identified) then 2-3 of the 10 samples should be located in these areas and not located simply based on a uniform space interval. However, the remainder of the samples can be spaced uniformly over the remainder of the tracks. If such areas cannot be determined then the sampling should remain uniformly spaced as currently identified in the work table.

Response: Comment noted. Further review of aerial photographs depicting the former use and operation of the railroad in Parcel F9 will be conducted. Revisions to the sample locations will be made, if necessary.

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List of Acronyms

AFB	Air Force Base
AOI	Area of Interest
ASC	Analytical Services Center
BGS	below ground surface
CS	confirmatory sampling
DQO	data quality objective
E & E	Ecology and Environment, Inc.
EPA	United States Environmental Protection Agency
ESI	Expanded Site Investigation
FOST	Findings of Suitability for Transfer
FSP	Field Sampling Plan
Griffiss AFB	former Griffiss Air Force Base
HASP	Health and Safety Plan
ID	inner diameter
IDW	investigation-derived waste
LIMS	laboratory information management system
MDL	method detection limit
NA	not applicable
NFS	no further study
NS	near surface soil
NYSDEC	New York State Department of Environmental Conservation
NYSDOH	New York State Department of Health
OD	outer diameter
OSWER	Office of Solid Waste and Emergency Response

List of Acronyms (Cont.)

PAH	polynuclear aromatic hydrocarbon
PCB	polychlorinated biphenyl
Pest	pesticides
PQL	practical quantitation limit
QA/QC	quality assurance/quality control
QAPjP	Quality Assurance Project Plan
QCP	Quality Control Plan
SD	sediment
SOP	Standard Operating Procedure
SS	subsurface soil
SVOC	semivolatile organic compound
TAL	Target Analyte List
TCL	Target Compound List
TIC	tentatively identified compound
TOC	total organic carbon
USACE	United States Army Corps of Engineers
VOC	volatile organic compound
WAD	Work Authorization Directive

Executive Summary

USACE
United States Army Corps of Engineers

E & E
Ecology and Environment, Inc.

AOIs
Areas of Interest

Griffiss AFB
former Griffiss Air Force Base

NFS
no further study

CS
confirmatory sampling

NYSDEC
New York State Department of Environmental Conservation

NYSDOH
New York State Department of Health

EPA
United States Environmental Protection Agency

FOST
Findings of Suitability for Transfer

Under contract to the United States Army Corps of Engineers (USACE), Kansas City District, Ecology and Environment, Inc., (E & E) will perform a sampling investigation at seven Areas of Interest (AOIs) and along a railroad track within Parcel F9 at the former Griffiss Air Force Base (Griffiss AFB) in Rome, New York. Five of these seven AOIs were previously recommended for no further study (NFS) based on the absence of observable spill or contamination areas. Based on the results of the confirmatory sampling (CS), the other two of the seven AOIs (i.e., AOI 53 and AOI 72) were also recommended for NFS. The railroad track within Parcel F9 has not been evaluated.

The additional investigations at Parcel F9 are being completed in response to a request by the New York State Department of Environmental Conservation (NYSDEC), the New York State Department of Health (NYSDOH), and the United States Environmental Protection Agency (EPA) under a Findings of Suitability for Transfer (FOST) for future land development.

Parcel F9 sampling will be performed at the Group III AOIs which are listed below:

Group III AOIs

1. AOI 53: Building 511 - Former Coal Storage Area
2. AOI 68: Ellsworth Road - Former Drum Storage Area
3. AOI 69/448: Woodhaven Housing - Former Drum Storage Area/Open Storage and Drainage Ditch
4. AOI 70: Current Trailer Park - Former Coal Storage Area
5. AOI 71: Trailer Park - Former Drum Storage Area - Tuscarora Drive
6. AOI 72: Mobile Avenue - Former Drum Storage Area
7. AOI 169: Building 5591 - Railroad Load/Unload Area

NS
near surface soil

SD
sediment

FSP
Field Sampling Plan

HASP
Health and Safety Plan

QAPjP
Quality Assurance Project Plan

QCP
Quality Control Plan

ESI
Expanded Site Investigation

This program will consist of both field and non-field activities. Field activities will include near surface (NS) and surface soil sample collection and sediment (SD) sampling. Non-field activities consisting of the in-house review of historical information, including drawings, aerial photos, and previous sampling data, were performed prior to the scoping of this investigation.

This Field Sampling Plan (FSP) presents the sampling investigation objectives, and describes the methodologies that will be used to investigate the seven AOIs and the railroad tracks. This modification will be performed in accordance with the procedures (where applicable) outlined in the October 1997 FSP, Health and Safety Plan (HASP), Quality Assurance Project Plan (QAPjP), and the Quality Control Plan (QCP) for the Expanded Site Investigation (ESI) Program. Procedures not covered in the October 1997 FSP are presented in Section 4 of this addendum.

1

Introduction

E & E
Ecology and Environment, Inc.

USACE
United States Army Corps of Engineers

WAD
Work Authorization Directive

AOIs
Areas of Interest

Griffiss AFB
former Griffiss Air Force Base

FOST
Findings of Suitability for Transfer

NFS
no further study

CS
confirmatory sampling

FSP
Field Sampling Plan

HASP
Health and Safety Plan

QAPjP
Quality Assurance Project Plan

ESI
Expanded Site Investigation

Ecology and Environment, Inc., (E & E), under contract to the United States Army Corps of Engineers (USACE), Kansas City District, Contract DACW41-99-D-0005, Work Authorization Directive (WAD) 07, was tasked to perform a sampling investigation at seven Areas of Interest (AOIs) and along a railroad track within Parcel F9 at the former Griffiss Air Force Base (Griffiss AFB) in Rome, New York (see Figure 1-1, back pocket). Parcel F9 is presently under a Findings of Suitability for Transfer (FOST) for future land development. Each of these AOIs was evaluated during Group III AOI screening. Based on the absence of observable spill or contamination areas, or documentation of sources of contamination or disposal, five of these seven AOIs were recommended for no further study (NFS). Two of the seven AOIs were recommended for confirmatory sampling (CS) by E & E (E & E Group III AOIs CS 1996). Based on results of the CS, NFS was also recommended for these two AOIs by E & E (E & E 1997). The railroad track within Parcel F9 has not been evaluated.

This Field Sampling Plan (FSP) presents the sampling investigation objectives, and describes the methodologies that will be used to investigate the seven AOIs and the railroad tracks. This modification will be performed in accordance with the procedures (where applicable) outlined in the October 1997 FSP, Health and Safety Plan (HASP), and Quality Assurance Project Plan (QAPjP) for the Expanded Site Investigation (ESI) Program (E & E 1997). Procedures not covered in the October 1997 FSP are presented in Section 4 of this addendum.

1.1 Purpose and Goals

The purpose of the Parcel F9 investigation is to delineate and evaluate contamination in the surface soil and near surface soil from material storage areas, coal storage areas, and railroad tracks. Previous investigations recommended no further study for these AOIs. The results of this investigation will either confirm the no

further study recommendation or be evaluated in a risk assessment to determine the potential risk to human health under future land use scenarios for Parcel F9.

2 Sampling Scheme and Rationale

DQOs
data quality objectives

TCL
Target Compound List

SVOC
semivolatile organic compound

2.1 Identification of Data Quality Objectives

The same data quality objectives (DQOs) described in the ESI FSP (E & E 1997) will apply to this work modification.

2.2 Sitewide Sample Summary

Table 2-1 presents a summary of the background information, previous sampling activities, and proposed sampling activities for each of the AOIs and the railroad track. This summary includes E & E's evaluation of the aerial photographs and the analytical results of the samples previously collected. In addition to the objectives of the proposed sampling activities, this summary also includes the number of samples and depths of samples at each sampling area, as well as the analytical tests and methods to be conducted. Due to the expedited schedule for this investigation, all samples will be analyzed on a 14-day turnaround basis, and tentatively identified compounds will be provided with the Target Compound List (TCL) semivolatile organic compound (SVOC) analysis.

Table 2-1 Parcel F9 Summary of Field Investigations and Justifications
Former Griffiss Air Force Base, Rome, New York

1	2	3	4	5	Proposed Investigations						
					6	7	8	9	10	11	12
Site No.	Site Name	Figure No.	Dates of Operation	Justification for Further Investigation	Sample Type	No. of Locations	No. of Samples Per Location	Boring Depth (feet bgs unless otherwise noted)	Sample Depth (feet bgs unless otherwise noted)	Sample Identification	Analytical Tests and Methods to be Conducted
AOI 53	**Building 511 - Former Coal Storage Area**	3-1	1943-early 1960s	**Background.** This site was identified as an AOI in the 1994 AOI report based on review of a 1943 drawing. E & E confirmed the presence of the former coal storage area by reviewing the drawing, along with historic aerial photos. According to the 1994 EBS, coal was stored in this area until the early 1960s. The coal was used in a steam plant that provided heating for a former hospital complex. However, coal storage was only visible in the 1943 aerial photo. The area is currently an open grassy field. Due to the potential impact of contamination of underlying soil and groundwater from runoff from the former coal pile, E & E recommended confirmatory sampling (CS) (E & E Group III AOIs CS 1996). Based on the results of the CS, no further study (NFS) was recommended (E & E 1997). **Previous Sampling.** The CS investigation consisted of background review, site reconnaissance, and installation of two soil borings within the area of former coal storage. Two subsurface soil samples were collected from each boring. PAHs were found only in one of the soil samples (0-2 feet bgs). Benzo(a)anthracene, chrysene, and dibenz(a,h)anthracene exceeded the preliminary screening criteria (NYSDEC TAGM) and only benzo(a)pyrene slightly exceeded RBCs. A temporary well was installed in one of the borings and a groundwater-screening sample was collected from it. Because subsurface soil and groundwater sampling did not indicate that runoff from the former coal storage pile has adversely impacted the environment at this site, NFS was recommended.	NS	1	2	—	0"-2"	G053-NS01-Z1	SW8270C TCL PAHs, SW6010B TAL metals[a], and ASTM_D2216 % solids
								4	2-4	G053-NS01-Z2	
						1	2	—	0"-2"	G053-NS02-Z1	
								4	2-4	G053-NS02-Z2	
						1	2	—	0"-2"	G053-NS03-Z1	
								4	2-4	G053-NS03-Z2	
						1	2	—	0"-2"	G053-NS04-Z1	
								4	2-4	G053-NS04-Z2	
						1	2	—	0"-2"	G053-NS05-Z1	
								4	2-4	G053-NS05-Z2	

Table 2-1 Parcel F9 Summary of Field Investigations and Justifications
Former Griffiss Air Force Base, Rome, New York

1	2	3	4	5	Proposed Investigations						
					6	7	8	9	10	11	12
Site No.	Site Name	Figure No.	Dates of Operation	Justification for Further Investigation	Sample Type	No. of Locations	No. of Samples Per Location	Boring Depth (feet bgs unless otherwise noted)	Sample Depth (feet bgs unless otherwise noted)	Sample Identification	Analytical Tests and Methods to be Conducted
				Sampling Prior to Transfer. The objective of this work is to delincate and evaluate any coal storage related contamination in the surface and near surface soil at AOI 53. To achieve this objective, ten soil samples will be collected at five locations. A surface (0"-2") and a near surface soil (2'-4') sample will be collected at each location and analyzed for TCL PAHs and selected TAL metals (i.e., aluminum, arsenic, beryllium, cadmium, chromium, cobalt, copper, iron, lead, magnesium, manganese, mercury, nickel, selenium, sodium, zinc, and total cyanide).							

Table 2-1 Parcel F9 Summary of Field Investigations and Justifications
Former Griffiss Air Force Base, Rome, New York

					Proposed Investigations						
1	2	3	4	5	6	7	8	9	10	11	12
Site No.	Site Name	Figure No.	Dates of Operation	Justification for Further Investigation	Sample Type	No. of Locations	No. of Samples Per Location	Boring Depth (feet bgs unless otherwise noted)	Sample Depth (feet bgs unless otherwise noted)	Sample Identification	Analytical Tests and Methods to be Conducted
AOI 68	**Ellsworth Road Former Drum Storage Area**	3-2	1960 only	**Background.** This site was identified as an AOI in the 1994 AOI report based on a review of a 1960 aerial photo. The AOI report states that drums and a storage area were noted only in 1960. E & E reviewed several historic aerial photos and noted that the area was used for storage between 1955 and 1960. By 1967, the site was an open lot. The presence of drums in the 1960 aerial photo is inconclusive. The site is currently an open area. **Previous Sampling.** This AOI was evaluated during Group III AOI screening, Since no spills or areas of contamination were observed, and there was no documentation of sources of contamination or disposal, no further study was recommended. **Sampling Prior to Transfer.** The objective of this work is to verify that AOI 68 does not contain contamination in the surface and near surface soil. To achieve this objective, four soil samples will be collected at two locations. A surface (0"-2") and a near surface soil (2'-4') sample will be collected at each location and analyzed for TCL SVOCs, TCL Pest/PCBs, and TAL metals.	NS NS	1 1	2 2	— 4 — 4	0"-2" 2-4 0"-2" 2-4	G068-NS01-Z1 G068-NS01-Z2 G068-NS02-Z1 G068-NS02-Z2	SW8270C TCL SVOCs, SW8081A TCL Pest, SW8082 TCL PCBs, SW6010B TAL metals, and ASTM_D2216 % solids

Table 2-1 Parcel F9 Summary of Field Investigations and Justifications
Former Griffiss Air Force Base, Rome, New York

1	2	3	4	5	Proposed Investigations						
					6	7	8	9	10	11	12
Site No.	Site Name	Figure No.	Dates of Operation	Justification for Further Investigation	Sample Type	No. of Locations	No. of Samples Per Location	Boring Depth (feet bgs unless otherwise noted)	Sample Depth (feet bgs unless otherwise noted)	Sample Identification	Analytical Tests and Methods to be Conducted
AOI 69/448	**Woodhaven Housing - Former Drum Storage Area/Open Storage and Drainage Ditch**	3-3	1955-1971	**Background.** This site was identified as an AOI in the 1994 AOI report based on what was believed to be a drum storage area. An aerial photograph from 1971 and a drawing from 1967 were reviewed to develop this interpretation. E & E concurs that this location was used for storage. The storage area was paved and appeared well organized. The presence of drums in this area was confirmed in the aerial photo. (AOIs 88 and 448 are duplicates of this AOI and were also recommended for no further study.) The site is currently an open area. **Previous Sampling.** This AOI was evaluated during the Group III AOI screening, Since there was no evidence of spills and no documentation of disposal existed for this site, no further study was recommended **Sampling Prior to Transfer.** The objective of this work is to verify that AOI 69/448 does not contain contamination in the drainage ditch, surface, and near surface soil. To achieve this objective, fourteen soil samples will be collected at seven locations. A surface (0"-2") and a near surface soil (2'-4') sample will be collected at each location and analyzed for TCL SVOCs, TCL Pest/PCBs, and TAL metals. Additionally, three sediment samples will be collected from the drainage ditch and analyzed for TCL SVOCs, TCL Pest/PCBs, and TAL metals.	NS	7	1	—	0"-2"	G069-NS01-Z1 through G069-NS07-Z1	SW8270C TCL SVOCs, SW8081A TCL Pest, SW8082 TCL PCBs, SW6010B TAL metals, and ASTM_D2216 % solids
						7	1	4	2-4	G069-NS02-Z2 through G069-NS07-Z2	
					SD	3	1	—	—	G069-SD01 through G069-SD03	SW8270C TCL SVOCs, SW8081A TCL Pest, SW8082 TCL PCBs, SW6010B TAL metals, ASTM_D2216 % solids, and Lloyd Kahn TOC

Table 2-1 Parcel F9 Summary of Field Investigations and Justifications
Former Griffiss Air Force Base, Rome, New York

1	2	3	4	5	Proposed Investigations						
					6	7	8	9	10	11	12
Site No.	Site Name	Figure No.	Dates of Operation	Justification for Further Investigation	Sample Type	No. of Locations	No. of Samples Per Location	Boring Depth (feet bgs unless otherwise noted)	Sample Depth (feet bgs unless otherwise noted)	Sample Identification	Analytical Tests and Methods to be Conducted
AOI 70	**Current Trailer Park-Former Coal Storage Area**	3-4	1960-1974	**Background.** This site was identified as an AOI in the AOI report based review of 1969 and 1971 aerial photos. The AOI report states that the area was used to store several types of materials, including nondescript mounds of soil, old tanks, and drums. The report also states that a spill was observed in the 1971 aerial photo adjacent to one of the drums. E & E does not concur with this interpretation. The AOI report does not describe the correct AOI location. It is possible that the AOI report is actually describing the area approximately 255 feet west of the location of AOI 70 (Map No. 66). Regardless, the scale of the 1971 photo is too small to determine whether there is a leaking drum in this area. E & E reviewed the referenced aerial photos, along with additional photo's taken between 1957 and 1975. Coal storage was confirmed in the designated map area for AOI 70 between 1960 and 1974. The site currently contains tall grass, scattered shrubs and tress and a number of concrete pads. The area identified as "AOI 70 Extension" was incorrectly identified as AOI 71 (Map No. 67). Refer to the background discussion of AOI 71 for further details. Due to the potential impact of contamination from runoff from the former coal pile to the underlying soils and groundwater, E & E recommended CS (E & E Group III AOIs CS 1996). However, based on the results of the CS, NFS was recommended (E & E 1997) Based on the planned future use of the site as institution (educational) land and potentially a job training facility,	NS NS	10 10	1 1	— 4	0"-2" 2-4	G070-NS01-Z1 through G070-NS10-Z1 G070-NS01-Z2 through G070-NS10-Z2	SW8270C TCL PAHs, SW8081A TCL Pest, SW8082 TCL PCBs, SW6010B TAL metals,[a] and % solids

Table 2-1 Parcel F9 Summary of Field Investigations and Justifications
Former Griffiss Air Force Base, Rome, New York

1	2	3	4	5	Proposed Investigations						
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Site No.	Site Name	Figure No.	Dates of Operation	Justification for Further Investigation	Sample Type	No. of Locations	No. of Samples Per Location	Boring Depth (feet bgs unless otherwise noted)	Sample Depth (feet bgs unless otherwise noted)	Sample Identification	Analytical Tests and Methods to be Conducted
				the very low levels of contamination found in the soils, and the lack of groundwater impacts, NFS was recommended (E & E 1997). **Sampling Prior to Transfer.** The objective of this work is to delineate and evaluate any coal storage related contamination in the surface and near surface soil at AOI 70 and AOI 70 extension. To achieve this objective, 20 soil samples will be collected at ten locations. A surface (0"-2") and a near surface soil (2'-4') sample will be collected at each location and analyzed for TCL PAHs and selected TAL metals (i.e., aluminum, arsenic, beryllium, cadmium, chromium, cobalt, copper, iron, lead, magnesium, manganese, mercury, nickel, selenium, sodium, zinc, and total cyanide).							

Table 2-1 Parcel F9 Summary of Field Investigations and Justifications
Former Griffiss Air Force Base, Rome, New York

1	2	3	4	5	Proposed Investigations						
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Site No.	Site Name	Figure No.	Dates of Operation	Justification for Further Investigation	Sample Type	No. of Locations	No. of Samples Per Location	Boring Depth (feet bgs unless otherwise noted)	Sample Depth (feet bgs unless otherwise noted)	Sample Identification	Analytical Tests and Methods to be Conducted
AOI 71	**Trailer Park - Former Drum Storage Area - Tuscarora Drive**	3-5	1971-1976	**Previous Sampling.** The CS investigation, consisted of background review, site reconnaissance, and installation of three subsurface soil borings within the former coal storage area. Two subsurface soil samples were collected from each boring. The shallow samples from borings G070-SS01 and G070-SS02 contained small amounts of coal. One of the soil samples (G070-SS02-Z1collected from 1 to 3 feet bgs) contained PAHs chrysene, (benzo[a] anthracene, benzo[a]pyrene, and dibenz[a,h]anthracene) that exceeded preliminary screening levels (NYSDEC TAGM) but were below the final RBCs. Additionally, arsenic in this soil sample exceeded the preliminary and final screening levels. A temporary well was installed in one of the borings (SS01) and a groundwater-screening sample was collected from it. **Background.** This site was identified as an AOI in the 1994 AOI report based on a review of an aerial photo from 1971. The report states that this area was used for drum storage. E & E does not concur with this interpretation, and the actual location of the site is on Onondaga Drive, and not on Tuscarora Drive as specified in the AOI name. The area was used for storage but the scale of the photo was too small to confirm the presence of drums. E & E's review of aerial photographs shows that this area was vegetated until 1957. A storage area was visible in aerial photographs from 1960 until 1972. The storage area was fenced in 1967. Excavation for the trailer park was visible in 1975. The storage area was no longer present at that time. The trailer park was mostly complete by 1976. The site is currently an open grassy area.	NS	1	2	—	0"-2"	G071-NS01-Z1	SW8270C TCL SVOCs,
								4	2-4	G071-NS01-Z2	SW8081A TCL Pest,
					NS	1	2	—	0"-2"	G071-NS02-Z2	SW8082 TCL PCBs, SW6010B TAL metals, and
								4	2-4	G071-NS02-Z2	ASTM_D2216 % solids

Table 2-1 Parcel F9 Summary of Field Investigations and Justifications
Former Griffiss Air Force Base, Rome, New York

1	2	3	4	5	Proposed Investigations						
					6	7	8	9	10	11	12
Site No.	Site Name	Figure No.	Dates of Operation	Justification for Further Investigation	Sample Type	No. of Locations	No. of Samples Per Location	Boring Depth (feet bgs unless otherwise noted)	Sample Depth (feet bgs unless otherwise noted)	Sample Identification	Analytical Tests and Methods to be Conducted
				Although the area was used for storage, no evidence of spills or documentation of disposal exists at this site. The location shown as map no. 67 in the AOI report is incorrect for this AOI. The site is actually located approximately 100 feet north of the area designated in the AOI report. Map No. 67 in the AOI report is believed to be an extension of the Former Coal Storage Area-Ft. Craven and Ft. Newport Drives (AOI 70). This area was covered under the AOI 70 Confirmatory Sampling Program (Group III AOI) **Previous Sampling.** This AOI was evaluated during the Group III AOI screening. Since the presence of drums in the aerial photo could not be confirmed, AOI 71 was recommended for NFS. **Sampling Prior to Transfer.** The objective of this work is to verify that AOI 71 does not contain contamination in the surface and near surface soil. To achieve this objective, 4 soil samples will be collected at two locations within the former storage area. A surface (0"-2") and a near surface soil (2'-4') sample will be collected at each location and analyzed for TCL SVOCs, TCL Pest/PCBs, and TAL metals.								

Table 2-1 Parcel F9 Summary of Field Investigations and Justifications
Former Griffiss Air Force Base, Rome, New York

1	2	3	4	5	Proposed Investigations						
					6	7	8	9	10	11	12
Site No.	Site Name	Figure No.	Dates of Operation	Justification for Further Investigation	Sample Type	No. of Locations	No. of Samples Per Location	Boring Depth (feet bgs unless otherwise noted)	Sample Depth (feet bgs unless otherwise noted)	Sample Identification	Analytical Tests and Methods to be Conducted
AOI 72	**Mobile Avenue - Former Drum Storage Area**	3-6	1966-unknown	**Background.** This site was identified as an AOI in the 1994 AOI report based on the 1989 EPA Site Analysis because drums were believed to be stored on site in 1966. E & E does not concur with this interpretation. An aerial photo from May 1960 shows an open area stripped of vegetation with erosion channels. Aerial photos from 1967 through 1973 show a storage area with even rows of unknown material in the southern and central portion of the site. By 1974, the material had been removed. In photographs from 1975 through 1978, two small areas of storage materials and possible drums were observed. In 1982, the storage of material appeared sporadic. The site is currently an open area. **Previous Sampling.** This AOI was evaluated during the Group III AOI screening, Since there is no evidence of spills or documentation of disposal at this site, NFS was recommended. **Sampling Prior to Transfer.** The objective of this work is to verify that AOI 72 does not contain contamination in the surface and near surface soil. To achieve this objective, 30 soil samples will be collected at 15 locations. A surface (0"-2") and a near surface soil (2'-4') sample will be collected at each location and analyzed TCL SVOCs, TCL Pest/PCBs, and TAL metals.	NS	15	1	—	0"-2"	G072-NS01-Z1 through G072-NS15-Z1	SW8270C TCL SVOCs, SW8081A TCL Pest, SW8082 TCL PCBs, SW6010B TAL metals, and ASTM_D2216 % solids
					NS	15	1	4	2-4	G072-NS01-Z2 through G072-NS15-Z2	

Table 2-1 Parcel F9 Summary of Field Investigations and Justifications
Former Griffiss Air Force Base, Rome, New York

1	2	3	4	5	Proposed Investigations						
					6	7	8	9	10	11	12
Site No.	Site Name	Figure No.	Dates of Operation	Justification for Further Investigation	Sample Type	No. of Locations	No. of Samples Per Location	Boring Depth (feet bgs unless otherwise noted)	Sample Depth (feet bgs unless otherwise noted)	Sample Identification	Analytical Tests and Methods to be Conducted
AOI 169	**Building 5591 Railroad Load/Unload Area**	3-7	1943-present	**Background.** This site was identified as an AOI in the 1994 AOI report based on review of a 1943 aerial photo. The AOI report states that this area was used for loading/unloading rail cars. Specific material and release history is unknown. E & E reviewed the referenced aerial photo, along with various other historic aerial photos. No spills or any other hazardous features were noted in any of the photos. The site is currently an open area. **Previous Sampling.** This AOI was evaluated during the Group III AOI screening. Since there was no evidence of contamination, no specific source of contamination, and no documentation of spills or other releases of hazardous substances, NFS was recommended. **Sampling Prior to Transfer.** The objective of this work is to verify AOI 169 does not contain contamination in the surface and near surface soil. To achieve this objective, four soil samples will be collected at two locations. A surface (0"-2") and a near surface soil (2'-4') sample will be collected at each location and analyzed for TCL SVOCs, TCL Pest/PCBs, and TAL metals.	NS	2	1	—	0"-2"	G169-NS01-Z1 G169-NS02-Z1	SW8270C TCL SVOCs, SW8081A TCL Pest, SW8082 TCL PCBs, SW6010B TAL metals, and ASTM_D2216 % solids
					NS	2	1	—	2-4	G169-NS01-Z2 G169-NS02-Z2	

Table 2-1 Parcel F9 Summary of Field Investigations and Justifications
Former Griffiss Air Force Base, Rome, New York

					Proposed Investigations						
1	2	3	4	5	6	7	8	9	10	11	12
Site No.	Site Name	Figure No.	Dates of Operation	Justification for Further Investigation	Sample Type	No. of Locations	No. of Samples Per Location	Boring Depth (feet bgs unless otherwise noted)	Sample Depth (feet bgs unless otherwise noted)	Sample Identification	Analytical Tests and Methods to be Conducted
—	**Railroad Tracks**	3-8A and 3-8B	—	**Background.** The railroad tracks are documented in aerial photographs dating back to the 1940s. **Previous Sampling.** No previous sampling was performed at this site. **Sampling Prior to Transfer** The objective of this work is to verify that contaminants are not present in the surface soil along the railroad track. To achieve this objective, ten surface (0"-2") samples will be collected and analyzed for TCL SVOCs, Pest/ PCBs, and TAL metals. The ten surface soil samples will be evenly distributed along the length of the tracks crossing Parcel F9.	NS	10	1	—	0"-2"	RT-NS01 through RT-NS10	SW8270C TCL SVOCs, SW8081A TCL Pest, SW8082 TCL PCBs, SW6010B TAL metals, and ASTM_D2216 % solids

1-12 Column Reference Numbers at top of each column.

[a] These samples will be analyzed for a selected list of TAL metals (i.e., aluminum, arsenic, beryllium, cadmium, chromium, cobalt, copper, iron, lead, magnesium, manganese, mercury, nickel, selenium, sodium, zinc, and total cyanide). These analytes are the same analytes used in the GROUP III AOIs CS. Section 3.3.2 of the Coal Pile Runoff Report to Congress titled, "Wastes from Combustion of Coal by Electric Utility Plants" (USEPA 1988) was used as a guidance document in selecting some of the preceding inorganic parameters.

Key:

AOI	= Area of Interest.	PAH	= Polynuclear aromatic hydrocarbon.	TCL	= Target compound list.
bgs	= Below ground surface.	PCB	= Polychlorinated biphenyl.	VOC	= Volatile organic compound.
CS	= Confirmatory Sampling.	Pest	= Pesticides.	Z1	= Shallow soil sample.
E & E	= Ecology and Environment, Inc.	RBCs	= Risk-based criteria.	Z2	= Deepest soil sample of two to be collected.
EBS	= Environmental Baseline Survey.	SD	= Sediment sample.	—	= Not applicable.
NFS	= No further study.	SVOC	= Semivolatile organic compound.	%	= Percent.
NS	= Near-surface soil sample.	TAGM	= Technical Administrative Guidance Memorandum.		
NYSDEC	= New York State Department of Environmental Conservation.	TAL	= Target Analyte List.		

3

Field Sampling Plan Part I: AOI-Specific Problem Definition and Sampling Rationale

PAH
polynuclear aromatic hydrocarbon

TAL
Target Analyte List

Pest
Pesticide

PCB
polychlorinated biphenyl

3.1 AOI 53: Building 511 - Former Coal Storage Area

The objective of this work is to delineate and evaluate any coal storage related contamination in the surface and near surface soil at AOI 53. To achieve this objective, 10 soil samples will be collected at five locations. A surface (0 to 2 inches) and a near surface soil (2 to 4 feet) sample will be collected at each location. A soil sampling grid with varied spacing will be established at AOI 53 to identify these sampling locations (see Figure 3-1). The grid includes the soil sample locations from the previous investigation (Group III AOIs CS, E & E 1997). The analytical results for these previous soil samples are provided on Figure 3-1. These samples will be analyzed for polynuclear aromatic hydrocarbons (PAHs) and a selected list of Target Analyte List (TAL) metals commonly found at trace levels in coal (i.e., aluminum, arsenic, beryllium, cadmium, chromium, cobalt, copper, iron, lead, magnesium, manganese, mercury, nickel, selenium, sodium, zinc, and total cyanide). These analytes are the same analytes investigated in the Group III AOIs CS. Section 3.3.2 of the Coal Pile Runoff Report to Congress titled, "Wastes from Combustion of Coal by Electric Utility Plants" (USEPA 1988) was used as a guidance document in selecting some of the preceding inorganic parameters. A list of sample identifications and analyses is presented on Table 3-1.

3.2 AOI 68: Ellsworth Road - Former Drum Storage Area

The objective of this work is to verify that AOI 68 does not contain contamination in the surface and near surface soil. To achieve this objective, four soil samples will be collected at two locations selected based on a review of the aerial photographs (see Figure 3-2). A surface (0 to 2 inches) and a near surface soil (2 to 4 feet) sample will be collected at each location and analyzed for TCL SVOCs, TCL pesticides/polychlorinated biphenyls (Pest/PCBs), and TAL metals. A list of sample identifications and analyses is presented on Table 3-2.

3.3 AOI 69/448: Woodhaven Housing - Former Drum Storage Area/Open Storage and Drainage Ditch

The objective of this work is to verify that AOI 69/448 does not contain contamination in the drainage ditch, surface, and near surface soil. To achieve this objective, fourteen soil samples will be collected at seven locations. Four of these locations will be within the scarred area identified on aerial photographs, and the remaining three locations will be within the former storage area identified on aerial photographs. A soil sampling grid with varied spacing will be established at AOIs 69/448 to identify these sampling locations (see Figure 3-3). A surface (0 to 2 inches) and a near surface soil (2 to 4 feet) sample will be collected at each location and analyzed for TCL SVOCs, TCL Pest/PCBs, and TAL metals. Additionally, three sediment samples will be collected from the drainage ditch and analyzed for TCL SVOCs, TCL Pest/PCBs, TAL metals, and total organic carbon. A list of sample identifications and analyses is presented on Table 3-3.

3.4 AOI 70: Current Trailer Park - Former Coal Storage Area

The objective of this work is to delineate and evaluate any coal storage-related contamination in the surface and near surface soil at AOI 70 and AOI 70 extension. To achieve this objective, 20 soil samples will be collected at 10 locations. A soil sampling grid with varied spacing will be established at AOI 70 and AOI 70 extension to identify these sampling locations (see Figure 3-4). The grid includes the soil sample locations from the previous investigation (Group III AOI CS, E & E 1997). The analytical results for these previous soil samples are provided on Figure 3-4. A surface (0 to 2 inches) and a near surface soil (2 to 4 feet) sample will be collected at each location. These samples will be analyzed for PAHs and a selected list of TAL metals commonly found at trace levels in coal (i.e., aluminum, arsenic, beryllium, cadmium, chromium, cobalt, copper, iron, lead, magnesium, manganese, mercury, nickel, selenium, sodium, zinc, and total cyanide). These analytes are the same analytes investigated in the Group III AOIs CS. Section 3.3.2 of the Coal Pile Runoff Report to Congress titled, "Wastes from Combustion of Coal by Electric Utility Plants" (USEPA 1988) was used as a guidance document in selecting some of the preceding inorganic parameters. A list of sample identifications and analyses is presented on Table 3-4.

3.5 AOI 71: Trailer Park - Former Drum Storage Area - Tuscarora Drive

The objective of this work is to verify that AOI 71 does not contain contamination in the surface and near surface soil. To achieve this objective, four soil samples will be collected at two locations selected based on a review of the aerial photographs (see Figure 3-5). A surface (0 to 2 inches) and a near surface soil (2 to 4 feet) sample will be collected at each location and analyzed for TCL SVOCs, TCL Pest/PCBs, and TAL metals. A list of sample identifications and analyses is presented on Table 3-5.

3.6 AOI 72: Mobile Avenue - Former Drum Storage Area

The objective of this work is to verify that AOI 72 does not contain contamination in the surface and near surface soil. To achieve this objective, 30 soil samples will be collected at 15 locations. A soil sampling grid with varied spacing will be established at AOI 72 to identify these sampling locations (see Figure 3-6). Two soil samples, a surface (0 to 2 inches) and a near surface soil (2 to 4 feet) sample, will be collected at each location and will be analyzed for TCL SVOCs, TCL Pest/PCBs, and TAL metals. A list of sample identifications and analyses is presented on Table 3-6.

3.7 AOI 169: Building 5591 - Railroad Load/Unload Area

The objective of this work is to verify that AOI 169 does not contain contamination in the surface and near surface soil. To achieve this objective, four soil samples will be collected at two locations selected based on a review of the aerial photographs (see Figure 3-7). A surface (0 to 2 inches) and a near surface soil (2 to 4 feet) sample will be collected at each location and analyzed for TCL SVOCs, TCL Pest/PCBs, and TAL metals. A list of sample identifications and analyses is presented on Table 3-7.

3.8 Railroad Track

The objective of this work is to verify that contaminants are not present in the surface soil along the railroad track. To achieve this objective, 10 surface soil (0 to 2 inches) samples will be collected. The 10 samples will be evenly distributed along the length of the track crossing Parcel F9 (see Figures 3-8A and 3-8B). All samples will be analyzed for TCL SVOCs, Pest/ PCBs, and TAL metals. A list of sample identifications and analyses is presented on Table 3-8.

TABLE 3-1
PARCEL F9 SAMPLING INVESTIGATION
SAMPLE LISTING FOR
BUILDING 511 - FORMER COAL STORAGE AREA (AOI 53)
FORMER GRIFFISS AIR FORCE BASE

							ANALYTES		
Location	Date	Sample Number	Lab	Matrix	Type	Depth	TCL PAHs	TAL Metals[a]	% Solids
AOI 53	TBD	G053-NS01-Z1	TBD	Soil	NS	0"-2"	X	X	X
	TBD	G053-NS01-Z2	TBD	Soil	NS	2'-4'	X	X	X
	TBD	G053-NS01-Z2 (MS/MSD)	TBD	Soil/QC Matrix	NS	2'-4'	X	X	X
	TBD	G053-NS02-Z1	TBD	Soil	NS	0"-2"	X	X	X
	TBD	G053-NS02-Z2	TBD	Soil	NS	2'-4'	X	X	X
	TBD	G053-NS03-Z1	TBD	Soil	NS	0"-2"	X	X	X
	TBD	G053-NS03-Z2	TBD	Soil	NS	2'-4'	X	X	X
	TBD	G053-NS04-Z1	TBD	Soil	NS	0"-2"	X	X	X
	TBD	G053-NS04-Z2	TBD	Soil	NS	2'-4'	X	X	X
	TBD	G053-NS05-Z1	TBD	Soil	NS	0"-2"	X	X	X
	TBD	G053-NS05-Z2	TBD	Soil	NS	2'-4'	X	X	X
	TBD	G053-NS05-Z2/D	TBD	Soil	NS	0"-2"	X	X	X
	TBD	G053-NS05-Z2/S	MRD	Soil	NS	0"-2"	X	X	X

[a] These samples will be analyzed for a selected list of TAL metals (i.e., aluminum, arsenic, beryllium, cadmium, chromium, cobalt, copper, iron, lead, magnesium, manganese, mercury, nickel, selenium, sodium, zinc, and total cyanide). These analytes are the same analytes used in the Group III AOIs CS. Section 3.3.2 of the Coal Pile Runoff Report to Congress titled, "Wastes from Combustion of Coal by Electric Utility Plants" (USEPA 1988) was used as a guidance document in selecting some of the preceding inorganic parameters.

Key:

AOI= Area of Interest
/D = duplicate
MRD = Missouri River Diovision laboratory
MS/MSD = matrix spike/matrix spike duplicate
NS= surface or near surface soil
PAH= polynuclear aromatic hydrocarbons
/S = split
TAL = Target Analyte List
TBD= to be determined
TCL = Target Compound List
QC = quality control sample
Z1= near surface soil depth 0"-2"
Z2= surface soil depth 2'-4'

TABLE 3-2
PARCEL F9 SAMPLING INVESTIGATION
SAMPLE LISTING FOR
ELLSWORTH ROAD - FORMER DRUM STORAGE AREA (AOI 68)
FORMER GRIFFISS AIR FORCE BASE

							ANALYTES			
Location	Date	Sample Number	Lab	Matrix	Type	Depth	TCL SVOCs	TCL Pest/PCBs	TAL Metals	% Solids
AOI 68	TBD	G068-NS01-Z1	TBD	Soil	NS	0"-2"	X	X	X	X
	TBD	G068-NS01-Z2	TBD	Soil	NS	2'-4'	X	X	X	X
	TBD	G068-NS02-Z1	TBD	Soil	NS	0"-2"	X	X	X	X
	TBD	G068-NS02-Z2	TBD	Soil	NS	2'-4'	X	X	X	X

Key:

AOI= Area of Interest
MS/MSD = matrix spike/matrix spike duplicate
NS= surface or near surface soil
PCB = polychlorinated biphenyls
Pest = pesticides
SVOC = semivolatile organic compounds
TAL = Target Analyte List
TBD= to be determined
TCL = Target Compound List
Z1= near surface soil depth 0"-2"
Z2= surface soil depth 2'-4'

TABLE 3-3
PARCEL F9 SAMPLING INVESTIGATION
SAMPLE LISTING FOR
WOODHAVEN HOUSING FORMER DRUM STORAGE AREA/
OPEN STORAGE AND DRAINAGE DITCH (AOI 69/448)
FORMER GRIFFISS AIR FORCE BASE

							ANALYTES			
Location	Date	Sample Number	Lab	Matrix	Type	Depth	TCL SVOCs	TCL Pest/PCBs	TAL Metals	% Solids
AOI 69/448	TBD	G069-NS01-Z1	TBD	Soil	NS	0"-2"	X	X	X	X
	TBD	G069-NS01-Z2	TBD	Soil	NS	2'-4'	X	X	X	X
	TBD	G069-NS02-Z1	TBD	Soil	NS	0"-2"	X	X	X	X
	TBD	G069-NS02-Z2	TBD	Soil	NS	2'-4'	X	X	X	X
	TBD	G069-NS03-Z1	TBD	Soil	NS	0"-2"	X	X	X	X
	TBD	G069-NS03-Z2	TBD	Soil	NS	2'-4'	X	X	X	X
	TBD	G069-NS03-Z2/D	TBD	Soil	NS	2'-4'	X	X	X	X
	TBD	G069-NS03-Z2/S	MRD	Soil	NS	2'-4'	X	X	X	X
	TBD	G069-NS04-Z1	TBD	Soil	NS	0"-2"	X	X	X	X
	TBD	G069-NS04-Z2	TBD	Soil	NS	2'-4'	X	X	X	X
	TBD	G069-NS05-Z1	TBD	Soil	NS	0"-2"	X	X	X	X
	TBD	G069-NS05-Z2	TBD	Soil	NS	2'-4'	X	X	X	X
	TBD	G069-NS06-Z1	TBD	Soil	NS	0"-2"	X	X	X	X
	TBD	G069-NS06-Z2	TBD	Soil	NS	2'-4'	X	X	X	X
	TBD	G069-NS07-Z1	TBD	Soil	NS	0"-2"	X	X	X	X
	TBD	G069-NS07-Z2	TBD	Soil	NS	2'-4'	X	X	X	X
	TBD	G069-SD01	TBD	Sediment	SD	-	X	X	X	X
	TBD	G069-SD02	TBD	Sediment	SD	-	X	X	X	X
	TBD	G069-SD03	TBD	Sediment	SD	-	X	X	X	X
	TBD	G069-SD03 (MS/MSD)	TBD	Sediment/ QC Matrix	SD	-	X	X	X	X
	TBD	G069-SD03/D	TBD	Sediment	SD	-	X	X	X	X
	TBD	G069-SD03/S	MRD	Sediment	SD	-	X	X	X	X

Key:

AOI= Area of Interest
/D = duplicate
MRD = Missouri River Diovision laboratory
MS/MSD = matrix spike/matrix spike duplicate
NS= surface or near surface soil
PCB = polychlorinated biphenyls
Pest = pesticides
/S = split
SD = sediment sample
SVOC = semivolatile organic compounds
TAL = Target Analyte List
TBD= to be determined
TCL = Target Compound List
QC = quality control sample
Z1= near surface soil depth 0"-2"
Z2= surface soil depth 2'-4'

TABLE 3-4
PARCEL F9 SAMPLING INVESTIGATION
SAMPLE LISTING FOR
CURRENT TRAILER PARK/FORMER COAL STORAGE AREA (AOI 70)
FORMER GRIFFISS AIR FORCE BASE

							ANALYTES		
Location	Date	Sample Number	Lab	Matrix	Type	Depth	TCL PAHs	TAL Metals [a]	% Solids
AOI 70	TBD	G070-NS01-Z1	TBD	Soil	NS	0"-2"	X	X	X
	TBD	G070-NS01-Z2	TBD	Soil	NS	2'-4'	X	X	X
	TBD	G070-NS02-Z1	TBD	Soil	NS	0"-2"	X	X	X
	TBD	G070-NS02-Z2	TBD	Soil	NS	2'-4'	X	X	X
	TBD	G070-NS03-Z1	TBD	Soil	NS	0"-2"	X	X	X
	TBD	G070-NS03-Z2	TBD	Soil	NS	2'-4'	X	X	X
	TBD	G070-NS04-Z1	TBD	Soil	NS	0"-2"	X	X	X
	TBD	G070-NS04-Z2	TBD	Soil	NS	2'-4'	X	X	X
	TBD	G070-NS04-Z2 (MS/MSD)	TBD	Soil/QC Matrix	NS	2'-4'	X		X
	TBD	G070-NS05-Z1	TBD	Soil	NS	0"-2"	X	X	X
	TBD	G070-NS05-Z2	TBD	Soil	NS	2'-4'	X	X	X
	TBD	G070-NS05-Z2/D	TBD	Soil	NS	2'-4'	X	X	X
	TBD	G070-NS05-Z2/S	MRD	Soil	NS	2'-4'	X	X	X
	TBD	G070-NS06-Z1	TBD	Soil	NS	0"-2"	X	X	X
	TBD	G070-NS06-Z2	TBD	Soil	NS	2'-4'	X	X	X
	TBD	G070-NS07-Z1	TBD	Soil	NS	0"-2"	X	X	X
	TBD	G070-NS07-Z2	TBD	Soil	NS	2'-4'	X	X	X
	TBD	G070-NS08-Z1	TBD	Soil	NS	0"-2"	X	X	X
	TBD	G070-NS08-Z2	TBD	Soil	NS	0"-2"	X	X	X
	TBD	G070-NS09-Z1	TBD	Soil	NS	0"-2"	X	X	X
	TBD	G070-NS09-Z2	TBD	Soil	NS	2'-4'	X	X	X
	TBD	G070-NS10-Z1	TBD	Soil	NS	0"-2"	X	X	X
	TBD	G070-NS10-Z2	TBD	Soil	NS	2'-4'	X	X	X
	TBD	G070-NS10-Z2/D	TBD	Soil	NS	2'-4'	X	X	X
	TBD	G070-NS10-Z2/S	MRD	Soil	NS	2'-4'	X	X	X

[a] These samples will be analyzed for a selected list of TAL metals (i.e., aluminum, arsenic, beryllium, cadmium, chromium, cobalt, copper, iron, lead, magnesium, manganese, mercury, nickel, selenium, sodium, zinc, and total cyanide). These analytes are the same analytes used in the Group III AOIs CS. Section 3.3.2 of the Coal Pile Runoff Report to Congress titled, "Wastes from Combustion of Coal by Electric Utility Plants" (USEPA 1988) was used as a guidance document in selecting some of the preceding inorganic parameters.

Key:

AOI= Area of Interest
/D = duplicate
MRD = Missouri River Diovision laboratory
MS/MSD = matrix spike/matrix spike duplicate
NS= surface or near surface soil
PAH= Polynuclear Aromatic Hydrocarbons
/S = split
TAL = Target Analyte List
TBD= to be determined
TCL = Target Compound List
QC = quality control sample
Z1= near surface soil depth 0"-2"
Z2= surface soil depth 2'-4'

TABLE 3-5
PARCEL F9 SAMPLING INVESTIGATION
SAMPLE LISTING FOR
TRAILER PARK/FORMER COAL STORAGE AREA-TUSCARORA DRIVE (AOI 71)
FORMER GRIFFISS AIR FORCE BASE

							ANALYTES			
Location	Date	Sample Number	Lab	Matrix	Type	Depth	TCL SVOCs	TCL Pest/PCBs	TAL Metals	% Solids
AOI 71	TBD	G071-NS01-Z1	TBD	Soil	NS	0"-2"	X	X	X	X
	TBD	G071-NS01-Z2	TBD	Soil	NS	2'-4'	X	X	X	X
	TBD	G071-NS02-Z2	TBD	Soil	NS	0"-2"	X	X	X	X
	TBD	G071-NS02-Z2	TBD	Soil	NS	2'-4'	X	X	X	X
	TBD	G071-NS02-Z2/D	TBD	Soil	NS	2'-4'	X	X	X	X
	TBD	G071-NS02-Z2/S	MRD	Soil	NS	2'-4'	X	X	X	X

Key:

AOI= Area of Interest
/D = duplicate
MS/MSD = matrix spike/matrix spike duplicate
NS= surface or near surface soil
PCB = polychlorinated biphenyls
Pest = pesticides
/S = split
SVOC = semivolatile organic compounds
TAL = Target Analyte List
TBD= to be determined
TCL = Target Compound List
QC = quality control sample
Z1= near surface soil depth 0"-2"
Z2= surface soil depth 2'-4'

TABLE 3-6
PARCEL F9 SAMPLING INVESTIGATION
SAMPLE LISTING FOR
MOBILE AVENUE/FORMER DRUM STORAGE AREA (AOI 72)
FORMER GRIFFISS AIR FORCE BASE

							ANALYTES			
Location	Date	Sample Number	Lab	Matrix	Type	Depth	TCL SVOCs	TCL Pest/PCBs	TAL Metals	% Solids
AOI 72	TBD	G072-NS01-Z1	TBD	Soil	NS	0"-2"	X	X	X	X
	TBD	G072-NS01-Z2	TBD	Soil	NS	2'-4'	X	X	X	X
	TBD	G072-NS02-Z1	TBD	Soil	NS	0"-2"	X	X	X	X
	TBD	G072-NS02-Z2	TBD	Soil	NS	2'-4'	X	X	X	X
	TBD	G072-NS03-Z1	TBD	Soil	NS	0"-2"	X	X	X	X
	TBD	G072-NS03-Z2	TBD	Soil	NS	2'-4'	X	X	X	X
	TBD	G072-NS04-Z1	TBD	Soil	NS	0"-2"	X	X	X	X
	TBD	G072-NS04-Z2	TBD	Soil	NS	2'-4'	X	X	X	X
	TBD	G072-NS05-Z1	TBD	Soil	NS	0"-2"	X	X	X	X
	TBD	G072-NS05-Z2	TBD	Soil	NS	2'-4'	X	X	X	X
	TBD	G072-NS06-Z1	TBD	Soil	NS	0"-2"	X	X	X	X
	TBD	G072-NS06-Z2	TBD	Soil	NS	2'-4'	X	X	X	X
	TBD	G072-NS06-Z2/D	TBD	Soil	NS	2'-4'	X	X	X	X
	TBD	G072-NS06-Z2/S	MRD	Soil	NS	2'-4'	X	X	X	X
	TBD	G072-NS07-Z1	TBD	Soil	NS	0"-2"	X	X	X	X
	TBD	G072-NS07-Z2	TBD	Soil	NS	2'-4'	X	X	X	X
	TBD	G072-NS08-Z1	TBD	Soil	NS	0"-2"	X	X	X	X
	TBD	G072-NS08-Z2	TBD	Soil	NS	2'-4'	X	X	X	X
	TBD	G072-NS09-Z1	TBD	Soil	NS	0"-2"	X	X	X	X
	TBD	G072-NS09-Z2	TBD	Soil	NS	2'-4'	X	X	X	X
	TBD	G072-NS10-Z1	TBD	Soil	NS	0"-2"	X	X	X	X
	TBD	G072-NS10-Z2	TBD	Soil	NS	2'-4'	X	X	X	X
	TBD	G072-NS10-Z2 (MS/MSD)	TBD	Soil/QC Matrix	NS	2'-4'	X	X	X	X
	TBD	G072-NS11-Z2	TBD	Soil	NS	2'-4'	X	X	X	X
	TBD	G072-NS011-Z2/D	TBD	Soil	NS	2'-4'	X	X	X	X
	TBD	G072-NS011-Z2/S	MRD	Soil	NS	2'-4'	X	X	X	X
	TBD	G072-NS12-Z1	TBD	Soil	NS	0"-2"	X	X	X	X
	TBD	G072-NS12-Z2	TBD	Soil	NS	2'-4'	X	X	X	X
	TBD	G072-NS13-Z1	TBD	Soil	NS	0"-2"	X	X	X	X
	TBD	G072-NS13-Z2	TBD	Soil	NS	2'-4'	X	X	X	X
	TBD	G072-NS14-Z1	TBD	Soil	NS	0"-2"	X	X	X	X
	TBD	G072-NS14-Z2	TBD	Soil	NS	2'-4'	X	X	X	X
	TBD	G072-NS15-Z1	TBD	Soil	NS	0"-2"	X	X	X	X
	TBD	G072-NS15-Z2	TBD	Soil	NS	2'-4'	X	X	X	X

Key:

AOI= Area of Interest
/D = duplicate
MRD = Missouri River Diovision laboratory
MS/MSD = matrix spike/matrix spike duplicate
NS= surface or near surface soil
PCB = polychlorinated biphenyls
Pest = pesticides
/S = split
SVOC = semivolatile organic compounds
TAL = Target Analyte List
TBD= to be determined
TCL = Target Compound List
QC = quality control sample
Z1= near surface soil depth 0"-2"
Z2= surface soil depth 2'-4'

TABLE 3-7
PARCEL F9 SAMPLING INVESTIGATION
SAMPLE LISTING FOR
BUILDING 5591 RAILROAD LOAD/UNLOAD AREA (AOI 169)
FORMER GRIFFISS AIR FORCE BASE

							ANALYTES			
Location	Date	Sample Number	Lab	Matrix	Type	Depth	TCL SVOCs	TCL Pest/PCBs	TAL Metals	% Solids
AOI 169	TBD	G069-NS01-Z1	TBD	Soil	NS	0"-2"	X	X	X	X
	TBD	G069-NS02-Z1	TBD	Soil	NS	2'-4'	X	X	X	X
	TBD	G069-NS01-Z2	TBD	Soil	NS	0"-2"	X	X	X	X
	TBD	G069-NS02-Z2	TBD	Soil	NS	2'-4'	X	X	X	X
	TBD	G069-NS02-Z2 (MS/MSD)	TBD	Soil/QC Matrix	NS	2'-4'	X	X	X	X
	TBD	G069-NS02-Z2/D	TBD	Soil	NS	2'-4'	X	X	X	X
	TBD	G069-NS02-Z2/S	MRD	Soil	NS	2'-4'	X	X	X	X

Key:

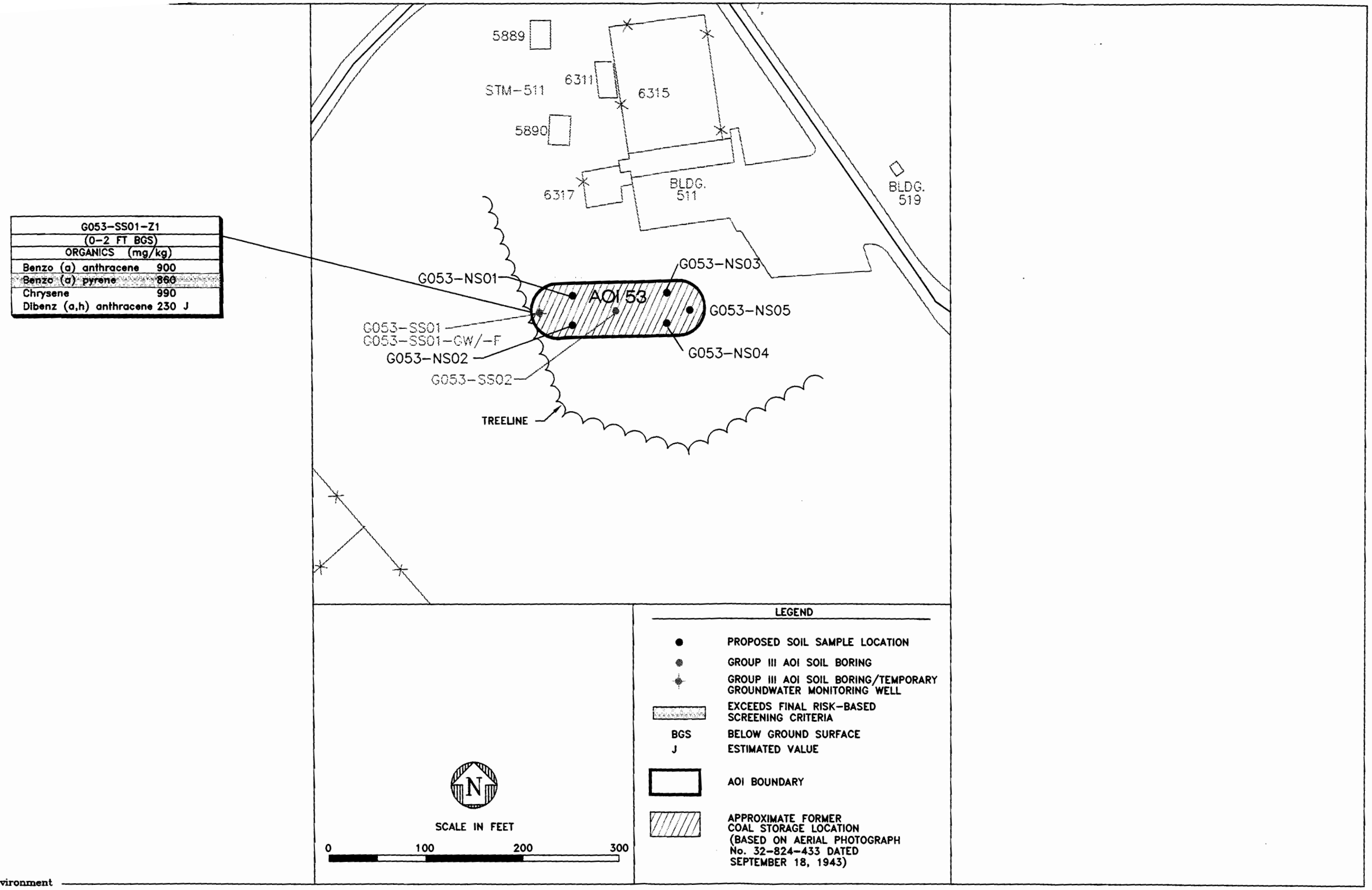
AOI= Area of Interest
/D = duplicate
MRD = Missouri River District laboratory
MS/MSD = matrix spike/matrix spike duplicate
NS= surface or near surface soil
PCB = polychlorinated biphenyls
Pest = pesticides
/S = split
SVOC = semivolatile organic compounds
TAL = Target Analyte List
TBD= to be determined
TCL = Target Compound List
QC = quality control sample
Z1= near surface soil depth 0"-2"
Z2= surface soil depth 2'-4'

TABLE 3-8
PARCEL F9 SAMPLING INVESTIGATION
SAMPLE LISTING FOR
RAILROAD TRACKS
FORMER GRIFFISS AIR FORCE BASE

							ANALYTES			
Location	Date	Sample Number	Lab	Matrix	Type	Depth	TCL SVOCs	TCL Pest/PCBs	TAL Metals	% Solids
Railroad	TBD	RT-NS01	TBD	Soil	NS	0"-2"	X	X	X	X
	TBD	RT-NS02	TBD	Soil	NS	0"-2"	X	X	X	X
	TBD	RT-NS03	TBD	Soil	NS	0"-2"	X	X	X	X
	TBD	RT-NS04	TBD	Soil	NS	0"-2"	X	X	X	X
	TBD	RT-NS05	TBD	Soil	NS	0"-2"	X	X	X	X
	TBD	RT-NS06	TBD	Soil	NS	0"-2"	X	X	X	X
	TBD	RT-NS07	TBD	Soil	NS	0"-2"	X	X	X	X
	TBD	RT-NS08	TBD	Soil	NS	0"-2"	X	X	X	X
	TBD	RT-NS09	TBD	Soil	NS	0"-2"	X	X	X	X
	TBD	RT-NS10	TBD	Soil	NS	0"-2"	X	X	X	X
	TBD	RT-NS10 (MS-MSD)	TBD	Soil/QC Matrix	NS	0"-2"	X	X	X	X
	TBD	RT-NS10/D	TBD	Soil	NS	0"-2"	X	X	X	X
	TBD	RT-NS10/S	MRD	Soil	NS	0"-2"	X	X	X	X

Key:

AOI= Area of Interest
/D = duplicate
MS/MSD = matrix spike/matrix spike duplicate
NS= surface or near surface soil
PCB = polychlorinated biphenyls
Pest = pesticides
RT = railroad tracks
/S = split
SVOC = semivolatile organic compounds
TAL = Target Analyte List
TBD= to be determined
TCL = Target Compound List
QC = quality control sample



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BUFF PLOTTED: 06/21/99 MEH

Figure 3-1 PROPOSED PARCEL F9 SAMPLE LOCATIONS FOR THE BUILDING 511 FORMER COAL STORAGE AREA (AOI 53)

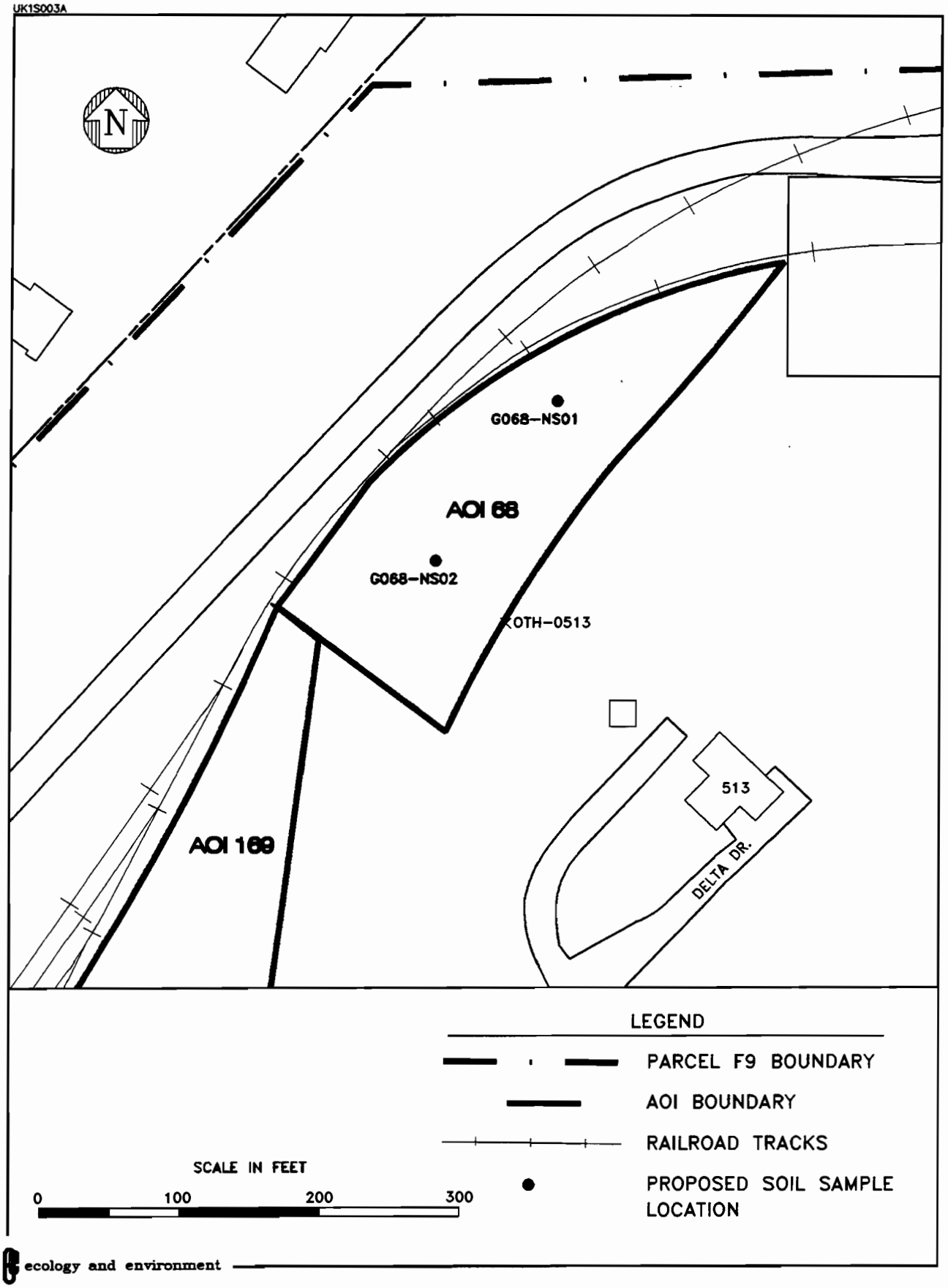


Figure 3-2
PROPOSED PARCEL F9 SAMPLE LOCATIONS
FOR THE ELLSWORTH ROAD FORMER DRUM
STORAGE AREA (AOI 68)

Date Plotted: 06/21/99 MEH

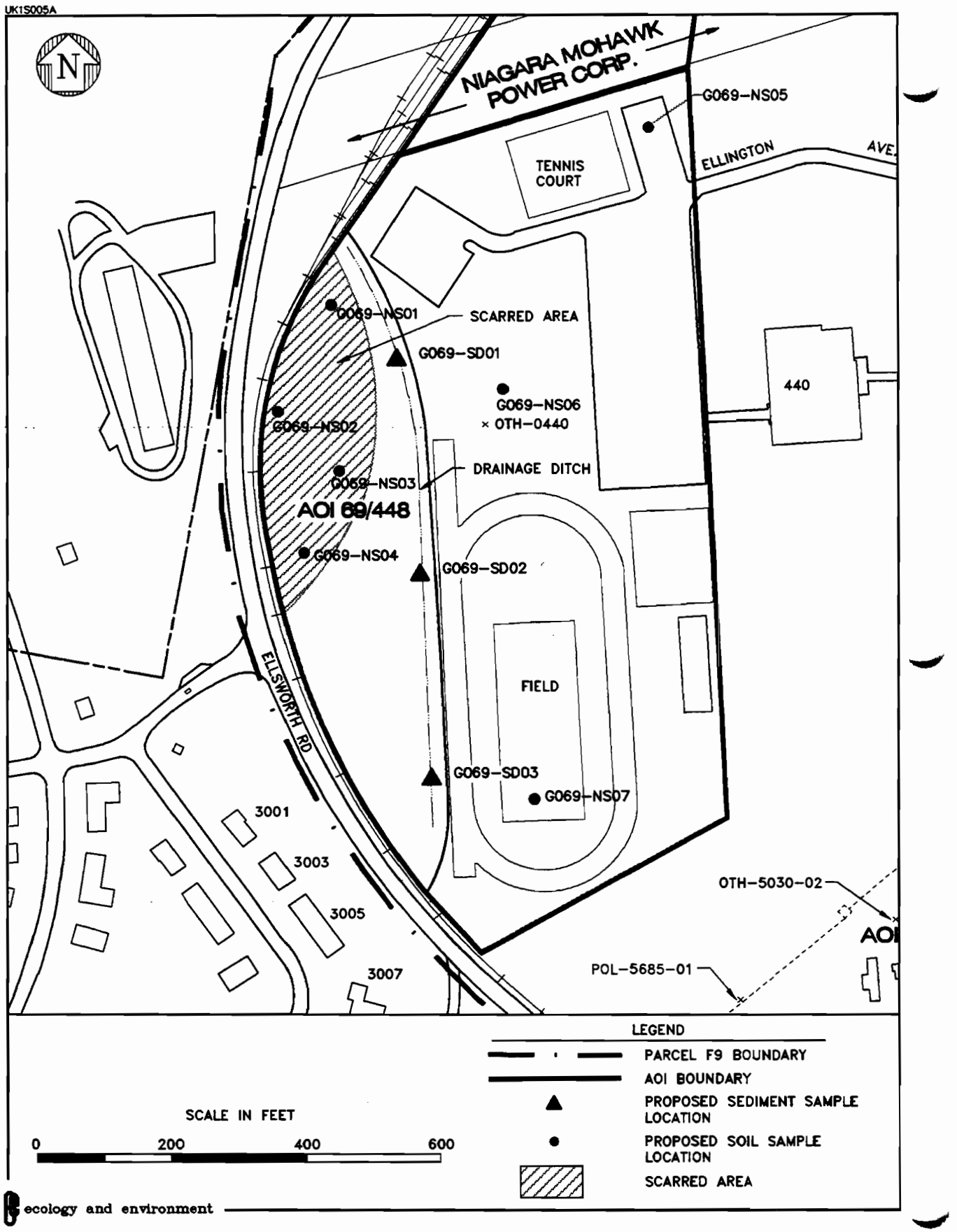
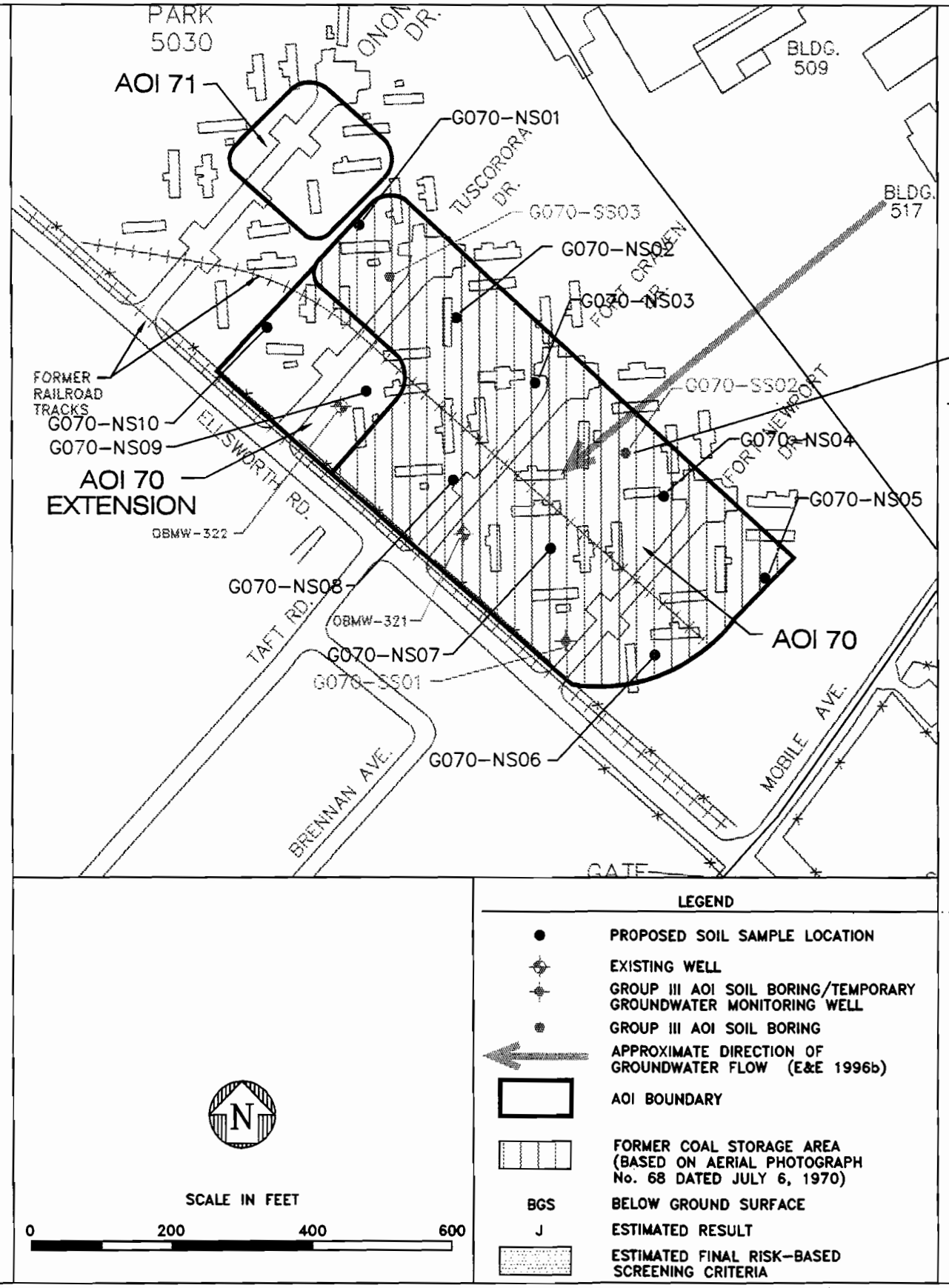


Figure 3-3
PROPOSED PARCEL F9 SAMPLE LOCATIONS
FOR THE WOODHAVEN HOUSING -
FORMER DRUM STORAGE AREA /
OPEN STORAGE AND DRAINAGE DITCH (AOI 69/448)

Date Plotted: 07/01/99 RTB

UK1S007B



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Figure 3-4 PROPOSED PARCEL F9 SAMPLE LOCATIONS FOR THE CURRENT TRAILER PARK – FORMER COAL STORAGE AREA (AOI 70)

BUFF Plotted: 06/21/99 MEH

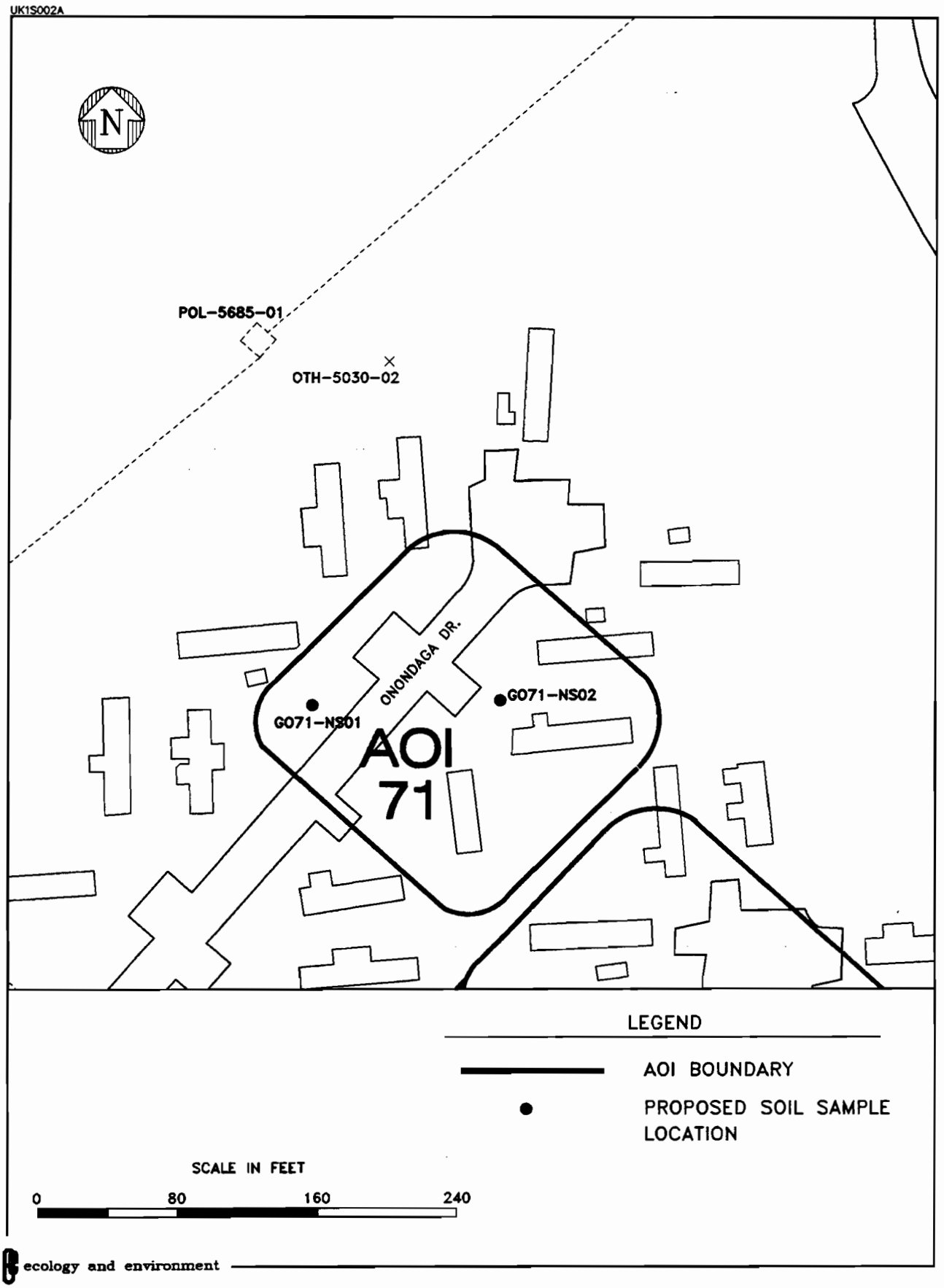


Figure 3-5
PROPOSED PARCEL F9 SAMPLE LOCATIONS
FOR THE TRAILER PARK -
FORMER DRUM STORAGE AREA
TUSCARORA DRIVE (AOI 71)

Date Plotted: 06/21/99 MEH

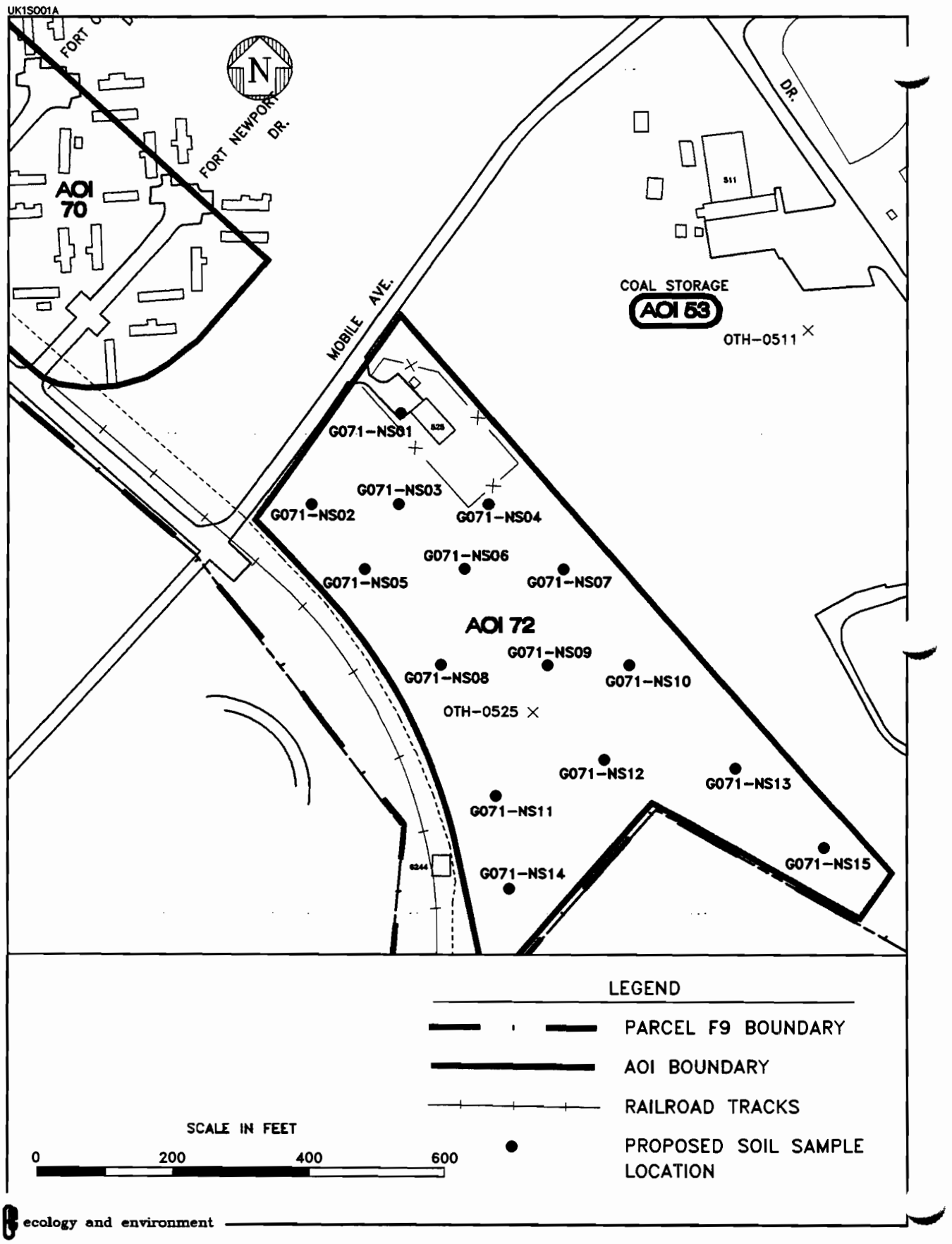


Figure 3-6
PROPOSED PARCEL F9 SAMPLE LOCATIONS
FOR THE MOBILE AVENUE -
FORMER DRUM STORAGE AREA (AOI 72)

BUFF Plotted :06/21/99 MEH

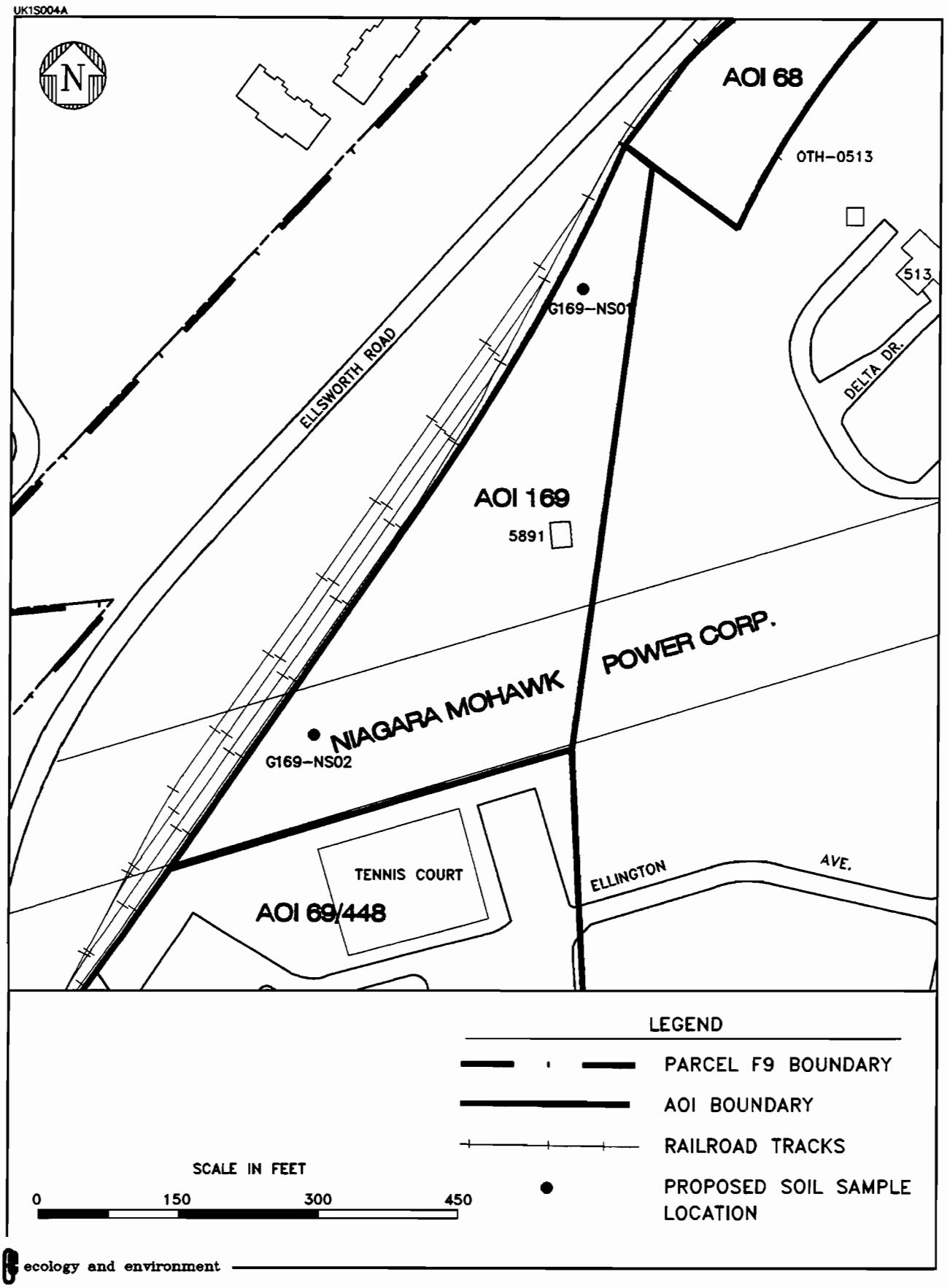


Figure 3-7
PROPOSED PARCEL F9 SAMPLE LOCATIONS
FOR THE BUILDING 5591 RAILROAD
LOAD/UNLOAD AREA (AOI 169)

BUFF Plotted :06/22/99 REB

UK1S0068

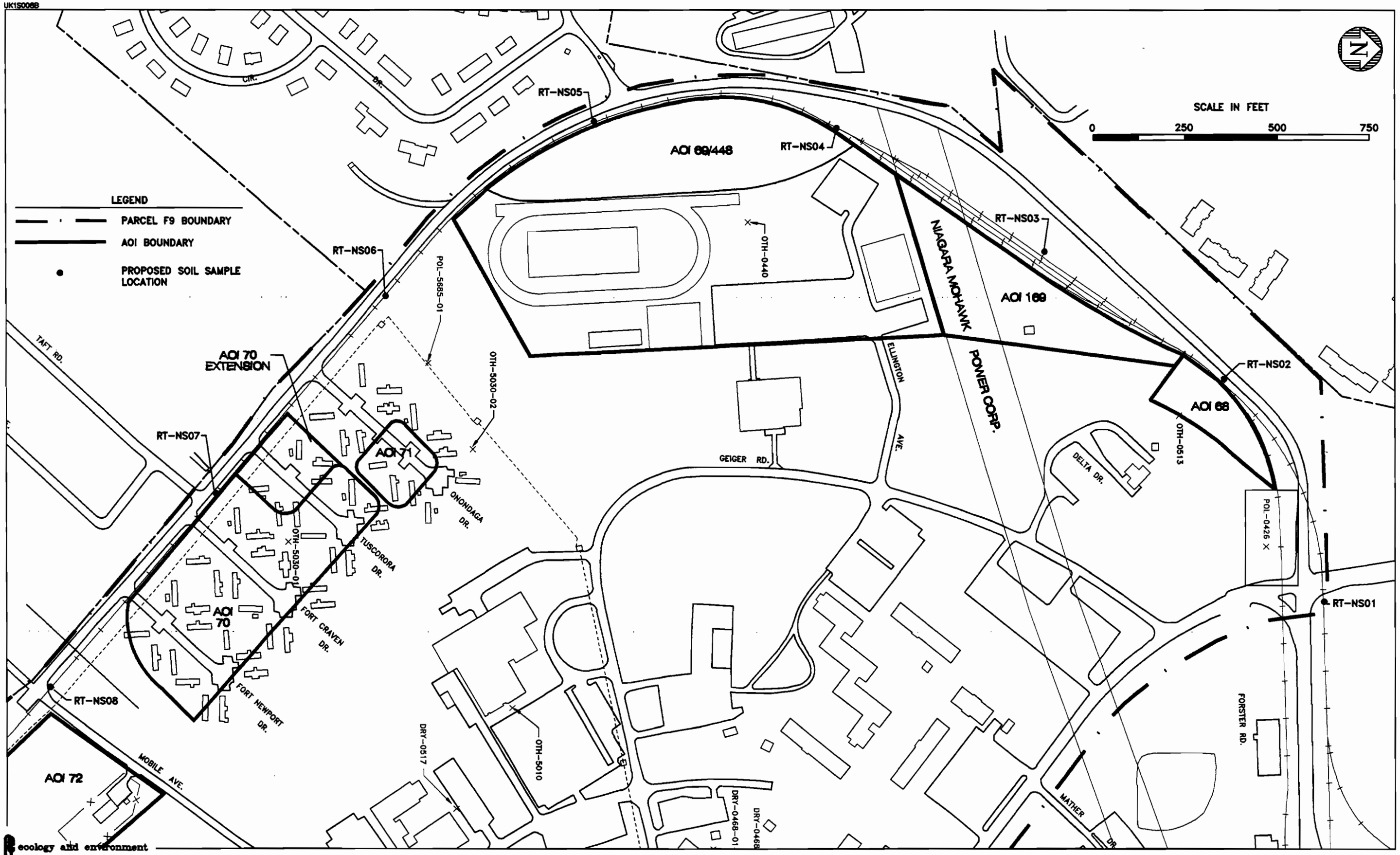
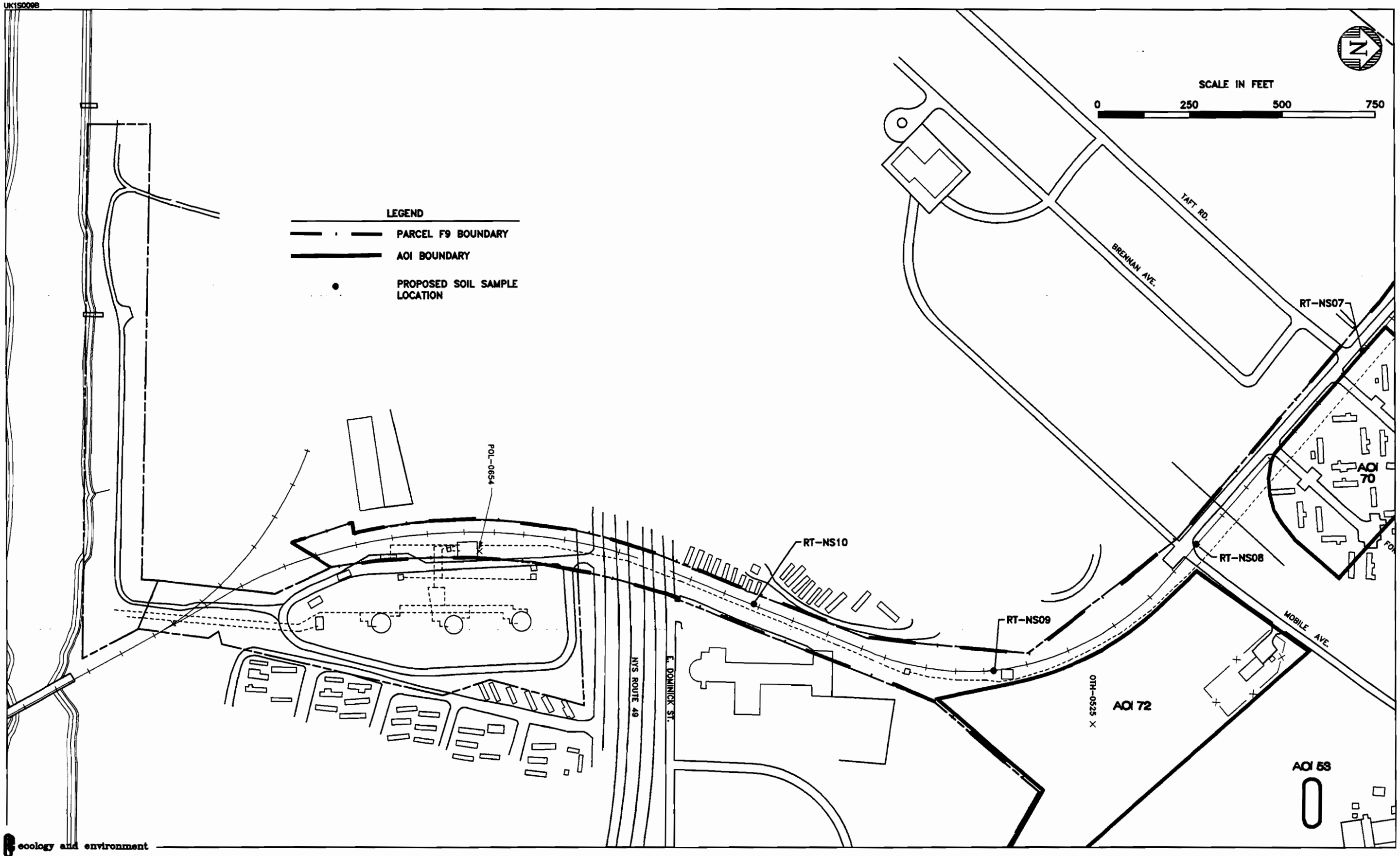


Figure 3-8A PROPOSED PARCEL F9 SAMPLE LOCATIONS FOR THE RAILROAD TRACK (NORTH AREA)

DOT FIGURES.DGN/4/1/99 MLH

UK1S009B



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Figure 3-8B PROPOSED PARCEL F9 SAMPLE LOCATIONS FOR THE RAILROAD TRACK (SOUTH AREA)

Plotted: 07/01/99 KLB

4

Field Sampling Plan Part II: Field Methodology

NS
near surface soil

SD
sediment

IDW
Investigation-Derived Waste

OD
outer diameter

ID
inner diameter

4.1 Introduction

The field work for this modification will include the collection of near surface soil (NS) and sediment (SD) samples. The work will be performed in accordance with applicable sections of the ESI FSP, HASP, and QAPjP (E & E 1997). Applicable sections of the ESI FSP include:

- 4.3 Field Notebooks;
- 4.6 Surface Water/Sediment Sampling Methods;
- 4.11 Equipment Decontamination;
- 4.12 Disposal of Investigation-Derived Waste (IDW); and
- 4.13 Site Survey.

Procedures not covered in Section 4 of the ESI FSP or which require minor modification are described below.

4.2 Near Surface Soil Sampling

Near surface soil samples will be collected from two depth intervals: 0 to 2 inches and 2 to 4 feet. A stainless steel trowel or spoon will be used for the collection of the shallower soil sample (0 to 2 inches). A drill rig will be used for the collection of the deeper soil sample (2 to 4 feet). The drill rig will be used to advance either a 2-inch outside diameter (OD), 2-foot-long split-spoon sampler or a 1.5-inch inside diameter (ID), 4-foot-long Geoprobe Macro-Core Sampler. Near surface soil sample collection will be performed according to the following procedures:

Trowel Method

Equipment and Supplies:

- Precleaned, stainless-steel sampling tools (trowel and spoons);
- Precleaned, stainless-steel bowl;
- Precleaned glass sample containers (see Table 4-1) equipped with teflon-lined lids or septa and certified "clean" per OSWER Directive 9240.9-05; and
- Cooler with ice.

Sampling Procedure:

- Decontaminate the trowel and spoons according to procedures outlined in Section 4.11 of the ESI FSP prior to collection of each sample.
- Using the trowel collect soil and empty it into a dedicated, precleaned, stainless-steel bowl each time it is filled until the desired total depth (2 inches) is achieved.
- Because no volatile organic compounds (VOCs) are proposed for collection, homogenize the sample and distribute to the appropriate sample containers (see Table 4-1) using a stainless-steel spoon.

VOC
volatile organic compound

- Immediately place the sample in a cooler with ice, cool, and then maintain sample temperature at 4°C.

Split Spoon Method

Equipment and Supplies:

- 2-inch OD carbon steel split-spoon sampler;
- Precleaned, stainless-steel utensils (i.e., spoons);
- Precleaned, stainless-steel bowl;
- Precleaned glass sample containers (see Table 4-1) equipped with teflon-lined lids or septa and certified "clean" per OSWER Directive 9240.9-05; and
- Cooler with ice.

Table 4-1 Summary of Sample Containers, Amounts, Preservation, and Holding Times, Griffiss Air Force Base

Method	Parameter	Sample Container[a,b]	Amount	Preservation	Holding Time	
					Extraction	Analysis
Soils and Sediments						
SW 8270C	BNAs (or PAHs)	One 8-oz. wide-mouth glass jar	Full	Cool to 4°C	5 days	40 days
SW 8081A/ SW8082	Pesticides/PCBs	One 8-oz. wide-mouth glass jar	Full	Cool to 4°C	5 days	40 days
ASTM_D2216	% solids	One 8-oz. wide-mouth glass jar	Full	Cool to 4°C	—	—
SW 6010B	Total TAL metals	One 8-oz. wide-mouth glass jar	Full	Cool to 4°C	NA	6 months; Mercury: 26 days
EW 415.2 (Mod.)	TOC	One 8-oz. wide-mouth glass jar	5g	Cool to 4°C	NA	26 days

Note: Holding times are from the time of sample collection. Soil samples being analyzed for BNAs, PAHs, pesticides/PCBs, TAL metals,and % solids require only one full 8-oz. jar for all parameters. If a sample is being analyzed for only one test, use the sample containers listed in the table.

[a] All containers to have teflon-lined lids.

[b] Samples chosen for quality assurance analysis require double the number of containers indicated.

Key:

BNA = Base-neutral-acid extractables.
g = Gram.
NA = Not applicable.
PAHs = Polynuclear aromatic hydrocarbons.
PCBs = Polychlorinated biphenyls.
SW = United States Environmental Protection Agency, "Test Methods for Evaluating Solid Wastes," SW-846, Third Edition, 1986.
TAL = Target Analyte List.
TOC = Total organic carbon.

Sampling Procedure:

- Decontaminate the split spoon sampler according to procedures outlined in Section 4.11 of the ESI FSP prior to collection of each sample.
- Advance the split spoon sampler 2 feet, withdraw and open the split spoon, discard the soil sample. Repeat until the desired total depth (4 feet) is achieved.
- Empty the split spoon into a dedicated, precleaned, stainless-steel bowl.
- Because no VOCs are proposed for collection, homogenize the sample and distribute to the appropriate sample containers (see Table 4-1) using a stainless-steel spoon.
- If additional sample volume is required for split or duplicate samples, a 3-inch OD carbon steel split-spoon will be used.
- Immediately place the sample in a cooler with ice, cool, and then maintain sample temperature at 4°C.

Geoprobe Macro-Core Method

Equipment and Supplies:

- Geoprobe soil probe machine;
- Macro-Core sampler and accessories;
- Acetate, removable, single-use liner;
- Precleaned, stainless-steel utensils (knives and spoons);
- Precleaned, stainless-steel bowl;
- Precleaned glass sample containers (see Table 4-1) equipped with teflon-lined lids or septa and certified "clean" per OSWER Directive 9240.9-05; and
- Cooler with ice.

Sampling Procedure:

- Decontaminate the Macro-Core sampler according to procedures outlined in Section 4.11 of the ESI FSP prior to collection of each sample.

- Advance the Macro-Core sampler to the desired sample depth using the Geoprobe. Retrieve the sampler, open, and remove the acetate liner. Slice the 4-foot liner longitudinally and open. If a split sample is desired, a precleaned, stainless-steel knife should be used to divide the liner contents in half, longitudinally.

- Because no VOCs are proposed for collection, empty the desired sample interval into a dedicated, precleaned, stainless-steel bowl.

- Homogenize the sample and distribute to the appropriate sample containers (see Table 4-1) using a stainless-steel spoon.

- Immediately place the sample in a cooler with ice, cool, and then maintain sample temperature at 4°C.

The sampling procedures described above will be repeated for the duplicate and split samples after moving the sampling device immediately adjacent to its original location.

4.3 Sample Labeling, Packaging, and Custody

Standard E & E labels prepared in the field will be used. Sample packaging and custody will be performed as described in the ESI FSP Sections 4.10-2 and 4.10-3.

5 References

Ecology and Environment, Inc., October 1997, *Field Sampling Plan, Health and Safety Plan, and Quality Assurance Project Plan for the Expanded Site Investigation Program at Griffiss Air Force Base, Rome, New York.*

_____, October 1997, *Quality Control Plan for the Expanded Site Investigation Program at Griffiss Air Force Base, Rome, New York.*

_____, March 1997, *Final Tables of AOIs for No Further Study, Griffiss Air Force Base, Rome, New York.*

_____, January 1997, *Confirmatory Sampling Report for 10 Areas of Interest (AOIs), Group III AOIs, Griffiss Air Force Base, Rome, New York.*

United States Environmental Protection Agency (EPA),1988, Report to Congress: *Wastes from the Combustion of Coal by Electric Utility Power Plants*, Office of Solid Waste and Emergency Response, Document No. PB88-177977.

A

Health and Safety Plan

(This Appendix includes an Existing Site Safety Plan Addendum Form for the proposed Parcel F9 AOI Investigation which is part of the Site-Specific Health and Safety Plan for tasks conducted at the Former Griffiss AFB.)

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EXISTING SITE SAFETY PLAN ADDENDUM FORM

Site Name: Former Griffiss AFB	TDD/PAN/Project No.: 001.002.UK01.00.01.00
Date of original SSP: 29 July 1997	
Date of amendment: 21 June 1999	
Date of proposed new work: July 6 – 9, 1999	

Added activities and hazard evaluations: This addendum extends the activities of "Task 2 – Near-Surface Soil Sampling" outlined in the original SSP (dated 7/29/97) to include July 6-9, 1999. Additionally, this activity will now include the use of a drill rig to insert 2-inch split-spoon samples to approximately 4 feet. Drilling Safety SOP to be added to existing SSP. Review hospital route.

Added monitoring activities: Monitoring to include LEL and CO at the exclusion zone. Refer to Table 8 of original SSP for Action Levels for Explosimeter use.

Level of protection: [ ] A [ ] B [(X)] C [X] D

Reason for up/downgrading: As stated in original SSP.

PPE: As outlined in original SSP. Hearing protection required while working around (within 20 feet) of drilling apparatus.

Decon: As outlined in original SSP. High-pressure steam will only be utilized in instances of heavily contaminated soil anthracene; otherwise, tubs to be used.

Team Members	Responsibility
Sherry Johnson	Team Leader - Geologist
Lea Angelaki	Safety Officer- Geologist

Equipment	Quantity	Equipment	Quantity
As outlined in original SSP			

THE TERMS OF THE ORIGINAL SSP SHALL BE IN EFFECT EXCEPT AS NOTED ON THIS FORM.

Prepared by: Lea Angelaki	Date: 6/21/99
Reviewed by: Keith Horn	Date: 6/21/99

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SITE-SPECIFIC HEALTH AND SAFETY PLAN

Project: Former Griffiss AFB

Project No.: KH-4000

TDD/PAN No.:

Project Location: Former Griffiss Air Force Base New York

Proposed Date of Field Activities: Fall 1997

Principal In Charge: Gerald A. Strobel, P.E.

Task Order Manager: Thomas Ferraro, P.G.

Original Prepared by: B. Wright

Date Prepared: 22 April 1995 (updated 2 July 96, 29 July 97, and 26 September 97)

Approved by: T. Siener

Date Approved: 7 October 1997

1. INTRODUCTION

1.1 POLICY

It is E & E's policy to ensure the health and safety of its employees, the public, and the environment during the performance of work it conducts. This site-specific health and safety plan (SHASP) establishes the procedures and requirements to ensure the health and safety of E & E employees for the above-named project. E & E's overall safety and health program is described in *Corporate Health and Safety Program for Toxic and Hazardous Substances* (CHSP). After reading this plan, applicable E & E employees shall read and sign E & E's Site-Specific Health and Safety Plan Acceptance form.

This SHASP has been developed for the sole use of E & E employees and is not intended for use by firms not participating in E & E's training and health and safety programs. Subcontractors are responsible for developing and providing their own safety plans.

This SHASP has been prepared to meet the following applicable regulatory requirements and guidance:

Applicable Regulation/Guidance
29 CFR 1910.120, Hazardous Waste Operations and Emergency Response (HAZWOPER)
Other: EM 385-1-1

1.2 SCOPE OF WORK

Description of Work: On-site tasks associated with field investigations at the Griffiss AFB will vary with each site. Activities that may be conducted during field work include:

Non-Intrusive Activities	Intrusive Activities
Geophysical Surveys	Near-Surface Soil Sampling
	Surface Water/Sediment Sampling
Decontamination	Soil Borings
	Subsurface Soil Sampling
	Groundwater Sampling
	Investigation Derived Waste (IDW) Sampling

Equipment/Supplies: Attachment 1 contains a checklist of equipment and supplies that will be needed for this work.

The following is a description of each numbered task:

Task Number	Task Description
1	Geophysical Surveys
2	Near-Surface Soil Sampling
3	Surface Water/Sediment Sampling
4	Soil Borings
5	Subsurface Soil Sampling
6	Groundwater Sampling
7	IDW Sampling (optional)
8	DECON
9	Test pit excavation at AOI 17 (optional task)

1.3 SITE DESCRIPTION

Site Map: A site map or sketch is attached at the end of this plan.

Site History/Description (see project work plan for detailed description):

Griffiss AFB has been realigned under the Base Realignment and Closure (BRAC). During the Expanded Site Investigation program, E & E will be conducting both intrusive and non-intrusive tasks.

Is the site currently in operation? ☒ Yes ☐ No

Locations of Contaminants/Wastes: This HASP contains information pertinent to general conditions at Griffiss AFB. The Field Operations Plan (FOP's) (Volume III) from Law Environmental, Inc., contain site-specific information pertaining to health and safety procedures to be implemented at each Area of Interest (AOI).

Types and Characteristics of Contaminants/Wastes:

☒ Liquid	☒ Solid	☐ Sludge	☐ Gas/Vapor
☒ Flammable/Ignitable	☒ Volatile	☐ Corrosive	☐ Acutely Toxic
☐ Explosive	☐ Reactive	☒ Carcinogenic	☐ Radioactive
☐ Medical/Pathogenic	Other:		

2. ORGANIZATION AND RESPONSIBILITIES

E & E team personnel shall have on-site responsibilities as described in E & E's standard operating procedure (SOP) for Site Inspection. The project team, which is planned at the time this HASP is issued, is identified below. Depending on availability, changes in personnel may be required when the field work commences.

Name	Site Role/Responsibility
Don Johnson	Project Geologist/Field Team Leader FTL
TBD	Site Safety Officer
Robert Meyers	Field Geologist
Richard Watt	Geophysicist
Gene Florentino	Geophysicist

3. TRAINING

Prior to work, E & E team personnel shall have received training as indicated below. As applicable, personnel shall have read the project work plan, sampling and analysis plan, and/or quality assurance project plan prior to project work.

Training	Required
40-Hour OSHA HAZWOPER Initial Training and Annual Refresher (29 CFR 1910.120)	X
Annual First Aid/CPR	X
Hazard Communication (29 CFR 1910.1200)	X
40-Hour Radiation Protection Procedures and Investigative Methods	

Training	Required
8-Hour General Radiation Health and Safety	
Radiation Refresher	
DOT and Biannual Refresher	
Other:	

4. MEDICAL SURVEILLANCE

4.1 MEDICAL SURVEILLANCE PROGRAM

E & E field personnel shall actively participate in E & E's medical surveillance program as described in the CHSP and shall have received, within the past year, an appropriate physical examination and health rating.

E & E's health and safety record (HSR) form will be maintained on site by each E & E employee for the duration of his or her work. E & E employees should inform the site safety officer (SSO) of any allergies, medical conditions, or similar situations that are relevant to the safe conduct of the work to which this SHASP applies.

4.2 RADIATION EXPOSURE

4.2.1 External Dosimetry

Although previous use of Thermoluminescent Dosimeter (TLD) Badges at this site has indicated no level of concern, it is E & E's policy that TLDs may be worn by any field employee if they choose to do so.

Pocket Dosimeters:

Other:

5. SITE CONTROL

5.1 SITE LAYOUT AND WORK ZONES

Site Work Zones: Refer to the maps (Figures 1-2 and 1-3) in the Field Sampling Plan for designated work areas.

Normally, the hazardous waste site will be divided into three zones: Zone 1 - Exclusion Zone; Zone 2 - Contamination Reduction Zone; and Zone 3 - Support Zone. These zones will be established on the basis of contamination potential, ranging from the highest levels of contamination in the exclusion zone to little or no contamination potential in the support zone. All zones will be defined and marked on the site map. Barricades and placards will be used when necessary to control access to all three zones.

The exclusion zone, the area of active site investigation (i.e., the area immediately surrounding each borehole), presents the highest risk of worker exposure. Personnel entering this zone will be required to wear the previously mandated level of protection. In some instances, more than one level of protection will be required within the same zone, depending on the tasks to be performed.

The contamination reduction zone will be a transition zone between the contaminated and clean zones. Decontamination of equipment and clothing will occur in this zone.

The support zone will be considered the noncontaminated or clean area. Support equipment will be located in this zone.

Site Access Requirements and Special Considerations:

Illumination Requirements:

TBD

Sanitary Facilities (e.g., toilet, potable water):

Available in Building 520. For more remote sites (AOI 9 and AOI 90), closer sanitary facilities will be located and designed prior to beginning work.

On-Site Communications:

Hand-held radio and telephone (Building 520).

Other Site-Control Requirements:

Conformance with existing site security policies (Oneida County Sheriff Patrol).

5.2 SAFE WORK PRACTICES

Daily Safety Meeting: A daily safety meeting will be conducted for all E & E personnel and documented on the Daily Safety Meeting Record form or in the field logbook. The information and data obtained from applicable site characterization and analysis will be addressed in the safety meetings and also used to update this SHASP, as necessary.

Work Limitations: Work shall be limited to a maximum of 12 hours per day. If 12 consecutive days are worked, at least one day off shall be provided before work is resumed. For heavy equipment operators, work shall be limited to a maximum of 10 hours. Work will be conducted in daylight hours unless prior approval is obtained and the illumination requirements in 29 CFR 1910.120(m) are satisfied.

Weather Limitations: Work shall not be conducted during electrical storms. Work conducted in other inclement weather (e.g., rain, snow) will be approved by project management and the regional safety coordinator or designee.

Other Work Limitations:

Buddy System: Field work will be conducted in pairs of team members according to the buddy system.

Line of Sight: Each field team member shall remain in the line of sight and within verbal communication of at least one other team member.

Eating, Drinking, and Smoking: Eating, drinking, smoking, and the use of tobacco products shall be prohibited in the exclusion and contamination reduction areas, at a minimum, and shall only be permitted in designated areas.

Contamination Avoidance: Field personnel shall avoid unnecessary contamination of personnel, equipment, and materials to the extent practicable.

Sample Handling: Protective gloves of a type designated in Section 7 will be worn when containerized samples are handled for labeling, packaging, transportation, and other purposes.

Other Safe Work Practices:

6. HAZARD EVALUATION AND CONTROL

6.1 PHYSICAL HAZARD EVALUATION AND CONTROL

Potential physical hazards and their applicable control measures are described in the following table for each task.

Hazard	Task Number	Hazard Control Measures
Biological (flora, fauna, etc.)	1,2,3,4,5,6,7,8,9	• Potential hazard: Poison Ivy/Oak; Ticks • Establish site-specific procedures for working around identified hazards. • Other:
Cold Stress	N/A	• Provide warm break area and adequate breaks. • Provide warm noncaffeinated beverages. • Promote cold stress awareness. • See *Cold Stress Prevention and Treatment* (attached at the end of this plan if cold stress is a potential hazard).
Compressed Gas Cylinders	2,3,4,5,6,7	• Use caution when moving or storing cylinders. • A cylinder is a projectile hazard if it is damaged or its neck is broken. • Store cylinders upright and secure them by chains or other means. • Other:
Confined Space	N/A	• Ensure compliance with 29 CFR 1910.146. • See SOP for Confined Space Entry. Additional documentation is required. • Other:
Drilling	4,5	• See SOP for Health and Safety on Drilling Rig Operations. Additional documentation may be required. • Other: • Other:
Drums and Containers	4,5,6,7,8	• Ensure compliance with 29 CFR 1910.120(j). • Consider unlabeled drums or containers to contain hazardous substances and handle accordingly until the contents are identified. • Inspect drums or containers and assure integrity prior to handling. • Move drums or containers only as necessary; use caution and warn nearby personnel of potential hazards.
		• Open, sample, and/or move drums or containers in accordance with established procedures; use approved drum/container-handling equipment. • Other:
Electrical	4,5,9	• Ensure compliance with 29 CFR 1910 Subparts J and S. • Locate and mark energized lines. • De-energize lines as necessary. • Ground all electrical circuits. • Guard or isolate temporary wiring to prevent accidental contact. • Evaluate potential areas of high moisture or standing water and define special electrical needs. • Other:
Excavation and Trenching	9	• Ensure that excavations comply with and personnel are informed of the requirements of 29 CFR 1926 Subpart P. • Ensure that no entry is made into excavations. • Identify special personal protective equipment (PPE) (see Section 7) and monitoring (see Section 8) needs if personnel are required to enter approved excavated areas or trenches.

Hazard	Task Number	Hazard Control Measures
		• Maintain line of sight between equipment operators and personnel in excavations/trenches. Such personnel are prohibited from working in close proximity to operating machinery. • Suspend or shut down operations at signs of cave in, excessive water, defective shoring, changing weather, or unacceptable monitoring results. • Other: • Other:
Fire and Explosion	4,5	• Inform personnel of the location(s) of potential fire/explosion hazards. • Establish site-specific procedures for working around flammables. • Ensure that appropriate fire suppression equipment and systems are available and in good working order. • Define requirements for intrinsically safe equipment. • Identify special monitoring needs (see Section 8). • Remove ignition sources from flammable atmospheres. • Coordinate with local fire-fighting groups regarding potential fire/explosion situations. • Establish contingency plans and review daily with team members. • Other:
Heat Stress	1,2,3,4,5,6,7,8,9	• Provide cool break area and adequate breaks. • Provide cool noncaffeinated beverages. • Promote heat stress awareness. • Use active cooling devices (e.g., cooling vests) where specified. • See *Heat Stress Prevention and Treatment* (attached at the end of this plan if heat stress is a potential hazard).
Heavy Equipment Operation	4,5,9	• Define equipment routes, traffic patterns, and site-specific safety measures. • Ensure that operators are properly trained and equipment has been properly inspected and maintained. Verify back-up alarms. • Ensure that ground spotters are assigned and informed of proper hand signals and communication protocols. • Identify special PPE (Section 7) and monitoring (Section 8) needs.
		• Ensure that field personnel do not work in close proximity to operating equipment. • Ensure that lifting capacities, load limits, etc., are not exceeded.
		• Other:
Heights (Scaffolding, Ladders, etc.)	N/A	• Ensure compliance with applicable subparts of 29 CFR 1910. • Identify special PPE needs (e.g., lanyards, safety nets, etc.) • Other:
Noise	2,4,5,9	• Establish noise level standards for on-site equipment/operations. • Inform personnel of hearing protection requirements (Section 7). • Define site-specific requirements for noise monitoring (Section 8). • Other:
Overhead Obstructions	2,4,5,9	• Wear hard hat. • Other:
Power Tools	4,5	• Ensure compliance with 29 CFR 1910 Subpart P. • Other:
Sunburn	1,2,3,4,5,6,7,8,9	• Apply sunscreen. • Wear hats/caps and long sleeves.

Hazard	Task Number	Hazard Control Measures
		• Other:
Utility Lines	4,5,9	• Identify/locate existing utilities prior to work. • Ensure that overhead, underground, and nearby utility lines are at least 25 feet away from project activities. • Contact utilities to confirm locations, as necessary. • Other:
Weather Extremes	1,2,3,4,5,6,7,8,9	• Potential hazards: • Establish site-specific contingencies for severe weather situations. • Provide for frequent weather broadcasts. • Weatherize safety gear, as necessary (e.g., ensure eye wash units cannot freeze, etc.). • Identify special PPE (Section 7) needs. • Discontinue work during severe weather. • Other:
Other:		•
Other:		•

N/A - Not applicable
* To be determined during daily health and safety meetings based on site conditions.

6.2 CHEMICAL HAZARD EVALUATION AND CONTROL

6.2.1 Chemical Hazard Evaluation

Adequate information for major known contaminants is included in the tables developed by LAW Engineering, pages B-25 through B-42 and in Table 6-1.

Table 6-1

POTENTIAL CHEMICAL HAZARD EVALUATION

Task Number	Compound	Exposure Limits (TWA)			Dermal Hazard (Y/N)	Route(s) of Exposure	Acute Symptoms	Odor Threshold/ Description	FID/PID	
		PEL	REL	TLV					Relative Response	Ioniz. Poten. (eV)
4,5,9	H_2S (hydrogen sulfide)	10 ppm; 15 ppm (Ceil.)	10 ppm (Ceil.)	10 ppm; 15 ppm (Ceil)		Inhal, Ing, Contact	Apnea, Eye Irritation, Irrit. Resp, System, Dizzy, HA, Irritability	Rotten Eggs		10.46 eV
Seepages B-25 through B-42 for other potential chemical hazards of concern.										

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6.2.2 Chemical Hazard Control

An appropriate combination of engineering/administrative controls, work practices, and PPE shall be used to reduce and maintain employee exposures to a level at or below published exposure levels (see Section 6.2.1).

Applicable Engineering/Administrative Control Measures:

When possible, work activities will be conducted upwind of the contamination source. Also, tasks will be planned when possible in such a way as to limit duration of activities in the hot zone (see Table 6-2).

PPE: See Section 7.2.

TABLE 6-2 CHEMICAL HAZARDS AND CONTROL MEASURES BY SITE

			CONTROL MEASURES				
SITE NUMBER	CHEMICAL HAZARDS	TASK DESCRIPTIONS	LEVEL OF PROTECTION D	C	B	INSTRUMENT	COMMENT
AOI 7	Lead	Near-surface soil sampling	X	(X)		OVA	Monitor for volatile organics in BZ
	Copper	Surface boring	X	(X)			during drilling operations
	Phosphorus	Groundwater screening sample	X	(X)		---	Avoid creating dust
AOI 9	VOCs	Soil gas	X	(X)		OVA	Monitor for volatile organics in BZ
	Metals	Subsurface boring	X	(X)			during drilling operations
	Pesticides	Groundwater screening smaple	X	(X)		LEL/O2	Monitor for LEL in the borehole
	PCBs	Surface water	X	(X)			during drilling operations
	Petroleum compounds	Sediment sample	X	(X)		---	Avoid creating dust
	Semi-volatile compounds						
AOI 16/193	VOCs	Subsurface boring	X	(X)		OVA	Monitor for volatile organics in BZ
	PAHS	Groundwater screening smaple	X	(X)			during drilling operations
	Trichloroethylene					LEL/O2	Monitor for LEL in the borehole
						---	Avoid creating dust
AOI 17	VOCs	Near-surface soil sampling	X	(X)		OVA	Monitor for volatile organics in BZ
	Semi-volatile compounds	Subsurface boring	X	(X)		LEL/O2	Monitor for LEL in the borehole
	Pesticides	Groundwater screening sample	X	(X)			during drilling operations
	PCBs					---	Avoid creating dust
	Petroleum compounds						
	Metals						
AOI 24	Lead	Near-surface soil sampling	X	(X)		OVA	Monitor for volatile organics in BZ
	PAHs					---	Avoid creating dust

TABLE 6-2 CHEMICAL HAZARDS AND CONTROL MEASURES BY SITE

SITE NUMBER	CHEMICAL HAZARDS	TASK DESCRIPTIONS	CONTROL MEASURES: LEVEL OF PROTECTION D	C	B	INSTRUMENT	COMMENT
AOI 58/101	VOCs	Subsurface boring	X	(X)		OVA	Monitor for volatile organics in BZ
	Semi-volatile compounds	Groundwater screening sample	X	(X)		LEL/O2	Monitor for LEL in the borehole during drilling operations
	PCBs						
	Petroleum compounds					---	Avoid creating dust
AOI 67	PCBs	Near-surface soil sampling	X	(X)		OVA	Monitor for volatile organics in BZ
							Avoid creating dust
AOI 90							
	Semi-volatile compounds	Near-surface soil sampling	X	(X)		OVA	Monitor for volatile organics in BZ
	Petroleum compounds						Monitor southeast vault prior to entry
	Lead					---	Avoid creating dust
AOI 100							
	VOCs	Near-surface soil sampling	X	(X)		OVA	Monitor for volatile organics in BZ
	Semi-volatile compounds	Subsurface boring	X	(X)		LEL/O2	Monitor for LEL in the borehole during drilling operations
	Petroleum compounds	Groundwater screening sample	X	(X)			
	Metals					---	Avoid creating dust
AOI 102							
	Pesticides	Near-surface soil sampling	X	(X)		OVA	Monitor for volatile organics in BZ
		Subsurface boring	X	(X)			during drilling operations
		Groundwater screening sample	X	(X)			Avoid creating dust
		Groundwater-existing well	X	(X)			

KEY:
BZ = Breathing Zone
LEL = Lower Explosive Limit
LEL/O2 = combustible gas/ oxygen meter
OVA = Organic Vapor Analyzer
PAH = Polycyclic Aromatic Hydrocarbon
PCBs = Polychlorinated Biphenyls
VOC = Volatile Organic Compound

7. LEVEL OF PROTECTION AND PERSONAL PROTECTIVE EQUIPMENT

7.1 LEVEL OF PROTECTION

The following levels of protection (LOPs) have been selected for each work task based on an evaluation of the potential or known hazards, the routes of potential hazard, and the performance specifications of the PPE. On-site monitoring results and other information obtained from on-site activities will be used to modify these LOPs and the PPE, as necessary, to ensure sufficient personnel protection. The authorized LOP and PPE shall only be changed with the approval of the regional safety coordinator or designee. Level A is not included below because Level A activities, which are performed infrequently, will require special planning and addenda to this SHASP.

Task Number	B	C	D	Modifications Allowed
1			X	No hard hat/safety glasses, Tyvek optional
3,4,5,6,8,9		(X)	X	Splash protection
7		(X)	X	No respirator required if OVA readings do not exceed background in breathing zone

Note: Use "X" for initial levels of protection. Use "(X)" to indicate levels of protection that may be used as site conditions warrant.

7.2 PERSONAL PROTECTIVE EQUIPMENT

The PPE selected for each task is indicated below. E & E's PPE program complies with 29 CFR 1910.120 and 29 CFR 1910 Subpart I and is described in detail in the CHSP. Refer to 29 CFR 1910 for the minimum PPE required for each LOP.

PPE	Task Number/LOP								
	1	2	3	4	5	6	7	8	9
Full-face APR Ultra Twin		(X)	(X)	(X)	(X)	(X)	(X)	(X)	(X)
PAPR									
Cartridges:									
H									
GMC-H		(X)	(X)	(X)	(X)	(X)	(X)	(X)	(X)
GMA-H									
Other:									
Positive-pressure, full-face SCBA									
Spare air tanks (Grade D air)									
Positive-pressure, full-face, supplied-air system									
Cascade system (Grade D air)									
Manifold system									

PPE	Task Number/LOP								
	1	2	3	4	5	6	7	8	
5-Minute escape mask									
Safety glasses		X	X	X	X	X	X	X	X
Monogoggles									
Coveralls	(X)	(X)	(X)	(X)	(X)	(X)	(X)	(X)	(X)
Protective clothing:									
Tyvek		(X)	(X)	(X)	(X)	X	X	X	(X)
Saranex						(X)	(X)	(X)	
Other:									
Splash apron									
Inner gloves:									
Cotton									
Nitrile		(X)	(X)	(X)	(X)	(X)	(X)	(X)	(X)
Latex									
Other:									
Outer gloves:									
Viton									
Rubber									
Neoprene			X	(X)	(X)	X	X	X	(X)
Nitrile									
Other:									
Work gloves	(X)								
Safety boots	X	X	X	X	X	X	X	X	X
Neoprene safety boots (as per ANSI Z41)									
Boot covers (type: Disposable booties)			(X)	(X)	(X)	(X)	X	X	(X)
Hearing protection (type:)			(X)	(X)					
Hard hat		(X)		X	X				X
Face shield									
Other:									
Other:									

8. HEALTH AND SAFETY MONITORING

Health and safety monitoring will be conducted to ensure proper selection of engineering/administrative controls, work practices, and/or PPE so that employees are not exposed to hazardous substances at levels that exceed permissible exposure/dose limits or published exposure levels. Health and safety monitoring will be conducted using the instruments, frequency, and action levels described in Table 8-1. Health and safety monitoring instruments shall have been appropriately calibrated and/or performance-checked prior to use.

Table 8-1

HEALTH AND SAFETY MONITORING

Instrument	Task Number	Contaminant(s)	Monitoring Location	Monitoring Frequency	Action Levels[a]	
☐ PID (e.g., HNu IS-101) ☒ FID (e.g., OVA 128-GC)	2,3,4,5,6,7, 9	Volatile Organic Vapors	See Pertinent AOIs	Continuously during drilling (for tasks 4 and 5); as needed for other tasks	**Unknown Vapors** Background to 1 ppm: Level D 1 to 5 ppm above background: Level C 5 to 500 ppm above background: Level B >500 ppm above background: Level A	**Contaminant-Specific**
Oxygen Meter/Explosimeter	4,5,9	Explosive atmospheres	See Pertinent AOIs	Continuously during drilling	**Oxygen** <19.5% or >22.0%: Evacuate area; eliminate ignition sources; reassess conditions. 19.5 to 25.0%: Continue work in accordance with action levels for other instruments.	**Explosivity** ≤10% LEL: Continue work in accordance with action levels for other instruments; monitor continuously for combustible atmospheres. >10% LEL: Evacuate area; eliminate ignition sources; reassess conditions.
Radiation Alert Monitor (Rad-mini or RAM-4)	1,4,5,9	Radiation	See Pertinent AOIs	Continuously	<0.1 mR/hr: Continue work in accordance with action levels for other instruments. ≥0.1 mR/hr: Evacuate area; reassess work plan and contact radiation safety specialist.	
Mini-Ram Particulate Monitor	N/A		See Pertinent AOIs		**General/Unknown** Evaluate health and safety measures when dust levels exceed 2.5 milligrams per cubic meter.	**Contaminant-Specific**
H_2S	4,5,9	H_2S	See Pertinent AOIs	Continuously	≥4 ppm: Leave area and consult with SSO.	

[a] Unless stated otherwise, airborne contaminant concentrations are measured as a time-weighted average in the worker's breathing zone. Acceptable concentrations for known airborne contaminants will be determined based on OSHA/NIOSH/ACGIH and/or NRC exposure limits.

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9. DECONTAMINATION PROCEDURES

Personnel Decontamination Procedures: All equipment, materials, and personnel will be evaluated for contamination upon leaving the exclusion area. Equipment and materials will be decontaminated and/or disposed and personnel will be decontaminated, as necessary. Decontamination will be performed in the contamination reduction area or any designated area such that the exposure of uncontaminated employees, equipment, and materials will be minimized. Decontamination will consist of disrobing and properly disposing of all tyveks, gloves, and boots in bags labeled "Hot Trash." Following this procedure, all field personnel will wash their hands and face with soap and potable water. Personnel should shower at the end of each work shift. Any excessive exposure to contaminated soil or groundwater will be immediately brought to the attention of the site SSO.

Equipment/Material Decontamination Procedures (see additional specifications in work plan): One or a combination of the following—High-pressure steam, alconox soap, 10% nitric acid rinse, deionized water.

Ventilation: All decontamination procedures will be conducted in an open, well-ventilated area.

PPE Requirements for E & E Personnel Performing Equipment Decontamination: Work gloves and tyvek coveralls will be worn if on-site monitoring indicates presence of contamination.

Disposition of Disposable PPE: Disposable PPE must be rendered unusable and disposed of in an appropriate manner.

Disposition of Decontamination Wastes (e.g., dry wastes, decontamination fluids, etc.): As specified in the work plan and contract scope of work.

10. EMERGENCY RESPONSE

This section contains additional information pertaining to on-site emergency response and does not duplicate pertinent emergency response information contained in earlier sections of this plan (e.g., site layout, monitoring equipment, etc.). Emergency response procedures will be rehearsed regularly, as applicable, during project activities.

10.1 EMERGENCY RESPONSIBILITIES

All Personnel: All personnel shall be alert to the possibility of an on-site emergency; report potential or actual emergency situations to the team leader and SSO; and notify appropriate emergency resources, as necessary.

Team Leader: The team leader will determine the emergency actions to be performed by E & E personnel and will direct these actions. The team leader also will ensure that applicable incidents are reported to appropriate E & E and client project personnel and government agencies.

SSO: The SSO will recommend health/safety and protective measures appropriate to the emergency.

Other:

Other:

10.2 LOCAL AND SITE RESOURCES (including phone numbers)

Ambulance: AMCARE Ambulance Service, Inc. 315/339-5600

Hospital:
Rome Hospital, Rome NY
911 (emergency)
(315)338-7000; (315)336-1234

Directions to Hospital (see Figure 10-1 attached at the end of this plan):

Exit base through Mohawk Gate (west side) on Mohawk drive. Go west approximately one mile, and turn left on Black River Boulevard. Hospital is on right within 0.25 miles.

Poison Control: Poison Control Center, Rome 800/252-5655

Police Department: Oneida County Sheriff, Ext. 3710

Fire Department: City of Rome, Emergency Phone Number: 315/336-1234, Ext. 7117

Client Contact: AFBCA/OL-X, Environmental Section, Building 301, Ext. 2275

Site Contact: AFBCA/OL-X, Environmental Section, Building 301, Ext. 2275

On-Site Telephone Number: 315/339-1185

Cellular Telephone Number: TBD

Radios Available:

Other:

10.3 E & E EMERGENCY CONTACTS

E & E Emergency Response Center (24 Hours):	716/684-8940	
Corporate Health and Safety Director, Dr. Paul Jonmaire:	716/684-8060 (office) 716/655-1260 (home)	
Regional Office Contact:		(office)
		(home)
Other:		(office)
		(home)

10.4 OTHER EMERGENCY RESPONSE PROCEDURES

On-Site Evacuation Signal/Alarm (must be audible and perceptible above ambient noise and light levels):

On-Site Assembly Area: Building 520

Emergency Egress Route to Get Off Site: Nearest gate or as directed by base security (Oneida County Sheriff).

Off-Site Assembly Area: N/A

Preferred Means of Reporting Emergencies: Two-way radio and telephone.

Site Security and Control: In an emergency situation, personnel will attempt to secure the affected area and control site access.

Emergency Decontamination Procedures: Emergency eyewash will be available in first aid kit(s). Clean running water will be available in Building 520.

PPE: Personnel will don appropriate PPE when responding to an emergency situation. The SSO and Section 7 of this plan will provide guidance regarding appropriate PPE.

Emergency Equipment: Appropriate emergency equipment is listed in Attachment 1. Adequate supplies of this equipment shall be maintained in the support area or other approved work location.

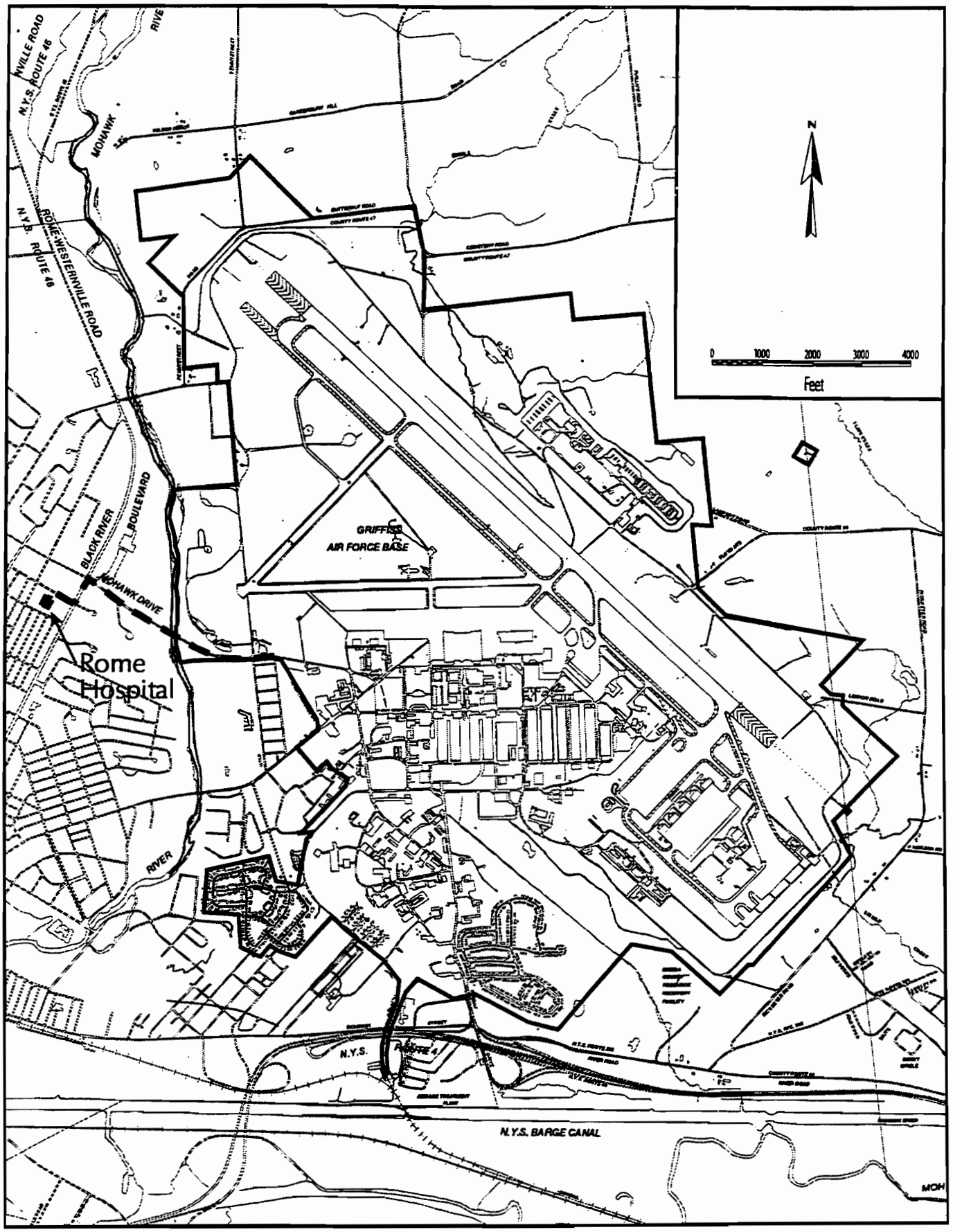
Incident Reporting Procedures: Notify site safety officer and field team leader. The base and AFBCA will be immediately notified, and appropriate incident reports will be completed by these personnel.

ATTACHMENT 1
EQUIPMENT/SUPPLIES CHECKLIST

INSTRUMENTATION	No.	EMERGENCY EQUIPMENT	No.
OVA	1	First aid kit	2
Thermal desorber		Stretcher	
O_2/explosimeter w/cal. kit	1	Portable eye wash	2
Photovac tip		Blood pressure monitor	
HNu (probe: eV)		Fire blanket	
Magnetometer	1	Fire extinguisher	
Pipe locator		Thermometer (medical)	
Weather station		Spill kit	
Draeger tube kit (tubes:)			
Brunton compass	1		
Real-time cyanide monitor			
Real-time H_2S monitor	1		
Heat stress monitor			
Noise equipment		**DECONTAMINATION EQUIPMENT**	
Personal sampling pumps and supplies		Wash tubs	2
MiniRam dust monitor		Buckets	
Mercury monitor		Scrub brushes	2
Spare batteries (type:)		Pressurized sprayer	
EM31	1	Spray bottle	2
EM61			
		Detergent (type: Alconox)	1
RADIATION EQUIPMENT/SUPPLIES		Solvent (type: HN03 [10%])	1
Documentation forms		Plastic sheeting	1
Portable ratemeter		Tarps and poles	
Scaler/ratemeter		Trash bags	1
1" NaI gamma probe		Trash cans	
2" NaI gamma probe		Masking tape	
ZnS alpha probe		Duct tape	1
GM pancake probe		Paper towels	1
Tungsten-shielded GM probe		Face mask	1
Micro R meter		Face mask sanitizer	
Ion chamber		Step ladders	
Alert monitor	1	Distilled water	
Pocket dosimeter		Deionized water	1
Dosimeter charger			
Radiation warning tape			
Radiation decon supplies			
Spare batteries (type: _____)			

ATTACHMENT 1
EQUIPMENT/SUPPLIES CHECKLIST

SAMPLING EQUIPMENT		MISCELLANEOUS (Cont.)	
8-oz. bottles	TBD	Gatorade or equivalent	TBD
Half-gallon bottles	TBD	Tables	
VOA bottles	TBD	Chairs	
String		Weather radio	
Hand bailers	5	Two-way radios	4
Thieving rods with bulbs	3	Binoculars	
Spoons	6	Megaphone	
Knives	2	Cooling vest	
Filters	24		
Bottle labels	TBD		
		SHIPPING EQUIPMENT	
		Coolers	TBD
MISCELLANEOUS		Paint cans with lids, 7 clips each	
Pump (hand)	1	Vermiculite	
Surveyor's tape		Shipping labels	TBD
100' Fiberglass tape		DOT labels:	
300' Nylon rope		"Up"	TBD
Nylon string		"Danger"	TBD
Surveying flags	TBD	"Inside Container Complies ..."	TBD
Camera	1	Hazard Group	
Film	1	Strapping tape	TBD
Bung wrench	1	Baggies	TBD
Soil auger	1	Custody seals	TBD
Pick		Chain-of-custody forms	TBD
Shovel		Federal Express forms	TBD
Catalytic heater		Clear packing tape	4
Propane gas		Permanent markers	6
Banner tape	1		
Surveying meter stick			
Chaining pins and ring			
Logbooks (large, small)	8		
Required MSDSs			
Intrinsically safe flashlight	1		
Potable water			



Route to Hospital From Griffiss AFB

Heat Injury Prevention, Recognition and Treatment

Field operations during the summer months can create a variety of hazards to E&E personnel. Of main concern are heat related injuries, which may become health or life threatening if not properly treated. Therefore, it is important that all E&E personnel be knowledgeable in the preventive measures, symptom recognition, and effective treatment procedures for heat related injuries.

COOLING MECHANISM

The body's complex thermoregulatory system, links the main organs, the blood supply, the central nervous system and the skin. The central nervous system regulates the requirement for cooling of the main organs; the organs are cooled by the flow of blood; the blood is cooled through it's routing through the skin; and the skin is cooled through the actions of the environment (temperature, humidity, and air movement).

This system keeps the body temperature within a small operating range maintaining a delicate balance between heat gains and loss. An internal body "core" temperature of 99F is considered normal. But core temperatures may vary between 97F and 101F, depending on activity. A core temperature of more than 101F in a healthy person is cause for concern, as temperatures nearing 105F may be life threatening.

Changes in any of the cooling mechanisms, such as loss of blood (injury), damage to the skin (sunburn), CNS damage (from chemical exposure) or environmental changes (heat, humidity, wind), will alter this mechanism and at times over tax it to the point of injury.

EFFECTS OF HEAT

Through the normal processes within the body, a predictable amount of heat is generated. When this heat is lost at a rate higher than its production, the body stays cool. As a person's activities increase, so too does the amount of heat generated by the body. As accumulated heat increases the body's temperature, various processes within the body speed up in an attempt to cool the body. This in turn, also increases the general temperature of the body.

The results are that now; not only is there the normal heat to eliminate, but the additional heat created by the added work load **and** the heat created by heightened activity of the internal processes of the body. All of this heat must be reduced to allow the body to operate effectively. Unless the body is allowed to rest and cool, this vicious circle will inevitably lead to an over taxation of the body's cooling mechanisms to a point of exhaustion, and a complete shutdown.

HEAT INJURY PREVENTION

The most important prevention measure is knowledge. This includes:

- The environment in which work will be accomplished.
- The preventive measures that can be taken.
- The signs and symptoms of heat injuries.
- The treatment procedures for each type of injury.
- The condition and limitations of the working personnel (age, physical condition, health problems, past heat related injuries).
- The local EMS phone number (911 in effect?), and the location of the nearest medical treatment facility or first aid provider (fire department, police)

Preventative Measures

- Replenishment of lost fluids and salt.

  Although water and a balanced diet should replace most lost fluids and salts, increased activity and stress requires increased replenishment of these constituents. "Gatorade", or it's equivalent are designed for this purpose. It is recommended that these types of drinks, along with drinking water (not deionized) be available.

- Allow for rest breaks.

  Personnel working in hot climates should be allowed to remove themselves from direct sun exposure, or from any stressful environment (protection level) for a period of time to allow them to recuperate.

  When protective clothing (level C and above) must be worn by E&E personnel, the suggested guidelines for maximum wearing times (**per excursion**) and the rest/work periods (by level of protection) are noted on Tables 2 & 3.

- Revise Work Schedule.

  Take advantage of the cooler morning (5 to 10pm) and evening (6 to 9am) hours to perform work.

Table 1indicates the apparent temperature felt by the body according to temperature and humidity. As noted, this figure does not take into account the effects brought by air movement (wind).

- Use of Cooling Vests.

  There are a variety of cooling vest types. Some vests contain pockets, situated in strategic places, which hold packets of cooled fluids; other vests may circulate cooled fluids throughout the vest. The cooled fluids aid the body in reducing skin temperature.

HEAT RELATED INJURIES

Heat related injuries are classified into three categories:

- Heat Cramps, - which includes Heat Syncope, Heat Rash, and Heat Fatigue - (Transient)
- Heat Exhaustion (stress),
- Heat Stroke.

In addition to these injuries, sunburn may at times, (depending on the severity) be considered a heat injury. Even the slightest damage to the skin, through sunburn, will reduce its effective cooling properties and heighten the probability of other heat injuries occurring. Direct exposure to the sun that may result sunburn should be avoided (i.e., wearing long sleeve shirts/pants, and hats). The use of sun blocks, depending on the duration of the task, is recommended.

Heat Cramps:

Heat cramps will usually affect individuals when their normal rate of perspiration increases. This increase in perspiration leads to a large loss of water and salt creating an imbalance of electrolytes within muscle cells. The first muscles to be affected by this loss are usually the larger muscles of the body; the abdomen and legs. The result produces very painful, and at times debilitating, cramps of the legs and abdominal muscles. Another form of heat cramp, sometimes called a "side stitch", may result from drinking iced water or other drinks too quickly or in too large a quantity prior to or immediately following increased activity.

The symptoms of heat cramps are:

- Muscle cramps in the legs and/or abdomen,
- Pain accompanying cramps,
- Profuse sweating, and
- Feeling faint.

Heat Syncope:

This injury is normally experienced by those individuals required to stand immobile for long periods of time in hot environments. Heat Syncope is brought about by the lack of blood to the brain due to its pooling within dilated blood vessels and lower parts of the body. Heat syncope occurs quickly, and at most times without warning.

The symptoms of heat syncope are:

- Nausea,
- Dizziness, and
- Fainting.

Fainting (heat syncope), can be dangerous to those individuals controlling operations requiring concentration.

Heat Rash:

Heat rash is brought about by an inflammatory reaction of sweat retained within the skin due to the plugging of sweat glands. Heat rash normally occurs in those areas of the body where an individual perspires the most (arm pits, legs, groin)

The symptoms of heat rash are:

- Profuse tiny raised red vesicles (blister-like)
- Prickly sensations in affected areas.

Heat Fatigue - Transient:

Heat Exhaustion:

Heat exhaustion is caused by over taxation of the cooling mechanism through the pooling of blood in the vessels of the skin. As heat is transported from the interior of the body to the skin, the blood vessels within the skin become dilated to hold and cool the increased amount of blood. This leads to a decrease in the amount of blood available for use throughout the rest of the body. The heart, reacting to the decrease in blood supply, increases its attempt (beat rate and pressure) to move available blood. The blood that can be moved by the heart is overheated, increasing the overall temperature of the body.

In a continuing attempt to cool itself, the body increases the activity of other internal organs while decreasing the activity of still other "non-essential" organs. This condition, coupled with the loss of blood through its pooling in the skin, leads eventually to physical collapse.

The symptoms of heat exhaustion are:

- Weak pulse,
- Rapid and usually shallow breathing,
- Profuse perspiration,
- Fainting,
- Generalized weakness,
- Pale, clammy skin,
- Dizziness,
- Unconsciousness.

Fainting, caused by heat exhaustion, can be dangerous to those individuals operating machinery or controlling operations requiring concentration.

Heat Stroke:

Heat stroke is a profound disturbance of the body's thermoregulating mechanism, resulting in complete shutdown. It is usually associated with very high "core" temperature and collapse. At times heat stroke may result in convulsions, unconsciousness and even death. Direct exposure to sun, poor air circulation, poor physical conditioning, and advanced age (over forty) bear directly on the tendency of a person to suffer from heat stroke.

Heat stroke is a serious threat to life and carries a twenty-percent mortality rate.

The symptoms of heat stroke are:

- Dry, hot and flushed skin,
- Early loss of consciousness,
- Deep breathing at first, diminishing to shallow or absence,
- Body temperature reaching 105 to 106 degrees or higher, and
- Dilated pupils,
- Full and fast pulse,
- Muscle twitching, growing into convulsions,
- Sudden onset,

EMERGENCY TREATMENT

Quick and decisive actions are required to effectively treat heat injuries.

Heat Cramps:

- Remove the patient from direct exposure to the sun.
- Administer small sips of liquid (water or equivalent replenishing fluid) if the patient is conscious.
- Apply light manual massaging to cramping muscles.
- Transport the patient to the hospital if the cramps persist or worsen.

Heat Exhaustion:

- Remove the patient from direct exposure to the sun.
- Remove as much **outer** clothing as possible.
- Administer small sips of liquid (water or equivalent replenishing fluid) if the patient is conscious.
- Provide air movement to cool the patient (i.e., fan).
- Treat the patient for shock (cover, and raise legs).
- Transport the patient to the hospital if injury persists or worsens.

Heat Stroke: **THIS IS A MEDICAL EMERGENCY**

- Remove the patient from direct exposure to the sun.
- Remove as much clothing as possible.
- Reduce body temperature as fast as possible (water immersion, dousing and fanning). Cold packs may be placed under the armpits, in the groin area, around the neck, and/or around the ankles. The patient should **not** be immersed into ice water.
- Protect the patient from hurting themselves during any convulsions.
- Transport the patient to a medical treatment facility A.S.A.P.

PREDISPOSING CONDITIONS

There are a number of predisposing conditions which heighten a person's susceptibility to heat injuries, that should be considered when personnel are required to work in hot environments. Some of these conditions are:

- **Job requirement:**

  Where, when, how and how long a person is performing their required task relates directly to their exposure to the elements and their susceptibility to heat injury.

- **Age:**

  The older a person is, the more susceptible they are to suffering from a heat injury.

- **Weight:**

  Extra weight will require the body to work harder to keep it cool. Fat layers acts as depositories for blood and negatively insulate the skin.

- **Physical Condition:**

  The better physical condition a person is in, the less likely they are to suffer from a heat injury.

- **Health & Medications**:

  There are many health conditions, such as respiratory and circulatory maladies, pregnancy; and medications (i.e., blood pressure medications and some antibiotics), which increase a persons susceptibility to heat injury. E&E personnel known to fall in this category are restricted from working in high heat environments. This restriction is noted in the individuals' medical record.

- **Region of Abode:**

  Individuals who reside in a hot environment are less susceptible to heat injuries.

- **Acclimation:**

  Full acclimation requires approximately 2 weeks to develop. When feasible, revised work schedules should be planned to allow for acclimation. When full acclimation is not feasible, a work - rest cycle, which gradually increases heat exposure, should be used.

- **Alcohol use:**

  Due to its effect on the circulatory system, the use of alcohol increases the risk of heat injury.

- **Tobacco use:**

  Due to its effect on the circulatory system, the use of tobacco increases the risk of heat injury.

- **Prior heat injury:**

  A person who has suffered a heat injury is more prone to suffer another injury.

HEAT STRESS MONITORING

To fully understand the impact of the hot environment on the workers, and to prevent heat related injuries, monitoring of personnel should be accomplished. E&E personnel are monitored using the modified "Brouha monitoring procedure" as follows: (see figure 1)

- Prior to beginning work each day, baseline measurements of body temperature (5-7 minutes) and pulse (1 minute) are taken, for each worker.
- A conservative work - rest cycle is established according to local weather conditions, tasks, and PPE being used.
- After the first work cycle is completed, temperature and pulse are taken to compare with baseline measurements and define the individuals deceleration rate.
- Changes to the work - rest cycles are made in accordance with the findings of the temperature and pulse measurements.

Return To Work Prerequisites

Prior to being allowed to return to work an individual's heat stress monitoring readings must indicate that:

- Body temperature (oral) is less than 99.6 (F)
- Pulse Rate is below 100 beats per minute, and
- Deceleration rate is equal to or greater than 10 beats per minute.

  Deceleration rate is the rate at which the body recovers, measured by radial pulse rate, from exposure to and/or working in a hot environment.

Deceleration rate compilation:

- At the beginning of the rest cycle, an individuals pulse rate is taken for the last 30 seconds of the first minute (P1), the last 30 seconds of the second minute (P2), and the last 30 seconds of the third minute (P3).
- Each measurement is then doubled to find the full pulse rate (beats per minute).
- The pulse rate of the first minute (P1) is subtracted from the pulse rate of the second minute (P2). This is the first deceleration measurement (D1).
- The pulse rate of the second minute (P2) is subtracted from the pulse rate of the third minute (P3). This is the second deceleration measurement (D2).

If it is found that the individuals temperature, pulse rate, and/or deceleration rate are above the return to work criteria, longer rest cycles will be scheduled. Rest cycles will be lengthen by approximately 10-15 minutes. This monitoring is accomplished at each rest cycle to find the individuals optimum work - rest cycle which will allow them complete recovery.

Table 1

Apparent Temperature Chart

	Air Temperature*										
	70	75	80	85	90	95	100	105	110	115	120
Humidity	Apparent Temperature*										
0%	64	69	73	78	83	87	91	95	99	103	107
10%	65	70	75	80	85	90	95	100	105	111	116
20%	66	72	77	82	87	93	99	105	112	120	
30%	67	73	78	84	90	96	104	113	123		
40%	68	74	79	86	93	101	110	123			
50%	69	75	81	88	96	107	120				
60%	70	76	82	90	100	114					
70%	70	77	85	93	106	124					
80%	71	78	86	97	113						
90%	71	79	88	102	122						
100%	72	80	91	108							

* = Degrees Fahrenheit

National Weather Service, U.S. News & World Report 7/83

= No Real Threat of Heat Injury

= Heat Injury Possible After Long Exposure and Physical Activity.

= Heat Injury Likely to Occur

= Heat Stroke Imminent

- The above chart does not take into account the cooling effects of air movement.
- The apparent temperature is that which the body senses from the combination of heat and humidity.
- The use of laminated personal protective clothing (i.e., Saranax) creates a 100% relative humidity environment for the wearer.

Table 2

AMBIENT TEMPERATURE (F)	MAXIMUM WEARING TIME (per excursion)
Above 90	15 minutes
87.5 - 90	30 minutes*
82.5 - 87.5	1 hour
77.5 - 82.5	1.5 hours
72.5 - 77.5	2 hours

NIOSH - Occupational Health & Safety Guidance Manual for Hazardous Waste Site Workers

* = Approx. 1 SCBA air tank

Table 3

Recommended Rest and Work Percentages
As a Function of Level of Protection and Weather Conditions

PPP Level	Ambient Temperature (F)							
	70		74		78		≥82	
	% Rest	% Work	% Rest	% Work	% Rest	% Work	% Rest	% Work
A	50	50	75	25	75	25	75	25
B	50	50	50	50	75	25	75	25
C	Continuous		25	75	50	50	75	25
D	Continuous		25	75	25	75	50	50

> = Greater than

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TITLE:	HEALTH AND SAFETY ON DRILLING RIG OPERATIONS
CATEGORY:	H&S 5.3
REVISED:	April 1998

STANDARD OPERATING PROCEDURE

HEALTH AND SAFETY ON DRILLING RIG OPERATIONS

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1. Introduction

This document is meant to be used in conjunction with Ecology and Environment, Inc., (E & E) standard operating procedures (SOPs) for field operations and hazardous waste site operations, and incorporates by reference all safety precautions required therein. It specifically addresses the functions and responsibilities of personnel working on or around drilling operations.

E & E personnel are frequently required to oversee a subcontractor's work in the field using drill rigs to take soil and rock samples, and install piezometers and monitoring wells. This document discusses the supervision of subcontract drillers by E & E.

2. Responsibilities and Authority of Subcontract Driller

The subcontract driller has authority to direct its personnel within the area while drilling operations are in progress. Access to the hazardous area around the auger and borehole is restricted by a "super exclusion zone" delineated by a 4-foot by 8-foot sheet of plywood centered over the borehole before drilling. A large hole cut in the plywood allows penetration of the augers. No E & E personnel are allowed in this "super exclusion zone" at any time while drilling is underway.

Housekeeping around the rig is the responsibility of the driller, but all team members should, when necessary, participate in this effort.

2.1 Responsibility and Authority of E & E Personnel

E & E personnel working at a drilling site must act as support to the subcontract drilling team by providing any necessary support functions; however, it is important that E & E personnel are careful not to interfere with the drilling process. Personnel are restricted from approaching the "super exclusion zone" while drilling is underway. If an E & E crew member recognizes an unsafe condition in the work area or on the rig, he should bring it to the attention of the site safety officer (SSO) and team leader if it is not resolved in a timely manner by the subcontractor driller. If conditions are still deemed to be hazardous, team members have the option of contacting their regional safety coordinator (RSC) or Corporate Health and Safety Group in Buffalo.

It is the responsibility of all E & E personnel to have with them on site their issued nondisposable gear, including hard hat, face shield, respirator, steel-toed boots, eyepiece inserts, safety glasses, and appropriate outerwear for the expected weather. It is the E & E employee's responsibility to ensure that all of his/her equipment is in proper working order.

All personnel should be aware of emergency facilities, egress routes, and special medical conditions of their team members. As with all E & E fieldwork, the buddy system is to be enforced.

3. Training Requirements for Site Personnel

3.1 E & E Site Safety Officer

In addition to basic health and safety training, annual health and safety refresher training, first aid, cardiopulmonary resuscitation (CPR), and necessary training in field monitoring of personnel, an SSO should have previous experience as a team member on field drilling projects in order to have a working knowledge of the drill rig and the extreme hazards that can occur with its operation. Where monitoring instrumentation is to be used, the SSO must be properly trained prior to fieldwork. The SSO must have an understanding of the hazards of heat and cold stress, their associated symptoms, and proper work modifications to protect field staff from potential injury.

3.2 Other E & E Personnel

All E & E personnel present on site shall have taken the basic 40-hour health and safety course and annual 8-hour refresher training course. Field personnel also must meet medical and respiratory fitness test requirements established by E & E and Occupational Safety and Health Agency (OSHA).

3.3 Subcontract Driller and Other Subcontract Drilling Personnel

Subcontract drillers and their support personnel on site must, at a minimum, have passed basic 40-hour health and safety training as prescribed by OSHA 29 Code of Federal Regulations (CFR)1910.120. They shall be medically approved and trained to use the level(s) of respiratory protection required on site. Certification of training by the subcontractor shall be required as a deliverable included in E & E's contractual documentation. This training shall be verbally verified and logged on site by the SSO or team leader before starting work.

4. Supervision of Subcontract Drillers

4.1 Responsibilities and Authority of Site Safety Officer

The responsibilities of the SSO at a drilling site where subcontracted drillers are used include the following: rig inspections, personnel monitoring, and personnel protection.

A rig inspection should begin by verifying the following:

- The mast must be located at least 25 feet from any overhead or underground utility lines;
- The location and operation of operational and unencumbered kill switches must be reiterated to all site personnel;
- Outriggers, stabilizers, or jacks are in place, and the rig is level;
- A geophysical survey (e.g., electromagnetic or ground-penetrating radar) or a reliable site history must be obtained to verify the absence of underground utilities, buried obstacles, tanks, and drums;
- A first aid kit and filled eyewash bottle must be readily available;
- A fire extinguisher should be charged to the proper pressure and placed at the rear of the rig during drilling;
- The condition of ropes, chains, and cables must be checked;
- A lifeline or safety belt must be available if mast climbing is necessary;
- The Site Safety Plan (SSP) must be posted with emergency phone list and map of hospital route; and
- A "super exclusion zone" must be established around the borehole, using traffic cones or a 4-foot by 8-foot sheet of plywood. This defined area will be entered during active drilling only by the subcontract driller and his helper(s), except in emergency situations.

If, upon review, the SSO deems that any material item noted above requires replacement or repair, the SSO must make necessary the arrangements for that repair or replacement, and later verify that repair or replacement is sufficient before actual drilling begins. Similarly, if the conditions listed above are not met, the SSO must request that they be met to his satisfaction before allowing drilling to proceed. Working together, the SSO and the subcontract driller should verify that the rig has been checked against the operator's checklist.

The SSO's monitoring duties include calibration and setup of the appropriate monitoring devices, as specified in the SSP. At a minimum, this generally includes an O_2/explosimeter and real-time organic-vapor monitoring capabilities (e.g., HNU, organic vapor analyzer [OVA]). Noise and heat-stress monitoring are employed where appropriate. If the SSO believes additional monitoring devices beyond the directive of the SSP should be employed (e.g., Rad Mini, Mini Ram), it is his/her responsibility to obtain this equipment from the nearest E & E office through the cooperation of the RSC or the Corporate Health and Safety Group. The SSO is also responsible for ensuring that a trained operator for this additional equipment is on site.

It is the responsibility of the SSO to ensure that all safety equipment is in good working order. Day-to-day operations, as well as calibration data, must be recorded in the equipment log or SSO log. Adequate supplies such as breathing air, drinking liquids, and calibration gas must be maintained.

E & E personnel are forbidden from entering the "super exclusion zone" around the borehole while drilling is underway. The SSO must not attempt to take air readings in or around the auger while it is in use, or from cutting samples while the auger is in motion. If possible, an O_2/explosimeter should be set up for unmanned (alarmed) operations at the rig, using an extension hose to continuously draw samples from the borehole area during drilling operations.

The SSO has ultimate authority over the subcontractor with regard to whether work practices meet the requirements of the SSP. Shutdown of work or restriction of personnel are options available to the SSO. The SSO should hold informal site safety briefings at the start of both fieldwork and daily work shifts throughout the course of the project. Although E & E contractually requires subcontractors to provide properly trained and outfitted staff, the SSO should verify verbally at the start-up meeting that the field staff has necessary respiratory approval and OSHA-mandated training, especially at hazardous waste sites. Site safety briefing topics, as well as the names of attendees, will be recorded in the site safety log.

If the SSO has reason to believe that either E & E or subcontractor personnel are under the influence of alcohol or drugs, or are otherwise ill before or during work on site, he or she should consider restricting those team members from site work. Personnel who are to perform work that requires Level C protection must be clean-shaven or they may be restricted at the discretion of the SSO.

The following is a list of basic topics to be discussed at site safety meetings:

- Personnel responsibilities;
- Planned investigation and presumed potential hazards;
- Levels of protection, monitoring plan, and equipment;
- Emergency scenario plans, including use of kill switches;
- Location and operation of kill switches, fire extinguisher, and first aid kits;
- Heat and cold stress hazards;
- "Super exclusion zone" around borehole; and
- Warnings to subcontractors about hazards of climbing the mast without proper safety equipment.

Because heat stress is a constant threat during warm weather, the SSO is responsible for determining whether conditions are unsuitable for work. If site conditions require the assistance

of work modifications, cooling vests, and other cooling means, the SSO may decide that work should not continue. The need for worker monitoring through blood pressure and oral temperature checks will be determined by the SSO with assistance from the RSC and Corporate Health and Safety Group staff, if necessary.

The SSO will be responsible for shutting down the drilling operation if electrical storms occur in the site area.

No refueling operations will be performed until rig engines are shut down. Motor fuels should be stored and dispensed from spring-loaded, OSHA/Factory Mutual-approved metal or polyethylene gas cans.

The SSO should ensure and document that no boreholes are left open or unfilled after drilling equipment is moved. In instances where a hole must be left open and unattended, suitable barricades or the equivalent will be staged around the hole to prevent personnel and equipment from falling in.

4.2 Responsibilities and Authority of Other E & E Personnel

All E & E personnel on site are required to follow the terms of the SSP and the direction of the SSO. Because the SSO cannot be in all places at all times, the crew should observe the subcontractors and condition of their equipment at all times, and report immediately to the team leader and SSO any safety-related issues that are unresolved. Included are such details as dressout, site functions, and decontamination. It is important that the SSO be involved so that proper log entries can be made.

It is a policy of E & E not to provide safety equipment or monitoring instrumentation to subcontractors. Some projects, however, may be arranged in such a manner that allows E & E personnel and subcontractors to share the same expendable supplies.

E & E personnel are forbidden from approaching augers during drilling. Activities at the borehole, such as sampling, require that the operation of equipment be stopped.

5. Drilling Hazards

5.1 General Drilling Hazards

Drilling operations present numerous health and safety hazards to site personnel, subcontractor drillers, and members of the public who may approach the rigs. Drilling hazards that apply to all drilling methods and possible control methods include:

- Slip/trip/fall hazards;
- Ergonomic hazards;
- Moving objects;

- Unguarded points of operation;
- Heat/cold stress;
- Noise;
- Buried or overhead utilities;
- Radiological hazards;
- Lightning;
- Chemical hazards; and
- Biological hazards.

5.2 Physical Hazards (Slip/Trip/Fall Hazards)

Personnel may be injured if they trip over tools or objects, walk on uneven terrain, fall from heights or into holes, or slip on surfaces.

Controls

- Store all tools and supplies away from the super exclusion zone;
- Personnel should use caution when walking on uneven surfaces so that they do not lose their balance;
- Subcontractor drillers must wear a lifeline or safety belt if mast climbing is necessary;
- Boreholes should be barricaded or marked with flags when drilling has been completed to prevent personnel from stepping in the hole; and
- Soil or sand should be applied to wet or slippery surfaces.

5.3 Ergonomic Hazards

Muscle strains, sprains, and injuries can occur when personnel use improper lifting methods, lift objects that are too heavy, improperly reach for objects, or work in awkward positions.

Controls

- Lift with the back as straight as possible, bend the knees, and keep the object close to the body;
- Use two people to move heavy objects such as augers;
- Avoid excessive stretching of the arms when picking up objects; and
- Avoid sudden twisting of the back or working in awkward positions.

5.4 Moving Objects

Site personnel may be injured if they are struck by debris from the borehole or by drilling machinery or components.

Controls

- Wear the appropriate personal protective equipment such as safety boots, safety glasses, and a hard hat; and
- Adequate inspection and maintenance of the drill rig will reduce the likelihood of worn equipment or parts falling and causing accidents.

5.5 Unguarded Points of Operation

The spinning auger on a drill rig or the V-belt drive on a motor are unguarded points of operation that can pull site personnel into the machinery and cause serious injuries.

Controls

- Mechanical guards cannot be placed around the spinning auger on a drill rig. Site personnel must stay away from the spinning auger and avoid wearing loose clothing that could get caught in the auger; and
- Mechanical guards must be placed over V-belt drives.

5.6 Heat/Cold Stress

Drilling is a strenuous job, and heat stress is a major hazard in hot, humid environments, especially when personnel are wearing protective equipment such as coveralls, gloves, boots, and respirators. Cold injury can occur at low temperatures and when the wind-chill factor is low.

Heat Stress

Controls

- Recognize the signs and symptoms of heat stress;
- Monitor workers who are wearing protective clothing; and
- Provide fluid replacement and schedule rest periods in cool locations.

Cold Stress

Controls

- Recognize the signs and symptoms of cold stress;
- Personnel must wear appropriate clothing during cold weather; and
- A warm rest location and fluid replacement should be provided.

5.7 Noise

Excessive noise can cause hearing damage, distract workers, and interfere with communications.

Controls

- In excessive noise areas, wear the hearing protection recommended by the SSO.

5.8 Buried or Overhead Utilities

Contact of drilling tools with electric, gas, steam, process, or other utility lines can result in fires, explosions, electric shock hazards, burns, etc.

Controls

- The boom on the drill rig must be kept at least 25 feet from overhead and buried utilities;
- After buried utilities have been located using an appropriate geophysical survey, the line locations should be marked with flags. Maps of underground utilities should also be checked, if available, to verify locations; and

- Drilling operations should proceed slowly in areas near buried utilities, as the actual utility location may not exactly correspond to the area identified by a flag or as illustrated on a map.

5.9 Radiological Hazards

5.9.1 Nonionizing Radiation

Nonionizing radiation is radiation that emits photon energy that is not sufficient to produce ionization in biological systems. Radio frequencies (including radar and microwave), infrared, visible light, and ultraviolet regions of the electromagnetic spectrum are considered to be nonionizing. Ultraviolet radiation from the sun is usually the major nonionizing radiation hazard present during drilling operations. Ultraviolet radiation can damage the skin and eyes. Potential effects include, but are not limited to, sunburn, skin cancer, photosensitization, and cataracts.

Controls

- Wear sunscreen on all exposed skin areas; and
- Wear safety glasses that block ultraviolet radiation (or sunglasses worn over safety glasses).

5.9.2 Ionizing Radiation Hazards

Ionizing radiation is electromagnetic or particulate radiation with sufficient energy to ionize atoms. Ionizing radiation may be present on some drilling sites and includes:

- Electromagnetic radiation
  - Gamma rays
  - X-rays
- Particulate radiation
  - Alpha
  - Beta
  - Neutrons

Controls

Site personnel can minimize their exposure to external radiation hazards by:

- Limiting exposure time;
- Increasing the distance from the radiation source; and
- Shielding the radiation source.

Some radiation sources can enter the body through inhalation, ingestion, and/or skin contact. Exposure can be controlled through the wearing of personal protective equipment and thorough washing of skin surfaces with soap and water.

5.10 Lightning Hazard

The elevated mast on a drill rig is a potential target of lightning.

Controls

- The SSO will halt drilling operations when electrical storms approach the drilling location.

5.11 Chemical Hazards

Chemical contaminants may be present in the form of gases, vapors, aerosols, fumes, liquids, or solids. Site personnel may be exposed to these contaminants through one or more of the following pathways: inhalation, ingestion, skin, and/or eye contact.

Controls

- Become familiar with the specific drilling operation being used to identify and avoid chemical discharge locations;
- Wear appropriate personal protective equipment;
- Practice contamination avoidance; and
- Stay upwind during grout mixing (silica inhalation hazard).

5.12 Biological Hazards

Biological hazards that may be present during drilling operations include poisonous plants, animals, and insects, and infectious agents.

Controls

- Wear insect repellant at sites where biting insects are prevalent;
- Learn to identify poisonous plants that cause dermatitis, such as poison ivy and poison oak;
- Wear impervious personal protective clothing (e.g., saranex coveralls, latex booties, nitrile surgical gloves) if work must be conducted in areas where site personnel will contact poisonous plants; and
- Avoid potential animal nesting areas and animal carcasses.

6. Drilling Methods and Hazards

6.1 Solid Flight and Bucket Augers

Solid-flight augers (also referred to as solid-stem augers, continuous flight augers, and disk augers) use solid-stem auger sections, with the flighting (curved corkscrew-like blades) connected end-to-end to the cutting head (see Figure 1). Soil cuttings are moved upward to the ground surface by the flighting as the auger penetrates into the soil. Samples are typically collected by removing an auger section, attaching a split-spoon or thin-wall sampler to the end of a drill rod, and placing this arrangement into the borehole. Split-spoon samples are collected by using a hammer connected to the drill rod and split-spoon. The hammer is operated by wrapping sections of rope around a rotating cathead hoist (a wide metal cylinder). A disk auger is similar to a solid-flight auger except that it is larger in diameter and the flighting goes around the stem once. Bucket augers have a cutting edge on the bottom. Once the bucket auger fills with soil cuttings, it is brought to the surface to be emptied. Figure 1 shows various types of bucket augers.

Auger drill methods are used in unconsolidated material for sampling subsurface media, installing groundwater monitoring wells, and identifying depth to bedrock.

6.2 Hollow-Stem Auger

A drill rig rotates a hollow-stem auger (see Figure 2) and moves it vertically into the soil. The hollow stem allows use of continuous or intermittent soil sampling techniques. Once the required depth has been reached, screens and casing for monitoring wells can be placed in the

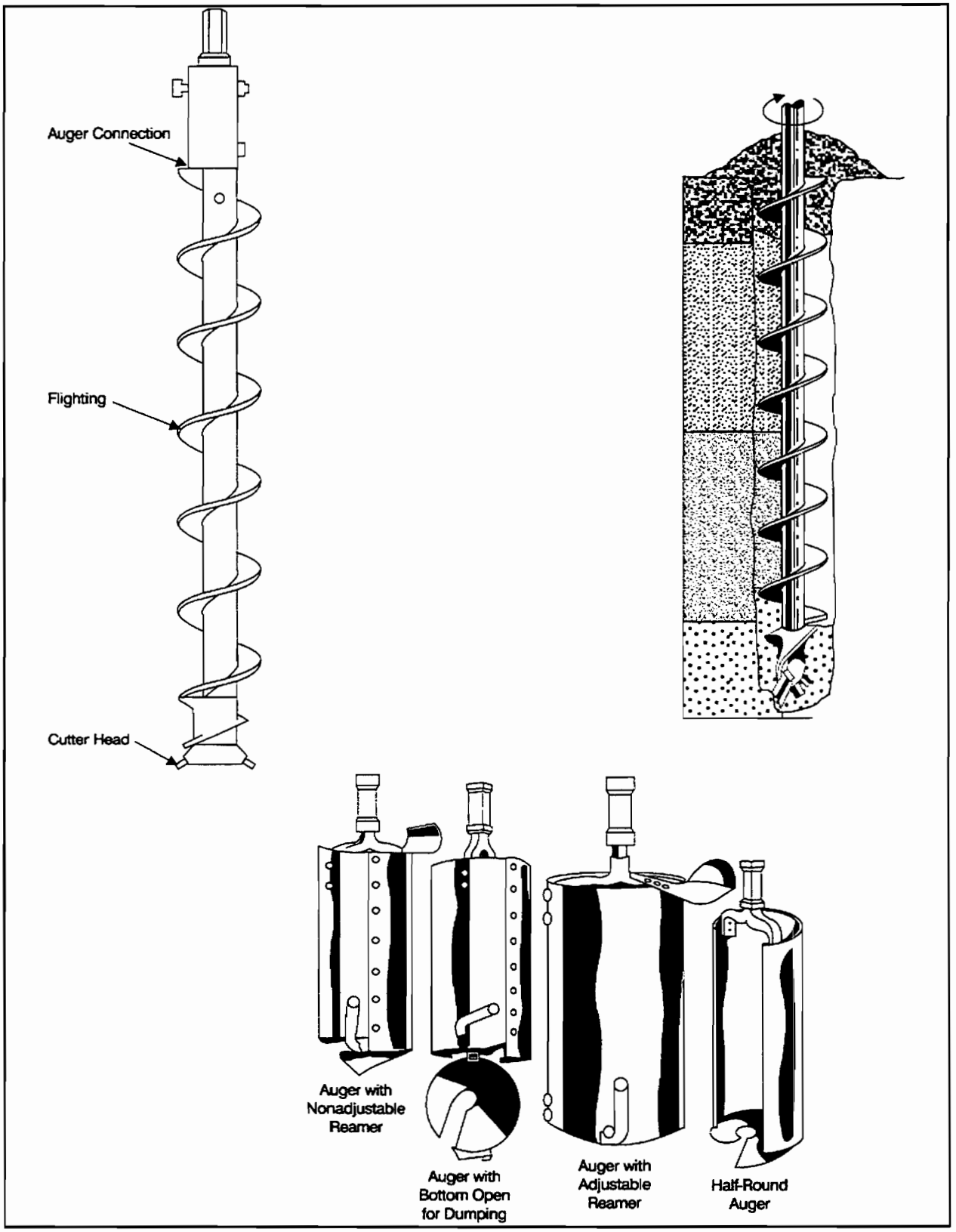


Figure 1 Solid Flight and Bucket Augers

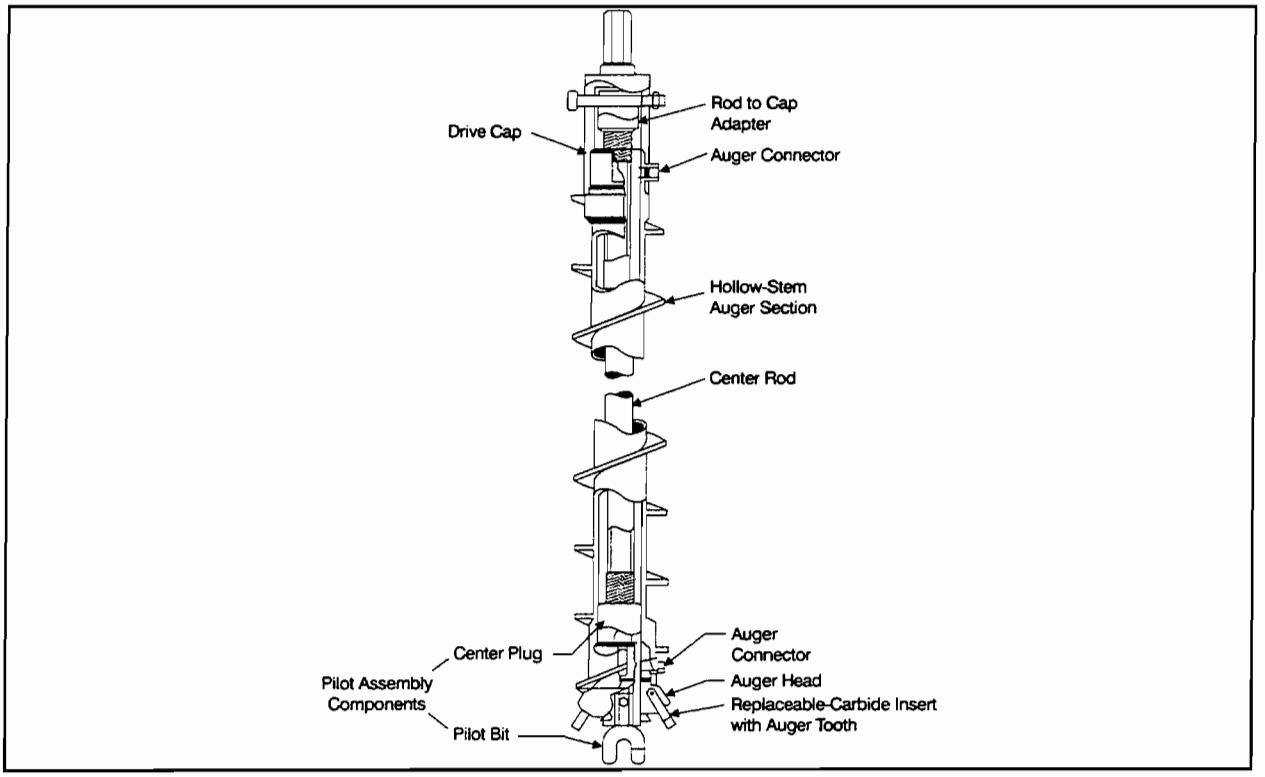


Figure 2 Hollow-Stem Auger

hollow-stem gravel pack and grout is added as the auger is pulled out of the borehole. Hollow-stem auger drilling is a common method of monitoring well installation.

6.2.1 Auger Drilling Hazards

Physical Hazards

Spinning Auger. The spinning auger is not equipped with a metal guard; therefore, it is imperative that personnel use extreme caution when working near spinning augers, as contact with the auger can cause personnel to be pulled into the auger and crushed between the auger and the drill rig. Only approved drillers will remain in proximity to the borehole during drilling, and an approximate 4- by 8-foot "super exclusion area" will be established around the moving auger at all times. The "super exclusion zone" may be established by placing a 4- by 8-foot sheet of plywood over the borehole, or by placing flagging or traffic cones around a 4- by 8-foot perimeter. No personnel, except the driller and the driller's helper, will enter this zone during drilling. The SSO will issue warnings to those personnel not authorized to enter this zone.

Overhead Equipment. If wire line core sampling is conducted, drill steel and sampling gear will be lifted overhead. Site personnel must conduct the necessary equipment inspections to ensure it is in good condition prior to the start of drilling operations. In addition, drillers must make sure that proper hoisting procedures are used to reduce the likelihood of dropping drill steel or sampling gear.

Drill Rig Lurching. The drill rig has a tendency to lurch and shake when the auger comes into contact with harder materials. This is especially true when hollow-stem auger drilling methods are utilized. The rig can also lurch seriously in hearing sands. Site personnel should be aware of possible drill rig movement and move away from the rig if lurching or shaking occurs.

Noise. If split-spoon sampling is conducted, a hammer is used to drive the spoon into the soil. The hammer generates a loud noise when it contacts a metal surface. Site personnel are required to wear appropriate hearing protection during hammering operations.

6.3 Open-Hole Rotary Methods

A direct mud rotary drilling system (also direct [liquid] rotary, hydraulic rotary, or reverse [circulation] rotary) is shown in Figure 3. Drilling fluid (mud) is pumped through drill rods to a bit. The mud flows back to the surface through the space between the drill rods and the borehole and is discharged at the surface through a pipe into a tank, tub, pond, or pit. After the cuttings settle, a pump recirculates the liquid back through the drill rods. The mud serves to:

- Cool and lubricate the bit;
- Stabilize the borehole well; and
- Prevent the inflow of fluids from formations.

A shale shaker can collect a sample from the circulated fluid by placing it in the discharge flow before the settling pit. In addition, the drilling fluid flow can be shut off and split-spoon, thin-wall, or consolidated-core samplers can be used to collect a sample by inserting a sampler through the drill rods. Reverse circulation rotary drilling is a variation of mud rotary drilling in that the mud flows from the mud pit down the borehole outside the drill rods, passes up through the bit carrying cuttings into the drill rods, and is then discharged into the mud pit. The equipment used is similar to the direct mud rotary method, except most of the equipment is larger.

Equipment Breaks. A break in support equipment for drill steel could cause equipment to fall and injure site personnel. Equipment inspection is required to ensure it is in good condition prior to the start of drilling operations.

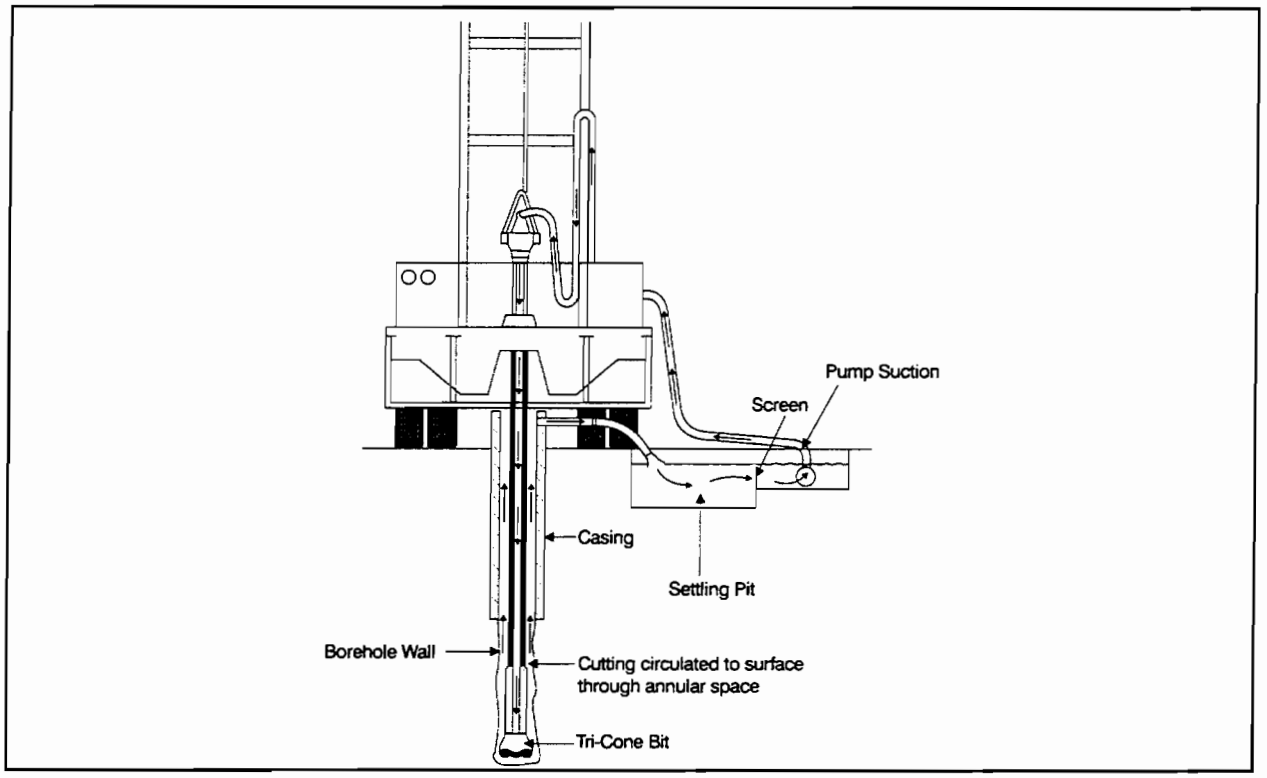


Figure 3 Open-Hole Rotary Method

Slippery Conditions. Because the use of drilling mud will create slippery conditions around the drill rig and support area, mud should be contained to the immediate work area. Slippery spots should be dried with sand/dirt to reduce slipping hazards. Gloves should be changed when they become coated with mud.

6.4 Direct Air Rotary with Rotary Bit/Downhole Hammer

Also called an air rotary with roller-cone (tri-cone) bit, down-the-hole hammer, or air percussion rotary, the rig setup for air rotary with a tri-cone or roller-cone bit is similar to direct mud rotary (see Figure 3), except the method uses air instead of water and drilling mud. The main components of a drill string using a tri-cone bit are illustrated in Figure 4. Compressed air is forced down through the drill rods to cool the bit, and cuttings are carried up the open hole to the surface. A cyclone slows down the air velocity, forcing the cuttings into the container. A roller-cone drill bit is used for hard-to-soft consolidated rock and unconsolidated formations. When a downhole hammer is utilized, it replaces the roller-cone bit (see Figure 4). The hammer produces a pounding action as it rotates. Other features are similar to the rotary bit, except small amounts of surfactant and water are used for dust and bit temperature control.

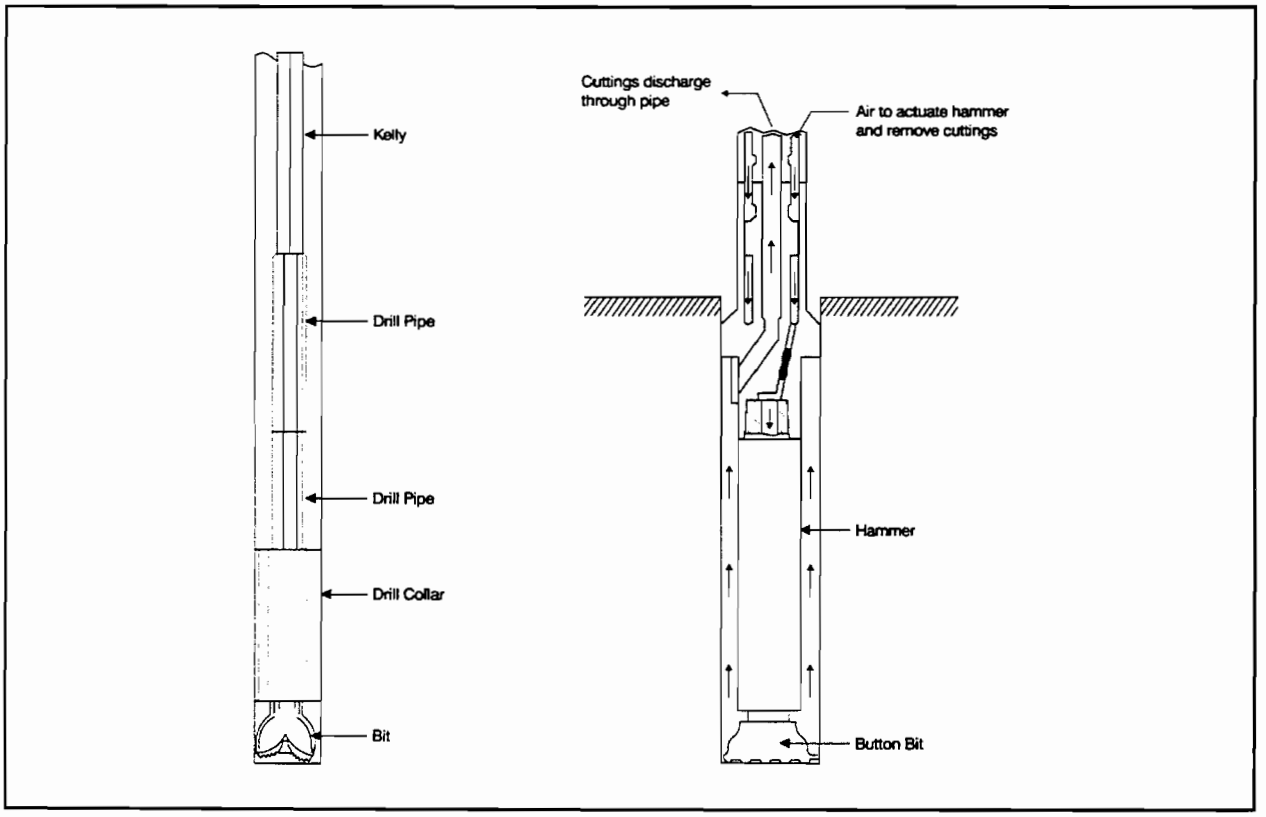


Figure 4 Direct Air Rotary

Physical Hazards

Noise. Excessive noise is generated from the use of air compressors, casing drivers, and downhole hammers. Site personnel are required to wear hearing protection during drilling operations.

Cuttings and Water. Cuttings and water blown from the hole can strike and injure site personnel. Site personnel must stay away from this discharge location and wear appropriate personal protective equipment.

Overhead Equipment. If wire line core sampling is conducted, drill steel and sampling gear will be lifted overhead. Site personnel must conduct the necessary equipment inspections to ensure it is in good condition prior to the start of drilling operations. In addition, drillers must make sure that proper hoisting procedures are followed to reduce the likelihood of falling drill steel or sampling gear.

6.5 Cable Tool

A cable tool drill rig operates by repeatedly lifting and dropping tools attached to a cable into a borehole. Figure 6-5 shows the components of a cable tool rig. This drilling method crushes rock and a spudding beam mixes the crushed particles with water. The water and debris is removed by a bailer or pump. In unconsolidated formations, a casing is driven into the ground. In consolidated formations, drilling is conducted without the use of a casing.

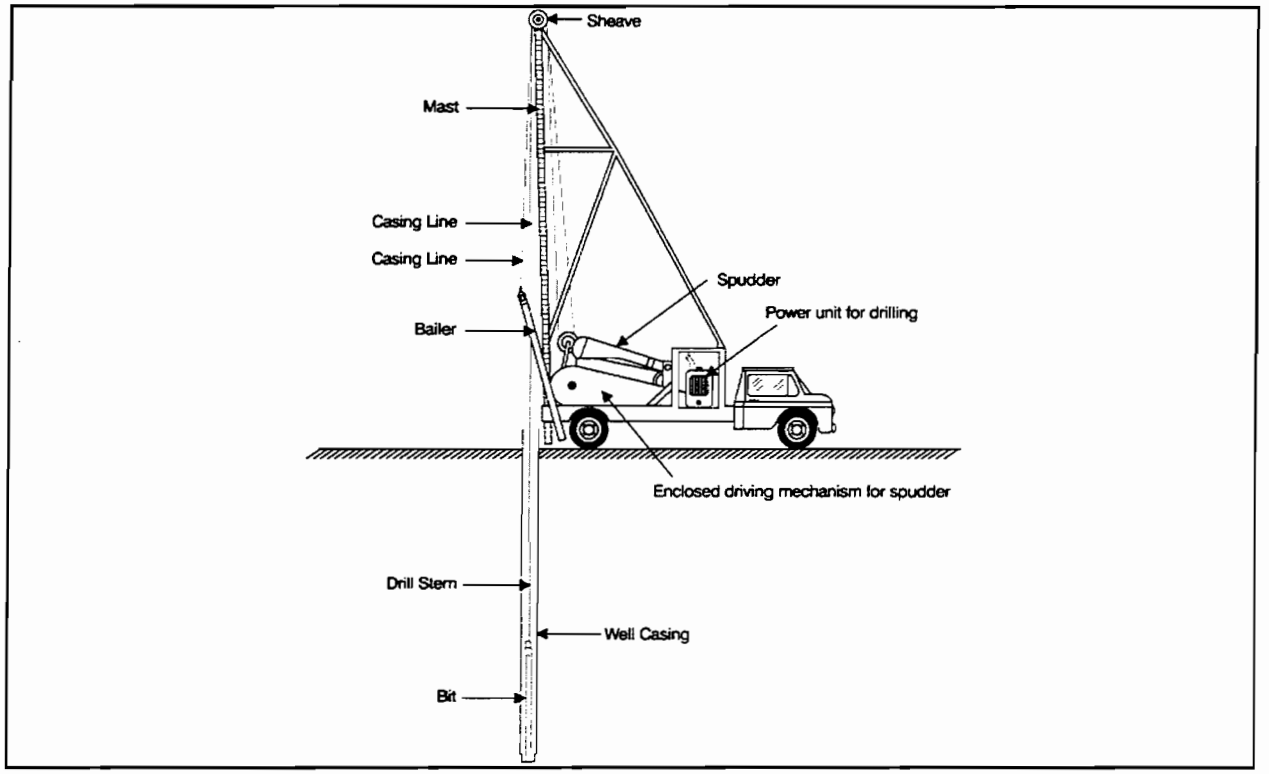


Figure 5 Cable Tool Drill Rig

Physical Hazards

Noise. The spudding beam generates excessive noise. All personnel must wear appropriate hearing protection during drilling operations.

Rig Movement. The drill rig tends to lurch as the drill string is raised and lowered. Site personnel must maintain an adequate distance from the rig during drilling operations.

Overhead Equipment. Drill string and bailers are hoisted during drilling operations and present an overhead hazard to site personnel if a tool falls from a height.

6.6 Casing Advancement: Rotary Drill-Through Methods

6.6.1 Drill-Through Casing Driver and Dual Rotary Method

Casing driver advancement (also referred to as air (mud) rotary drill or downhole hammer with casing drivers, air rotary casing hammer, and air drilling with casing hammer) involves a driver that moves the casing as drilling occurs (see Figure 6) during the use of conventional direct air (mud) or downhole hammer equipment. Drill cuttings move upward in the space between the drill pipe and the casing. The diameter of the casing is slightly larger than the bit so it can be easily removed.

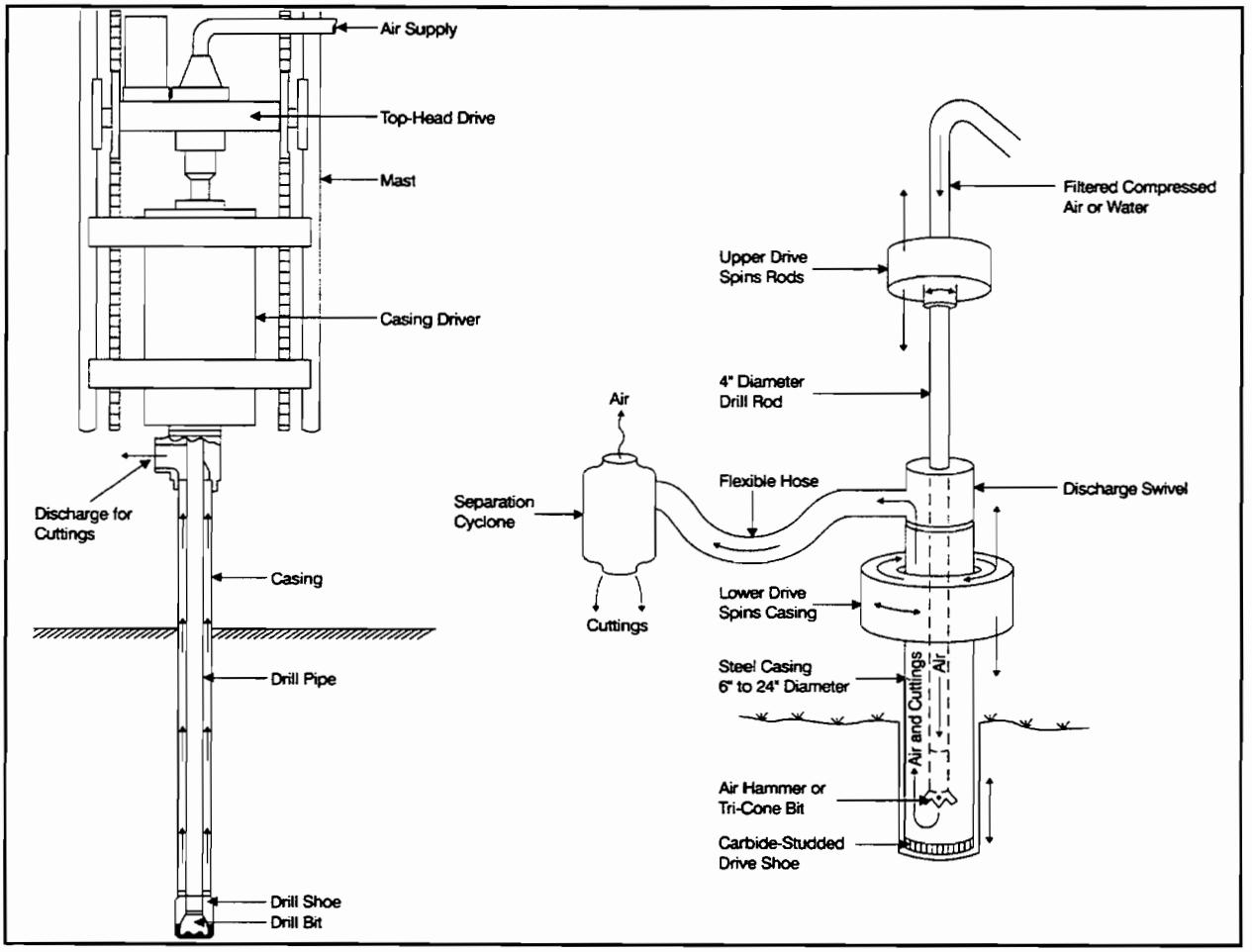


Figure 6 Casings

In dual rotary advancement, the casing is moved by using a rotating steel casing provided with a carbide-studded drive shoe. The carbide ring cuts through the overburden material. Rotary drilling (usually air) takes place at the same time using a downhole hammer or tri-cone bit. Drilling can be conducted either inside or ahead of the casing.

This type of drilling is used to install monitoring wells in unconsolidated formations, where loss of circulation of drilling fluids is a problem, and/or where prevention of cross-contamination of aquifers is important.

6.6.2 Reverse Circulation (Rotary, Percussion Hammer, and Hydraulic Percussion)

The reverse-circulation rotary drilling method can utilize air rotary with a downhole hammer or bit or mud rotary. Two or three casings can be used.

Reverse circulation dual-wall rotary. This method is similar to downhole hammers with a casing driver or air rotary-cone bit, except air is moved down the space between the casing and the drill pipe to the bit, and soil cuttings are pushed to the surface through the drill pipe (see Figure 7).

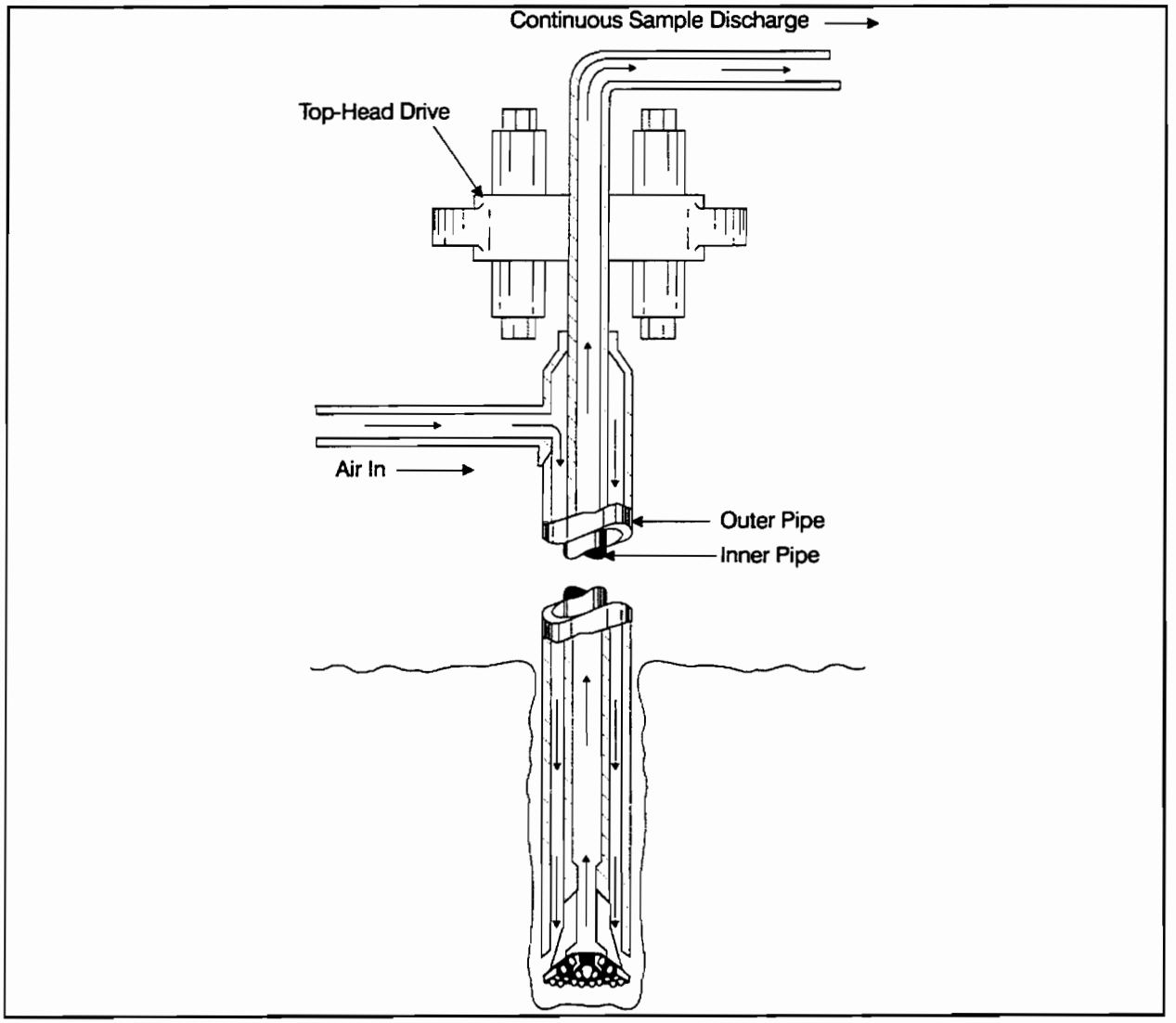


Figure 7 Reverse Circulation Rotary Method

Reverse circulation dual-wall percussion hammer. The percussion hammer operates in a similar manner of reverse circulation as the dual-wall rotary method, except the drive method is different. Either two or three casings are used. Compressed air is moved into the space between the outer and inner pipes, and soil cuttings are discharged from the inner pipe to a cyclone. A percussion hammer on the most of the drill rig strikes an anvil on the top of the drive assembly. Two or three casings are driven, and the bit does not rotate.

Hydraulic percussion. This method is similar to the jet-percussion method, except a check valve is located between the bit and the lower part of the drill pipe. Water fills the space between the drill rods and well casing and the drill rods are lifted and dropped. A reciprocating motion moves the water and drill cuttings to the surface where they enter a tank. Water is returned to the hole from the tank. Casing is driven as drilling proceeds.

Physical Hazards—Reverse Circulation Dual-Wall Rotary

Noise. Excessive noise is generated from the use of air compressors, casing drivers, and downhole hammers. Site personnel are required to wear hearing protection during drilling operations.

Cuttings. Cuttings and debris discharged from the hole can strike and injure site personnel. Site personnel must stay away from the discharge point and wear appropriate personal protective equipment.

Overhead Equipment. If wire line core sampling is conducted, drill steel and sampling gear will be lifted overhead. Site personnel must conduct the necessary equipment inspections to ensure it is good condition prior to the start of drilling operations. In addition, drillers must make sure that proper hoisting procedures are followed to reduce the likelihood of dropping drill steel or sampling gear.

Physical Hazards—Hydraulic Percussion

Slips/Falls. Site personnel can slip on wet ground around the drill rig or fall into the water tank. Site personnel must keep the drilling location clear of debris and contain spillage prior to and during drilling operation.

B Quality Assurance Project Plan

Quality Assurance Project Plan for Parcel F9 Investigation at Griffiss Air Force Base, Rome, New York

Contract No. DACW41-99-D-0005
Work Authorization Directive 07

July 1999

Prepared for:

U.S. ARMY CORPS OF ENGINEERS
Kansas City District
601 East 12th Street
Kansas City, Missouri 64106

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This Quality Assurance Project Plan (QAPjP) is an addendum to the expanded site investigation (ESI) planning documents prepared for the project "ESI at Griffiss Air Force Base (GAFB), Rome, New York." The laboratory for this project will be Ecology and Environment's, Inc (E & E) Analytical Services Center (ASC). Quality assurance (QA) procedures at the ASC are implemented in accordance with the current version of the Laboratory Quality Assurance Manual, Revision 1, November 1998. All project-specific QA procedures will be implemented in accordance with the ESI QAPjP August 1997. Any modifications to existing ESI QAPjP forms, tables or figures that do not change the underlying technical content of QA procedure are not included in this addendum. The Field Team Leader for this phase will be Sheryl L. Johnson, P.G., C.P.G.. A copy of her biography is provided in Attachment B-1. E & E has no planned field or laboratory audits for this phase of the project.

Samples planned for this project are solid matrix. The samples are to be analyzed according the following methods.

Test Name	Method Number
Semivolatile Organics by Method 8270C	SW8270C
Polyaromatic Hydrocarbons (PAH) by Method 8270C	SW8270C (1)
Pesticides by Method 8081A	SW8081A
PCBs by Method 8082	SW8082
Metals, TAL (PE) by ICP Method 6010B	SW6010B
Mercury Analysis in Soil by Method 7471A	SW7471A
Total Organic Carbon	Lloyd Kahn
Cyanide, Total by Method 9012A	SW9012A

(1) Please note the limits listed for Semivolatile Organics are applicable for PAH compounds only. No tentatively identified compounds (TICs) are required for the PAH only version of the method. No samples are proposed for Volatile Organic Compound analysis; consequently, they are not included in this QAPjP addendum.

United States Army Corps of Engineers (USACE) and New York State Department of Health currently approve the ASC for all methods listed above. All analytical procedures will be implemented in accordance with current versions of standard operating procedures (SOPs) as approved by USACE. Attachment B-2 contains updated lists of analytes of interest and detection limits for the analytical methods listed above. Attachment B-3

contains updated control limits for the analytical methods listed above. The updated tables were reprinted from directly from E & E's laboratory information management system (LIMS) and do not directly reference tables in the existing ESI QAPjP. Based on risk assessment review of the tables in Attachment B-2, the laboratory must report all compounds to the method detection limit (MDL) to meet risk-based criteria. Values reported between the MDL and practical quantitation limit (PQL) will be flagged "J" as estimated. The ASC will use this recently installed LIMS, a Microsoft Access program, for all data processing and reporting.

B-1

Resumes of Key Personnel

SHERYL L. JOHNSON, P.G., C.P.G. **Project Geologist**

EDUCATION:

M.S., Geology, University of Illinois at Chicago
B.S.S., Geology, Cornell College

EXPERIENCE:

With 10 years' experience, Ms. Johnson is a registered Professional Geologist (Illinois and Indiana) and a Certified Professional Geologist (American Institute of Professional Geologists). With E & E, she leads and conducts hydrogeologic and geophysical investigations. She plans and supervises the installation of groundwater monitoring-well networks, prepares/ implements environmental sampling plans, conducts geophysical surveys, and leads/ participates in soil-gas surveys and sample field screening. She uses the results of her fieldwork and subsequent laboratory analyses to delineate the nature, magnitude, pathways, and receptors of surface and subsurface contamination; evaluate multiaquifer groundwater systems; and develop site-specific remedial measures. In addition, Ms. Johnson participates in well network specification writing and monitors the work of drilling and remedial construction contractors.

Under E & E's Alternative Remedial Contracting Strategy (ARCS) program for EPA Region 5, Ms. Johnson was remedial investigation (RI) field team leader for the MacGillis and Gibbs federal Superfund site in New Brighton, Minnesota, and the Prestolite Battery Superfund site in Vincennes, Indiana. She planned/supervised the installation of groundwater monitoring-well networks, oversaw drilling subcontractors to verify compliance with technical specifications, and supervised sampling activities. For the Prestolite Battery, she prepared sections of the RI report, including the analysis of hydrogeologic data and soil contamination.

An experienced RI field team leader, Ms. Johnson has supervised boring and well installation activities to verify compliance with technical specifications at numerous sites, including Kenosha, Wisconsin (for Outokumpu American Brass Company); Glenview Naval Air Station in Illinois and Fort Gordon Army Base in Georgia (for the Southern Division of the Naval Facilities Engineering Command); and Hawthorne Army Depot in Nevada (for the Sacramento District of the United States Army Corps of Engineers). As RI field team leader for three phases of investigation for a private-industry client at a site in Hillsdale, Michigan, she supervised monitoring-well installation and soil, sediment, and surface water sampling; participated in pump tests; and assisted in the preparation of all planning documents and reports.

She prepared drilling specifications and supervised drilling and monitoring-well installation to characterize the extent of contamination caused by occasional solvent spills at a former truck terminal belonging to Rogers Cartage Company in Hammond, Indiana. She oversaw UST removal and the excavation of contaminated soil, conducted confirmatory soil sampling for the remedial action, and managed quarterly groundwater monitoring.

B-2 List of Analytes of Interest and Detection Limits - Updates

Ecology and Environment, Inc.

Date: 21-Jun-99

Test Code: 1_6010B_TAL1_S
Test Number: SW6010B
Test Name: Metals, TAL (PE) by ICP Method 6010B
Matrix: Solid **Units:** mg/Kg

METHOD DETECTION / REPORTING LIMITS

Updated:

Type	Analyte	MDL	PQL
A	Aluminum	2.99	10
A	Antimony	0.604	1
A	Arsenic	0.355	0.5
A	Barium	0.051	2
A	Beryllium	0.0186	0.5
A	Cadmium	0.0343	0.5
A	Chromium	0.103	1
A	Cobalt	0.0819	2
A	Copper	0.0975	2
A	Lead	0.232	0.5
A	Manganese	0.121	1
A	Nickel	0.0836	2
A	Selenium	0.901	1
A	Silver	0.11	1
A	Thallium	0.632	1
A	Vanadium	0.101	2
A	Zinc	0.0857	1

Ecology and Environment, Inc.

Date: 21-Jun-99

Test Code: 1_6010B_TAL2_S
Test Number: SW6010B
Test Name: Metals, TAL Cations (JY) by ICP Method 6010
Matrix: Solid **Units:** mg/Kg

METHOD DETECTION / REPORTING LIMITS

Updated:

Type	Analyte	MDL	PQL
A	Calcium	16.4	50
A	Iron	0.871	5
A	Magnesium	26.9	50
A	Potassium	35.3	100
A	Sodium	29	100

Ecology and Environment, Inc.

Date: 21-Jun-99

Test Code: 1_7471A_HG_S
Test Number: SW7471A
Test Name: Mercury Analysis in Soil by Method 7471A
Matrix: Soil **Units:** mg/Kg

METHOD DETECTION / REPORTING LIMITS

Updated:

Type	Analyte	MDL	PQL
A	Mercury	0.00713	0.033

Ecology and Environment, Inc.

Date: 21-Jun-99

Test Code: 1_8081A_3550B_S
Test Number: SW8081A
Test Name: Pesticides by Method 8081A
Matrix: Solid **Units:** µg/Kg

METHOD DETECTION / REPORTING LIMITS

Updated:

Type	Analyte	MDL	PQL
A	4,4′-DDD	0.255	2
A	4,4′-DDE	0.186	2
A	4,4′-DDT	0.302	2
A	Aldrin	0.229	1
A	alpha-BHC	0.0856	1
A	alpha-Chlordane	0.259	1
A	beta-BHC	0.111	1
A	delta-BHC	0.195	1
A	Dieldrin	0.331	2
A	Endosulfan I	0.416	2
A	Endosulfan II	0.162	2
A	Endosulfan sulfate	0.199	2
A	Endrin	0.463	2
A	Endrin aldehyde	0.197	2
A	Endrin ketone	0.157	2
A	gamma-BHC	0.19	1
A	gamma-Chlordane	0.0885	1
A	Heptachlor	0.157	2
A	Heptachlor epoxide	0.194	2
A	Methoxychlor	0.834	10
A	Toxaphene	19.4	50
S	Decachlorobiphenyl	0	0
S	Tetrachloro-m-xylene	0	0

Ecology and Environment, Inc.

Date: 21-Jun-99

Test Code: 1_8082_3550B_S
Test Number: SW8082
Test Name: PCBs by Method 8082
Matrix: Solid **Units:** µg/Kg

METHOD DETECTION / REPORTING LIMITS

Updated:

Type	Analyte	MDL	PQL
A	Aroclor 1016	26.9	20
A	Aroclor 1221	23	40
A	Aroclor 1232	4.34	20
A	Aroclor 1242	15.3	20
A	Aroclor 1248	11.4	20
A	Aroclor 1254	2.91	20
A	Aroclor 1260	18.4	20
S	Decachlorobiphenyl	0	0
S	Tetrachloro-m-xylene	0	0

Ecology and Environment, Inc.

Date: 21-Jun-99

Test Code: 1_8270C_3550B_S
Test Number: SW8270C
Test Name: Semivolatile Organics by Method 8270C
Matrix: Solid **Units:** µg/Kg

METHOD DETECTION / REPORTING LIMITS

Updated:

Type	Analyte	MDL	PQL
A	1,2,4-Trichlorobenzene	62.2	330
A	1,2-Dichlorobenzene	55.7	330
A	1,3-Dichlorobenzene	54.7	330
A	1,4-Dichlorobenzene	52.7	330
A	2,4,5-Trichlorophenol	75.4	830
A	2,4,6-Trichlorophenol	81.5	330
A	2,4-Dichlorophenol	74.1	330
A	2,4-Dimethylphenol	145	330
A	2,4-Dinitrophenol	83	330
A	2,4-Dinitrotoluene	79.5	330
A	2,6-Dinitrotoluene	72.7	330
A	2-Chloronaphthalene	63.1	330
A	2-Chlorophenol	68.8	330
A	2-Methylnaphthalene	57.9	330
A	2-Methylphenol	67.3	330
A	2-Nitroaniline	76.9	830
A	2-Nitrophenol	67	330
A	3,3´-Dichlorobenzidine	189	660
A	3-Nitroaniline	148	830
A	4,6-Dinitro-2-methylphenol	107	830
A	4-Bromophenyl phenyl ether	74	330
A	4-Chloro-3-methylphenol	67.4	330
A	4-Chloroaniline	125	330
A	4-Chlorophenyl phenyl ether	60.6	330
A	4-Methylphenol	77.9	330
A	4-Nitroaniline	66.6	830
A	4-Nitrophenol	95.2	830
A	Acenaphthene	38.8	330
A	Acenaphthylene	37.9	330
A	Anthracene	33	330
A	Benz(a)anthracene	36.1	330
A	Benzo(a)pyrene	38.7	330
A	Benzo(b)fluoranthene	49.5	330
A	Benzo(g,h,i)perylene	53.5	330
A	Benzo(k)fluoranthene	57.4	330
A	Benzoic acid	1390	830
A	Benzyl alcohol	143	330
A	Bis(2-chloroethoxy)methane	51.4	330
A	Bis(2-chloroethyl)ether	87.3	330
A	Bis(2-chloroisopropyl)ether	74.9	330
A	Bis(2-ethylhexyl)phthalate	56.6	330
A	Butyl benzyl phthalate	89.3	330

Ecology and Environment, Inc.

Date: 21-Jun-99

Test Code: 1_8270C_3550B_S
Test Number: SW8270C
Test Name: Semivolatile Organics by Method 8270C
Matrix: Solid **Units:** µg/Kg

METHOD DETECTION / REPORTING LIMITS

Updated:

Type	Analyte	MDL	PQL
A	Carbazole	52.5	330
A	Chrysene	34.9	330
A	Di-n-butyl phthalate	60.8	330
A	Di-n-octyl phthalate	62.2	330
A	Dibenz(a,h)anthracene	54.8	330
A	Dibenzofuran	57	330
A	Diethyl phthalate	103	330
A	Dimethyl phthalate	51.1	330
A	Fluoranthene	34.5	330
A	Fluorene	31.4	330
A	Hexachlorobenzene	53.2	330
A	Hexachlorobutadiene	70.3	330
A	Hexachlorocyclopentadiene	57.7	830
A	Hexachloroethane	51.8	330
A	Indeno(1,2,3-cd)pyrene	51.6	330
A	Isophorone	58.2	330
A	N-Nitrosodi-n-propylamine	41.9	330
A	N-Nitrosodimethylamine	76.8	330
A	N-Nitrosodiphenylamine	43.3	330
A	Naphthalene	41.9	330
A	Nitrobenzene	94.4	330
A	Pentachlorophenol	85.6	830
A	Phenanthrene	32	330
A	Phenol	66.5	330
A	Pyrene	32.5	330
I	1,4-Dichlorobenzene-d4	0	0
I	Acenaphthene-d10	0	0
I	Chrysene-d12	0	0
I	Naphthalene-d8	0	0
I	Perylene-d12	0	0
I	Phenanthrene-d10	0	0
S	2,4,6-Tribromophenol	0	0
S	2-Fluorobiphenyl	0	0
S	2-Fluorophenol	0	0
S	Nitrobenzene-d5	0	0
S	Phenol-d5	0	0
S	Terphenyl-d14	0	0

Ecology and Environment, Inc.

Date: 21-Jun-99

Test Code: 1_LK_TOC_S
Test Number: Lloyd Kahn
Test Name: Total Organic Carbon by Method Lloyd Kahn
Matrix: Solid **Units:** mg/Kg

METHOD DETECTION / REPORTING LIMITS

Updated:

Type	Analyte	MDL	PQL
A	Total Organic Carbon	358	4000

Ecology and Environment, Inc.

Date: 01-Jul-99

Test Code: 1_9012A_CN_S
Test Number: SW9012A
Test Name: Cyanide, Total by Method 9012A
Matrix: Solid **Units:** mg/Kg

METHOD DETECTION / REPORTING LIMITS

Updated:

Type	Analyte	MDL	PQL
A	Cyanide	0.0976	0.5

B-3 Control Limits for Analytical Methods - Updates

Ecology and Environment, Inc Analytical Services Center Current Control Limits

Test Name	Method Number	Matrix	Sample Type	Analyte	Spike Amount	Low Limit	High Limit	Units
Metals, TAL (PE) by ICP Method 6010B	SW6010B	Solid	LCS	Aluminum	100	80	120	mg/Kg
			LCS	Antimony	100	80	120	mg/Kg
			LCS	Arsenic	100	80	120	mg/Kg
			LCS	Barium	100	80	120	mg/Kg
			LCS	Beryllium	100	80	120	mg/Kg
			LCS	Cadmium	100	80	120	mg/Kg
			LCS	Chromium	100	80	120	mg/Kg
			LCS	Cobalt	100	80	120	mg/Kg
			LCS	Copper	100	80	120	mg/Kg
			LCS	Lead	100	80	120	mg/Kg
			LCS	Manganese	100	80	120	mg/Kg
			LCS	Nickel	100	80	120	mg/Kg
			LCS	Selenium	100	80	120	mg/Kg
			LCS	Silver	5	80	120	mg/Kg
			LCS	Thallium	100	80	120	mg/Kg
			LCS	Vanadium	100	80	120	mg/Kg
			LCS	Zinc	100	80	120	mg/Kg
Metals, TAL Cations (JY) by ICP Method 6010B	SW6010B	Solid	LCS	Calcium	10000	87	115	mg/Kg
			LCS	Iron	1000	90	112	mg/Kg
			LCS	Magnesium	10000	90	110	mg/Kg
			LCS	Potassium	10000	75	107	mg/Kg
			LCS	Sodium	10000	81	112	mg/Kg
Mercury Analysis in Soil by Method 7471A	SW7471A	Solid	LCS	Mercury	1	61	139	mg/Kg
Cyanide, Total by Method 9012A	SW9012A	Solid	LCS	Cyanide	0.2	75	123	mg/Kg

Ecology and Environment, Inc Analytical Services Center Current Control Limits

Test Name	Method Number	Matrix	Sample Type	Analyte	Spike Amount	Low Limit	High Limit	Units
Pesticides by Method 8081A	SW8081A	Solid	LCS	4,4´-DDD	3.33	73	119	µg/Kg
			LCS	4,4´-DDE	3.33	74	124	µg/Kg
			LCS	4,4´-DDT	3.33	67	140	µg/Kg
			LCS	Aldrin	3.33	67	152	µg/Kg
			LCS	alpha-BHC	3.33	65	134	µg/Kg
			LCS	beta-BHC	3.33	48	135	µg/Kg
			LCS	delta-BHC	3.33	44	144	µg/Kg
			LCS	Dieldrin	3.33	63	149	µg/Kg
			LCS	Endosulfan I	3.33	65	127	µg/Kg
			LCS	Endosulfan II	3.33	54	132	µg/Kg
			LCS	Endosulfan sulfate	3.33	69	130	µg/Kg
			LCS	Endrin	3.33	67	142	µg/Kg
			LCS	Endrin aldehyde	3.33	15	142	µg/Kg
			LCS	gamma-BHC	3.33	71	135	µg/Kg
			LCS	Heptachlor	3.33	75	143	µg/Kg
			LCS	Heptachlor epoxide	3.33	54	132	µg/Kg
			LCS	Methoxychlor	3.33	74	147	µg/Kg
			Surrogate	Decachlorobiphenyl	6.67	39	135	µg/Kg
			Surrogate	Tetrachloro-m-xylene	6.67	47	140	µg/Kg
PCBs by Method 8082	SW8082	Solid	LCS	Aroclor 1016	167	59	119	µg/Kg
			LCS	Aroclor 1260	167	50	150	µg/Kg
			Surrogate	Decachlorobiphenyl	6.67	52	115	µg/Kg
			Surrogate	Tetrachloro-m-xylene	6.67	39	125	µg/Kg
Semivolatile Organics by Method 8270C	SW8270C	Solid	LCS	1,2,4-Trichlorobenzene	1667	39	110	µg/Kg
			LCS	1,4-Dichlorobenzene	1667	33	108	µg/Kg
			LCS	2,4-Dinitrotoluene	1667	46	111	µg/Kg
			LCS	2-Chlorophenol	2000	48	121	µg/Kg
			LCS	4-Chloro-3-methylphenol	2000	52	118	µg/Kg
			LCS	4-Nitrophenol	2000	54	124	µg/Kg
			LCS	Acenaphthene	1667	39	111	µg/Kg
			LCS	N-Nitrosodi-n-propylamine	1667	34	107	µg/Kg
			LCS	Pentachlorophenol	2000	52	116	µg/Kg
			LCS	Phenol	2000	43	125	µg/Kg
			LCS	Pyrene	1667	26	96	µg/Kg
			Surrogate	2,4,6-Tribromophenol	2000	32	130	µg/Kg
			Surrogate	2-Fluorobiphenyl	1667	27	123	µg/Kg
			Surrogate	2-Fluorophenol	2000	36	135	µg/Kg
			Surrogate	Nitrobenzene-d5	1667	25	122	µg/Kg
			Surrogate	Phenol-d5	2000	36	128	µg/Kg
			Surrogate	Terphenyl-d14	1667	51	116	µg/Kg