DEPARTMENT OF THE AIR FORCE

AIR FORCE CENTER FOR ENGINEERING AND THE ENVIRONMENT

LACKLAND AIR FORCE BASE TEXAS

October 4, 2010

MEMORANDUM FOR SEE DISTRIBUTION LIST

FROM: AFCEE/EXC - Griffiss
428 Phoenix Drive
Rome NY 13441-4105

SUBJECT: Final Record of Decision for Area of Concern 9 (SD-62) at the Former Griffiss Air Force Base, Rome, New York

1. Enclosed please find the signed Final Record of Decision (ROD) for Area of Concern 9 site dated July 2010. Also enclosed are copies of the USEPA and NYSDEC concurrence letters.

2. If you have any questions, please contact Cathy Jerrard, 315-356-0810, Ext. 204.

MICHAEL F. MCDERMOTT
BRAC Environmental Coordinator

Attachment: As Noted

DISTRIBUTION: Final Record of Decision for Area of Concern 9 (SD-62)
at the Former Griffiss Air Force Base Rome, New York

Ms. Heather L. Bishop
NYSDEC
Division of Hazardous Waste Remediation
625 Broadway, 11th Floor
Albany NY 12233-7015 (4 copies, 2 CDs)

USEPA Region II
Attn: Mr. Douglas Pocze
Federal Facilities Section
290 Broadway, 18 th Floor
New York City NY 10007-1866 (2 copies, 1 CD)

Ms. Nanci Higginbotham
US Army Corps of Engineers
CENWK-EC-ED
700 Federal Building
601 E. 12th Street
Kansas City MO 64106-2896 (2 copies, 1 CD)

Mr. Joseph Wojnas
US Army Corps of Engineers
428 Phoenix Dr.
Rome NY 13441-4105 (1 copy)

Ms. Catherine Jerrard
AFRPA – Griffiss
Environmental Section
428 Phoenix Dr.
Rome NY 13441-4105 (5 copies, 2 CDs)

Mr. Greg Rys
New York State Department of Health
5665 NYS Route 5
Herkimer NY 13350 (2 copy 1 CD)

Ms. Carolyn White
Associate General Counsel SAF/GCN
1777 Kent Street North
Suite 11500
Arlington, VA 22209 (1 copy)

Air Force Real Property Agency
Attn: Mr. Stephen TerMaath
485 Quinten Roosevelt
San Antonio, TX 78226 (1 copies)

Final
Record of Decision
for Area of Concern 9 (SD-62)
at the
Former Griffiss Air Force Base
Rome, New York

July 2010

Contract No. W912DQ-09-D-3013

Prepared for:

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

Prepared by:

ECOLOGY AND ENVIRONMENT ENGINEERING P.C.
368 Pleasant View Drive
Lancaster, New York 14086

Under Contract to:

PARSONS INFRASTRUCTURE & TECHNOLOGY GROUP, INC.
301 Plainfield Road, Suite 350
Syracuse, New York 13212

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DEPARTMENT OF THE AIR FORCE
AIR FORCE REAL PROPERTY AGENCY

13 Aug 04

AFRPA/Kelly
2261 Hughes Avenue Suite 121
Lackland AFB TX 78236-9821

Mr. Walter E. Mugdan
Director, Emergency and Remedial Response Division
U.S. EPA Region II
290 Broadway
New York, NY 10007-1866

Dear Mr. Mugdan

Enclosed please find the final Record of Decision (ROD) for the Area of Concern 9 (SD-62) Site. After the ROD has been signed, please retain one copy for your records. Forward one copy to New York Department of Environmental Conservation, ATTN: Ms. Heather Bishop, Division of Hazardous Waste Remediation, 625 Broadway, 11th Floor, Albany, NY 12233-7015 and one copy to the Air Force Real Property Agency, ATTN: Mr. Michael F. McDermott, 428 Phoenix Drive, Rome, NY 13441-4105.

This ROD represents another milestone in the successful clean-up of the former Griffiss AFB and is a result of our partnership with the State of New York and U. S. Environmental Protection Agency.

If you have any questions or need additional information, please contact Mr. Stephen TerMaath at (210) 395-9428.

Sincerely

Robert M. Moore
ROBERT M. MOORE
Director

Attachments:
ROD Area of Concern 9 – 3 copies

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UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION 2
290 BROADWAY
NEW YORK, NY 10007-1866

SEP 21 2010

Mr. Robert M. Moore
Director
AFRPA/Kelly
2261 Hughes Avenue Suite 121
Lackland AFB, TX 78236-9821

Re: Records of Decision – Area of Concern 9
Former Griffiss AFB, Rome, NY

Dear Mr. Moore:

This is to inform you that after reviewing the Draft Record of Decision (ROD), responsiveness summary and other supporting documents, the U.S. Environmental Protection Agency (EPA) concurs with the final ROD for Area of Concern 9, dated July 2010. Therefore, on behalf of EPA, I have co-signed the ROD and will forward a copy to Mr. Michael McDermott of the Air Force Real Property Agency and the New York State Department of Environmental Conservation as requested in your August 13, 2010 submittal letter.

Please note, that the ROD requires implementation of the following:

- Source removal for soil,
- In-situ treatment;
- Monitoring of the groundwater;
- Land use controls; and
- Five-Year reviews

If you have any questions regarding the subject of this letter, please contact me or have your staff contact Douglas Pocze, of my staff, at (212) 637-4432.

Sincerely,

Walter E. Mugdan, Director
Emergency and Remedial Response Division

cc: Dale Desnoyers, Director
Division of Environmental Remediation, NYSDEC

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New York State Department of Environmental Conservation
Division of Environmental Remediation, 12th Floor
625 Broadway, Albany, New York 12233-7011
Phone: (518) 402-9706 • **FAX:** (518) 402-9020
Website: www.dec.ny.gov

Alexander B. Grannis
Commissioner

MAR 3 1 2010

Mr. Michael McDermott
AFRPA/DA-Griffiss
Environmental Section
153 Brooks Road
Rome, NY 13441-4015

Re: Former Griffiss Air Force Base
Site No. 633006
Draft AOC9 Groundwater
Record of Decision
Dated March 2009

Dear Mr. McDermott:

The New York State Department of Environmental Conservation and the New York State Department of Health have reviewed the Draft Record of Decision for Area of Concern 9 Groundwater. Based on that review, I understand that the selected remedy includes excavation and removal of soil contaminated with volatile organic compounds, chemical oxidation treatment of groundwater and land use controls. Groundwater monitoring will continue to evaluate the effectiveness of the remedy. The land use controls would limit the property to commercial or industrial use, prohibit use of on-site groundwater, restrict access to subsurface soil, and require evaluation of the soil vapor intrusion pathway prior to construction of any on-site buildings. In addition, the existing former weapon storage igloos will remain unoccupied.

The State concurs with the selected remedy, as stated in the Draft Record of Decision, of March 2010. If you have any questions, please contact Dr. Chittibabu Vasudevan at (518) 402-9625.

Sincerely,

Dale A. Desnoyers
Director
Division of Environmental Remediation

cc: W. Mugdan, USEPA
J. Malleck, USEPA
A. Carpenter, USEPA
C. Jerrard, AFRPA
C. Vasudevan, NYSDEC

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Certificate of Compliance

Final Record of Decision for
Area of Concern 9 (SD-62)
at the
Former Griffiss Air Force Base, Rome, New York

July 2010

On behalf of Ecology and Environment Engineering, P.C. (EEEPC), the undersigned certify that the attached document(s) were developed in conformance with EEEPC's Scope of Work, contract requirements and EEEPC's Quality Control Plan.

Marcia M. Galloway — 7/28/2010
Quality Control Manager (or designee) — Date

Timothy Jones — 7/28/10
Program Manager (or designee) — Date

Robert A. Myers — 7-28-2010
Project Manager (or designee) — Date

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Table of Contents

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List of Abbreviations and Acronyms

AFB	Air Force Base
AFFF	aqueous film-forming foam
AFRPA	Air Force Real Property Agency
Air Force	United States Air Force
AOC	Area of Concern
AOI	Area of Interest
ARAR	Applicable or Relevant and Appropriate Requirement
AS/SVE	air sparging/soil vapor extraction
ATSDR	Agency for Toxic Substances and Disease Registry
BGS	below ground surface
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
COPC	chemical of potential concern
COC	contaminant of concern
DCB	dichlorobenzene
DCE	dichloroethene
DFAS	Defense, Finance, and Accounting Services
EPA	United States Environmental Protection Agency
ESI	Expanded Site Investigation
FFA	Federal Facility Agreement
FID	flame ionization detector
FS	feasibility study

List of Abbreviations and Acronyms (con't)

HI	hazard index
µg/L	micrograms per liter
mg/kg	milligrams per kilogram
MIP	Membrane Interface Probe
NEADS	Northeast Air Defense Sector
NCP	National Oil and Hazardous Substances Pollution Contingency Plan
NPL	National Priorities List
NYANG	New York Air National Guard
NYCRR	New York Code of Rules and Regulations
NYS	New York State
NYSDEC	New York State Department of Environmental Conservation
NYSDOH	New York State Department of Health
OSHA	Occupational Safety and Health Administration
ppm	parts per million
PCE	tetrachloroethene
PDI	predesign investigation
PID	photoionization detector
POTW	Publicly Owned Treatment Works
RAO	remedial action objective
RI	remedial investigation
ROD	Record of Decision
SAC	Strategic Air Command
SARA	Superfund Amendments and Reauthorization Act
SI	supplemental investigation
SVOC	semivolatile organic compound

List of Abbreviations and Acronyms (con't)

TAGM	Technical and Administrative Guidance Memorandum
TAL	Target Analyte List
TBC	To-Be-Considered
TCE	trichloroethene
TCL	Target Compound List
VOC	volatile organic compound
WSA	Weapons Storage Area

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1 Declaration

1.1 Site Name and Location

Area of Concern (AOC) 9 (site identification designation SD-62) is located at the former Griffiss Air Force Base (AFB) in Rome, Oneida County, New York.

1.2 Statement of Basis and Purpose

This Record of Decision (ROD) presents the selected remedial action alternative for the AOC 9 at the former Griffiss AFB. This alternative has been chosen in accordance with the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) of 1980, as amended by the Superfund Amendments and Reauthorization Act (SARA), and the National Oil and Hazardous Substances Pollution Contingency Plan (NCP). The remedy has been selected by the United States Air Force (Air Force) in conjunction with the United States Environmental Protection Agency (EPA) and with the concurrence of the New York State Department of Environmental Conservation (NYSDEC) pursuant to the Federal Facility Agreement (FFA) among the parties under Section 120 of CERCLA. This decision is based on the administrative record file for this site.

1.3 Assessment of the Site

The remedial action selected in this ROD is necessary to protect the public health or welfare, or the environment, from actual or threatened releases of hazardous substances from the AOC into the environment.

1.4 Description of Selected Remedy

The Selected Remedy for AOC 9 includes removal of the source area through excavation of contaminated soil, treatment of contaminated groundwater using chemical oxidation, and land use controls. The excavation of the source area is the primary treatment for groundwater at this site. The horizontal and vertical limits of this excavation have been defined based on the selected cleanup objectives, and groundwater and soil boring analytical results. Approximately 99% of the total volatile organic compounds (VOCs) contaminant mass will be removed during the source area excavation and the bottom of the excavation will be screened with the photoionization detector (PID) to ensure that the contamination has not migrated deeper into the soil or bedrock. If contamination is found above 50 parts per million (ppm) total VOCs in air with the PID, that soil will be excavated and the process repeated. In addition, as a polishing step, a sodium persulfate oxidant with an iron chelate activator (persulfate oxidant) will be applied to the bottom of the excavation to oxidize any low level residual contamination. Application of the oxidant is expected to reduce the number of years required to meet remedial action objectives (RAOs).

After the source is removed, the concentrations of contaminants in the groundwater plume are expected to decrease due to natural processes including advection, dilution, and biodegradation. In addition, to further reduce the number of years required to meet RAOs, the groundwater will be treated with persulfate oxidant, which will be injected into the center of the plume through temporary wells approximately 15 to 25 feet deep immediately downgradient of the excavation area. The persulfate oxidant will be used because it is very stable in the subsurface, performs well in a neutral pH environment, and can destroy chlorobenzene and dichlorobenzene. Oxidant injection is being performed in an area of 50 feet by 200 feet immediately downgradient of the excavation area, which will treat groundwater in an in-situ plume area of 10,000 square feet. This portion of the plume has an average saturated thickness of 15 feet and an estimated porosity of 0.35, which provides a water treatment volume of approximately 390,000 gallons. Modeling has indicated that removal of the source by excavation of the soil, application of persulfate oxidant to the soil at the bottom of the excavation, and one injection of persulfate

oxidant in the center of the plume immediately downgradient of the excavation area will result in a reduction of groundwater contaminant concentration levels and anticipated achievement of RAOs in 11 years (see Section 2.9, Alternative 7).

During source excavation, uncontaminated overburden soil will be removed to access the contaminated soil. The overburden soil will be excavated, stockpiled, and used for backfilling following excavation of the contaminated soil. Steel sheeting will be installed around the contaminated soil area to support the excavation below the water table. An area of approximately 31,500 square feet of soil, 6 feet thick, is planned to be removed, which provides a contaminated soil removal volume of approximately 7,000 cubic yards (all volumes will be further refined during the remedial design stage). Dewatering will be performed during the excavation of the contaminated soil located below the groundwater table. The collected groundwater will be pumped into tanks, treated (if necessary), sampled, and shipped to the City of Rome Publicly Owned Treatment Works (POTW). Following excavation of the contaminated soil and application of the persulfate oxidant to the excavation floor, the steel sheeting will be removed and the area will be backfilled with the stockpiled overburden soil. Presently, the elevation of the excavation area is above the surrounding roadways and after construction it is expected that the final grade will remain higher than the adjacent roadways. Swales and culverts will be restored to their preconstruction elevations to match existing drainage features.

Monitoring of the groundwater plume and treatment performance will be performed by the Air Force until RAOs are achieved, i.e., until four consecutive sampling rounds provide results below the remediation goals listed in Table 1. In order to properly monitor the plume, groundwater sampling will be performed to determine and monitor seasonal water table and contaminant concentration fluctuations.

The bedrock beneath the proposed excavation area at AOC 9 is present at depths of 30 to 35 feet below ground surface (BGS), and in 2002, the bedrock groundwater study (E & E 2002b) concluded that groundwater contamination had not migrated into the underlying bedrock. Based on predesign investigation (PDI) studies (EEEPC 2007a, Parsons 2007, EEEPC 2007b), it was determined that a thickness of between 6 and 16 feet of uncontaminated soil rests above the bedrock.

Table 1 AOC 9 Groundwater Cleanup Goals	
Contaminants of Concern[a]	**Groundwater Cleanup Goal[b] (µg/L)**
1,2-Dichlorobenzene	3
1,2-Dichloroethane	0.6
1,2,4-Trimethylbenzene	5
1,3,5-Trimethylbenzene	5
1,3-Dichlorobenzene	3
1,4-Dichlorobenzene	3
Acetone	50
Benzene	1
Chlorobenzene	5
cis-1,2-Dichloroethene	5
Ethylbenzene	5
Isopropylbenzene	5
Methylene Chloride	5
Naphthalene	10
n-Butylbenzene	5
n-Propylbenzene	5
o-Xylene	5
sec-Butylbenzene	5
Trichloroethene	5
tert-Butylbenzene	5
Tetrachloroethene	5
Vinyl Chloride	2
Xylene (Total)	5

Notes:
[a] From the *Final Feasibility Study Report for AOC 9* (E & E 2004a)
[b] NYSDEC Class GA groundwater standard

Key:
µg/L = Micrograms per liter.

If during the source excavation or during monitoring of the groundwater plume there are indications that contamination is migrating deeper, the potential impacts to bedrock groundwater will be evaluated and a recommendation will be presented to NYSDEC and the EPA for additional bedrock groundwater sampling.

Land Use Controls in the form of deed restrictions for affected groundwater will also be implemented as follows:

- Development and use of the entire AOC 9 property for residential housing, elementary and secondary schools, childcare facilities, and playgrounds will be prohibited unless prior approval is received from the Air Force, EPA, and NYSDEC.

- The owner or occupant of this site shall not extract, utilize, consume, or permit others to extract, utilize, or consume any water from the subsurface aquifer within the

boundary of the site (see Figure 6) unless such owner or occupant obtains prior written approval from the New York State Department of Health (NYSDOH).

- The owner or occupant of this site will not engage in any activities that will disrupt required remedial investigation, remedial actions, and oversight activities, should any be required.

- The owner or occupant of this site will restrict access to and prohibit contact with all subsurface soils and groundwater at or below the groundwater interface at this AOC until cleanup goals are achieved and have been confirmed through sample results.

- With respect to risks that may be posed via indoor air contaminated by chemicals volatilizing from the groundwater (vapor intrusion), the Grantee will covenant to conduct either (a) construction of new structures within the Groundwater Restriction Area in a manner that would mitigate unacceptable risk under CERCLA and the NCP; or (b) an evaluation of the potential for unacceptable risk prior to the erection of any structure in the Groundwater Restriction Area, and the Grantee shall include mitigation of the vapor intrusion in the design/construction of the structure prior to occupancy if an unacceptable risk under CERCLA and the NCP is posed. Any such mitigation or evaluations will be coordinated with the EPA and NYSDEC. In addition, with respect to vapor intrusion, Buildings 912 and 913 will remain unoccupied until either of the actions under (a) or (b) above is completed. "Occupied" means that the building is used and there is human occupation of it with regularity (e.g., persons present the same day of the week, for approximately the same number of hours). Incidental use of the building, such as for storage of materials, that necessitates intermittent visits by individuals who would not remain in the building after delivery or retrieval of such materials, would not meet this definition of occupation. "Occupied" has the same meaning throughout this document. The owner may also choose to demolish the buildings.

The above restrictions will be maintained until the concentrations of hazardous substances in the groundwater are at such levels to allow for unrestricted use. The restriction on occupancy of Buildings 912 and 913 will remain in effect after the groundwater cleanup goals are achieved unless the requirements of the previous paragraph are followed. Prior approval by EPA and NYSDEC will be required for any modification or termination of land use controls, use restrictions, or anticipated actions that may disrupt the effectiveness of or alter or negate the need for land use controls.

Based on computer modeling, which is described under Alternative 7 in Section 2.9, groundwater at this site is expected to reach Remediation Goals in 11 years. Until Remediation Goals are achieved, data will be collected as part of remedy performance monitoring. Following each monitoring event, concentrations of contaminants of concern

(COCs) and trends in concentrations of COCs will be evaluated. If an increasing trend in COC concentrations is identified (e.g. three consecutive monitoring events showing a statistically significant increasing trend), the Air Force will propose to the EPA and NYSDEC that additional action be performed. Additional oxidant injections or additional excavations may be executed without requiring either an Explanation of Significant Differences or ROD amendment. The Air Force will initiate additional oxidant injection or excavation within six months of completion of the trend analysis if these actions will be effective in achieving cleanup standards as shown in Table 1. If other actions will be required, the Air Force will propose development and implementation of a ROD amendment or Explanation of Significant Differences.

1.5 Statutory Determinations

The Air Force Real Property Agency (AFRPA) (formerly Air Force Base Conversion Agency) and EPA, with concurrence from NYSDEC, have determined that remedial action is warranted for this site. The Selected Remedy is protective of human health and the environment, complies with federal and New York State (NYS) applicable or relevant and appropriate requirements (ARARs), is cost effective, and utilizes permanent solutions to the extent possible. This remedy accomplishes the required end result of protection of human health and the environment by removing approximately 99% of the total VOC contaminant mass in the soil during the source area excavation, treatment of the groundwater plume through application of oxidant to the bottom of the excavation, and injection of oxidant into the groundwater plume downgradient of the excavation, thereby eliminating the sources of the risks to human health and the environment associated with AOC 9 (see Section 2.7, Summary of Site Risks).

The Air Force will perform annual inspections and reporting prior to property transfer; the transferee will perform those actions post-transfer. This remedy will ultimately result in hazardous substances, pollutants, or contaminants remaining on the site at levels that allow for unlimited use and unrestricted exposure. However, the remediation process will take more than 5 years to achieve these conditions. To ensure the remedy

remains protective of human health and the environment, Five-Year Reviews will be performed by Air Force in coordination with the EPA and NYSDEC.

1.6 ROD Data Certification Checklist

The following information is included in the Decision Summary section of this ROD. Additional information can be found in the Administrative Record for this site.

- The chemicals of potential concern (COPCs) and their respective concentrations are presented in Section 2.5, Site Characteristics.
- Current and reasonably anticipated future use assumptions used in the baseline risk assessment are presented in Section 2.6, Current and Potential Future Site and Resource Uses.
- The baseline risk represented by the COPCs is presented in Section 2.7, Summary of Site Risks.
- The key factors that led to the selection of the remedy are presented in Section 2.10, Comparative Analysis of Alternatives.

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1.7 Authorizing Signatures

On the basis of the remedial investigations performed at AOC 9 and the baseline risk assessment, the Selected Remedy for AOC 9 includes removal of the source area through excavation of contaminated soil, treatment of contaminated groundwater using chemical oxidation, and land use controls. The Selected Remedy meets the requirements for remedial action set forth in CERCLA, Section 121. The NYSDEC has concurred with the selected remedial action presented in this ROD.

Robert M. Moore — 13 AUG 10

Robert M. Moore — **Date**
Director
Air Force Real Property Agency

Walter E. Mugdan — Sept. 21, 2010

Walter E. Mugdan — **Date**
Director, Emergency and Remedial Response Division
United States Environmental Protection Agency, Region 2

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2 Decision Summary

2.1 Site Name, Location, and Brief Description

AOC 9 (site identification designation SD-62) is located at the former Griffiss AFB in Rome, Oneida County, New York (see Figure 1). Pursuant to Section 105 of CERCLA, Griffiss AFB was included on the National Priorities List (NPL) on July 15, 1987. On August 21, 1990, the EPA, NYSDEC, and the AFRPA entered into an FFA under Section 120 of CERCLA.

AOC 9 is a grass-covered area approximately 1,500 feet long and 650 feet wide located in the southwest side of the inactive Weapons Storage Area (WSA) (see Figure 1). The site is part of a strip of land that lies between an airplane runway to the southwest and extends into the WSA to the northeast. Perimeter Road runs through the site and Six Mile Creek borders the southwest edge. Between the WSA fence and Perimeter Road is a small water-retention pond (the aqueous film-forming foam [AFFF] pond) that was connected to WSA operations (see Figure 2).

The ground surface at AOC 9 slopes gently downward toward Six Mile Creek. Groundwater flows southwest toward the creek. Depth to groundwater is approximately 10 to 12 feet but is closer to the ground surface between Perimeter Road and Six Mile Creek. There are several locations in this area where shallow groundwater discharges to the surface. Three intermittent drainage ways that discharge to Six Mile Creek exist on the southern portion of the site.

2.2 Former Griffiss AFB History and Enforcement Activities

2.2.1 Operational History

The mission of the former Griffiss AFB varied over the years. The base was activated on February 1, 1942, as Rome Air Depot, with the mission of storage, maintenance, and shipment of material for the U.S. Army Air Corps. Upon creation of the Air Force in

1947, the depot was renamed Griffiss AFB. The base became an electronics center in 1950, with the transfer of Watson Laboratory Complex (later Rome Air Development Center [1951], Rome Laboratory, and then the Air Force Research Laboratory Information Directorate, established with the mission of accomplishing applied research, development, and testing of electronic air-ground systems). The 49th Fighter Interceptor Squadron was also added. The Headquarters of the Ground Electronics Engineering Installations Agency was added in June 1958 to engineer and install ground communications equipment throughout the world. On July 1, 1970, the 416th Bombardment Wing of the Strategic Air Command (SAC) was activated with the mission of maintenance and implementation of both effective air refueling operations and long-range bombardment capability. Griffiss AFB was designated for realignment under the Base Realignment and Closure Act in 1993 and 1995, resulting in deactivation of the 416th Bombardment Wing in September 1995. The Air Force Research Laboratory Information Directorate and the Northeast Air Defense Sector (NEADS) will continue to operate at their current locations; the New York Air National Guard (NYANG) operated the runway for the 10th Mountain Division deployments until October 1998, when they were relocated to Fort Drum; and the Defense Finance and Accounting Services (DFAS) has established an operating location at the former Griffiss AFB.

2.2.2 Environmental Background

As a result of the various national defense missions carried out at the former Griffiss AFB since 1942, hazardous and toxic substances were used and hazardous wastes were generated, stored, or disposed at various sites on the installation. The defense missions involved, among others, procurement, storage, maintenance, and shipping of war materiel; research and development; and aircraft operations and maintenance.

Numerous studies and investigations under the U.S. Department of Defense Installation Restoration Program have been carried out to locate, assess, and quantify the past toxic and hazardous waste storage, disposal, and spill sites. These investigations included a records search in 1981, interviews with base personnel, a field inspection, compilation of an inventory of wastes, evaluation of disposal practices, and an assessment to determine the nature and extent of site contamination; Problem Confirmation and Quantification studies (similar to what is now designated a Site Investigation) in 1982 and 1985;

02:002888.PI02.04-B2854\Fig1.CDR-9/11/2009-GRA

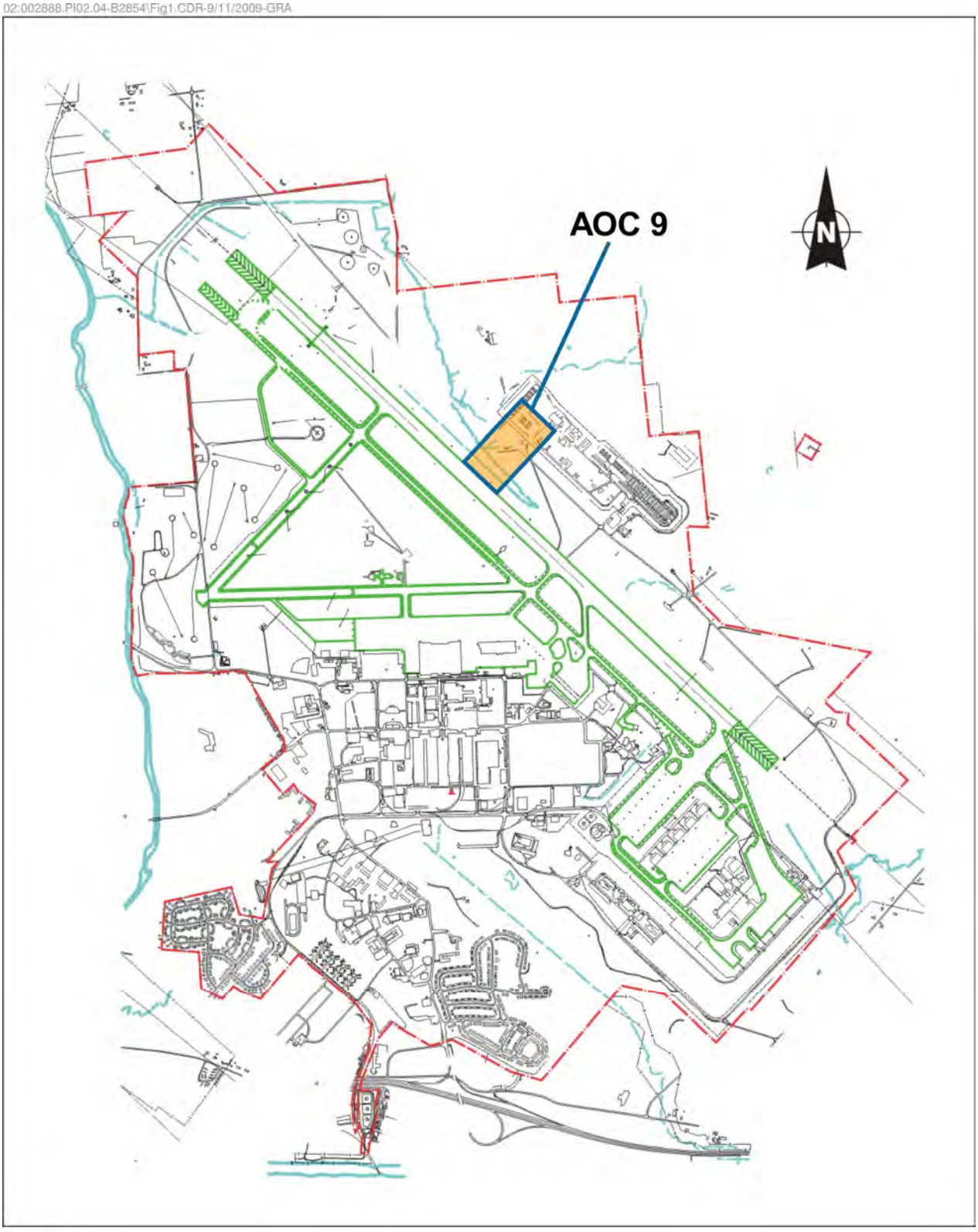

Figure 1 AOC 9, Former Griffiss Air Force Base, Rome, NY

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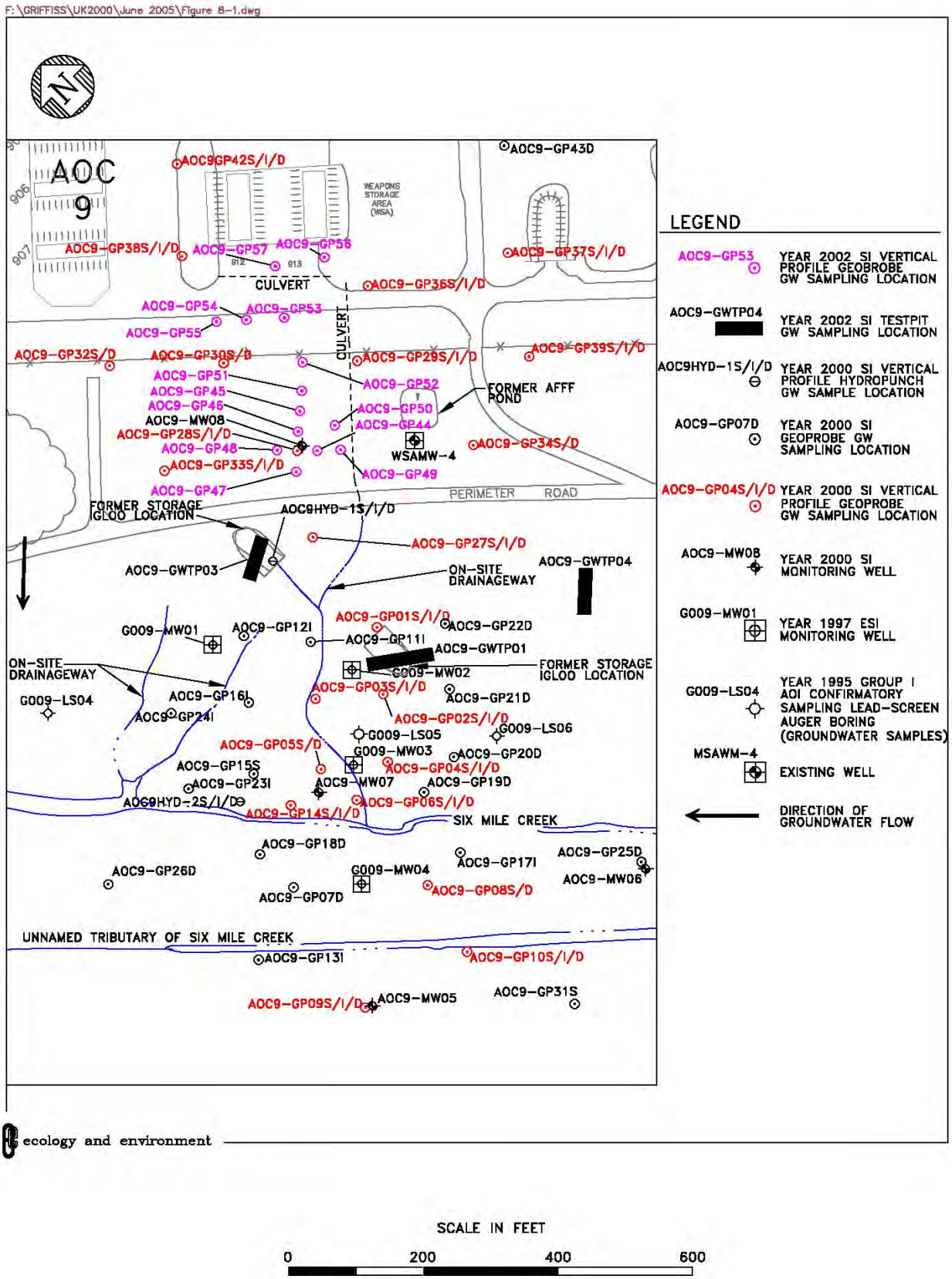

Figure 2 AOC 9 Groundwater Monitoring Well and Sampling Locations (1995 – 2002)

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soil and groundwater analyses in 1986; a basewide health assessment in 1988 by the U.S. Public Health Service, Agency for Toxic Substances and Disease Registry (ATSDR); base-specific hydrology investigations in 1989 and 1990; a groundwater investigation in 1991; and site-specific investigations between 1989 and 1993. The ATSDR issued a Public Health Assessment for Griffiss AFB, dated October 23, 1995, and an addendum, dated September 9, 1996.

Pursuant to Section 105 of CERCLA, Griffiss AFB was included on the NPL on July 15, 1987. On August 21, 1990, the agencies entered into an FFA under Section 120 of CERCLA. On March 20, 2009, 2,800 acres of the 3,552 acres at the former Griffiss AFB were removed from the NPL (AOC 9 remains on the NPL).

The Air Force prepared and submitted numerous reports to NYSDEC and EPA for review and comment. These reports addressed remedial activities that the Air Force is required to undertake under CERCLA and included identification of AOCs on base; a scope of work for a remedial investigation (RI); a work plan for the RI, including a sampling and analysis plan and a quality assurance project plan; a baseline risk assessment; a community relations plan; multiple RI reports; and work plans and the reports for supplemental investigations (SIs). The Air Force delivered the draft-final RI report covering 31 AOCs to EPA and NYSDEC on December 20, 1996. The final SI Report was delivered on July 24, 1998. Additional site-specific reports for AOC 9, all of which NYSDEC and EPA concurred with the findings of, included: the final RI for AOC 9 (May 2004), the final feasibility study (FS) for AOC 9 (October 2004), several PDI data summaries for AOC 9 (2007), and an Addendum to the final FS (2010).

2.3 Community Participation

A proposed plan for AOC 9, indicating remedial action, was released to the public on Wednesday, January 13, 2010. The document was made available to the public in the administrative record file located at 153 Brooks Road in the Griffiss Business and Technology Park. The notice announcing the availability of this document was published in the *Rome Sentinel* on January 14, 2010. The public comment period lasted from January 13, 2010 to February 16, 2010, and was set up to encourage public participation in the alternative selection process. In addition, a public meeting was held on Wednesday, January 20, 2010. The AFRPA, EPA, NYSDEC, and the NYSDOH held an information

session at the beginning of the public meeting and answered questions about issues at AOC 9 and the proposal under consideration. A response to the comments received during this period is included in the Responsiveness Summary, which is part of this ROD (see Section 3).

2.4 Scope and Role of Site Response Action

The scope of the plan for remedial action for AOC 9 addresses the concerns for human health and the environment. The remedial action is consistent with the results of the human health and ecological risk assessments performed for residential and occupational receptors and terrestrial and aquatic wildlife. In addition, source control, which is a key factor in the restoration of AOC 9, will be attained through the performance of remedial actions.

2.5 Site Characteristics

The former Griffiss AFB covered approximately 3,552 contiguous acres in the lowlands of the Mohawk River Valley in Rome, Oneida County, New York. Topography within the valley is relatively flat, with elevations on the former Griffiss AFB ranging from 435 to 595 feet above mean sea level. Three Mile Creek, Six Mile Creek (both of which drain into the NYS Barge Canal, located to the south of the base), and several state and/or federal-regulated wetlands are located on the former Griffiss AFB, which is bordered by the Mohawk River on the west. Due to its high average precipitation and predominantly silty sands, the former Griffiss AFB is considered a groundwater recharge zone.

AOC 9 is a grass-covered area approximately 1,500 feet long and 650 feet wide located in the southwest side of the inactive WSA (see Figure 1). The site is part of a strip of land that lies between an airplane runway to the southwest and extends into the WSA to the northeast. Perimeter Road runs through the site and Six Mile Creek borders the southwest edge. Between the WSA fence and Perimeter Road is a small water-retention pond (the AFFF pond) that was connected to WSA operations (see Figure 2).

The area comprising AOC 9 was originally farmland in the 1930s, before base construction. In the 1940s and 1950s, the first landfill for the base (currently known as AOC 9) was located beneath the northern portion of the former WSA and extended south

between Perimeter Road and Six Mile Creek. Based on aerial photographs, it was determined that the landfill was used between 1943 and 1957 but no later than 1960. The type of material buried at this site is unknown; however, it is reported that large quantities of the landfill material were removed during construction of the WSA. Two former WSA igloos, identified as Buildings 912 and 913, are located at AOC 9. The buildings are periodically used for storage but are not currently occupied and will remain vacant. In addition, two munitions storage bunkers were erected between Perimeter Road and Six Mile Creek in the early 1950s. One of the bunkers (also referred to as igloos) was removed in the late 1970s or early 1980s (i.e., before 1981), and the other bunker was removed in 1992. Although the bunkers were initially used for munitions storage, they were later used to store hazardous materials. Due to the presence of elevated chlorinated solvents (i.e., in excess of NYSDEC Class GA standards and EPA maximum contaminant levels) in groundwater samples collected during the Expanded Site Investigation (ESI) at Area of Interest (AOI) 9, the status of this site was changed from AOI to AOC in 1998.

AOC 9 is currently inactive and access is somewhat restricted by Perimeter Road Gates 4 and 11. The southern portion of this area is expected to remain vacant in the future, acting as a buffer zone between the runway and future development in adjacent areas. The northern portion of the site extends into the former WSA boundary and is expected to be zoned as a non-residential, industrial area.

The ground surface at AOC 9 slopes gently downward toward Six Mile Creek. Groundwater flows southwest toward the creek. Depth to groundwater is approximately 10 to 12 feet but is closer to the ground surface between Perimeter Road and Six Mile Creek. There are several locations in this area where shallow groundwater discharges to the surface. Three intermittent drainage ways that discharge to Six Mile Creek exist on the southern portion of the site.

Debris (including glass, slag, bricks, ceramics, cinderblocks, asphalt, concrete, wire, and metal) encountered during test pit excavations within the boundaries of the former landfill accounted for less than 1% by volume of the excavated material. The lack of waste materials observed from test pit excavations support reports that the former WSA landfill was removed prior to the construction of the WSA. Based on the analytical data obtained from the samples collected from the excavations, the soil in the area of the test pits is not a source of contamination.

A contaminated groundwater plume (chlorobenzene, trichloroethene [TCE], dichloroethene [DCE]) extends downgradient from AOC 9 for approximately 1,500 feet and covers approximately 8 acres. The lateral extent of the plume is approximately 400 feet and the vertical extent ranges from ground surface to 20 feet BGS, which is the top of bedrock. The chlorobenzene/TCE/ cis-1,2-DCE concentrations range from non-detect to 14,400 micrograms per liter (µg/L), 127 µg/L, and 227 µg/L, respectively. The groundwater cleanup goals (NYSDEC Groundwater Standards) for chlorobenzene, TCE, and cis-1,2-DCE are 5 µg/L. The leading edge of this plume has reached Six Mile Creek. Chlorobenzene and 1,2 dichlorobenzene have been detected in Six Mile Creek surface water samples at very low concentrations. However, no COCs have been detected at concentrations exceeding the most stringent screening criteria.

Site Investigations and Studies

In 1994, a groundwater monitoring well (WSAMW-4) was installed and sampled at AOC 9 (United States Air Force, 1994). The groundwater sample contained low levels of chloromethane. In 1995, during the Group I AOI Confirmatory Sampling Program (E & E 1996), surface soil, subsurface soil, surface water, and groundwater samples were collected, and a geophysical survey was performed. Sample results indicated the presence of chlorinated hydrocarbons in the groundwater.

The scope of further groundwater, soil, and vapor investigations performed at AOC 9 include an Expanded Site Investigation (E & E 1998a), 2000 Supplemental Investigation (E & E 2000), 2002 Supplemental Investigation (E & E 2002a), Bedrock Groundwater Study (E & E 2002b), in situ chemical oxidation groundwater Treatability Studies (E & E 2004c), Soil Vapor Study (EEEPC 2007c), and Predesign Investigations (EEEPC 2007a, Parsons 2007, EEEPC 2007b.

Expanded Site Investigation. In 1997, an ESI (E & E 1998a) was performed. The main objective of the ESI was to investigate the nature and extent of environmental contamination from historical releases at the site in order to determine whether any remedial action was necessary to prevent potential threats to human health and the environment that might arise from exposure to site conditions. The ESI included the installation and sampling of four permanent monitoring wells. Analytical results indicated the presence of benzene, chlorobenzene, cis-1,2-DCE, 1,2-dichlorobenzene (DCB), 1,3-DCB,

1,4-DCB, tetrachloroethene (PCE), and TCE in one or more wells in concentrations that exceeded screening criteria. Several metals, including aluminum, iron, manganese, and potassium, were also detected in concentrations that exceeded screening criteria in one or more wells.

2000 Supplemental Investigation. In 2000, an SI (E & E 2000) was performed. A total of 88 Geoprobe and six Hydropunch groundwater screening samples were collected from 45 locations. Twenty-six of the 45 locations were vertically profiled (i.e., up to three samples were collected from different depths at the same location). In addition, four new monitoring wells were installed and sampled, and four existing monitoring wells were resampled. Analytical results for the Geoprobe/Hydropunch samples indicated the presence of sixteen VOCs at levels exceeding the most stringent criteria. Analytical results for the monitoring wells indicated the presence of 14 VOCs and five metals at concentrations exceeding the most stringent criteria (see Table 2).

2002 Supplemental Investigation. In 2002, a second SI (E & E 2002a) was performed to collect additional data to further delineate the chlorinated hydrocarbon plume and determine if petroleum hydrocarbons were present within the groundwater. A total of 56 Geoprobe groundwater screening samples were collected from 14 locations. Eleven of the 14 locations were vertically profiled (i.e., up to five samples were collected from different depths at the same location). Analytical results for the Geoprobe samples indicated the presence of 15 VOCs at levels exceeding the most stringent screening criteria (see Table 3). The groundwater monitoring wells and temporary wells installed and monitored from 1995 through the 2002 SI are shown in Figure 2.

Based on these results, the overall shape of the contaminant plume at that time appeared to be linear and oriented northeast/southwest (approximately 850 feet long) with a relatively narrow center. The downgradient portion appeared to be the widest due to natural dispersion and the change in direction of groundwater flow in proximity to the creeks, as illustrated in the lower portion of Figure 3. Subsequent investigations provided additional data to better define the entire plume.

Table 2
Compounds Exceeding Standards and Guidance Values
2000 AOC 9 Supplemental Investigation
Groundwater Samples
(Sampling conducted May 2000)

Compound	Range of Detected Concentrations*	Frequency of Detection Above Most Stringent Criterion**	Most Stringent Criterion
VOCs (µg/L)			
Benzene	0.650 - 12.6	22/102	1 [a]
n-Butylbenzene	Trace - 48.1	3/102	5 [a]
sec-Butylbenzene	Trace - 10.2	1/102	5 [a]
tert-Butylbenzene	Trace - 5.4	1/102	5 [a]
Chlorobenzene	Trace - 2352	32/102	5 [a]
1,2-Dichlorobenzene	0.363J - 414.2	30/102	3 [a]
1,3-Dichlorobenzene	Trace - 7.3	6/102	3 [a]
1,4-Dichlorobenzene	Trace - 214.9	27/102	3 [a]
cis-1,2-Dichloroethene	Trace - 227.2	21/102	5 [a]
Ethylbenzene	Trace - 50.3	5/102	5 [a]
Isopropylbenzene	Trace - 22.8	2/102	5 [a]
Methylene Chloride	72.6	1/102	5 [a, b]
Naphthalene	28.3	1/102	10 [d]
n-Propylbenzene	Trace - 14.0	1/102	5 [a]
Tetrachloroethene	Trace - 173.3	7/102	5 [a ,b]
Trichloroethene	Trace - 66.9	22/102	5 [a, b]
1,2,4-Trimethylbenzene	Trace - 68.8	1/102	5 [a]
1,3,5-Trimethylbenzene	Trace - 34.4	1/102	5 [a]
Vinyl Chloride	1.3J - 63.7	16/102	2 [a, b]
m,p-Xylene	16.4	1/102	5 [a]
o-Xylene	10.0	1/102	5 [a]
Metals (µg/L)			
Aluminum	587 - 2770	2/16	50 [c]
Iron	178 - 10800	8/16	300 [a, c]
Manganese	4.21J - 6810	14/16	50 [c]
Selenium	12.2 - 23.2	10/16	10 [a]
Thallium	6.2J - 7.46J	2/16	0.5 [d]

Notes:
[*] Does not include nondetects.
[**] The number of samples that exceeded the criteria/ the total number of samples collected.
[a] NYSDEC Class GA groundwater standard, June 1998.
[b] EPA Federal primary maximum contaminant level.
[c] EPA Federal secondary maximum contaminant level.
[d] NYSDEC Class GA groundwater guidance value; June 1998.

Key:
J = Estimated concentration.
µg/L = Micrograms per liter.

Table 3
Compounds Exceeding Standards and Guidance Values
2002 AOC 9 Supplemental Investigation
Groundwater Samples
(Sampling conducted July 2002)

Compound	Range of Detected Concentrations*	Frequency of Detection Above Most Stringent Criterion**	Most Stringent Criterion
VOCs (µg/L)			
Acetone	3.27J - 352	4/56	50 [a]
Benzene	0.107J - 12.6J	17/56	1 [a]
Chlorobenzene	0.163J - 2150	41/56	5 [a]
1,2-Dichlorobenzene	0.0720J - 513J	30/56	3 [a]
1,3-Dichlorobenzene	0.174J - 7.32J	3/56	3 [a]
1,4-Dichlorobenzene	0.194J - 151J	39/56	3 [a]
1,2-Dichloroethene, total	0.188J - 71.2	3/56	5 [a]
cis-1,2-Dichloroethene	0.0900J - 70.0	3/56	5 [a]
Ethylbenzene	0.0790J - 59.6	5/56	5 [a]
Tetrachloroethene	0.0870J - 15.4	11/56	5 [a ,b]
Trichloroethene	0.152J - 10.3J	11/56	5 [a, b]
Vinyl Chloride	0.188J - 13.1J	4/56	2 [a, b]
m,p-Xylene	0.268J - 197	4/56	5 [a]
o-Xylene	0.104J - 19.7	2/56	5 [a]

Notes:
[*] Does not include nondetects.
[**] The number of samples that exceeded the criteria/ the total number of samples collected.
[a] NYSDEC Class GA groundwater standard, June 1998.
[b] EPA Federal primary maximum contaminant level.

Key:
J = Estimated concentration.
µg/L = Micrograms per liter.

During the SI, five test pits were excavated to the water table and groundwater samples were collected to determine if petroleum hydrocarbons were present within the groundwater. Analytical results indicated that there was no significant petroleum hydrocarbon contamination in the test pit samples.

Bedrock Groundwater Study. A Bedrock Groundwater Study for AOC 9 (E & E 2002b) was conducted in 2002 to determine whether contamination was present in the bedrock. The study consisted of drilling, installation, development, sampling, and slug testing of three new bedrock wells and installation of one soil boring. Soil and groundwater samples were analyzed for VOCs and chemicals that would be indicative of natural attenuation (methane, ethane, ethene, anions, and dissolved organic carbon). The soil and groundwater samples collected from the soil boring were collected for treatability bench-scale tests in preparation for a groundwater treatability pilot study. Analytical re-

sults for the bedrock groundwater samples indicated that VOCs are not present at concentrations above the most stringent screening criteria within the bedrock.

The Bedrock Groundwater Study concluded that groundwater contamination observed in the overlying overburden aquifer does not appear to have migrated downward into the underlying bedrock at the site. Therefore, no further action was recommended for bedrock groundwater.

Treatability Studies. AOC 9 was included in the in situ chemical oxidation groundwater treatability studies (E & E 2004c) for Landfill 6 and Building 775 due to the similarity of their contaminants. The treatability studies evaluated the effectiveness of the technology at these sites.

Bench-scale Study. In 2002, in situ chemical oxidation bench-scale studies (treatability studies) for groundwater contamination were conducted at AOC 9 using both potassium permanganate and Fenton-based reagent as the oxidants. Results from the Fenton-based test indicated a very effective 99.9% destruction of VOCs (i.e., total VOCs were reduced from 591 μg/L to 0.41 μg/L), but groundwater treated with permanganate showed no VOC reduction. This is likely due to Fenton's reagent ability to destroy chlorobenzene, one of the COCs at the site.

Field Pilot-scale Study. Field pilot-scale studies (treatability studies) were performed at AOC 9 in 2002 and 2003 to identify and collect the data/information needed to assess the potential full-scale implementation of in situ chemical oxidation technology. Based on the results of the bench-scale study, Fenton-based reagent was used as the oxidant. Two injections of the oxidant were conducted (November 2002 and November 2003) in an attempt to determine the amount of oxidant needed to treat the groundwater plumes on a full-scale basis and to obtain information regarding radial effects. In general, the pilot study results indicated that conditions at the site would be conducive to treating groundwater containing chlorobenzene and other VOCs within the dissolved phase plume. After the second injection event, there was an overall total VOC reduction in the wells, but a rebound of contaminant levels was observed following the completion of the pilot study.

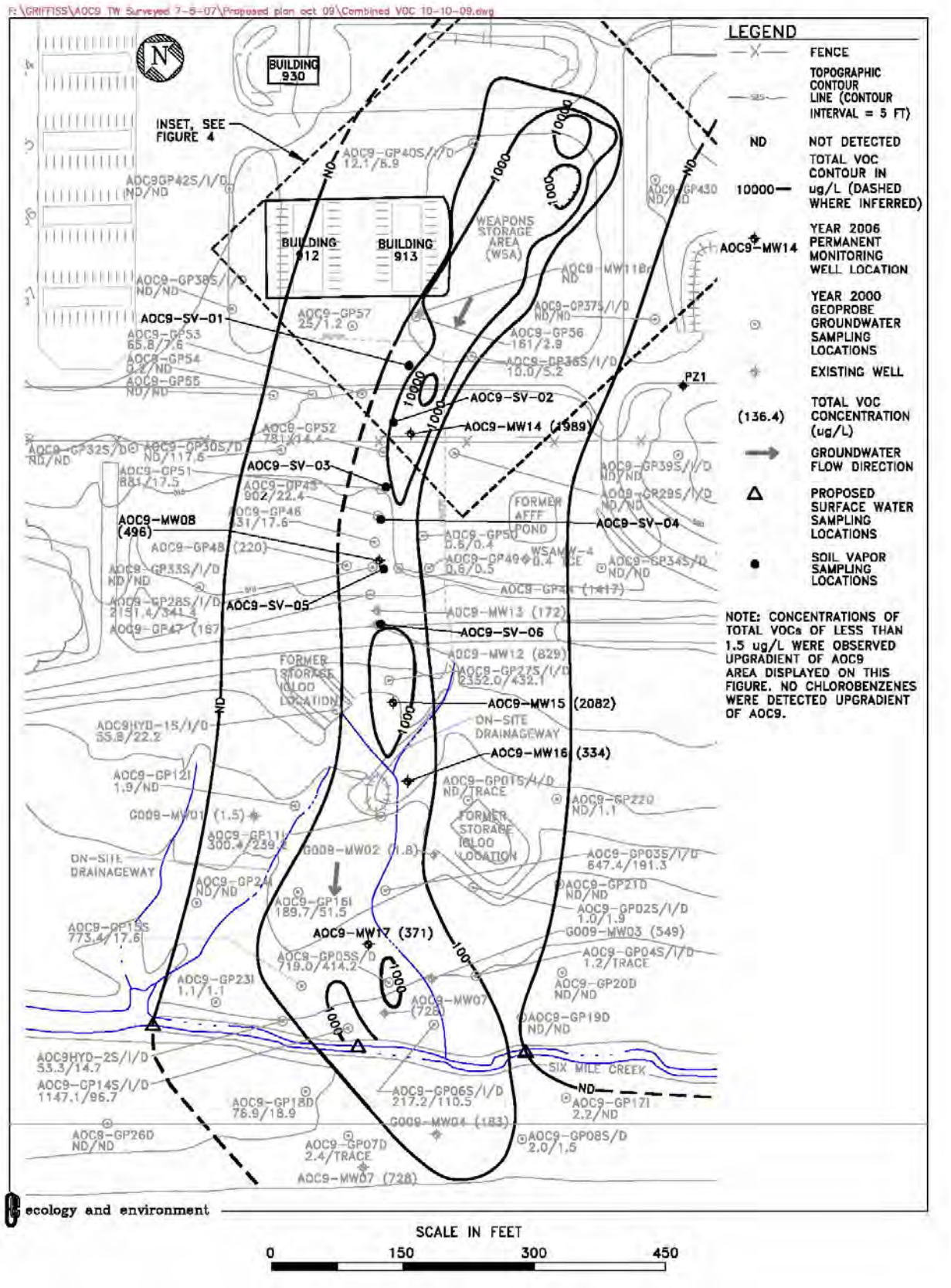

Figure 3 Total VOC Concentrations in Groundwater and Soil Vapor Sample Locations

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Soil Vapor Study. Six soil vapor samples (from 5 to 8 feet BGS) were collected at AOC 9 in 2006 (EEEPC 2007c). PCE and TCE concentrations were detected below the screening levels in all samples. PCE was detected at levels ranging from 130 to 610 $\mu g/m^3$ (screening level 4,088 $\mu g/m^3$) and TCE was detected at levels ranging from 17 to 810 $\mu g/m^3$ (screening level 1,386 $\mu g/m^3$). Chlorobenzene was detected in only one sample at a concentration of 1.4 $\mu g/m^3$. Soil vapor results are provided in Table 4 and sample locations are shown on Figure 3.

Table 4
Summary of Positive Results for Soil Vapor Samples Collected From AOC 9 2006

Compound	Range of Detected Concentrations*	Frequency of Detection**
VOCs ($\mu g/m^3$)		
1,2,4-Trimethylbenzene	2.7 – 5.4	5/6
1,3-Butadiene	4.4 – 11	4/6
4-Ethyltoluene	3.9	1/6
Acetone	48 – 69	4/6
Benzene	1.7 – 12	4/6
Carbon Disulfide	3.4 – 6.5	4/6
cis-1,2-Dichloroethene	15 - 19	2/6
Cyclohexane	15	1/6
Ethylbenzene	2.3 – 4.8	4/6
m,p-Xylene (sum of isomers)	6.9 – 14	5/6
Methyl ethyl ketone (2-butanone)	35 – 150	6/6
n-Heptane	2.7 – 23	4/6
n-Hexane	5.3 – 35	4/6
o-Xylene	2.0 – 3.9	4/6
Styrene	3.5 – 7.2	5/6
Tetrachloroethene	130 – 610	6/6
Toluene	12 – 19	6/6
Total 1,2-Dichloroethene	15 – 19	2/6
Trichloroethene	17 – 810	6/6
Xylenes, Total	7.4 – 18	5/6
2-Hexanone (methyl butyl ketone)	6.1 – 22	3/6
4-Ethyltoluene	2.1 – 2.7	2/6
Chlorobenzene	1.4	1/6
Cyclohexane	2.2	1/6
Trichlorofluoromethane	1.5	1/6

* Does not include non-detects.
** The number of samples that contain detections / the total number of samples collected.

Key:
$\mu g/m^3$ = Micrograms per cubic meter.

There are no buildings within this portion of the AOC 9 site. However, following the PDIs, the AOC 9 boundary was expanded because the investigations concluded that the plume extended upgradient of and adjacent to Building 913. In the upgradient area, the levels of soil and groundwater contamination are significantly higher than in the area of the soil vapor investigation, as discussed in the PDI section. With the exception of one sample, however, the Air Force does not have soil vapor data for the upgradient area.

The potential soil vapor risk was analyzed for an occupant of a structure in this area using modeling based on maximum detection levels in soil and groundwater. It was determined that there is a potential unacceptable non-cancer risk (Hazard Index greater than 1) for 1,2,4-trimethylbenzene and chlorobenzene. The calculated cumulative non-cancer hazard index for a resident was estimated as 40, with a non-cancer hazard index for an industrial worker at 28.7. Total cancer risk was estimated to be $1.8x10^{-4}$ for a resident and 1.1×10^{-4} for an industrial worker due mostly to tetrachloroethene with the remainder attributable to trichloroethene. These risk levels exceed the range of acceptable levels in the NCP.

The Air Force will place deed restrictions on any future buildings constructed on this property until groundwater cleanup goals are achieved. Deed covenant language for this property (see Section 2.12) will require that any new construction on the property address soil vapor intrusion in coordination with NYSDEC, EPA Region 2 and the Air Force. Building 912 and Building 913 will be restricted to remain unoccupied. The restriction on occupancy of Buildings 912 and 913 will remain in effect after the groundwater cleanup goals are achieved unless the requirements of the fifth bullet in Section 1.4 are followed.

Predesign Investigations. A final FS was developed for AOC 9 (E & E 2004a) that identified and evaluated technologies that were available to remediate the areas identified in the previous investigations as requiring remedial action. The FS was developed considering information collected during the treatability studies described above. Technologies to remediate the groundwater plume were evaluated and in-situ chemical oxidation was recommended as the preferred alternative in the final FS. Several alternatives considered during the final FS are discussed in detail in the Description of Alternatives section of this ROD. However, as a result of further investigations, the preferred alternative was modified.

During a PDI (EEEPC 2007a) conducted from September through November 2006, four additional groundwater monitoring wells (AOC9-MW14 through AOC9–MW17) were installed at the site. Twenty-three different VOCs were detected in at least one of the groundwater samples collected during this investigation (see Table 5). The highest concentrations of total VOCs (1, 2-DCB, 1, 4-DCB, chlorobenzene, and benzene) were detected in presumed upgradient wells AOC9-MW14 and AOC9-MW15 (see Figure 3) at 1,989 µg/L and 2,082 µg/L, respectively. These concentrations at presumed upgradient wells prompted further investigation and a potential source of groundwater contamination was found in the soil upgradient of Six Mile Creek and Perimeter Road. Two additional PDIs were conducted to determine the extent and nature of this source.

Table 5
Compounds Exceeding Standards and Guidance Values
2006 AOC 9 Predesign Investigation
Groundwater Samples

Compound	Range of Detected Concentrations*	Frequency of Detection Above Most Stringent Criterion**	Most Stringent Criterion
VOCs (µg/L)			
1,2,4-Trimethylbenzene	8.0J – 220	2/4	5[a]
1,2-Dichlorobenzene	25 – 170	4/4	3[a]
1,3,5-trimethylbenzene	10J – 79	2/4	5[a]
1,3-Dichlorobenzene	1.2 – 8.0J	2/4	3[a]
1,4-Dichlorobenzene	14 – 110	4/4	3[a]
Benzene	0.96 – 12J	3/4	1[a]
Chlorobenzene	250 – 1900	4/4	5[a]
Cis-1,2-Dichloroethene	2.1 – 12	1/4	5[a]
Ethylbenzene	Trace - 21	1/4	5[a]
Isopropylbenzene	0.25J – 17	2/4	5[a]
Xylene	5.9 – 68	2/4	5[a]
Methylene Chloride	87	1/4	5[a]
Naphthalene	51	1/4	10[a]
Propylbenzene	15	1/4	5[a]
Cymene	5.5	1/4	5[a]
Butylbenzene	0.33J – 8.3	1/4	5[a]
Trichloroethene	1.2 – 19	1/4	5[a]

Notes:
[*] Does not include nondetects.
[**] The number of samples that exceeded the criteria/ the total number of samples collected.
[a] NYSDEC Class GA groundwater standard, June 1998.

Key:
J = Estimated concentration.
µg/L = Micrograms per liter.

The second PDI (Parsons 2007) was performed from February through April 2007. This study included the installation of 25 temporary monitoring wells and identified areas containing levels of chlorobenzene and related compounds east of Building 913 at concentrations an order of magnitude higher than detected during previous investigations (see Table 6). Monitoring wells TW39 and TW32 (see Figure 4) had chlorobenzene concentrations of 14,400 μg/L and 8,580 μg/L, respectively. Based on an evaluation of the data collected during the PDIs, an additional PDI was initiated to further refine the groundwater plume and characterize a potential soil source area.

Table 6
Compounds Exceeding Standards and Guidance Values
2007 AOC 9 Predesign Investigation 2
Groundwater Samples

Compound	Range of Detected Concentrations	Frequency of Detection Above Most Stringent Criterion	Most Stringent Criterion
VOCs (μg/L)			
1,2,4-Trimethylbenzene	3.45 – 1140	11/25	5[a]
1,2-Dichlorobenzene	1.1 – 4930	4/25	3[a]
1,3,5-Trimethylbenzene	1.76 – 433	10/25	5[a]
1,4-Dichlorobenzene	0.570 – 1380	13/25	3[a]
Benzene	0.51 – 1.81	1/25	1[a]
Chlorobenzene	0.66 – 14400	16/25	5[a]
Cis-1,2-Dichloroethene	Trace – 79.5	1/25	5[a]
Ethylbenzene	4.02 – 22.5J	1/25	5[a]
Isopropylbenzene	4.3 – 84.5	4/25	5[a]
n-Butylbenzene	2.66 – 160	2/25	5[a]
n-Propylbenzene	2.48 – 87.5	3/25	5[a]
m+p-Xylenes	7.99 – 778	4/25	5[a]
Naphthalene	6.06 – 530	10/25	10[a]
o-Xylene	Trace– 10.8	1/25	5[a]
p-Isopropyltoluene	13.6 – 166	3/25	5[a]
sec-Butylbenzene	2.37 – 138	2/25	5[a]
tert-Butylbenzene	5.10 – 74.0	2/25	5[a]
Toluene	Trace – 6.00J	1/25	5[a]
Trichloroethene	Trace – 127	1/25	5[a]
Total Xylenes	18.8 – 855	6/25	5[a]

Note:
[a] NYSDEC Class GA groundwater standard, June 1998.

Key:
J = Estimated concentration.
μg/L = Micrograms per liter.

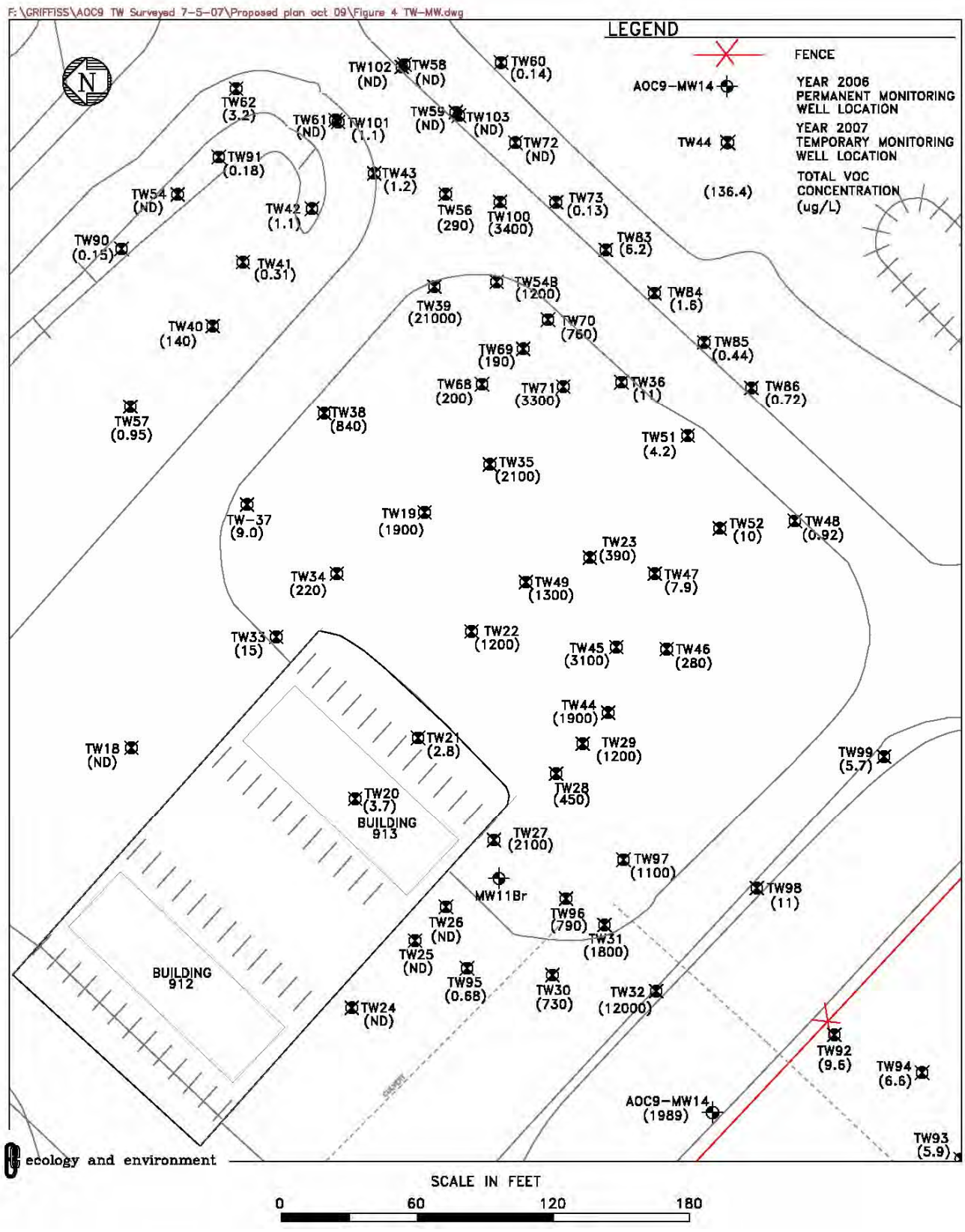

Figure 4 Temporary Monitoring Well Locations (2007)

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As part of this additional PDI (EEEPC 2007b), a total of 56 new temporary monitoring wells were installed around the site. Twenty-two different VOCs were detected in the groundwater samples collected from the temporary monitoring wells at concentrations exceeding the groundwater standards (see Table 7). The highest total VOC concentrations were detected in groundwater samples collected from temporary wells TW45 (3,100 µg/L), TW71 (3,300 µg/L), and TW100 (3,400 µg/L) (see Figure 4).

In addition, characterization of a potential source for groundwater contamination involved installation of 42 boreholes in the soil. Soil cores were screened continuously with a PID/flame ionization detector (FID) from ground surface to refusal (in the glacial till layer, approximately between 20 and 30 feet BGS. Samples were taken at depth intervals where the highest PID/FID readings were measured. Twelve VOCs (1, 2, 4-trimethylbenzene, 1, 3, 5-trimethylbenzene, 1, 2-DCB, 1,3-DCB, 1, 4-DCB, chlorobenzene, ethylbenzene, naphthalene, n-butylbenzene, n-propylbenzene, sec-butylbenzene, and toluene) were detected at concentrations exceeding screening criteria in the soil samples collected from the 42 soil borings (see Figure 5). The highest total VOC concentrations were detected in soil samples collected from boreholes SB01 (1,100 milligrams per kilogram [mg/kg]) and SB12 (1,600 mg/kg) with chlorobenzenes representing the largest fraction of VOCs. The sample results and field observations indicated that there was a 6-foot thick gray to black smear zone of contamination at the top of the saturated zone which is located at depths ranging from 8 to 17 feet BGS. None of the samples collected below the smear zone yielded levels of contamination greater than the proposed excavation limit of 1 part per million total VOCs. Excavation of contaminated soil within the 1 ppm total VOC contaminant contour will remove approximately 99% of the VOC contaminant mass.

Based on the PDIs, the soil east of Building 913 was identified as the source of the AOC 9 groundwater contamination, and the preferred alternative identified in the final FS was reevaluated.

AOC 9 Soil. The nature and extent of soil contamination at AOC 9 was evaluated during the remedial investigations and during the predesign investigations. The existing data includes the characterization of soil throughout AOC 9 (Areas A and B on Figure 6).

Table 7 Area A Compounds Exceeding Standards and Guidance Values 2007 AOC 9 Additional Predesign Investigation Groundwater and Soil Samples			
Compound	**Range of Detected Concentrations**	**Frequency of Detection Above Most Stringent Criterion**	**Most Stringent Criterion**
Groundwater: VOCs (µg/L)			
1,2,4-Trimethylbenzene	0.20J – 680	10/53	5 [a]
1,2-Dichlorobenzene	0.11J – 230	12/53	3 [a]
1,3,5-Trimethylbenzene	0.16J – 240	10/53	5 [a]
1,3-Dichlorobenzene	0.54J – 11	6/53	3 [a]
1,4-Dichlorobenzene	0.12J – 523	12/53	3 [a]
Benzene	1.0J – 120J	12/53	1 [a]
Chlorobenzene	0.15J – 2400	12/53	5 [a]
Cis-1,2-Dichloroethene	0.19J – 26	7/53	5 [a]
Ethylbenzene	0.17J – 26	5/53	5 [a]
Isopropylbenzene	0.61J – 40	6/53	5 [a]
n-Butylbenzene	0.30J – 17	5/53	5 [a]
n-Propylbenzene	0.19J – 45	5/53	5 [a]
m+p-Xylenes	1.4J – 140J	8/53	10 [a]
Naphthalene	1.0 – 88	9/53	10 [a]
o-Xylene	1.8 – 35J	7/53	5 [a]
p-Isopropyltoluene	0.48J – 25	6/53	5 [a]
sec-Butylbenzene	0.20J – 20	6/53	5 [a]
tert-butylbenzene	0.48J – 9.8J	2/53	5 [a]
Tetrachloroethene	0.21J – 12	3/53	5 [a]
Toluene	0.11J – 6.7	1/53	5 [a]
Trichloroethene	0.12J – 14	1/53	5 [a]
Vinyl Chloride	0.44J – 3.5	2/53	2 [a]
Total Xylenes	3.7 – 120	9/53	5 [a]
Soil Borings: VOCs (mg/kg)			
1,2,4-Trimethylbenzene	0.0006J – 394J	21/49	3.6 [b]
1,2-Dichlorobenzene	0.0007J – 1000J	12/49	1.1 [b]
1,3,5-Trimethylbenzene	0.0006J – 174J	15/49	8.4 [b]
1,3-Dichlorobenzene	0.0009J – 24J	4/49	2.4 [b]
1,4-Dichlorobenzene	0.0009J – 170J	18/49	1.8 [b]
Chlorobenzene	0.0006J – 440J	18/49	1.1 [b]
Ethylbenzene	0.0006J – 6.96J	5/49	1 [b]
n-Propylbenzene	0.0006J – 29.4J	6/49	3.9 [b]
Naphthalene	0.0082 – 57J	5/49	12 [b]
sec-Butylbenzene	0.0007J – 20.9J	1/49	11 [b]
Toluene	0.0006J – 3.4J	1/49	0.7 [b]

Notes:

[a] NYSDEC Class GA groundwater standard, June 1998.

[b] NYSDEC, 6NYCRR Part 375-6 Remedial Program Soil Cleanup Objectives, Draft, Dec. 14, 2006 Unrestricted Use of Soil Cleanup Objectives.

Key:

J = Estimated concentration.

µg/L = Micrograms per liter.

mg/kg = Milligrams per kilogram.

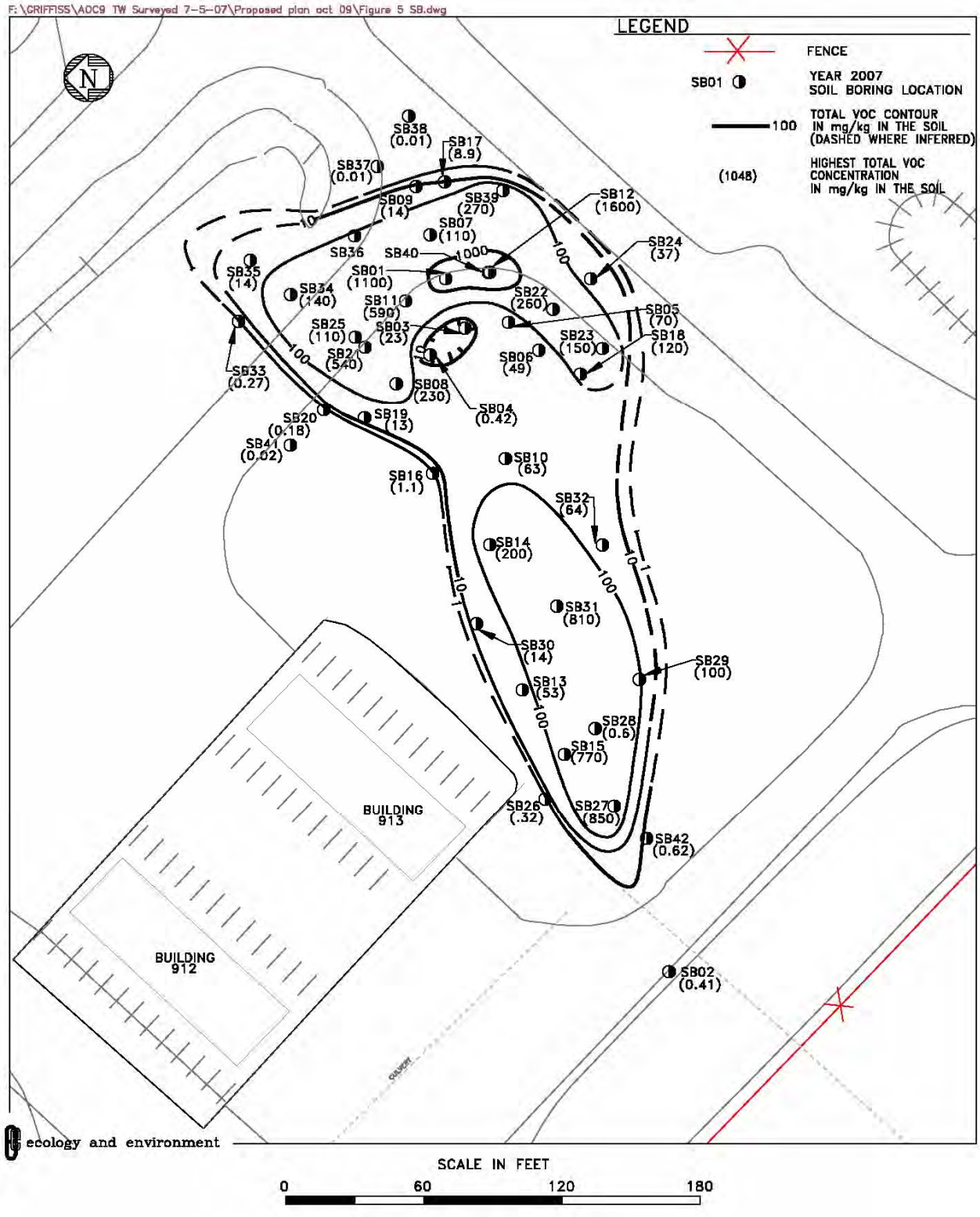

Figure 5 Soil Boring Locations and Total VOC Contours

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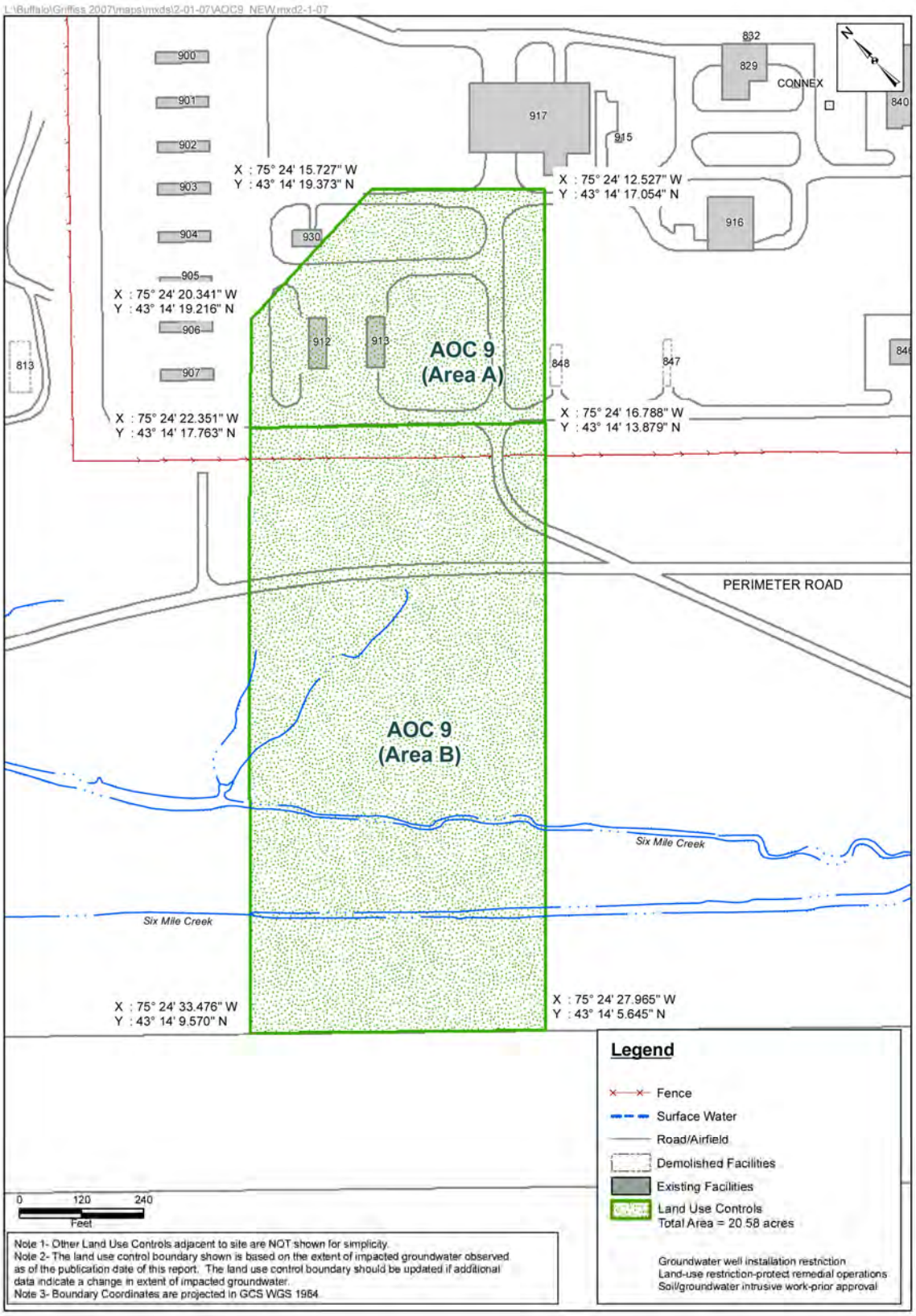

Figure 6 Land Use Controls Boundary

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Area B: Investigations 1995 – 2002. Surface and subsurface soil samples were collected and analyzed for Area B during numerous investigations including Group I AOI confirmatory sampling program (1995), the Expanded Site Investigation (1997), and the Supplemental Investigations (2000 and 2002). A summary of these investigations and the associated risk assessment are documented in *AOC 9: Weapons Storage Area (WSA) Landfill Final 2002 Remedial Investigation Report*, May 2004. Both surface and subsurface soil samples were analyzed for Target Compound List (TCL) VOCs, semivolatile organic compounds (SVOCs), pesticides, PCBs, and total Target Analyte List (TAL) metals. Table 8 provides a summary of the soil contaminants that exceeded the NYSDEC guidance criteria that were in effect during the investigations (Technical and Administrative Guidance Memorandum [TAGM] 4046); the current criteria (6NYCRR Part 375-6 Unrestricted Use Soil Cleanup Objectives) also are included in the table for comparison purposes. Based on the new unrestricted use soil cleanup objectives established in Part 375, there were no exceedances for surface soils.

For the surface soil samples (up to 2 feet) collected at Area B through 2002, the RI human health risk assessment concluded that future exposure to surface soil would not pose significant health risks to future site residents (1.1×10^{-5} for Child; 5.1×10^{-6} for Adult) or commercial/industrial workers (4.2×10^{-6}) and were within the EPA's acceptable risk range. Subsurface soil contamination was primarily found in the saturated zone indicating that the soil was being impacted by the groundwater plume. For the subsurface soil, the RI risk assessment concluded that exposure to subsurface soil by construction workers (2.8×10^{-7}) was below the EPA's acceptable risk range and a groundwater remedy was initiated. These investigations took place prior to the 2004 FS when a remedy for soils was not required based on the criteria that were in effect at that time. Therefore, review of the data and comparison to criteria used for screening during development of the FS addendum did not result in a need for a soil remedy in Area B.

Table 8 Area B Compounds Exceeding Standards and Guidance Values AOC 9 Soil Boring and Test Pit Samples 1995 - 2002				
Compound	**Range of Detected Concentrations[a]**	**Frequency of Detection Above Most Stringent Criterion[b]**	**NYSDEC TAGM 4046[c]**	**NYSDEC 6NYCRR Part 375-6[d]**
Subsurface Soil 1995 AOI Investigation				
Metals (mg/kg)				
Beryllium	0.61 - 0.76	2/5	0.16	7.2
Copper	11 - 46	1/5	25	50
Iron	9,500 - 27,000	5/5	2,000	NA[e]
Magnesium	2,000 - 5,400	1/5	5,000	NA[e]
Nickel	10 - 28	4/5	13	30
Silver	1.2 – 1.7	5/5	1.1 (SB)[f]	2
Zinc	21 - 47	5/5	20	109
Surface Soil (0 to 2 feet) 1997 Expanded Site Investigation				
SVOCs (µg/kg)				
Benzo(a)anthracene	75J - 490J	1/11	224	1,000
Benzo(a)pyrene	170J - 660J	2/11	61	1,000
Chrysene	87J - 670J	1/11	400	1,000
Metals (mg/kg)				
Aluminum	5,600 - 19,000	1/11	18,306	NA[e]
Arsenic	4.0 – 6.8	7/11	4.9	13
Barium	72	1/11	71	350
Beryllium	0.89 - 0.94	2/11	0.73	7.2
Potassium	590 – 11,000	3/11	1,993	NA[e]
Selenium	2.1 – 6.5	11/11	0.34	3.9
Thallium	0.58	1/11	0.45	NA[e]
Subsurface Soil 1997 Expanded Site Investigation				
Metals (mg/kg)				
Calcium	1200 – 30,000	1/5	23,821	NA[e]
Selenium	1.9 – 4.3	5/5	0.34	3.9
Test Pit Soil Samples (0 to 10 feet) 2000 Site Investigation				
SVOCs (µg/kg)				
Benzo(a)anthracene	163J – 2170J	1/6	224	1,000
Benzo(a)pyrene	87.3J- 1400	2/6	61	1,000
Benzo(b)fluoranthene	161J – 1510J	1/6	1100	1,000
Benzo(k)fluoranthene	133J - 1800	1/6	1100	800
Chrysene	168J – 1900J	1/6	400	1,000

Table 8 (continued) Area B Compounds Exceeding Standards and Guidance Values AOC 9 Soil Boring and Test Pit Samples 1995 - 2002				
Compound	**Range of Detected Concentrations[a]**	**Frequency of Detection Above Most Stringent Criterion[b]**	**NYSDEC TAGM 4046[c]**	**NYSDEC 6NYCRR Part 375-6[d]**
Metals (mg/kg)				
Cadmium	1.41 – 2.17	5/6	1.0	2.5
Subsurface Soil And Test Pit Soil Samples 2002 Site Investigation				
Metals (mg/kg)				
Antimony	0.749J – 4.94J	6/7	ND	NA[e]
Beryllium	0.264J - 0.298J	2/7	0.16	7.2
Chromium	5.80 – 13.0	1/7	10	30
Copper	6.79 – 28.2	1/7	25	50
Iron	10,300 - 26,900	6/7	2,000	NA[e]
Nickel	3.38 – 15.5	1/7	13	30
Thallium	0.871J– 5.66J	6/7	1.1 (SB)[f]	2
Zinc	24.4 – 65.1	6/7	20	109

[a] Does not include nondetects.

[b] The number of samples that exceeded the criteria/ the total number of samples collected.

[c] Screening criteria as established in NYSDEC Technical and Administrative Guidance Memorandum (TAGM) 4046.

[d] 6NYCRR Part 375-6 Remedial Program Soil Cleanup Objective, Draft, Dec. 14, 2006 Unrestricted Use Soil Cleanup Objectives.

[e] No criteria provided for compound in 6NYCRR Part 375-6.

[f] NYSDEC guidance value given as site-specific soil background.

Key:

J = Estimated concentration.
μg/kg = Micrograms per kilogram.
mg/kg = Milligram per kilogram.
NA = Not available.
SB = Soil background.

Area A: Investigations 2006 – 2007. The surface soil in Area A, the northern portion of the site, was investigated through the use of a Membrane Interface Probe (MIP) during the first predesign investigation (2006). Data collected from 26 soil borings showed no PID response (no contamination) in the top one foot of surface soils as presented in the *Final Predesign Investigation Data Summary Report at Landfill 6, Building 817/WSA, Building 775/Pumphouse 3, and AOC 9*, February 2007. Contaminated subsurface soil was identified in samples collected from soil borings in Area A in the saturated zone during the additional predesign investigation (2007). The soil data are summarized in Table 7. No contamination was found beyond the excavation boundary at levels above NYSDEC's soil cleanup objectives (6NYCRR Part 375-6). A risk assessment was not performed for this soil because it will be excavated and 99% of the contaminant mass will be removed (see Selected Remedy section of this ROD).

Feasibility Study Addendum. In 2009, an addendum to the final FS was prepared to address the change in nature and extent of contamination that was identified during the PDIs. It was determined that the alternative recommended in the final FS would not be the optimal treatment alternative for AOC 9 due to the presence of a previously uncharacterized source of chlorobenzene in the soil. The preferred alternative would include removal of this source of contamination in addition to chemical oxidation of the groundwater. The preferred alternative in the FS Addendum is described in the Description of Alternatives section of this ROD.

A soil risk assessment was not performed because the source removal component of the remedy will remove contaminated soil to meet the RAO to restore groundwater to the Class GA standards specified in Table 1. Excavation of the soil mass will remove any contaminated soil above regulatory screening levels appropriate for this AOC.

2.6 Current and Potential Future Site and Resource Uses

Griffiss AFB was designated for realignment under the Defense Base Closure and Realignment Act in 1993 and 1995, resulting in deactivation of the 416th Bombardment Wing in September 1995.

The current and future use designation for the southern portion of the AOC 9 area is open space, acting as a buffer zone between the runway and future development in ad-

jacent areas. The northern portion of the site extends into the former WSA boundary and is expected to be zoned as a non-residential, industrial area (see Section 2.12).

2.7 Summary of Site Risks

In 2002, as part of the RI, a baseline risk assessment (E & E 2004b) was performed at AOC 9 to evaluate current and future potential risks to human health and the environment associated with contaminants found in the groundwater at the site. During the PDI, the maximum contaminant concentrations detected in the source area were an order of magnitude higher than those previously detected, which were used in the RI Risk Assessment. Therefore, the actual risk assessment numbers would be greater to human health and the environment.

2.7.1 Human Health Risk Assessment

Background Information

A baseline human health risk assessment was conducted to determine whether chemicals detected at the site could pose health risks to individuals under the current and expected future land use conditions. As part of the baseline risk assessment, the following four-step process was used to assess site-related human health risks for a reasonable maximum exposure scenario: Hazard identification—identifies the COPCs at the site based on several factors such as toxicity, frequency of occurrence, and concentration; Exposure Assessment—estimates the magnitude of actual and/or potential human exposures, the frequency and duration of these exposures, and the pathway (e.g., ingestion of contaminated soils) by which humans are potentially exposed; Toxicity Assessment—determines the types of adverse health effects associated with chemical exposures and the relationship between magnitude of exposure (dose) and severity of adverse effects (response); and Risk Characterization—summarizes and combines outputs of the exposure and toxicity assessments to provide a quantitative (e.g., one-in-a-million excess carcinogenic risk and noncarcinogenic Hazard Index [HI)] value) assessment of site-related risks and a discussion of uncertainties associated with the evaluation of the risks and hazards for the site.

COPCs were identified based on the analytical results and data quality evaluation from the RI. All contaminants detected in the groundwater samples from the site were considered COPCs with the exception of inorganics detected at concentrations less than twice the mean background concentrations; elements considered to be essential human nutrients (iron, magnesium, calcium, potassium, and sodium); and chemicals detected in less than 5% of the total samples and at concentrations below ARARs and To-Be-Considereds (TBCs). As a class, petroleum hydrocarbons were not selected as a chemical of concern; but the individual toxic constituents (e.g., benzene, toluene, ethylbenzene) were evaluated. The presence of petroleum hydrocarbons as a class of contaminants was considered in the selection of the preferred remedial action.

Quantitative estimates of carcinogenic and noncarcinogenic risks were calculated as part of a risk characterization. The risk characterization evaluates potential health risks based on estimated exposure intakes and toxicity values. For carcinogens, risks are estimated as the incremental probability of an individual developing cancer over a lifetime as a result of exposure to the potential carcinogen. The range of acceptable risk is generally considered to be 1 in 10,000 (1×10^{-4}) to 1 in 1,000,000 (1×10^{-6}) of an individual developing cancer over a 70-year lifetime from exposure to the contaminant(s) under specific exposure assumptions. Therefore, sites with carcinogenic risk within or below the acceptable risk range for a reasonable maximum exposure do not generally require cleanup based upon carcinogenic risk under the NCP.

Results of Site-Specific Health Risk Assessment

A baseline risk assessment (E & E 2004b) was performed for AOC 9 to evaluate current and future potential risks to human health and the environment associated with contaminants found in the groundwater at the site. The assessment was based on environmental data collected from July 1992 through the 2002 SI.

The current and future use designation for the southern portion of the AOC 9 area is open space, acting as a buffer zone between the runway and future development in adjacent areas. The northern portion of the site extends into the former WSA boundary and is expected to be zoned as a non-residential, industrial area. The human health risk assessment evaluated exposure to potential residential and occupational (commercial/industrial worker and construction) worker populations. The receptors and pathways

evaluated for groundwater exposure in the risk assessment are summarized in Table 9. The exposure assumptions, which were selected in accordance with EPA guidance, are more fully described in the RI report.

Table 9
AOC 9 Plume
Risk Assessment Exposure Scenarios

Residential Receptor (groundwater used for potable water)	Occupational Receptor (groundwater used for potable or process water)
■ Groundwater ingestion ■ Inhalation of volatiles in groundwater (bathing, showering) ■ Dermal contact with groundwater	■ Inhalation of volatiles in groundwater ■ Dermal contact with groundwater

Carcinogenic Risk

For future residential exposures at AOC 9, the estimated total child/adult lifetime carcinogenic risk was 8×10^{-3} and the total estimated carcinogenic risk for future commercial/industrial workers was 8×10^{-4}, both exceeding the EPA's target risk range. The estimated carcinogenic risk for construction workers (3×10^{-7}) was below EPA's target risk range.

The bulk of the total estimated future residential cancer risk is due to exposures associated with household groundwater use, mainly from inhalation of vapors released from groundwater during baths/showers, which accounts for approximately 95% of the child cancer risk and approximately 83% of the adult risk, and from water ingestion. The estimated cancer risks from residential exposure to soil, 1×10^{-5} for the child and 5×10^{-6} for the adult, and the risks from recreational exposures to sediment and surface water are minor compared to groundwater and within EPA's acceptable risk range (E & E 2004b).

Inhalation of vapors released from groundwater during showering accounts for approximately 80% of the estimated future commercial/industrial workers' total cancer risk, and groundwater consumption accounts for the majority of the remaining risk.

Noncarcinogenic Risk

For future residential exposures, the total HIs for child and adult were 921 and 102, respectively, and for future commercial/industrial workers the total HI was 32. The total HI calculated for construction workers was 2. Therefore, for all potential future receptors, the HI exceeded the acceptable level of 1.

Most of the total HI (91% for the child, 71% for the adult) is associated with inhalation of vapors released from groundwater during baths/showers. The HIs associated with residential exposure to surface soil or with recreational sediment and surface water exposures are minor compared to groundwater. For residential soil exposures by all three routes, the total HI for the adult is less than 1.0 and the total HI for the child is approximately 2, with no target-specific HIs exceeding 1.0 (E & E 2004b).

The total HI calculated for future commercial/industrial workers is also due mainly to vapor inhalation while showering (70%) and groundwater consumption (25%).

The estimated carcinogenic and non-carcinogenic risks were primarily due to groundwater consumption and inhalation of vapors released from groundwater during baths/showers. The chemicals in groundwater that accounted for the majority of the risks were TCE, 1,4-DCB, 1,3,5-trimethylbenzene, 1,2,4-trimethylbenzene, vinyl chloride, and cis-1,2-DCE.

The results of the human health risk assessment indicated that the potential risk of COPCs in groundwater is reduced substantially if groundwater is not used for drinking water or bathing/showering purposes.

2.7.2 Uncertainties

There are inherent uncertainties associated with the overall risk assessment process and with each of its components. However, conservative (health-protective) assumptions are used throughout the process to ensure that the risk estimates will be protective of human health and the environment. Examples of uncertainties associated with the risk assessment process include: (1) Samples were collected from locations with known or suspected contamination rather than random locations, which may result in a potential overestimation of risk; (2) Actual natural background concentrations of inorganic compounds in the groundwater are uncertain, due to limited data sets; (3) For inhalation exposures, contaminant concentrations in air were estimated from soil and groundwater concentrations using modeling and conservative model input assumptions, which may result in a potential overestimation of risk; (4) During the PDI, the maximum contaminant concentrations detected in the source area were an order of magnitude higher than those previously detected, which were used in the RI Risk Assessment. Therefore, the actual risk assessment numbers would be greater to human health and the environment; and (5) it

was assumed that groundwater might be used as a potable water source, which is unlikely since the site has ready access to existing water supplies at the former base and in the city of Rome. This would result in a potential overestimation of risk.

2.7.3 Ecological Risk Assessment

The ecological risk assessment (E & E 2004b) focused on four assessment points: terrestrial and wetland plant communities, the soil-fauna community, aquatic life in Six Mile Creek and on-site tributaries (where groundwater discharges to the surface), and bird and mammal populations in the vicinity of the site. AOC 9 does not represent a high quality habitat because most of the site is periodically mowed, the area surrounding the site is developed (buildings, roads), and an on-site fence limits access to the site by wildlife. Several chlorinated pesticides, metals, and polynuclear aromatic hydrocarbons exceeded conservative screening benchmarks at selected sampling locations or were predicted to pose a potential risk to wildlife when the exposure was calculated using maximum chemical concentrations in soil and sediment. However, given the conservative nature of the risk estimation process, the overall results from the 2002 risk assessment indicated that the environmental contamination at the site was unlikely to adversely affect populations or communities of ecological receptors.

The ecological risk assessment for exposure to groundwater beneath the surface was not performed because wildlife does not have access to this groundwater at AOC 9, with the exception of the surface water exposures as noted above.

2.8 Remedial Action Objectives

For the AOC 9 groundwater, the RAOs are as follows:

1. Achieve the cleanup goals for COCs specified in Table 1.

2. Prevent potential unacceptable human risk associated with exposure to groundwater through groundwater-use restrictions until cleanup goals are achieved.

3. Prevent contaminated groundwater from the site from adversely impacting surface water (in Six Mile Creek), which is defined as surface water concentrations above performance indicators for COCs specified in Table 1.

4. Prevent the potential for unacceptable human risk under CERCLA associated with exposure to Soil Vapor until the groundwater cleanup goals identified in Table 1 are achieved.

Until these Cleanup Goals are achieved, interim actions to cut off exposure pathways (ingestion of groundwater and inhalation of vapors) will be in place as described herein.

2.9 Description of Alternatives

CERCLA regulations mandate that a remedial action must be protective of human health and the environment. Alternatives 1 through 6 were originally evaluated in the AOC 9 Final FS that was completed in 2004. Alternative 7 was added and Alternatives 1 through 6 were reconsidered and re-evaluated during development of this FS Addendum. The seven alternatives are listed below:

- Alternative 1: No Action
- Alternative 2: Land Use Controls/Remedy Performance Monitoring
- Alternative 3: In-Situ Chemical Oxidation
- Alternative 4: In situ Air Sparging/Soil Vapor Extraction
- Alternative 5: Groundwater Extraction Treatment and Disposal
- Alternative 6: Constructed Treatment Wetland
- Alternative 7: Source Removal, Groundwater Treatment, and Land Use Controls

Alternatives 5 and 6 are no longer considered appropriate and were eliminated from further consideration due to the presence of a source of groundwater contamination in the soil, which was believed likely to result in very long remediation times. The time required to achieve RAOs and the cost estimates for Alternatives 1 through 4 were updated in the FS Addendum in consideration of the larger area of impacted groundwater, the presence of the source of contamination in the soil, and the time since the original estimates were made.

Descriptions of the five alternatives evaluated in the FS Addendum are as follows:

- **Alternative 1: No Action.** No remedial action for treatment of the AOC 9 plume would be performed. The plume would be allowed to migrate and naturally attenuate. This alternative does not include remedial action, land use controls, or remedy performance monitoring.

- **Alternative 2: Land Use Controls/ Remedy Performance Monitoring.** Land use controls would employ methods such as deed restrictions to prevent future use of the groundwater; a groundwater monitoring program would evaluate the extent of migration and attenuation of the plume (but without any treatment of the plume or potential source contamination). For purposes of the FS Addendum, it was assumed that on-site contaminant concentrations would remain above cleanup goals for the assumed 30-year alternative duration.

- **Alternative 3: In Situ Chemical Oxidation.** In situ chemical oxidation involves the delivery of a strong oxidizing agent into the subsurface through temporary injection points to oxidize COCs to non-toxic compounds. In addition, land use controls, including remedy performance monitoring of groundwater, would be implemented to minimize the potential for future exposure to contaminated groundwater until cleanup goals were achieved. For purposes of the FS Addendum, it was assumed that maintenance of land use controls and a remedy performance monitoring program would remain for the assumed 30-year alternative duration.

- **Alternative 4: In Situ Air Sparging/Soil Vapor Extraction** (AS/SVE)**.** This alternative involves injection of air through a contaminated aquifer. Injected air would flow in channels through the soil, which would remove VOCs and SVOCs through volatilization. An on-site pilot study would be conducted before full-scale implementation of this technology. In addition, land use controls, including remedy performance monitoring of groundwater, would be implemented to minimize the potential for future exposure to contaminated groundwater and to monitor the extent of migration or natural attenuation of the plume. In the FS Addendum, operation of the AS/SVE system was assumed for 5 years and maintenance of land use controls and a remedy performance monitoring program was assumed for an estimated 25 years beyond the operation of the AS/SVE system.

- **Alternative 7: Source Removal, Groundwater Treatment, and Land Use Controls.** This alternative includes removal of the source area through excavation of contaminated soil, treatment of contaminated groundwater using chemical oxidation, and land use controls. The groundwater contaminant source area is identified as the proposed excavation area within the 1 mg/kg total VOC contour on Figure 5. Excavation of contaminated soil within the 1 ppm total VOC contaminant contour will remove approximately 99% of the VOC contaminant mass.

  The groundwater contaminant source area excavation would be followed by in situ chemical oxidation treatment of the soil below the source area (application of persulfate oxidant), which is expected to result in further contaminant destruction. After removal of the source area, the groundwater would be treated with a persulfate oxidant injected through temporary wells within the treatment area (see Figure 7). Computer modeling was performed for several remediation scenarios to assist in the remedy screening process. Three different models were used to predict the impacts of different remediation techniques on the contamination of AOC 9: Source DK, BIOCHLOR, and REMChlor. These models were used to evaluate the effectiveness of both source controls (excavation and treatment of the source area) and plume migration management tools. These models, when calibrated to the data collected from

AOC 9, indicated that removal of the source by excavation of the soil, application of persulfate oxidant to the soil at the bottom of the excavation, and injection of persulfate oxidant in the center of the plume immediately downgradient of the excavation area will result in a reduction of groundwater contaminant concentration levels and achievement of RAOs in 11 years.

2.10 Comparative Analysis of Alternatives

Remedial alternatives are assessed on the basis of both a detailed and a comparative analysis pursuant to the NCP. The analysis of AOC 9 consisted of (1) an assessment of the individual alternatives against nine evaluation criteria and (2) a comparative analysis focusing upon the relative performance of each alternative against the criteria. In general, the following "threshold" criteria must be satisfied by an alternative for it to be eligible for selection:

1. Overall protection of human health and the environment addresses whether a remedy provides adequate protection and describes how risks posed through each exposure pathway (based on a reasonable maximum exposure scenario) are eliminated, reduced, or controlled through treatment, engineering controls, or remedial action with remedy performance monitoring.

2. Compliance with ARARs addresses whether a remedy would (a) meet all of the ARARs or (b) provide grounds for invoking a waiver.

In addition, the following "primary balancing" criteria are used to make comparisons and identify the major trade-offs among alternatives:

3. Long-term effectiveness and permanence refers to the ability of a remedy to maintain reliable protection of human health and the environment over time once cleanup goals have been met. It also addresses the magnitude and effectiveness of the measures that may be required to manage the risk posed by treatment residuals and/or untreated wastes.

4. Reduction of toxicity, mobility, or volume via treatment refers to a remedial technology's expected ability to reduce the toxicity, mobility, or volume of hazardous substances, pollutants, or contaminants at the site.

5. Short-term effectiveness addresses (a) the period of time needed to achieve protection and (b) any adverse impacts on human health and the environment that may be posed during the construction and implementation periods until cleanup goals are achieved.

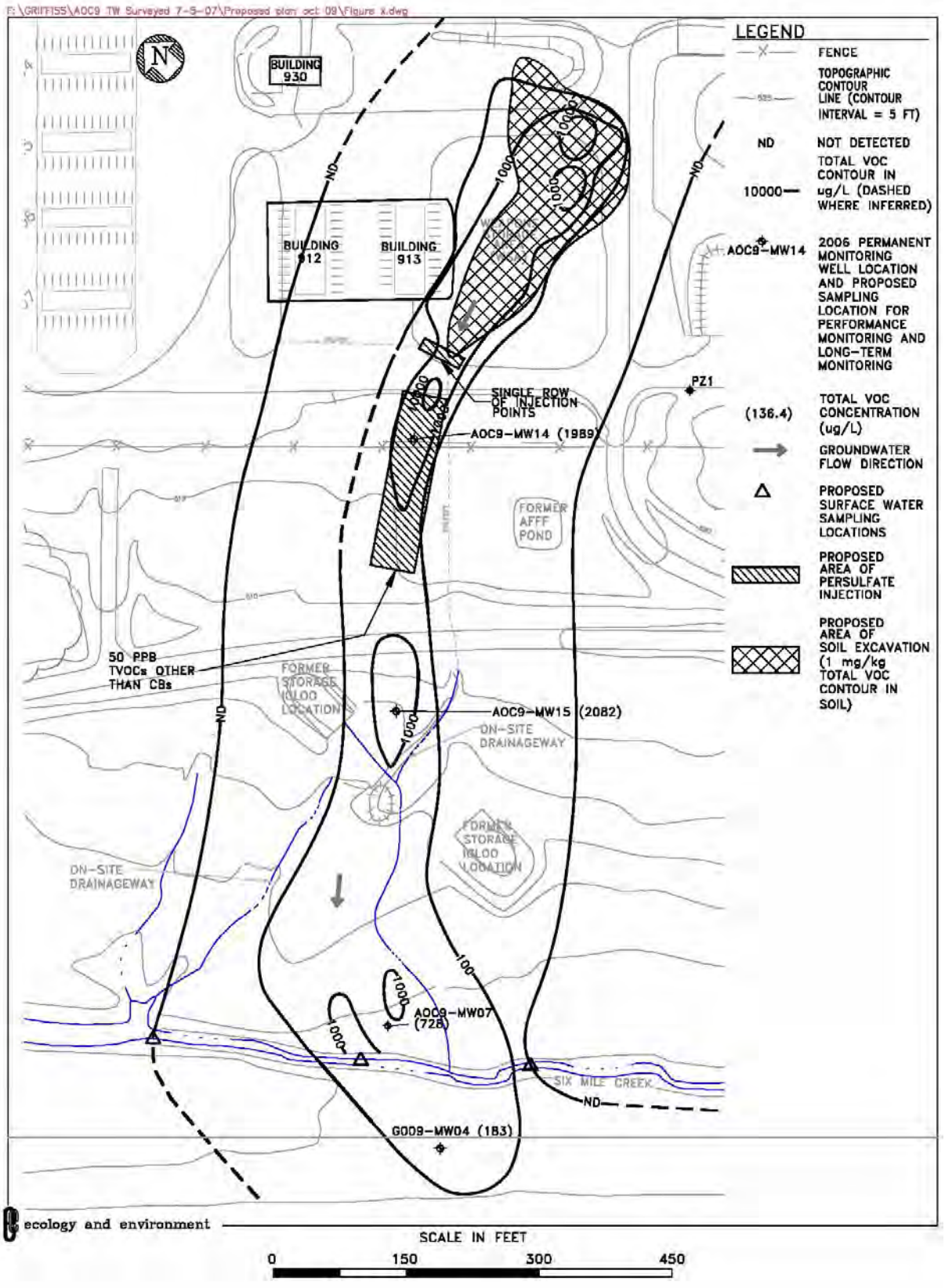

Figure 7 AOC 9 Remedial Action Areas and Monitoring Locations

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6. Implementability refers to the technical and administrative feasibility of a remedy, including the availability of materials and services needed.

7. Cost includes estimated capital, operation and maintenance, and present-worth costs.

Finally, the following "modifying" criteria are considered fully after the formal public comment period on the proposed plan is complete:

8. State acceptance indicates whether, based on its review of the RI and the proposed plan, the state supports or opposes the Selected Remedy and/or has identified any reservations with respect to the Selected Remedy.

9. Community acceptance refers to the public's general response to the alternatives described in the proposed plan and the RI reports. Factors of community acceptance include support, reservation, or opposition by the community.

A comparative analysis of the five alternatives based on the nine evaluation criteria follows.

1. Overall Protection of Human Health and the Environment.

Under Alternatives 1 and 2, no actions would be taken to reduce levels of contaminants in groundwater or the soil source area. Alternative 1 is not protective of human health or the environment. Under existing site conditions, there are currently no on-site human or environmental receptors in direct contact with overburden groundwater contamination. However, site groundwater discharges to the surface in certain areas and to Six Mile Creek, allowing the potential for future exposure to site contaminants. By not performing remedial actions or providing protection to human health and the environment, groundwater contamination exceeding regulatory standards will remain in place and be available for potential future exposure.

Alternative 2 includes remedy performance monitoring and land use controls designed to prevent future exposures to contaminants. The Air Force would also monitor contaminant levels in groundwater. Although this alternative would be protective of human health and the environment on site, the plume is expected to continue to discharge into Six Mile Creek where there would be a potential for exposure.

Although Alternatives 3 and Alternative 4 employ active treatment remedies and land use controls, they do not address the source of the contamination or provide for its removal. The source would remain and may continue to contaminate the groundwater, which would not be protective of human health and the environment. The Selected Remedy (Alternative 7) would remove the source of groundwater contamination through excavation and eliminate future potential exposure threats. The land use controls included in this alternative would restrict the use of contaminated groundwater during and after cleanup and provide some long-term protection of human health and the environment until RAOs are achieved.

2. Compliance with ARARs.

NYSDEC Class GA Groundwater Quality Standards comprise the chemical-specific ARARs for this plume. ARARs would not be achieved with Alternatives 1 and 2. The source of the contamination would not be removed, and contaminated groundwater and/or vapors from volatile groundwater contaminants may diffuse to the surface, where they may be released to ambient air. Alternatives 3 and 4 provide treatment mechanisms for removing contaminants from the groundwater, but do not address removal of the source. Therefore, these alternatives are not in compliance with the ARARs.

The Selected Remedy (Alternative 7) will comply with ARARs and CERCLA preferences by removing the source area through excavation of contaminated soil. The cleanup goal of Alternative 7 is to reduce groundwater VOC concentrations to below the NYSDEC Class GA groundwater standards.

Off-site disposal will comply with all applicable land disposal restrictions and analytical requirements. The remedy will be implemented in compliance with action-specific ARARs including noise limitations, substantive requirements governing wetlands, and Occupational Safety and Health Administration (OSHA) regulations.

3. Long-term Effectiveness and Permanence.

Alternative 1 would not allow for reliable protection of human health and the environment in the long term since no actions would be taken to remove the source of contamination or to reduce levels of contamination in the groundwater. This alternative is not effective in the long-term.

Alternative 2 provides effective long-term mechanisms to protect human health and the environment on site through the use of land use controls. However, in the absence of treatment mechanisms for the contaminated groundwater plume and the source of the contamination, this alternative is less protective than Alternatives 3, 4, and 7.

Alternatives 3 and 4 implement in-situ technologies to treat the contaminated groundwater plume, but do not address the source of contamination or provide for its removal. Although the groundwater cleanup goals may be met, the potential would exist for groundwater contamination to recur from the source in the future. Therefore, Alternatives 3 and 4 are not as effective as Alternative 7 in the long term.

The Selected Remedy (Alternative 7) is expected to be the most effective alternative in the long term because it includes source removal through soil excavation. Approximately 99% of the estimated total mass of total VOCs will be removed. In situ chemical oxidation of the groundwater and dilution of the groundwater due to the recharge of the aquifer following remedial action will reduce groundwater concentrations to cleanup goals; modeling has indicated that this will occur in 11 years.

4. **Reduction of Toxicity, Mobility, or Volume through Treatment.**
Alternatives 1 and 2 do not provide for removal of the source of contamination, or any treatment or containment of contaminant migration, therefore, they do not result in any reduction of toxicity, mobility, or volume.

Alternatives 3 and 4 employ treatment technologies in-situ, but do not provide for the removal of the source of contamination. For Alternative 3, a high treatment efficiency may not be possible because sufficient mixing is hard to achieve between groundwater, the impacted soils, and the oxidant solution. In addition, multiple injections would be required followed by a monitoring period to assess effectiveness. For Alternative 4, in situ air sparging, air distribution may be hard to predict since the air flow path is highly sensitive to the material permeability. Treatment efficiency also may be reduced by diversion of the plume away from the air-sparging influence zone because air injection can produce a zone of reduced hydraulic conductivity. Therefore Alternatives 3 and 4 result in a temporary reduction of contaminants in the plume, but they do not result in a reduction of toxicity, mobility, or volume from the source of contamination.

Under the Selected Remedy (Alternative 7), the volume of contamination at the site will be reduced through source excavation and on-site groundwater treatment. The source removal will assist in eliminating concerns associated with toxicity of the groundwater, and in-situ chemical oxidation is expected to reduce dissolved phase concentrations.

5. **Short-term Effectiveness.**
Since no remedial actions will be taken under Alternatives 1 and 2, there would be no adverse impacts to human health or the environment in the short term. To limit short-term impacts during implementation of Alternative 3, a section of Six Mile Creek would be diverted around the proposed injection area. This would eliminate the potential for oxidizing agents or contaminants to migrate off-site when injecting near the downgradient edge of the plume. Land use controls and a monitoring program would be employed during operation and until cleanup goals were achieved.

The implementation/operation of Alternative 4 is estimated at 5 years for operation of the AS/SVE system, with maintenance of land use controls and monitoring events performed during operation and extending 25 years beyond.

Under the Selected Remedy (Alternative 7), several short-term impacts to the community and workers may arise during excavation of contaminated soil, dewatering, and water treatment at the site. These short-term impacts include dust, noise, and potential spills during handling and transportation of contaminants. To limit short-term impacts, site access will be restricted during construction and remediation activities. Measures will be implemented to protect the workers and surrounding community including air monitoring, use of appropriate personal protective equipment, and decontamination of equipment leaving the site. Air monitoring action levels will be set prior to any intrusive activities in accordance with state and federal (e.g., OSHA) guidance, and an appropriate corrective action will be implemented if these action levels are exceeded. Off-site transportation of contaminated soil to the disposal facil-

ity will be performed by a licensed hauler. The construction activities at the site are estimated to last less than one year. After removal of contaminated soil, the source area will be covered with backfill soil and will be reseeded, reducing potential inhalation exposures. In addition, groundwater concentrations and the subsequent exposure to contaminated groundwater will be reduced through the source excavation and chemical oxidation process.

6. Implementability.

There are no actions to implement for Alternative 1. Alternative 2 is readily implemented using standard land use controls and groundwater monitoring methods. Furthermore, all wells proposed for the monitoring program exist on-site.

Alternatives 3, 4, and 7 employ in-situ treatment technologies. Since a chemical oxidation pilot study has already been performed at the site (E & E 2004c), there is a better understanding of the physical and chemical requirements necessary to treat the contaminants of concern at this site, and chemical oxidation for Alternatives 3 and 7 is readily implementable. However, an on-site pilot study would need to be conducted before full-scale implementation of AS/SVE for Alternative 4. There is a possibility that testing would reveal technical problems that may limit the ability to implement the technology or require changes from the assumptions that have been made.

The Selected Remedy (Alternative 7) also includes removal of the source through excavation of soil. The soil excavation can be readily implemented using standard construction means and methods.

7. Cost.

The estimated costs for the five alternatives are provided in Table 10 below. Alternative 1 calls for no action and no cost. Alternative 2, Land Use Controls and remedy performance monitoring, is the least expensive of the remaining alternatives with a present-worth cost of $660,000. Alternatives 3 and 4 include in situ treatment, land use controls, and remedy performance monitoring, and have comparable present-worth costs of $5,305,000 and $5,308,000, respectively.

Table 10
Summary of Remedial Alternative Durations and Costs For AOC 9

Description	Alternative[a]				
	1	2	3	4	7
	No Action	Land Use Controls/ Remedy Performance Monitoring	In Situ Chemical Oxidation	Air Sparging/ Soil Vapor Extraction	Source Removal, Groundwater Treatment, and Land Use Controls
Total Approximate Project Duration (Years)	0	30	30	30	11
Total Present Value (in $ 2009)	**$0**	**$660,000***	**$5,305,000***	**$5,308,000***	**$5,658,000**

[a] Alternatives 5 and 6 were eliminated from further consideration in the final FS Addendum.

Key:
LTM = Long-term monitoring.
* = Values estimated from the R.S. Means Historical Cost Index Method

The 2009 total present worth cost of the Selected Remedy (Alternative 7) is $5,658,000. This cost assumes an 11-year period to reach groundwater cleanup goals, which is based on modeling results.

8. **Agency Acceptance.**
   AFRPA, NYSDEC, and EPA have mutually agreed to select Alternative 7, Source Removal, Groundwater Treatment, and Land Use Controls. The Selected Remedy satisfies the threshold criteria and ensures compliance with applicable regulations.

9. **Community Acceptance.**
   Community acceptance of the Selected Remedy was assessed at the public meeting and during the public comment period. Based on the oral comments made by the public at the public meeting and written comments received during the public comment period, the public has accepted the selection of Alternative 7, Source Removal, Groundwater Treatment, and Land Use Controls.

2.11 Principal Threat Wastes

There are no principal threat wastes at AOC 9.

2.12 Selected Remedy

The Selected Remedy for AOC 9 includes removal of the source area through excavation of contaminated soil, treatment of contaminated groundwater using chemical oxidation, and land use controls. The excavation of the source area is the primary treatment for groundwater at this site. The horizontal and vertical limits of this excavation have been defined based on the selected cleanup objectives, and groundwater and soil boring analytical results. Approximately 99% of the total VOCs contaminant mass will be removed during the source area excavation. After the soil is excavated from the 6-foot smear zone, the bottom of the excavation will be screened with the PID to ensure that the contamination has not migrated deeper into the soil. If contamination is found above 50 ppm total VOCs in air with the PID, that soil will be excavated and the process repeated. In addition, as a polishing step, a sodium persulfate oxidant with an iron chelate activator (persulfate oxidant) will be applied to the bottom of the excavation to oxidize any low-level residual contamination. Application of the oxidant is expected to reduce the number of years required to meet RAOs.

After the source is removed, the concentrations of contaminants in the groundwater plume are expected to decrease due to natural processes including advection, dilution,

and biodegradation. In addition, to further reduce the number of years required to meet RAOs, the groundwater will be treated with persulfate oxidant, which will be injected into the center of the plume through temporary wells approximately 15 to 25 feet deep immediately downgradient of the excavation area. The persulfate oxidant will be used because it is very stable in the subsurface, performs well in a neutral pH environment, and can destroy the major COCs at AOC 9, including DCB, DCE, TCE, PCE, and chlorobenzene. Oxidant injection is being performed in an area of approximately 50 feet by 200 feet immediately downgradient of the excavation area, which will treat groundwater in an in situ plume area of approximately 10,000 square feet. This portion of the plume has an average saturated thickness of 15 feet and an estimated porosity of 0.35, which provides a water treatment volume of approximately 390,000 gallons. Modeling has indicated that removal of the source by excavation of the soil, application of persulfate oxidant to the soil at the bottom of the excavation, and injection of persulfate oxidant in the center of the plume immediately downgradient of the excavation area, will result in a reduction of groundwater contaminant concentration levels and achievement of RAOs in 11 years.

During source excavation, uncontaminated overburden soil will be removed to access the contaminated soil. The overburden soil will be excavated, stockpiled, and used for backfilling following excavation of the contaminated soil. Steel sheeting will be installed around the contaminated soil area to support the excavation below the water table. An area of approximately 31,500 square feet of soil, 6 feet thick, is planned to be removed, which provides a contaminated soil removal volume of 7,000 cubic yards (all volumes will be further refined during the remedial design stage). Dewatering will be performed during the excavation of the contaminated soil located below the groundwater table. The collected groundwater will be pumped into tanks, treated (if necessary), sampled, and shipped to the City of Rome POTW. Following excavation of the contaminated soil and application of the persulfate oxidant to the excavation floor, the steel sheeting will be removed and the area will be backfilled with the stockpiled overburden soil. Presently, the elevation of the excavation area is above the surrounding roadways. After completion of construction, it is expected that the final grade will be lower, but still higher than the surrounding roadways. Swales and culverts will be restored to their pre-construction elevations to match existing drainage features.

This remedy will ultimately result in hazardous substances, pollutants, or contaminants remaining on the site at levels that allow for unlimited use and unrestricted exposure. However, the remediation process will take more than 5 years to achieve these conditions. To ensure the remedy remains protective of human health and the environment, Five-Year Reviews will be performed by Air Force in coordination with EPA and NYSDEC.

Monitoring of the groundwater plume and treatment performance will be performed by the Air Force until RAOs are achieved, i.e., until four consecutive sampling rounds are below the remediation goals listed in Table 1. In order to properly monitor the plume, groundwater sampling will be performed to determine and monitor seasonal water table and contaminant concentration fluctuations.

The bedrock beneath the proposed excavation area at AOC 9 is present at depths of 30 to 35 feet BGS and, in 2002, the bedrock groundwater study concluded that groundwater contamination had not migrated into the underlying bedrock. Based on previous studies, it was determined that a thickness of between 6 and 16 feet of uncontaminated soil rests above the bedrock. If during the source excavation or during monitoring of the groundwater plume there are indications that contamination is migrating deeper, the potential impacts to bedrock groundwater will be evaluated and a recommendation will be presented to NYSDEC and USEPA for additional bedrock groundwater sampling.

Land use controls in the form of deed restrictions for affected groundwater will also be implemented as follows:

- Development and use of the entire AOC 9 property for residential housing, elementary and secondary schools, childcare facilities, and playgrounds will be prohibited unless prior approval is received from the Air Force, EPA, and NYSDEC.

- The owner or occupant of this site shall not extract, utilize, consume, or permit others to extract, utilize, or consume any water from the subsurface aquifer within the boundary of the site unless such owner or occupant obtains prior written approval from the NYSDOH.

- The owner or occupant of this site will not engage in any activities that will disrupt required remedial investigation, remedial actions, and oversight activities, should any be required.

- The owner or occupant of this site will restrict access to and prohibit contact with all subsurface soils and groundwater at or below the groundwater interface at this AOC until cleanup goals are achieved and have been confirmed through sample results.

- With respect to risks that may be posed via indoor air contaminated by chemicals volatilizing from the groundwater (vapor intrusion), the Grantee will covenant to conduct either (a) construction of new structures within the Groundwater Restriction Area in a manner that would mitigate unacceptable risk under CERCLA and the NCP; or (b) an evaluation of the potential for unacceptable risk prior to the erection of any structure in the Groundwater Restriction Area, and the Grantee shall include mitigation of the vapor intrusion in the design/construction of the structure prior to occupancy if an unacceptable risk under CERCLA and the NCP is posed. Any such mitigation or evaluations will be coordinated with the EPA and NYSDEC. In addition, with respect to vapor intrusion, Buildings 912 and 913 will remain unoccupied until either of the actions under (a) or (b) above is completed. "Occupied" means that the building is used and there is human occupation of it with regularity (e.g., persons present the same day of the week, for approximately the same number of hours). Incidental use of the building, such as for storage of materials, that necessitates intermittent visits by individuals who would not remain in the building after delivery or retrieval of such materials, would not meet this definition of occupation. "Occupied" has the same meaning throughout this document. The owner may also choose to demolish the buildings.

The above restrictions will be maintained until the concentrations of hazardous substances in the groundwater are at such levels to allow for unrestricted use. The restriction on occupancy of Buildings 912 and 913 will remain in effect after the groundwater cleanup goals are achieved unless the requirements of the previous paragraph are followed. Prior approval by the EPA and NYSDEC will be required for any modification or termination of land use controls, use restrictions, or anticipated actions that may disrupt the effectiveness of or alter or negate the need for land use controls.

Based on modeling, groundwater at this site is expected to reach Remediation Goals in 11 years. Until Remediation Goals are achieved, data will be collected as part of remedy performance monitoring. Following each monitoring event, concentrations of COCs and trends in concentrations of COCs will be evaluated. If an increasing trend in COC concentrations is identified (e.g., three consecutive monitoring events showing a statistically significant increasing trend), the Air Force will propose to the EPA and NYSDEC that additional action be performed. Additional oxidant injections or additional excavations may be executed without requiring either an Explanation of Significant Differences or ROD amendment. The Air Force will initiate additional oxidant injection or excavation within six months of completion of the trend analysis if these actions will be effective in achieving cleanup standards as shown in Table 1. If other actions will be

required, the Air Force will propose development and implementation of a ROD amendment or Explanation of Significant Differences.

The upgradient area of AOC 9 (Area A on Figure 6) was transferred prior to discovery of the upgradient portion of the contamination. A deed modification will be issued to implement the land use controls as deed restrictions for Area A.

If the property that has not yet been transferred (designated as Area B on Figure 6), is transferred to another federal entity (federal-to-federal transfer) or a non-federal entity in the future, the EPA and NYSDEC will be notified at least six months prior to such transfer. If the six-month notification is not possible, the EPA and NYSDEC will be notified no later than 60 days prior to such transfer. The Air Force shall provide a copy of the executed deed to EPA and NYSDEC.

The Air Force will take the following actions to ensure that the aforementioned use restrictions and the controls are effective in eliminating the exposure scenario and protecting human health and the environment:

Deed Restrictions: Each transfer of fee title from the United States will include the information required by CERCLA 120(h)(3)(A), with the required reservation of access extending to the Air Force, USEPA, and NYSDEC, and their respective officials, agents, employees, contractors, and subcontractors for purposes consistent with the Air Force obligations under CERCLA or similar authorities for taking remedial or corrective action on the property. Deeds will also include a description of any residual contamination on the property above unlimited use and unrestricted exposure levels and any related environmental restrictions, and will expressly prohibit activities inconsistent with use restrictions established herein and remedial action objectives. Deeds will contain appropriate provisions designed to ensure that restrictions run with the land and are enforceable by the Air Force.

Lease Restrictions: During the time between the adoption of this ROD and deeding of the AOC 9 property, equivalent restrictions will be implemented by lease terms, which are no less restrictive than the use restrictions and controls described above in this ROD. These lease terms shall remain in place until the property is transferred by deed, at which time they will be superseded by the land use controls described in this ROD.

Environmental Easement and State Land Use Notification: The Air Force will condition transfer of the property upon the transferee granting an environmental easement, containing a complete description of the restrictions described in this ROD, for the land use controls boundary shown on Figure 6 in accordance with Article 71, Title 36 of the New York State Environmental Conservation Law. The coordinates and area in acres of the land use controls boundary are included

on Figure 6. The Air Force will ensure that the transferee will grant the environmental easement to NYSDEC, on behalf of the State of New York, at the time of transfer of title for the property from the United States. The content of the document creating the environmental easement must be pre-approved by NYSDEC, with concurrence from the EPA as a third-party beneficiary that the easement reflects the restrictions described in the ROD.

Notice: Prior to property transfer, the transferee will be notified of any environmental use restrictions and institutional controls or reporting requirements. Concurrent with the transfer of fee title, information regarding the environmental use restrictions and controls will be communicated in writing to the property owner and to appropriate state agencies to ensure that such agencies can factor such conditions into their oversight and decision-making activities regarding the land use controls boundary, as shown in Figure 6. The Air Force will also provide a copy of the deeds to the regulatory agencies as soon as practicable after the transfer of fee title.

Monitoring and Enforcement

Monitoring: Monitoring of the environmental use restrictions and controls will be conducted annually by the Air Force until the property encompassing the land use and land use controls boundary (Figure 6) is transferred and a report will be provided. Any such annual monitoring reports will be included in a separate report or as a section of another environmental report, if appropriate, and be provided to the EPA and NYSDEC. Upon the effective date of the property conveyance, the Air Force will place a requirement in the deed that the transferee or subsequent property owner(s) will conduct annual physical inspections of the AOC 9 site to confirm continued compliance with all land use controls objectives unless and until all land use controls at the site are terminated and will provide to the Air Force, EPA and NYSDEC an annual monitoring report. All annual monitoring reports will report on the status of land use controls and how any land use control deficiencies or inconsistent uses have been addressed, whether use restrictions and controls were communicated in the deed(s) for any property transferred in the reporting period, and whether use of the property encompassing the land use controls boundary (Figure 6) has conformed to such restrictions and controls.

If a transferee fails to provide an annual monitoring report as described above to the Air Force, the Air Force will notify the EPA and NYSDEC as soon as practicable. If the EPA or NYSDEC does not receive the annual monitoring report from the transferee they will notify the Air Force as soon as practicable. Within 30 days of the report's due date, the Air Force will take steps to determine whether land use controls are effective and remain in place and advise the regulators of its efforts. In any event, within 90 days of the report's due date, the Air Force shall determine the status of land use controls and provide its written findings, with supporting evidence sufficient to confirm the reported status, based on the use restrictions/land use controls and site conditions, to the EPA and NYSDEC unless either EPA or NYSDEC, in its sole discretion, acts to confirm the status of the land use controls independently.

The land use controls monitoring reports will be used in the preparation of the five-year reviews to evaluate the effectiveness of the remedy. The continuation, modification, or elimination of the monitoring reports, and any changes to land use controls monitoring frequencies, will be subject to the EPA and NYSDEC approval. The five-year review reports will be submitted to the regulatory agencies for review and comment.

Response to Violations: The Air Force will notify the EPA and NYSDEC via e-mail or telephone as soon as practicable, but no later than 10 days after discovery of any activity that is inconsistent with the land use controls or use restrictions, exposure assumptions, or any action that may interfere with the effectiveness of the land use controls. Any violations that breach federal, state or local criminal or civil law will be reported to the appropriate civilian authorities, as required by law.

Enforcement: Any activity that is inconsistent with the land use controls or use restriction or any action that may interfere with the effectiveness of the land use controls will be addressed by the Air Force as soon as practicable (but in no case more than 10 days) after the Air Force becomes aware of the violation. The Air Force will notify the EPA and NYSDEC regarding how the breach has been addressed within 10 days of sending EPA and NYSDEC notification of the breach. The Air Force will exercise such rights as it retained under the transfer documents to direct that activities in violation of the controls be immediately halted. To the extent necessary, the Air Force will engage the services of the Department of Justice to enforce such rights.

Notification of Land Use Modification: The recipient of the property will obtain approval from the Air Force, EPA, and NYSDEC for any proposals for a land use change at a site inconsistent with the use restrictions described in this ROD.

The Air Force is responsible for implementing, maintaining, monitoring, and enforcing the Selected Remedy (including the land use controls). Although the Air Force may later transfer [has transferred] these responsibilities to another party, the Air Force, both pre-transfer and post-transfer, shall retain ultimate responsibility for implementing, maintaining, monitoring, and enforcing the Selected Remedy.

2.13 Statutory Determinations

The AFRPA and EPA, with concurrence from NYSDEC, have determined that remedial action (source removal, groundwater treatment, and land use controls) is warranted for this site. The Selected Remedy is protective of human health and the environ-

ment, complies with federal and NYS ARARs, is cost effective, and utilizes permanent solutions to the extent possible.

Annual inspections and reporting will be performed by the Air Force to verify that the land use controls are effective prior to the transfer; after property transfer, the transferee will perform these functions. This remedy will ultimately result in hazardous substances, pollutants, or contaminants remaining on the site at levels that allow for unlimited use and unrestricted exposure. However, the remediation process will take more than 5 years to achieve these conditions. To ensure the remedy remains protective of human health and the environment, Five-Year Reviews will be performed by Air Force in coordination with the EPA and NYSDEC.

2.14 Documentation of Significant Changes

No significant changes have been made to the Selected Remedy from the time the proposed plan was released for public comment.

3 Responsiveness Summary

On Wednesday, January 13, 2010, AFRPA, following consultation with and concurrence of the EPA and NYSDEC, released for public comment the proposed plan for source removal, groundwater treatment, and land use controls at AOC 9 located at the former Griffiss AFB. The release of the proposed plan initiated the public comment period, which concluded on February 16, 2010.

During the public comment period, a public meeting was held on Wednesday, January 20, 2010, at 5:00 pm at the Mohawk Valley EDGE Conference Room, 153 Brooks Road, Rome, New York, to present the Selected Remedy for AOC 9. A court reporter recorded the proceedings of the public meeting. Copies of the transcript and attendance list are included in the Administrative Record. The public comment period and the public meeting were intended to elicit public comment on the proposed plan for this site.

This document summarizes and provides responses to the oral comments received at the public meeting and the written comments received during the public comment period.

Oral Comments

Based on a review of the transcript prepared for the AOC 9 Proposed Plan public meeting held on January 20, 2010, no oral public comments were made that require a written response.

Written Comments

Comment #1 (John Fitzgerald; Daniel Ours, C.P.G., Technical Assistance for Public Participation [TAPP])

The effectiveness of ISCO assumes that the source, nature, and extent of groundwater contamination have been adequately defined. The contamination source

and overburden groundwater contamination are well-defined, but bedrock groundwater contamination remains a potential question. Although there is no evidence that bedrock groundwater has been affected by overburden groundwater contamination, there are only three (3) bedrock wells in AOC-9 (compared to scores of overburden groundwater samples). One of these bedrock wells is located upgradient, adjacent to Building #913, and two are located approximately 800 feet downgradient, in proximity to Six Mile Creek. As part of the remedial design, one bedrock observation well might be considered downgradient of the proposed area of persulfate injection (approximately mid-way between the upgradient and downgradient bedrock monitoring wells), to be used as an observation point (i.e. not an injection well). The bedrock observation well would serve two purposes:

1. to substantiate that there is no bedrock groundwater contamination in the center of the plume.
2. to determine whether any of the injected persulfate solution disperses into bedrock (thereby losing contact with overburden groundwater contamination).

Response #1

As referenced in the Summary of Site Activities section of the AOC 9 Proposed Plan, the bedrock beneath the proposed excavation area at AOC 9 is present at depths of 30 to 35 feet BGS and in 2002, the Bedrock Groundwater Study concluded that groundwater contamination had not migrated into the underlying bedrock. The study consisted of drilling, installation, development, sampling, and slug testing of three new bedrock wells and installation of one soil boring. Analytical results for the bedrock groundwater samples indicated that VOCs are not present at concentrations above the most stringent screening criteria within the bedrock. Additionally, data collected within the source area indicate that a thickness of between 6 and 16 feet of uncontaminated groundwater and soil is present below the impacted groundwater and above the bedrock. Based on the data collected from the three bedrock wells and the lack of contamination observed near the top of rock in the source area it was concluded that bedrock contamination was not present.

As an additional check, following excavation of the contaminated soil at AOC 9, the bottom of the excavation will be screened with a PID to ensure that the contamination hasn't migrated deeper into the soil and bedrock. If contamination is detected at elevated levels (greater than 50 ppm total VOCs in air) with the PID, that soil will be excavated and the process repeated.

If during the source excavation or during monitoring of the groundwater plume, there are indications that contamination has migrated deeper, the potential impacts to bedrock groundwater will be evaluated and a recommendation will be presented to NYSDEC and EPA for additional bedrock groundwater sampling.

Comment #2 (John Fitzgerald; Daniel Ours, C.P.G., Technical Assistance for Public Participation [TAPP])

Additionally, please consider surface water sampling of the creek to be performed at the same time as groundwater sampling during the remediation process.

Response #2

Surface water sampling will be conducted at Six Mile Creek at the same time as groundwater sampling.

Comment #3 (John Fitzgerald; Daniel Ours, C.P.G., Technical Assistance for Public Participation [TAPP])

It is assumed that the responsibility for monitoring the performance of remedial systems will reside with the Department of Defense, along with any responsibility to make corrections to remedial actions that are not working as planned.

Response #3

That assumption is correct.

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