

DISTRIBUTION: Final Interim Remedial Action Completion Report for Remedy-in-Place and Construction Complete for the On-base Groundwater Area of Concern (SD-52) at the Former Griffiss Air Force Base

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

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

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)

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

Ms. Catherine Jerrard
AFCEE/EXC – Griffiss
428 Phoenix Drive
Rome NY 13441-4105 (3 copies, 2 CDs)



DEPARTMENT OF THE AIR FORCE
AIR FORCE CENTER FOR ENGINEERING AND THE ENVIRONMENT

August 12, 2011

MEMORANDUM FOR SEE DISTRIBUTION LIST

FROM: AFCEE/EXC – Griffiss
428 Phoenix Drive
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SUBJECT: Final Interim Remedial Action Completion Report for Remedy-in-Place and Construction Complete for the On-Base Groundwater Area of Concern (SD-52) at the Former Griffiss Air Force Base.

1. Enclosed please find the Final Interim Remedial Action Completion Report for Remedy-in-Place and Construction Complete for the On-Base Groundwater Area of Concern (SD-52) at the Former Griffiss Air Force Base dated August 2011. Responses to comments received on October 19, 2010 from the United States Environmental Protection Agency (USEPA) on the September 2010 draft version of the report are also included.
2. If you have any questions, please contact Cathy Jerrard at 315-356-0810, ext. 204.

A handwritten signature in black ink, appearing to read "Michael F. Mc Dermott".

MICHAEL F. MCDERMOTT
BRAC Environmental Coordinator

Attachment: As Noted

**Final Interim Remedial Action Completion
Report for Remedy-in-Place and
Construction Complete for the On-Base
Groundwater Area of Concern (SD-52) at the
Former Griffiss Air Force Base**

Contract No. W912DQ-06-D-0012

August 2011

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:

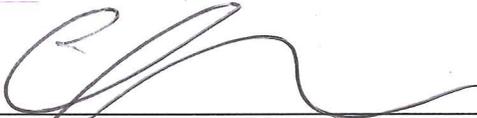
**PARSONS INFRASTRUCTURE & TECHNOLOGY GROUP, INC.
301 Plainfield Road, Suite 350
Syracuse, New York 13212**

Certificate of Compliance

Final Interim Remedial Action Completion Report for Remedy-in-Place and Construction
Complete for the On-Base Groundwater Area of Concern (SD-52) at the Former Griffiss
Air Force Base

August 2011

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.



Quality Control Manager (or designee)

12 Aug 2011

Date



Program Manager (or designee)

8/9/11

Date



Project Manager (or designee)

8/12/11

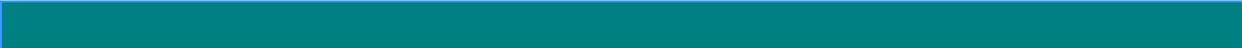
Date

Table of Contents

Section	Page
Executive Summary	1
1 Overview	1-1
1.1 Landfill 6	1-1
1.2 Building 817/WSA	1-2
1.3 Building 775/Pumphouse 3	1-2
1.4 Nosedocks/Apron 2	1-2
1.5 Document Organization	1-5
2 Remedial Action Objectives	2-1
2.1 Landfill 6	2-1
2.1.1 Remedy Functionality	2-2
2.2 Building 817/WSA	2-3
2.2.1 Remedy Functionality	2-4
2.3 Building 775/Pumphouse 3	2-5
2.3.1 Remedy Functionality	2-6
2.4 Nosedocks/Apron 2	2-8
2.4.1 Remedy Functionality	2-9
3 Summary of Remedial Actions	3-1
3.1 Landfill 6	3-1
3.1.1 Deviations from the Remedial Design Work Plan	3-1
3.2 Building 817/WSA	3-1
3.3 Building 775	3-2
3.3.1 Deviations from the Remedial Design Work Plan	3-2
3.4 Nosedocks/Apron 2	3-2
4 Demonstration of Completion	4-1
4.1 Landfill 6	4-1
4.2 Building 817/WSA	4-1
4.3 Building 775	4-1
4.4 Nosedocks/Apron 2	4-1
5 Ongoing Activities	5-1
5.1 Landfill 6	5-1
5.2 Building 817/WSA	5-1

Table of Contents (cont.)

Section	Page
5.3 Building 775	5-1
5.4 Nosedocks/Apron 2	5-1
6 Community Relations	6-1
7 References.....	7-1
Appendix	
A Construction Completion Report and Submittal Register ...	A-1
B Building 775 Groundwater Capture Performance.....	B-1
C 2009 LUC/IC Site Inspection Report.....	C-1



List of Figures



Figure		Page
1-1	Former Griffis Air Force Base Site Location Map	1-3

List of Abbreviations and Acronyms

AFB	Air Force Base
AFRPA	Air Force Real Property Agency
Air Force	United States Air Force
AOC	Area of Concern
Apron 2	Nosedocks/Apron 2
BCT	Base Realignment and Closure Team
bgs	below ground surface
Building 775	Building 775/Pumphouse 3
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
COC	contaminant of concern
CRP	community relations plan
DCE	cis-1,2-Dichloroethylene
DOC	dissolved organic compound
DoD	U.S. Department of Defense
EEEP	Ecology and Environment Engineering, P.C.
EPA	U.S. Environmental Protection Agency
EW	extraction well
FFA	Federal Facilities Agreement
FPM	FPM Group, Ltd.
gpm	gallons per minute
IRACR	Interim Remedial Action Completion Report
LF6	Landfill 6
LUC/IC	Land Use Control/Institutional Control
MAROS	Monitoring and Remediation Optimization System
µg/L	micrograms per liter
MNA	monitored natural attenuation
MW	monitoring well

List of Abbreviations and Acronyms (cont.)

NPL	National Priorities List
NYSDEC	New York State Department of Environmental Conservation
NYSDOH	New York State Department of Health
OBGW	on-base groundwater
ORP	oxidation-reduction potential
Parsons	Parsons Infrastructure & Technology Group, Inc.
PCE	Perchloroethylene (tetrachloroethylene)
PM	performance monitoring
RA	remedial action
RAB	restoration advisory board
RAO	remedial action objective
RI	remedial investigation
ROD	Record of Decision
TCA	1,1,1-trichloroethane
TCE	trichloroethylene
VC	vinyl chloride
VOC	volatile organic compound
WPCF	water pollution control facility
WSA	Building 817/Weapons Storage Area

Executive Summary

This Interim Remedial Action Completion Report (IRACR) was completed in accordance with the United States Department of Defense (DoD) and Environmental Protection Agency (EPA) subject document: *DoD/EPA Joint Guidance on Streamlined Site Closeout and National Priorities List (NPL) Deletion Process for DoD Facilities*. This IRACR documents that the remedies of the four sites below have been constructed and are in place. Ongoing work at each of the sites is described in Section 5. This IRACR was completed from July 2008 to January 2009, and remedial construction was performed in accordance with the approved remedial design work plan (EEEEPC 2008). The following work was completed:

Landfill 6

The remedial action (RA) implemented at Landfill 6 (LF6) included bioremediation of the plume in the area exhibiting the highest concentration of contaminants of concern (COCs). This was accomplished through the following actions:

- One monitoring well (MW) was installed; and
- Vegetable oil was injected in the groundwater at six injection well locations.

Building 817/Weapons Storage Area

The RA implemented at Building 817/Weapons Storage Area (WSA) included bioremediation of groundwater at the site in the area exhibiting the highest COCs. This was accomplished through the following action:

- Vegetable oil was injected in the groundwater at eight injection well locations.

Building 775/Pumphouse 3

The RA implemented at Building 775/Pumphouse 3 (Building 775) included installation of a pump-and-discharge system. This was accomplished through the following actions:

- One monitoring well was installed and one extraction well (EW) was converted into a monitoring well;
- Two EWs were installed; and

- A groundwater extraction system was installed and is designed to operate at approximately 4 gallons per minute (gpm).

Nosedocks/Apron 2

The RA implemented at Nosedocks/Apron 2 (Apron 2) included monitored natural attenuation (MNA) of groundwater and surface water to verify that human health and the environment are protected. This was accomplished through the following action:

- Three monitoring wells were installed.

1

Overview

This section was prepared in accordance with the United States Department of Defense (DoD) and Environmental Protection Agency (EPA) subject document: *DoD/EPA Joint Guidance on Streamlined Site Closeout and National Priorities List (NPL) Deletion Process for DoD Facilities*, Page 4, Section A, and includes a very brief description of the operating unit characteristics, contaminants of concern, major findings, and results of site investigation activities. A more detailed description can be found in the Construction Completion Report (see Appendix A).

The former Griffiss Air Force Base (AFB) is located in Oneida County, New York, and is approximately 2 miles northeast of the city of Rome in central New York State (see Figure 1-1). The base property covers approximately 3,540 acres and is situated in a relatively broad valley of the Mohawk River.

On July 22, 1987, the base was listed on the EPA NPL, which brought the installation under the federal facilities provisions of Section 120 of the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA). In August 1990, the United States Air Force (Air Force), EPA, and New York State Department of Environmental Conservation (NYSDEC) entered a Federal Facilities Agreement (FFA) for environmental remediation at a number of sites at the former Griffiss AFB.

1.1 Landfill 6

Landfill 6 (LF6) is a 15.7-acre area in the southern portion of the former Griffiss AFB between Perimeter Road and Three Mile Creek. The landfill, which is unlined, consisted of hard fill and general refuse and operated from 1955 to 1959.

The LF6 site plume is downgradient and west of the landfill and south of the Building 775 site. The contaminants detected in groundwater samples exceeding NYSDEC Class GA groundwater standards are trichloroethylene (TCE), cis-1,2-dichloroethylene (DCE), and vinyl chloride (VC). The contaminated aquifer comprises mostly silty sands with an average saturated thickness extending from 19 feet below ground surface (bgs) to 80 feet bgs at the shale bedrock layer.

1.2 Building 817/WSA

The Building 817/Weapons Storage Area (WSA) site is located on the north side of the main runway between Building 817 and the culverted section of Six Mile Creek, south of the former WSA. Building 817 was once used for electronics parts maintenance.

The results of baseline sampling from November 2006 confirmed exceedances of NYSDEC Class GA groundwater standards for Perchloroethylene (tetrachloroethylene; PCE) and TCE detections within the plume (FPM Group, Ltd. 2007).

The groundwater plume at the Building 817/WSA site extends from Building 817 in the north downgradient to slightly beyond the culverted section of Six Mile Creek to the south. The lateral extent of the plume is approximately 250 feet and extends from 5 feet bgs to 25 feet bgs, where the Utica shale bedrock is encountered.

1.3 Building 775/Pumphouse 3

Building 775 is located in the south-central portion of the former Griffiss AFB. The primary contaminant exceeding NYSDEC Class GA groundwater standards at Building 775 is TCE, with minor detections of 1, 1, 1-trichloroethane (1,1,1-TCA) and PCE. Most of the Building 775 plume appears to have migrated south toward LF6. A baseline survey site inspection was conducted in April 1994 (AFRPA 2009) to evaluate contaminant sources. Groundwater contaminants were not found in the bedrock (EEEEPC 2008).

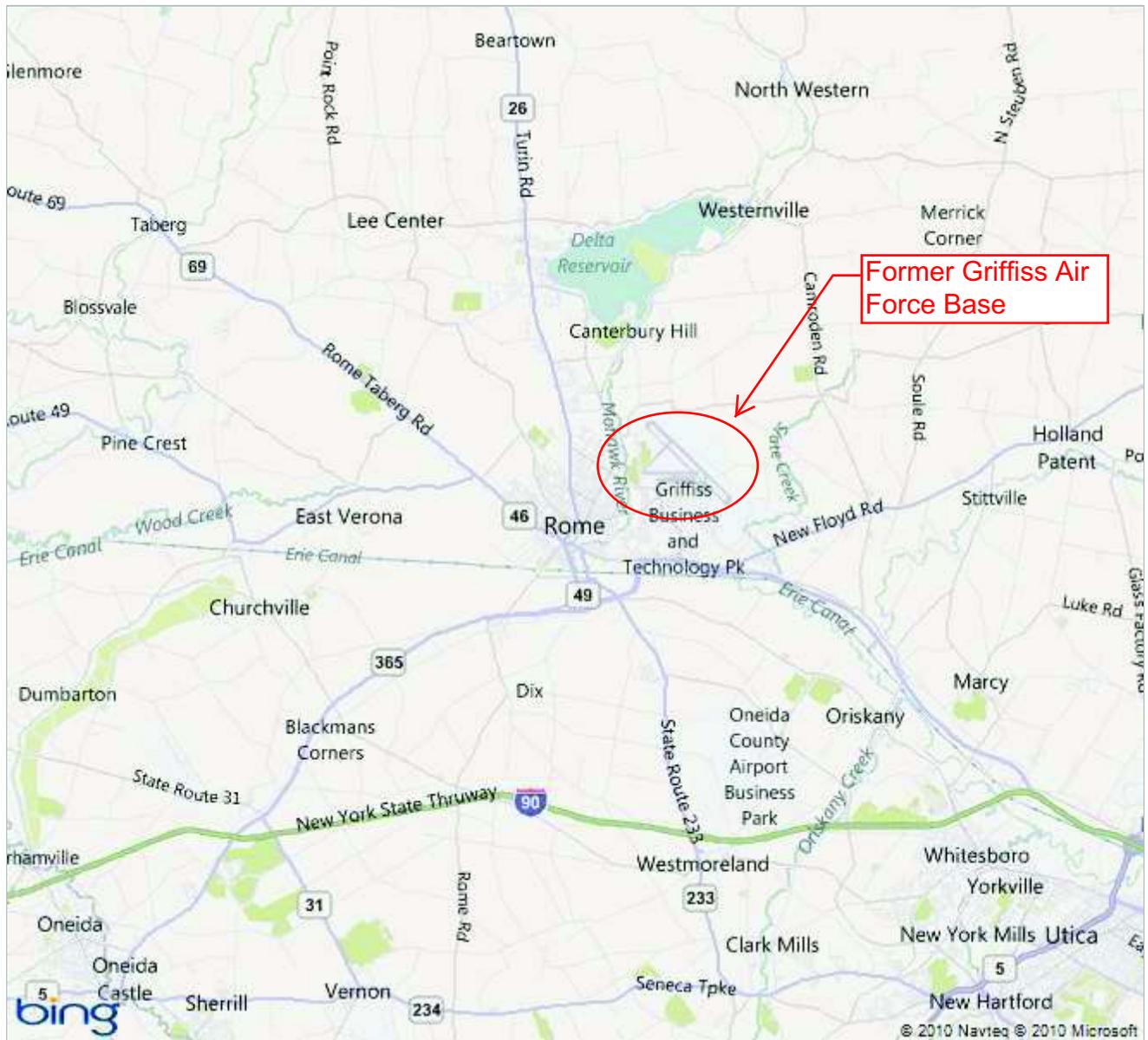
1.4 Nosedocks/Apron 2

The Nosedocks/Apron 2 (Apron 2), a former aircraft parking apron and refueling area, were used as aircraft maintenance facilities. The chlorinated volatile organic compounds (VOCs) contamination associated with the Apron 2 chlorinated plume site is present in two plumes, the southern and northern plumes.

The contaminants detected in groundwater samples exceeding NYSDEC Class GA groundwater standards are cis-1,2-DCE, TCE, and VC. The cleanup goals for cis-1,2-DCE, TCE, and VC are 5 micrograms per liter ($\mu\text{g/L}$), 5 $\mu\text{g/L}$, and 2 $\mu\text{g/L}$, respectively.

The contaminated aquifer is located 9 to 25 feet bgs, with the shallower portion occurring in the vicinity of Six Mile Creek. The aquifer is composed of several well-defined layers, including a silty-sand layer in the upper 5 feet, a 5- to 15-foot-thick coarse sand and gravel layer in the middle of the aquifer, and a 15- to 20-foot-thick layer of till composed of fine sand, silt, and gravel resting on the shale bedrock. The high hydraulic conductivity of the gravel layers has produced an estimated average groundwater velocity of 106 feet per year.

Figure 1- 1 Former Griffiss Air Force Base Site Location Map



1.5 Document Organization

The following briefly describes the organization of the remaining sections of this document:

- Section 2 identifies the remedial action objectives (RAOs) and cleanup standards specified in the Record of Decision (ROD; EEEPC 2008), and subsequent modifications, if any.
- Section 3 briefly discusses the remedial actions (RAs) taken to meet the remedial objectives.
- Section 4 includes information demonstrating attainment of remedial objectives.
- Section 5 describes the activities still being performed onsite.
- Section 6 briefly summarizes the public outreach activities conducted at the site.

2

Remedial Action Objectives

This section was prepared in accordance with the DoD and EPA subject document: DoD/EPA Joint Guidance on Streamlined Site Closeout and NPL Deletion Process for DoD Facilities, Page 4, Section B, and identifies the RAOs and cleanup standards in the ROD. A more detailed description can be found in the Construction Completion Report (see Appendix A).

2.1 Landfill 6

The ROD for the LF6 Area of Concern (AOC) was issued by the Air Force in December 2008 and signed by the EPA in March 2009. Based on investigations and risk assessments performed at the LF6 OBGW site, the site contaminants of concern (COCs) include cis-1,2-DCE, TCE, and VC. For site COCs, the NYSDEC Class GA Groundwater Quality Standards were selected as the site cleanup goals. The cleanup goals for cis-1,2-DCE, TCE, and VC are 5 µg/L, 5 µg/L, and 2 µg/L, respectively.

As described in the ROD, the RAOs are to:

1. Achieve the cleanup goals for COCs specified above;
2. Prevent human exposure to groundwater through groundwater-use restrictions until cleanup goals are achieved; and
3. Prevent contaminated groundwater from the site from adversely impacting surface water (in Three Mile Creek), which is defined as surface water concentrations above performance indicators (NYSDEC Class GA Groundwater Quality Standards of 5 µg/L for DCE and 2 µg/L for VC).
4. Prevent intrusive work or other activities that will impact the effectiveness of the landfill closure and post-closure activities.
5. Prevent development and use of the property for residential housing, elementary and secondary schools, childcare facilities and playgrounds.

Based on the previous investigations and environmental conditions at the site, the selected remedy included:

- Bioremediation of the plume in the area exhibiting the highest COC concentrations.
- Installation of recovery wells to extract groundwater for recirculation, if necessary, based on review of the remedial system performance data. The remedy at the LF6 site will be implemented in a phased approach. First, bioremediation will occur and then groundwater extraction and recirculation will be implemented, if needed.
- Implementation of a contingency plan including an in situ air sparge wall (or other action agreed upon by the Air Force, EPA, and NYSDEC), if elevated levels of DCE and/or VC attributable to site groundwater are detected in Three Mile Creek.
- Remedial performance monitoring during full-scale implementation.
- Implementation of Land Use Controls/Institutional Controls (LUC/ICs) in the form of deed restrictions within the main landfill boundary and for affected groundwater.

2.1.1 Remedy Functionality

The initial phase of the selected remedy for the LF6 TCE AOC, vegetable oil injection, targeted monitoring wells which exhibited chlorinated solvent concentrations above 500 µg/L.

Trend chart analysis, per the *Summer 2009 Annual Report Performance Monitoring* (FPM Group, Ltd. 2010), showed a decreasing trend in total VOCs results between 2004 and 2009, especially for wells within the hot spot. All other monitoring wells with detections are clustered at or below 300 µg/L total VOCs, with stable total VOC levels. Statistical trend analysis per the *Summer 2009 Annual Report Performance Monitoring* (FPM Group, Ltd. 2010) was performed with the Monitoring and Remediation Optimization System (MAROS) and showed mostly decreasing, potentially decreasing, or stable trends for cis-1,2-DCE and TCE in the hot spot. The rest of the VOC plume wells had mostly stable or no trend results.

The LF6 AOC ROD included the following LUC/ICs:

1. Development and use of the entire SD-52, LF6 TCE AOC 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.
2. 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 New York State Department of Health (NYSDOH).

3. The owner or occupant of this site will not engage in any activities that will disrupt required remedial investigation (RI), RAs, and oversight activities, should any be required.
4. 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.
5. Intrusive work or other activities that impact the effectiveness of the landfill closure and post-closure activities will not be allowed within the restricted landfill boundary.
6. Posting of notices and signs to minimize the interference with the landfill closure and post-closure activities. Signs will be posted along the landfill property boundary that read "SOLID WASTE LANDFILL – CONTAINS HAZARDOUS SUBSTANCES – NO TRESPASSING."

Implementation of LUC/ICs that were included in the deed, as required by the ROD, was confirmed by an on-site inspection and by the LUC/IC confirmation form signed by W. Vernon Gray, Commissioner of Aviation, on August 24, 2009. The LUC/IC confirmation results are provided in the 2009 LUC/IC Site Inspection Report (see Appendix C).

The mechanism in place at property still under Air Force control is to continue execution of the annual inspection program, including completion of associated reports and inspection forms, to ensure the LUC/ICs required by the ROD are implemented. The LUC/ICs at property owned by the Air Force will be implemented as deed restrictions when the property is transferred.

2.2 Building 817/WSA

The ROD for the Building 817/WSA AOC was issued by the Air Force in December 2008 and was signed by the EPA in March 2009. Based on investigations performed at the Building 817/WSA OBGW site, the site COCs include PCE and TCE. For site COCs, the NYSDEC Class GA Groundwater Quality Standards were selected as the site cleanup goals. The cleanup goals for PCE and TCE are 5 µg/L and 5 µg/L, respectively.

As described in the ROD, the RAOs are to:

1. Achieve the cleanup goals for COCs specified above;
2. Prevent human 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 (NYSDEC Class GA Groundwater Quality Standards of 5 µg/L for DCE and 2 µg/L for VC); and
4. Prevent development and use of the property for residential housing, elementary and secondary schools, childcare facilities and playgrounds. Based on the previous investigations and environmental conditions at the site, the selected remedy included:
5. Enhanced bioremediation to remove VOCs from Building 817/WSA site groundwater.
6. Implementation of the contingency air sparge wall (or other action agreed upon by the Air Force, EPA, and NYSDEC) will be completed if surface water samples from the culverted section of Six Mile Creek contain elevated concentrations of DCE and/or VC that could be attributed to site groundwater.
7. Institutional controls in the form of deed restriction for affected groundwater will also be implemented.

2.2.1 Remedy Functionality

The initial phase of the remedy for the Building 817/WSA AOC was enhanced bioremediation via vegetable oil emulsion injection. The injection was performed at injection wells located near the Building 817, upgradient of the chlorinated solvent plume.

The trend chart analysis per the *Summer 2009 Annual Report Performance Monitoring* (FPM Group, Ltd. 2010) shows a decreasing trend in total VOC detections. A negative Mann Kendall statistic (indicating a decrease in constituent concentrations over time) is reported for five of the six wells, which had PCE detections, and all wells that had TCE detections. A negative Mann Kendall statistic has been reported for both the PCE and TCE mass indicating a decreasing mass. A decreasing dissolved organic compound (DOC) and VOC trend indicate that the bacteria are utilizing the carbon source for COC mitigation. DOC concentrations are below the recommended minimum level of 20 to 50 milligrams per liter for sustained enhanced bioremediation. Declining oxidation-reduction potential (ORP) levels at WSA-MW16 and -MW18 indicate that the reductive zone caused by the injected vegetable oil is growing.

Implementation of LUC/ICs required by the ROD in the form of deed restrictions has not taken place at this time, as Parcel F10C or Parcel A5 have not been transferred. The LUC/ICs for this site have been implemented by the Air Force and are included in the lease document as provided below.

1. The lessee shall restrict the conduct of any type of excavation, digging, drilling, utilization of groundwater, or other ground disturbing activity on the

property without prior written Air Force approval and Air Force coordination with applicable federal and state regulatory agencies as necessary.

2. The lessee shall restrict access to subsurface soils on the Leased Premises until the Base Realignment and Closure Team (BCT) identifies appropriate cleanup requirements and cleanup actions are executed by the Air Force to the satisfaction of the BCT.

Implementation of LUC/ICs that were included in the deed, as required by the ROD, was confirmed by an on-site inspection and by the LUC/IC confirmation form signed by W. Vernon Gray, Commissioner of Aviation, GIA, on August 24, 2009. The LUC/IC confirmation results are provided in the 2009 LUC/IC Site Inspection Report (see Appendix C).

The mechanism in place at property still under Air Force control is to continue execution of the annual inspection program, including completion of associated reports and inspection forms, to ensure the LUC/ICs required by the ROD are implemented. The LUC/ICs at property owned by the Air Force will be implemented as deed restrictions when the property is transferred.

2.3 Building 775/Pumphouse 3

The ROD for the Building 775 AOC was issued by the Air Force in December 2008 and signed by the EPA in March 2009. Based on investigations and risk assessments performed at the Building 775 OBGW site, the site COC is TCE. For the site COC, the NYSDEC Class GA Groundwater Quality Standards were selected as the site cleanup goals. The cleanup goal for TCE is 5 µg/L.

As described in the ROD, the RAOs are to:

1. Achieve the cleanup goals for COC specified above;
2. Prevent human 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 Three Mile Creek), which is defined as surface water concentrations above performance indicators (NYSDEC Class GA Groundwater Quality Standards of 5 µg/L for DCE and 2 µg/L for vinyl chloride); and
4. Prevent development and use of the property for residential housing, elementary and secondary schools, childcare facilities and playgrounds.

Based on the previous investigations and environmental conditions at the site, the selected remedy included:

- Installation of recovery wells to extract the groundwater from the Building 775 plume.

- The groundwater will be discharged to a sanitary sewer for off-site treatment at a wastewater treatment facility or treated on site and discharged to Three Mile Creek.
- Long-term maintenance of the remedial system that will require sampling of the influent and effluent VOC concentrations prior to discharge.
- Remedial performance monitoring during full-scale implementation.
- Institutional controls in the form of deed restrictions for affected groundwater have been/will be implemented.

2.3.1 Remedy Functionality

The initial phase of the remedy for the Building 775 site was the installation of a groundwater extraction and discharge system. As part of the remedial design, multiple pumping tests were conducted. The hydraulic testing and analysis of these wells estimated well pumping rates averaging approximately 4 gpm to capture the target area (see the Building 775 Groundwater Capture Performance Report in Appendix B).

The system is operating at its design pump rate of 4 gallons per minute (gpm). The effluent sample results show that TCE is effectively extracted from the Building 775 site. Additional performance monitoring (PM) results also show a decreasing trend in chlorinated solvents throughout the site.

LUC/ICs were implemented in the property transfer deeds as specified in the ROD. The Building 775 AOC is within four parcels (Parcels F2C, F4B, F6B, and F11B). Parcels F2C and F4B have been transferred and the LUC/ICs were implemented as deed restrictions. Parcels F6B and F11B have not been transferred and the LUC/ICs were implemented by the Air Force. The LUC/ICs will be implemented as deed restrictions when both properties are transferred.

The trend chart per the *Summer 2009 Annual Report Performance Monitoring* (FPM Group, Ltd. 2010) for the Building 775 Site shows a clear decreasing trend in TCE results between 2000 and early 2009. Statistical trend analysis performed with MAROS shows negative Mann Kendall statistics for all monitoring wells with sufficient sampling results for the MAROS statistical analysis indicating decreasing concentrations. Concentrations have decreased since the groundwater extraction and discharge system was put in operation.

The deed for Parcel F2 includes the following deed restriction as specified by the ROD:

1. The grantee covenants to restrict the use of the property to industrial, educational, and commercial non-residential activities unless it obtains written permission to do so from the EPA, NYSDEC, and NYSDOH.

2. Remedial Action Objectives

2. The grantee covenants that it will not engage in any activities that will disrupt required RI, response actions or oversight activities, should any be required on the property. The grantor agrees to coordinate its remediation activities with the grantee so as not to unreasonably disrupt use of the property by the grantee.
3. The grantee covenants not to extract, utilize, consume or permit any extraction, use, consumption of any water from the aquifer below the surface of the ground on the property unless the groundwater has been tested and found to meet all applicable standards and the grantee first obtains the prior written approval from NYSDOH. The grantee further covenants to ensure that the aquifer will not be used in any way that could spread or exacerbate environmental contamination or open exposure pathways to humans or the environment. The grantee and its successors and assignees covenant to comply with all applicable federal and state laws and regulations with regard to activities affecting the groundwater in the aquifer. The grantee will bear all costs associated with obtaining use of such water, including the cost of studies, analysis or remediation, without any cost whatsoever to the grantor.

The deed for Parcel F4B includes the following deed restriction as specified by the ROD:

1. The grantee covenants and agrees that it will not spread or exacerbate environmental contamination or open exposure pathways to humans or the environment, and that it will not disrupt environmental investigations and remedial activities, or jeopardize the protectiveness of such remedies.
2. The transaction documents will restrict property use to industrial and commercial non-residential use unless permission is obtained from the EPA, NYSDEC, and NYSDOH.
3. The grantee covenants not to extract, utilize, consume or permit any extraction, use, consumption of any water from the aquifer below the surface of the ground on the property unless the groundwater has been tested and found to meet all applicable standards and the grantee first obtains the prior written approval from NYSDOH. The grantee further covenants to ensure that the aquifer will not be used in any way that could spread or exacerbate environmental contamination or open exposure pathways to humans or the environment. The grantee and its successors and assignees covenant to comply with all applicable federal and state laws and regulations with regard to activities affecting the groundwater in the aquifer. The grantee will bear all costs associated with obtaining use of such water, including the cost of studies, analysis or remediation, without any cost whatsoever to the grantor.

Implementation of LUC/ICs that were included in the deed, as required by the ROD, was confirmed by an on-site inspection and by the LUC/IC confirmation

form signed by W. Vernon Gray, Commissioner of Aviation, GIA, on August 24, 2009. The LUC/IC confirmation results are provided in the 2009 LUC/IC Site Inspection Report (see Appendix C).

The mechanism in place at property still under Air Force control is to continue execution of the annual inspection program, including completion of associated reports and inspection forms, to ensure the LUC/ICs required by the ROD are implemented. The LUC/ICs at property owned by the Air Force will be implemented as deed restrictions when the property is transferred.

2.4 Nosedocks/Apron 2

The ROD for the Apron 2 chlorinated plume AOC was issued by the Air Force in December 2008 and signed by the EPA in March 2009. Based on investigations and risk assessments performed at the Apron 2 OBGW site, the site COCs include cis-1,2-DCE, TCE, and VC. For site COCs, the NYSDEC Class GA Groundwater Quality Standards were selected as the site cleanup goals. The cleanup goals for cis-1,2-DCE, TCE, and VC are 5 µg/L, 5µg/L, and 2 µg/L, respectively.

As described in the ROD, the RAOs are to:

1. Achieve the cleanup goals for COCs specified above;
2. Prevent human 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 (NYSDEC Class GA Groundwater Quality Standard of 2 µg/L for VC); and
4. Prevent development and use of the property for residential housing, elementary and secondary schools, childcare facilities and playgrounds.

Based on the previous investigations and environmental conditions at the site, the selected remedy includes:

- Monitored natural attenuation (MNA), including groundwater and surface water monitoring, to verify that human health and the environment are protected.
- Implementation of the contingency alternative, such as a horizontal air sparging barrier (or other action agreed upon by the Air Force, EPA, and NYSDEC), if surface water samples from Six Mile Creek contain elevated concentrations of VC that could be attributed to site groundwater.
- Long-term monitoring of the groundwater plume will be performed. A higher monitoring frequency is selected for the first year to identify seasonal fluctuations and uncertainties within the plume.

- Institutional controls in the form of deed restrictions for affected groundwater will also be implemented.

2.4.1 Remedy Functionality

The initial phase of the he selected remedy at the site is MNA. PM data indicates that the Apron 2 chlorinated plume concentrations appear to be decreasing. The trend was confirmed by the MAROS statistical analysis. Further analysis shows the estimated TCE mass has decreased, which is likely the result of natural attenuation possibly enhanced though the presence of petroleum constituents.

The trend chart per the *Summer 2009 Annual Report Performance Monitoring* (FPM Group, Ltd. 2010) shows a decreasing trend in total VOCs results between 2000 and 2009, especially for wells with higher contamination levels (782VMW-76, -78, -93, and -96, among others). Total VOC concentrations appear to have decreased to 60 µg/L or below. Statistical trend analysis was performed with MAROS shows that the TCE mass is probably decreasing, the cis-1,2-DCE mass is decreasing and that the VC mass is stable.

The Apron 2 chlorinated plume AOC is located in three parcels, Parcel A2, Parcel F6B, and Parcel F4A/F12A. Parcel F4A/F12A has been transferred. The LUC/ICs as specified in the ROD were implemented as deed restrictions in the deed for this property. The following summarizes the LUC/ICs provided in the deed for Parcel F4A/F12A:

1. The grantee, its successors and assignees shall be prohibited from accessing or otherwise disturbing or causing exposure to subsurface soils or consuming or otherwise using or causing exposure to the underlying groundwater.
2. The grantee is prohibited from extraction, utilization, or consumption of any water from the aquifer below the surface of the ground unless the water has been tested and found to meet all applicable standards and such owner obtains the prior written approval from NYSDOH.
3. The grantee is prohibited from managing the aquifer in any way that could spread or exacerbate environmental contamination or open exposure pathways to humans or the environment.
4. Activities by the grantee and its successors and assignees shall not disturb the integrity or effectiveness of the grantor's actions to complete closure of the environmental sites.

Implementation of LUC/ICs that were included in the deed, as required by the ROD, was confirmed by an on-site inspection and by the LUC/IC confirmation form signed by W. Vernon Gray, Commissioner of Aviation, GIA, on August 24, 2009. The LUC/IC confirmation results are provided the 2009 LUC/IC Site Inspection Report (see Appendix C).

2. Remedial Action Objectives

The mechanism in place at property still under Air Force control is to continue execution of the annual inspection program, including completion of associated reports and inspection forms, to ensure the LUC/ICs required by the ROD are implemented. The LUC/ICs at property owned by the Air Force will be implemented as deed restrictions when the property is transferred.

3

Summary of Remedial Actions

This section was prepared in accordance with the DoD and EPA subject document: DoD/EPA Joint Guidance on Streamlined Site Closeout and NPL Deletion Process for DoD Facilities, Page 4, Section C, and briefly discusses the remedial actions taken to meet the remedial objectives. A more detailed description can be found in the Construction Completion Report (see Appendix A).

3.1 Landfill 6

The initial phase of the remedy implemented at LF6 was enhanced anaerobic bioremediation using vegetable oil emulsion injections to aid in biodegradation and reductive dechlorination. Injections were made in the center of the identified plume, near LF6-MW12.

3.1.1 Deviations from the Remedial Design Work Plan

Modifications of the Remedial Design Work Plan (EEEEPC 2008) included the following:

- An alternate location for LF6MW-39 was identified and approved by Parsons Infrastructure & Technology Group, Inc. (Parsons) personnel during surveying activities because the original location was in the middle of a forested area. The new location allowed for easier access for the drill rig.
- Morie sand #00N was used in the monitoring well filter pack instead of Morie #00.
- A 24-inch-diameter concrete drainage pad was installed instead of the designed 2-foot by 2-foot by 4-inch-thick concrete pad around LF6MW-39.
- A centralizer was not installed in LF6MW-39 as designated in the Final Remedial Action Work Plan.

3.2 Building 817/WSA

The initial phase of the remedy implemented at Building 817/WSA was enhanced anaerobic bioremediation using vegetable oil emulsion injections to achieve reductive dechlorination. Injections were made in the upgradient portion of the plume, near Building 817.

3.3 Building 775

The initial phase of the remedy implemented for the Building 775 site consists of an unmanned and automated operational pump and discharge system. The system was designed to contain the contaminated plume and extract groundwater to remove contaminants from the aquifer. The contaminated groundwater is discharged to the existing sanitary sewer system, which leads to the City of Rome Water Pollution Control Facility (WPCF).

3.3.1 Deviations from the Remedial Design Work Plan

Deviations from the Remedial Design Work Plan (EEEEPC 2008) occurred, and include the following:

- Monitoring well 775MW-19R was installed with a screen interval of 40 to 60 feet bgs.
- Extraction well EW-1 was unsuccessfully developed. Extraction wells EW-1R and EW-3 were installed to replace EW-1.
- The electrical and waste discharge lines under the access road between Building 775 and the parking lot were installed by boring, rather than the method proposed in the original work plan which was to open cut the road.

Additional details regarding the deviations and any resulting impacts are identified in Section 3.5.7 of Appendix A.

3.4 Nosedocks/Apron 2

The initial phase of the implemented remedy for the Apron 2 site consisted of the installation of three additional monitoring wells: 782VMW-84D, 782VMW-121, and 782VMW-121D.

4

Demonstration of Completion

This section was prepared in accordance with the DoD and EPA subject document: DoD/EPA Joint Guidance on Streamlined Site Closeout and NPL Deletion Process for DoD Facilities, Page 4, Section D, and, for this interim document, includes information needed to demonstrate progress towards attainment of remedial objectives. A more detailed description can be found in the Construction Completion Report (see Appendix A).

4.1 Landfill 6

As documented in each quarterly report (FPM Group, Ltd. 2007, 2008, 2009a, 2009b, 2009c), the performance monitoring results indicated that although contaminant concentrations were decreasing, additional remedial actions would be required to increase the concentration of DOC in the impacted groundwater (see Section 5 for details).

4.2 Building 817/WSA

As documented in each quarterly report (FPM Group, Ltd. 2007, 2008, 2009a, 2009b, 2009c), the performance monitoring results indicated that although contaminant concentrations were decreasing, additional remedial actions would be required to increase the concentration of DOC in the impacted groundwater (see Section 5 for details).

4.3 Building 775

As documented in each quarterly report (FPM Group, Ltd. 2007, 2008, 2009a, 2009b, 2009c) the performance monitoring has commenced and the results indicate that the remedy is operating as designed.

4.4 Nosedocks/Apron 2

As documented in each quarterly report (FPM Group, Ltd. 2007, 2008, 2009) the performance monitoring has commenced and the results indicate that the remedy is operating as designed.

5

Ongoing Activities

This section was prepared in accordance with the DoD and EPA subject document: *DoD/EPA Joint Guidance on Streamlined Site Closeout and NPL Deletion Process for DoD Facilities*, Page 5, Section E, and describes the activities, if any, still being performed. A more detailed description can be found in the Construction Completion Report (see Appendix A).

5.1 Landfill 6

Additional vegetable oil injection was performed in August 2010 (Parsons 2010). The results of the injection are discussed in detail in the Draft Spring 2010 Annual Report Performance Monitoring (FPM Group 2011, Appendix D). Semiannual performance monitoring is being performed to evaluate the impact of the vegetable oil injection on the groundwater chemistry and contamination biodegradation and/or migration.

5.2 Building 817/WSA

Additional vegetable oil injection was performed in August 2010 (Parsons 2010). The results of the injection are discussed in detail in the Draft Spring 2010 Annual Report Performance Monitoring (FPM Group 2011, Appendix D). Semiannual performance monitoring is being performed to evaluate the impact of the vegetable oil injection on the groundwater chemistry and contamination biodegradation and/or migration.

5.3 Building 775

Semiannual performance monitoring is being performed to evaluate the impact of the extraction system on groundwater contaminant concentrations and the extent of the plume.

5.4 Nosedocks/Apron 2

Semiannual performance monitoring is being performed to evaluate the range of groundwater contamination.

6

Community Relations

The original community relations plan (CRP) to support the former Griffiss AFB Installation Restoration Program was produced by the Air Force in May 1991. The objective of the CRP was to detail the program to distribute information, provide public access to documents, and to encourage the community to participate and influence the decision-making process. The updated Griffiss AFB CRP for the Environmental Cleanup Program was published in October 1997.

The Restoration Advisory Board (RAB) serves as a forum for discussion and exchange of environmental cleanup information between the community and the governmental agencies. Members of the RAB include the governmental agencies (in this case, Air Force, EPA, NYSDEC) as well as local government officials (city of Rome, town of Floyd) and concerned citizens. At the former Griffiss AFB, the RAB was established in 1994. The charter of the RAB was established in 2001. Periodic RAB meetings have been held since February 1994 and are open to the public, advertized in local media as public notices and agendas, and documentation are available to the public.

On Tuesday, September 25, 2007, Air Force Real Property Agency (AFRPA), following consultation with and concurrence of the EPA and NYSDEC, released for public comment the proposed plan for RAs at the OBGW AOC located at the former Griffiss AFB (FPM Group, Ltd. 2010). The release of the proposed plan initiated the public comment period, which concluded on October 25, 2007.

During the public comment period, a public meeting was held on Wednesday, October 3, 2007, at 5:00 p.m. at the Mohawk Valley EDGE Conference Room, Air Force Real Property Agency, 153 Brooks Road, Griffiss Business and Technology Park, Rome, New York. The selected remedies for the OBGW AOC sites were presented at the public meeting and a court reporter recorded the proceedings of the 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 the OBGW AOC.

7

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A

**Construction Completion Report
and Submittal Register**

**Construction
Completion Report
for the On-Base Groundwater Area
of Concern (SD-52) at the
Former Griffiss
Air Force Base**

Contract No. W912DQ-06-D-0012

August 2011

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**

Table of Contents

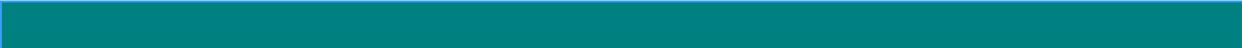
Section	Page
Executive Summary	1
1 Introduction	1-1
1.1 Purpose and Objectives of the Construction Completion Report.....	1-1
1.2 Scope	1-1
1.3 Remedial Action Objectives.....	1-1
1.3.1 Landfill 6	1-1
1.3.2 Building 817/WSA	1-2
1.3.3 Building 775/Pumphouse 3	1-2
1.3.4 Nosedocks/Apron 2	1-3
1.4 Literature Review	1-3
1.5 Document Organization	1-6
2 Site Characteristics/Background Information.....	2-1
2.1 LF6	2-1
2.2 Building 817/WSA	2-2
2.3 Building 775/Pumphouse 3	2-3
2.4 Nosedocks/Apron 2	2-3
3 Summary of Remedial Actions.....	3-1
3.1 Site-Specific Remedial Actions	3-1
3.1.1 Landfill 6	3-1
3.1.2 Building 817/WSA	3-1
3.1.3 Building 775	3-1
3.1.4 Nosedocks/Apron 2	3-1
3.2 General Site Activities	3-2
3.2.1 Underground Utilities Identification	3-2
3.2.2 Site Survey	3-2
3.2.3 Permitting.....	3-2
3.2.3.1 LF6 and Building 817/WSA Water Use	3-2
3.2.3.2 Building 775 Discharge Permit.....	3-3
3.2.3.3 Underground Injection Permit	3-3
3.2.3.4 Site-Derived Waste	3-3
3.3 Site Activities: LF6	3-3
3.3.1 Access Road Repairs.....	3-4
3.3.2 Monitoring Well Installation.....	3-4
3.3.2.1 Well Development	3-4

Table of Contents (cont.)

Section	Page
3.3.2.2	Slug Test Procedures and Results 3-5
3.3.3	Substrate Injection Well 3-5
3.3.4	Substrate Injections 3-6
3.3.4.1	Substrate Emulsion Content..... 3-6
3.3.4.2	Injection Rates, Volumes, and Pressures 3-7
3.3.4.3	Injection Monitoring 3-10
3.3.4.4	Post-Injection Performance Monitoring Plan 3-10
3.3.4.5	Long-Term Monitoring Plan..... 3-11
3.3.5	Post-Construction Site Restoration 3-11
3.3.6	Final Inspections 3-12
3.3.7	Deviations from the Remedial Design Work Plan 3-12
3.4	Site Activities: Building 817/WSA 3-12
3.4.1	Monitoring Well Installation..... 3-13
3.4.2	Organic Substrate Injection System Installation 3-13
3.4.2.1	Substrate Injection Wells 3-13
3.4.2.2	Injection Delivery System..... 3-14
3.4.3	Substrate Injections 3-14
3.4.3.1	Substrate Emulsion Content..... 3-15
3.4.3.2	Injection Rates, Volumes, and Pressures 3-15
3.4.3.3	Injection Monitoring 3-17
3.4.3.4	Post-Injection Performance Monitoring Plan 3-18
3.4.3.5	Long-Term Monitoring Plan..... 3-19
3.4.4	Post-Construction Site Restoration 3-19
3.4.5	Final Inspections 3-19
3.4.6	Deviations from the Remedial Design Work Plan 3-20
3.5	Site Activities at Building 775 3-20
3.5.1	Monitoring Well Installation..... 3-20
3.5.2	Extraction Well Installation 3-20
3.5.3	Treatment System Installation and Start-up 3-21
3.5.3.1	Groundwater Pumping and Piping System 3-21
3.5.3.2	Pump Control System 3-22
3.5.4	Treatment System Initial Operation/Maintenance 3-22
3.5.5	Post-Construction Site Restoration 3-23
3.5.6	Final Inspections 3-23
3.5.7	Deviations from the Remedial Design Work Plan 3-23
3.6	Site Activities at Nosedocks/Apron 2 3-24
3.6.1	Monitoring Well Installation..... 3-24
3.6.2	Well Development..... 3-24
3.6.3	Post-Construction Site Restoration 3-24
3.6.4	Final Inspections 3-25
3.6.5	Deviations from the Remedial Design Work Plan 3-25
4	Remedy-In-Place Status 4-1
4.1	LF6 4-1
4.2	Building 817/WSA 4-1
4.3	Building 775 4-1

Table of Contents (cont.)

Section	Page
4.4 Nosedocks/Apron 2	4-2
5 References.....	5-1
Appendix	
A Record Drawings.....	A-1
B Permits.....	B-1
C Field Reports-Photos	C-1
D Inspection Checklists	D-1
E Well Verification and Construction Checklists	E-1
F Boring Logs and Well Development Records	F-1
G Slug Test Results	G-1
H Field Adjustment Forms	H-1
I Building 775 Operations and Maintenance Manual	I-1
J Supporting Calculations.....	J-1



List of Tables



Table		Page
3-1	Substrate Injection Summary for LF6 in 2008	3-7
3-2	LF6 Performance Monitoring Sample Analysis Summary.....	3-11
3-3	Substrate Injection Summary for Building 816/WSA in 2008	3-15
3-4	Building 817/WSA Performance Monitoring Sample Analysis Summary	3-18
3-5	Pumping Test Summary – EW-1R and EW-3	3-21



List of Figures



Figure		Page
3-1	Apron 2 Sampling Locations	3-27

List of Abbreviations and Acronyms

AFB	Air Force Base
AFRPA	Air Force Real Property Agency
AOC	Area of Concern
Apron 2	Nosedocks/Apron 2
ATV	all-terrain vehicle
bgs	below ground surface
Building 775	Building 775/Pumphouse 3
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CFR	Code of Federal Regulations
COC	contaminant of concern
DCE	cis-1,2-Dichloroethene
DFR	Daily Field Report
DOC	dissolved oxygen content
E & E	Ecology and Environment, Inc.
EEEPC	Ecology and Environment Engineering, P.C.
EPS	Environmental Products and Services, Inc.
FFA	Federal Facilities Agreement
FPM	FPM Group, Ltd.
FS	feasibility study
ft ² /day	square feet per day
gals	gallons
gpm	gallons per minute
HDPE	high-density polyethylene
ID	inner diameter
IRACR	Interim Remedial Action Completion Report
LF6	Landfill 6
µg/L	micrograms per liter

List of Abbreviations and Acronyms (cont.)

MNA	monitored natural attenuation
NPL	National Priorities List
NYSDEC	New York State Department of Environmental Conservation
NYSDOT	New York State Department of Transportation
OBGW	on-base groundwater
OWS	oil/water separator
Parsons	Parsons Infrastructure & Technology Group, Inc.
PCE	Perchloroethene (tetrachloroethene)
PDI	pre-design investigation
POTW	publicly owned treatment works
ppb	parts per billion
psi	pounds per square inch
PVC	polyvinyl chloride
RA	remedial action
RAO	remedial action objectives
RI	remedial investigation
ROD	Record of Decision
SAC	Strategic Air Command
TCA	1,1,1-trichloroethane
TCE	trichloroethene
UIC	underground injection control
USACE	U.S. Army Corps of Engineers
USEPA	U. S. Environmental Protection Agency
VC	vinyl chloride
VOC	volatile organic compound
WPCF	water pollution control facility
WSA	Weapons Storage Area

Executive Summary

This Construction Completion Report documents that the remedies of the four sites below have been constructed and are in place. From July 2008 to January 2009, remedial construction was performed at four sites in accordance with approved regulatory documents. During construction activities, no accidents, illnesses, or injuries occurred. The following work was completed and is based on documentation provided by the Parsons' Daily Field Reports (DFRs):

Landfill 6

The Remedial Action (RA) implemented at Landfill 6 (LF6) and described herein included bioremediation of the plume in the area exhibiting the highest concentration of contaminants of concern (COCs). This was accomplished through the following actions:

- One monitoring well was installed.
- Vegetable oil was injected in the groundwater at six injection well locations. A total of 156 gallons of vegetable oil, 102 gallons of pH buffer, 72 gallons of lactate, and 7,046 gallons of mix water was injected.

Building 817/Weapons Storage Area

The RA implemented at Building 817/Weapons Storage Area (WSA) and described herein includes bioremediation of groundwater at the site in the area exhibiting the highest COCs. The following was performed:

- Vegetable oil was injected in the groundwater at eight injection well locations. A total of 710 gallons of vegetable oil, 350 gallons of pH buffer, and 23,714 gallons of mix water was injected.

Building 775/Pumphouse 3

The RA implemented at Building 775/Pumphouse 3 included installation of a pump-and- discharge system. The system was designed to contain the contaminated plume and extract groundwater using two new extraction wells to remove contaminants from the aquifer and discharge the contaminated groundwater directly into the existing sewer system for treatment at the publicly owned treatment works (POTW).

This was accomplished through the following actions:

- One monitoring well was installed and one extraction well was converted into a monitoring well;
- Two extraction wells were installed; and
- A groundwater extraction system was installed and is designed to operate at approximately 4 gallons per minute.

Nosedocks/Apron 2

The RA implemented at Nosedocks/Apron 2 (Apron 2) includes monitored natural attenuation (MNA) of groundwater and surface water to verify that human health and the environment are protected. This was accomplished through the following action:

- Three monitoring wells were installed.

Conclusions and Recommendations

In summary:

1. The remedial systems have been installed per the approved work plans;
2. Continue with performance monitoring and implement a long-term monitoring plan; and
3. Perform an additional round of vegetable injections at Building 817/WSA and LF6 in order to increase the organic mass to maintain anaerobic processes in the subsurface. See the Remedial Action Work Plan Addendum (Parsons 2010) for details.

1

Introduction

1.1 Purpose and Objectives of the Construction Completion Report

Ecology and Environment Engineering, P.C. (EEEEPC), in cooperation with Parsons Infrastructure and Technology Group, Inc. (Parsons) and the FPM Group, Ltd. (FPM), under contract to the United States Army Corps of Engineers (USACE), Kansas City District, Contract No. W912DQ-06-D-0012, has been tasked to prepare a construction completion report for the following areas of concern (AOCs) at the former Griffiss Air Force Base (AFB) in Rome, New York: LF6, Building 775/Pumphouse 3 (Building 775), Building 817/Weapons Storage Area (WSA), and Nosedocks/Apron 2 (Apron 2).

1.2 Scope

This report has been developed based on data accumulated to date for each AOC and documentation provided by Parsons and FPM.

The scope of this Construction Completion Report is to summarize the remedial activities that were performed at each AOC and identify deviations from the *Remedial Design Work Plan and 90% Design Drawings* and the *Remedial Action Work Plan, On-Base Groundwater Remediation, Former Griffiss Air Force Base*. (See Section 1.4, Literature Review, for a summary of these documents.)

1.3 Remedial Action Objectives

1.3.1 Landfill 6

The Remedial Action (RA) implemented at LF6 and described herein included the bioremediation of the plume in the area exhibiting the highest concentration of contaminants of concern (COCs). As described in the ROD, the remedial action objectives (RAOs) are to:

1. Achieve the cleanup goals for COCs specified in Section 3.1.7.3;
2. Prevent human exposure to groundwater through groundwater-use restrictions until cleanup goals are achieved; and
3. Prevent contaminated groundwater from the site from adversely impacting surface water (in Three Mile Creek), which is defined as surface water con-

centrations above performance indicators (New York State Department of Environmental Conservation [NYSDEC] Class GA Groundwater Quality Standards of 5 micrograms per liter [$\mu\text{g/L}$] for cis-1,2-Dichloroethene [DCE] and 2 $\mu\text{g/L}$ for vinyl chloride [VC]).

4. Prevent intrusive work or other activities that will impact the effectiveness of the landfill closure and post-closure activities.
5. Prevent development and use of the property for residential housing, elementary and secondary schools, childcare facilities and playgrounds.

1.3.2 Building 817/WSA

The RA implemented at Building 817/WSA and described herein includes the bioremediation of groundwater at the site in the area exhibiting the highest COCs. As described in the Record of Decision [ROD], the RAOs are to:

1. Achieve the cleanup goals for COCs specified in Section 3.3.7.1;
2. Prevent human 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 (NYSDEC Class GA Groundwater Quality Standards of 5 $\mu\text{g/L}$ for DCE and 2 $\mu\text{g/L}$ for VC); and
4. Prevent development and use of the property for residential housing, elementary and secondary schools, childcare facilities and playgrounds.

1.3.3 Building 775/Pumphouse 3

The RA implemented at Building 775 included the installation of a pump and discharge system. The system was designed to contain the contaminated plume and extract groundwater through use of two new extraction wells to remove contaminants from the aquifer and discharge contaminated groundwater into the existing sewer system to be treated off site. As described in the ROD, the RAOs are to:

1. Achieve the cleanup goals for COCs specified in Section 3.2.7.3;
2. Prevent human exposure to groundwater through groundwater use restrictions until cleanup goals are achieved; and
3. Prevent contaminated groundwater from the site from adversely impacting surface water (in Three Mile Creek), which is defined as surface water concentrations above performance indicators (NYSDEC Class GA Groundwater Quality Standards of 5 $\mu\text{g/L}$ for DCE and 2 $\mu\text{g/L}$ for VC).

4. Prevent development and use of the property for residential housing, elementary and secondary schools, childcare facilities and playgrounds.

1.3.4 Nosedocks/Apron 2

The RA implemented at Apron 2 includes monitored natural attenuation (MNA) of groundwater and surface water to verify human health and the environment are protected. As described in the ROD, the RAOs are to:

1. Achieve the cleanup goals for COCs specified in Section 3.4.7.3;
2. Prevent human 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 (NYSDEC Class GA Groundwater Quality Standard of 2 µg/L for VC); and
4. Prevent development and use of the property for residential housing, elementary and secondary schools, childcare facilities and playgrounds.

1.4 Literature Review

Information provided in the Interim Remedial Action Completion Report (IRACR) was gathered from several different sources. This section reviews the sources used and presents a description of the information provided by each document.

Conti Environment, Inc. and EA Engineering, P.C., and its affiliate, EA Science and Technology

- *Landfill 6 Cover Improvements at the Former Griffiss Air Force Base, Rome, New York, Closure Plan.* March 2004.

The USACE contracted Conti Environmental, Inc., its subcontractor, EA Engineering, P.C., and its affiliate EA Science and Technology to prepare documents to support LF6 closure activities at the former Griffiss AFB. The report details the closure of LF6 and includes pre-design investigations and landfill cap design, as specified in the LF6 ROD signed by the United States Environmental Protection Agency (EPA) on June 7, 2001.

Ecology and Environment, Inc. (E & E)

- *Final Record of Decision for Landfill 6 Area of Concern, Former Griffiss Air Force Base, Rome New York.* March 2001.

This ROD presents the “presumptive remedy” alternative as the selected remedial action for AOC LF6 at the former Griffiss AFB. The following information is presented in the ROD: site name and location, statement of basis and purpose, assessment of the site, description of selected remedy, declaration statement, community participation, current and potential site use, summary of site risks, RAOs, description/evaluation of remedial action alternatives, and documentation of significant changes.

- *Final Groundwater Treatability Pilot Study Report, Former Griffiss Air Force Base, Rome, New York.* June 2004.

This report details the bench-scale and pilot-scale groundwater studies completed at Griffiss AFB. Bench-scale studies were conducted at LF6, Building 775, Building 817/WSA, and AOC 9. Field pilot-scale studies were conducted at LF6, Building 817/WSA, and AOC 9. The purpose of the treatability studies was to identify and collect data and operating parameters that were critical to a successful full-scale application of the in situ chemical oxidation technology.

- *Final Feasibility Study Report for Landfill 6 Groundwater, Building 775 Groundwater, Building 817/Weapons Storage Area Groundwater.* April 2005.

This report details the feasibility study (FS) for three areas of groundwater contamination at the former Griffiss AFB in Rome, New York. The three areas are plumes at LF6, Building 775, and at Building 817/Weapon Storage Area. The three plumes addressed by this FS are identified as separate AOCs and generally have separate sources. They are addressed together in this one FS because the contaminants and hydrogeology are similar. The submittal included an introduction, the development of RAOs, identification and screening of technologies, and a detailed analysis of alternatives.

Ecology and Environment Engineering, P.C.

- *Final Predesign Investigation, Data Summary Report at Landfill 6, Building 817/WSA, Building 775, and AOC 9, Former Griffiss Air Force Base, Rome, New York.* February 2007.

Pre-design investigations (PDIs) were conducted at the four remediation sites to better define suspected contaminant source areas and contaminant plumes and to monitor groundwater remediation efforts. This report provided a description and contamination summary for each listed site, a discussion of field activities performed during the PDI, and results of the investigation.

- *Final Remedial Design Work Plan and 90% Design Drawings, Former Griffiss Air Force Base, Rome New York.* February 2008.

This report provides detailed descriptions of the geology, hydrogeology, and the current conditions of each On-Base Groundwater (OBGW) AOC and details the development of remedial designs at LF6, Building 775, Building 817/WSA, and Apron 2.

Air Force Real Property Agency

- *Final Record of Decision for the On-Base Groundwater AOC (SD-52) at the Former Griffiss Air Force Base, Rome, New York.* April 2009.

This ROD presents remedies for the four OBGW AOC sites at the former Griffiss AFB. The following information is presented in the ROD: a brief description of each site, site history and enforcement activities, community participation, scope and role of site remediation activities, site characteristics, current and potential site and resource uses, summary of site risks, remedial action objectives, description and comparative analysis of alternatives, principal-threat wastes, selected remedy, statutory determinations, and documentation of significant changes.

Parsons Infrastructure and Technology Group, Inc.

- *Remedial Action Work Plan, On-Base Groundwater Remediation, Former Griffiss Air Force Base, Rome, New York.* July 2008.

The RA Work Plan presents the project background, project objectives, innovative technology assessment, and physical characteristics of the AOCs. It also includes a summary of previous site activities and investigations. The Remediation Management Plan is provided in it, along with the required permits and approvals. The AOC work plans are described, and the associated remediation activities, site restoration, and contingency plans are also described, along with the preliminary construction schedule.

FPM Group, Ltd.

- *Final Monitoring Report, Baseline and PDI 2 Sampling, On-Base Groundwater Areas of Concern.* August 2007.

Baseline groundwater data collected from five site locations on the former Griffiss AFB are presented in this report. Data was collected by FPM from October 2006 through November 2006 and from February through April of 2007. This document also provided conclusions and recommendations based on the reported data.

- *Final Performance Monitoring Work Plan (PMWP) On-Base Groundwater Remediation, On-Base Areas of Concern, Former Griffiss Air Force Base, Rome, New York.* September 2008.

This report described the site background, remedial action summary, and performance monitoring sampling methodology for each of the four AOCs. Also included is a description of the proposed sampling activities and reporting requirements.

- *Building 775/Pumphouse 3 Quarterly Discharge Report, Rome, New York.* January 2009.

Prepared by FPM in association with Parsons, the quarterly discharge reports summarize the analytical results of grab samples collected from Building 775's extraction-system discharge into the sanitary sewer, as required by the City of Rome's Special Discharge Permit.

- *Quarterly Reports Performance Monitoring.* February 2009 and April 2009.

Prepared by FPM in association with Parsons, the quarterly reports summarize remedial activities on-site during the quarter and the results of groundwater sampling to support decision-making and assessment of the implemented remedy.

1.5 Document Organization

The following briefly describes the organization of the remaining sections of this document:

- Section 2 describes the general site characteristics and provides background information for each OBGW AOC.
- Section 3 summarizes the remedial actions performed on-site to complete the selected remedy at each OBGW AOC. This section also identifies any deviations from the original remedial design.
- Section 4 indicates the remedy-in-place status for each site.
- Section 5 lists references used in this report preparation.
- Appendices A through J are attached and comprise the documentation collected by Parsons and FPM during field activities.

2

Site Characteristics/Background Information

The former Griffiss AFB is located in Oneida County, New York, and is approximately 2 miles northeast of the city of Rome in central New York State. The base property covers approximately 3,540 acres and is situated in a relatively broad valley of the Mohawk River.

Griffiss AFB was established in 1942 and became a Strategic Air Command (SAC) bomber support installation in the late 1950s. The 416th Bombardment Wing was the host unit at Griffiss AFB, and its mission was to maintain and implement effective air-refueling operations while providing long-range bombardment capabilities worldwide. Griffiss AFB was realigned as part of the nationwide Base Realignment and Closure Acts of 1993 and 1995, resulting in the deactivation of the 416th Bombardment Wing. Much of Griffiss AFB's mission has since been transferred to other locations.

On July 22, 1987, the base was listed on the EPA's National Priority List (NPL), which brought the installation under the federal facilities provisions of Section 120 of the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA). In August 1990, the Air Force, the EPA, and NYSDEC entered a Federal Facilities Agreement (FFA) for environmental remediation at a number of sites at the former Griffiss AFB.

2.1 LF6

LF6 is a 15.7-acre area in the southern portion of the former Griffiss AFB between Perimeter Road and Three Mile Creek. The landfill, which consisted of hard fill and general refuse, operated from 1955 to 1959. Disposal activities were conducted in two areas that were separated by a direct access road that passes along the southern boundary of the landfill and bisects the northern area.

The landfill is unlined. A clay cap was constructed in 1986 over the disposal areas. In 2005, improvements to the landfill cover specified in the LF6 ROD (E & E 2001) and the *Landfill 6 Closure Plan* (Conti Environment, Inc. 2004) included installation of an impermeable cover to reduce the amount of water infiltrating the landfill. Long-term monitoring of the contaminated aquifer is also part of the LF6 closure activities.

2. Site Characteristics/Background Information

The LF6 site plume is downgradient and west of the landfill and south of the Building 775 site. The contaminants detected in groundwater samples exceeding NYSDEC Class GA groundwater standards are trichloroethene (TCE), DCE, and VC. The contaminated aquifer comprises mostly silty sands with an average saturated thickness extending from 19 feet below ground surface (bgs) to 80 feet bgs, where the shale bedrock layer is encountered.

No buildings are currently associated with the LF6 site. The groundwater plume at this site impacts one land parcel, which is owned by the Air Force. The future land use at this parcel is to remain the same as its current use, open space (non-residential).

Institutional controls for this site will be implemented as stated in the final ROD (AFRPA 2009).

2.2 Building 817/WSA

The Building 817/WSA site is located on the north side of the main runway between Building 817 and the culverted section of Six Mile Creek, south of the former WSA. Building 817 was once used for electronics parts maintenance; TCE and perchloroethene (PCE) were used in small quantities at this location.

Baseline sampling was performed by FPM in November 2006 to establish pre-injection conditions in order to track the effects of the vegetable oil emulsion. FPM sampled five existing monitoring wells for the following parameters: volatile organic compounds (VOCs), sulfate, dissolved oxygen content (DOC), and methane/ethane/ethene. Seven monitoring wells also were installed and sampled for VOCs during this initial sampling event in 2006. The results of the November 2006 sampling confirmed exceedances of NYSDEC GA Groundwater Standards for PCE and TCE detections within the plume (FPM 2007). Sampling was also performed in February 2007 to monitor the effects of the initial injections performed during the pre-design investigation pilot study (EEEEPC 2007). The results of both the November 2006 and February 2007 sampling events are provided in FPM's *Final Monitoring Report* (FPM 2007).

The contaminants at this site exceeding NYSDEC Class GA groundwater standards are TCE and PCE. The groundwater plume at the Building 817/WSA site extends from Building 817 in the north downgradient to slightly beyond the culverted section of Six Mile Creek to the south. The lateral extent of the plume is approximately 250 feet and extends from 5 feet bgs to 25 feet bgs, where the Utica shale bedrock is encountered. The plume impacts two land parcels, which are currently owned by the Air Force. (The parcel south of Perimeter Road is leased to Oneida County.) There is a potential for future industrial/commercial development of the areas above the contaminant plume.

Institutional controls for this site will be implemented as stated in the final ROD (AFRPA April 2009).

2.3 Building 775/Pumphouse 3

Building 775 is located in the south-central portion of the former Griffiss AFB. It is situated on a topographic high relative to the runway and flight aprons. Building 775 (also referred to as Pumphouse 3) was one of four pumphouses located east of Ready Road. The topography in this area is relatively flat with less than one foot of topographic relief. Run-off from the site is channeled into the base storm water system and discharges to Three Mile Creek.

The site comprises silty sands extending from 60 feet bgs to 120 feet bgs, where till is overlying shale bedrock. The depth of bedrock varies up to a maximum of approximately 120 feet bgs, with the average depth to bedrock being less. The depth to bedrock at the proposed extraction-well location is approximately 95 feet bgs. Average groundwater velocities are slow and are estimated to be 10 feet per year. Groundwater contaminants were not found in the bedrock (EEEP 2008).

The primary contaminant exceeding NYSDEC Class GA Groundwater Standards at Building 775 is TCE, with minor detections of 1, 1, 1-trichloroethane (1,1,1-TCA) and PCE. Most of the Building 775 plume appears to have migrated south toward LF6. During the remedial investigation (RI) and site inspection, it was determined that the source of contamination was the degreasing room/vat in Building 774. The degreasing system used a monorail to carry equipment to the degreasing vat to be cleaned with solvents when the building was used as an armament and electronics shop. Chlorinated solvents that have contributed to the groundwater contamination are suspected to have originated from this area. No evidence of the degreasing system was found during the base-wide environmental baseline survey site inspection in April 1994 (AFRPA 2009).

Institutional controls for this site will be implemented as stated in the final ROD (AFRPA 2009).

2.4 Nosedocks/Apron 2

The Apron 2, a former aircraft parking apron and refueling area, were used as aircraft maintenance facilities. They are located in the southeast portion of the former Griffiss AFB. Apron 2 is a relatively flat, 18-inch-thick, steel-reinforced concrete pad. The concrete paving is flanked by 50-foot-wide areas of asphalt paving on the northwest and southeast sides. The surrounding surface is unpaved lawn. The vicinity of the Nosedocks encompasses the buildings themselves, two oil/water separators (OWS 5730 [removed in 2001] and 6389-3), and several underground utilities (storm drains and sanitary sewers). Groundwater flow in the area of the Nosedocks is complex because of the large surface pavements of Aprons 1 and 2. Massive construction has altered the natural hydrology in the area of the aprons and has compacted the subsurface layers, leading to perched groundwater conditions in the area. In general, however, the groundwater flow direction is northeasterly.

2. Site Characteristics/Background Information

The chlorinated VOCs contamination associated with the Apron 2 chlorinated plume site is present in two plumes, the southern and northern plumes. Chlorinated solvent was probably used in all Nosedock facilities, and multiple small sources could exist along floor drains, sewer lines, and oil/water separators. The three primary contaminants at the site that exceed NYSDEC Class GA groundwater standards are TCE and its breakdown products, cis-1,2 DCE and VC. The plume is commingled with several petroleum fuel plumes originating from the Apron 2 fueling system. At locations where TCE and fuel contaminants are commingled, significant reductive dechlorination occurs, and TCE is almost completely degraded to cis-1,2 DCE and VC.

The contaminated aquifer is located 9 to 25 feet bgs, with the shallower portion occurring in the vicinity of Six Mile Creek. The aquifer is composed of several well-defined layers, including a silty-sand layer in the upper 5 feet, a 5- to 15-foot-thick coarse sand and gravel layer in the middle of the aquifer, and a 15- to 20-foot-thick layer of till composed of fine sand, silt, and gravel resting on the shale bedrock. The total aquifer thickness ranges from 45 feet in the source areas to less than 20 feet in the downgradient areas near Six Mile Creek. Although the site has a relatively flat gradient, the high hydraulic conductivity of the gravel layers has produced an estimated average groundwater velocity of 106 feet per year. This velocity seems reasonable given the 2,800 feet the VOC plume has migrated.

Institutional controls for this site will be implemented as stated in the final ROD (AFRPA 2009).

3

Summary of Remedial Actions

3.1 Site-Specific Remedial Actions

3.1.1 Landfill 6

The remedy implemented at LF6 was enhanced anaerobic bioremediation using vegetable oil emulsion injections to aid in biodegradation and reductive dechlorination. Injections were made in the center of the identified plume, near LF6-MW12, as shown on Drawing No. AS745115-C-003, LF6 Site Plan (see Appendix A, Record Drawings and Appendix J). This area has shown historically the highest VOC concentrations at LF6.

3.1.2 Building 817/WSA

The remedy implemented at Building 817/WSA was enhanced anaerobic bioremediation using vegetable oil emulsion injections to achieve reductive dechlorination. Injections were made in the upgradient portion of the plume, near Building 817, as shown on Drawing No. AS745115-C-002, Building 817/WSA Site Plan (see Appendix A, Record Drawings and Appendix J). Samples collected represent the highest VOC concentrations observed at Building 817/WSA.

3.1.3 Building 775

The remedy implemented for the Building 775 site consists of an unmanned and automated operational pump and discharge system, as shown on Drawing No. AS745115-C-004, Site Plan Building 775 (see Appendix A, Record Drawings). The system was designed to contain the contaminated plume and extract groundwater to remove contaminants from the aquifer. The contaminated groundwater is discharged to the existing sanitary sewer system, which leads to the City of Rome Water Pollution Control Facility (WPCF).

3.1.4 Nosedocks/Apron 2

The implemented remedy for the Apron 2 site consisted of the installation of three additional monitoring wells: 782VMW-84D, 782VMW-121, and 782VMW-121D, as shown on Drawing No. AS745115-C-001, Apron 2 Site Plan (see Appendix A, Record Drawings). The three new monitoring wells, along with 15 previously installed wells, are being used to monitor the natural attenuation of the plume. A *Final Performance Monitoring Work Plan* (FPM 2008) described the field sampling and analysis activities to be used to collect the necessary groundwater data, as identified in the *Remedial Design Work Plan* (EEEEPC 2008). Performance monitoring is ongoing, and a long-term groundwater monitoring plan is

still in the process of being developed by FPM. Section 3.6 describes the activities and documentation by Parsons and FPM to complete the monitoring system and conduct performance monitoring at the Apron 2 site.

3.2 General Site Activities

Prior to the commencement of work at Griffiss AFB, the City of Rome Police Department, Fire Department, and the Oneida County Department of Aviation were contacted and informed of site activities by Parsons. Copies of the Notifications of Work are presented in Appendix B.

3.2.1 Underground Utilities Identification

Records indicated that a site utility clearance meeting was held prior to mobilization at Griffiss AFB and included the following utility agencies: Griffiss Utility Service Corporation, Level 3 Communications Oneida County Telephone Company, City of Rome Water Department, Griffiss Local Development Corporation, and Verizon. The purpose of this meeting was to verify that the proposed drilling locations at LF6, Apron 2, and Building 775 did not interfere with any sub-grade utilities at Griffiss AFB. No utility issues were identified prior to drilling activities. Notes from the meeting and a sign-in sheet can be found in Appendix C, and Dig Safe Notifications submitted prior to work can be found in Appendix B. Additional pre-drilling utility clearance inventories were performed at Building 775 on October 8 and 20, 2008 to identify the sub-grade conveyance line for the extraction and discharge system. The pre-drilling and subsurface checklists for both utility clearance activities are included in Appendix D.

3.2.2 Site Survey

LaFave, White, and McGivern Land Surveyors, P.C. conducted a pre-construction survey on June 18, 2008, in accordance with the *Remedial Action Work Plan* (Parsons 2008). Locations for the new monitoring wells for Apron 2, LF6, and Building 775 and the locations for extraction wells at Building 775 were identified and marked. A description and photos of activities that occurred and the actual survey coordinates recorded at each location are located in Appendix C.

A final survey of all wells (monitoring and extraction) installed at LF6, Apron 2, and Building 775 was performed by LaFave, White, and McGivern Land Surveyors, P.C., on December 17, 2008. A copy of the final surveyed coordinates at each site, stamped by a licensed surveyor, is provided in Appendix D.

3.2.3 Permitting

3.2.3.1 LF6 and Building 817/WSA Water Use

The City of Rome Public Works Department was contacted by Parsons and a representative was brought on-site on July 8, 2008, to locate and approve the hydrant that was to be used for injection activities for both LF6 and the WSA remedies. The selected hydrant is located west of Building 817, just across from Perimeter Road, as seen on Drawing No. AS745115-C-002, Building 817/WSA Site Plan (see Appendix A, Record Drawings).

3.2.3.2 Building 775 Discharge Permit

A permit to discharge effluent from the groundwater extraction system into the City of Rome WPCF was obtained from the City of Rome Water Pollution Control Authority prior to construction by Parsons. The permit was issued under number GAFB-775-1 and became effective on June 10, 2008. The permit is valid for five years and expires on June 10, 2013. A copy of the permit, reflecting all requirements that must be met prior to discharge activities, is provided in Appendix B.

3.2.3.3 Underground Injection Permit

Authorization to inject was obtained by Parsons from the EPA under the Underground Injection Control (UIC) Program prior to injection activities at Griffiss AFB. The injection wells installed at LF6 and Building 817/WSA are classified as Class V injection wells and, therefore, did not require an injection permit. The "Inventory of Injection Wells" EPA form 7520-16 (Office of Management and Budget No. 2040-0042) was submitted to the EPA's UIC program director pursuant to 40 Code of Federal Regulations (CFR) §144.2. The authorization letter for injection activities was issued by the EPA on June 20, 2008, and is provided in Appendix B.

3.2.3.4 Site-Derived Waste

During implementation of remedial actions at each OBGW AOC, waste that was generated from site activities (i.e., installation of monitoring and extraction wells) was stored in drums and staged at two separate designated areas at Griffiss AFB.

Two drum investigations were performed by Parsons personnel on August 5, 2008, and November 5, 2008, to profile drum contents and determine the methods required for off-site deposition. Composite samples were collected from randomly selected drums and sent to Life Science Laboratories, Inc. for analysis. Results from the lab indicated that all drums were non-hazardous and could be disposed of as such.

The *Analytical Test Results from Investigation-Derived Waste Drum Sampling* prepared by Parsons is provided in Appendix D and includes the laboratory results from each disposal sample collected. Field records indicated that waste characterization identified 28 drums containing water, 75 drums containing site-derived waste, and the remaining 43 drums were profiled as empty used drums. On November 21, 2008, 146 drums were transported off-site by Environmental Products and Services, Inc. (EPS) to one of their facilities.

3.3 Site Activities: LF6

Access-road improvements and monitoring well installation, as described below, were performed by third-party contractors hired by Parsons. Field oversight for this work was performed by Parsons. Additionally, Parsons performed injection activities, including mobilization, staging, and demobilization at LF6 and docu-

mented the work as indicated throughout the following sections. FPM was on-site for injection activities to monitor the surrounding area for signs of mounding and emulsion breakthrough. After injection activities were completed, FPM also sampled various wells quarterly to monitor the performance of the injected emulsions. The following sections summarize activities conducted at LF6 and are based on documentation provided to EEEPC.

3.3.1 Access Road Repairs

Prior to injection activities, Chargo Earthworks, Inc., was contracted to improve the existing access road that led to the injection points at LF6. The repairs took place from July 11 through July 15, 2008, and approximately 1,850 feet of road was reworked. Modifications included placing geotextile fabric and approximately 600 tons of No. 2 stone to repair road surface conditions. Documentation of field activities can be found in Appendix C.

3.3.2 Monitoring Well Installation

One new groundwater monitoring well, LF6MW-39, was installed on July 8, 2008, to complete the groundwater monitoring network at LF6 per the *Final Remedial Design Work Plan* (EEEPC 2008). The new monitoring well is located immediately southeast of the current monitoring wells LF6VMW-13R and LF6MW-13RD as seen on Drawing No. AS745115-C-003, Landfill 6 Site Plan (see Appendix A, Record Drawings).

Minor deviations from the *Remedial Action Work Plan* and the *Remedial Design Work Plan and 90% Design Drawings* (EEEPC 2008) are described in Section 3.3.7.

Drilling at LF6 was performed by Parratt-Wolf, Inc., using an all-terrain vehicle (ATV) track-mounted drill rig. The boring for LF6MW-39 was advanced using a 4.25 -inch inner diameter (ID) auger to a depth of 32 feet. The screened interval was set from 10 feet bgs to 30 feet bgs and the well screen consisted of a 2-inch, factory-slotted (0.010-inch) polyvinyl chloride (PVC) screen. The well casing consisted of a 2-inch ID Schedule 40 PVC pipe. Details about the monitoring well installation are provided in the Well Verification Checklist and Well Construction Checklist in Appendix E. The HTW Drilling Log and Drilling Methods Checklist are included in field records for July 8, 2008 (see Appendix C). Pictures of drilling and well installation activities were collected during construction oversight by Parsons personnel (Daily Field Report [DFR] 5).

3.3.2.1 Well Development

Well LF6MW-39 was developed on July 31, 2008. Field documentation showed that the well appeared to stabilize within approximately two hours from the start of pumping; 130 gallons were purged during development and were containerized for disposal. The well record and details of purging activities for LF6MW-39 are included in Appendix F.

3.3.2.2 Slug Test Procedures and Results

Three separate hydrogeologic aquifer or slug tests (both falling and rising-head slug testing) were conducted and analyzed at LF6 by Parsons to determine the effects of injection activities on the horizontal hydraulic conductivity across the injection area. Testing at wells LF6MW-28 and LF6MW-30 and the testing methods are described in various slug test analysis summary memoranda found in Appendix G.

These memoranda indicate that the first round of slug tests was performed before injection activities on June 17, 2008, and was initiated to identify the baseline response for each well. The second round of slug tests was performed on August 12, 2008, and was used to determine if hydraulic conductivity was affected by injection activities. Post-injection hydraulic conductivity tests were performed approximately one month after injections were complete, on September 9, 2008.

The data was analyzed using the Bouwer and Rice method for unconfined aquifers and the results indicated that the injection activities had no major effect on hydraulic conductivity during or after implementation of the remedy. The testing activities and summary of results for each slug test can be found in three slug test analysis summaries in Appendix G.

3.3.3 Substrate Injection Well

Per the *Final Remedial Design Work Plan* prepared by EEEPC, six existing temporary injection wells (LF6IW-01 through LF6IW-06) that were installed in the 2002 potassium permanganate injection investigation were used for LF6 remediation activities (EEEPC 2008). Due to the thickness of the contaminated aquifer zone (approximately 37 to 55 feet bgs) the wells were screened at two separate interval depths. LF6IW-01, LF6IW-03, and LF6IW-05 were screened from approximately 37 to 47 feet bgs, and LF6IW-02, LF6IW-04, and LF6IW-06 were screened from approximately 45 to 55 feet bgs. The injection points were placed approximately 10 feet apart, extended through the width of the 500 parts per billion (ppb) contaminant contour of the plume, and were aligned perpendicular to groundwater flow. The orientation of this row of injection wells is shown on LF6, Drawing No. AS745115-C-003, LF6 Site Plan (see Appendix A, Record Drawings).

Injection Delivery System

On July 24, 2008, the portable injection system was set-up at LF6. Potable water was supplied to the injection system from a fire hydrant near Building 817. A tanker truck with a 325-gallon capacity periodically transported water from the hydrant to a storage tank staged in the immediate vicinity of the injection system. Prior to the transport of the water, the pH buffer and lactate substrate were added to the tank at regulated dosages. The field records show that each injection well at LF6 required four tanker truck deliveries of the batch water.

The injection system consisted of a 425-gallon tank, static in-line mixer, two flow meters, a 6-inch diaphragm pump, various valves, vegetable oil tote, feed pumps, and associated high-density polyethylene (HDPE) piping to the six injection wells. The tank, which contained the potable water mixture (containing the pH buffer and lactate), was connected and pumped directly to the conveyance line, which was also fed via the vegetable oil dosimeter at controlled dosages. Once combined, the organic substrate and potable water flowed through the in-line mixer to ensure the mixture was fully emulsified, and then the oil-in-water emulsion was delivered to the injection manifold where valves were used to direct the mixture to the correct injection well. The sequencing and rates of injections are described in Section 3.3.4.

3.3.4 Substrate Injections

Substrate injection activities at LF6 began on July 24, 2008, and were performed and documented by Parsons and monitored by FPM. Injections were sequenced as follows:

- Injection 1 (July 24, 2008): LF6IW-05
- Injection 2 (July 25, 2008): LF6IW-02
- Injection 3 (July 28, 2008): LF6IW-01
- Injection 4 (July 28-29, 2008): LF6IW-03
- Injection 5 (July 29, 2008): LF6IW-06
- Injection 6 (July 30-31, 2008): LF6IW-04

Field notes show that substrate injection flow rates started relatively low during each injection event and were adjusted until the flows were maximized so that the monitored system pressures remained below 34 pounds per square inch (psi) for wells LF6IW-01, -03, and -05 and below 42 psi for wells LF6IW-02, -04, and -06. These pressures were calculated to be the maximum overburden pressure for the area of influence at the site (EEEPC 2008). FPM monitored the surrounding area for signs of mounding and breakthrough during injection activities.

The following sections summarize the total volume of each emulsion component, system pressures, and calculated injection flow rates. Detailed descriptions and photos of daily injection activities are included in the DFRs in Appendix C.

3.3.4.1 Substrate Emulsion Content

The injection mixture for LF6 was designed in the Final Remedial Design Work Plan to consist of a four-part emulsion of approximately 1,150 gallons of potable water, 26 gallons of vegetable oil, 12 gallons of lactate, and approximately 17 gallons of pH buffering product per each of the six wells (EEEPC 2008).

The organic substrate included 100% vegetable oil (Textrol-Br™), which consisted of soybean oil and lecithin and is manufactured by Solae, Inc; 60% sodium lactate in water solution manufactured by JRW Bioremediation, LLC; and the pH buffer product, Neutral Zone™, manufactured by Remediation and Natural At-

3. Summary of Remedial Actions

tenuation Services, Inc. All substrate material was delivered on-site prior to injections and housed in Building 817. Delivery slips for the materials can be found in the DFRs (see Appendix C).

Table 3-1 summarizes the final volumes of each substrate, including potable water from the hydrant, delivered during each injection event.

Table 3-1 Substrate Injection Summary for LF6 in 2008

	July 28 LF6IW-01	July 25 LF6IW-02	July 28-29 LF6IW-03	July 30-31 LF6IW-04	July 24 LF6IW-05	July 29 LF6IW-06
Water (gallons)	1,150	1,200	1,150	1,196	1,200	1,150
pH Buffer (gallons)	17	17	17	17	17	17
Sodium Lactate (gallons)	12	12	12	12	12	12
Vegetable Oil (gallons)	26	26	26	25	26	27
Total (gallons)	1,205	1,255	1,205	1,250	1,255	1,206

3.3.4.2 Injection Rates, Volumes, and Pressures

Injection 1: LF6IW-05

Injection activities for LF6 at LF6IW-05 began and were completed on July 24, 2008 by Parsons. The injection emulsion included four truckloads of batch water prepared at Building 817. Field records indicated that each batch contained 3.1 gallons of lactate, 4.4 gallons of pH buffer, and approximately 300 gallons of potable water from the on-site hydrant (DFR 17). This mixture was transported by Parsons and stored in the tank that was staged near the LF6 injection area. The batch water was then pumped into the conveyance line, at rates manually regulated by Parsons, and mixed with the dosed vegetable oil prior to injection. The average injection rate of the system after the system pressure appeared to have stabilized has been calculated as 3.7 gallons per minute (gpm).

Records indicated that the vegetable oil feed pump was shut down after a total of 26 gallons had been injected, as estimated from visual observation of the drum volumes. The conveyance line was closed and the system was shut down after the remaining volume of batch water had been pumped from the tank and injected into the subsurface.

After injection activities had been completed, the total volume of water supplied from the hydrant was recorded by Parsons as 1,200 gallons (DFR 17). Records show that the system pressure appeared to fluctuate between 9 psi and 10 psi during injection operations. Details of how the system pressures and flow rates were adjusted can be found in Appendix C.

Injection 2: LF6IW-02

Injection activities for LF6 at LF6IW-02 began and were completed on July 25, 2008 by Parsons. Each trucked emulsion batch contained 3.1 gallons of lactate,

3. Summary of Remedial Actions

4.4 gallons of pH buffer, and approximately 300 gallons of water from the on-site hydrant. This emulsion was stored in the tank and then pumped into the conveyance line to be mixed with the vegetable oil at regulated dosages. The average injection flow rate, approximately 4.0 gpm, has been calculated using the injection records located in the July 25, 2008 DFR. This rate appeared to fluctuate throughout injection activities, especially prior to stabilization of the system pressure readings.

Parsons indicated that the vegetable oil feed pump was shut down after a total injection volume of 26 gallons, as estimated from visual observation of the vegetable oil levels within the drum. The conveyance line was closed and the system was shut down after the remaining volume of batch water had been pumped from the storage tank and injected into the subsurface.

The total volume of water supplied from the hydrant was 1,200 gallons. The overall system pressure fluctuated between 9 psi and 11.5 psi. Details of how the system pressures and flow rates were adjusted throughout the injection can be found in the DFR 18 (see Appendix C).

Injection 3: LF6IW-01

Injection activities for LF6 at LF6IW-01 began and were completed on July 28, 2008. Parsons' documentation indicated that the emulsion included four truckloads of batch water consisting of 3.1 gallons of lactate, 4.4 gallons of pH buffer, and approximately 300 gallons of potable water from the on-site hydrant. This emulsion was stored in a storage tank and then pumped into the conveyance line to be mixed with the vegetable oil at regulated dosages. The average injection rate of the system, after the system pressure appeared to have stabilized, has been calculated as 3.7 gpm.

The vegetable oil feed pump was shut down after a total of approximately 26 gallons had been injected, as estimated from visual observation of the remaining drum volume. The conveyance line was closed and the system was shut down after the remaining volume of batch water had been pumped from the tank and injected into the subsurface.

The total volume of water supplied from the hydrant was recorded as 1,150 gallons at the completion of injection activities. The overall system pressure appeared to fluctuate between 9 psi and 10 psi, which was well below the maximum overburden pressure. Details of how the system pressures and flow rates were adjusted throughout the injection can be found in the DFRs (see Appendix C).

Injection 4: LF6IW-03

Injection activities for LF6 at LF6IW-03, performed by Parsons, began on July 28, 2008 and were completed on July 29, 2008. The emulsion included four truckloads of batch water consisting of 3.1 gallons of lactate, 4.4 gallons of pH buffer, and 300 gallons of potable water from the on-site hydrant. This emulsion was

stored in the tank and then pumped into the conveyance line to be mixed with the vegetable oil at regulated dosages. Using the injection rates record in the DFR, the average injection rate of the system into LF6IW-03 has been calculated as 3.4 gpm.

The vegetable oil feed pump was shut down after a total of approximately 26 gallons had been injected, as estimated from visual observation of the remaining drum volume. The conveyance line was closed and the system was shut down after the remaining volume of batch water had been pumped from the tank and injected into the subsurface.

After injection activities were complete, the total volume of water supplied from the hydrant was recorded as 1,150 gallons. The overall system pressure fluctuated between 9 psi and 11 psi, which was well below the maximum overburden pressure. Details of how the system pressures and flow rates were adjusted throughout the injection can be found in the DFRs (see Appendix C).

Injection 5: LF6IW-06

Injection activities for LF6 at LF6IW-06, performed by Parsons, began on July 29, 2008, and were completed on July 30, 2008. The emulsion included four truckloads of batch water consisting of 3.1 gallons of lactate, 4.4 gallons of pH buffer, and approximately 300 gallons of potable water from the on-site hydrant. This emulsion was stored in the tank and then pumped into the conveyance line to be mixed with the vegetable oil at regulated dosages. During the initial attempts to inject at LF6IW-06, leakage was observed at the connection (DFR 20). Parsons personnel concluded from their field observations that the leakage was apparently caused by minor damage to the well casing that had occurred during installation; the damage was remedied and injections proceeded (see DFR 20 for July 29, 2008 [see Appendix C] for details). Using injection rates recorded in field notes, the average injection rate of the system had been calculated to be 3.7 gpm.

The vegetable oil feed pump was shut down after a total of approximately 26 gallons had been injected, as estimated from visual observation of the remaining drum volume. The conveyance line was closed and the system was shut down after the remaining volume of batch water had been pumped from the tank and injected into the subsurface.

After injection activities had been completed, the total volume of water supplied from the hydrant was recorded as 1,150 gallons. The overall system pressure fluctuated between 9 psi and 11 psi, which was well below the maximum overburden pressure. Details of how the system pressures and flow rates were adjusted throughout the injection can be found in Appendix C.

Injection 6: LF6IW-04

The final injection activities for LF6 occurred at LF6IW-04 on July 30, 2008 and were completed on July 31, 2008. The emulsion included four truckloads of batch water consisting of 3.1 gallons of lactate, 4.4 gallons of pH buffer, and approximately 300 gallons of potable water from the on-site hydrant. This emulsion was stored in the tank and then pumped into the conveyance line to be mixed with the vegetable oil at regulated dosages. The average injection rate of the system into LF6IW-04 has been calculated to be 1.7 gpm.

The vegetable oil feed pump was shut down after a total of approximately 26 gallons had been injected, as estimated from visual observation of the remaining drum volume. The conveyance line was closed and the system was shut down after the remaining volume of batch water had been pumped from the tank and injected into the subsurface.

The total volume of water supplied from the hydrant was recorded as 1,250 gallons. The overall system pressure fluctuated between 9 psi and 11 psi, which was well below the maximum overburden pressure. Details of how the system pressures and flow rates were adjusted throughout the injection can be found in Appendix C.

3.3.4.3 Injection Monitoring

During injection activities at LF6 the ground surface around the injection wells was observed for substrate leakage. The adjacent monitoring wells downgradient of injection points were monitored by FPM with a water level indicator for signs of mounding. Field records revealed that emulsion leakage from a cut in the well casing that had occurred during installation of the injection system was observed at LW6IW-06 during initial attempts to inject. Injection activities were immediately stopped once the presence of emulsion was observed around the seal, and the issue was remedied before injections proceeded (see DFR 20 for details). Records did not indicate that significant mounding was observed.

The potential exists for biofouling as a result of substrate injections. Evidence of biofouling was not present during the injection or any subsequent monitoring; however, biofouling will be monitored as part of the performance monitoring program by monitoring well yields and geochemistry.

3.3.4.4 Post-Injection Performance Monitoring Plan

A *Final Performance Monitoring Work Plan* (FPM 2008) was developed and implemented by FPM to assess the performance of the enhanced reductive dechlorination and ensure that the injection activities did not cause the plume to expand or migrate toward Three Mile Creek. Sampling occurred at various wells located throughout the site, both inside and outside the plume (see Table 3-2). FPM performed quarterly sampling according to the *Final Performance Monitoring Work Plan* (FPM 2008).

3. Summary of Remedial Actions

The first round of performance monitoring sampling after the RA was completed occurred on September 26 and 29, 2008 and was performed by FPM at the wells listed in Table 3-2. The second quarterly sampling event occurred on January 5 and 6, 2009 and included the same sampling schedule as in September. Quarterly samples were again collected on April 13, 2009.

Table 3-2 LF6 Performance Monitoring Sample Analysis Summary

Sampling Locations	Sampling Rationale	Target Analytes	Initial Monitoring ¹	Performance Monitoring ²
LF6VMW-13R	Downgradient extent	<ul style="list-style-type: none"> ■ VOCs ■ Sulfate ■ DOC ■ Methane/Ethane/ Ethene ■ Field Parameters: ORP, oxygen, pH, water levels 	●	●
LF6VMW-13RD	Potential vertical Migration		●	●
LF6MW-16	Within 500 ppb contour		●	●
LF6MW-17	Within 500 ppb contour		●	●
LF6MW-20	Within 500 ppb contour		●	--
LF6MW-26	Within 50 ppb contour		●	●
LF6MW-31	Downgradient extent		●	●
LF6TW-33	Within 50 ppb contour		●	●
LF6TW-34	Within 50 ppb contour		●	●
LF6TW-35	Upgradient extent		●	●
LF6TW-36	Within 50 ppb contour		●	●
LF6TW-38	Within 50 ppb contour		●	●
LF6MW-39	Downgradient extent		●	●
Surface Water				
LF6-SW1-PM	Between surface water samples LF6/TMCSW-1 and 2			

Notes:

¹ Initial monitoring will occur quarterly for one year after injections.

² Performance monitoring will occur semi-annually after initial monitoring sampling has been completed.

Key:

DOC = Dissolved oxygen content.

ORP = Oxidation-reduction potential.

ppb = Parts per billion.

VOCs = Volatile organic compounds.

3.3.4.5 Long-Term Monitoring Plan

The long-term monitoring plan will be developed in a future document prepared by FPM and will be based on available information from the baseline, injection, and performance monitoring collected by FPM. The long-term monitoring well network, sample frequency, and sample parameters will be established based on available performance monitoring data. It has been assumed that contamination monitoring at LF6 will continue until remediation goals have been achieved, as presented in the ROD. Monitoring will be performed in accordance with the to-be-developed long-term monitoring plan.

3.3.5 Post-Construction Site Restoration

Injection activities at all wells were completed by July 31, 2008. Parsons decontaminated and demobilized the vegetable oil staging area and the injection system on August 1, 2008, and the equipment was transported to the WSA for storage.

The Final Inspection Checklist provided by Parsons (see Appendix D) notes that the areas around the injection well and the new monitoring well, LF6MW-39, were restored to pre-construction conditions. All cuttings from LF6MW-39 were containerized in drums and transported to the laydown area at LF6 for inventory, sampling, and disposal.

Records from Parsons also indicated that the access road for LF6 was graded to maintain pre-construction drainage, and top soil and seeding were added to the areas adjacent to the access road in accordance with the guidance provided in the *Remedial Action Work Plan* (Parsons 2008).

3.3.6 Final Inspections

Final inspections of the injection area at LF6 were made by personnel from Parsons and the USACE on August 6, 2008. (The Final Inspection Vegetable Oil Injection Checklist is included in Appendix D.) Minor housekeeping activities were required, including redistributing gravel around the initial entrance to the access road and grading the ruts that had developed along the road during construction activity; otherwise, the site was in acceptable condition according to documentation provided by Parsons.

3.3.7 Deviations from the Remedial Design Work Plan

Based on documentation provided by Parsons, field adjustments were made during the installation of the monitoring well at LF6. Modifications of the *Remedial Action Work Plan* included the following:

- An alternate location for LF6MW-39 was identified and approved by Parsons personnel during surveying activities because the original location was in the middle of a forested area. The new location, as seen on Drawing No. AS745115-C-003, LF6 Site Plan (see Appendix A, Record Drawings), allowed for easier access for the drill rig.
- Morie sand #00N was used in the monitoring well filter pack instead of Morie #00. Morie #00N is not as fine and settles better when saturated, per Field Adjustment Reports approved by Parsons.
- A 24-inch diameter concrete drainage pad was installed instead of the designed 2-foot by 2-foot by 4-inch-thick concrete pad around LF6MW-39 as requested by the drillers and as approved by Parsons.
- A centralizer was not installed in LF6MW-39 as designated in the *Final Remedial Action Work Plan*. The well string was hung in order to keep plumb during installation. This change was approved by Parsons.

3.4 Site Activities: Building 817/WSA

Parsons performed all injection activities, including mobilization, staging, and demobilization at Building 817/WSA and documented the work in the DFRs and

various checklists. FPM was on site for injection activities to monitor the surrounding area for signs of mounding and emulsion breakthrough. FPM also performed sampling for post-injection performance monitoring. The following summary of activities conducted at Building 817/WSA were presented in documentation provided to EEEPC by Parsons.

3.4.1 Monitoring Well Installation

Additional monitoring wells were not installed at Building 817/WSA. The current well matrix was used to monitor the effects of injection activities.

Slug Test

Three separate hydrogeologic aquifer or slug tests (both falling and rising-head slug testing) were conducted by Parsons at Building 817/WSA to determine the effects of injection activities on the horizontal hydraulic conductivity across the injection area. Testing was conducted at wells WSA-MW-8 and WSA-MW-18 in accordance with activities; details of the testing methods are described in various slug test analysis summary memoranda prepared by Parsons.

The memoranda show the first round of slug tests were performed prior to injection activities on June 17, 2008, and were initiated to identify the baseline response for each well. The second round of slug tests was performed on August 12, 2008, and was used to determine if the hydraulic conductivity was affected by injection activities. Post-injection hydraulic conductivity tests were performed approximately one month after injections were complete, on September 9, 2008.

The slug test analysis summary memoranda indicate that the data were analyzed using the Bouwer and Rice method for unconfined aquifers; the results suggest that the injection activities had no major effect on hydraulic conductivity during or after implementation of the remedy. The testing activities and summary of results for each slug test can be found in the memoranda prepared by Parsons (see Appendix G).

3.4.2 Organic Substrate Injection System Installation

3.4.2.1 Substrate Injection Wells

As indicated in the *Final Remedial Design Work Plan* prepared by EEEPC, the eight existing temporary injection wells (B817IW-1 through B817IW-8) that were installed for the 2006 pre-design investigation (EEEPC 2007) were used for Building 817/WSA remediation activities. Each well consists of 0.75-inch PVC piping installed to 19 feet bgs. A 5-foot (0.01-inch slot) PVC screen was set from 14 to 19 feet bgs through the interval of the highest observed VOC concentrations (EEEPC 2008). The injection points were placed approximately 10 feet apart, extended through the width of the 100 ppb contaminant contour of the plume, and were aligned perpendicular to groundwater flow. The orientation of this row of injection wells is shown on Drawing No. AS745115-C-002, Building 817/WSA Site Plan (see Appendix A, Record Drawings).

3.4.2.2 Injection Delivery System

The vegetable oil emulsion was prepared on-site and the portable injection system set-up and organic substrate staging at Building 817/WSA was completed on July 14, 2008 (DFR 9). The system consisted of a static in-line mixer, three flow meters, pressure indicators, two dosimeters, various valves, a backflow preventer, a vegetable oil tote, a pH buffer drum, chemical feed pumps, and associated HDPE piping to the eight injection wells. An on-site fire hydrant was used to supply potable water for dilution and dispersion of the organic substrates through the injection-influenced area (EEEEPC 2008).

The original design of the injection delivery system, as described in the *Remedial Action Plan* (Parsons 2008) and the *Remedial Design Work Plan* (EEEEPC 2008) also included a diaphragm pump and mixing tank to be used to emulsify the substrates. However, as noted in DFR 9, the fire hydrant was observed by Parsons field personnel to provide sufficient pressure to supply the oil-in-water emulsion to injection wells and would thus allow in-line mixing of substrate. The hydrant was connected directly to the conveyance line, which was also fed by the pH buffer and vegetable oil dosimeters at manually adjusted dosages. Once combined, the substrate and potable water flowed through the in-line mixer to ensure the mixture was fully emulsified, and then the oil-in water emulsion was delivered to the injection manifold where valves were used to direct the mixture to the correct injection wells as per the *Final Remedial Design Work Plan* (EEEEPC 2008). The sequencing and rates of injections are described in Section 3.4.3.

3.4.3 Substrate Injections

Substrate injection activities at Building 817/WSA began on July 15, 2008, after the wet and dry shakedown activities were completed. Parsons personnel performed the injections and recorded field activities in the DFRs. FPM personnel were on site during injection activities to observe the adjacent area around the injection wells for visual signs of mounding. Injections occurred in well pairs and were sequenced as follows:

- Injection 1 (July 15-16, 2008): B817IW-7 and B817IW-8
- Injection 2 (July 17-18, 2008): B817IW-3 and B817IW-4
- Injection 3 (July 18-21, 2008): B817IW-1 and B817IW-2
- Injection 4 (July 21-22, 2008): B817IW-5 and B817IW-6

During each injection, the system flow rates started relatively low and were adjusted until the flows were maximized so that the monitored system pressures remained below 12 psi, which was calculated to be the maximum overburden pressure. The following sections summarize the total volume of each emulsion component, system pressures, and calculated injection flow rates based on the records provided by Parsons. Detailed descriptions of daily injection activities are included in Appendix C. Additionally, the initial inspection of the vegetable oil injection system was performed by the USACE and Parsons at Building 817/WSA. The Initial Inspection Checklist can be found in Appendix D.

3.4.3.1 Substrate Emulsion Content

The injection mixture for Building 817/WSA was designed to consist of a three-part emulsion of approximately 3,000 gallons of potable water, 90 gallons of vegetable oil, and approximately 45 gallons of pH buffering product per well (EEEEPC 2008). The organic substrate included 100% vegetable oil, Textrol-Br™, which consists of soybean oil and lecithin and is manufactured by Solae, Inc., and the pH buffer product, Neutral Zone™, manufactured by Remediation and Natural Attenuation Services, Inc.

Table 3-3 summarizes the final calculated volumes of each substrate, including potable water from the hydrant delivered during each injection event.

Table 3-3 Substrate Injection Summary for Building 816/WSA in 2008

	July 18-21		July 17-18		July 21-22		July 15-16	
	B817IW-1	B817IW-2	B817IW-3	B817IW-4	B817IW-5	B817IW-6	1B817IW-7	B817IW-8
Water (gallons) ¹	5,961 (5,711)		5,753 (5,587)		5,807 (5,435)		6,193 (6,005)	
pH Buffer (gallons)	90		90		80		90	
Vegetable Oil (gallons)	180		180		170		180	
Total (gallons)	3,084	3,147	3,123	2,900	2,976	3,081	2,912	3,551
Total (gallons)	6,231		6,023		6,057		6,463	

Note:

¹ The volume of water recorded in the DFR from the flow meter located at the hydrant was not consistent with the total gallons recorded from flow meters at the individual injection points. The difference between the sum of total flow volume from injection well pairs and the sum of the pH buffer solution and vegetable oil was used to estimate the total volume of water injected into the subsurface. Actual flow meter reading at the hydrant is noted in parentheses.

3.4.3.2 Injection Rates, Volumes, and Pressures

Injection 1: B817IW-7 and B817IW-8

Injection activities began at B817IW-7 and B817IW-8 on July 15 and 16, 2008. The injection system was manually calibrated by Parsons personnel so that the target chemical feed injection rates (measured by dosimeter flow meter) were set at approximately 3.0% for the vegetable oil (3 gallons of oil per gallon of water) and approximately 1.5% for the pH buffer (1.5 gallons of oil per gallon of water), with slight variations through the injections to account for system pressures. The flow rate from the hydrant was set to stabilize at 10 gpm, but this rate appeared to fluctuate slightly throughout injection activities. The pH buffer feed pump was shut down after a total of 90 gallons had been injected into the two wells. The vegetable oil feed pump was shut down after 180 gallons had been injected. The hydrant was closed shortly after the allotted volumes of substrates were injected.

The total volume of water supplied from the hydrant was recorded as 6,005 gallons. The total flow volumes injected into B817IW-7 and B817IW-8 were recorded as 2,912 gallons and 3,551 gallons, respectively. Using the field records,

3. Summary of Remedial Actions

the average flow rate for B817IW-7 has been calculated to be approximately 5 gpm, and the average flow rate for B817IW-8 approximately 6 gpm. The system pressure fluctuated between 9 psi and 12 psi but never exceeded 12 psi. Based on the results of this first injection, further adjustments to the system were made during the next injection in order to equalize the flow rate to each injection well. Details of how the system pressures and flow rates were adjusted throughout the injection can be found in the DFRs 10 and 11 (see Appendix C).

Injection 2: B817IW-3 and B817IW-4

Injection activities occurred at B817IW-3 and B817IW-4 on July 17 and 18, 2008. The injection system was manually calibrated so that the target chemical feed injection rates (measured by the dosimeter flow meter) were set at approximately 3.0% for the vegetable oil (3 gallons of oil per gallon of water) and approximately 1.5% for the pH buffer (1.5 gallons of oil per gallon of water), with slight variations throughout the injections to account for system pressures. The flow rate from the hydrant was set to stabilize around 10 gpm, but this rate appeared to fluctuate slightly throughout injection activities. The pH buffer feed pump was shut down when a total of 90 gallons had been injected into the two wells. The vegetable oil feed pump was shut down after 180 gallons had been injected. The hydrant was closed shortly after the allotted volumes of substrates were injected.

The total volume of water supplied from the hydrant was recorded as 5,587 gallons. The total flow volumes injected into B817IW-3 and B817IW-4 were recorded as 3,123 gallons and 2,900 gallons, respectively. The flow rates for B817IW-3 and B817IW-4 have been calculated to be 5 gpm and the system pressure fluctuated but never exceeded 12 psi. Details about the system adjustments made throughout the injection activities to regulate volumes, pressures, and flow rates can be found in the DFRs in Appendix C.

Injection 3: B817IW-1 and B817IW-2

Injection activities began at B817IW-1 and B817IW-2 on July 18 and were completed on July 21, 2008. The injection system was manually calibrated so that the target chemical feed injection rates (measured by the dosimeter flow meter) were set at approximately 3.0% for the vegetable oil (3 gallons of oil per gallon of water) and approximately 1.5% for the pH buffer (1.5 gallons of oil per gallon of water) with slight variations throughout the course of the injections to account for system pressures. The flow rate from the hydrant was set so that it stabilized around 10 gpm, but this rate appeared to fluctuate slightly during injection activities. The pH buffer feed pump was shut down after a total of 90 gallons had been injected into the two wells. The vegetable oil feed pump was shut down after 180 gallons had been injected. The hydrant was closed shortly after the allotted volumes of substrates were injected.

The total volume of water supplied from the hydrant was recorded as 5,711 gallons. The total flow volumes injected into B817IW-1 and B817IW-2 were recorded as 3,084 gallons and 3,147 gallons, respectively. Using the field notes in

3. Summary of Remedial Actions

the DFR the average flow rates for both B817IW-1 and B817IW-2 have been calculated as approximately 5 gpm. The system pressure fluctuated but never exceeded 12 psi. Details about the system adjustments made throughout the injection activities to regulate volumes, pressures, and flow rates can be found in the DFRs (see Appendix C).

Injection 4: B817IW-5 and B817IW-6

Injection activities began at B817IW-5 and B817IW-6 on July 21 and were completed on July 22, 2008. The injection system was manually calibrated so that the target chemical feed injection rates (measured by the dosimeter flow meter) were set at approximately 3.0% for the vegetable oil (3 gallons of oil per gallon of water) and approximately 2.0% for the pH buffer (2 gallons of oil per gallon of water) in order to get the desired injection rate, with slight variations throughout the injection activities. The flow rate from the hydrant was set so that it eventually stabilized around approximately 10 gpm, but this rate appeared to fluctuate from 8.5 gpm to 10 gpm throughout injection activities. The pH buffer feed pump was shut down after a total of 80 gallons had been injected into the two wells. The vegetable oil feed pump was shut down after 170 gallons had been injected. The volume of pH buffer and vegetable oil were reduced when compared with previous injection activities in order to conserve substrates for the injection activities at LF6. The hydrant was closed shortly after the allotted volumes of substrates were injected.

The total volume of water supplied from the hydrant was 5,435 gallons. The total flow volumes injected into B817IW-1 and B817IW-2 were recorded as 2,976 gallons and 3,081 gallons, respectively. The average flow rates for B817IW-1 and B817IW-2 have been calculated as approximately 5 gpm. The system pressure fluctuated between 8.0 psi and 12 psi but never exceeded the maximum overburden pressure. Details about the system adjustments made throughout the injection activities to regulate volumes, pressures, and flow rates can be found in the DFRs (see Appendix C).

3.4.3.3 Injection Monitoring

Field notes prepared by Parsons indicate that during injection activities the injection well seals and monitoring wells downgradient of injection points were monitored visually for substrate breakthrough. Monitoring wells B817-MW1, B817-BW2, and B817-MW3 and three manholes (MH-1, MH-2, and MH-3) were also monitored by FPM every half-hour for visual signs of mounding in the vicinity of a utility corridor that had been identified as a potential pathway for substrate migration.

Notes provided in the WSA site Initial Inspection Checklist (see Appendix D) appear to indicate that FPM observed mounding. However, the mounding did not appear to be significant enough to warrant major adjustment of the injection rates, as indicated on the Initial Inspection Checklist. Records show that no visual sign of the vegetable oil emulsion was observed in monitoring wells or around the in-

3. Summary of Remedial Actions

injection wells The groundwater mounding observed by FPM is indicative that the injection of the vegetable oil was getting into the formation as intended and that groundwater was being displaced. Major adjustments to injection rates would have only occurred if the system experienced excessive back pressure, leaks, or if the mounding become so significant that groundwater rose out of the monitoring well and on to the ground surface. None of those situations were experienced and so major adjustments of injection rates did not occur.

The potential exists for biofouling as a result of substrate injections. Evidence of biofouling was not present during the injection or any subsequent monitoring; however, biofouling will be monitored as part of the performance monitoring program by monitoring well yields and geochemistry.

3.4.3.4 Post-Injection Performance Monitoring Plan

A monitoring plan was developed and implemented by FPM to assess the performance of the enhanced reductive dechlorination and ensure that the injection activities did not cause the plume to expand or migrate toward Six Mile Creek. Sampling occurred at wells located throughout the site, inside and outside the plume, as noted in Table 3-4. FPM's quarterly sampling reports show that FPM sampled according to the activities detailed in the *Final Performance Monitoring Work Plan* (FPM 2008).

Table 3-4 Building 817/WSA Performance Monitoring Sample Analysis Summary

Sampling Locations	Sampling Rationale	Target Analytes	Initial Monitoring ¹	Performance Monitoring ²
LAWMW-9	Downgradient extent	<ul style="list-style-type: none"> ■ VOCs ■ Sulfate ■ DOC ■ Methane/Ethane/Ethene ■ Field Parameters: ORP, oxygen, pH, water levels 	● ³	● ³
WSA-MW8	Upgradient extent		● ³	● ³
WSA-MW9	Downgradient extent		●	●
WSA-MW16	Within 100 ppb contour		●	●
WSA-VMW17	Within 30 ppb contour		●	--
WSA-MW18	Within 100 ppb contour		●	●
WSA-MW19	Between MW-16 and VMW-17		●	●
WSA-MW21	Downgradient extent, within plume		●	●
WSA-MW23	Cross-gradient, outside plume		● ³	● ³
Surface Water				
WSA-SW1PM ⁴	Upstream 400 feet, in manhole			●
WSA-SW2PM ⁴	Central manhole slightly downgradient from where plume potentially will intersect Six Mile Creek	<ul style="list-style-type: none"> ■ VOCs ■ Field parameters: water levels 		●
WSA-SW3PM ⁴	Downstream 400 feet, in manhole			●
MH-1	Utility corridor, potential preferential pathway		●	
MH-2	Utility corridor, potential preferential pathway	<ul style="list-style-type: none"> ■ Visual monitoring for substrate 	●	

Table 3-4 Building 817/WSA Performance Monitoring Sample Analysis Summary

Sampling Locations	Sampling Rationale	Target Analytes	Initial Monitoring ¹	Performance Monitoring ²
MS-3	Utility corridor, potential preferential pathway	presence	●	

Notes:

¹ Initial monitoring occurred quarterly for one year after injections.

² Performance monitoring will occur semi-annually after initial monitoring sampling has been completed.

³ Annual sampling only.

⁴ Surface water samples were collected only if the results from WSA-MW9 were above the NYSDEC Class GA groundwater standards.

Key:

DOC = Dissolved oxygen content.

ORP = Oxygen reduction potential.

VOCs = Volatile organic compounds.

The first round of performance-monitoring sampling after the remedial action was completed on September 23, 2008, at the wells listed in Table 3-4. The second quarterly sampling event was completed on December 31, 2008, and followed the same sampling schedule as in September. A third round of sampling occurred on April 8, 2009. No surface water samples were collected during any sampling because VOCs were not detected at monitoring well WSA-MW9 (FPM 2009b, 2009c). Details of sampling activities and an evaluation of the analytical results for each sampling event can be found in FPM's quarterly monitoring reports. The quarterly monitoring reports indicated that no modifications were made to the *Final Performance Monitoring Work Plan* (FPM 2008).

3.4.3.5 Long-Term Monitoring Plan

The long-term monitoring plan will be developed in a future document prepared by FPM and will be based on available information from the baseline, injection, and performance monitoring. The long-term monitoring-well network, sample frequency, and sample parameters will be established based on available performance monitoring data collected by FPM; it is assumed that contamination monitoring at Building 817/WSA will continue until remediation goals have been achieved, as presented in the ROD.

3.4.4 Post-Construction Site Restoration

Injection activities at all wells were completed on July 23, 2008. The vegetable oil/pH buffer staging area and the injection system were demobilized and the equipment was transported by Parsons to LF6 to be set up for injections. The remaining vegetable oil totes and pH buffer drums were stored in Building 817.

Field records show that restoration activities appeared to be minor at the Building 817/WSA site because no new monitoring or injection wells had been installed and the soil remained undisturbed.

3.4.5 Final Inspections

Final inspections of the injection area at Building 817/WSA by personnel from Parsons and the USACE occurred on August 6, 2008. The Final Inspection Vege-

table Oil Injection Checklist is included in Appendix D. Only minor housekeeping activities were required; otherwise the site was in acceptable condition according to Parsons.

3.4.6 Deviations from the Remedial Design Work Plan

No significant deviations occurred.

3.5 Site Activities at Building 775

3.5.1 Monitoring Well Installation

One additional monitoring well, 775VMW-19R, was installed on July 16, 2008 (DFR 11). This well is located west of 775MW-28 as shown on Drawing No. AS745115-C-004, Site Plan Building 775 (see Appendix A, Record Drawings). Monitoring well 775VMW-19R was installed by Parratt Wolf, Inc., who was hired by Parsons to drill a total depth of 76 feet bgs and install the well screen at an interval of 55 to 75 feet bgs. Parsons provided oversight and documentation of drilling activities at Building 775. The installation at 775MW-19R deviated from the *Remedial Action Work Plan* planned screen interval of 40 to 60 feet bgs due to the elevation of the static water table, which was observed to be deeper than shown in the work plan (57 to 60 feet). E & E and Parsons field personnel approved the deeper screen depth of 55 to 75 feet in order to intersect the plume which is approximately 10 feet below the static water table (Well Construction Checklist 7-16-08).

Details about the extraction well installation and drilling activities are provided in the Well Verification Checklist and Well Construction Checklist (see Appendix E), HTW Drilling Log (see Appendix F), and Drilling Methods Checklist (included in the DFRs for July 16, 2008 found in Appendix C). Pictures of the drilling and well installation activities are also included in the DFRs.

3.5.2 Extraction Well Installation

Extraction well EW-1 was installed on July 17 and 18, 2008 by Nothnagle Drilling, Inc. under the observation of Parsons. Field records indicated EW-1 was deemed inappropriate for groundwater extraction by Parsons field personnel during its development. To still make use of the borehole, EW-1 was converted into a monitoring well by the addition of a retrofitted well (EW-1A) inside EW-1. The decision to retrofit EW-1 was approved by AFRPA, USACE, Parsons and EEEPC, as documented in a Parsons' Memo dated August 29, 2008. The retrofitted well was installed on September 12, 2008.

Based on a capture zone analysis, using data from pump tests conducted on well EW-1A (formally EW-1), a plan was developed to install two extraction wells as a substitute for the failed EW-1 extraction well (Parsons Memo October 3, 2008). Prior to the start of work, the plan was reviewed and approved by AFRPA, USACE, Parsons, and EEEPC. Notification was also sent to NYSDEC and the EPA. Extraction wells EW-1R and EW-3 were installed from October 21 to 23, 2008, and October 24 to 27, 2008, respectively. The Well Verification Checklists

3. Summary of Remedial Actions

and DFRs indicated that EW-1R has a total depth of 79.2 feet bgs and a screen depth interval of 55.2 to 75.2 feet bgs. EW-3 has a total depth of 80 feet bgs with a screen depth interval of 56 to 76 feet bgs.

Details about the extraction well installation and drilling activities are provided in the Well Verification Checklist and Well Construction Checklist (see Appendix E), Hazardous and Toxic Wastes Drilling Log (see Appendix F), and Drilling Methods Checklist (included in the DFRs 53 and 56 in Appendix C). Pictures of the drilling and well installation activities are also included in the DFRs.

Extraction Well Development and Testing

Attempts to fully develop extraction well EW-1 began on July 21, 2008. However after eight working days without success, efforts to fully develop EW-1 into an extraction well were abandoned on July 31 at the direction of Parsons. Development of EW-1 as a retrofitted monitoring well (EW-1A) occurred on September 15, 2008 (see DFRs 14, 22, and 32 for details).

Replacement extraction wells EW-1R and EW-3 were developed on October 29 and 30, 2008, respectively. Pumps were installed by Parsons in EW-1R and EW-3 on November 3, 2008. A constant-rate 24-hour pump test on extraction well EW-1R was initiated on November 5, 2008, followed by a combined 24-hour pump test of EW-1R and EW-3 beginning on November 6, 2008 and concluding November 7, 2008, both conducted by Parsons field personnel. During the pump tests, groundwater measurements were collected from the extraction wells and existing monitoring wells EW-1A, 775MW-27, 775VMW-8, 775MW-28, and 775MW-6. The pump test records indicated that transmissivity was in the range of 200 to 300 square feet per day (ft²/day). A summary of test results are presented in Table 3-5. The test procedure and summary of results for each pump test can be found in memoranda prepared by Parsons (see Appendix G).

Table 3-5 Pumping Test Summary – EW-1R and EW-3

Well ID	Distance from Well EW-1R (ft)	Drawdown EW-1R test (ft)	Drawdown Combined Test EW-1R and EW-3 (ft)
EW-1R	0.00	8.74	8.37
775MW-27	29.80	0.26	0.35
EW-1	53.60	0.16	0.29
EW-3	65.00	0.15	8.08
775VMW-8	72.90	0.10	0.16
775VMW-28	199.00	-0.01	Negligible
775MW-6	230.00	0.02	Negligible
Approximate Flow Rate		2.60 gpm	EW-1R = 2.57 gpm EW-3 = 2.56 gpm

3.5.3 Treatment System Installation and Start-up

3.5.3.1 Groundwater Pumping and Piping System

Construction of Building 775's pumping and piping system began on October 8 by Chargo Earthworks with the installation of discharge and electrical conduit

pipng under Phoenix Drive. Parsons provided oversight of the construction work at Building 775 and documented construction activities in the DFRs. A 2-inch diameter PVC pipe force main was installed to connect extraction wells EW-1R and EW-3 to the existing sanitary sewer system. The force main, pitless adapters, valves, and associated connections were installed on November 20 in accordance with the *Remedial Action Work Plan*, with the exception that the piping layout had to be changed to accommodate changes to the extraction well plan (see Section 3.5.2). A layout and details of the groundwater pumping and piping system are shown on Drawing No. AS745115-C-003, Landfill 6 Site Plan (see Appendix A, Record Drawings).

On October 23, a standard, lightweight, meter box assembly was installed in the vicinity of SS MH-2 near the west corner of Building 776. The meter box was set on a 5-foot diameter by 6-inch concrete pad. Within the meter box the 2-inch diameter PVC pipe force main was reduced to a 1-inch pipe and connected to a flow meter as shown on Drawing No. AS745115-C-005, Building 775 Sections and Details, and Drawing No. AS745115-C-006, Extraction Well Flow Diagram (see Appendix A, Record Drawings). The flow meter is a 1-inch diameter Neptune T10 turbine flow meter with remote readout. The readout was connected from the flow meter to a control panel located southwest of EW-3. From the flowmeter the force main was expanded back to 2 inches in diameter and then tunneled though to SS MH-2. Additional details are shown on the New Flow Meter Manhole section drawing located on Drawing No. AS745115-C-005, Building 775 Sections and Details (see Appendix A, Record Drawings).

3.5.3.2 Pump Control System

The installation of the control panel located southwest of EW-3 was completed on December 18 by TW Electric (see As-Built Figure E1, Power Distribution; and As-Built Figure E2, Pump Controls Wiring Diagram, Appendix A, Record Drawings). The control panel contains a hands-off auto switch and read-out screen that displays operational data, such as flow totals, run time, and water-level information for each of the two extraction wells. An indicator light was installed on the control panel to identify when the pumps are running or not running. Also present in the control panel is the read-out and control switch to the flow meter located in the meter box before the sanitary sewer outfall (Parsons 2008).

3.5.4 Treatment System Initial Operation/Maintenance

Both pumps were activated and the system pipes were flushed on December 22, 2008 (DFR 77). The complete recovery system was later tested and run on January 6, 2009. Further testing was performed by Parsons on January 9, 2009 to determine the flow rates and re-fill intervals necessary to set the system at an average rate of 4 gpm, as per design.

A comprehensive description of operation and maintenance activities for the extraction and discharge system are presented in the *Building 775 Extraction and*

Discharge System Operation and Maintenance Manual, drafted in June 2009 by FPM (see Appendix H).

3.5.5 Post-Construction Site Restoration

The majority of the restoration work at Building 775's infrastructure occurred on May 2, May 4, May 15, and June 5, 2009. During that time, Chargo Earthworks and Fuller Paving, Inc. removed the 3 inches of temporary cold patch (cold asphalt) used over the winter to bring the trench area in the parking lot up to grade. Crews compacted the sub-base materials and placed and compacted 2 inches of New York State Department of Transportation (NYSDOT) Type 3 asphalt. The trenches were brought to grade with a Type 7 finish asphalt, compacted, and then drum-rolled, as shown on Drawing No. AS745115-C-007, Trench Sections and Details (see Appendix A, Record Drawings). The parking lot repairs were completed with asphaltic sealant and the parking lines were repainted. Areas that had been disturbed around the control panel were filled in with topsoil and seeded with grass seed. The USACE personnel were on site to observe various activities during the repairs and repaving of the parking lot on May 4 and 15, 2009 (DFR 90; DFR 91).

3.5.6 Final Inspections

A pre-final inspection of the Building 775 extraction and discharge system was conducted on February 2, 2009, by the project team. The inspection documentation and meeting minutes are presented in Appendix D.

Final inspections of the Building 775 extraction and discharge system occurred on June 18, 2009. The inspection documentation and meeting minutes are presented in Appendix D. The final inspection consisted of reviewing the pavement and ground restoration. The USACE and Parsons found the restoration to be acceptable.

3.5.7 Deviations from the Remedial Design Work Plan

As described within preceding sections, deviations from the Remedial Design Work Plan occurred, and include the following:

- Monitoring well 775MW-19R was installed with a screen interval of 40 to 60 feet bgs, deviating from the Work Plan design of 55 to 75 feet bgs. Refusal was encountered and the well could not be installed to 75 feet bgs. Monitoring well 775MW-19R is approximately 200 feet downgradient of the closest pumping well and the change in actual screen interval versus design screen interval is anticipated to be negligible when conducting monitoring well gauging.
- Extraction well EW-1 was unsuccessfully developed, and as a result retrofitted into a monitoring well (EW-1A). Extraction wells EW-1R and EW-3 were installed to replace EW-1. (See Section 3.5.2 for further details about why this occurred and the resulting effects it had on the system design.)

- The electrical and waste discharge lines under the access road between Building 775 and the parking lot were installed by jacking, rather than the method proposed in the original work plan which was to open cut the road. This deviation did not affect the performance of the system design.

3.6 Site Activities at Nosedocks/Apron 2

The implemented remedy for the Apron 2 site consisted of the installation of three additional monitoring wells: 782VMW-84D, 782VMW-121, and 782VMW-121D (see Figure 3-1). The three new monitoring wells, along with 15 previously installed wells, are being used to monitor the natural attenuation of the plume. A *Final Performance Monitoring Work Plan* (FPM 2008) described the field sampling and analysis activities to be used to collect the necessary groundwater data as identified in the *Remedial Design Work Plan* (EEEEPC 2008) as needed. Performance monitoring is ongoing, and a long-term monitoring plan is still in the process of being developed. The following sections discuss activities that were performed and documented by Parsons and FPM to complete the monitoring system and conduct performance monitoring at the Apron 2 site.

3.6.1 Monitoring Well Installation

The locations of wells 782VMW-84D, -121, and -121D were surveyed on June 18, 2008. On July 10, well 782VMW-121D was installed, with a total depth of 32 feet bgs, and well 782VMW-121 was drilled to a depth of 26 feet bgs. The last monitoring well to be installed was 782VMW-84D on July 11, which had a total depth of 56.5 feet bgs.

Details about the monitoring well installation and drilling activities are provided in the Well Verification Checklist and Well Construction Checklist (see Appendix E), and Drilling Methods Checklist (included in DFR 11 [see Appendix C]). Pictures of the drilling and well installation activities are also included in Parson's DFR.

3.6.2 Well Development

Well 782VMW-121, -121D, and -84D, were developed on July 24, July 25, and July 29, 2008, respectively. The well record and details of purging activities for 782VMW-121, -121D, and -84D are included in Appendix F.

3.6.3 Post-Construction Site Restoration

Monitoring well installation activities were completed on July 14, 2008 (DFR 09). The Final Inspection Checklist provided by Parsons (see Appendix D) notes that the areas around the new monitoring wells, 782VMW-121D, 782VMW-121, 782VMW-84D, were restored to pre-construction conditions. All cuttings from the new monitoring wells were containerized in drums and staged at the LF6 decontamination area.

3. Summary of Remedial Actions

3.6.4 Final Inspections

Final inspections of the injection area at Apron 2 were made by personnel from Parsons, FPM, and the USACE on August 6, 2008 (see Appendix D, Final Inspection Checklist). No action items were recorded.

3.6.5 Deviations from the Remedial Design Work Plan

No significant deviations occurred.

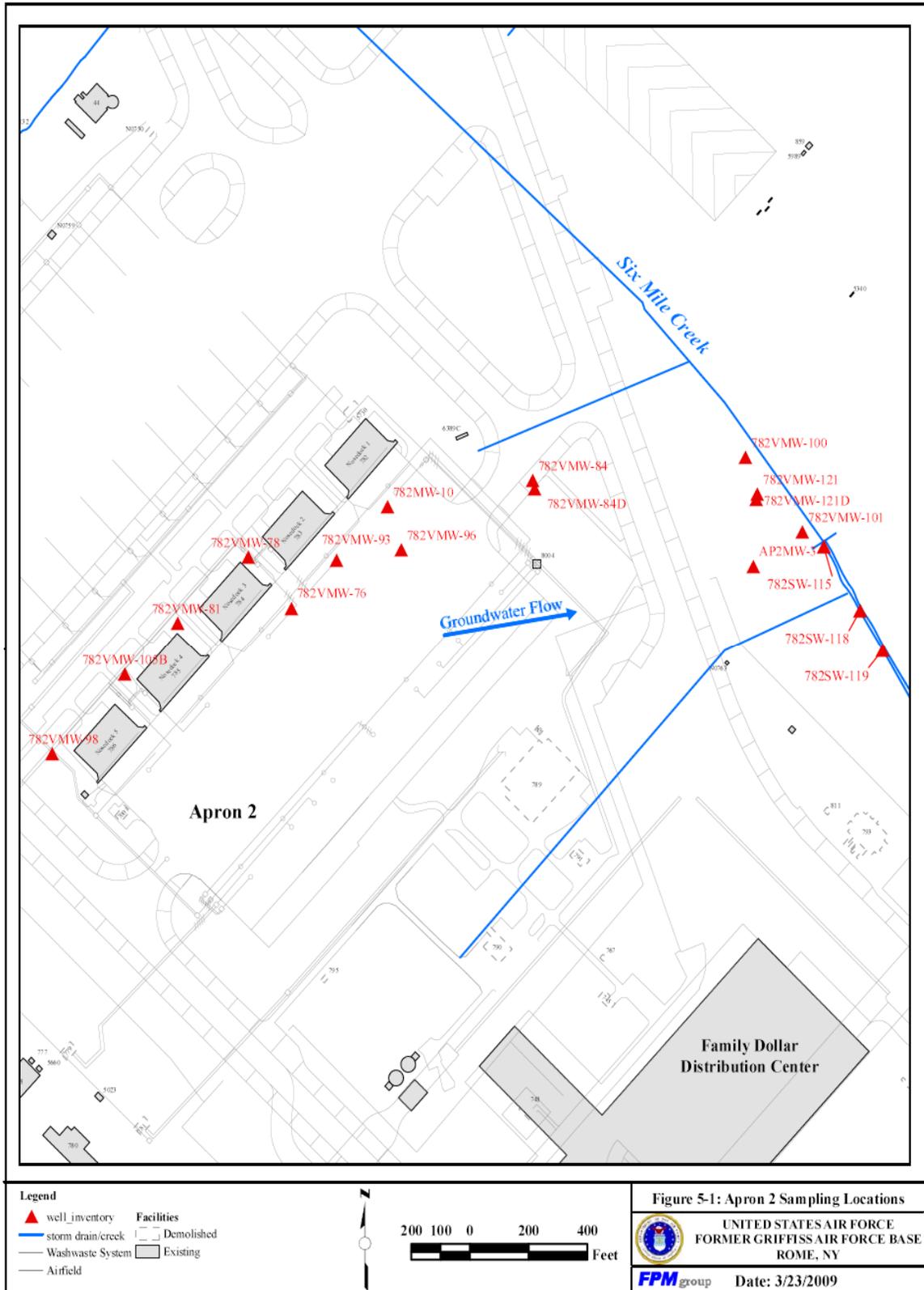


Figure 3-1 Apron 2 Sampling Locations

4

Remedy-In-Place Status

4.1 LF6

The LF6 bioremediation remedy involved injecting a vegetable oil emulsion into the ground to increase the rate of biodegradation of groundwater contaminants. The vegetable oil emulsion increases the natural breakdown of the chemicals, thus reducing the concentration of the contaminants found on-site. The injections occurred in July 2008 (FPM 2009b, 2009c). The remedy at LF6 has been constructed “in place” as per approved designs and work plans referenced throughout this report.

As documented in the quarterly reports, the performance monitoring has commenced and the results indicate that the remedy is operational and functional. Continued quarterly performance monitoring based on the *Final Performance Monitoring Work Plan* (FPM 2007) will be used to evaluate the impact of the vegetable oil injection on the groundwater chemistry and contamination.

4.2 Building 817/WSA

The Building 817/WSA bioremediation remedy involved injecting a vegetable oil emulsion into the ground to increase the biodegradation rate of groundwater contaminants. The vegetable oil emulsion increases the natural breakdown of the chemicals, thus reducing the concentration of the contaminants found on site. The injection occurred in July 2008 (FPM 2009b, 2009c). The remedy at Building 817/WSA has been constructed “in place” as per approved designs and work plans referenced throughout this report.

As documented in the quarterly reports, the performance monitoring has commenced and the results indicate that the remedy is operational and functional. Continued quarterly performance monitoring conducted according to the *Final Performance Monitoring Work Plan* (FPM 2008) will be used to evaluate the impact of the vegetable oil injection on the groundwater chemistry and contamination biodegradation and/or migration.

4.3 Building 775

The remedial action at the Building 775 site is an extraction and discharge system designed to contain the contaminated plume (>50 ppb) and remove the contaminants from the aquifer. Two extraction wells, EW-1R and EW-3, remove the con-

taminated water from the aquifer and discharge it to the sanitary sewer system for treatment at the publicly owned treatment works (FPM 2009a). The remedy at Building 775 has been constructed “in place” as per approved designs and work plans, referenced throughout this report.

As documented in the quarterly reports, the performance monitoring has commenced and the results indicate that the remedy is operational and functional. Continued quarterly performance monitoring will be used to evaluate the impact of the extraction system on groundwater contaminant concentrations and the extent of the plume.

4.4 Nosedocks/Apron 2

The remedial action at the Apron 2 site is specified as MNA. MNA uses the ongoing physical, chemical, and/or natural biological processes that reduce the contaminants in the aquifer (FPM 2009b). This remedial action was chosen based on previous studies that indicated that MNA was occurring at the Apron 2 site. The remedy at Apron 2 is considered to be “in place” as per approved designs and work plans referenced throughout this report.

As documented in the quarterly reports, the performance monitoring has commenced and the results indicate that the remedy is operational and functional. Continued quarterly performance monitoring will be used to evaluate the range of groundwater contamination.

5

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A

Record Drawings

Please see enclosed CD.

B

Permits

Please see enclosed CD.

C

Field Reports-Photos

Please see enclosed CD.

D

Inspection Checklists

Please see enclosed CD.

E

Well Verification and Construction Checklists

Please see enclosed CD.

F

Boring Logs and Well Development Records

Please see enclosed CD.



Slug Test Results

Please see enclosed CD.



Field Adjustment Forms

Please see enclosed CD.



Building 775 Operations and Maintenance Manual

(January 2010 Version)

Please see enclosed CD.

J

Supporting Calculations

Please see enclosed CD.

Submittal Register

SUBMITTAL REGISTER																				CONTRACT NUMBER: W912DQ-06-D-0012						
(ER 415-1-10)																										
TITLE AND LOCATION: Former Griffiss AFB, Rome, NY				PROJECT NAME: On-Base Groundwater Remediation										CONTRACTOR PARSONS						SPECIFICATION SECTION- RAWP, July 2008						
ACTIVITY NO	TRANSMITTAL NO	ITEM NUMBER	SPECIFICATION PARAGRAPH NUMBER	DESCRIPTION OF ITEMS SUBMITTED	TYPE OF SUBMITTAL										CLASSIFICATION		CONTRACTOR SCHEDULE DATES			CONTRACTOR ACTION		GOV'T ACTION		REMARKS		
					DRAWING	INSTRUCTIONS	SCHEDULES	STATEMENTS	REPORTS	CERTIFICATIONS	SAMPLES	RECORDS	O & M MANUAL	INFORMATION ONLY	GOV'T APPROVED	REVIEWER	SUBMIT	APPROVAL NEEDED BY	MATERIAL NEEDED BY	CODE	DATE	SUBMIT TO GOVERNMENT	CODE		DATE	
a	b	c	d	e	f	g	h	i	j	k	l	m	n	o	p	q	r	s	t	u	v	w	x	y	z	aa
	Various Numbers	1	3.4.2	Daily Field Reports						X											P	07-Jul-08 through TBD	USACE/AFRPA			Submit daily or as needed To Cathy Jerrard (AFRPA) and Joe Wojnas (USACE) hardcopy. Uploaded to Project Website. Daily Field Reports from June 17, 2008 through June 24, 2009.
	01 A/B		3.4.2	DFR 01 6/17/08											X						P	19-Jun-08	USACE/AFRPA			Submitted to Cathy Jerrard (AFRPA) and Joe Wojnas (USACE) by Fed Ex 6/19/08. Uploaded to Project Website
	01/ A/B		3.4.2	DFR 02 6/18/08											X						P	19-Jun-08	USACE/AFRPA			Submitted to Cathy Jerrard (AFRPA) and Joe Wojnas (USACE) by Fed Ex 6/19/08. Uploaded to Project Website
	05 A/B		3.4.2	DFR 03 7/2/08											X						P	2-Jul-08	USACE/AFRPA			Submitted to Cathy Jerrard (AFRPA) and Joe Wojnas (USACE) hardcopy on July 7, 2008. Uploaded to Project Website
	745115-DFR 04		3.4.2	DFR 04 7/7/08											X						P	7-Jul-08	USACE/AFRPA			Submitted to Cathy Jerrard (AFRPA) and Joe Wojnas (USACE) hardcopy on July 8, 2008. Uploaded to Project Website
	745115-DFR 05		3.4.2	DFR 05 7/8/08											X						P	8-Jul-08	USACE/AFRPA			Submitted to Cathy Jerrard (AFRPA) and Joe Wojnas (USACE) hardcopy on July 9, 2008. Uploaded to Project Website
	745115-DFR 06		3.4.2	DFR 06 7/9/08											X						P	9-Jul-08	USACE/AFRPA			Submitted to Cathy Jerrard (AFRPA) and Joe Wojnas (USACE) hardcopy on July 10, 2008. Uploaded to Project Website
	745115-DFR 07		3.4.2	DFR 07 7/10/08											X						P	10-Jul-08	USACE/AFRPA			Submitted to Cathy Jerrard (AFRPA) and Joe Wojnas (USACE) hardcopy on July 11, 2008. Uploaded to Project Website
	745115-DFR 08		3.4.2	DFR 08 7/11/08											X						P	11-Jul-08	USACE/AFRPA			Submitted to Cathy Jerrard (AFRPA) and Joe Wojnas (USACE) hardcopy on July 14, 2008. Uploaded to Project Website
	745115-DFR 09		3.4.2	DFR 09 7/14/08											X						P	14-Jul-08	USACE/AFRPA			Submitted to Cathy Jerrard (AFRPA) and Joe Wojnas (USACE) hardcopy on July 15 2008. Uploaded to Project Website
	745115-DFR 10		3.4.2	DFR 10 7/15/08											X						P	15-Jul-08	USACE/AFRPA			Submitted to Cathy Jerrard (AFRPA) and Joe Wojnas (USACE) hardcopy on July 16, 2008. Uploaded to Project Website
	745115-DFR 11		3.4.2	DFR 11 7/16/08											X						P	16-Jul-08	USACE/AFRPA			Submitted to Cathy Jerrard (AFRPA) and Joe Wojnas (USACE) hardcopy on July 17, 2008. Uploaded to Project Website
	745115-DFR 12		3.4.2	DFR 12 7/17/08											X						P	17-Jul-08	USACE/AFRPA			Submitted to Cathy Jerrard (AFRPA) and Joe Wojnas (USACE) hardcopy on July 18, 2008.

SUBMITTAL REGISTER																				CONTRACT NUMBER: W912DQ-06-D-0012						
(ER 415-1-10)																										
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	745115-DFR 14		3.4.2	DFR 14 7/21/08											X						P	21-Jul-08	USACE/AFRPA			Submitted to Cathy Jerrard (AFRPA) and Joe Wojnas (USACE) hardcopy on July 22, 2008. Uploaded to Project Website
	745115-DFR 15		3.4.2	DFR 15 7/22/08											X						P	22-Jul-08	USACE/AFRPA			Submitted to Cathy Jerrard (AFRPA) and Joe Wojnas (USACE) hardcopy on July 23, 2008. Uploaded to Project Website
	745115-DFR 16		3.4.2	DFR 16 7/23/08											X						P	23-Jul-08	USACE/AFRPA			Submitted to Cathy Jerrard (AFRPA) and Joe Wojnas (USACE) hardcopy on July 24, 2008. To Be Uploaded to Project Website
	745115-DFR 17		3.4.2	DFR 17 7/24/08											X						P	24-Jul-08	USACE/AFRPA			Submitted to Cathy Jerrard (AFRPA) and Joe Wojnas (USACE) hardcopy on July 25, 2008. Uploaded to Project Website
	745115-DFR 18		3.4.2	DFR 18 7/25/08											X						P	25-Jul-08	USACE/AFRPA			Submitted to Cathy Jerrard (AFRPA) and Joe Wojnas (USACE) hardcopy on July 28, 2008. Uploaded to Project Website
	745115-DFR 19		3.4.2	DFR 19 7/28/08											X						P	28-Jul-08	USACE/AFRPA			Submitted to Cathy Jerrard (AFRPA) and Joe Wojnas (USACE) hardcopy on July 30, 2008. Uploaded to Project Website
	745115-DFR 20		3.4.2	DFR 20 7/29/08											X						P	29-Jul-08	USACE/AFRPA			Submitted to Cathy Jerrard (AFRPA) and Joe Wojnas (USACE) hardcopy on July 30, 2008. Uploaded to Project Website
	745115-DFR 21		3.4.2	DFR 21 7/30/08											X						P	30-Jul-08	USACE/AFRPA			Submitted to Cathy Jerrard (AFRPA) and Joe Wojnas (USACE) hardcopy on July 31, 2008. Uploaded to Project Website
	745115-DFR 22		3.4.2	DFR 22 7/31/08											X						P	31-Jul-08	USACE/AFRPA			Submitted to Cathy Jerrard (AFRPA) and Joe Wojnas (USACE) hardcopy on August 1, 2008. To Be Uploaded to Project Website
	745115-DFR 23		3.4.2	DFR 23 8/1/08											X						P	1-Aug-08	USACE/AFRPA			Submitted to Cathy Jerrard (AFRPA) and Joe Wojnas (USACE) hardcopy on August 4, 2008. To Be Uploaded to Project Website
	745115-DFR 24		3.4.2	DFR 24 8/4/08											X						P	4-Aug-08	USACE/AFRPA			Submitted to Cathy Jerrard (AFRPA) and Joe Wojnas (USACE) hardcopy on August 5, 2008. Uploaded to Project Website
	745115-DFR 25		3.4.2	DFR 25 8/5/08											X						P	5-Aug-08	USACE/AFRPA			Submitted to Cathy Jerrard (AFRPA) and Joe Wojnas (USACE) hardcopy on August 6, 2008. Uploaded to Project Website
	745115-DFR 26		3.4.2	DFR 26 8/6/08											X						P	6-Aug-08	USACE/AFRPA			Submitted to Cathy Jerrard (AFRPA) and Joe Wojnas (USACE) hardcopy on August 7, 2008. Uploaded to Project Website

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(ER 415-1-10)																										
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					DRAWING	INSTRUCTIONS	SCHEDULES	STATEMENTS	REPORTS	CERTIFICATIONS	SAMPLES	RECORDS	O & M MANUAL	INFORMATION	GOV'T APPROVED	REVIEWER	SUBMIT	APPROVAL NEEDED BY	MATERIAL NEEDED BY	CODE	DATE	SUBMIT TO GOVERNMENT	CODE		DATE	
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	745115-DFR 27		3.4.2	DFR 27 8/7/08											X						P	7-Aug-08	USACE/AFRPA			Submitted to Cathy Jerrard (AFRPA) and Joe Wojnas (USACE) hardcopy on August 8, 2008. Uploaded to Project Website
	745115-DFR 28		3.4.2	DFR 28 8/8/08											X						P	8-Aug-08	USACE/AFRPA			Submitted to Cathy Jerrard (AFRPA) and Joe Wojnas (USACE) hardcopy on August 14, 2008. Uploaded to Project Website
	745115-DFR 29		3.4.2	DFR 29 8/12/08											X						P	12-Aug-08	USACE/AFRPA			Submitted to Cathy Jerrard (AFRPA) and Joe Wojnas (USACE) via Fed Ex on August 15, 2008. Uploaded to Project Website
	745115-DFR 30		3.4.2	DFR 30 9/9/08											X						P	11-Sep-08	USACE/AFRPA			Submitted to Cathy Jerrard (AFRPA) and Joe Wojnas (USACE) hardcopy on September 12, 2008. Uploaded to Project Website
	745115-DFR 31		3.4.2	DFR 31 9/12/08											X						P	12-Sep-08	USACE/AFRPA			FedEx'd to Cathy Jerrard (AFRPA) and Joe Wojnas (USACE) hardcopy on September 17, 2008. Uploaded to Project Website
	745115-DFR 32		3.4.2	DFR 32 9/15/08											X						P	15-Sep-08	USACE/AFRPA			Fed Ex'd to Cathy Jerrard (AFRPA) and Joe Wojnas (USACE) hardcopy on September 17, 2008. Uploaded to Project Website
	745115-DFR 33		3.4.2	DFR 33 9/16/08											X						P	16-Sep-08	USACE/AFRPA			Delivered to Cathy Jerrard (AFRPA) and Joe Wojnas (USACE) hardcopy on September 24, 2008. Uploaded to the project website.
	745115-DFR 34		3.4.2	DFR 34 9/17/08											X						P	17-Sep-08	USACE/AFRPA			Delivered to Cathy Jerrard (AFRPA) and Joe Wojnas (USACE) hardcopy on September 24, 2008. Uploaded to the project website.
	745115-DFR 35		3.4.2	DFR 35 9/18/08											X						P	18-Sep-08	USACE/AFRPA			Delivered to Cathy Jerrard (AFRPA) and Joe Wojnas (USACE) hardcopy on September 24, 2008. Uploaded to the project website.
	745115-DFR 36		3.4.2	DFR 36 9/19/08											X						P	19-Sep-08	USACE/AFRPA			Delivered to Cathy Jerrard (AFRPA) and Joe Wojnas (USACE) hardcopy on September 24, 2008. Uploaded to the project website.
	745115-DFR 37		3.4.2	DFR 37 9/24/08											X						P	24-Sep-08	USACE/AFRPA			Fed Ex'd to Cathy Jerrard (AFRPA) and Joe Wojnas (USACE) hardcopy on September 30, 2008. Uploaded to Project Website

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a	b	c	d	e	f	g	h	i	j	k	l	m	n	o	p	q	r	s	t	u	v	w	x	y	z	aa	
	745115-DFR 38		3.4.2	DFR 38 9/25/08											X							P	25-Sep-08	USACE/AFRPA			Fed Ex'd to Cathy Jerrard (AFRPA) and Joe Wojnas (USACE) hardcopy on September 30, 2008. Uploaded to Project Website
	745115-DFR 39		3.4.2	DFR 39 9/26/08											X							P	26-Sep-08	USACE/AFRPA			Fed Ex'd to Cathy Jerrard (AFRPA) and Joe Wojnas (USACE) hardcopy on September 30, 2008. Uploaded to Project Website
	745115-DFR 40		3.4.2	DFR 40 10/03/08											X							P	3-Oct-08	USACE/AFRPA			Submitted to Cathy Jerrard (AFRPA) and Joe Wojnas (USACE) hardcopy on October 6, 2008. Uploaded to Project Website
	745115-DFR 41		3.4.2	DFR 41 10/06/08											X							P	6-Oct-08	USACE/AFRPA			Submitted to Cathy Jerrard (AFRPA) and Joe Wojnas (USACE) hardcopy on October 7, 2008. Uploaded to Project Website
	745115-DFR 42		3.4.2	DFR 42 10/07/08											X							P	7-Oct-08	USACE/AFRPA			Submitted to Cathy Jerrard (AFRPA) and Joe Wojnas (USACE) hardcopy on October 8, 2008. Uploaded to Project Website
	745115-DFR 43		3.4.2	DFR 43 10/08/08											X							P	8-Oct-08	USACE/AFRPA			Submitted to Cathy Jerrard (AFRPA) and Joe Wojnas (USACE) hardcopy on October 9, 2008. Uploaded to Project Website
	745115-DFR 44		3.4.2	DFR 44 10/09/08											X							P	9-Oct-08	USACE/AFRPA			Submitted to Cathy Jerrard (AFRPA) and Joe Wojnas (USACE) hardcopy on October 10, 2008. Uploaded to Project Website
	745115-DFR 45		3.4.2	DFR 45 10/10/08											X							P	10-Oct-08	USACE/AFRPA			Submitted to Cathy Jerrard (AFRPA) and Joe Wojnas (USACE) hardcopy on October 13, 2008. Uploaded to Project Website
	745115-DFR 46		3.4.3	DFR 46 10/13/08											X							P	13-Oct-08	USACE/AFRPA			Submitted to Cathy Jerrard (AFRPA) and Joe Wojnas (USACE) hardcopy on October 14, 2008. Uploaded to Project Website
	745115-DFR 47		3.4.4	DFR 47 10/14/08											X							P	14-Oct-08	USACE/AFRPA			Submitted to Cathy Jerrard (AFRPA) and Joe Wojnas (USACE) hardcopy on October 15, 2008. Uploaded to Project Website

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a	b	c	d	e	f	g	h	i	j	k	l	m	n	o	p	q	r	s	t	u	v	w	x	y	z	aa
	745115-DFR 48		3.4.5	DFR 48 10/15/08											X						P	15-Oct-08	USACE/AFRPA			Submitted to Cathy Jerrard (AFRPA) and Joe Wojnas (USACE) hardcopy on October 16, 2008. Uploaded to Project Website
	745115-DFR 49		3.4.6	DFR 49 10/16/08											X						P	16-Oct-08	USACE/AFRPA			Submitted to Cathy Jerrard (AFRPA) and Joe Wojnas (USACE) hardcopy on October 17, 2008. Uploaded to Project Website
	745115-DFR 50		3.4.7	DFR 50 10/17/08											X						P	17-Oct-08	USACE/AFRPA			Submitted to Cathy Jerrard (AFRPA) and Joe Wojnas (USACE) hardcopy on October 20, 2008. Uploaded to Project Website
	745115-DFR 51		3.4.7	DFR 51 10/20/08											X						P	20-Oct-08	USACE/AFRPA			Submitted to Cathy Jerrard (AFRPA) and Joe Wojnas (USACE) hardcopy on October 21, 2008. Uploaded to Project Website
	745115-DFR 52		3.4.7	DFR 52 10/21/08											X						P	21-Oct-08	USACE/AFRPA			Submitted to Cathy Jerrard (AFRPA) and Joe Wojnas (USACE) hardcopy on October 22, 2008. Uploaded to Project Website
	745115-DFR 53		3.4.7	DFR 53 10/22/08											X						P	22-Oct-08	USACE/AFRPA			Submitted to Cathy Jerrard (AFRPA) and Joe Wojnas (USACE) hardcopy on October 23, 2008. uploaded to Project Website
	745115-DFR 54		3.4.7	DFR 54 10/23/08											X						P	23-Oct-08	USACE/AFRPA			Submitted to Cathy Jerrard (AFRPA) and Joe Wojnas (USACE) hardcopy on October 24, 2008. Uploaded to Project Website
	745115-DFR 55		3.4.7	DFR 55 10/24/08											X						P	24-Oct-08	USACE/AFRPA			Submitted to Cathy Jerrard (AFRPA) and Joe Wojnas (USACE) hardcopy on October 27, 2008. Uploaded to Project Website
	745115-DFR 56		3.4.7	DFR 56 10/27/08											X						P	27-Oct-08	USACE/AFRPA			Submitted to Cathy Jerrard (AFRPA) and Joe Wojnas (USACE) hardcopy on October 28, 2008. Uploaded to Project Website
	745115-DFR 57		3.4.7	DFR 57 10/28/08											X						P	28-Oct-08	USACE/AFRPA			Submitted to Cathy Jerrard (AFRPA) and Joe Wojnas (USACE) hardcopy on October 29, 2008. Uploaded to Project Website
	745115-DFR 58		3.4.7	DFR 58 10/29/08											X						P	29-Oct-08	USACE/AFRPA			Submitted to Cathy Jerrard (AFRPA) and Joe Wojnas (USACE) hardcopy on October 30, 2008. Uploaded to Project Website

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a	b	c	d	e	f	g	h	i	j	k	l	m	n	o	p	q	r	s	t	u	v	w	x	y	z	aa
	745115-DFR 59		3.4.7	DFR 59 10/30/08											X						P	30-Oct-08	USACE/AFRPA			Submitted to Cathy Jerrard (AFRPA) and Joe Wojnas (USACE) hardcopy week of November 3, 2008. Uploaded to Project Website
	745115-DFR 60		3.4.7	DFR 60 11/3/08											X						P	3-Nov-08	USACE/AFRPA			Submitted to Cathy Jerrard (AFRPA) and Joe Wojnas (USACE) hardcopy November 4, 2008. Uploaded to Project Website
	745115-DFR 61		3.4.7	DFR 61 11/4/08											X						P	4-Nov-08	USACE/AFRPA			Submitted to Cathy Jerrard (AFRPA) and Joe Wojnas (USACE) hardcopy November 18, 2008. Uploaded to Project Website
	745115-DFR 62		3.4.7	DFR 62 11/5/08											X						P	5-Nov-08	USACE/AFRPA			Submitted to Cathy Jerrard (AFRPA) and Joe Wojnas (USACE) hardcopy November 18, 2008. Uploaded to Project Website
	745115-DFR 62-2		3.4.7	DFR 62-2 11/5/08 (DRUM SAMPLING- extra DFR)											X						P	5-Nov-08	USACE/AFRPA			Submitted to Cathy Jerrard (AFRPA) and Joe Wojnas (USACE) via Fed Ex on November 14, 2008. To Be Uploaded to Project Website
	745115-DFR 63		3.4.7	DFR 63 11/6/08											X						P	6-Nov-08	USACE/AFRPA			Submitted to Cathy Jerrard (AFRPA) and Joe Wojnas (USACE) hardcopy November 18, 2008. To Be Uploaded to Project Website
	745115-DFR 64		3.4.7	DFR 64 11/7/08											X						P	7-Nov-08	USACE/AFRPA			Submitted to Cathy Jerrard (AFRPA) and Joe Wojnas (USACE) hardcopy November 18, 2008. Uploaded to Project Website
	745115-DFR 65		3.4.7	DFR 65 11/17/08											X						P	17-Nov-08	USACE/AFRPA			Submitted to Cathy Jerrard (AFRPA) and Joe Wojnas (USACE) hardcopy November 18, 2008. Uploaded to Project Website

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a	b	c	d	e	f	g	h	i	j	k	l	m	n	o	p	q	r	s	t	u	v	w	x	y	z	aa
	745115-DFR 66		3.4.7	DFR 66 11/18/08											X						P	18-Nov-08	USACE/AFRPA			Submitted to Cathy Jerrard (AFRPA) and Joe Wojnas (USACE) hardcopy November 24, 2008. Uploaded to Project Website
	745115-DFR 67		3.4.7	DFR 67 11/19/08											X						P	19-Nov-08	USACE/AFRPA			Submitted to Cathy Jerrard (AFRPA) and Joe Wojnas (USACE) hardcopy November 24, 2008. Uploaded to Project Website
	745115-DFR 68		3.4.7	DFR 68 11/20/08											X						P	20-Nov-08	USACE/AFRPA			Submitted to Cathy Jerrard (AFRPA) and Joe Wojnas (USACE) hardcopy November 24, 2008. Uploaded to Project Website
	745115-DFR 69		3.4.7	DFR 69 11/21/08											X						P	21-Nov-08	USACE/AFRPA			Submitted to Cathy Jerrard (AFRPA) and Joe Wojnas (USACE) hardcopy November 24, 2008. To Be Uploaded to Project Website
	745115-DFR 70		3.4.7	DFR 70 11/24/08											X						P	24-Nov-08	USACE/AFRPA			Fed Ex'd to Cathy Jerrard (AFRPA) and Joe Wojnas (USACE) hardcopy November 26 2008. Uploaded to Project Website
	745115-DFR 71		3.4.7	DFR 71 11/25/08											X						P	25-Nov-08	USACE/AFRPA			Fed Ex'd to Cathy Jerrard (AFRPA) and Joe Wojnas (USACE) hardcopy November 26 2008. Uploaded to Project Website
	745115-DFR 72		3.4.7	DFR 72 12/10/08											X						P	10-Dec-08	USACE/AFRPA			Submitted to Cathy Jerrard (AFRPA) and Joe Wojnas (USACE) hardcopy December 11, 2008 To Be Uploaded to Project Website
	745115-DFR 73		3.4.7	DFR 73 12/11/08											X						P	11-Dec-08	USACE/AFRPA			Fed Ex'd to Cathy Jerrard (AFRPA) and Joe Wojnas (USACE) hardcopy December 12, 2008 To Be Uploaded to Project Website
	745115-26Nov08		3.4.7	DFR 26Nov08 11/26/08											X						P	26-Nov-08	USACE/AFRPA			Fed Ex'd to Cathy Jerrard (AFRPA) and Joe Wojnas (USACE) hardcopy December 12 2008 To Be Uploaded to Project Website
	745115-DFR 74		3.4.7	DFR 74 12/17/08											X						P	17-Dec-08	USACE/AFRPA			Submitted to Cathy Jerrard (AFRPA) and Joe Wojnas (USACE) hardcopy. Uploaded to
	745115-DFR 75		3.4.7	DFR 75 12/18/08											X						P	18-Dec-08	USACE/AFRPA			Submitted to Cathy Jerrard (AFRPA) and Joe Wojnas (USACE) via Fed Ex on December 24, 2008. Uploaded to Project Website.

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a	b	c	d	e	f	g	h	i	j	k	l	m	n	o	p	q	r	s	t	u	v	w	x	y	z	aa
	745115-DFR 76		3.4.7	DFR 76 12/16/08											X							P	16-Dec-08	USACE/AFRPA		Submitted to Cathy Jerrard (AFRPA) and Joe Wojnas (USACE) via Fed Ex on December 16, 2008. Uploaded to Project Website.
	745115-DFR 77		3.4.7	DFR 77 12/22/08											X							P	22-Dec-08	USACE/AFRPA		Submitted Hardcopy to Cathy Jerrard (AFRPA) and Joe Wojnas (USACE) via Fed Ex on December 31, 2008. Uploaded to Project Website.
	745115-DFR 78		3.4.7	DFR 78 12/24/08											X							P	24-Dec-08	USACE/AFRPA		Submitted Hardcopy to Cathy Jerrard (AFRPA) and Joe Wojnas (USACE) via Fed Ex on December 24, 2008. Uploaded to Project Website.
	745115-DFR 79		3.4.2	DFR 79 01/06/09											X							P	6-Jan-09	USACE/AFRPA		Submitted Hardcopy to Cathy Jerrard (AFRPA) and Joe Wojnas (USACE) via Fed Ex on January 8, 2009. Uploaded to Project Website.
	745115-DFR 80		3.4.2	DFR 80 01/09/09											X							P	9-Jan-09	USACE/AFRPA		Submitted Hardcopy to Cathy Jerrard (AFRPA) and Joe Wojnas (USACE) Jan 28, 2009 Uploaded to Project Website.
	745115-DFR 81		3.4.2	DFR 81 01/14/09											X							P	14-Jan-09	USACE/AFRPA		Submitted Hardcopy to Cathy Jerrard (AFRPA) and Joe Wojnas (USACE) Jan 28, 2009 Uploaded to Project Website.
	745115-DFR 82		3.4.2	DFR 82 01/21/09											X							P	21-Jan-09	USACE/AFRPA		Submitted Hardcopy to Cathy Jerrard (AFRPA) and Joe Wojnas (USACE) Jan 28, 2009 Uploaded to Project Website.
	745115-DFR 83		3.4.2	DFR 83 01/28/09											X							P	28-Jan-09	USACE/AFRPA		Submitted Hardcopy to Cathy Jerrard (AFRPA) and Joe Wojnas (USACE) on February 4, 2009. Uploaded to Project Website.
	745115-DFR 84		3.4.2	DFR 84 02/04/09 (Includes B775 Pre-Final Inspection)											X							P	4-Feb-08	USACE/AFRPA		Submitted Hardcopy to Cathy Jerrard (AFRPA) and Joe Wojnas (USACE) via Fed Ex on February 6, 2009. Uploaded to Project Website.
	745115-DFR 85		3.4.2	DFR 85 02/16/09											X							P	16-Feb-08	USACE/AFRPA		Submitted Hardcopy to Cathy Jerrard (AFRPA) and Joe Wojnas (USACE) on February 26, 2009. Uploaded to Project Website.
	745115-DFR 86		3.4.2	DFR 86 02/26/09											X							P	26-Feb-09	USACE/AFRPA		Submitted Hardcopy to Cathy Jerrard (AFRPA) and Joe Wojnas (USACE) via Fed Ex on March 6, 2009. Uploaded to Project Website.
	745115-DFR 87		3.4.2	DFR 87 03/17/09											X							P	17-Mar-09	USACE/AFRPA		Submitted Hardcopy to Cathy Jerrard (AFRPA) and Joe Wojnas (USACE) via Fed Ex on March 19, 2009. Uploaded to Project Website.
	745115-DFR 88		3.4.2	DFR 88 03/18/09											X							P	18-Mar-09	USACE/AFRPA		Submitted Hardcopy to Cathy Jerrard (AFRPA) and Joe Wojnas (USACE) via Fed Ex on March 19, 2009. Uploaded to Project Website.
	745115-DFR 89		3.4.2	DFR 89 03/19/09											X							P	19-Mar-09	USACE/AFRPA		Submitted Hardcopy to Cathy Jerrard (AFRPA) and Joe Wojnas (USACE) via Fed Ex on March 19, 2009. Uploaded to Project Website.

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a	b	c	d	e	f	g	h	i	j	k	l	m	n	o	p	q	r	s	t	u	v	w	x	y	z	aa
	745115-DFR 90		3.4.2	DFR 90 05/04/09												X					P	4-May-09	USACE/AFRPA			Submitted Hardcopy to Cathy Jerrard (AFRPA) and Joe Wojnas (USACE) via Fed Ex on May 5, 2009. Uploaded to Project Website.
	745115-DFR 91		3.4.2	DFR 91 05/15/09												X					P	15-May-09	USACE/FRPA			Submitted hardcopy to Cathy Jerrard (AFRPA) and Joe Wojnas (USACE) via UPS on May 26, 2009. Uploaded to project website.
	745115-DFR 92		3.4.2	DFR 92 06-05-09																	P	5-Jun-09	USACE/FRPA			Submitted hardcopy to Cathy Jerrard (AFRPA) and Joe Wojnas (USACE) via UPS on June 10, 2009. Uploaded to project website.
	745115-DFR 93		3.4.2	DFR 93 06/24/09																	P	24-Jun-09	USACE/FRPA			Submitted hardcopy to Cathy Jerrard (AFRPA) and Joe Wojnas (USACE) via UPS on June 30, 2009. Uploaded to project website.
	09 & 19	2	3.4.3	Safety Audits 7/15/08 & 10/22/08												X					P	July 18, 2008 & Nov. 12, 2008	USACE			Submittals a-b to be transmitted separately
	09	a	3.4.3	Parsons Internal Safety Audit July 15, 2008												X					P	18-Jul-08	USACE			Submitted to Joe Wojnas (USACE) hardcopy on July 21, 2008. Uploaded to Project Website.
	19	b	3.4.3	Parsons Internal Safety Audit - October 22, 2008												X					P	12-Nov-08	USACE			Submitted to Joe Wojnas (USACE) via Fed Ex and uploaded to project Website on November 14, 2008.
	06	3a	4.1	Dig Safe Notification												X					P	3-Jul-08	USACE			Delivered Hardcopy July 7, 2008. Uploaded to Project Website
	06	3b	4.5	Notification of Upcoming Work (Building 775)- Griffiss Police Department												X					P	3-Jul-08	USACE			Delivered Hardcopy July 7, 2008. Uploaded to Project Website
	06	3c	4.5	Notification of Upcoming Work (Building 775)- Griffiss Fire Department												X					P	3-Jul-08	USACE			Delivered Hardcopy July 7, 2008. Uploaded to Project Website

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a	b	c	d	e	f	g	h	i	j	k	l	m	n	o	p	q	r	s	t	u	v	w	x	y	z	aa
	06	3d	4.5	Notification of Upcoming Work (Apron 2)- Griffiss Airpark												X					P	3-Jul-08	USACE			Delivered Hardcopy July 7, 2008. Uploaded to Project Website
	26	4	4.4	Survey Report																	S	16-Dec-08	USACE			Submitted Survey Results to Joe Wojnas (USACE) via Fed Ex on December 24, 2008. Uploaded to Project Website.
	02	5	4.5.2	Water Discharge Permit																	P	Received 5/21/2008. Hardcopy Transmittal 30Jun08	USACE			City of Rome Water Pollution Control Facility- Uploaded to project website and sent hardcopy July 2, 2008.
	03	6	4.5.3	Underground Injection Notification																	P	Received 6/20/08. Hardcopy Transmittal 30Jun08	USACE			Received June 20, 2008. Uploaded to project website and sent hardcopy July 2, 2008.
	04 & 11	7	5.3.1, 6.3.1	Slug Test Results							X										P	June 30, August 25, & October 20, 2008				Submittal A Submitted July 2, 2008; Submittal B submitted Sept. 11, 2008; and Submittal C submitted October 20, 2008.
	04		a	Slug Test Results- Before Injections (June 17, 2008)							X										P	Completed 6/30/2008	USACE			Transmitted Hardcopy 2Jul08.
	11		b	Slug Test Results - During Injections (August 12, 2008)							X										P	Completed 8/25/08	USACE			Delivered Hardcopy 11Sept08. Posted to ParShare Website.
	16		c	Slug Test Results -After Injections (September 9, 2008)							X										P	Hardcopy transmitted 20Oct08	USACE			Submitted Hardcopy to Joe Wojnas (USACE) October 20, 2008. Posted to the Parshare Site
	14 & 21 & 22 & 23	8	7.4.1	Extraction Well System Components												X					S	10/1/2008	USACE			Some of the submittals were sent to Joe Wojnas (USACE) Hardcopy Oct 2,2008 (See drop down grouping). Posted to Project Website.
	21		a	½ horse power, 60 hertz (hz) standard capacity submersible pump (Model #5SQ05-90, Grundfos Pumps or equivalent)												X					S	11/25/2008	USACE			Fed Ex'd Hardcopy to Joe Wojnas (USACE) on November 25, 2008. Uploaded to Project Website.
	14		b	pitless adapter												X					S	10/1/2008	USACE			Fed Ex'd Hardcopy to Joe Wojnas (USACE) Oct 2, 2008. Uploaded to Project Website.
	14		c	steel pump cable with eyelet, and a capacity of 3600 pounds (lbs) working load.												X					S	10/1/2008	USACE			Fed Ex'd Hardcopy to Joe Wojnas (USACE) Oct 2, 2008. Uploaded to Project Website.
	14		d	torque arrestor												X					S	10/1/2008	USACE			Fed Ex'd Hardcopy to Joe Wojnas (USACE) Oct 2, 2008. Uploaded to Project Website.

SUBMITTAL REGISTER																				CONTRACT NUMBER: W912DQ-06-D-0012						
(ER 415-1-10)																										
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a	b	c	d	e	f	g	h	i	j	k	l	m	n	o	p	q	r	s	t	u	v	w	x	y	z	aa
	See Electrical Submittal		e	pressure transducer (See Well Watcher Electrical Submittal)											X							S	See Electrical Submittal	USACE		See Electrical Submittal
	14		f	Parker-Hannefin 1 foot- 4-inch ID GST II water hose (model #7093-125204 or equivalent)											X							S	10/1/2008	USACE		Fed Ex'd Hardcopy to Joe Wojnas (USACE) Oct 2, 2008. Uploaded to Project Website.
	14		g	1.5-inch polyvinyl chloride (PVC) gate valve											X							S	10/1/2008	USACE		Fed Ex'd Hardcopy to Joe Wojnas (USACE) Oct 2, 2008. Uploaded to Project Website.
	14		h	2 piece adjustable cast iron curb box (#93-E) with a flush fit cover manufactured by Bingham and Taylor Inc. or equivalent											X							S	10/1/2008	USACE		Fed Ex'd Hardcopy to Joe Wojnas (USACE) Oct 2, 2008. Uploaded to Project Website.
	14		i	2-inch, PVC, Schedule 80, force main											X							S	10/1/2008	USACE		Fed Ex'd Hardcopy to Joe Wojnas (USACE) Oct 2, 2008. Uploaded to Project Website.
	14		j	compression connection											X							S	10/1/2008	USACE		Fed Ex'd Hardcopy to Joe Wojnas (USACE) Oct 2, 2008. Uploaded to Project Website.
	22		k	Pressure test all piping in accordance with ANSI/AWWA C605-05											X							S	11/26/2008	USACE		Fed Ex'd Hardcopy to Joe Wojnas (USACE) November 26, 2008. Uploaded to Project Website.
	14		l	standard non-metallic, lightweight, meter box assembly (#194513 with snap lock lid by Armor Access Boxes, or approved equivalent)											X							S	10/1/2008	USACE		Fed Ex'd Hardcopy to Joe Wojnas (USACE) Oct 2, 2008. Uploaded to Project Website.
	14		m	¼-inch flex sampling hose with tether cord											X							S	10/1/2008	USACE		Fed Ex'd Hardcopy to Joe Wojnas (USACE) Oct 2, 2008. Uploaded to Project Website.
	23		n	1-inch diameter flow meter with remote flow readout by Flow Technology or equivalent.											X							S	12/2/2008	USACE		Fed Ex'd Hardcopy to Joe Wojnas (USACE) December 2, 2008. Uploaded to Project Website.
	See Electrical Submittal		o	control panel with an indicator light identifying when the pump is running or not running											X							S	See Electrical Submittal	USACE		See Electrical Submittal
	14		p	mechanical type compressible penetration seal (Model #LS-300-CS-4-8, Link Seal Corp or approved equivalent) for 2-inch PVC pipe.											X							S	10/1/2008	USACE		Fed Ex'd Hardcopy to Joe Wojnas (USACE) Oct 2, 2008. Uploaded to Project Website.
	14		q	carbon steel pipe sleeve											X							S	10/1/2008	USACE		Fed Ex'd Hardcopy to Joe Wojnas (USACE) Oct 2, 2008. Uploaded to Project Website.
	14		r	3-inch x 3-inch x 2-inch tee											X							S	10/1/2008	USACE		Fed Ex'd Hardcopy to Joe Wojnas (USACE) Oct 2, 2008. Uploaded to Project Website.

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a	b	c	d	e	f	g	h	i	j	k	l	m	n	o	p	q	r	s	t	u	v	w	x	y	z	aa
	07	9	7.4.1	Extraction Well Components (EW-1)											X						S	Completed July 3, 2008	USACE			Submitted 'a' - 'd' as a single submittal. Submitted to Joe Wojnas (USACE) hardcopy on July 7, 2008. Uploaded to Project Website.
	07		a	Well casing, 6" Schedule 10 SS pipe											X						S	Received 7/3/08 from Drillers	USACE			Submitted Hardcopy July 7, 2008; uploaded to project site
	07		b	6" SS well screen											X						S	Received 7/3/08 from Drillers	USACE			Submitted Hardcopy July 7, 2008; uploaded to project site
	07		c	Filter pack (#3Q-ROK unground silica or equal)											X						S	Received 7/3/08 from Drillers	USACE			Submitted Hardcopy July 7, 2008; uploaded to project site
	07		d	6" dia protective steel casing											X						S	Received 7/3/08 from Drillers	USACE			Submitted Hardcopy July 7, 2008; uploaded to project site
	20	10	7.4.2	Pump Test Results (Step and Constant Rate)						X											P	Sept 17 and Sept 19, 2008 and Nov 21,	USACE			Submitted on September 17 and 18 and November 21 and 24, 2008
	DFR 34 & 36		a	Step Test and Constant Rate Test for Retrofit Well (EW-1A)						X											P	Sept 17 and Sept 19, 2008	USACE			Submitted as part of DFR 34 - September 17, 2008 and DFR 36 - September 19, 2008.
	20		b	Step Test and Constant Rate Test for Extraction Wells (EW-1R & EW-3)						X											P	Submitted November 21, 24, 2008	USACE			Submitted on to Joe Wojnas (USACE) on November 24, 2008.
	NA	11	NA	DELETED																	NA	NA	NA			NA
	08	12	10.1.1	Monitoring Well Components											X						S	Completed July 3, 2008	USACE			Submitted 'a' - 'd' as a single submittal. Submitted to Joe Wojnas (USACE) hardcopy on July 7, 2008. Uploaded to project Website.
	08		a	Well casing, 2" Schedule 40 PVC pipe											X						S	Received 7/3/08 from Drillers	USACE			Submitted Hardcopy July 7, 2008; uploaded to project site
	08		b	2" PVC well screen											X						S	Received 7/3/08 from Drillers	USACE			Submitted Hardcopy July 7, 2008; uploaded to project site
	08		c	Filter pack (Moire #0 or equal)											X						S	Received 7/3/08 from Drillers	USACE			Submitted Hardcopy July 7, 2008; uploaded to project site
	08		d	6" dia protective steel casing and Locking Caps											X						S	Received 7/3/08 from Drillers	USACE			Submitted Hardcopy July 7, 2008; uploaded to project site
		13	10.1.2	Well Development Record						X											S	Refer to DFR	USACE			Submitted as part of the Daily Field Reports

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a	b	c	d	e	f	g	h	i	j	k	l	m	n	o	p	q	r	s	t	u	v	w	x	y	z	aa
		14	10.4	Field Log Books						X											P	Refer to DFR	USACE			Copies of the field log books are submitted with the daily field reports.
		15	10.5	Well Verification Checklist						X											P	Refer to DFR	USACE			Copies were submitted with the daily field reports. Complete checklist to be submitted with the IRACR
		15	11	Restoration Materials																	S	10/1/2008	USACE			Some of the submittals were Fed Ex'd Hardcopy to Joe Wojnas (USACE) Oct 2, 2008 (See drop down grouping). Uploaded to Project Website. Remaining Submittals Pending.
			a	Asphalt										X							S	10/1/2008	USACE			Fed Ex'd Hardcopy to Joe Wojnas (USACE) Oct 2, 2008. Uploaded to Project Website.
	NA		b	Cast-in-Place Concrete- Refer to K-Crete (item H)										X							S	NA	NA			NA
	NA		c	topsoil • Organic loam, well drained, homogenous- Refer to Landfill 6 restoration (item 18C)- For B775										X							S	NA	NA			NA
		15	d	grass seed - mixture of 30% annual ryegrass and 70% perennial ryegrass										X							S	10/1/2008	USACE			Fed Ex'd Hardcopy to Joe Wojnas (USACE) Oct 2, 2008. Uploaded to Project Website.
		15	e	Fertilizer (commercial grade 5-10-5 mixture)										X							S	10/1/2008	USACE			Fed Ex'd Hardcopy to Joe Wojnas (USACE) Oct 2, 2008. Uploaded to Project Website.
		15	f	Pea gravel or approved pipe bedding										X							S	10/1/2008	USACE			Fed Ex'd Hardcopy to Joe Wojnas (USACE) Oct 2, 2008. Uploaded to Project Website.
		15	g	Crushed stone base- under finished pavement										X							S	10/1/2008	USACE			Fed Ex'd Hardcopy to Joe Wojnas (USACE) Oct 2, 2008. Uploaded to Project Website.
		15	h	K-Crete Backfill										X							S	10/1/2008	USACE			Fed Ex'd Hardcopy to Joe Wojnas (USACE) Oct 2, 2008. Uploaded to Project Website.
	14, 21, 23, 27 & 28	17	4.3	Electrical										X							P	11/25/2008	USACE			Submittal a-m are submitted as a single item. Fed Ex'd Hardcopy to Joe Wojnas (USACE) on November 26, 2008. Uploaded to Project Website.
	21		a	Pump Controller (Well Watcher)										X							P	11/25/2008	USACE			Fed Ex'd Hardcopy to Joe Wojnas (USACE) on November 26, 2008. Uploaded to Project Website.
	21		b	Motor Starter										X							P	11/25/2008	USACE			Fed Ex'd Hardcopy to Joe Wojnas (USACE) on November 26, 2008. Uploaded to Project Website.

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					DRAWING	INSTRUCTIONS	SCHEDULES	STATEMENTS	REPORTS	CERTIFICATIONS	SAMPLES	RECORDS	O & M MANUAL	INFORMATION ONLY	GOV'T APPROVED	REVIEWER	SUBMIT	APPROVAL NEEDED BY	MATERIAL NEEDED BY	CODE	DATE	SUBMIT TO GOVERNMENT	CODE		DATE	
a	b	c	d	e	f	g	h	i	j	k	l	m	n	o	p	q	r	s	t	u	v	w	x	y	z	aa
	14		c	Schedule 80 PVC conduit (1 inch and 2- inch)											X						P	10/1/2008	USACE			Fed Ex'd Hardcopy to Joe Wojnas (USACE) Oct 2, 2008. Uploaded to Project Website.
	21		d	100 Amp Safety Switch (Grainger Item 1H251 or Equal)											X						P	11/25/2008	USACE			Fed Ex'd Hardcopy to Joe Wojnas (USACE) on November 26, 2008. Uploaded to Project Website.
	21		e	Class 5K Non Time Delay Fuse, 60 Amp (Grainger 4XF97, or equal)											X						P	11/25/2008	USACE			Fed Ex'd Hardcopy to Joe Wojnas (USACE) on November 26, 2008. Uploaded to Project Website.
	21		f	Enclosed Rainproof Molded Switch Case (Grainger 2DP81, or Equal)											X						P	11/25/2008	USACE			Fed Ex'd Hardcopy to Joe Wojnas (USACE) on November 26, 2008. Uploaded to Project Website.
	21		g	100 Amp Load Center Panel Board (Grainger 5B770, or equal)											X						P	11/25/2008	USACE			Fed Ex'd Hardcopy to Joe Wojnas (USACE) on November 26, 2008. Uploaded to Project Website.
	21		h	Circuit Breakers, 20 Amps, (Grainger 1D301 & 1H824, or equals)											X						P	11/25/2008	USACE			Fed Ex'd Hardcopy to Joe Wojnas (USACE) on November 26, 2008. Uploaded to Project Website.
	21 & 28		i	Pilot Light Head (Grainger 6HW18, or equal)											X						P	11/25/2008 & 2/4/09	USACE			Fed Ex'd Hardcopy to Joe Wojnas (USACE) on November 26, 2008. Submitted Hardcopy on Feb 4, 2009 Uploaded to Project Website.
	21 & 28		j	Pilot Light Lamp Module (Grainger 6HW25, or equal)											X						P	11/25/2008 & 2/4/09	USACE			Fed Ex'd Hardcopy to Joe Wojnas (USACE) on November 26, 2008. Submitted Hardcopy on Feb 4, 2009 Uploaded to Project Website.
	21		k	Indicating Light Enclosure (Grainger 6HK20 or equal)											X						P	11/25/2008	USACE			Fed Ex'd Hardcopy to Joe Wojnas (USACE) on November 26, 2008. Uploaded to Project Website.
	21 & 27& 28		l (rev 1)	Time Delay Relay (Grainger 6AB55, or equal) [Submitted Rev 1 on Dec 31, 2008-SRC Series SRC72ANNA or equivalent]											X						P	11/25/2008 & 12/30/08 (Rev 1) & 2/4/08	USACE			Fed Ex'd Hardcopy to Joe Wojnas (USACE) on November 26, 2008 and December 31, 2008. Submitted Hardcopy on Feb 4, 2009. Uploaded to Project Website.
	21 & 23		m	Electrical Wire Diagrams (Submitted Rev 1 on Dec 2, 2008)			X														P	11/25/2008 & 12/2/08	USACE			Fed Ex'd Hardcopy to Joe Wojnas (USACE) on November 26, 2008. Revision 1 Fed Ex On December 2, 2008. Uploaded to Project Website.
	28		n	Alarm Wiring Diagrams			X														P	2/4/2009	USACE			Submitted Hardcopy to Joe Wojnas (USACE) on February 4, 2009. Uploaded to Project Website
	28		o	Repeat Cycle Time Delay Relay											X						P	2/4/2009	USACE			Submitted Hardcopy to Joe Wojnas (USACE) on February 4, 2009. Uploaded to Project Website
	28		p	Fuse Blocks (Littlefuse LH, or equal)											X						P	2/4/2009	USACE			Submitted Hardcopy to Joe Wojnas (USACE) on February 4, 2009. Uploaded to Project Website

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a	b	c	d	e	f	g	h	i	j	k	l	m	n	o	p	q	r	s	t	u	v	w	x	y	z	aa
	10 & 13	18	9.3	Landfill 6 Road Improvement/ Restoration												X					S	Completed July 14, 2008	USACE			Submitted 'a-b' as a single submittal. Landfill 6 Access Road to be improved as needed to support RA field work. Submitted Hardcopy to Joe Wojnas (USACE) on July 21, 2008. Uploaded to Project Website. Submittals 'c-d' to be a single submittal for the Landfill 6 Access Road Restoration.
	10	18	a	Stone/Gravel												X					S	Received from Subcontractor week of 7/14/08	USACE			Submitted Hardcopy to Joe Wojnas (USACE) on July 21, 2008. Uploaded to Project Website
	10	18	b	Geotextile/fabric												X					S	Received from Subcontractor week of 7/14/08	USACE			Submitted Hardcopy to Joe Wojnas (USACE) on July 21, 2008. Uploaded to Project Website
	13	18	c	Topsoil													X				P	Work Completed Sept 26, 2008	USACE			Fed Ex'd to Joe Wojnas (USACE) on September 30, 2008. Uploaded to Project Website.
	13	18	d	Grass Seed Mixture													X				P	Work Completed Sept 26, 2008	USACE			Fed Ex'd to Joe Wojnas (USACE) on September 30, 2008. Uploaded to Project Website.
	18, 24 & 25	19	10.3	Remedial Derived Waste																	P	Completed Process December 24, 2008	USACE/ AFRPA			See various submittals sent to USACE and AFRPA. Waste removal completed and certificates of disposal presented on December 24, 2008.
	25		a	Laboratory Analytical Results- Drums		X															P	12/24/2008	USACE/ AFRPA			Submitted via Fed Ex to Joe Wojnas (USACE) and Cathy Jerrard (AFRPA) on December 24, 2008. Uploaded to Project Website
	25		b	Waste Profiles																	P	12/24/2008	USACE/ AFRPA			Submitted via Fed Ex to Joe Wojnas (USACE) and Cathy Jerrard (AFRPA) on December 24, 2008. Uploaded to Project Website
	18		c	Transporter Information (i.e. License/Permit)																	P	11/7/2008	USACE			Submitted permits via Fed Ex to Joe Wojnas (USACE) on November 7, 2008. Uploaded to ParShare
	18		d	TSD Facility Permit Information																	P	11/7/2008	USACE			Submitted permits via Fed Ex to Joe Wojnas (USACE) on November 7, 2008. Uploaded to ParShare

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a	b	c	d	e	f	g	h	i	j	k	l	m	n	o	p	q	r	s	t	u	v	w	x	y	z	aa
	25		e	Copies of the Waste Manifests											X						P	12/24/2008	USACE/AFRPA			Submitted via Fed Ex to Joe Wojnas (USACE) and Cathy Jerrard (AFRPA) on December 24, 2008. Uploaded to Project Website
	25		f	Certificates of Destruction							X										P	12/24/2008	USACE/AFRPA			Submitted via Fed Ex to Joe Wojnas (USACE) and Cathy Jerrard (AFRPA) on December 24, 2008. Uploaded to Project Website
	24		g	Laboratory Analytical Results- Frac Tank (includes Chain of Custody)	X																P	Sampled on Nov 7 2008	AFRPA/USACE			Delivered Hardcopy to Cathy Jerrard (AFRPA) and Joe Wojnas on Dec 3, 2008. Uploaded to Project Website.
	24		h	City of Rome- Frac Tank Discharge Completion Letter												X					P	Discharged on Nov 24-26, 2008	AFRPA/USACE			Delivered Hardcopy to Cathy Jerrard (AFRPA) and Joe Wojnas on Dec 3, 2008. Uploaded to Project Website.
	12	20	NA	Retrofit Extraction Well Components (EW-1A)												X					S	Completed 11Sept08	USACE			Submittals a-d were be submitted as a single submittal to Joe Wojnas on Sept 12, 2008 and posted to the Parshare Website.
	12		a	Well casing, 3" Schedule 10 SS pipe												X					S	Completed 11Sept08	USACE			Delivered Hardcopy to Joe Wojnas Sept 12, 2008. Posted to Parshare Website
	12		b	0.010 inch slot size-Well screen												X					S	Completed 11Sept08	USACE			Delivered Hardcopy to Joe Wojnas Sept 12, 2008. Posted to Parshare Website
	12		c	Filter pack (Filpro Well Gravels #00)												X					S	Completed 11Sept08	USACE			Delivered Hardcopy to Joe Wojnas Sept 12, 2008. Posted to Parshare Website
	12		d	Bentonite (Enviroplug Medium & Coarse)												X					S	Completed 11Sept08	USACE			Delivered Hardcopy to Joe Wojnas Sept 12, 2008. Posted to Parshare Website
	June 2010	21	Dwg Notes	As-Built Drawings							X										P/S	June 2010	USACE/AFRPA			Submitted as Part of the IRAC Report in June 2010.
	---	22	NA	DELETED																	P					Deleted line item- Duplicate
	3/2/2010	23	NA	As-Built Drawing of Extraction System Piping for GUSC. To include pipe location and depth.		X															P					FPM submitted to GUSC on March 2, 2010.

SUBMITTAL REGISTER																				CONTRACT NUMBER: W912DQ-06-D-0012						
(ER 415-1-10)																										
TITLE AND LOCATION: Former Griffiss AFB, Rome, NY				PROJECT NAME: On-Base Groundwater Remediation												CONTRACTOR: PARSONS				SPECIFICATION SECTION- RAWP, July 2008						
ACTIVITY NO	TRANSMITTAL NO	ITEM NUMBER	SPECIFICATION PARAGRAPH NUMBER	DESCRIPTION OF ITEMS SUBMITTED	TYPE OF SUBMITTAL										CLASSIFICATION		CONTRACTOR SCHEDULE DATES			CONTRACTOR ACTION		GOV'T ACTION		REMARKS		
					DATA	DRAWING	INSTRUCTIONS	SCHEDULES	STATEMENTS	REPORTS	CERTIFICATIONS	SAMPLES	RECORDS	O&M MANUAL	INFORMATION ONLY	GOV'T APPROVED	REVIEWER	SUBMIT	APPROVAL NEEDED BY	MATERIAL NEEDED BY	CODE	DATE	SUBMIT TO GOVERNMENT		CODE	DATE
a	b	c	d	e	f	g	h	i	j	k	l	m	n	o	p	q	r	s	t	u	v	w	x	y	z	aa
	17	24	7.4.1	Extraction Well Components (EW-1R & EW-3)											X						S	17-Oct-08	USACE			Submitted 'a' - 'd' as a single submittal. Submitted to Joe Wojnas (USACE) hardcopy on October 20, 2008. Uploaded to Project Website.
	17		a	Well casing, 6" Schedule 10 SS pipe											X						S	17-Oct-08	USACE			Submitted Hardcopy October 20 2008; uploaded to project site
	17		b	6" SS well screen (slot size 0.010 in)											X						S	17-Oct-08	USACE			Submitted Hardcopy October 20 2008; uploaded to project site
	17		c	Filter pack (#00 silica or equal)											X						S	17-Oct-08	USACE			Submitted Hardcopy October 20 2008; uploaded to project site
	17		d	6" dia protective steel casing											X						S	17-Oct-08	USACE			Submitted Hardcopy October 20 2008; uploaded to project site
	---	25	NA	Rome WPCF B 775 Quarterly Discharge Report							X											Various Dates	Rome/USACE/AFRPA			Quarterly Reports to be submitted to the City of Rome Water Pollution Control Facility with Copies going to USACE-KC and AFRPA.
	26-Jan-09	25.1	NA	Quarterly Discharge Report Oct-Dec 2008							X											1/26/2009	Rome/USACE/AFRPA			Report was sent Hardcopy on January 26, 2009 to Rome WPCF. Sent hardcopy to USACE on January 29, 2009.
	21-Apr-09	25.2	NA	Quarterly Discharge Report Jan-Mar 2009							X											4/21/2009	Rome/USACE/AFRPA			Report was sent Hardcopy on April 21, 2009 to Rome WPCF. Sent hardcopy to USACE/AFRPA on April 21, 2009..
	28-Jul-09	25.3	NA	Quarterly Discharge Report- (2 Quarter)- April- June 2009							X											7/28/2009	Rome/USACE/AFRPA			Submitted to City of Rome on July 28, 2009. Hardcopy sent to USACE-KC and AFRPA on July 28, 2009.
	28-Oct-09	25.4	NA	Quarterly Discharge Report- (3 Quarter)- July- September 2009							X											10/28/2009	Rome/USACE/AFRPA			Submitted to City of Rome on October 28, 2009. Hardcopy sent to USACE-KC and AFRPA on October 30, 2009.
	8-Jan-10	25.5	NA	Quarterly Discharge Report- (4 Quarter)- October- December 2009							X											1/8/2010	Rome/USACE/AFRPA			Submitted to City of Rome on January 8, 2010. Hardcopy sent to USACE-KC and AFRPA on January 8, 2010.
	30-Apr-10	25.6	NA	Quarterly Discharge Report- (1 Quarter)- January - March 2010							X											4/30/2010	Rome/USACE/AFRPA			Submitted to City of Rome on April 30, 2010. Hardcopy sent to USACE-KC and AFRPA on April 30, 2010.
	23-Jul-10	25.7	NA	Quarterly Discharge Report- (2 Quarter)- April - June 2010							X											7/23/2010	Rome/USACE/AFRPA			Submitted to City of Rome on July 23, 2010. Hardcopy sent to USACE-KC and AFRPA on July 23, 2010.
	1-Jul-09	26	NA	Building 775 O&M Manual											X							7/28/2009	Rome/USACE/AFRPA			O&M Manual prepared by FPM and Parsons to document operation and maintenance of the groundwater discharge system at B775. Submitted July 7, 2009.
	11-Jun-09		NA	Draft O&M Manual to AFRPA/USACE											X						S	6/11/2009	USACE/AFRPA			The Draft O&M Manual was submitted to AFRPA and USACE on June 11, 2009. Comments received around July 1, 2009

SUBMITTAL REGISTER																				CONTRACT NUMBER: W912DQ-06-D-0012						
(ER 415-1-10)																										
TITLE AND LOCATION: Former Griffiss AFB, Rome, NY				PROJECT NAME: On-Base Groundwater Remediation										CONTRACTOR: PARSONS				SPECIFICATION SECTION- RAWP, July 2008								
ACTIVITY NO	TRANSMITTAL NO	ITEM NUMBER	SPECIFICATION PARAGRAPH NUMBER	DESCRIPTION OF ITEMS SUBMITTED	TYPE OF SUBMITTAL										CLASSIFICATION			CONTRACTOR SCHEDULE DATES			CONTRACTOR ACTION		GOV'T ACTION		REMARKS	
					DRAWING	INSTRUCTIONS	SCHEDULES	STATEMENTS	REPORTS	CERTIFICATIONS	SAMPLES	RECORDS	O&M MANUAL	INFORMATION ONLY	GOV'T APPROVED	REVIEWER	SUBMIT	APPROVAL NEEDED BY	MATERIAL NEEDED BY	CODE	DATE	SUBMIT TO GOVERNMENT	CODE	DATE		
a	b	c	d	e	f	g	h	i	j	k	l	m	n	o	p	q	r	s	t	u	v	w	x	y	z	aa
	24-Aug-09		NA	Draft O&M Manual to USEPA/NYSDEC											x						s	8/24/2009	USEPA/NYSDEC			The draft O&M Manual was submitted to USEPA and NYSDEC on August 24, 2009.
	26-Jan-10		NA	Final O&M Manual to USEPA/NYSDEC											x						S	1/26/2010	USEPA/NYSDEC			The final O&M Manual was submitted to the USEPA, NYSDEC, AFRPA and USEPA, on January 26, 2010.
	29	27	NA	Building 775 Final Inspection - June 18, 2009											X						P	6/18/2009	USACE/AFRPA			Report was sent Hardcopy on June 30,2009 to Joe Wojnas (USACE) and Cathy Jerrard (AFRPA) via UPS. Uploaded to the project
	13-May-10	28		Underground Injection Notification to USEPA- RAWP Addendum											X						P	5/13/2010	USEPA			Report was sent to USEPA hardcopy on May 13, 2010.
	NA	NA	NA	IRAC Report																	S	June 2010	USACE/AFRPA			Report was submitted to the USACE and AFRPA June 2010

ENG FORM 4288-R, JAN 97

EDITION OF MAR 95 IS OBSOLETE

AE=AREA ENGINEER; RE=RESIDENT ENGINEER; CO=CONSTRUCTION/OPERATIONS DIVISION; ED=ENGINEERING DIVISION; SO=SAFETY OFFICE; PD=PLANNING DIVISION

(PROPONENT CEM-CE)

Notes:

- 1 Column d (Specification Paragraph #) = RAWP On-Base Groundwater Remediation, July 2008
- 2 IRACR = Interim Remedial Action Completion Report
- 3 Column v (Code) P = Parsons, S = Parsons Subcontractor

B

Building 775 Groundwater Capture Performance

TECHNICAL REPORT

BUILDING 775

GROUNDWATER CAPTURE PERFORMANCE

FORMER GRIFFISS AIR FORCE BASE, NEW YORK

PREPARED BY:

PARSONS

290 Elwood Davis Road, Suite 312
Liverpool, New York 13088
(315) 451-9560 Fax (315) 451-9570

FEBRUARY, 2011

Purpose

The purpose of this document is to summarize the performance evaluation conducted for the groundwater extraction system installed in the area of the Building 775 TCE plume.

Introduction

As part of the remediation program a groundwater extraction system was designed to capture groundwater impacted with site specific Compounds of Concern (COCs). The targeted capture area is where trichloroethene exists in groundwater at concentration above 50 µg/L, based on the Site Record of Decision (ROD). Section 3.2.12 of the ROD Selected Remedy states “Extraction wells located within the approximated 50 ug/L plume contamination contour are selected for the extraction scheme” and “The selected remedy will result in reduction of the highest concentrations of VOCs in groundwater at the Building 775 OBGW site. The remaining on-site VOC contamination is anticipated to attenuate naturally to achieve groundwater standards”.

As part of the remedial design and construction wells were installed and multiple pumping tests were conducted. The scope of work for the pumping tests included hydraulic tests designed to estimate groundwater parameters (i.e. transmissivity, storage coefficient, and distance-drawdown relationships). The types of hydraulic testing included pumping step-tests, constant rate tests and recovery tests. The results suggest the unit is a moderately transmissive, silt and sand, demonstrating hydraulic connection throughout the area around EW-1R and EW-3. The testing and analysis of these wells, provided in the remedial design documents (Parsons, 2008) estimated well pumping rates to capture the target area.

During 2009 performance monitoring data were collected to assist in understanding the groundwater chemistry, effects of groundwater extraction. These data (including performance monitoring groundwater samples, water level measurements, and field readings) were reviewed and analyzed, in order to evaluate the performance of the groundwater extraction system. A “converging lines of evidence” approach (EPA, 2008) was used to evaluate the groundwater capture zone.

Methods

Depth to water measurements were collected during each of the quarterly sampling events. Of the four sampling events, the September, 2009 event was most appropriate for derivation of a groundwater capture zone map, due to completeness. Therefore the September data were used to represent steady-state conditions. During September the combined groundwater extraction rate was approximately 3.5 gpm.

A groundwater elevation map was derived from water level measurements (see Figure 1). For each of the monitoring wells groundwater elevation was based on depth to water measurements and measuring point elevations. Meanwhile, for the extraction wells (EW-1R and EW-3) the groundwater elevation near the wells was calculated from the upper set point readings at each extraction well, corrected for well efficiency. Well efficiency, calculated as 70%, was based on step-test analysis conducted during aquifer testing. This method is appropriate for two reasons: (1) the upper set point is used as a surrogate for the water level in the extraction well, however the actual water level in the well is up to approximately 9 feet below this elevation for the majority of the pump cycle, (2) the upper set point water level was corrected for well efficiency.

The groundwater elevations and capture zone were overlaid on the same map with June 2009 concentration delineation ($> 50 \mu\text{g/L}$), to determine if the capture zone was sufficient. June 2009 was used for comparison because the $50 \mu\text{g/L}$ delineation was largest during this event.

The groundwater analytical model and capture zone calculations used to during the pre-construction groundwater capture analysis (Parsons, 2008). Updates to these calculations included revised hydraulic gradient and revised groundwater extraction rates.

Results

The attached figures demonstrate the groundwater capture zone created by the pumping from EW-1R and EW-3. Table 1 summarizes the approach and provides further details regarding each technique. Results of the “converging lines of evidence” capture analysis conclude that the extraction of groundwater from EW-1R and EW-3 was sufficient to contain the target capture area, as defined as upgradient concentration greater than $50 \mu\text{g/L}$. Capture was sufficient during 2009 at flow rates averaging at 3.5 gpm (combined). As groundwater travels

south from the area near 775VMW-5 it flows in the cone of depression created by EW-1R and EW-3, and is captured.

References

Javendal, I and Tsang, C.-F., 1986. Capture zone curves: a tool for aquifer cleanup. *Ground Water* 24 (5), 616-625.

Parsons 2008, Technical Report, Building 775 Groundwater Capture Analysis, Former Griffiss Air Force Base, New York.

United States Environmental Protection Agency, 2008 *A Systematic Approach for Evaluation of Groundwater Capture Zones at Pump and Treat Systems* EPA 600/R-08/003 | January 2008.

FIGURES

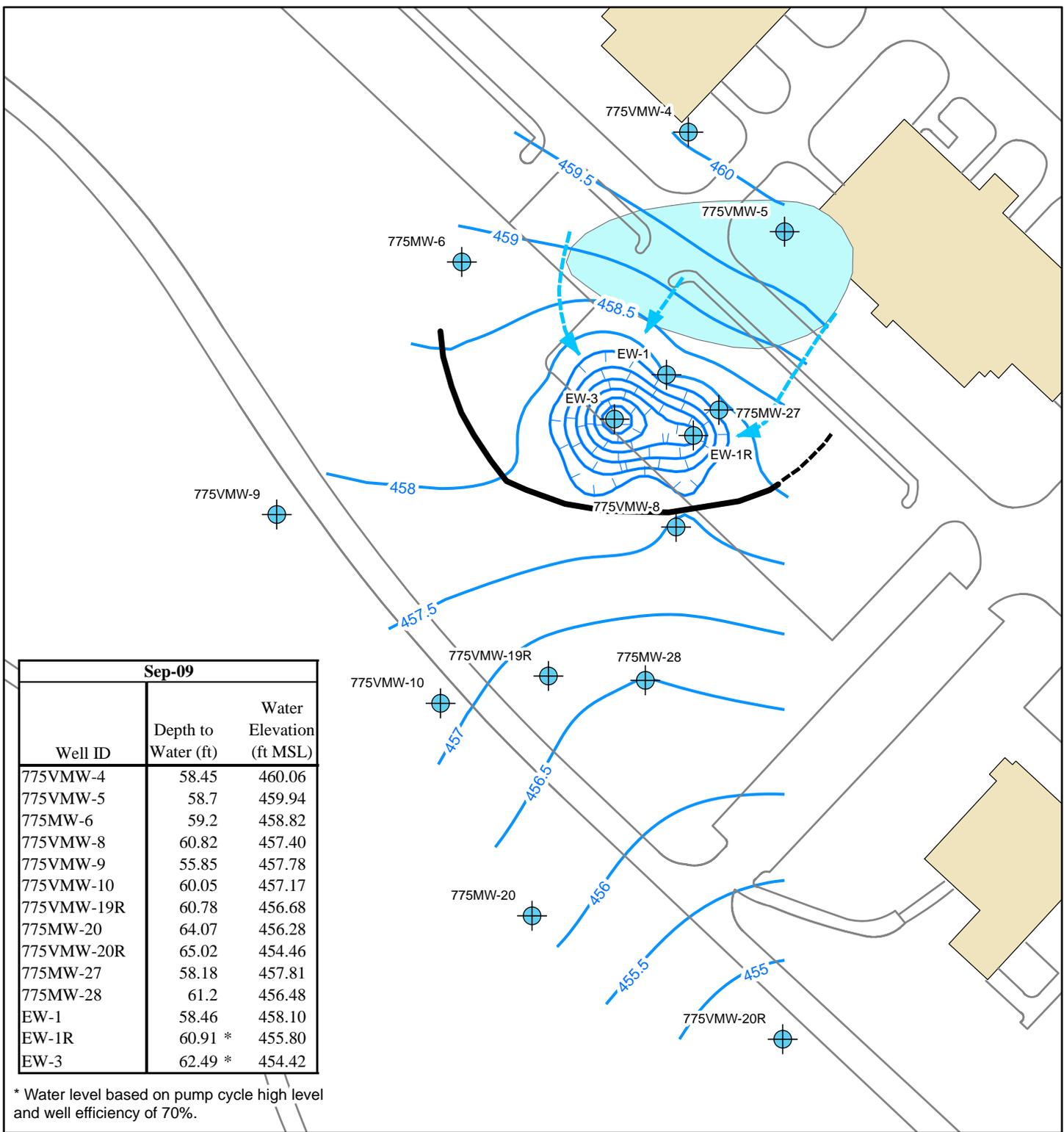
FIGURE 1: BUILDING 775 GROUNDWATER CAPTURE ZONE 2009

FIGURE 2: BUILDING 775 GROUNDWATER CAPTURE ZONE CAPTURE WIDTH CALCULATION FOR A SINGLE EXTRACTION WELL

FIGURE 3: BUILDING 775 GROUNDWATER CAPTURE ZONE REVISED ANALYTICAL MODEL RESULTS

TABLES

TABLE: RESULTS FROM A MULTIPLE LINES OF EVIDENCE APPROACH TO ANALYZING GROUNDWATER CAPTURE

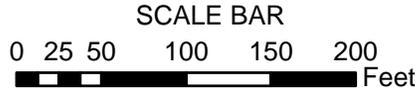


Sep-09		
Well ID	Depth to Water (ft)	Water Elevation (ft MSL)
775VMW-4	58.45	460.06
775VMW-5	58.7	459.94
775MW-6	59.2	458.82
775VMW-8	60.82	457.40
775VMW-9	55.85	457.78
775VMW-10	60.05	457.17
775VMW-19R	60.78	456.68
775MW-20	64.07	456.28
775VMW-20R	65.02	454.46
775MW-27	58.18	457.81
775MW-28	61.2	456.48
EW-1	58.46	458.10
EW-1R	60.91 *	455.80
EW-3	62.49 *	454.42

* Water level based on pump cycle high level and well efficiency of 70%.

Legend

- Well Location
- Water Level Contour Sept - 09
- June 09, TCE 50 ug/L
- Buildings
- Groundwater Flow Direction
- Downgradient Edge of Capture zone



**FIGURE 1: BUILDING 775
GROUNDWATER CAPTURE ZONE
2009**

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FORMER GRIFFISS AIR FORCE BASE
ROME, NY

PARSONS

GRIFFISS EW-1R AND EW-3 CAPTURE ANALYSIS

Capture zone from a single GW extraction well

Javandel & Tsang (1986)

Q =	1.70	gpm	
Kh =	80	gpd/sq.ft	(Kh = horizontal hydraulic conductivity)
Gradient (I) =	0.007	ft/ft	
Aq.Thkness (B):	20	feet	
u=Kh*I=	5.08E-05	ft/min	
Bu=	1.02E-03	sq.ft/min	
Q/Bu =	224	feet	Max Upgradient width of capture zone (Q/Bu = 68.22 meters)
Q/2Bu=	112	feet	Capture zone width perpendicular to pumping well
Q/(2*pi*Bu)=	36	feet	Distance to downgradient Stagnation Point
0.3183Q/Bu=	71	feet	Optimal Distance between two wells on a line

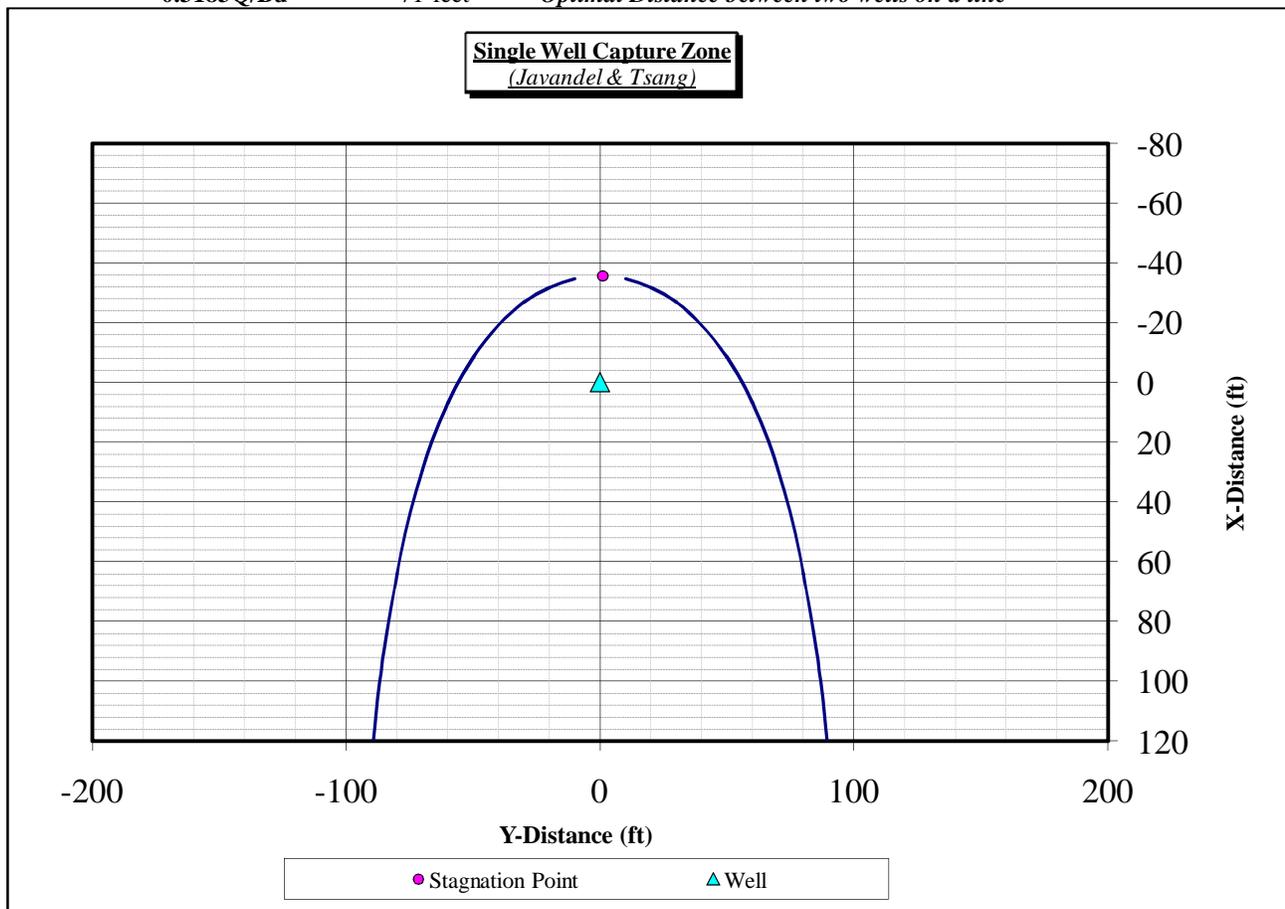
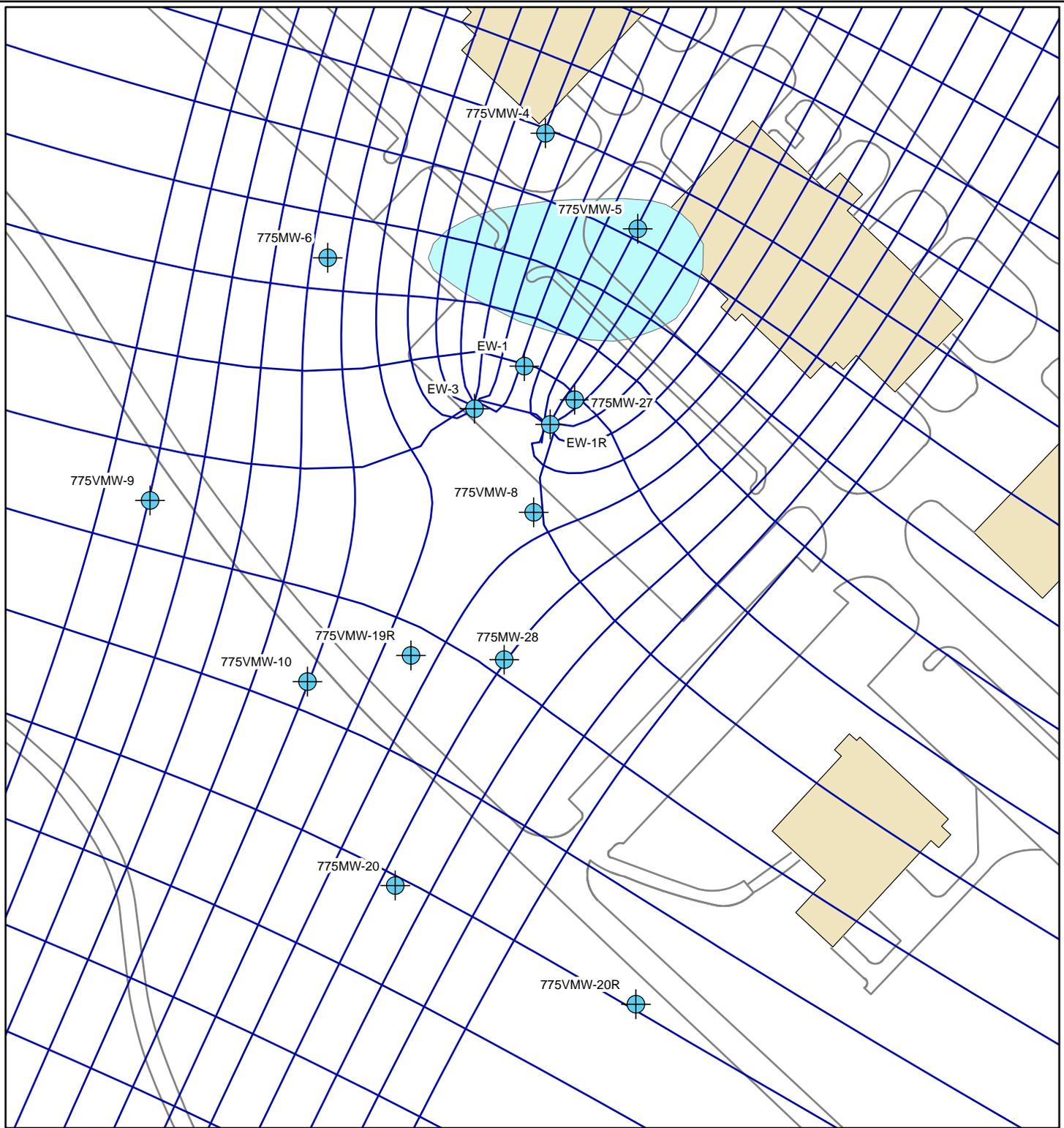


FIGURE 2: BUILDING 775 GROUNDWATER CAPTURE ZONE CAPTURE WIDTH CALCULATION FOR A SINGLE EXTRACTION WELL

UNITED STATES AIR FORCE FORMER GRIFFISS AIR FORCE BASE ROME, NY

PARSONS



Legend

-  Well Location
-  Groundwater Model Output
-  June 09, TCE 50 ug/L
-  Buildings



Notes: Model based on design model, revised to include measure gradients and well pumping rates (3.4 combined gpm).

**FIGURE 3: BUILDING 775
GROUNDWATER CAPTURE ZONE
REVISED ANALYTICAL MODEL RESULTS**

UNITED STATES AIR FORCE
FORMER GRIFFISS AIR FORCE BASE
ROME, NY

PARSONS

**TABLE 1
RESULTS FROM A MULTIPLE LINES OF EVIDENCE APPROACH TO ANALYZING
GROUNDWATER CAPTURE**

Line of evidence	Is Capture Sufficient?	Comments
<p style="text-align: center;"><u>Water levels:</u></p> <p>Groundwater Contour Map (see Figure 1)</p>	Yes.	Figure 1 demonstrates the groundwater capture zone created by the pumping from EW-1R and EW-1. The target capture area represented in the figure lies well within the capture zone.
<p style="text-align: center;"><u>Calculations:</u></p> <p>Capture zone from a single GW extraction well (Javendal & Tsang, 1986)</p> <p>Groundwater flow model with particle tracking.</p>	Yes Yes	<p>Calculations from pre-installation analysis were revised with current site information. Capture zone width perpendicular to pumping wells = 224 ft (Figure 2), which is wider than the target capture area.</p> <p>Groundwater flow model from pre-installation analysis was revised with current site information. Flow lines indicate that target capture zone is within calculated capture zone (Figure 3)</p>
<p style="text-align: center;"><u>Concentration Trends:</u></p> <p>Downgradient monitoring wells</p> <p>Sentinel well</p>	Undetermined Undetermined	<p>Due to low groundwater flow rates it is anticipated that more than one year of analytical data are needed to interpret capture. Concentrations were generally consistent throughout the year and all downgradient locations remained below 50 ug/l except for one anomalous sample at MW-20 (Sept. 09).</p> <p>At well MW-20R Concentrations remained below groundwater standards for all of 2009, TCE remained below detection levels.</p>
<p><u>Overall conclusion:</u></p> <p>Results of the “converging lines of evidence” capture analysis conclude that the extraction of groundwater from EW-1R and EW-3 was sufficient to contain the target capture area, as defined as the upgradient area where concentrations of TCE are greater than 50 µg/L. As groundwater travels south from the area near 775VMW-5 it flows in the cone of depression created by EW-1R and EW-3, and is captured.</p>		



2009 LUC/IC Site Inspection Report

The above described LUC/IC corresponds with soil/groundwater intrusive work – prior approval, land-use restriction – protect remedial operations, and groundwater well installation restriction as shown in Plate 4 and Exhibit 1. The LUC/ICs were confirmed by an on-site inspection and by the LUC/IC confirmation form signed by W. Vernon Gray, Commissioner of Aviation, GIA, on August 24, 2009. The 2009 LUC/IC confirmation results are provided in Exhibit 1. The LUC/IC confirmation form is provided in Appendix A. The petroleum-contaminated soil land farm operation has been moved to Apron 2.

2.5 Apron 2

2.5.1 Site Description

Apron 2 was used as an aircraft parking and refueling area. Two jet fuel pipeline systems are associated with Apron 2. The former Type II Jet Fuel System once supplied JP-4 fuel to hydrants located throughout Apron 2. The LUC/ICs areas are located in Parcels A2, F4A/F12A, and F6B. Parcels F4A and F12A have been transferred and Parcels A2 and F6B are projected for transfer in 2011.

There are four NYSDEC petroleum spill numbers in the vicinity of the Apron 2 site. NYSDEC Spill #8910168 is associated with subsurface contamination attributed to the jet fuel pipeline in the vicinity of Building 786, Spill #9706957 is associated with underground storage tanks (USTs) 7001-3, -4, and -5, Spill #9810713 is associated with the Type II Fuel System in the vicinity of Building 789, and Spill #9713631 is associated with the Type II Fuel System at Apron 2.

One IRP number (SD-52, Nosedocks/Apron 2 Operable Unit) is associated with the chlorinated Volatile Organic Compound (VOC) contamination in the Apron 2 site.

2.5.2 LUC/ICs

The ROD for SD-52, Nosedocks/Apron 2 Operable Unit was issued by the Air Force in December 2008 and signed by the USEPA in March 2009. In summary, the ROD for SD-52, Nosedocks/Apron 2 Operable Unit states that:

“Development and use of the entire SD-52, Nosedocks/Apron 2 Operable Unit AOC property for residential housing, elementary and secondary schools, childcare facilities, and playgrounds will be prohibited unless prior approval is received from the Air Force, USEPA, 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.”

The Apron 2 petroleum spill site is covered under the NYSDEC Spill Program and does not require a ROD. The LUC/ICs are provided in the Parcel A2 FOSET and Revised Draft Parcel F6B FOSET (AFRPA, June 2009) and the Parcel F4A/F12A deed.

The following summarizes the LUC/ICs provided in the FOSET for Parcel A2 and Revised Draft FOSET for Parcel F6B. The LUC/ICs provided in the Revised Draft FOSET for Parcel F6B will be included in the deed for Parcel F6B.

“The deed will restrict access to all groundwater at this Operable Unit until the remedial action objectives have been achieved by the Air Force. Until remedial action objectives are achieved, the owner or occupant of this site shall not extract, utilize, consume, or permit to be extracted, any water from the subsurface aquifer within the boundary of the site unless such owner or occupant obtains prior written approval from Air Force, NYSDEC, and USEPA.”

“The transferee will be restricted from conducting any type of excavation, digging, drilling, utilization of groundwater, or other ground disturbing activity at the open spill sites on this property without prior written Air Force approval and Air Force Coordination with applicable federal and state regulatory agencies as necessary.”

The following summarizes the LUC/ICs provided in the deed for Parcel F4A/F12A:

“The grantee, its successors and assigns shall be prohibited from accessing or otherwise disturbing or causing exposure to subsurface soils or consuming or otherwise using or causing exposure to the underlying groundwater.”

“The grantee is prohibited from extraction, utilization, or consumption of any water from the aquifer below the surface of the ground unless the water has been tested and found to meet all applicable standards and such owner obtains the prior written approval from the NYSDOH.”

“The grantee is prohibited from managing the aquifer in any way that could spread or exacerbate environmental contamination or open exposure pathways to humans or the environment.”

“Activities by the grantee and its successors and assigns shall not disturb the integrity or effectiveness of the grantor’s actions to complete closure of the environmental sites.”

The above described LUC/IC corresponds with soil/ groundwater intrusive work – prior approval, groundwater consumption – prior approval, adverse aquifer use prohibited, land-use restriction – protect remedial operations, groundwater intrusive work – prior approval, and groundwater well installation restriction as shown in Plate 4 and Exhibit 1. The LUC/ICs were confirmed by an on-site inspection and by the LUC/IC confirmation form signed by W. Vernon Gray, Commissioner of Aviation, GIA, on August 24, 2009. The 2009 LUC/IC confirmation results are provided in Exhibit 1. The LUC/IC confirmation form is provided in Appendix A.

2.6 Building 3 Drywell (DP-11)

2.6.1 Site Description

Building 3 is located in the center of the former Griffiss AFB (Parcel AFRL-5) south of the Tank Farms 1 and 3 Source Removal Area (SRA) and northwest of the Building 20 AOC. Surface water drains to Six Mile Creek on the eastern side (drywell area) of the building and to Three Mile Creek on the western side. A drywell associated with the site was used to dispose of cleaning solvents, etching acids with metal salts, and paint thinners from 1960 to 1984 as stated in the RI (Law, December 1996). Building 3 was retained by the Department of Defense (DOD) and is currently a facility for the Air Force Research Laboratory (AFRL).

2.6.2 LUC/ICs

The LUC/ICs area at Building 3 is a drywell site located outside, on the southeastern side of the building. The LUC/ICs are provided in the Building 3 ROD. The ROD was issued by the Air Force in November 2004 and signed by the USEPA in March 2005. In summary, the ROD for Building 3 states that:

“Development and use of the entire Building 3 AOC property for residential housing, elementary and secondary schools, childcare facilities and playgrounds will be prohibited unless prior approval is received from the Air Force, USEPA, and NYSDEC.”

“The owner or occupant of this site shall not extract, utilize, consume, or permit to be extracted, 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 above described LUC/ICs correspond with groundwater consumption – prior approval, adverse aquifer use prohibited, and land-use restriction – industrial/commercial/non-residential, as shown in Plate 3 and Exhibit 1. The LUC/ICs were confirmed by an on-site inspection and by the LUC/IC confirmation form signed by Fredrick Conover, Environmental and Occupational Health Manager, AFRL, on August 17, 2009. The 2009 LUC/IC confirmation results are provided in Exhibit 1. The LUC/IC confirmation form is provided in Appendix A.

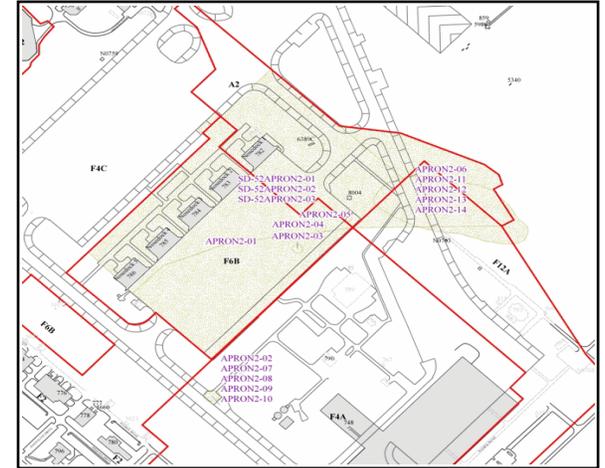
Apron 2
Parcel A1A, A2, F6B, AND F4A/F12A (Southern Portion, Former Griffiss AFB)
LUC/IC Confirmation



Apron 2



Apron 2 Remediation Site
(near Six Mile Creek)



Legend: Refer to "Key to Features"
at beginning of Section.

C-6

LUC/IC ID	LUC/IC TYPE	METHOD	INSPECTION	CONFIRMATION	GENERAL SITE CONDITION	COMMENTS/RECOMMENDATIONS
APRON2-01	SOIL / GROUNDWATER INTRUSIVE WORK-PRIOR APPROVAL	On-site Inspection and Letter	7/27/2009	LUC/IC VALID. LUC/IC confirmation (letter confirmation) by W. Veron Gray, Commissioner of Aviation, Griffiss International Airport - 8/24/09	Vacant area (concrete and grass), new biopiles constructed on apron in summer 2008. Area is within the airport fencing. Groundwater LTM and remediation at site.	Continue annual inspections
APRON2-02	SOIL / GROUNDWATER INTRUSIVE WORK-PRIOR APPROVAL	On-site Inspection and Letter	7/27/2009	LUC/IC VALID. LUC/IC confirmation (letter confirmation) by W. Veron Gray, Commissioner of Aviation, Griffiss International Airport - 8/24/09	Vacant area (concrete and grass), new biopiles constructed on apron in summer 2008. Area is within the airport fencing. Groundwater LTM and remediation at site.	Continue annual inspections
APRON2-03	SOIL / GROUNDWATER INTRUSIVE WORK-PRIOR APPROVAL	On-site Inspection and Letter	7/27/2009	LUC/IC VALID. LUC/IC confirmation (letter confirmation) by W. Veron Gray, Commissioner of Aviation, Griffiss International Airport - 8/24/09	Vacant area (concrete and grass), new biopiles constructed on apron in summer 2008. Area is within the airport fencing. Groundwater LTM and remediation at site.	Continue annual inspections
APRON2-04	SOIL / GROUNDWATER INTRUSIVE WORK-PRIOR APPROVAL	On-site Inspection and Letter	7/27/2009	LUC/IC VALID. LUC/IC confirmation (letter confirmation) by W. Veron Gray, Commissioner of Aviation, Griffiss International Airport - 8/24/09	Vacant area (concrete and grass), new biopiles constructed on apron in summer 2008. Area is within the airport fencing. Groundwater LTM and remediation at site.	Continue annual inspections

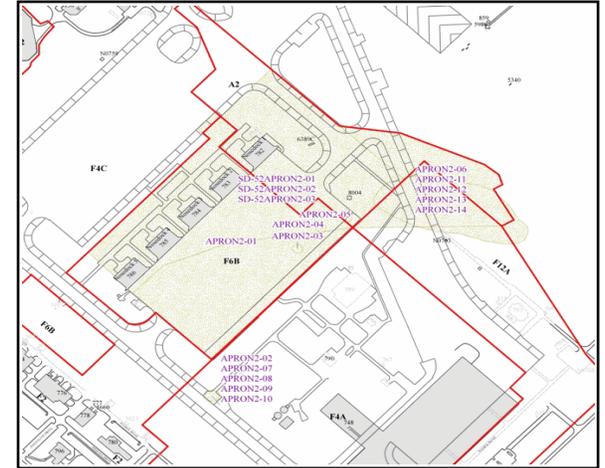
Apron 2
Parcel A1A, A2, F6B, AND F4A/F12A (Southern Portion, Former Griffiss AFB)
LUC/IC Confirmation



Apron 2



Apron 2 Remediation Site
(near Six Mile Creek)



Legend: Refer to "Key to Features"
at beginning of Section.

C-7

LUC/IC ID	LUC/IC TYPE	METHOD	INSPECTION	CONFIRMATION	GENERAL SITE CONDITION	COMMENTS/RECOMMENDATIONS
APRON2-05	SOIL / GROUNDWATER INTRUSIVE WORK-PRIOR APPROVAL	On-site Inspection and Letter	7/27/2009	LUC/IC VALID. LUC/IC confirmation (letter confirmation) by W. Veron Gray, Commissioner of Aviation, Griffiss International Airport - 8/24/09	Vacant area (concrete and grass), new biopiles constructed on apron in summer 2008. Area is within the airport fencing. Groundwater LTM and remediation at site.	Continue annual inspections
APRON2-06	SOIL / GROUNDWATER INTRUSIVE WORK-PRIOR APPROVAL	On-site Inspection and Letter	7/27/2009	LUC/IC VALID. LUC/IC confirmation (letter confirmation) by W. Veron Gray, Commissioner of Aviation, Griffiss International Airport - 8/24/09	Vacant area (concrete and grass), new biopiles constructed on apron in summer 2008. Area is within the airport fencing. Groundwater LTM and remediation at site.	Continue annual inspections
APRON2-07	GROUNDWATER CONSUMPTION-PRIOR APPROVAL	On-site Inspection and Letter	7/27/2009	LUC/IC VALID. LUC/IC confirmation (letter confirmation) by W. Veron Gray, Commissioner of Aviation, Griffiss International Airport - 8/24/09	Vacant area (concrete and grass), new biopiles constructed on apron in summer 2008. Area is within the airport fencing. Groundwater LTM and remediation at site.	Continue annual inspections
APRON2-08	ADVERSE AQUIFER USE PROHIBITED	On-site Inspection and Letter	7/27/2009	LUC/IC VALID. LUC/IC confirmation (letter confirmation) by W. Veron Gray, Commissioner of Aviation, Griffiss International Airport - 8/24/09	Vacant area (concrete and grass), new biopiles constructed on apron in summer 2008. Area is within the airport fencing. Groundwater LTM and remediation at site.	Continue annual inspections

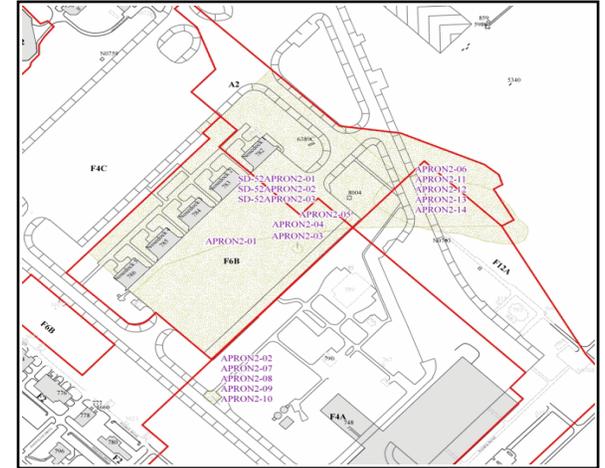
Apron 2
Parcel A1A, A2, F6B, AND F4A/F12A (Southern Portion, Former Griffiss AFB)
LUC/IC Confirmation



Apron 2



Apron 2 Remediation Site
(near Six Mile Creek)



Legend: Refer to "Key to Features"
at beginning of Section.

C-8

LUC/IC ID	LUC/IC TYPE	METHOD	INSPECTION	CONFIRMATION	GENERAL SITE CONDITION	COMMENTS/RECOMMENDATIONS
APRON2-09	LAND-USE RESTRICTION-PROTECT REMEDIAL OPERATIONS	On-site Inspection and Letter	7/27/2009	LUC/IC VALID. LUC/IC confirmation (letter confirmation) by W. Veron Gray, Commissioner of Aviatin, Griffiss International Airport - 8/24/09	Vacant area (concrete and grass), new biopiles constructed on apron in summer 2008. Area is within the airport fencing. Groundwater LTM and remediation at site.	Continue annual inspections
APRON2-10	GROUNDWATER INTRUSIVE WORK-PRIOR APPROVAL	On-site Inspection and Letter	7/27/2009	LUC/IC VALID. LUC/IC confirmation (letter confirmation) by W. Veron Gray, Commissioner of Aviatin, Griffiss International Airport - 8/24/09	Vacant area (concrete and grass), new biopiles constructed on apron in summer 2008. Area is within the airport fencing. Groundwater LTM and remediation at site.	Continue annual inspections
APRON2-11	GROUNDWATER CONSUMPTION-PRIOR APPROVAL	On-site Inspection and Letter	7/27/2009	LUC/IC VALID. LUC/IC confirmation (letter confirmation) by W. Veron Gray, Commissioner of Aviatin, Griffiss International Airport - 8/24/09	Vacant area (concrete and grass), new biopiles constructed on apron in summer 2008. Area is within the airport fencing. Groundwater LTM and remediation at site.	Continue annual inspections
APRON2-12	ADVERSE AQUIFER USE PROHIBITED	On-site Inspection and Letter	7/27/2009	LUC/IC VALID. LUC/IC confirmation (letter confirmation) by W. Veron Gray, Commissioner of Aviatin, Griffiss International Airport - 8/24/09	Vacant area (concrete and grass), new biopiles constructed on apron in summer 2008. Area is within the airport fencing. Groundwater LTM and remediation at site.	Continue annual inspections

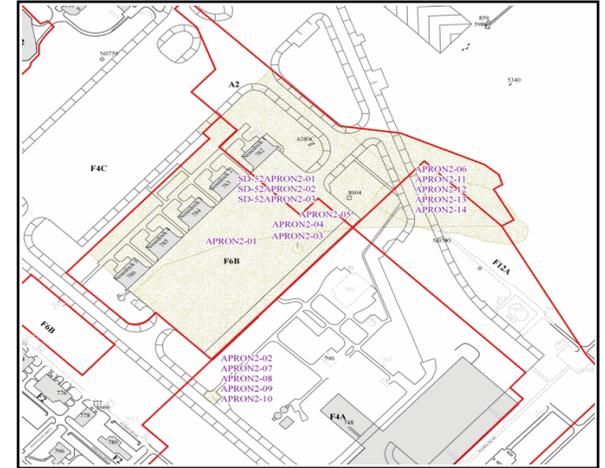
**Apron 2
Parcel A1A, A2, F6B, AND F4A/F12A (Southern Portion, Former Griffiss AFB)
LUC/IC Confirmation**



Apron 2



Apron 2 Remediation Site
(near Six Mile Creek)



Legend: Refer to "Key to Features"
at beginning of Section.

C-9

LUC/IC ID	LUC/IC TYPE	METHOD	INSPECTION	CONFIRMATION	GENERAL SITE CONDITION	COMMENTS/RECOMMENDATIONS
APRON2-13	LAND-USE RESTRICTION-PROTECT REMEDIAL OPERATIONS	On-site Inspection and Letter	7/27/2009	LUC/IC VALID. LUC/IC confirmation (letter confirmation) by W. Veron Gray, Commissioner of Aviatin, Griffiss International Airport - 8/24/09	Vacant area (concrete and grass), new biopiles constructed on apron in summer 2008. Area is within the airport fencing. Groundwater LTM and remediation at site.	Continue annual inspections
APRON2-14	GROUNDWATER INTRUSIVE WORK-PRIOR APPROVAL	On-site Inspection and Letter	7/27/2009	LUC/IC VALID. LUC/IC confirmation (letter confirmation) by W. Veron Gray, Commissioner of Aviatin, Griffiss International Airport - 8/24/09	Vacant area (concrete and grass), new biopiles constructed on apron in summer 2008. Area is within the airport fencing. Groundwater LTM and remediation at site.	Continue annual inspections
SD-52APRON2-01	SOIL / GROUNDWATER INTRUSIVE WORK-PRIOR APPROVAL	On-site Inspection and Letter	7/27/2009	LUC/IC VALID. LUC/IC confirmation (letter confirmation) by W. Veron Gray, Commissioner of Aviatin, Griffiss International Airport - 8/24/09	Vacant area (concrete and grass), new biopiles constructed on apron in summer 2008. Area is within the airport fencing. Groundwater LTM and remediation at site.	Continue annual inspections
SD-52APRON2-02	GROUNDWATER WELL INSTALLATION RESTRICTION	On-site Inspection and Letter	7/27/2009	LUC/IC VALID. LUC/IC confirmation (letter confirmation) by W. Veron Gray, Commissioner of Aviatin, Griffiss International Airport - 8/24/09	Vacant area (concrete and grass), new biopiles constructed on apron in summer 2008. Area is within the airport fencing. Groundwater LTM and remediation at site.	Continue annual inspections

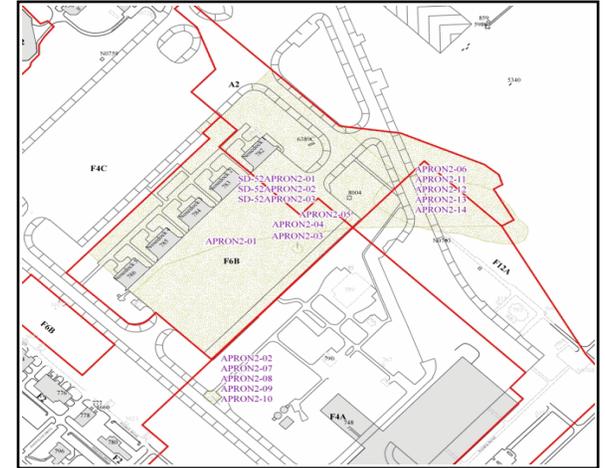
Apron 2
Parcel A1A, A2, F6B, AND F4A/F12A (Southern Portion, Former Griffiss AFB)
LUC/IC Confirmation



Apron 2



Apron 2 Remediation Site
(near Six Mile Creek)



Legend: Refer to "Key to Features"
at beginning of Section.

C-10

LUC/IC ID	LUC/IC TYPE	METHOD	INSPECTION	CONFIRMATION	GENERAL SITE CONDITION	COMMENTS/RECOMMENDATIONS
SD-52APRON2-03	LAND-USE RESTRICTION-PROTECT REMEDIAL OPERATIONS	On-site Inspection and Letter	7/27/2009	LUC/IC VALID. LUC/IC confirmation (letter confirmation) by W. Veron Gray, Commissioner of Aviatin, Griffiss International Airport - 8/24/09	Vacant area (concrete and grass), new biopiles constructed on apron in summer 2008. Area is within the airport fencing. Groundwater LTM and remediation at site.	Continue annual inspections

“The owner or occupant of the property shall not extract, utilize, consume, or permit to be extracted, any water from the subsurface aquifer within the boundary of the property unless such owner or occupant obtains prior written approval from the NYSDOH.”

The above described LUC/ICs are associated with groundwater consumption – prior approval, adverse aquifer use prohibited, and land-use restriction – industrial/commercial/non-residential, as shown in Plate 3 and Exhibit 1. The LUC/ICs were confirmed by an on-site inspection and by the LUC/IC confirmation form signed by Frank Sanzone, Facilities Operation Manager, GLDC, on September 1, 2009. The 2009 LUC/IC confirmation results are provided in Exhibit 1. The LUC/IC confirmation form is provided in Appendix A.

2.19 Building 775/Pumphouse 3 (SS-38)

2.19.1 Site Description

The Building 775 plume is located downgradient to the south of former maintenance facilities in Building 774 and 776, and former fuel pump house Building 775. Although the source has not been identified, solvent use in Building 774 was thought to be a primary source of trichloroethylene (TCE) contamination. Solvent use was widespread in these facilities in the 1950s, 1960s and early 1970s. This contamination is studied under the On-base Groundwater program, SD-52. The LUC/IC area is located in Parcels F2, F4B, F6B, and F11B. Parcels F2 and F4B have been transferred and parcels F6B and F11B are projected for transfer in 2011.

2.19.2 LUC/ICs

The ROD for SD-52, Building 775 Operable Unit was issued by the Air Force in December 2008 and signed by the USEPA in March 2009. In summary, the ROD for SD-52, Building 775 Operable Unit states that:

“Development and use of the entire SD-52, Building 775 Operable Unit AOC property for residential housing, elementary and secondary schools, childcare facilities and playgrounds will be prohibited unless prior approval is received from the Air Force, USEPA, 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.”

“The owner or occupant of this site shall provide the Air Force with 60 days advance notice of any proposed alterations that will involve excavating in and/or disturbing soil and/or groundwater and shall not proceed with any such proposed alterations until it has received written notice from the Air Force that the alterations are acceptable to the Air Force, USEPA, and NYSDEC.”

The above described LUC/IC corresponds with soil/groundwater intrusive work – prior approval, adverse aquifer use prohibited, and land-use restriction – protect remedial operations as shown in Plate 4 and Exhibit 1. The LUC/ICs were confirmed by an on-site inspection. The 2009 LUC/IC confirmation results are provided in Exhibit 1.

2.20 Building 781 (SS-54)

2.20.1 Site Description

Building 781 contained the former Pumphouse 1 (a 30-ft by 46-ft, one-story building), four 50,000-gallon USTs used for jet fuel storage, and one 2,000-gallon UST used for storing waste jet fuel and separator water. Building 781 was built between 1956 and 1958. Usage was discontinued in 1988 and the USTs were pumped dry and cleaned out between July 1988 and August 1989. NYSDEC Spill #9202658 was assigned to the site in 1992. Building 781 and the associated USTs were demolished and removed in May 1995. The LUC/IC area is located in Parcels F2, F4A, and F4B. All three parcels have been transferred.

2.20.2 LUC/ICs

The Building 781 site does not require a ROD and is covered under the NYSDEC Spill Program. The Building 781 site is located within the boundaries of Parcel F2, F4A, and F4B. These parcels have been transferred.

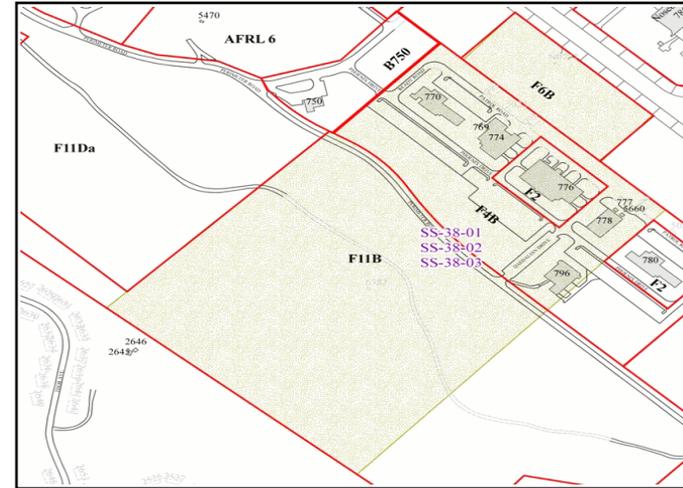
LUC/ICs at the site provided in the deed for Parcel F2, include:

“The grantee covenants that it will not engage in any activities that will disrupt required remedial investigation, response actions or oversight activities, should any be required on the property. The grantor agrees to coordinate its remediation activities with the grantee so as not to unreasonably disrupt use of the property by the grantee.”

“The grantee covenants not to extract, utilize, consume or permit any extraction, use, consumption, of any water from the aquifer below the surface of the ground on the property unless the groundwater has been tested and found to meet all applicable standards and the grantee first obtains the prior written approval from NYSDOH. The grantee further covenants to ensure that the aquifer will not be used in any way that could spread or exacerbate environmental contamination or open exposure pathways to humans or the environment. The grantee and its

**Building 775 (SS-38)
Parcel F2, F4B, F6B, and F11B (Southern Portion [SAC Hill], Former
Griffiss AFB)
LUC/IC Confirmation**

C-13



Legend: Refer to "Key to Features" at beginning of Section.

LUC/IC ID	LUC/IC TYPE	METHOD	INSPECTION	CONFIRMATION	GENERAL SITE CONDITION	COMMENTS/RECOMMENDATIONS
SS-38-01	SOIL / GROUNDWATER INTRUSIVE WORK-PRIOR APPROVAL	On-site Inspection	07/27/2009	LUC/IC VALID. LUC/IC confirmation by Frank Sanzone, Facilities Operation Manager, GLDC 9/1/09	Parking lot, grass area, and commercial/ industrial buildings. Building 775, SD-52 TCE plume (groundwater) at the site. Contamination treatment and groundwater. LTM is ongoing	Continue annual inspections.
SS-38-02	ADVERSE AQUIFER USE PROHIBITED	On-site Inspection	07/27/2009	LUC/IC VALID. LUC/IC confirmation by Frank Sanzone, Facilities Operation Manager, GLDC 9/1/09	Parking lot, grass area, and commercial/ industrial buildings. Building 775, SD-52 TCE plume (groundwater) at the site. Contamination treatment and groundwater. LTM is ongoing	Continue annual inspections.
SS-38-03	LAND-USE RESTRICTION-PROTECT REMEDIAL OPERATIONS	On-site Inspection	07/27/2009	LUC/IC VALID. LUC/IC confirmation by Frank Sanzone, Facilities Operation Manager, GLDC 9/1/09	Parking lot, grass area, and commercial/ industrial buildings. Building 775, SD-52 TCE plume (groundwater) at the site. Contamination treatment and groundwater. LTM is ongoing	Continue annual inspections.

“The grantee shall be prohibited from accessing or otherwise disturbing or causing exposure to the subsurface soils.”

“The grantee is prohibited from extraction, utilization or consumption of any water from the aquifer below the surface of the ground within the property unless the groundwater has been tested and found to meet all applicable standards and such the owner obtains the prior written approval from the NYSDOH.”

The above described LUC/IC corresponds with soil/groundwater intrusive work – prior approval as shown in Plate 4 and Exhibit 1. The LUC/ICs were confirmed by an on-site inspection. The 2009 LUC/IC confirmation results are provided in Exhibit 1.

2.23 Building 817/WSA (SD-52)

2.23.1 Site Description

The Building 817/WSA site is located on the north side of the main runway between Building 817 and the culverted section of Six Mile Creek south of the former WSA. The site is within the boundaries of Parcel A5 and F10B and contains IRP SD-52. Building 817 was once used for electronics parts maintenance, and TCE and perchloroethene (PCE) were solvents used in small quantities at this location. This property is projected to be transferred in 2011.

2.23.2 LUC/ICs

The ROD for SD-52, Building 817/WSA Operable Unit was issued by the Air Force in December 2008 and signed by the USEPA in March 2009. In summary, the ROD for SD-52, Building 817/WSA Operable Unit states that:

“Development and use of the entire SD-52, Building 817/WSA Operable Unit property for residential housing, elementary and secondary schools, childcare facilities, and playgrounds will be prohibited unless prior approval is received from the Air Force, USEPA, 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.”

The above described LUC/IC corresponds with soil/groundwater intrusive work – prior approval, groundwater well installation restriction, and land-use restriction – protect remedial operations as shown in Plate 2 and Exhibit 1. The LUC/ICs were confirmed by an on-site inspection and by the LUC/IC confirmation form signed by W. Vernon Gray, Commissioner of Aviation, GIA, on August 24, 2009. The 2009 LUC/IC confirmation results are provided in Exhibit 1. The LUC/IC confirmation form is provided in Appendix A.

2.24 Building 7001

2.24.1 Site Description

The former Building 7001 was located in the southwestern corner of Apron 2 (Parcel F6B). The site was associated with a former vehicle fueling station at the southwest end of Apron 2. NYSDEC Spill #9706957 is associated with USTs 7001-3, -4, and -5, and was assigned to the site after the tank excavation activities in 1997. Parcel F6B is projected for transfer in 2011.

2.24.2 LUC/ICs

The Building 7001 site does not require a ROD and is covered under the NYSDEC Spill Program. The LUC/IC for this site is provided in the Revised Draft FOSET for Parcel F6B (AFRPA, June 2009) and will be included in the Parcel F6B deed.

“The transferee will be restricted from conducting any type of excavation, digging, drilling, utilization of groundwater, or other ground disturbing activity at the open spill sites on this property without applicable written Air Force approval and Air Force coordination with applicable federal and state regulatory agencies as necessary.”

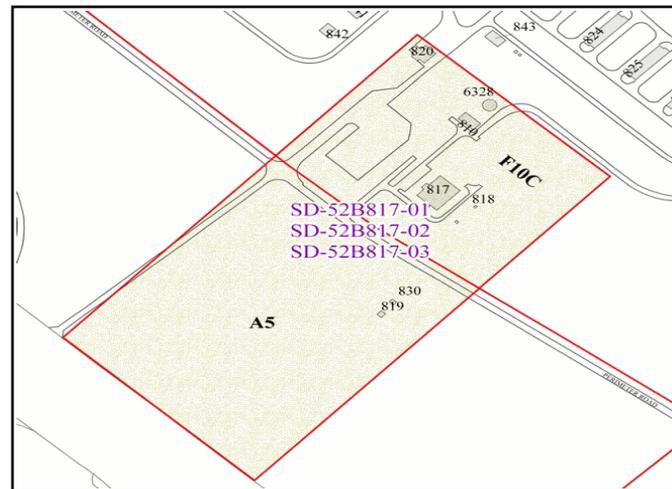
The above described LUC/IC corresponds with soil/groundwater intrusive work – prior approval as shown in Plate 4 and Exhibit 1. The LUC/ICs were confirmed by an on-site inspection and by the LUC/IC confirmation form signed by W. Vernon Gray, Commissioner of Aviation, GIA, on August 24, 2009. The 2009 LUC/IC confirmation results are provided in Exhibit 1. The LUC/IC confirmation form is provided in Appendix A.

2.25 Bulk Fuel Storage Area (ST-04)

2.25.1 Site Description

The Bulk Fuel Storage Area (BFSA) is located at the extreme southern part of the former Griffiss AFB in Parcels F9 and F14. The site was constructed in 1959 and consisted of three former 630,000-gallon steel ASTs (653, 655, and 657) each surrounded by a secondary containment dike. A pump house (Building 654), a truck fill station and a tanker unloading system were also

**WSA Building 817 (SD-52)
Parcel A5 (Northern Portion, Former Griffiss AFB)
LUC/IC Confirmation**



Legend: Refer to "Key to Features" at beginning of Section.

C-16

LUC/IC ID	LUC/IC TYPE	METHOD	INSPECTION	CONFIRMATION	GENERAL SITE CONDITION	COMMENTS/RECOMMENDATIONS
SD-52B817-01	SOIL / GROUNDWATER INTRUSIVE WORK-PRIOR APPROVAL	On-Site Inspection and Letter	07/27/2009	LUC/IC VALID. LUC/IC Confirmation by W. Vernon Gray, Commissioner of Aviation, Griffiss International Airport (Parcel A5) – 8/24/2009 and Frank Sanzone, GLDC (Parcel F10C) - 9/1/09.	Vacant field, within the airport fencing. WSA Building 817 (SD-52 - TCE plume), contains piezometers and monitoring wells. LTM ongoing.	Continue annual inspections.
SD-52B817-02	GROUNDWATER WELL INSTALLATION RESTRICTION	On-Site Inspection and Letter	07/27/2009	LUC/IC VALID. LUC/IC Confirmation by W. Vernon Gray, Commissioner of Aviation, Griffiss International Airport (Parcel A5) – 8/24/2009 and Frank Sanzone, GLDC (Parcel F10C) - 9/1/09.	Vacant field, within the airport fencing. WSA Building 817 (SD-52 - TCE plume), contains piezometers and monitoring wells. LTM ongoing.	Continue annual inspections.
SD-52B817-03	LAND-USE RESTRICTION-PROTECT REMEDIAL OPERATIONS	On-Site Inspection and Letter	07/27/2009	LUC/IC VALID. LUC/IC Confirmation by W. Vernon Gray, Commissioner of Aviation, Griffiss International Airport (Parcel A5) – 8/24/2009 and Frank Sanzone, GLDC (Parcel F10C) - 9/1/09.	Vacant field, within the airport fencing. WSA Building 817 (SD-52 - TCE plume), contains piezometers and monitoring wells. LTM ongoing.	Continue annual inspections.

Plate 4 and Exhibit 1. The LUC/ICs were confirmed by an on-site inspection. The 2009 LUC/IC confirmation results are provided in Exhibit 1.

2.32 Landfill 5 (LF-7)

2.32.1 Site Description

Landfill 5, approximately 4 acres in size, is located in the south-central portion of the former Base, south of Patrick Square, immediately southwest of the unpaved access road and east of Three Mile Creek. The sources of potential contamination at Landfill 5 consist of domestic wastes that were disposed of in the subsurface at the site. The property is scheduled to be transferred in 2011.

2.32.2 LUC/ICs

The LUC/ICs provided in the closure plan for Landfill 5 correspond with the Landfill 5 ROD requirements. The ROD for Landfill 5 was issued by the Air Force in March 2000 and signed by the USEPA in June 2000. Based on the previous investigations and environmental conditions at the site, the LUC/IC components of the selected remedy for Landfill 5 AOC consisted of the following actions:

“Maintenance of the impermeable cover.”

“Implementation of institutional controls in the form of deed restrictions on the main landfill boundary to prohibit inappropriate use of the area and groundwater, and to ensure the soil cover is not damaged and the area is maintained as a landfill.”

The actions listed above that describe LUC/ICs correspond with groundwater consumption – prior approval, adverse aquifer use prohibited, protect closure/post-closure activities, groundwater intrusive work – prior approval, land-use restriction – protect remedial operations, landfill fencing/ signage, annual inspection/reporting to USEPA and NYSDEC, and 5-year review as shown in Plate 3 and Exhibit 1. The LUC/ICs were confirmed by an on-site inspection. The 2009 LUC/IC confirmation results are provided in Exhibit 1.

2.33 Landfill 6 (LF-9) and Landfill 6 TCE (SD-52)

2.33.1 Site Description

Landfill 6, approximately 16 acres in size, was operational as an unlined landfill located between Perimeter Road and Three Mile Creek from 1955 to 1959 for the disposal of hardfill and general refuse. Landfill 6 was initially capped in 1986. Groundwater flow in the vicinity of the landfill is toward Three Mile Creek. In the 1980s, it was reported that an unknown volume of fuel-contaminated soils from the Tank Farms 1 and 3 excavations were disposed of at Landfill 6.

TCE contamination is also present in groundwater at this site. This contamination is included in the On-base Groundwater program, SD-52. The ROD for Landfill 6 TCE (SD-52) was released in December 2008 after the 2008 inspections were performed. The property is scheduled to be transferred in 2011.

2.33.2 LUC/ICs

The LUC/ICs provided in the closure plan for Landfill 6 correspond with the Landfill 6 ROD requirements. The ROD for Landfill 6 was issued by the Air Force in February 2001 and signed by the USEPA in June 2001. Based on the previous investigations and environmental conditions at the site, the LUC/IC components of the selected remedy for Landfill 6 consisted of the following actions:

“Maintenance of the impermeable cover.”

“Implementation of institutional controls in the form of deed restrictions on the main landfill boundary to prohibit inappropriate use of the area and groundwater, and to ensure the soil cover is not damaged and the area is maintained as a landfill.”

The ROD for SD-52, Landfill 6 Operable Unit was issued by the Air Force in December 2008 and signed by the USEPA in March 2009. In summary, the ROD for SD-52, Landfill 6 Operable Unit states that:

“Development and use of the entire SD-52, Landfill 6 Operable Unit AOC property for residential housing, elementary and secondary schools, childcare facilities, and playgrounds will be prohibited unless prior approval is received from the Air Force, USEPA, 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.”

“Intrusive work or other activities that impact the effectiveness of the landfill closure and post-closure activities will not be allowed within the restricted landfill boundary.”

“Posting of notices and signs to minimize the interference with the landfill closure and post-closure activities.”

The actions listed above that describe LUC/ICs correspond with groundwater consumption – prior approval, adverse aquifer use prohibited, protect closure/post-closure activities, groundwater intrusive work – prior approval, land-use restriction – protect remedial operations, landfill fencing/ signage, annual inspection/reporting to USEPA and NYSDEC, soil/groundwater intrusive work – prior approval, and groundwater well installation restriction as shown in Plate 4 and Exhibit 1. The LUC/ICs were confirmed by an on-site inspection. The 2009 LUC/IC confirmation results are provided in Exhibit 1.

2.34 Landfill 7 (LF-3)

2.34.1 Site Description

Landfill 7, approximately 11 acres in size, is located northeast of Runway 15/33. The sources of potential contamination at Landfill 7 consist of domestic refuse and solid waste, liquid wastes, petroleum products, and miscellaneous Base operations waste (such as airplane parts). The landfill was active from 1950 to 1954. Landfill 7 is located in Parcel A6 which was transferred in 2008.

2.34.2 LUC/ICs

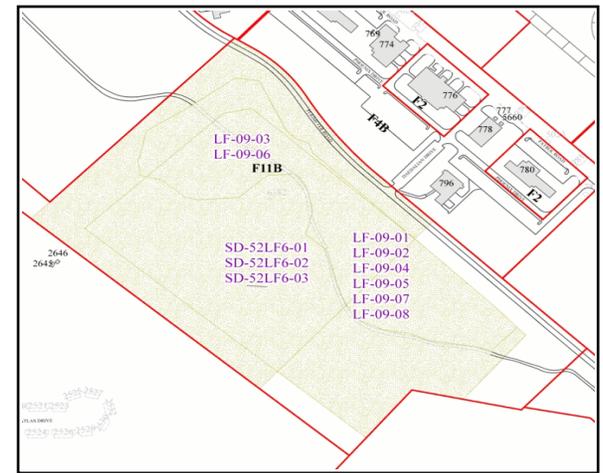
The LUC/ICs provided in the closure plan for Landfill 7 correspond with the Landfill 7 ROD requirements. The ROD for Landfill 7 was issued by the Air Force in March 2000 and signed by the USEPA in June 2000. Based on the previous investigations and environmental conditions at the site, the LUC/IC components of the selected remedy for Landfill 7 consisted of the following actions:

“Maintenance of the impermeable cover.”

“Implementation of institutional controls in the form of deed restrictions on the main landfill boundary to prohibit inappropriate use of the area and groundwater, and to ensure the soil cover is not damaged and the area is maintained as a landfill.”

The actions listed above that describe LUC/ICs correspond with groundwater consumption – prior approval, adverse aquifer use prohibited, protect closure/post-closure activities, groundwater intrusive work – prior approval, land-use restriction – protect remedial operations, landfill fencing/ signage, and annual inspection/reporting to USEPA and NYSDEC as shown in Plate 4 and Exhibit 1. The LUC/ICs were confirmed through an on-site inspection. The 2009 LUC/IC confirmation results are provided in Exhibit 1.

**Landfill 6 (LF-9 and SD-52LF6-01)
Parcel F11B (Central Portion, Former Griffiss AFB)
LUC/IC Confirmation**

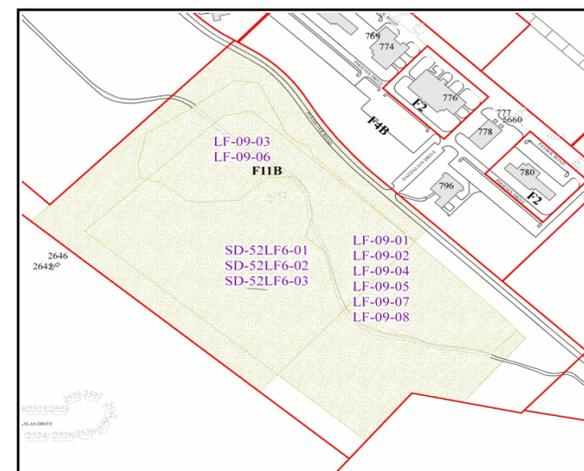


Legend: Refer to "Key to Features"
at beginning of Section.

C-20

LUC/IC ID	LUC/IC TYPE	METHOD	INSPECTION	CONFIRMATION	GENERAL SITE CONDITION	COMMENTS/RECOMMENDATIONS
LF-09-01	GROUNDWATER CONSUMPTION-PRIOR APPROVAL	On-Site Inspection	07/17/2009	LUC/IC VALID	Open space Landfill 6 Groundwater LTM, no evidence of damage to the cap. Signs and wells are in good condition.	Continue annual inspections.
LF-09-02	ADVERSE AQUIFER USE PROHIBITED	On-Site Inspection	07/17/2009	LUC/IC VALID	Open space Landfill 6 Groundwater LTM, no evidence of damage to the cap. Signs and wells are in good condition.	Continue annual inspections.
LF-09-03	PROTECT CLOSURE / POST-CLOSURE ACTIVITIES	On-Site Inspection	07/17/2009	LUC/IC VALID	Open space Landfill 6 Groundwater LTM, no evidence of damage to the cap. Signs and wells are in good condition.	Continue annual inspections.
LF-09-04	GROUNDWATER INTRUSIVE WORK-PRIOR APPROVAL	On-Site Inspection	07/17/2009	LUC/IC VALID	Open space Landfill 6 Groundwater LTM, no evidence of damage to the cap. Signs and wells are in good condition.	Continue annual inspections.

**Landfill 6 (LF-9 and SD-52LF6-01)
Parcel F11B (Central Portion, Former Griffiss AFB)
LUC/IC Confirmation**

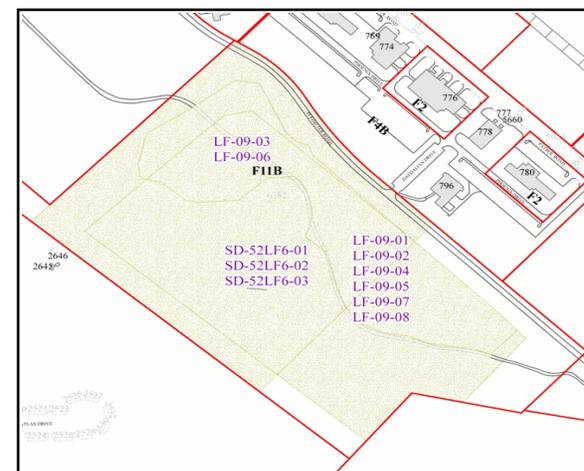


Legend: Refer to "Key to Features"
at beginning of Section.

C-21

LUC/IC ID	LUC/IC TYPE	METHOD	INSPECTION	CONFIRMATION	GENERAL SITE CONDITION	COMMENTS/RECOMMENDATIONS
LF-09-05	LAND-USE RESTRICTION-PROTECT REMEDIAL OPERATIONS	On-Site Inspection	07/17/2009	LUC/IC VALID	Open space Landfill 6 Groundwater LTM, no evidence of damage to the cap. Signs and wells are in good condition.	Continue annual inspections.
LF-09-06	LANDFILL FENCING / SIGNAGE	On-Site Inspection	07/17/2009	LUC/IC VALID	Open space Landfill 6 Groundwater LTM, no evidence of damage to the cap. Signs and wells are in good condition.	Continue annual inspections.
LF-09-07	ANNUAL INSPECTION / REPORTING TO USEPA / NYSDEC	On-Site Inspection	07/17/2009	LUC/IC VALID	Open space Landfill 6 Groundwater LTM, no evidence of damage to the cap. Signs and wells are in good condition.	Continue annual inspections.
LF-09-08	5-YEAR REVIEW	On-Site Inspection	07/17/2009	LUC/IC VALID	Open space Landfill 6 Groundwater LTM, no evidence of damage to the cap. Signs and wells are in good condition.	Continue annual inspections.

**Landfill 6 (LF-9 and SD-52LF6-01)
Parcel F11B (Central Portion, Former Griffiss AFB)
LUC/IC Confirmation**



Legend: Refer to "Key to Features"
at beginning of Section.

C-22

LUC/IC ID	LUC/IC TYPE	METHOD	INSPECTION	CONFIRMATION	GENERAL SITE CONDITION	COMMENTS/RECOMMENDATIONS
SD-52LF6-01	SOIL / GROUNDWATER INTRUSIVE WORK-PRIOR APPROVAL	On-Site Inspection	07/17/2009	LUC/IC VALID	Open space Landfill 6 (TCE plume). Groundwater LTM, no evidence of damage to the cap. Signs and wells are in good condition.	Continue annual inspections.
SD-52LF6-02	GROUNDWATER WELL INSTALLATION RESTRICTION	On-Site Inspection	07/17/2009	LUC/IC VALID	Open space Landfill 6 (TCE plume). Groundwater LTM, no evidence of damage to the cap. Signs and wells are in good condition.	Continue annual inspections.
SD-52LF6-03	LAND-USE RESTRICTION-PROTECT REMEDIAL OPERATIONS	On-Site Inspection	07/17/2009	LUC/IC VALID	Open space Landfill 6 (TCE plume). Groundwater LTM, no evidence of damage to the cap. Signs and wells are in good condition.	Continue annual inspections.