FINAL

SITE CLOSURE PLAN
ST006 BUILDING 101 AOC

FORMER GRIFFISS AIR FORCE BASE SITE
ROME, NEW YORK

Prepared for:

Air Force Civil Engineer Center
Building 45
706 Brooks Road
Rome, New York 13441

Prepared by:

FPM

FPM Remediations Inc.
584 Phoenix Drive
Rome, NY 13441

In association with:

CAPE

10901 Lowell Avenue, Suite 271
Overland Park, Kansas 66210

Contract Number FA8903-10-D-8595/
Delivery Order 0014

January 2013

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LIST OF ACRONYMS

AFB	Air Force Base
AFCEC	Air Force Civil Engineer Center
AOC	Area of Concern
BADP	Battery Acid Disposal Pit
BADrP	Battery Acid Drainage Pit
bgs	below ground surface
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CFR	Code of Federal Regulations
DCB	dichlorobenzene
DCE	dichloroethylene
EPA	Environmental Protection Agency
FPM	FPM Remediations, Inc.
Ft.	feet
LCC	life cycle costs
LUC/ICs	Land-Use Controls/Institutional Controls
mg/kg	milligram per kilogram
µg/L	microgram per Liter
NCP	National Oil and Hazardous Substances Pollution Contingency Plan
NYCRR	New York Codes, Rules, and Regulations
NYSDEC	New York State Department of Environmental Conservation
NYSDOH	New York State Department of Health
PAH	polycyclic aromatic hydrocarbons
PCB	polychlorinated biphenyl
PCE	tetrachloroethylene
PID	photoionization detector
ppm	parts per million
RI	Remedial Investigation
ROD	Records of Decision
RSL	Regional Screening Levels

LIST OF ACRONYMS (continued)

SCGs	Standards, Criteria, and Guidance values
SCO	Site Cleanup Objective
SI	Supplemental Investigation
SOP	Standard Operating Procedure
SVE	Soil Vapor Extraction
SVI	Soil Vapor Intrusion
SVOC	semi-volatile organic compound
TAGM	Technical and Administrative Guidance Memorandum
TCE	trichloroethylene
VOC	volatile organic compound

1.0 INTRODUCTION

FPM Remediations, Inc. (FPM), in association with CAPE, Inc., under contract with the Air Force Civil Engineer Center (AFCEC), is conducting site closure activities at the Building 101 Area of Concern (AOC) at the former Griffiss Air Force Base (AFB) in Rome, New York. The intent of these activities is to obtain unrestricted use and final site closure at the AOC.

1.1 Purpose

The purpose of this Site Closure Plan is to establish the activities needed to determine that the concentrations of hazardous substances are at such levels or of acceptable risks as to allow for unrestricted use at the site. An assessment based on unrestricted use shall be performed prior to making any such determination. The assessment and determination will be coordinated with the EPA and NYSDEC, in accordance with the Building 101 AOC Record of Decision (Air Force, September 2012). Tasks proposed to achieve unrestricted use and final site closure are sub-slab vapor, indoor air, and outdoor air sampling. If needed, the sampling results will be used to support a risk evaluation for unrestricted use and site closure or installation and operation of a soil vapor extraction (SVE) system at the site.

The work at this site will be conducted in accordance with provisions of the Basic Contract #FA8903-10-D-8595 and Delivery Order # 0014.

2.0 RECORD OF DECISION

The Record of Decision (ROD) for the Building 101 AOC was signed by the Air Force and United States Environmental Protection Agency (EPA) on September 28, 2012. The selected remedy for the Building 101 AOC is Land Use Controls/ Institutional Controls (LUC/ICs) for industrial/commercial use and evaluation of the SVI potential if future construction is performed in the Soil Vapor Intrusion (SVI) restriction area. The ROD, provided in Appendix A, requires that the transfer documents contain the following restrictions to ensure that the reuse of the site is consistent with the risk assessment:

- Development and use of the entire Building 101 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 New York State Department of Environmental Conservation (NYSDEC).
- The owner/occupant of the property shall evaluate the potential for soil vapor intrusion if future construction is performed in the SVI restriction area.

3.0 SITE BACKGROUND

The former Griffiss AFB, located in Oneida County in central New York State, covered approximately 3,552 contiguous acres in the lowlands of the Mohawk River Valley in the city of Rome. Topography within the valley is relatively flat, with elevations on the former Griffiss AFB ranging from 435 to 595 feet above mean sea level. Three Mile Creek, Six Mile Creek (both of which drain into the New York State Barge Canal, located to the south of the base), and several state-designated wetlands are located on the former Griffiss AFB, which is bordered by the Mohawk River on the west.

The Building 101 AOC is located south of Apron 3 in the central portion of the base along the northern margin of the industrial complex (Figure 1). It is bounded by Hangar Road to the south, Building 100 to the east, and Apron 4 parking area to the west. Building 101 operated as an aircraft maintenance hangar. The Building 101 AOC consists of a former Battery Acid Disposal Pit (BADP) and a former Battery Acid Drainage Pit (BADrP) (Figure 2).

The former BADP was located in the central portion of the building in an area designated as the Lead Battery Room. The BADP was in use from the early 1940s until 1985, when it was excavated. The BADP consisted of a pit beneath the concrete floor measuring approximately 2 feet long by 2 feet wide by 10 feet deep and was covered with a steel grate. Acids from spent batteries were neutralized with baking soda and poured into the BADP, where the neutralized liquid was allowed to percolate into the underlying soil. A 4-inch floor drain and overflow piping from the BADP ran west to the BADrP located beyond the west wall of the Lead Battery Room. The BADrP was approximately 17.5 feet long by 5.5 feet wide. Following removal of the BADP, a new 4-inch floor drain was installed at the former BADP location and piped to the BADrP. The BADrP was removed along with underlying soils in 1997. The former BADrP location was backfilled and sealed with concrete.

SVI sampling was conducted at the Building 101 AOC in fall 2006 and winter 2007. Soil vapor (exterior) and sub-slab vapor (interior) samples were collected in October 2006. The samples were collected and analyzed for VOCs using the EPA Method TO-15. The results of this initial sampling round were evaluated by the agencies and additional sampling was recommended. The second round of SVI sampling occurred in February 2007. Indoor and outdoor air samples were collected and also analyzed for VOCs using the EPA Method TO-15. The soil vapor, sub-slab vapor, indoor and outdoor locations are illustrated in the ROD on Figure 6. Sampling results are provided in Tables 5 and 6 of the ROD. Results were compared to the calculated Industrial/Commercial scenario screening levels provided in the Report for SVI Sampling at Building 101 (FPM, November 2007). Results indicate that all soil vapor, indoor air, and outdoor air detections are below screening levels. Five sub-slab vapor detections were above the sub-slab vapor screening levels, but the detections are within one order of magnitude of the screening levels.

No further action or evaluation of SVI is required at the Building 101 AOC unless building use changes in the future from aircraft maintenance to another industrial/commercial use or to residential use (the latter of which is prohibited). For further detailed site background information, please refer to the Final Building 101 AOC ROD (September 2012) provided in Appendix A.

3.1 Regulatory Drivers

The Building 101 AOC is regulated under the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) of 1980, as amended, and the National Oil and Hazardous Substances Pollution Contingency Plan (NCP). The site activities are conducted in consultation with the EPA Region II and NYSDEC.

4.0 CLOSURE PLAN

4.1 Scope and Regulatory Basis for Closure

The Griffiss Local Redevelopment Agency has implemented reuse and redevelopment for the former Griffiss AFB that includes a mixture of commercial, industrial and airport use. The Air Force's initiative to reduce its long-term environmental liabilities and life cycle costs through unrestricted site closure creates an opportunity to optimize benefits to the local public, the federal government, and the environment. The Building 101 AOC is subject to industrial/commercial use and evaluation of the potential for soil vapor intrusion if future construction is performed in the SVI restriction area. The proposed strategy is aimed at lifting the existing restrictions to achieve unrestricted reuse at the site.

4.2 Closure Tasks

The following tasks are proposed:

- **Collection of 10 sub-slab vapor, 2 indoor air samples, and 1 outdoor air sample**.
  - The sub-slab vapor and indoor air samples will be collected in the proposed SVI restriction area. All potentially volatile products, such as cleaning solvents, within the sampling area will be noted during sampling and used in the analysis of the results.
  - Data shall be compared to background levels of VOCs in air as provided in the New York State Department of Health (NYSDOH) SVI guidance document (Section 3.2.4), the NYSDOH's guidelines for VOCs in air (Table 3.1 in the NYSDOH SVI guidance document), the Air Force calculated screening levels, and EPA SVI screening levels (EPA, November 2002).

- **Conduct human health risk assessment if sampling results show concentrations above SVI screening levels.**
  - Site Closure will be recommended if the human health risk assessment acceptable risks for residential use at the site.
  - A full scale SVE system will be installed at the site if the human health risk assessment finds that there are unacceptable risks for residential use at the site. The SVE system will initially be deployed to gather sufficient data regarding radius of influence and contaminants removal effectiveness. The data will support incorporating a full-scale system in an Explanation of Significant Differences (ESD).

The data will be relied upon to update the SVI evaluation and evaluate the site-specific risk. If results from the evaluation do not support site closure, the data will be used to implement an

SVE system that is capable of eliminating any residual soil vapor. Table 1 summarizes the proposed field activities. Figure 3 shows the proposed sample locations.

In accordance with the guidance documents, "Guidance for Evaluating Soil Vapor Intrusion in the State of New York," issued by the NYS Department of Health (NYSDOH), VOCs in air samples shall be analyzed using Method TO-15. A sample analysis summary is provided in Table 2. Sample methodology is provided in Appendix B, SVI Sampling Standard Operating Procedures. Field forms for the SVI sampling are also provided in Appendix B. The samples shall be collected and handled in accordance with the protocols as specified in the NYSDOH Guidance Document (NYSDOH, February 2005) and analyzed by the laboratory using EPA Method TO-15. The laboratory's Standard Operating Procedure (SOP) for Method TO-15 is included in the Uniform Federal Policy Quality Assurance Project Plan (UFP QAPP) for Performance Based-Remediation at the Former Griffiss AFB (CAPE/FPM, November 2011). All data will then be reviewed and evaluated in accordance with these procedures, and the laboratory's standard qualifiers would apply.

Since the sampling is proposed within the building footprint, subsurface utilities identification through Dig Safe NY cannot be performed. The planned work will be discussed with the current building occupant and the building's owner (who may have utility blueprints). It should be noted that the drilling will only extend one or two inches into the sub-base under the building's concrete floor and it is anticipated that the drilling will not interfere with any underground utilities. The Health and Safety Plan for Performance Based-Remediation at the Former Griffiss AFB (CAPE/FPM, June 2011) will be operational in conjunction with this Site Closure Plan.

5.0 DELIVERABLES

5.1 SVI Evaluation Report

The results of the sub-slab vapor and indoor/outdoor air sampling shall be summarized in the Building 101 SVI Evaluation Report which will also include the site specific risk evaluation. The report will contain figures with sampling locations and summary tables containing any detected soil vapor concentrations.

5.2 Explanation of Significant Differences

The ESD will be prepared to document the findings of the SVI evaluation and to proposed site closure or a remedial action such as soil vapor extraction.

6.0 REFERENCES

AFCEE, Final Building 101 Area of Concern (ST006) Record of Decision September 2012.

FPM Group Ltd., Draft Confirmation Sampling Report, Building 101 Battery Acid Drainage Pit Area of Concern, former Griffiss Air Force Base, Rome, New York, Revision 0.0, August 2002.

FPM Group Ltd., Draft Report, Soil Vapor Intrusion Sampling, Building 101, former Griffiss Air Force Base, Rome, New York, Revision 0.0, November 2007.

FPM Group Ltd., Monitoring Report (Spring 2007), On-Base Groundwater AOCs, Monitoring Program, Former Griffiss Air Force Base, Rome, New York, August 2007.

FPM Group Ltd., Monitoring Report (Annual 2008), On-Base Groundwater AOCs, Monitoring Program, Former Griffiss Air Force Base, Rome, New York, Revision 0.0, April 2009.

CAPE/FPM/AECOM, Draft-Final Health and Safety Plan for Performance Based-Remediation at the former Griffiss AFB, New York, July 2011.

CAPE/FPM/AECOM, Final Uniform Federal Policy Quality Assurance Project Plan for Performance Based-Remediation at the former Griffiss AFB, New York, November 2011.

Law, Remedial Investigation at the former Griffiss AFB, December 1996.

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TABLES

Table 1
Soil Vapor Intrusion Pathway Investigation at Building 101
Field Activity Summary

Activity	Rationale	Analytical Parameters
Collection of ten sub-slab vapor samples from Building 101, five from the former BADP and five from the former BADrP.	Sub-slab vapor samples shall be collected to evaluate the potential for current human exposures within Building 101. Samples will also help to evaluate the indoor air results adequately. The results shall indicate whether closure with regard to the SVI pathway is appropriate.	VOCs – EPA TO-15
Collection of two indoor air samples within Building 101. One from within the office area (vicinity of the former BADP) and one outside of the office at the former BADrP area.	Indoor air samples shall be collected to evaluate current human exposures. Should indoor air samples indicate VOCs that are not present in sub-slab vapor samples, either additional sub-slab vapor samples shall be collected, or other sources (i.e., from within the building) shall be suspected.	VOCs – EPA TO-15
Collection of one outdoor air sample outside of Building 101. The outdoor air samples hall establish background and shall be collected simultaneously with the indoor air samples.	Outdoor air samples shall be collected to characterize the site-specific background air conditions, and to specifically evaluate the extent to which outdoor sources may be influencing indoor air quality. Outdoor air samples shall serve as ambient blanks for this investigation.	VOCs – EPA TO-15

Table 2
Soil Vapor Intrusion Pathway Investigation at Building 101
Sample Analysis Summary

Analyte/ EPA Method Numbers	Sample Type	No. of Samples	No. of Field Dups./Reps.	No. of Trip Blanks	Total No. of Samples
VOCs – EPA TO-15	Sub-slab Vapor	10	--[1]	--[1]	
VOCs – EPA TO-15	Indoor Air	2	--[1]	--[1]	
VOCs – EPA TO-15	Outdoor Air	1	--[1]	--[1]	

[1] One trip blank is required per cooler containing VOCs. One field duplicate sample shall be collected as either a subsurface vapor or a sub-slab vapor sample.

FIGURES

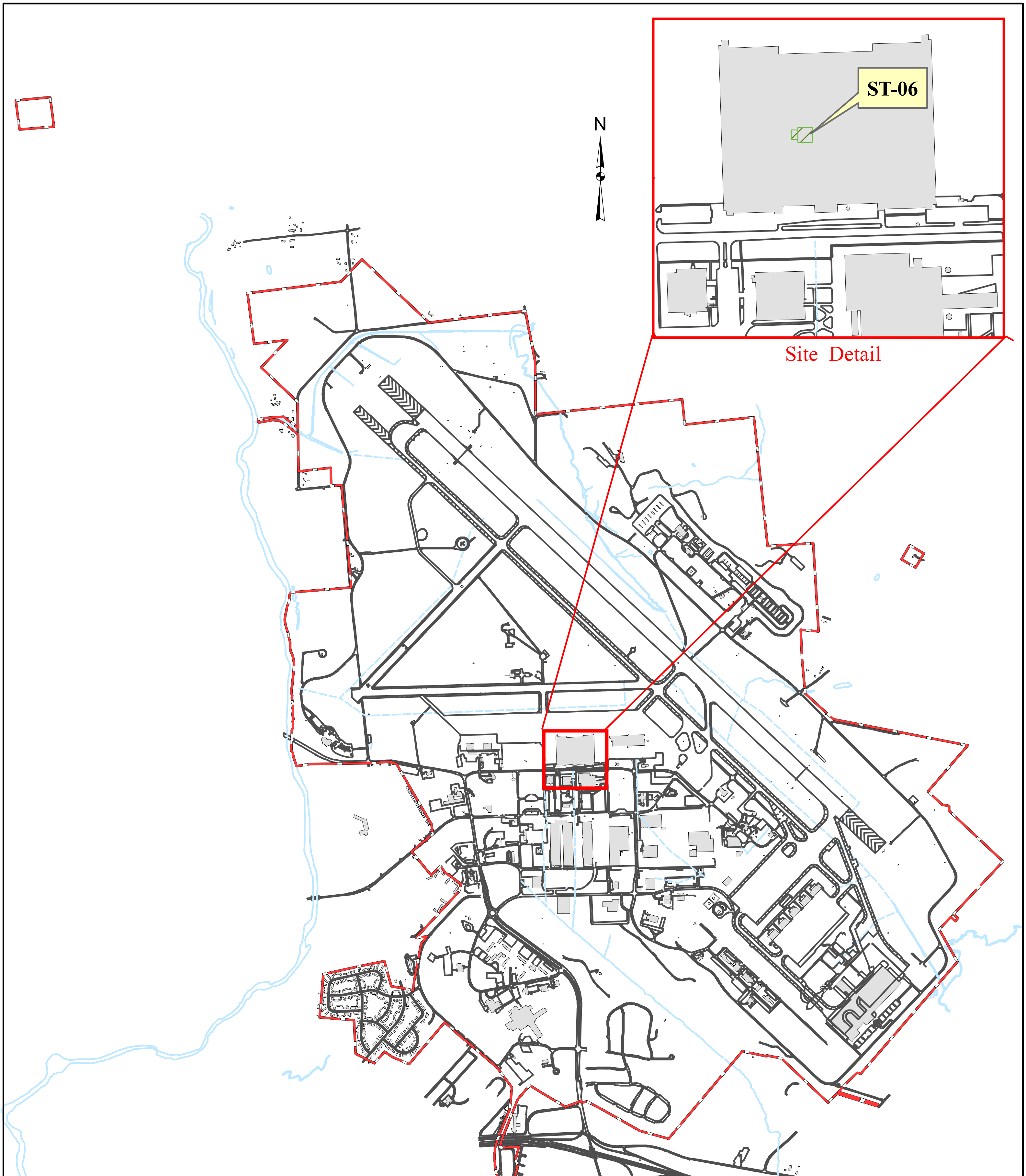

Figure 1
Building 101 AOC Site Location Map

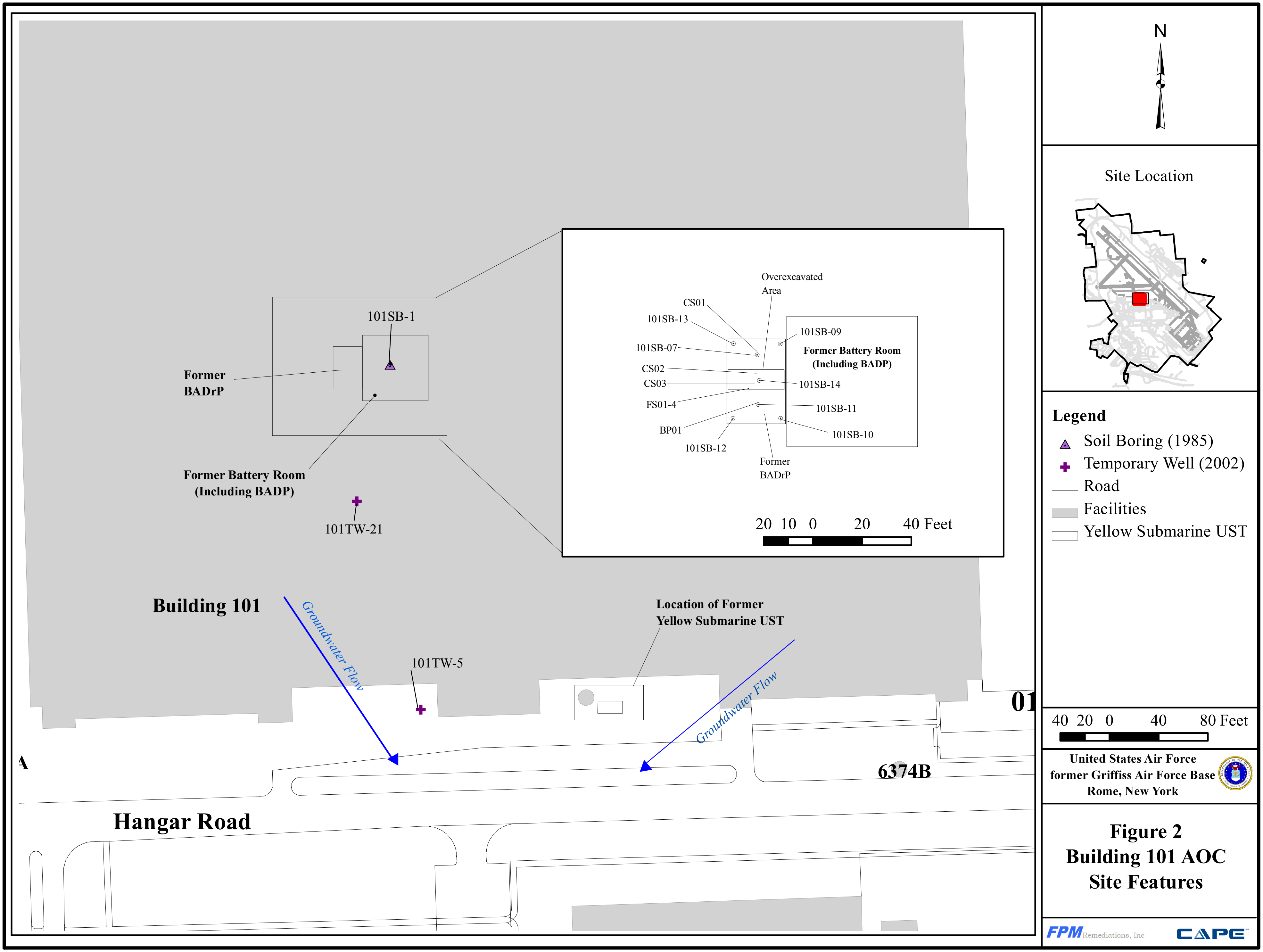

Figure 2
Building 101 AOC
Site Features

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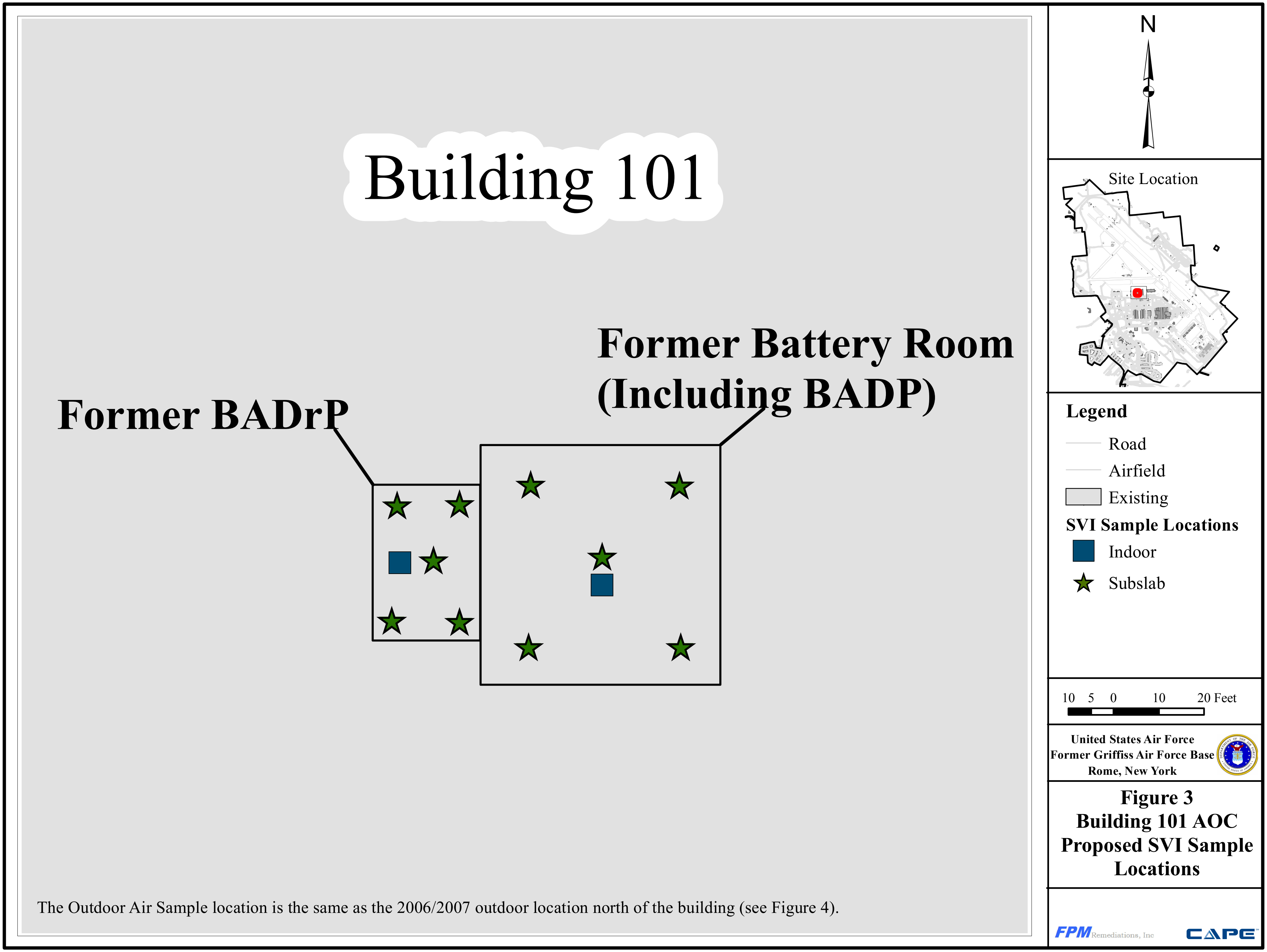

Y:\GIS_Projects\Griffiss\Projects\1015-11-01\Mod_2\101\Proposed SVI Sample Locations (2012)

APPENDICES

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

SEP 28 2012

Mr. Robert Moore
Director
Air Force Real Property Agency
2261 Hughes Avenue, Suite 121
Lackland AFB, TX 78236-9821

Re: Record of Decision – Building 101 (Site ST-06)
Former Griffiss Air Force Base, Rome, New York

Dear Mr. Moore:

This is to inform you that after reviewing the Draft Record of Decision (ROD), responsiveness summary and other supporting documents, the U.S. Environmental Protection Agency (EPA) concurs with the final ROD, dated September 2012, for the Building 101 (Site ST-06) area of concern, located at the former Griffiss Air Force Base in Rome, New York. Therefore, on behalf of EPA, I have co-signed the ROD, a copy of which will be mailed directly to Michael McDermott at Griffiss AFB.

The ROD calls for institutional controls prohibiting residential land use and requiring evaluation of the potential for soil vapor intrusion if future construction is undertaken at the site, and it summarizes the studies and actions taken in support of this recommendation.

Please note this ROD addresses only the above-mentioned area of concern and that all other areas at the former Griffiss AFB are being or have been addressed under separate RODs and/or operable units.

If you have any questions regarding the subject of this letter, please contact me or have your staff contact Robert D. Morse of my staff at (212) 637-4331.

Sincerely,

Walter E. Mugdan, Director
Emergency and Remedial Response Division

Enclosures

cc: Robert W. Schick, NYSDEC, w/o encl.
Michael F. McDermott, GAFB, w/encl
John B. Swartwout, NYSDEC, w/encl

DEPARTMENT OF THE AIR FORCE
AIR FORCE REAL PROPERTY AGENCY

OFFICE OF THE ASSISTANT SECRETARY

28 Sep 12

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

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

Dear Mr. Mugdan:

Enclosed please find three sets of the final Record of Decision (ROD) for Building 101, Area of Concern Site (ST006). After the ROD has been signed, please retain one set for your records. Please forward one signed set to New York Department of Environmental Conservation, ATTN: Ms. Heather Bishop, Division of Hazardous Waste Remediation, 625 Broadway, 11th Floor, Albany, NY 12233-7015 and one signed set to the Air Force Center for Engineering and the Environment, ATTN: Mr. Michael F. McDermott, 428 Phoenix Drive, Rome, NY 13441-4105.

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

If you have any questions or need additional information, please contact Mr. Michael McDermott at (315) 356-0810 ex 202.

Sincerely,

Robert M. Moore

ROBERT M. MOORE
Director

Attachment:
ROD Building 101, Area of Concern (ST006) - 3 sets

FINAL

RECORD OF DECISION

BUILDING 101 AREA OF CONCERN (IRP Site ST-06)

FORMER GRIFFISS AIR FORCE BASE ROME, NEW YORK

UNITED STATES DEPARTMENT OF THE AIR FORCE AIR FORCE REAL PROPERTY AGENCY

September 2012

FINAL

RECORD OF DECISION

BUILDING 101 AREA OF CONCERN
(IRP Site ST-06)

FORMER GRIFFISS AIR FORCE BASE
ROME, NEW YORK

UNITED STATES DEPARTMENT OF THE AIR FORCE
AIR FORCE REAL PROPERTY AGENCY

SEPTEMBER 2012

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ACRONYMS

AFB	Air Force Base
AFRPA	Air Force Real Property Agency
AOC	Area of Concern
ARARs	Applicable or Relevant and Appropriate Requirements
ATSDR	Agency for Toxic Substances and Disease Registry
BADP	Battery Acid Disposal Pit
BADrP	Battery Acid Drainage Pit
bgs	below ground surface
BRAC	Base Realignment and Closure Act
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CFR	Code of Federal Regulations
COC	Contaminants of Concern
DCE	cis-1,2-dichloroethene
DFAS	Defense Finance and Accounting Services
EADs	Eastern Air Defense Sector
EPA	Environmental Protection Agency
FFA	Federal Facility Agreement
ft	feet
HRC	Hydrogen Release Compound
IRP	Installation Restoration Program
LUC/IC	Land-Use Controls/Institutional Controls
µg/kg	microgram per kilogram
µg/L	microgram per Liter
$\mu g/m^3$	microgram per cubic meter
NCP	National Oil and Hazardous Substances Pollution Contingency Plan
NPL	National Priorities List
NYANG	New York Air National Guard
NYSDEC	New York State Department of Environmental Conservation
PAH	polycyclic aromatic hydrocarbons
PCBs	polychlorinated biphenyls
PCE	tetrachloroethylene
PID	photoionization detector

ACRONYMS (continued)

RI	Remedial Investigation
ROD	Records of Decision
RSCO	Recommended Soil Cleanup Objective
SCGs	Standards, Criteria, and Guidance values
SI	Supplemental Investigation
STARS	Spill Technology and Remediation Series
SVI	Soil Vapor Intrusion
SVOC	semi-volatile organic compound
TAGM	Technical and Administrative Guidance Memorandum
TCE	trichloroethylene
UST	underground storage tank
VOC	volatile organic compound

1.0 DECLARATION

1.1 Site Name and Location

The Building 101 Area of Concern (AOC) (site identification designation ST-06) is located at the former Griffiss Air Force Base, Rome, Oneida County, New York.

1.2 Statement of Basis and Purpose

This Record of Decision (ROD) presents the selected remedial alternative for the Building 101 AOC at the former Griffiss Air Force Base (AFB) in Rome, New York. It has been developed in accordance with the Comprehensive Environmental Response, Compensation, and Liability Act of 1980 (CERCLA), 42 U.S.C. §§ 9601-9675, as amended, and to the extent practicable, the National Oil and Hazardous Substances Pollution Contingency Plan (NCP), 40 C.F.R. Part 300. This decision is based on the Administrative Record for this site, a copy of which is available on-line at https://afrpaar.lackland.af.mil/ar.

The remedy of Land-Use Controls/Institutional Controls (LUC/ICs) has been selected by the United States Air Force (Air Force) in conjunction with the United States Environmental Protection Agency (EPA) and with the New York State Department of Environmental Conservation (NYSDEC) pursuant to the former Griffiss AFB Federal Facility Agreement (FFA).

1.3 Description of the Remedy

The Selected Remedy of LUC/ICs for the Building 101 AOC is protective of human health and the environment and complies with the federal and state Applicable or Relevant and Appropriate Requirements (ARARs). As a result of prior performed Building 101 response actions, the majority of soil and groundwater contamination has been removed. LUC/ICs will be in the form of land use restrictions limiting future use to industrial/commercial purposes and re-evaluation for soil vapor intrusion (SVI) if new construction is performed in the SVI restriction area identified in Figure 1. Five-year reviews will be performed by the Air Force, in conjunction with the EPA and NYSDEC, to ensure that future land use is in compliance with the deed restriction for industrial/commercial use and to ensure that future land use is in compliance with the land use controls to manage the potential for SVI. Five-year reviews will ensure that the selected remedy is protective of human health and the environment. The transfer documents will contain the following restrictions to ensure that the reuse of the site is consistent with the risk assessment:

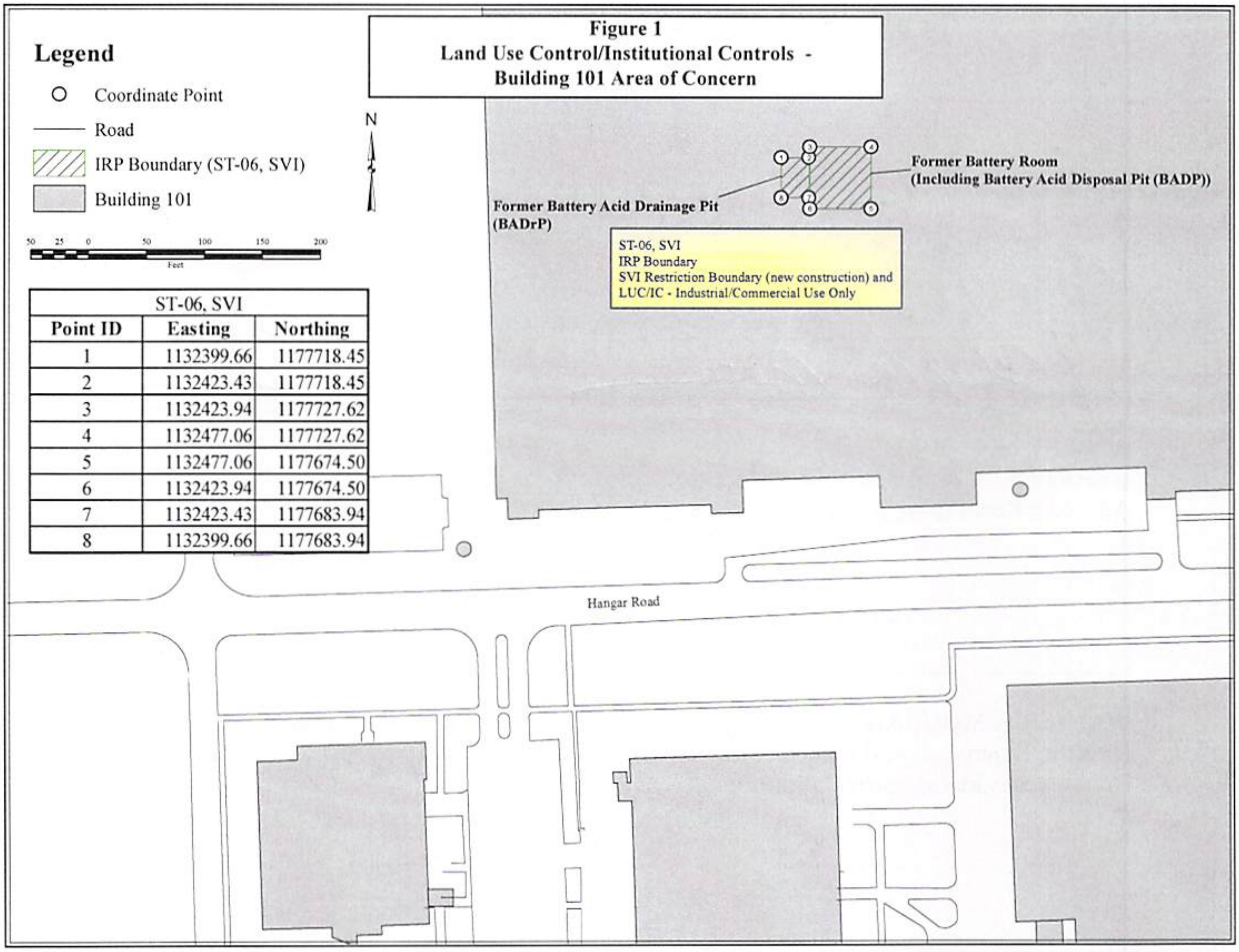
- Development and use of the entire Building 101 AOC property for residential housing, elementary and secondary schools, childcare facilities and playgrounds will be prohibited unless prior approval is received from the Air Force, EPA, and NYSDEC.
- The owner/occupant of the property shall evaluate the potential for soil vapor intrusion if future construction is performed in the SVI restriction area.

The soil vapor intrusion evaluation conducted at the Building 101 AOC in fall 2006 and winter 2007 included soil vapor (exterior) and sub-slab vapor (interior) (2006) and indoor and outdoor air samples (2007). Results indicate that all exterior soil vapor and indoor and outdoor air detections were below screening levels for industrial/ commercial use. Sub-slab contamination was detected above screening levels but was within one order of magnitude of the sub-slab screening levels. Because no exceedances were detected in the indoor air samples, no further action or evaluation of SVI is required unless construction within the SVI restriction area identified in Figure 1 is to be performed.

1.4 Statutory Determinations

The selected remedy (LUC/ICs) for Site ST-06 is protective of human health and the environment and complies with federal and state ARARs. Five-year reviews will be performed by the Air Force, in conjunction with the EPA and NYSDEC, to ensure that future land use is in compliance with the deed restrictions for industrial/commercial/non-residential use and to ensure that future land use is in compliance with the land use controls to manage the potential for SVI. These reviews will also ensure that the selected remedy is protective of human health and the environment.

Figure 1
Land Use Control/Institutional Controls - Building 101 Area of Concern



ST-06, SVI		
Point ID	**Easting**	**Northing**
1	1132399.66	1177718.45
2	1132423.43	1177718.45
3	1132423.94	1177727.62
4	1132477.06	1177727.62
5	1132477.06	1177674.50
6	1132423.94	1177674.50
7	1132423.43	1177683.94
8	1132399.66	1177683.94

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1.5 Authorizing Signatures

On the basis of the remedial investigation and successfully completed removal actions performed at the Building 101 AOC, there is no evidence that residual contamination at the site poses a current or future potential threat to human health or the environment. NYSDEC has concurred with the Selected Remedy presented in this Record of Decision.

28 Sep 12

ROBERT M. MOORE
Director
Air Force Real Property Agency

Date

Sept. 28, 2012

WALTER E. MUGDAN
Director, Emergency and Remedial Response Division
United States Environmental Protection Agency, Region 2

Date

2.0 DECISION SUMMARY

2.1 Site Name, Location, and Description

The former Griffiss AFB, located in Oneida County in central New York State, covered approximately 3,552 contiguous acres in the lowlands of the Mohawk River Valley in the city of Rome. Topography within the valley is relatively flat, with elevations on the former Griffiss AFB ranging from 435 to 595 feet above mean sea level. Three Mile Creek, Six Mile Creek (both of which drain into the New York State Barge Canal, located to the south of the base), and several state-designated wetlands are located on the former Griffiss AFB, which is bordered by the Mohawk River on the west.

The Building 101 AOC is located south of Apron 3 in the central portion of the base along the northern margin of the industrial complex (see Figure 2). It is bounded by Hangar Road to the south, Building 100 to the east, and Apron 4 parking area to the west. Building 101 operated as an aircraft maintenance hangar. The Building 101 AOC consists of three separate areas, a former 12,000-gallon reinforced fiberglass underground storage tank (UST), known as the Yellow Submarine, a former Battery Acid Disposal Pit (BADP), and a former Battery Acid Drainage Pit (BADrP) (see Figure 3).

The former Yellow Submarine UST was located approximately 15 feet from the southern wall of Building 101 until June 1993, at which time it was removed. The Yellow Submarine UST was situated within a small graveled area of approximately 20 feet by 30 feet and rested on a concrete pad approximately 15.5 feet below grade. The UST measured approximately 10 feet in diameter by 20 feet in length. A partially buried vault above the UST housed a pump station. The Yellow Submarine UST was used as a holding and dilution tank for plating wastes from a metals plating shop that was located within Building 101. The wastes were discharged into the sanitary sewer system. The UST was in operation from 1973 to 1987 and reportedly received about 20 gallons per day in plating wash-down and about 10 gallons per year of plating solids and plating bath solutions.

The former BADP was located in the central portion of the building in an area designated as the Lead Battery Room. The BADP was in use from the early 1940s until 1985, when it was excavated. The BADP consisted of a pit beneath the concrete floor measuring approximately 2 feet long by 2 feet wide by 10 feet deep and was covered with a steel grate. Acids from spent batteries were neutralized with baking soda and poured into the BADP, where the neutralized liquid was allowed to percolate into the underlying soil. A 4-inch floor drain and overflow piping from the BADP ran west to the BADrP located beyond the west wall of the Lead Battery Room. The BADrP was approximately 17.5 feet long by 5.5 feet wide. Following removal of the BADP, a new 4-inch floor drain was installed at the former BADP location and piped to the BADrP. The BADrP was removed along with underlying soils in 1997. The former BADrP location was backfilled and sealed with concrete.

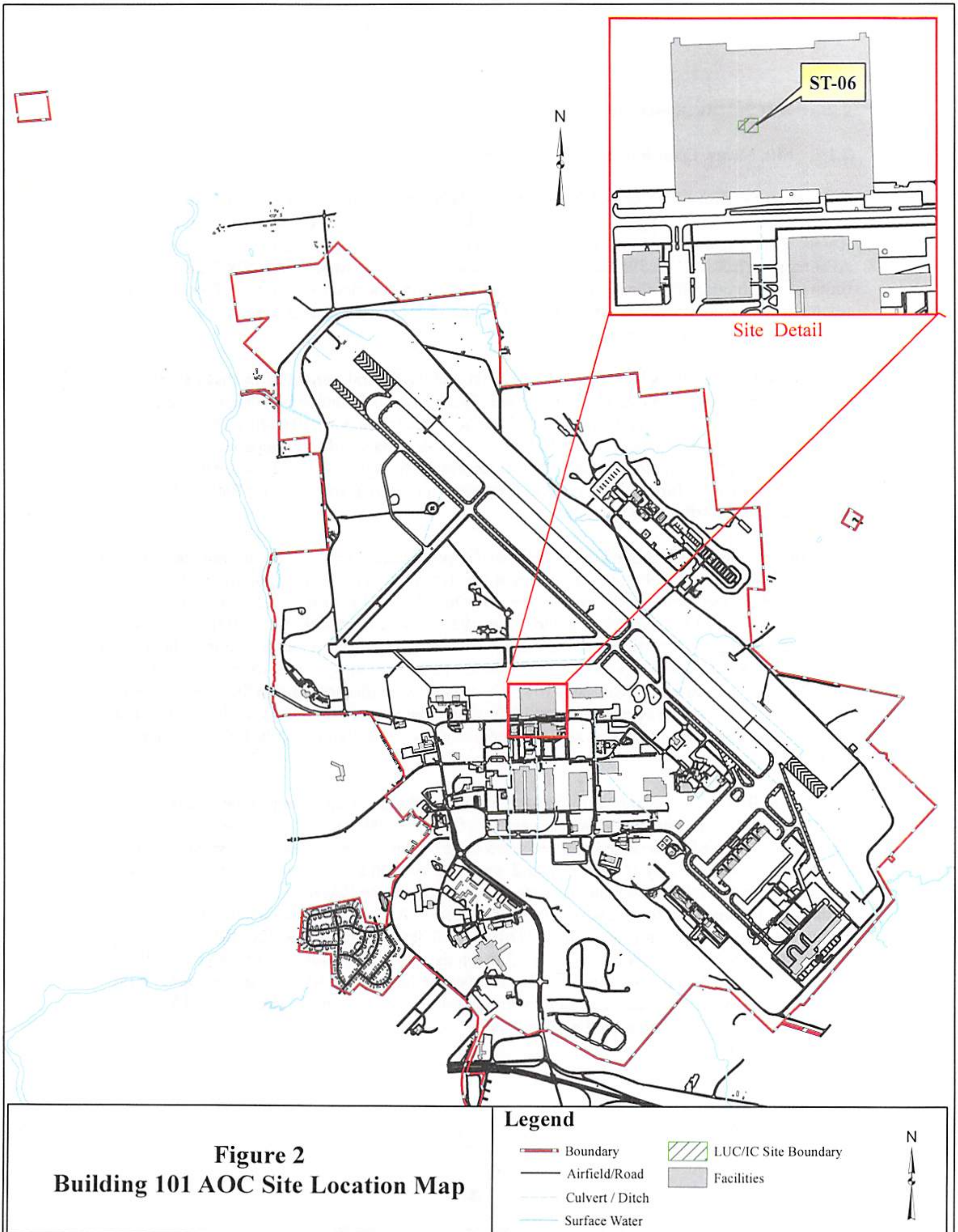


Figure 2
Building 101 AOC Site Location Map

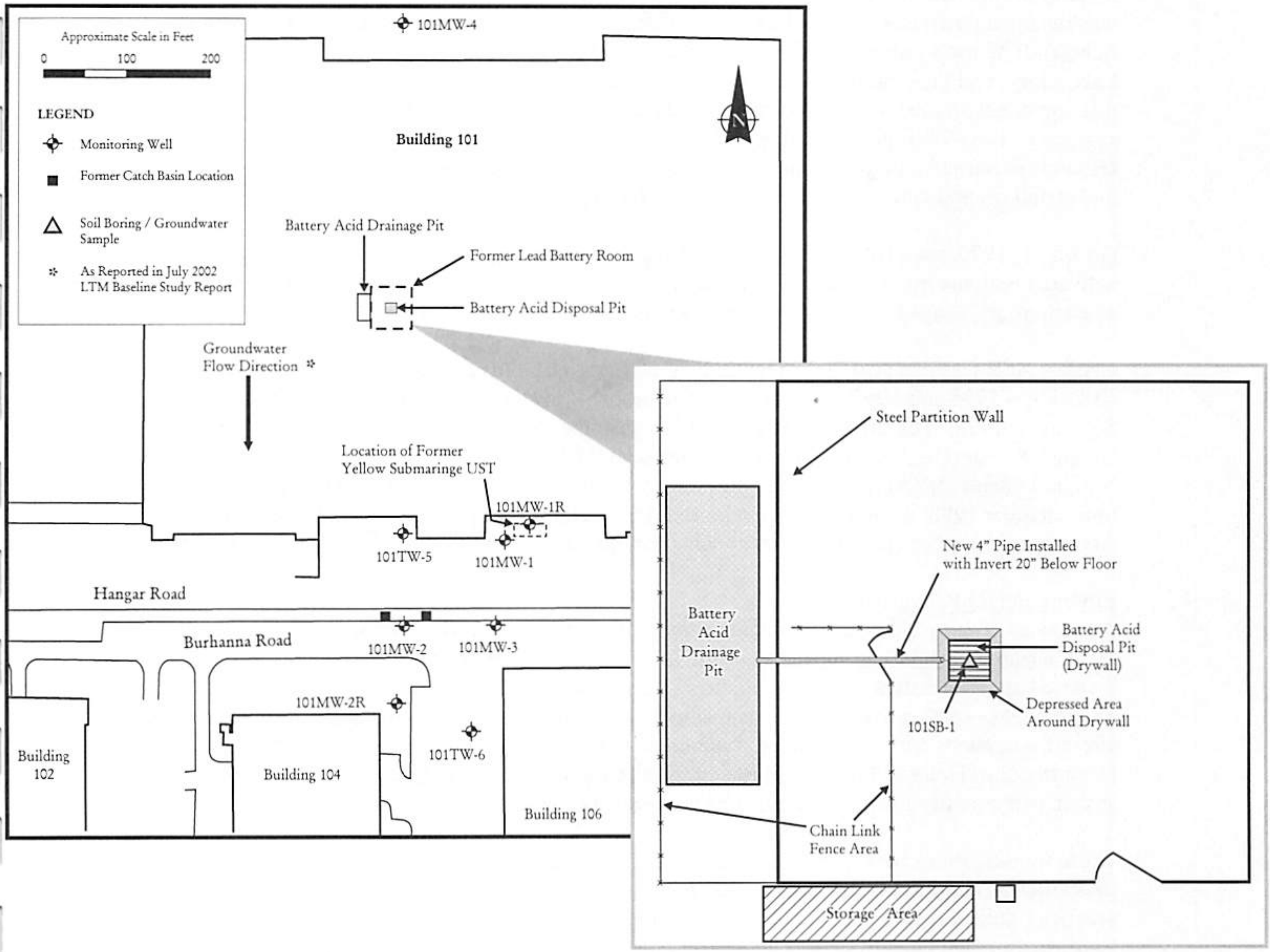


Figure 3
Building 101 AOC Site Features

2.2 History and Enforcement Activities

The Former Griffiss AFB Operational History

The mission of the former Griffiss AFB varied over the years. The base was activated on February 1, 1942, as Rome Air Depot, with the mission of storage, maintenance, and shipment of material for the U.S. Army Air Corps. Upon creation of the U.S. Air Force in 1947, the depot was renamed Griffiss Air Force Base. The base became an electronics center in 1950, with the transfer of Watson Laboratory Complex (later Rome Air Development Center [1951], Rome Laboratory, and then the Information Directorate at Rome Research Site, established with the mission of accomplishing applied research, development, and testing of electronic air-ground systems). The 49th Fighter Interceptor Squadron was also added. The Headquarters of the Grounds Electronics Engineering Installations Agency was established in June 1958 to engineer and install ground communications equipment throughout the world.

On July 1, 1970, the 416th Bombardment Wing of the Strategic Air Command (SAC) was activated with the mission of maintenance and implementation of both effective air refueling operations and long-range bombardment capability.

Griffiss AFB was designated for realignment under the Base Realignment and Closure Act (BRAC) in 1993 and 1995, resulting in deactivation of the 416th Bombardment Wing in September 1995. The Information Directorate at Rome Research Site and the Eastern Air Defense Sector (EADS) will continue to operate at their current locations; the New York Air National Guard (NYANG) operated the runway for the 10th Mountain Division deployments until October 1998, when they were relocated to Fort Drum; and the Defense Finance and Accounting Services (DFAS) has established an operating location at the former Griffiss AFB.

Environmental Background

As a result of the various national defense missions carried out at the former Griffiss AFB since 1942, hazardous and toxic substances were used and hazardous wastes were generated, stored, or disposed at various sites on the installation. The defense missions involved, among others, procurement, storage, maintenance, and shipping of war material; research and development; and aircraft operations and maintenance. Numerous studies and investigations under the U.S. Department of Defense Installation Restoration Program (IRP) have been carried out to locate, assess, and quantify the past toxic and hazardous waste storage, disposal, and spill sites.

These investigations include the following: a records search in 1981, interviews with base personnel, a field inspection, compilation of an inventory of wastes, evaluation of disposal practices, and an assessment to determine the nature and extent of site contamination; Problem Confirmation and Quantification studies (similar to what is now designated a Site Investigation) in 1982 and 1985; soil and groundwater analyses in 1986; a base-wide health assessment in 1988 by the U.S. Public Health Service, Agency for Toxic Substances and Disease Registry (ATSDR); base-specific hydrology investigations in 1989 and 1990; a groundwater investigation in 1991; and site-specific studies and investigations between 1989 and 1995. The ATSDR issued a Public Health Assessment for Griffiss AFB, dated October 23, 1995, and an addendum, dated September 9, 1996.

Pursuant to Section 105 of CERCLA, Griffiss AFB was included on the National Priorities List (NPL) on July 15, 1987. On August 21, 1990, the agencies entered into a FFA under Section 120 of CERCLA. On March 20, 2009, approximately 2,900 acres of the 3,552 acres at the former Griffiss AFB were removed from the NPL. The AOC which is the subject of this ROD remains on the NPL.

2.3 Community Participation

A proposed plan for the Building 101 AOC (Air Force Real Property Agency (AFRPA), August 2012), recommending LUC/IC, was released to the public on August 15, 2012. The document was made available to the public in the administrative record file available on-line at https://afrpaar.lackland.af.mil/ar.

The notice of the availability of these documents was published in the Rome Daily Sentinel Newspaper on August 15, 2012. In addition, a 30-day public comment period was designated from August 15, 2012 to September 14, 2012 to solicit public input on the Proposed Plan for the Building 101 AOC. During this period, the public was invited to review the Administrative Record and comment on the preferred alternative being considered.

In addition, Griffiss AFB hosted a public meeting on August 28, 2012 at the Griffiss Institute located at 725 Daedalian Drive, Rome, New York 13441. The date and time of the meeting was published in the Rome Daily Sentinel Newspaper. At the meeting, the Air Force provided data gathered at the site, the preferred alternative, and the decision-making process. The meeting provided the opportunity for the community to comment officially on the Proposed Plan. The public meeting has been recorded and transcribed, and a copy of the transcript has been added to the Administrative Record. No public comments on the Proposed Plan were submitted. A Responsiveness Summary documenting the comment solicitation process is included in Section 3.0.

2.4 Scope and Role of Area of Concern

The Building 101 AOC is one of several sites administered under the Griffiss AFB Installation Restoration Program (IRP). The Building 101 AOC includes both previously contaminated soil in the unsaturated zone and previously contaminated groundwater at the site. LUC/ICs are recommended for the Building 101 AOC. Interim actions conducted at the site have eliminated the source of soil and groundwater contamination.

2.5 Site Characteristics

Various actions undertaken at the AOC have removed the sources of groundwater and soil contamination. Currently, no significant threat to human health is posed by the groundwater or soil at the Building 101 AOC. Previous investigations and removal actions (Section 2.5.1), groundwater monitoring (Section 2.5.2), and soil vapor intrusion evaluations (Section 2.5.3) are summarized below. In the discussion below, "most stringent criteria", "soil clean-up goals", and "groundwater standards" refer to the lowest values among all identified federal and state standards that have been identified as ARARs at the site or in other federal and state advisories, guidance, and standards referred to as To-Be-Considereds (TBCs).

2.5.1 Previous Investigations and Removal Actions

2.5.1.1 Yellow Submarine

The aqueous and sludge phase contents of the Yellow Submarine UST were sampled in 1992. Cadmium, chromium, nickel, lead, cyanide, and chlorinated solvents (methylene chloride, tetrachloroethylene, 1,2-trans-dichloroethylene, and trichloroethylene) were detected in both the aqueous and sludge phase samples. In addition, benzene, 1,1-dichloroethylene, ethylbenzene, and toluene were also identified in the sludge sample. The UST was evacuated and removed in 1993. Samples of soil from the excavation and the tank contents (sludge and liquid) were analyzed for chemical characterization. Fourteen soil samples collected from the tank excavation and sidewall samples collected from just above the groundwater table revealed the presence of only one volatile organic compound (VOC) (tetrachloroethylene) and three metals (chromium, lead, and nickel), which were below screening levels. The soil was determined to be suitable to use as backfill for the excavation and was not removed from the site.

As part of the 1992/1993 quarterly groundwater sampling program, monitoring well 101MW-1 was sampled for three consecutive quarters. Samples were analyzed for semi-volatile organic compounds (SVOCs), VOCs, metals, and glycols. Tetrachloroethylene (PCE), trichloroethylene (TCE), manganese, and zinc were the only chemicals detected in the quarterly groundwater samples with the highest concentrations occurring in June 1993.

In 1994, an RI was performed by Law Engineering and Environmental Services, Inc. The main objective of the RI was to investigate the nature and extent of environmental contamination from historical releases at the AOC in order to determine whether any further remedial action was necessary to prevent potential threats to human health and the environment that might arise from exposure to site conditions. The RI field investigation activities performed at the former location of the Yellow Submarine UST included a soil gas/groundwater screening survey at 30 sample locations; the installation and sampling of two groundwater monitoring wells (101MW-2 and 101MW-3), the sampling of the one existing well (101MW-1), and the collection of a sediment sample from one storm water catch basin nearest the former UST location.

The soil gas/groundwater screening survey was performed in order to determine if fuel products, petroleum-based solvents, or chlorinated solvents were present. Analysis of the soil gas/groundwater screening samples revealed the presence of fuel products or petroleum-based solvents in the headspace of 8 out of the 30 groundwater samples and in 2 of the 30 gas samples, and chlorinated hydrocarbon compounds were detected in the headspace of 16 of the 30 groundwater samples and in 1 of the 30 soil gas samples. The analyte concentrations were greatest near the southwest corner of Building 101 and at an adjacent area on Hangar Road.

Analyses of the groundwater samples from monitoring wells 101MW-1, 101MW-2, and 101MW-3 indicated the presence of eight VOCs, 15 SVOCs, five polychlorinated biphenals (PCBs), six pesticides, 21 metals, and cyanide (Table 1).

Table 1 Building 101 AOC Compounds Exceeding Standards and Guidance Values Yellow Submarine UST - RI Monitoring Well Groundwater Samples						
Compound	Range of Detected Concentration	Frequency of Detection Above Most Stringent Criterion	RCRA Corrective Action Level	NYS Groundwater Standard	NYS Groundwater Guidance Value	Federal secondary maximum contaminant level
Volatiles (µg/L)						
Tetrachloroethylene	ND - 7.7	1/3	0.7 [a]	5 [b]	NA	NA
cis-1,2-Dichloroethene	0.3 J - 120 DJ	1/3	NA	5 [b]	NA	NA
Semi-Volatiles (µg/L)						
2,2,4,4,5,6-Hexachlorobiphenyl	ND - 0.2 J	1/3	NA	0.1 [b]	NA	NA
2,4-Dichlorophenol	ND - 10 J	2/3	5 [a]	5 [b]	NA	NA
Benzo(a)anthracene	ND - 0.1 J	1/3	NA	NA	0.002 [c]	NA
gamma-chlordane	ND - 0.02 J	1/3	NA	0.05 [b]	NA	NA
Pesticides (µg/L)						
Aldrin	0.002 J - 0.008 J	3/7	ND [a]	NA	NA	NA
Total PCB*	0.1 J - 0.49 J	2/3	NA	0.1 [b]	NA	NA
Metals (mg/L)						
Aluminum	0.39 J - 1 J	3/3	NA	NA	NA	0.05 [d]
Iron	0.081 J - 2.76 J	2/3	NA	0.0007 [b]	NA	NA
Manganese	0.359 - 0.796	3/3	NA	NA	NA	0.05 [d]
Mercury	0.00004 J - 0.00084 J	1/3	NA	0.0007 [b]	NA	NA
Sodium	4.07 - 56.5	1/3	NA	20 [b]	NA	NA

Notes:

[a] RCRA Corrective Action Levels

[b] NYSDEC Class GA groundwater standard; June 1998

[c] NYSDEC Class GA groundwater guidance values; June 1998

[d] Federal secondary maximum contaminant level

* New York State Standard for Groundwater of 0.1 µg/L applies to the sum of all components

Key:

D = Indicates the compound was identified in an analysis from a diluted sample

J = Estimated concentration

NA = not applicable

ND = non-detect

A sediment sample was collected from a catch basin located near the former Yellow Submarine UST. The sample was collected to evaluate potential residual contamination in the storm water system associated with the discharge of plating wastes directly into the storm water system prior to the installation of the UST in 1973. One VOC (acetone) and 11 metals were detected in the sediment sample. Six metals (hexavalent chromium, lead, molybdenum, sodium, strontium and zinc) exceeded background screening concentrations for soil. Acetone is not expected to be associated with the plating waste discharges occurring before 1973 because it is highly volatile and would have evaporated. It is most likely a laboratory contaminant because it is used to clean glassware and is present at low levels in most laboratories.

Both catch basins shown on Figure 3 were removed during the reconstruction of Hangar Road in 1997 and 1998.

2.5.1.2 Battery Acid Disposal Pit

In 1984, split-spoon soil samples were taken every 2 feet to a depth of 8 feet from within the BADP. Battery sludge was encountered to a depth of 6 feet. The soil samples were analyzed for heavy metals and revealed high concentrations of antimony, copper, lead, and zinc at shallow depths. In 1985, the BADP was excavated to a depth of approximately 10 feet and replaced with New York State Type 4 fill, and a floor drain with new piping between the BADP and the BADrP was installed (see Figure 3). The former BADP is currently evident by the presence of the floor drain, which was sealed with a rubber cap in 1992 to prevent the emission of vapors from the drainage pit.

The RI field investigation activities performed at the location of the former BADP included the drilling of one soil boring; the collection of six soil samples from the soil boring; and the collection of one groundwater sample from the soil boring.

Analyses of the groundwater sample indicated the presence of one VOC, one SVOC, three pesticides, and 19 metals. The concentrations of one pesticide and 10 metals exceeded the most stringent criterion for groundwater (Table 2). The results of the subsurface soil sampling indicated the presence of two VOCs, eight SVOCs, three pesticides/PCBs, and 23 metals. The concentrations of two SVOCs and six metals exceeded the most stringent criterion (Table 3).

2.5.1.3 Supplemental Investigation

A supplemental investigation (SI) was conducted in 1997. The SI included resampling the three existing wells; installing and sampling one new, permanent, upgradient well (101MW-4) and installing and sampling two downgradient temporary wells (101TW-5 and 101TW-6). Analysis of the samples indicated the presence of bis(2-ethylhexyl)phthalate, chloroform, trichloroethylene, and tetrachloroethylene. The only chemicals that exceeded the most stringent criteria were bis(2-ethylhexyl)phthalate in the upgradient well (8.9 micrograms per liter (µg/L); criteria = 6 µg/L) and chloroform in two downgradient wells (19 µg/L; criteria = 7 µg/L).

Table 2 **Compounds Exceeding Standards and Guidance Values** **RI Soil Boring Groundwater Sample** **from Temporary Well in Building 101 BADP (101-SB-1)**						
Compound	Detected Concentration	Frequency of Detection Above Most Stringent Criterion	NYS Groundwater Standard	Federal secondary maximum contaminant level	Federal maximum contaminant level	NYS Groundwater Guidance Value
Pesticides/PCBs (μg/L)						
Aldrin	0.029 J	1/1	ND [a]	NA	NA	NA
Metals (mg/L)						
Aluminum	71.2	1/1	NA	0.05 [b]	NA	NA
Arsenic	0.068	1/1	0.025 [a]	NA	NA	NA
Chromium	0.22	1/1	0.05 [a]	NA	NA	NA
Copper	0.57	1/1	0.2 [a]	NA	NA	NA
Iron	922	1/1	0.3 [a]	NA	NA	NA
Lead	0.093	1/1	NA	NA	0.015 [c]	NA
Magnesium	47.8	1/1	NA	NA	NA	35 [d]
Manganese	19.2	1/1	NA	0.05 [b]	NA	NA
Mercury	0.0009	1/1	0.0007 [a]	NA	NA	NA
Sodium	123	1/1	20 [a]	NA	NA	NA

Notes:
[a] = NYSDEC Class GA groundwater standard; June 1998
[b] = Federal secondary maximum contaminant level
[c] = Federal action level
[d] = NYSDEC Class GA groundwater guidance values; June 1998
Key:
J = Estimated concentration *
NA = not applicable
ND= Non-detect
* = Estimated concentrations are typically due to measuring very low levels below the quantitation limit but above the detection limit or due to a quality control concern identified by a data reviewer.

Table 3 **Compounds Exceeding Standards and Guidance Values** **Building 101 BADP** **RI Subsurface Soil Samples**							
Compound	Range of Detected Concentration	TAGM 4046 Recommended Soil Cleanup Objective	Frequency of Detection Above TAGM 4046 Recommended	Background screening concentrations	Frequency of Detection Above Background screening	6-NYCRR Part 375 Unrestricted Use Soil	Frequency of Detection Above
SVOCs (μg/kg)							
Benzo(a)pyrene	74 J - 83 J	61 [a]	2/6	NA	NA	1000	0/6
Phenol	120 J	30 [a]	1/6	NA	NA	330	0/6
Metals (mg/kg)							
Antimony	7.5 - 8.8	NA	2/6	3.4 [b]	2/6	NA	NA
Arsenic	1.2 - 6.8	NA	1/6	4.9 [b]	1/6	13	0/6
Calcium	1,460 - 276,000	NA	3/6	23,800 [b]	3/6	NA	NA
Lead	8.9 - 369	NA	2/6	36.2 [b]	2/6	63	2/6
Mercury	0.11 - 0.75	NA	2/6	0.1 [b]	2/6	0.18	1/6
Sodium	135 J - 2,340 J	NA	2/6	259 [b]	2/6	NA	NA

Notes:
[a] = NYSDEC TAGM 4046 Recommended soil cleanup objective
[b] = Background screening concentration identified during the Remedial Investigation (1996).
* = 6 NYCRR Part 375 Environmental Remediation Programs Subparts 375-1 to 375-4 and 375-6
Key:
J = Estimated concentration **
NA = not applicable
** = Estimated concentrations are typically due to measuring very low levels below the quantitation limit but above the detection limit or due to a quality control concern identified by a data reviewer.

2.5.1.4 Long Term Monitoring Baseline Study

In 1998, as part of the proposed long term monitoring plan, two new groundwater monitoring wells (101MW-1R and 101MW-2R) were installed. During a groundwater baseline study conducted in 1999, which included four quarterly sampling rounds, all of the wells were sampled and analyzed for the chemicals of potential concern identified during the 1994 RI (cis-1,2-dichloroethene (DCE), tetrachloroethylene (PCE), trichloroethylene (TCE), chloroform, and vinyl chloride). Analysis of the samples indicated the presence of DCE, PCE, TCE, and chloroform. The concentration of chloroform in one well exceeded the NYSDEC Groundwater Standards, Criteria, and Guidance values (SCGs) during the April and August sampling rounds at 8.08 µg/L and 11.4 µg/L; the concentrations of all other chemicals were below the groundwater standards.

2.5.1.5 Battery Acid Drainage Pit

A sample of the BADrP contents was collected for analysis in August 1992. Metals, including cadmium, chromium, cobalt, lead, mercury, nickel, silver, vanadium, and zinc were detected, as well as chlorinated hydrocarbons, solvents, and polycyclic aromatic hydrocarbons (PAHs).

A removal action was performed from June 1997 to January 1998 (Figure 4). The work consisted primarily of sludge removal, removal of the concrete floor and sump, soil excavation, waste characterization sampling, confirmatory sampling, backfilling, concrete restoration, and smoke and dye testing of the drain piping under the floor.

Work activities began on June 2, 1997. The BADrP was free of any residual liquids and contained a dry sludge layer that was approximately 8 inches thick and exhibited a solvent-like odor. Photoionization detector (PID) screenings of the sludge vapor indicted the presence of VOCs ranging from 0 to 127 parts per million (ppm) and a four point composite sample was obtained. One VOC, two SVOCs, PCBs, and six metals were detected. The sludge was removed from the pit, placed into drums for disposal, and the concrete bottom was pressure-washed and scrubbed on July 11, 1997. Six wipe samples were collected following the surface remediation and analyzed for PCBs and metals. While no PCBs were detected in any of the samples at concentrations above the wipe action levels (as indicated by 40 Code of Federal Regulations (CFR) 761.125(b)(1) and site-specific action levels derived from two studies of indoor surface contamination), several metals were detected above the action levels in each of the six wipe samples.

Two smoke tests of the BADrP were conducted in September 1997 in order to determine the drainage discharge location of the pit. Although both tests showed smoke rising from nearby floor drains, it was not clear as to where the drains ultimately discharged. A dye test, also performed in September 1997, revealed that the discharge from the BADrP entered the sanitary sewer system on the south side of Hangar Road just outside the south side of Building 101.

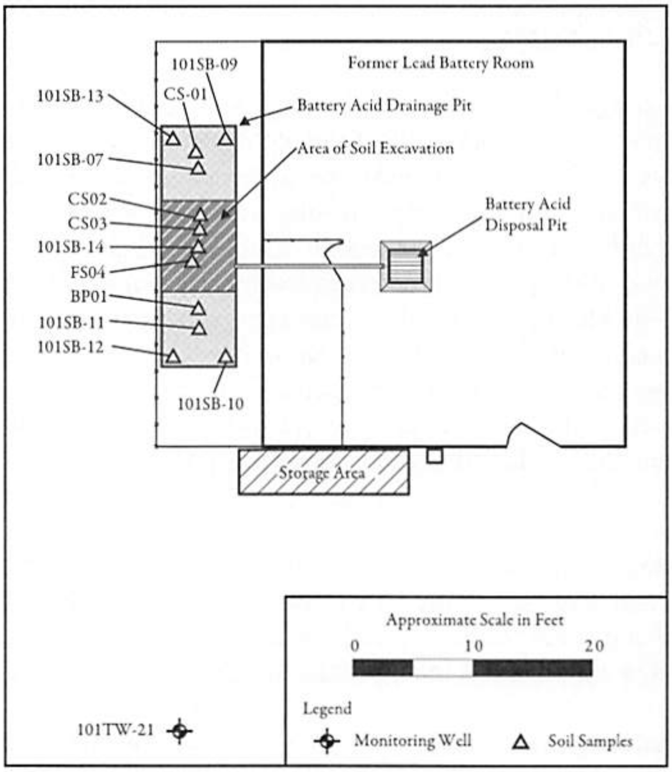


Figure 4
Building 101 Removal Action - BADrP limit

The concrete sump and a portion of the concrete bottom of the pit were removed in early September 1997 in order to assess soil contamination underneath the pit. PID screenings in the headspace of samples from the pit indicated the presence of VOCs ranging from 50 to 115 ppm. One bucket auger sample (BP01) was collected from where the sump had been removed and was submitted for analysis of VOCs, SVOCs, PCBs, and metals. The results were compared to New York State's Technical and Administrative Guidance Memorandum (TAGM) 3028 action levels, and this comparison indicated no exceedances. However, the Air Force later determined that this site fell under CERCLA regulatory guidance, and the action levels were replaced by the recommended soil cleanup objectives in TAGM 4046 which were established at that time. Results indicated that two SVOCs (phenol and 4-methylphenol) and five metals (cadmium, chromium, lead, mercury, and silver) were detected at concentrations above their respective TAGM 4046 action levels. Another round of soil and wipe sampling was recommended at the time to confirm the results of the initial soil sample and to assess the possibility for remaining contamination on the concrete surface.

In October 1997, three soil samples (CS01, CS02, and CS03) and two wipe samples were collected from the bottom and concrete walls of the pit, respectively. The soil samples were analyzed for VOCs, SVOCs, PCBs, and metals; the wipe samples were analyzed for metals only. At the time of the investigation the soil sample results were compared to TAGM 3028 action levels, which indicated only 1,4-dichlorobenzene in sample CS02 at levels above the action level. The central portion of the pit was recommended for excavation and confirmation samples where analyzed for 1,4-dichlorobenzene only. Later analysis of the same data indicated several SVOCs, including phenol, 4-methylphenol, 1,2-dichlorobenzene, 1,3-dichlorobenzene, and 1,4-dichlorobenzene and one metal (cadmium) were detected at concentrations above their respective TAGM 4046 action levels in the soil sample collected from the central portion of the pit bottom (CS02), and 4-methylphenol was found slightly above the TAGM 4046 action level in sample CS01.

In November 1997, the remaining sections of the concrete pit floor were removed, and the underlying soil in the central section of the pit was excavated to a depth of 3 feet. Three soil samples were collected and analyzed for 1,4-dichlorobenzene only. This compound was not found above TAGM 3028 action levels in any of the three soil samples collected.

A sample of crushed concrete floor material was also collected and analyzed for PCBs and metals, and a sample from the pile of excavated soil was collected and analyzed for VOCs, SVOCs, PCBs, and metals. No chemicals were detected at levels above regulatory guidance levels in either the concrete waste sample or the soil waste samples. The concrete removed from the bottom of the BADrP and soil excavated from under the pit were transported to a Subtitle D landfill in Camillus, New York, for disposal.

Also, as a result of this removal action, nine drums of solid material and two drums of rinse water were transported and disposed of as hazardous waste at the Michigan Disposal Waste Treatment Plant in Belleville, Michigan.

In December 1997, one final confirmation soil sample (FS04) was collected from the overexcavated area of the disposal pit and analyzed for VOCs, SVOCs, PCBs, and metals. No compounds were detected above either the TAGM 3028 or 4046 action levels. Although the October 1997 wipe samples of the pit walls indicated site-specific action level exceedances for cadmium, chromium, lead, mercury, and silver, the concrete walls were not recommended for removal. The BADrP was backfilled and covered with a 6-inch concrete pad in January 1998.

In June 2002, one additional sampling event was performed to compare the existing soil concentrations beneath the former BADrP to TAGM 4046 levels and determine whether closure would be appropriate for the site. A total of seven soil borings were installed within the footprint of the former BADrP. Two soil samples were collected from each boring: one was collected in the native soils directly beneath the fill area, and the second was collected 2 ft below the top of the native soil (i.e., if native soil was encountered at 4 ft BGS, one soil boring was collected from 4 to 6 ft BGS, and a second from 6 to 8 ft BGS). The results of the sampling indicated the presence of 17 VOCs, 8 SVOCs, 22 metals, and 3 PCBs. The concentrations of one SVOC exceeded the TAGM 4046 level (see Table 4); however the data was qualified as being below the laboratory method detection limit. Six metals exceeded the background screening concentrations. Following this sampling event, TAGM 4046 standards were superseded by the *Title 6 of the New York Codes, Rules, and Regulations (6 NYCRR) Part 375* (NYSDEC 2006) Unrestricted Use Soil Clean-up Objectives (SCOs). Under the 6-NYCRR Part 375 Unrestricted Use SCOs, no SVOCs and only 3 metals concentrations are above the SCOs.

To confirm that previous soil contamination did not affect the groundwater quality in the vicinity of the former BADrP, a groundwater sample was collected from the top of the groundwater table within 100 feet downgradient of the former BADrP (101TW-21). The sample was submitted and analyzed for total VOCs, SVOCs, PCBs, and metals, the results of which did not exceed NYSDEC Groundwater SCGs. Due to the temporary nature of the groundwater monitoring well, the groundwater sample demonstrated excessive quantities of suspended solids, which compromised the integrity of the sample collected at 101TW-21 for metals analysis. Metals results for downgradient wells (101MW-2, -2R, and -3) sampled in March 2002, however, showed minor exceedances for only iron, manganese, and sodium, which are not considered to be chemicals of potential concern.

2.5.2 Groundwater Monitoring

FPM Group, Ltd performed groundwater sampling from September 2001 to September 2008. Monitoring wells 101MW-1R, 101MW-2, and 101MW-2R were sampled in September and December 2001, March, June, September, and December 2002, March, June, September, and December 2003 and March 2004 for the target VOCs. Monitoring well 101MW-3 was sampled only during the first five sampling rounds, September 2001 through September 2002, before it was decommissioned in November 2002 during the removal of the asphalt parking lot adjacent to Building 101. Due to the confirmed absence of VOC contamination at the other long term monitoring (LTM) network wells, only 101MW-2 was sampled in June, September and December 2004, and March, June, September, and December 2005, May, September, December 2006, April, October, December 2007, April 2008, and September 2008 for target VOCs. The Building 101 LTM network is illustrated on Figure 3. Sampling results reported several VOC detections, including TCE and DCE. Only DCE was detected in exceedance of the NYS Groundwater SCGs during the sampling events.

Table 4 **Compounds Exceeding Standards and Guidance Values** **Building 101 BADP** **June 2002 Confirmatory Soil Samples**							
Compound	Range of Detected Concentration	TAGM 4046 Recommended Soil Cleanup Objective	Frequency of Detection Above TAGM 4046 Recommended Soil Cleanup Objective	Background screening concentrations	Frequency of Detection Above Background screening concentrations	6-NYCRR Part 375 Unrestricted Use Soil Cleanup Objective*	Frequency of Detection Above Unrestricted Use Soil Cleanup Objectives
SVOCs (µg/kg)							
Phenol	310 J	30 [a]	1/14	NA	NA	330	0/14
Metals (mg/kg)							
Cadmium	0.091 F - 8.9	NA	NA	1.1 [b]	3/14	2.5	2/14
Calcium	1,770 - 136,000	NA	NA	23,821 [b]	2/14	NA	NA
Copper	10- 47.6	NA	NA	43.8 [b]	1/14	50	0/14
Mercury	0.018 F - 1.18	NA	NA	0.1 [b]	1/14	0.18	1/14
Silver	0.15 F - 3	NA	NA	1.1 [b]	1/14	2	1/14
Sodium	71.8 F - 312	NA	NA	259 [b]	1/14	NA	NA

Notes:

[a] = NYSDEC TAGM 4046 Recommended soil cleanup objective

[b] = Background screening concentration identified during the Remedial Investigation (1996).

* = 6 NYCRR Part 375 Environmental Remediation Programs Subparts 375-1 to 375-4 and 375-6

Key:

F = The analyte was positively identified but the associated numerical value is below the reporting limit

J = estimated concentration

NA = not applicable

µg/kg = microgram per kilogram

mg/kg = milligram per kilogram

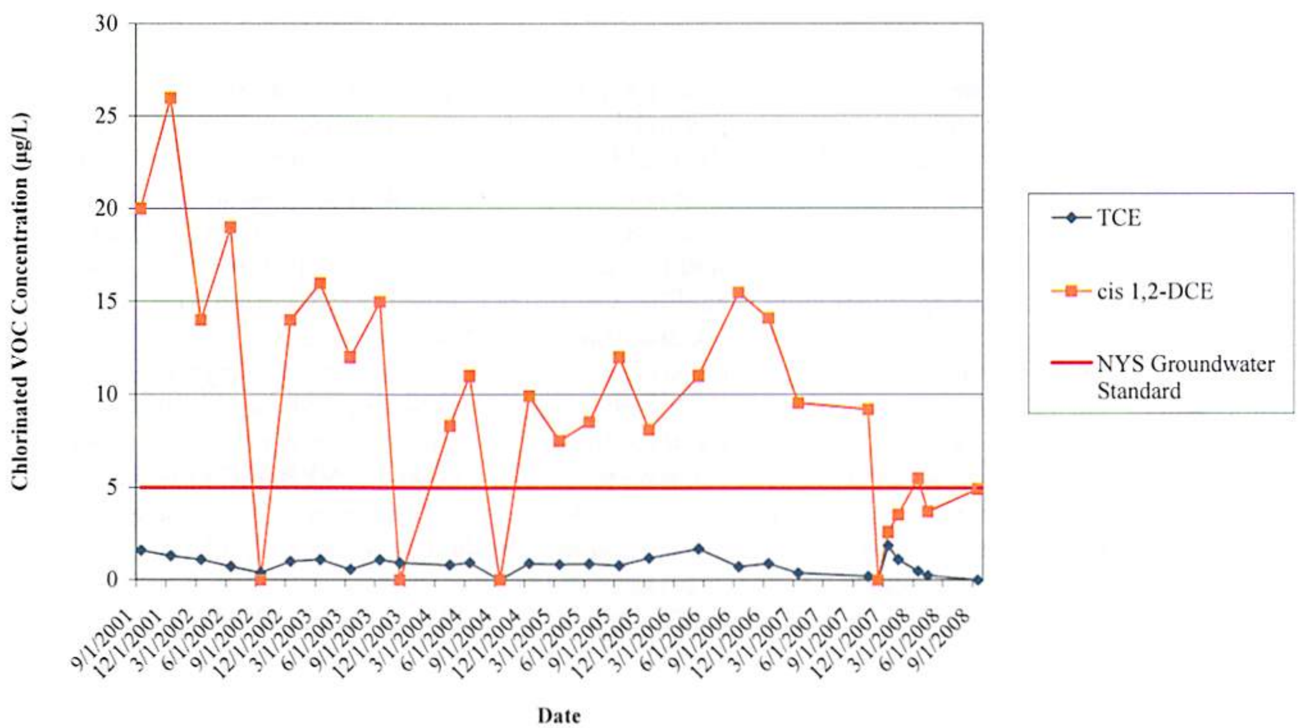
In December 2005, Hydrogen Release Compound (HRC) Advanced™ was injected at the Building 101 AOC. HRC Advanced™ is "a product designed specifically for the in-situ treatment of chlorinated solvent based contamination or any anaerobically degradable substance in the groundwater environment. HRC is a viscous liquid that is pressure injected directly into the subsurface. Upon contact with water, HRC Advanced™ slowly hydrolizes and is broken down by microbial action. During this process, lactic acid is released and utilized by microbes to produce hydrogen. The resulting hydrogen is then used in a microbially mediated process known as reductive dechlorination. This step-by-step biodegradation process (reductive dechlorination) reduces harmful contaminants into harmless end products." (Regenesis website, 9 January 2006). Five injection points were planned in a 50-ft wide injection wall in the former Yellow Submarine UST location. HRC Advanced™ was injected from 20 to 10 ft bgs with an application rate of 8 pounds of product per ft of depth. HRC Advanced™ was also applied in monitoring well 101MW-2 in February 2006. A second HRC Advanced™ injection was performed in August 2006 at the Building 101 AOC. HRC was injected at 5 points from 20 to 10 ft bgs at a rate of 8 pounds of product per foot. These points were directly west of the former Yellow Submarine UST location.

As recommended in the August 2007 monitoring report (FPM, August 2007), an injection of Newman Zone® (a proprietary vegetable oil emulsion with lactate) was performed on November 19, 2007 in monitoring well 101MW-2 at the Building 101 AOC. This product is injected in the soil matrix to create an anaerobic aquifer zone to make it (more) conducive to anaerobic degradation of chlorinated solvents. This injection was performed in the monitoring well due to the difficult utilities layout on the site. In addition to the LTM sampling performed in December 2007, April 2008, and September 2008, sampling was also performed at monitoring well 101MW-2 in November 2007, January 2008, and March 2008 to monitor the effect of the Newman Zone® injection. The first sample (November 2007) was collected two days after injection. The DCE and TCE results are illustrated in Figure 4. The detected concentrations reported at the Building 101 AOC changed little until the Newman Zone® injection in November 2007. Originally, DCE has consistently been reported at 2 to 3 times the NYSDEC Groundwater Standard of 5 µg/L; however, the sampling results collected after the Newman Zone® injection show that the enhancement of the naturally occurring bioremediation on site has had a positive effect on site COC concentrations; the DCE concentrations have decreased to levels at or below the New York State Groundwater Standard of 5 µg/L, while TCE has remained below state standards.

2.5.3 Soil Vapor Intrusion Evaluations

SVI sampling was conducted at the Building 101 AOC in fall 2006 and winter 2007. Soil vapor (exterior) and sub-slab vapor (interior) samples were collected in October 2006. The samples were collected and analyzed for VOCs using the EPA Method TO-15. The results of this initial sampling round were evaluated by the agencies and additional sampling was recommended. The second round of SVI sampling occurred in February 2007. Indoor and Outdoor air samples were collected and also analyzed for VOCs using the EPA Method TO-15. The soil vapor, sub-slab vapor, indoor and outdoor locations are illustrated on Figure 6. Sampling results are provided in Tables 5 and 6, October 2006 and February 2007, respectively. Results were compared to the

Figure 5
101MW-2 TCE and cis 1,2-DCE concentrations



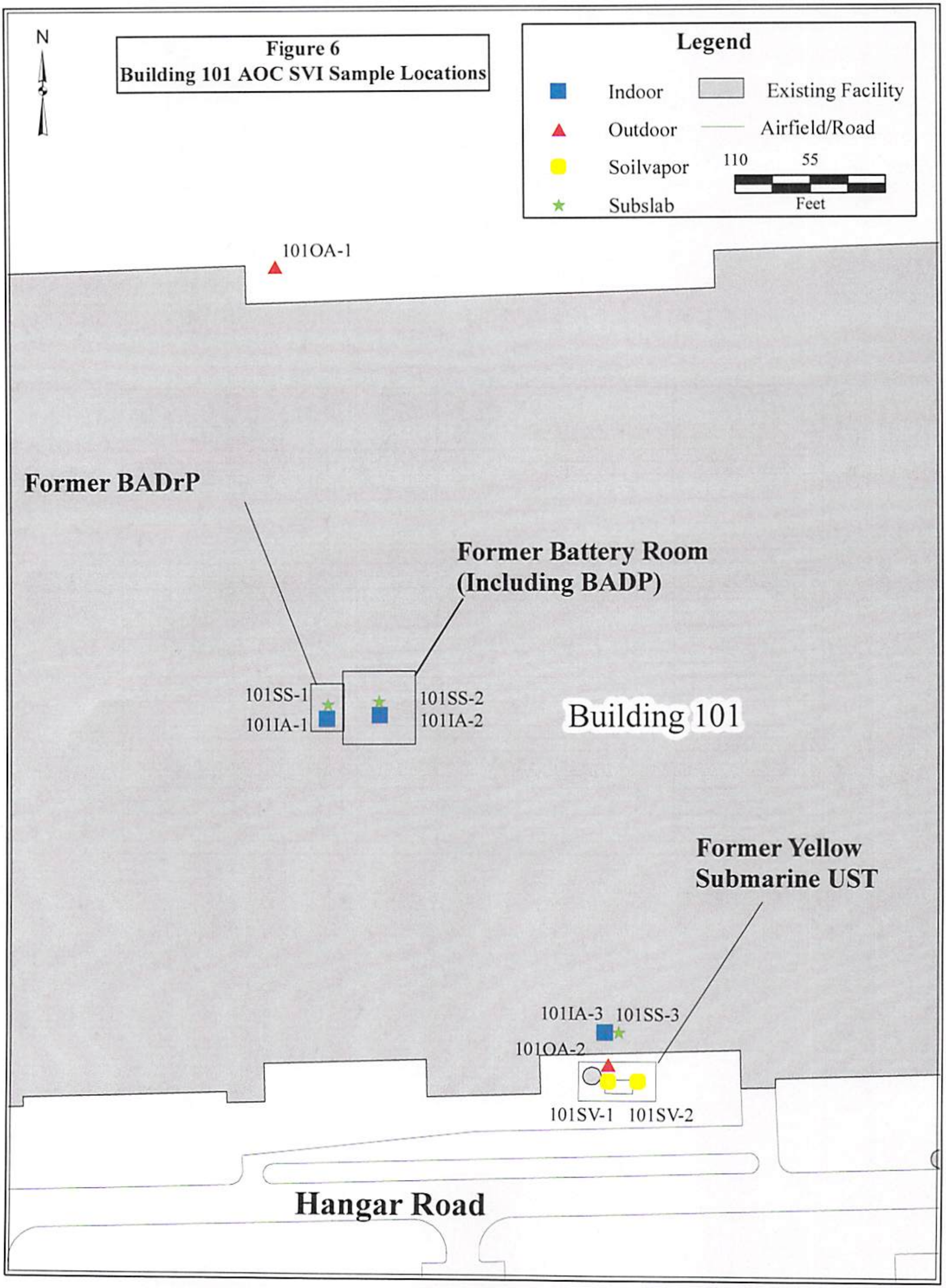

N
Figure 6
Building 101 AOC SVI Sample Locations
Legend
Indoor
Outdoor
Soilvapor
Subslab
Existing Facility
Airfield/Road
110
55
Feet
101OA-1
Former BADrP
Former Battery Room
(Including BADP)
101SS-1
101IA-1
101SS-2
101IA-2
Building 101
Former Yellow
Submarine UST
101IA-3
101SS-3
101OA-2
101SV-1
101SV-2
Hangar Road

Table 5
Building 101 AOC Detected Soil Vapor and Sub-slab Vapor Analytical Results
October 2006

Sample Location	Sub-slab Vapor Screening Level (ug/m³)	101SS-1	101SS-2	101SS-3	Soil Vapor Screening Level (ug/m³)	101SV-1	101SV-2
Sample ID		101SS0101AA	101SS0201AA	101SS0301AA		101SV0105AA	101SV0205AA
Sample Type		Sub Slab	Sub Slab	Sub Slab		Soil Vapor	Soil Vapor
Sample Date		19-Oct-2006	19-Oct-2006	19-Oct-2006		19-Oct-2006	19-Oct-2006
Sample Depth (ft bgs)		1	1	1		5	5
Sample Collection Duration (hr)	12	24	24	8	12	8	8
Volatiles (TO-15) in µg/m³							
1,1,1-trichloroethane	146,000	9.1	12	U	1,460,000	U	1.5
1,2,4-trimethylbenzene	175	15	16	9.7	1,752	11	9.2
1,3,5-trimethylbenzene	175	6.4	6.9	5.3	1,752	4.7	3.6
2,2,4-trimethylpentane	NA	2.4	U	U	NA	3.9	3.8
4-ethyltoluene	NA	7.4	7.8	4.2	NA	5.9	3.1
acetone	NA	130	10,000	100	NA	450	78
benzene	105	16	75	13	1,048	13	8.8
bromomethane	NA	U	0.55	U	NA	U	U
carbon disulfide	20,440	4.1	17	9.8	204,400	10	2.4
carbon tetrachloride	55	1.8	45	U	545	U	U
chloroethane	NA	U	U	0.56	NA	U	U
chloroform	36	4.8	19	7.9	355	1.2	1.3
chloromethane	818	U	U	U	8,176	U	3.8
cis-1,2-dichloroethene	1,022	2.3	U	U	10,220	U	U
cyclohexane	175,200	97	36	U	1,752,000	34	16
ethylbenzene	743	92	300	1,200	7,433	10	8.1
freon 11	20,440	3.8	3.2	2.9	204,400	3.8	5.4
freon 113	876,000	3.8	1.4	3	8,760,000	5	3.6
freon 12	5,840	3.4	2	2	58,400	2.1	1.8
heptane	NA	150	100	10	NA	30	20
hexane	20,440	310	160	12	204,400	110	50
m,p-xylene (sum of isomers)	2,920	240	730	3,000	29,200	32	21
methyl ethyl ketone	146,000	U	U	U	1,460,000	220	110
methyl tert-butyl ether	87,600	3.5	U	U	876,000	U	U
methylene chloride	1,740	2.1	220	U	17,396	U	1
o-xylene	2,920	29	360	590	29,200	10	7
tetrachloroethylene (pce)	139	5.8	170	13	1,386	14	19
tetrahydrofuran	NA	U	U	U	NA	23	U
toluene	146,000	240	17,000	110	1,460,000	74	35
trichloroethylene (tce)	409	1200	430	14	4,088	12	9.8

Notes:
U - < MRL
µg/m³ - microgram per cubic meter
[shaded box] Exceedance of the cancer screening value.
[outlined box] Analytes identified as chemical of potential concern due to detections within one order of magnitude of the screening level.

Table 6
Building 101 AOC Short List Indoor and Outdoor Analytical Results
February 2007

Sample Location	Indoor Air Screening Level (µg/m³)	101IA-1	101IA-2	101OA-1	101IA-3	101OA-2
Sample ID		101IA0105AA	101IA0205AA	101OA0105AA	101IA0305AA	101OA0205AA
Sample Type		Indoor	Indoor	Outdoor	Indoor	Outdoor
Sample Date		12-Feb-2007	12-Feb-2007	12-Feb-2007	12-Feb-2007	12-Feb-2007
Sample Depth (ft above ground)		5	5	5	5	5
Sample Collection Duration (hr)	12	24	24	24	8	8
Volatiles (TO-15) in µg/m³						
acetone	NA	700	900	17.5	84.7	19.4
benzene	88	6.23	5.88 M	0.520	2.88 M	0.747
chloroform	36	U	U	U	U	U
cis-1,2-dichloroethene	102	U	U	U	U	U
ethylbenzene	743	8.83	11.5	U	8.39	0.485 F
m,p-xylene (sum of isomers)	292	32.7	38.8	0.708 F	23.8	1.24 F
o-xylene	292	7.50	15.9	U	8.74 M	0.706
tetrachloroethylene (pce)	102	U	U	1.45 M	1.10 M	0.896 F
trans-1,2-dichloroethene	NA	U	U	U	U	U
trichloroethylene (tce)	41	U	U	U	0.765 M	1.64
vinyl chloride	186	U	U	U	U	U

Notes:
F - The analyte is detected and the qualitation is between the MDL and RL.
M - A matrix effect was present.
U - < MRL
µg/m3 - microgram per cubic meter.

calculated Industrial/Commercial scenario screening levels provided in the Report for SVI Sampling at Building 101 (FPM, November 2007). Results indicate that all soil vapor, indoor air, and outdoor air detections are below screening levels. Five sub-slab vapor detections were above the sub-slab vapor screening levels, but the detections are within one order of magnitude of the screening levels. This provides evidence that the concrete slab at the building (7-12 inches thick) provides an adequate SVI barrier. Moreover, although not part of the final remedy, the current occupant (an aircraft maintenance operation) has coated the entire floor it occupies with epoxy paint. This type of epoxy coating is one of the options generally applied to eliminate SVI potential, since this epoxy coating can be an effective vapor barrier.

Since the sub-slab detections above screening levels are within one order of magnitude of the sub-slab screening levels and no exceedances have been reported for the indoor air samples, no further action or evaluation of SVI is required at the Building 101 AOC unless building use changes in the future from aircraft maintenance to another industrial/commercial use or to residential use (the latter of which is prohibited).

2.6 Current and Potential Future Land and Resource Use

The Griffiss Local Development Corporation is responsible for maintaining property and developing base facilities, as necessary, to promote advantageous reuse. The planned future land-use designations for the Building 101 AOC are industrial/commercial/non-residential.

2.7 Summary of Site Risks

In 1994, as part of the RI, site risks were analyzed based on the extent of contamination at the Building 101 AOC. The baseline risk assessment was conducted to evaluate current and future potential risks to human health and the environment associated with contaminants found in the soil and groundwater at the site. This risk assessment was performed for the BADP, prior to the investigation and removal action at the BADrP in 1997 and 1998. The results of this assessment and the removal action were considered when formulating this proposed plan.

Human Health Risk Assessment Background Information

A baseline human health risk assessment was conducted during the RI to determine whether chemicals detected at the Building 101 AOC could pose health risks to individuals under current and proposed future land use. As part of the baseline risk assessment, the following four-step process was used to assess site-related human health risks for a reasonable maximum exposure scenario: Hazard identification—identifies the contaminants of concern at the site based on several factors such as toxicity, frequency of occurrence, and concentration; Exposure Assessment—estimates the magnitude of actual and/or potential human exposures, the frequency and duration of these exposures, and the pathway (e.g., ingestion of contaminated soil) by which humans are potentially exposed; Toxicity Assessment—determines the types of adverse health effects associated with chemical exposures and the relationship between magnitude of exposure (dose) and severity of adverse effects (response); and Risk Characterization—summarizes and combines outputs of the exposure and toxicity assessments to provide a quantitative (e.g., one-in-a-million excess cancer risk and noncancer Hazard Index value) assessment of site-related risks and a discussion of uncertainties associated with the evaluation of the risks and hazards for the site.

Chemicals of potential concern (COPCs) were selected for use in the risk assessment based on the analytical results and data quality evaluation. All contaminants detected in the soil and groundwater at the site were considered chemicals of potential concern with the exception of inorganics detected at concentrations less than twice the mean background concentrations; iron, magnesium, calcium, potassium, and sodium, which are essential human nutrients; and compounds detected in less than 5% of the total samples (unless they were known human carcinogens). As a class, petroleum hydrocarbons were not included as a chemical of concern; however, the individual toxic constituents (e.g., benzene, toluene, ethylbenzene) were evaluated.

The human health risk assessment was conducted consistent with the anticipated future land use identified in the Master Reuse Plan, which is industrial. As such, the risk assessment evaluated exposure to potential recreational populations and occupational populations (utility, construction, and industrial workers) that may be exposed to chemicals detected in the site media. The various exposure scenarios for each population are described in Table 7. Intake assumptions, which are based on EPA guidance, are more fully described in the RI. The risk assessment was not performed for unrestricted land use receptors.

Table 7
Building 101 AOC Risk Assessment Scenarios and Exposures Pathways

Utility Worker (Current and Future)	Construction Worker (Future)	Industrial Worker – BADP (Future)	Industrial Worker – Yellow Submarine UST (Future)
Incidental ingestion of subsurface soil. Inhalation of fugitive dust from subsurface soil. Dermal contact with subsurface soil.	Incidental ingestion of subsurface soil. Inhalation of fugitive dust from subsurface soil. Dermal contact with subsurface soil.	Ingestion of groundwater. Dermal contact with groundwater. Inhalation of volatiles from groundwater.	Ingestion of groundwater. Dermal contact with groundwater. Inhalation of volatiles from groundwater.

Quantitative estimates of carcinogenic and noncarcinogenic risks were calculated for the Building 101 AOC as part of a risk characterization. The risk characterization evaluates potential health risks based on estimated exposure intakes and toxicity values. For carcinogens, risks are estimated as the incremental probability of an individual developing cancer over a lifetime as a result of exposure to the potential carcinogen. The risks of the individual chemicals are summed for each pathway to develop a total risk estimate. The range of acceptable risk is generally considered to be 1 in 10,000 (1×10^{-4}) to 1 in 1,000,000 (1×10^{-6}) of an individual developing cancer over a 70-year lifetime from exposure to the contaminant(s) under specific exposure assumptions. Therefore, sites with carcinogenic risk below the risk range for a reasonable maximum exposure do not generally require cleanup based upon carcinogenic risk under the NCP.

To assess the overall noncarcinogenic effects posed by more than one contaminant, EPA has developed the Hazard Quotient (HQ) and Hazard Index (HI). The HQ is the ratio of the chronic daily intake of a chemical to the reference dose for the chemical. The reference dose is an estimate (with uncertainty spanning perhaps an order of magnitude or greater) of a daily exposure level for the human population, including sensitive sub-populations, that is likely to be without an appreciable risk of deleterious effects during a portion of a lifetime. The HQs are summed for all contaminants within an exposure pathway (e.g., ingestion of soil) and across pathways to determine the HI. When the HI exceeds 1, there may be concern for potential noncarcinogenic health effects if the contaminants in question are believed to cause similar toxic effects.

Whether to conduct site remediation is based on the risk to human health and the environment. Under EPA regulations, for known or suspected carcinogens, acceptable exposure levels are generally concentration levels that represent an excess cancer risk to an individual of between 1×10^{-4} and 1×10^{-6} (USEPA 1990) or the noncarcinogenic HI exceeds a level of 1. Once either of these thresholds has been exceeded, the 1 in 1,000,000 (1×10^{-6}) risk level and an HI of 1 may be used as the point of departure for determining remediation goals for alternatives.

Results of Site-Specific Health Risk Assessment

Potential risks from exposure to COPCs at the Building 101 AOC were evaluated for utility, construction, and industrial workers during the RI, prior to the interim remedial action at the BADrP. The potential carcinogenic and noncarcinogenic risks from exposure to soil and groundwater are summarized below.

Carcinogenic Risk

The total carcinogenic risk associated with exposure by utility workers to subsurface soil at the BADP was 1×10^{-6}. The pathway-specific risks for utility workers from incidental ingestion of soil, inhalation of fugitive dust, and dermal contact were 6×10^{-7}, 7×10^{-10}, and 6×10^{-7} respectively. The chemical contributing most to the estimated cancer risks for these exposure scenarios was arsenic, which was detected in all six subsurface soil samples. Although arsenic did not exceed standards, it was included in the risk assessment and did contribute to the potential risk at this site.

The total carcinogenic risk associated with exposure by construction workers to subsurface soil at the former BADP was 9×10^{-7}. The pathway-specific risks for construction workers from incidental ingestion of soil, inhalation of fugitive dust, and dermal contact were 8×10^{-7}, 2×10^{-10}, and 1×10^{-7} respectively. The risk from incidental ingestion of subsurface soil contaminated with arsenic was the greatest contributor to the risk.

The total carcinogenic risk associated with exposure by industrial workers to contaminants in groundwater at the former BADP was 2×10^{-6}. The pathway-specific risks for industrial workers from ingestion of groundwater, inhalation of VOCs released from groundwater, and dermal contact with groundwater were 2×10^{-6}, 1×10^{-11}, and 2×10^{-8} respectively. The risk from ingestion of groundwater contaminated with aldrin was the greatest contributor to the risk.

The total carcinogenic risk associated with exposure by industrial workers to contaminants in groundwater at the former Yellow Submarine UST was 3×10^{-4}, which is above EPA's target risk range. The pathway-specific risks for industrial workers from ingestion of groundwater, inhalation of VOCs released from groundwater, and dermal contact with groundwater were 3×10^{-4}, 3×10^{-7}, and 2×10^{-5} respectively. The chemicals contributing to the ingestion pathway were arsenic, tetrachloroethylene, and trichloroethylene. These same chemicals and benzo(a)anthracene were the major contributors to the risk associated with the dermal contact pathway.

Noncarcinogenic Risk

The total HI for potential utility workers exposed to subsurface soil was 0.01. This cumulative HI is below the acceptable level of 1.

The total HI calculated for potential construction workers exposed to subsurface soil was 0.3. This cumulative HI is below the acceptable level of 1.

The total HI for potential industrial workers exposed to groundwater at the former BADP was 0.01. This HI is below the acceptable level of 1.0.

The total HI for potential industrial workers exposed to groundwater collected in the vicinity of the former Yellow Submarine UST was 5. This HI exceeds the acceptable level of 1. The calculated hazard indices for industrial workers from ingestion of groundwater, inhalation of VOCs released from groundwater, and dermal contact with groundwater were 5, 2×10^{-6}, and 0.2, respectively. The exposure pathway presenting the greatest potential noncarcinogenic hazard was from the ingestion of groundwater contaminated with arsenic and manganese.

Toxicity values were not available for 2-methylnaphthalene, phenanthrene, lead, and five PCB congeners (2,2,3,3,4,4,6-heptachlorobiphenyl, 2,2,3,3,4,6,6-octochlorobiphenyl, 2,2,3,4,5-pentachlorobiphenyl, 2,2,4,4,5,6-hexachlorobiphenyl, and 2,2,4,4-tetrachlorobiphenyl) and, therefore, the risk arising from exposure to these compounds was assessed qualitatively. In addition, lead was evaluated using the Exposure Uptake Biokinetic Model for Lead in Children (IEUBK) model. Possible exposures to the site concentrations of these compounds are unlikely to pose a health hazard for occupational receptors potentially performing intrusive activities at this site.

The results of the human health baseline risk assessment indicate that chemicals in soil should not present a risk to current and future construction, utility, and industrial workers. The only potentially unacceptable risk was to industrial workers from ingestion of groundwater at the

Building 101 AOC. Quantitative evaluation of risk is subject to several conservative assumptions and should not be considered an absolute measure of risk.

Uncertainties

Uncertainties exist in many areas of the human health risk assessment process. However, use of conservative variables in intake calculations and health-protective assumptions throughout the entire risk assessment process results in an assessment that is protective of human health and the environment in the absence of remedial actions or controls. Examples of uncertainties associated with the risk assessment for this AOC include the following: (1) chemical samples were collected from the suspected source of contamination rather than through random sampling, which may result in a potential overestimation of risk; (2) the HIs associated with dermal contact with soil were not quantified for the majority of COPCs based on the lack of a dermal absorption factor, which may lead to underestimation of the overall risk due to dermal contact; (3) the models used in the RI are likely to overestimate exposure point concentrations in air, which would cause a potential overestimation of risk for the inhalation pathway; (4) construction at the site was assumed to occur over a one year period. Since construction may take less time to complete, this would result in a potential overestimation of risk; and (5) it was assumed that groundwater would be used as a potable water source under the industrial use scenario (i.e., showering, ingestion, industrial processes) in the future, which is unlikely since the site has ready access to the existing water supplies at the former base and in the City of Rome. This assumption would result in a potential overestimation of risk.

Ecological Risk Assessment

A baseline risk assessment for ecological receptors at the Building 101 AOC was conducted during the RI. Since Building 101 is located in a highly developed portion of the base, no complete exposure pathways for ecological receptors were identified. Contamination that may be associated with the site is expected to be well below ground surface and ecological receptors are not expected to be found at these depths. In addition, the future land use designation is expected to remain industrial/commercial. Therefore, potential exposures related to this AOC are not expected to exist.

Although certain state-listed endangered plants and animals have been on or in the vicinity of the base, no threatened and/or endangered species have been identified at this site. There are no federally listed (U.S. Department of the Interior) threatened or endangered plant or animal species at the former base.

2.8 Remedial Action Objectives

The following are the remedial action objectives developed for this AOC based upon the site data presented in the RI, Supplemental Investigation reports and Interim Remedial Action reports:

Restrict Exposure to Contamination

Land use restrictions within the site boundary (Figure 1) will be implemented to restrict site use to industrial/commercial use only and restrict the potential sub slab soil vapor exposure.

The following are the goals and objectives of the use restrictions:

- Prevent residential housing, elementary and secondary schools, childcare facilities and playgrounds on Building 101 AOC since the risk assessment was evaluated for only non-residential use scenarios (future use) and not for unrestricted use.
- Prevent the potential for soil vapor intrusion if future construction is performed in the SVI restriction area.

Evaluate Effectiveness of the Remedy

Five-year reviews will be performed by the Air Force, in conjunction with the EPA and NYSDEC, to ensure that (1) the Selected Remedy is protective of public health and the environment, (2) land use is in compliance with the deed restrictions limiting use to industrial/commercial use, and (3) SVI is further evaluated if construction is performed in the SVI restriction area.

2.9 Description of Alternatives

CERCLA regulations mandate that a remedial action must be protective of human health and the environment, cost effective, and utilize permanent solutions and treatment technologies to the maximum extent practicable. This ROD evaluates a No Action scenario as dictated by CERCLA, and compares it to the land use and SVI restriction alternative. A summary of the two alternatives is presented below.

No Action Alternative

CERCLA requires that the No Action alternative be compared with other alternatives. Under the No Action alternative, no remedy would be implemented at the Building 101 AOC. The site would remain as it is presently and no land use restrictions would be established. Costs and construction time are not associated with this alternative.

Land Use Restrictions for Industrial/Commercial Use and SVI Restriction Alternative

This alternative includes land use restrictions for industrial/commercial use and SVI restrictions. If the property is transferred to a non-federal entity in the future, the deed from the United States, which includes property within the boundary of the Building 101 AOC, will contain the following elements to ensure that the reuse of the site is consistent with the risk assessment:

- Development and use of the entire Building 101 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.

- The owner/occupant of the property shall evaluate the potential for soil vapor intrusion if future construction is performed in the SVI restriction area.

Five-year reviews will be performed by the Air Force, in conjunction with the EPA and NYSDEC, to ensure that (1) the Selected Remedy is protective of public health and the environment, (2) land use is in compliance with the deed restrictions for industrial/commercial use, and (3) the potential for soil vapor intrusion is evaluated if future construction is performed in the SVI restriction area. Costs will range between $2,000 and $5,000 per review and construction time is not associated with this alternative.

2.10 Comparative Analysis of Alternatives

Remedial alternatives are assessed on the basis of both a detailed and a comparative analysis pursuant to the NCP. The analysis of the Building 101 AOC consisted of (1) an assessment of the individual alternatives against nine evaluation criteria and (2) a comparative analysis focusing upon the relative performance of each alternative against the criteria. In general, the following "threshold" criteria must be satisfied by an alternative for it to be eligible for selection:

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

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

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

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

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

5. Short-term effectiveness addresses (a) the period of time needed to achieve

protection and (b) any adverse impacts on human health and the environment that may be posed during the construction and implementation periods until cleanup goals are achieved.

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

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

Finally, the following "modifying" criteria are considered after the formal public comment period on the Proposed Plan is complete:

8. State acceptance indicates whether, based on its review of the RI and the Proposed Plan, the State supports or opposes the preferred alternative and/or has identified any reservations with respect to the preferred alternative.

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

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

1. Overall Protection of Human Health and the Environment

   The No Action alternative would potentially not provide adequate protection of human health and the environment since no remedy would be implemented at the Building 101 AOC to restrict its use. The potential risks to utility and construction workers from exposure to soil are expected to be minimal because the contaminated soil was removed and it is unlikely that any residual contamination remains in the soil above the water table. Sub-slab vapors were detected above screening levels but are within one order of magnitude of the sub-slab screening levels. Since no exceedances have been reported for the indoor air samples, no further action or evaluation of SVI is required, unless construction within the SVI restriction area is to be performed.

   The proposed alternative will prevent unnecessary exposure to the soil and sub-slab vapors (not evaluated for residential use scenarios) by limiting the future use of the site and through the implementation of land use restrictions for industrial/commercial use.

2. Compliance with ARARs

   Contaminant concentrations will not immediately comply with the ARARs under the No Action alternative or the Selected Remedy alternative.

In the RI report, the results of the risk assessment were compared to available SCGs using federal and state environmental and public health laws that were identified as potentially ARARs at the site. Chemical specific ARARs are usually health- or risk-based numerical values or methodologies that result in a numerical value when applied to site-specific conditions. Also considered were other non-promulgated federal and state advisories and guidance values, referred to as TBCs, and background levels of the contaminants in the absence of TBCs.

The Selected Remedy alternative applies to soil and sub-slab vapors at the site. The Selected Remedy alternative will limit exposure to soil and Sub-slab vapors through the implementation of land use restrictions. There is no evidence that chemical concentrations in the soil at this site pose a current or future potential threat to human health or the environment when used for industrial/commercial purposes and when construction within the SVI area is restricted. Further, five-year reviews will be performed by the Air Force, in conjunction with the EPA and NYSDEC, to ensure that (1) the Selected Remedy is protective of public health and the environment, (2) future land use is in compliance with the deed restrictions for industrial/commercial use, and (3) the potential for soil vapor intrusion is further evaluated if future construction is performed in the SVI restriction area.

3. Long-term Effectiveness and Permanence

The No Action alternative would not allow for reliable protection of human health and the environment in the long term due to the potential for exposure to potentially contaminated soil and sub slab vapors by portions of the human population other than utility, construction, and industrial workers.

For the Selected Remedy alternative, the implementation of land use and sub slab soil vapor restrictions will eliminate human contact with any potentially contaminated soil and sub slab soil vapors. This action, coupled with the five-year reviews, provides reliable long-term protection of human health and the environment.

4. Reduction of Toxicity, Mobility, or Volume through Treatment

The No Action alternative provides no treatment or containment of contaminants, and therefore does not result in any reduction of toxicity, mobility, or volume.

The Selected Remedy alternative provides no treatment or containment of contaminants other than those as a result of response actions already taken, and therefore, it does not result in any additional reduction of toxicity, mobility, or volume. However, the levels of contamination found in the soil and sub slab do not warrant treatment. Although treatment will not be employed, this alternative will eliminate potential exposures to the soil and sub slab vapors.

5. Short-term Effectiveness

   The No Action alternative would not be an effective alternative because the potential for human exposure to contaminated soil and the potential for sub slab vapor exposure would continue to exist.

   For the Selected Remedy alternative, land use and sub slab vapor restrictions would be implemented if the property were transferred to a non-federal entity. The present and immediate future use of the property is industrial/commercial.

6. Implementability

   There would be no limitations to implementing the No Action alternative.

   There would be no limitations to implementing the Selected Remedy alternative. Implementation of land use and soil vapor restrictions is feasible and has been incorporated into other property transfers.

7. Cost

   There would be no costs associated with the No Action alternative.

   There are no capital costs or project construction durations associated with the Selected Remedy. Reviews to ensure that the remedy is still performing as planned will cost between $2,000 and $5,000 per review.

8. Agency Acceptance

   AFRPA, NYSDEC, and EPA have mutually agreed to select the land use and SVI use restrictions alternative. The Selected Remedy satisfies the threshold criteria and ensures compliance with applicable regulations.

9. Community Acceptance

   Community acceptance of the Selected Remedy was assessed at the public meeting and during the public comment period.

2.11 Principal Threat Wastes

There are no principal threat wastes at the Building 101 AOC.

2.12 Selected Remedy

The Selected Remedy of LUC/ICs for the Building 101 AOC is protective of human health and the environment and complies with the federal and state ARARs. As a result of the Building 101 remedial actions, the majority of soil and groundwater contamination have been removed.

LUC/ICs will be in the form of land use restrictions for industrial/commercial and re-evaluation for SVI if new construction is performed in the SVI restriction area identified in Figure 6 (BADP or BADrP). The transfer documents will contain the following restrictions to ensure that the reuse of the site is consistent with the risk assessment:

- Development and use of the entire Building 101 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.
- The owner/occupant of the property shall evaluate the potential for soil vapor intrusion if future construction is to be performed in the SVI restriction area in coordination with the Air Force, EPA, and NYSDEC.

The soil vapor intrusion evaluation conducted at the Building 101 AOC in fall 2006 and winter 2007 included soil vapor (exterior) and sub-slab vapor (interior) (2006) and indoor and outdoor air samples (2007). Results indicate that all soil vapor, indoor, and outdoor air detections are below screening levels for industrial/ commercial use. Sub-slab detections were detected above screening levels but are within one order of magnitude of the sub-slab screening levels. Because no exceedances have been reported for the indoor air samples, no further action or evaluation of SVI is required unless construction within the SVI restriction area identified in Figure 1 is undertaken in the future.

The above restrictions will be maintained until it is determined that the concentrations of hazardous substances are at such levels as to allow for unrestricted use. An assessment based on unrestricted use shall be performed prior to making any such determination. The assessment and determination will be coordinated with the EPA and NYSDEC.

Prior approval by EPA and NYSDEC will be required for any modification or termination of land use controls, use restrictions, or anticipated actions that may disrupt the effectiveness of or alter or negate the need for land use controls.

In addition to implementing the aforementioned deed restrictions, the Air Force will take the following actions to ensure that the controls are effective at protecting human health and the environment:

The Air Force shall notify the property owner of the annual Institutional Control/Engineering Control Certification requirements of 6 NYCRR Part 375, 1.8, (h)(3). If the property owner fails to provide an annual certification to the Air Force, the Air Force will notify EPA and NYSDEC as soon as practicable.

Should the required certification not be provided by the property owner, the Air Force shall determine the status of land use controls and provide its written findings to EPA and NYSDEC unless either EPA or NYSDEC, in its sole discretion, acts to confirm the status of the land use controls independently.

The Air Force is responsible for insuring implementation, maintenance, monitoring, and enforcement of the LUC/ICs. Although the Air Force may later transfer the task to another party, the Air Force shall retain ultimate responsibility for implementing, maintaining, monitoring, and enforcing the LUC/ICs.

Five-year reviews will be performed by the Air Force, in conjunction with the EPA and NYSDEC, to ensure that future land use is in compliance with the deed restriction for industrial/commercial use and to ensure that future land use is in compliance with the land use controls to manage the potential for SVI. Five-year reviews will ensure that the selected remedy is protective of human health and the environment.

2.13 Documentation of Significant Changes

There are no significant changes between the preferred alternative presented in the Proposed Plan for the Building 101 AOC and the selected remedy presented in this ROD.

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3.0 RESPONSIVENESS SUMMARY

On August 15, 2012, the Air Force Center for Engineering and the Environment (AFCEE), following consultation with and concurrence of EPA and NYSDEC, released for public comment the proposed plan for the Building 101 AOC located at the former Griffiss AFB. The release of the proposed plan initiated the public comment period, which concluded on September 14, 2012.

During the public comment period, a public meeting was held on August 28, 2012 at the Griffiss Institute located at 725 Daedalian Drive, Rome, New York 13441. The selected remedy for the Building 101 AOC was 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 Building 101 AOC.

No verbal or written comments were received at the public meeting or during the public comment period.

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4.0 REFERENCES

AFCEE, Quality Assurance Project Plan, Version 3.1, August 2001.

E&E, Basewide Environmental Baseline Survey Supplement (Update 3), Griffiss AFB, *New York*, December 1997.

E&E, Final Report for Supplemental Investigations of Areas of Concern, Griffiss Air Force Base, July 1998.

E&E, Well/Piezometer Inventory (October 1998) Report for the Former Griffiss Air Force Base, Rome, New York, January 1999.

FPM, Petroleum Spill Sites Long Term Monitoring Program Draft Work Plan Addendum III, Former Griffiss Air Force Base, Revision 0.0, May 2003.

FPM, Field Sampling Plan, Long Term Monitoring Program at the Former Griffiss Air Force Base, June 2003.

FPM Group Ltd., Draft Confirmation Sampling Report, Building 101 Battery Acid Drainage Pit Area of Concern, former Griffiss Air Force Base, Rome, New York, Revision 0.0, August 2002.

FPM Group Ltd., Draft Monitoring Report, On-Base Groundwater AOCs, Revision 1.0, November 2004.

FPM Group, Ltd., Draft Report, AOC Long-Term Monitoring Baseline Study, Griffiss Air Force Base, Revision 1.0, July 2000.

FPM Group Ltd., Field Sampling Plan, Long-Term Monitoring Program, Revision 3.0, March 2005.

FPM Group, Ltd., Monitoring Report, On-Base Groundwater AOCs Monitoring Program, Former Griffiss Air Force Base, Rome, New York, Revision 0.0, August 2005.

FPM Group, Ltd., Monitoring Report, On-Base Groundwater AOCs Monitoring Program, Former Griffiss Air Force Base, Rome, New York, Revision 0.0, August 2006.

FPM Group Ltd., Monitoring Report (Spring 2007), On-Base Groundwater AOCs, Revision 0.0, August 2007.

FPM Group Ltd., Draft April 2008 Annual On-base Groundwater AOCs Monitoring Report, Rev. 0.0, April 2009.

NYSDEC, Interim Procedures for Inactivation of Petroleum-Impacted Sites, January 1997.

NYSDEC, New York State Ambient Water Quality Standards and Guidance Values, June 1998.

NYSDEC, Spill Technology and Remediation Series (STARS), Guidance Values for Fuel Contaminated Soil, August 1992.

NYSDEC, TAGM 4046, Determination of Remediation Soil Cleanup Objectives (RSCOs) and Cleanup Levels, January 1994.

NYSDEC, Sampling Guidelines and Protocols Manual, September 1992.

NYSDEC, Spill Technology and Remediation Services (STARS) Memo No. 1: Petroleum-contaminated Soil Guidance Policy, August 1992.

NYSDEC, Determination of Soil Clean-up Objectives and Clean-up Levels, Division of Technical and Administrative Guidance Memorandum DHWR, January 1994.

NYSDEC, Title 6 of the New York Codes, Rules, and Regulations Part 375, December 2006.

5.0 GLOSSARY

Administrative Record: A file established and maintained in compliance with section 113(K) of the Comprehensive Environmental Response, Compensation, and Liability Act consisting of information upon which the lead agency bases its final decisions on the selection of remedial method(s) for a site. The Administrative Record is available to the public.

Applicable Requirements: Applicable requirements are those cleanup standards, standards of control, and other substantive requirements, criteria, or limitations promulgated under federal or state environmental or facility sitting laws that specifically address a hazardous substance, pollutant, contaminant, remedial action, location, or other circumstance found at a CERCLA site. Only those state standards that are identified by a state in a timely manner and that are more stringent that federal requirements may be applicable. See also Relevant and Appropriate Requirements.

Aquifer: A water-bearing formation or group of formations.

Chlorinated Hydrocarbons: Organic compounds that contain chloride such as trichloroethylene (TCE) and cis-1,2-dichloroethylene (DCE). Also referred to as chlorinated solvents.

Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA): A federal law passed in 1980 and subsequently amended. The act requires responsible parties under the law to investigate and remediate releases of hazardous substances.

Contaminant Plume: A volume of contaminated groundwater with measurable horizontal and vertical dimensions. Plume contaminants are dissolved in and move with groundwater.

Environmental Impact Statement: A study conducted to provide information on potential environmental impacts that could result from a proposed action.

Groundwater: Water found beneath the earth's surface that fills pores within materials such as sand, soil, gravel, and cracks in bedrocks, and often serves as a source of drinking water if found in an adequate quantity.

Hydrogeologic: Pertaining to subsurface waters and the related geologic aspects of subsurface waters.

Installation Restoration Program (IRP): The United States Air Force subcomponent of the Defense Environment Restoration Program (DERP) that specifically deals with investigating and remediating sites associated with suspected releases of toxic and hazardous materials from past activities. The DERP was established to clean up contaminated sites at Department of Defense facilities nationwide.

Monitoring: Ongoing collection of information about the environment that helps gauge the effectiveness of a cleanup action. Information gathering may include groundwater well sampling, surface water sampling, soil sampling, air sampling, and physical inspections.

National Oil and Hazardous Substances Pollution Contingency Plan (NCP): The NCP is a federal regulation which provides the organization, structure, and procedures for preparing for and responding to discharges of oil and releases of hazardous substances, pollutants, and contaminants. The NCP is the implementing regulation of CERCLA and the Clean Water Act, and USEPA has been delegated the responsibility for preparing and implementing the NCP. The NCP is applicable to response actions taken pursuant to the authorities under CERCLA and the Clean Water Act.

National Priorities List: USEPA's list of the most serious uncontrolled or abandoned releases of hazardous substance identified for possible long-term remedial action under the Superfund program.

Organic Compounds: Any chemical compounds built on the carbon atom, i.e., methane, propane, phenol, etc.

Polychlorinated Biphenyl (PCB): An organic pollutant that was formerly used in electrical transformers and capacitors, their manufacture was banned in 1979. There are 210 different PCB compounds that typically have 40% to 60% chlorine by weight.

Polycyclic Aromatic Hydrocarbons (PAHs): Compounds often associated with combustion process and distillation tars.

Proposed Plan: A public document that solicits public input on a recommended remedial alternative to be used at a site. The Proposed Plan is based on information and technical analysis generated during the RI/FS. The recommended remedial action could be modified or changed based on public comments and community concerns.

Record of Decision (ROD): A public document that selected and explains the remedial alternative to be used at a CERCLA site. The ROD is based on information and technical analysis generated during the remedial investigation, and on consideration of the public comments and community concerns received on the Proposed Plan. The ROD includes a Responsiveness Summary of public comments.

Remedial Action: The action which is chosen to address a release of hazardous substances that is serious but not an immediate threat to human health or the environment.

Remedial Alternatives: Options evaluated to address the source and/or migration of contaminants to meet health-based or ecology-based remediation goals.

Remedial Investigation (RI): An investigation that determines the nature and extent and composition of contamination at a hazardous waste site. It is used to assess the types of remedial options that are developed in the feasibility study.

Semivolatile Organic Compounds (SVOCs): Organic constituents which are generally insoluble in water and are not readily transported in groundwater.

Source: Area at a hazardous waste site from which contamination originates.

Vadose Zone: The volume located between the ground surface and the water table. Also known as the unsaturated zone.

Volatile Organic Compounds (VOCs): Organic constituents which tend to volatilize or to change from a liquid to a gas form when exposed to the atmosphere. Many VOCs are readily transported in groundwater.

Water Table: The surface of a body of unconfined groundwater at which the water pressure is equal to that of the atmosphere.

STANDARD OPERATING PROCEDURES
SOIL VAPOR SAMPLING
FORMER GRIFFISS AFB

TABLE OF CONTENTS

SECTION **PAGE**

1 Soil Vapor Sampling (soil vapor, sub-slab vapor, indoor air, and outdoor air)

The purpose of this section is to define the SOP for collecting soil vapor samples at the former Griffiss AFB using electrical drills and soil vapor probes. This SOP describes the equipment, field procedures, and QA/QC procedures implemented for soil vapor sampling.

The sampling methodologies provided below were adapted from the NYSDOH SVI guidance document (NYSDOH, October 2006). Site-specific details and modifications have been implemented through the Sub-Slab Vapor Mitigation Design Work Plan.

Applicable SOPs are listed below:

SOP No. 2, Sample Handling, Documentation, and Tracking

SOP No. 3, Decontamination

1.1 Equipment and Materials List

The following equipment and materials should be on site for soil sampling:

Summa® canisters, minicans, or similar

PID (ppbRAE or similar)

Regulator for vapor sample canister preset to the appropriate sample duration

Vacuum pump (manual or electric)

Stainless steel or PE vapor implants with ‘speedfit’ push fitting

PE tubing

Box cutter

Tee’s for duplicate sample collection

Field logbook

Field Sampling Forms

Digital camera

Waterproof and permanent marking pens

Appropriate health and safety equipment, as specified in the SSHP

Appropriate decontamination supplies, as specified in SOP No. 8

1.2 Locating the Sampling Points

The indoor, outdoor, and sub-slab vapor sample locations will be predetermined in accordance with the site-specific sampling WP.

1.3 Soil Vapor Sampling Procedures

1.3.1 Soil Vapor Sampling

1.3.1.1 Temporary Soil Vapor Probe Installation and Abandonment

The installation and abandonment procedure is as follows:

- A Geoprobe® shall be employed to attain a depth of at least 5 ft below ground surface (bgs) for each soil vapor probe. A 2.5-inch coring machine shall be used to core through the concrete prior to engaging the Geoprobe. If necessary; a hollow-stem auger can be used to attain the desired depth;
- Once the target depth is reached, the rods will be pulled up one foot, exposing the void space, and the sampling apparatus will be set up in the borehole;
- New ¼-inch laboratory grade polyethylene tubing equipped with a threaded stainless steel fitting will be attached to a disposable soil vapor drive point to prevent infiltration of the atmospheric air present at land surface directly above the soil boring (ambient air);
- A clay seal will then be placed at land surface in the annular space between the Geoprobe® rods and the concrete surface, as well as between the tip of the rods and the sample tubing;
- The sampling tubing will be connected to a 'T' connector three-way valve assembly, with one end of the 'T' connector leading to a vacuum pump and the other end leading to a pre-evacuated summa canister with a calibrated regulator;
- The soil vapor sample tubing will then be purged of approximately two volumes of the sample tubing using a vacuum pump set at a rate of approximately 0.2 liters per minute;
- After sampling is completed, the borehole shall be abandoned by being tremie grouted to land surface using a bentonite grout.

1.3.1.2 Soil Vapor Sample Collection

The sampling procedure described below shall be followed at each location to minimize discrepancies between sampling points:

- Prior to formal sample collection, a tracer gas (i.e., helium) shall be used to verify the integrity of the soil vapor probe seal. To do so:
  - ✓ The immediate vicinity of the area where the probe intersects the ground surface shall be exposed to tracer gas using a garbage bag, cardboard box, or plastic pail;
  - ✓ At least one implant volume (i.e., the volume of the sample probe and tube) shall be purged using a flow rate of not more than 0.2 L/min;
  - ✓ Using the same flow rate as the purge (i.e., less than 0.2 L/min), a vapor sample shall be collected from the probe using a Tedlar bag;
  - ✓ The Tedlar bag shall be fitted with a portable monitoring device (i.e., a Gas Check 3000 meter, which measures the rate of the helium leakage at the land surface) and screened for helium. The enriched area (i.e., within the garbage bag/cardboard box/plastic pail) will also be screened for helium.

    - ✓ If the concentration of helium is greater than 20% of the helium detected in the enriched area, the seal is not adequate and should be reset. The sample rods will be purged again until the helium is no longer detected at levels greater than 20% of the enriched area located directly above the borehole.
- Once the integrity of the seal has been verified, to ensure samples collected are representative, three implant volumes (i.e., the volume of the sample probe and tube) must be purged prior to collecting the sample;
- Flow rates for both purging and collecting shall not exceed 0.2 L/min to minimize outdoor air filtration during sampling;
- Following the purging, the valve leading to the pump will be closed, the pump will be turned off, and the soil vapor will be directed to a 100% certified 1-L Summa® canister provided by the laboratory. The sample shall be collected using the canister's regulator to restrict the sample collection rate.
- After sample collection, the soil vapor will be screened using a photoionization detector (PID), calibrated daily with a 100 parts per million (ppm) isobutylene standard.

The field sampling team must maintain a sample log sheet summarizing the pertinent sample information, and any relevant observations such as odors and readings from field instrumentation.

1.3.2 Sub-slab Vapor Sampling

1.3.2.1 Temporary Sub-slab Vapor Probe Installation and Construction

As noted in the NYSDOH guidance document, during colder months, heating systems should be operating at least 24 hours prior to and during the scheduled sampling time to maintain normal indoor air temperatures. Prior to installation of the sub-slab vapor probes, the building floor should be inspected and any penetrations (i.e., cracks, floor drains, utility perforations, sumps, etc.) should be noted and recorded. Probes should be installed at locations where the potential for ambient air infiltration via floor penetrations is minimal.

The installation procedure is as follows:

- A rotary hammer drill will be used to create 1-inch diameter holes through concrete and into sub-slab material (e.g., sand or sand and gravel). Drilling into sub-slab material will create an open cavity to prevent obstruction of probes by small pieces of gravel;
- Probes will be constructed from dedicated ¼ inch-diameter laboratory grade polyethylene tubing;
- Tubing shall not extend further than 2 inches into the sub-slab material;
- The implant shall be sealed to the surface with permagum grout, melted beeswax, putty, or other non-VOC-containing and non-shrinking product;
- After sampling is completed, the borehole shall be abandoned in accordance with the procedures described in Section 5.5.3, in the UFP QAPP for Performance Based-Remediation at the Former Griffiss AFB (CAPE/FPM, November 2011).

1.3.2.2 Sub-slab Vapor Sample Collection

The sampling procedure described below shall be followed at each location to minimize discrepancies between sampling points:

- To ensure samples collected are representative, three implant volumes (i.e., the volume of the sample probe and tube) must be purged prior to collecting the sample;
- Flow rates for purging shall not exceed 0.2 L/min to minimize outdoor air filtration during sampling. Purge air shall be collected in a Tedlar bag so it is not released into the building;
- Samples shall be collected over an 24-hour time period, consistent with concurrent indoor and outdoor air samples, if possible;
- Samples shall be collected in 100% certified 6-L Summa® canisters provided by the laboratory.

The field sampling team must maintain a sample log sheet summarizing the pertinent sample information, the uses of VOCs in commercial or industrial processes and/or during building maintenance, weather conditions and ventilation conditions, and any relevant observations such as spills, floor stains, odors and readings from field instrumentation.

In addition, floor plan sketches should be drawn that include the floor layout with sample locations, chemical storage areas, garages, doorways, stairways, location of basement sumps or subsurface drains and utility perforations through building foundations, HVAC system air supply and return registers, compass orientation (north) and any other pertinent information. If possible, photographs should accompany floor plan sketches.

1.3.3 Indoor/Outdoor Air Sampling

1.3.3.1 Pre-sampling Inspection and Documentation

As noted in the NYSDOH guidance document, during colder months, heating systems should be operating at least 24 hours prior to and during the scheduled sampling time to maintain normal indoor air temperatures. Prior to collecting indoor air samples, a pre-sampling inspection should be performed prior to each sampling event to identify conditions that may affect or interfere with the proposed testing. The inspection should evaluate the type of structure, floor layout, physical conditions, and airflows of the building(s) being studied. The inspection information should be identified on the attached Indoor Air Quality Questionnaire and Building Inventory form. In addition, potential sources of chemicals of concern should be evaluated within the building by conducting a product inventory.

In addition, floor plan sketches should be drawn that include the floor layout with sample locations, chemical storage areas, garages, doorways, stairways, location of basement sumps or subsurface drains and utility perforations through building foundations, HVAC system air supply and return registers, compass orientation (north) and any other pertinent information should be documented. If possible, photographs should accompany floor plan sketches.

Finally, outdoor plot sketches should be drawn that include the building site, area streets, outdoor air sample locations, the location of potential interferences (e.g., gasoline stations, factories, other facilities, lawn mowers, etc.), compass orientation (north), footings that create separate foundation sections, and paved areas. Significant activities in the vicinity of the sample locations (e.g., operation of heavy equipment) should be recorded.

1.3.3.2 Indoor/Outdoor Air Sample Collection

Indoor air samples shall be collected in the vicinity of the sub-slab samples from a height above the ground to represent the breathing zone when occupants normally are seated (i.e., 5 ft.). The locations of the outdoor samples shall be chosen from areas away from wind obstructions, and at a height above the ground to represent the breathing zone (i.e., 3 to 5 ft.).

For either indoor or outdoor air samples, the sampling procedure described below shall be followed at each location to minimize discrepancies between sampling points:

- Samples should be collected during normally occupied periods to be representative of typical exposure;
- Sample collection intakes should be located to approximate the breathing zone for building occupants (i.e., 5 feet above the floor level where occupants are normally seated);
- To ensure that an air sample is representative of the conditions being tested and to avoid undue influence from sampling personnel, samples should be collected for a period of twenty-four (24) hours, and personnel should avoid lingering in the immediate area of the sampling device while samples are being collected;
- The sampling team members should avoid actions (e.g., fueling vehicles, using permanent marking pens) that can cause sample interference in the field;
- Flow rates for collecting samples shall not exceed 0.2 L/min to be consistent with concurrent sub-slab sampling;
- Samples shall be collected in 100% certified 6-L Summa® canisters provided by the laboratory; and
- Indoor and outdoor samples should be collected simultaneously;
- Ideally, samples shall be collected over the same period of time as concurrent sub-slab samples.

The field sampling team must maintain a sample log sheet summarizing the pertinent sample information, the uses of VOCs in commercial or industrial processes and/or during building maintenance, weather conditions and ventilation conditions, and any relevant observations such as spills, floor stains, odors and readings from field instrumentation.

1.4 Field Quality Assurance/Quality Control Samples

Field QA/QC samples are designed to help identify potential sources of external sample contamination and evaluate potential error introduced by sample collection and handling. All QA/QC samples will be labeled with QA/QC identification numbers and sent to the laboratory with the other samples for analyses.

1.4.1 Duplicate Samples

Duplicate samples are samples collected to assess precision of sampling and analysis. Duplicate samples will be collected at the same time and for the same parameters as the initial samples. A nylon T-barb will be installed in the PE tubing to allow for sampling of one airstream from one sampling point with two vapor sample canisters simultaneously. The rate of duplicate sample collection is specified in the UFP-QAPP (Worksheet #20).

1.4.2 Matrix Spikes and Matrix Spike Duplicates

MS and MSD analysis are used to assess the potential for matrix effects. The MS/MSD sample will be collected from a randomly selected normal sample by the lab. Following the normal analysis, the lab spikes the normal sample canister with the matrix spike and analyses the air in the canister. The rate of MS/MSD collection is specified in the UFP-QAPP (Worksheet #20).

1.5 Field Documentation

The most important aspect of field documentation is thorough, organized, and accurate record keeping. This includes proper preservation and storage of all field documentation. Field documentation for sub-slab vapor sampling includes field logbooks and field forms. The field forms, described in section 6.5.2, include the sub-slab vapor probe monitoring form, indoor/outdoor air monitoring form, weather observation form, and the NYSDOH Indoor Air Quality Questionnaire and Building Inventory Center for Environmental Health form.

1.5.1 Field Logbook

All information pertinent to sub-slab sampling will be recorded in a bound field logbook with consecutively numbered pages. The field sampling team must maintain a sample log sheet summarizing the pertinent sample information, the uses of VOCs in commercial or industrial processes and/or during building maintenance, weather conditions and ventilation conditions, and any relevant observations such as spills, floor stains, odors and readings from field instrumentation. Refer to SOP No. 7 for detailed procedures regarding documentation in the field logbook.

1.5.2 Field Forms

Sub-slab Probe Monitoring Form

The Sub-slab Probe Monitoring Form contains the following minimum information:

Date

Time

Sample identification

Sample depth

Field personnel

Instruments

Tracer gas identified and concentration

Sample purge volume

Volume of soil vapor extracted

Summa canister: vacuum before sampling and vacuum after sampling

Apparent moisture content

Comments and observations during sampling

Weather conditions, including the outdoor temperature, barometric pressure, precipitation, ventilation conditions, heating system active?, and windows closed

Indoor/Outdoor Air Monitoring Form

The Indoor/Outdoor Air Monitoring Form contains the following minimum information:

Date

Time

Sample identification

Sample height

Field personnel

Instruments

Type of sample

Duration of air sampled

Volume of sample

Summa canister: vacuum before sampling and vacuum after sampling

Comments and observations during sampling

VOCs used during normal operations of facility

Weather conditions, including the outdoor temperature, barometric pressure, precipitation, ventilation conditions, heating system active?, and windows closed

Weather Observation Form

The Weather Observation Form contains the following minimum information:

Location

Date

Field Personnel

Instruments

Time

Conditions collected prior to sampling, mid-day, and end of sampling include:

Precipitation

Atmospheric pressure

Temperature

Wind speed

NYSDOH Indoor Air Quality Questionnaire and Building Inventory Center for Environmental Health Form

The NYSDOH Indoor Air Quality Questionnaire and Building Inventory Center for Environmental Health Form contains the following minimum information:

Preparer’s name

Date/Time

Preparer’s affiliation

Phone number

Field Personnel

Occupant

Name

Address

Phone Number

Number of occupants in building and age

Owner or landlord

Name

Address

Phone Number

Building Characteristics

Type of Building

Property type

Multiple units

Air flow

Basement and Construction Characteristics

Heating, Venting, and Air Conditioning information

Occupancy

Factors that may influence indoor air quality
Water and sewer information
Relocation information
Floor Plans
Outdoor plot
Product inventory form

SUB-SLAB VAPOR PROBE MONITORING FORM

DATE: ______________________________ TIME: ___________________________

SAMPLE IDENTIFICATION: ____

SAMPLE DEPTH: ____

FIELD PERSONNEL: ____

INSTRUMENTS (model and serial number):

PUMP: ____

CGI: ____

TRACER GAS VERIFIED: ☐ Yes ☐ No TRACER GAS CONC. (%): ________________

SAMPLE PURGE VOLUME: ____

VOLUME OF SOIL VAPOR EXTRACTED: ____

SUMMA CANISTER: VACUUM BEFORE SAMPLING: _____________________________

VACUUM AFTER SAMPLING: ______________________________

APPARENT MOISTURE CONTENT: (DRY/MOIST/SATURATED/ETC.)

____

Comments/Observations during sampling (spills, floor stains, odors, other instrument readings):

VOCs used during normal operations of facility:

____

____

Weather conditions: Outdoor temperature: __________________________________

Barometric pressure: __________________________________

Precipitation: __________________________________

Ventilation conditions: __________________________________

Heating System Active? ☐ Yes ☐ No Indoor Air Temp: __________

Location in relation to sample location: ____________________________

Windows Closed? ☐ Yes ☐ No

INDOOR/OUTDOOR AIR MONITORING FORM

DATE: ______________________________ TIME: ____________________________

SAMPLE IDENTIFICATION: ____

SAMPLE DEPTH: ____

FIELD PERSONNEL: ____

INSTRUMENTS (model and serial number):

PUMP: ____

CGI: ____

TYPE OF SAMPLE: ☐ INDOOR ☐ OUTDOOR

DURATION OF AIR SAMPLING: ____

VOLUME OF AIR SAMPLED: ____

SUMMA CANISTER: VACUUM BEFORE SAMPLING: ______________________________

VACUUM AFTER SAMPLING: ______________________________

Comments/Observations during sampling (spills, floor stains, odors, other instrument readings):

____

____

VOCs used during normal operations of facility: ___________________________________

____

Weather conditions: Outdoor temperature: ____

Barometric pressure: ____

Precipitation: ____

Ventilation conditions: ____

Heating System Active? ☐ Yes ☐ No Indoor Air Temp.:____________

Location in relation to sample location: ______________________________

Windows Closed? ☐ Yes ☐ No

WEATHER OBSERVATION FORM

LOCATION: ____

DATE: ____

FIELD PERSONNEL: ____

INSTRUMENTS (model and serial number):

Thermometer: ____

Anemometer: ____

	Time (military)	Precip. (in)	Atmospheric pressure (in)	Temp. (degrees F)	Wind (mph)	Comments
Prior to Sampling						
Mid Day						
End of Sampling						

Notes: Additional measurements should be taken in case of weather condition changes.
Air sampling will be postponed if conditions move outside the acceptable range.

Sampling Event Acceptable Range:
1. Precipitation: dry while conducting sampling.
2. Atmospheric pressure: 29.7 – 30.4 in Hg.
3. Temperature: 35 – 95 degrees F. The ground must be completely thawed.
4. Wind: <10 mph.

NEW YORK STATE DEPARTMENT OF HEALTH
INDOOR AIR QUALITY QUESTIONNAIRE AND BUILDING INVENTORY
CENTER FOR ENVIRONMENTAL HEALTH

This form must be completed for each residence involved in indoor air testing.

Preparer's Name ____________________________________ Date/Time Prepared ______________

Preparer's Affiliation ________________________________ Phone No.______________________

Purpose of Investigation____

1. OCCUPANT:

Interviewed: Y / N

Last Name: _________________________ First Name: _________________________

Address: ____

County: _________________

Home Phone: ____________________ Office Phone: ____________________

Number of Occupants/persons at this location _______ Age of Occupants ______________________

2. OWNER OR LANDLORD: (Check if same as occupant ___)

Interviewed: Y / N

Last Name: _________________________ First Name: _________________________

Address: ____

County: _________________

Home Phone: ____________________ Office Phone: ____________________

3. BUILDING CHARACTERISTICS

Type of Building: (Circle appropriate response)

Residential	School	Commercial/Multi-use
Industrial	Church	Other: _________________

If the property is residential, type? (Circle appropriate response)

Ranch	2-Family	3-Family
Raised Ranch	Split Level	Colonial
Cape Cod	Contemporary	Mobile Home
Duplex	Apartment House	Townhouses/Condos
Modular	Log Home	Other:_______________

If multiple units, how many? ________

If the property is commercial, type?

Business Type(s) _______________________________________

Does it include residences (i.e., multi-use)? Y / N   If yes, how many? ______

Other characteristics:

Number of floors______   Building age______

Is the building insulated? Y / N   How air tight? Tight / Average / Not Tight

4. AIRFLOW

Use air current tubes or tracer smoke to evaluate airflow patterns and qualitatively describe:

Airflow between floors

____

____

____

Airflow near source

____

____

____

Outdoor air infiltration

____

____

____

Infiltration into air ducts

____

____

____

5. BASEMENT AND CONSTRUCTION CHARACTERISTICS (Circle all that apply)

a. Above grade construction:	wood frame	concrete	stone	brick
b. Basement type:	full	crawlspace	slab	other ________
c. Basement floor:	concrete	dirt	stone	other ________
d. Basement floor:	uncovered	covered	covered with _______________	
e. Concrete floor:	unsealed	sealed	sealed with ________________	
f. Foundation walls:	poured	block	stone	other ________
g. Foundation walls:	unsealed	sealed	sealed with ________________	
h. The basement is:	wet	damp	dry	moldy
i. The basement is:	finished	unfinished	partially finished	
j. Sump present?	Y / N			

k. Water in sump? Y / N / not applicable

Basement/Lowest level depth below grade: ________(feet)

Identify potential soil vapor entry points and approximate size (e.g., cracks, utility ports, drains)

____

____

6. HEATING, VENTING and AIR CONDITIONING (Circle all that apply)

Type of heating system(s) used in this building: (circle all that apply – note primary)

Hot air circulation	Heat pump	Hot water baseboard	
Space Heaters	Stream radiation	Radiant floor	
Electric baseboard	Wood stove	Outdoor wood boiler	Other ___________

The primary type of fuel used is:

Natural Gas	Fuel Oil	Kerosene
Electric	Propane	Solar
Wood	Coal	

Domestic hot water tank fueled by: _____________________________

Boiler/furnace located in:	Basement	Outdoors	Main Floor	Other___________
Air conditioning:	Central Air	Window units	Open Windows	None

Are there air distribution ducts present? Y / N

Describe the supply and cold air return ductwork, and its condition where visible, including whether there is a cold air return and the tightness of duct joints. Indicate the locations on the floor plan diagram.

____

____

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7. OCCUPANCY

Is basement/lowest level occupied? Full-time Occasionally Seldom Almost Never

Level	**General Use of Each Floor (e.g., familyroom, bedroom, laundry, workshop, storage)**
Basement	____
1st Floor	____
2nd Floor	____
3rd Floor	____
4th Floor	____

8. FACTORS THAT MAY INFLUENCE INDOOR AIR QUALITY

a. Is there an attached garage? Y / N

b. Does the garage have a separate heating unit? Y / N / NA

c. Are petroleum-powered machines or vehicles stored in the garage (e.g., lawnmower, atv, car) Y / N / NA
Please specify___________________

d. Has the building ever had a fire? Y / N When?_________________

e. Is a kerosene or unvented gas space heater present? Y / N Where? _________________

f. Is there a workshop or hobby/craft area? Y / N Where & Type? _________________

g. Is there smoking in the building? Y / N How frequently? ________________

h. Have cleaning products been used recently? Y / N When & Type? _________________

i. Have cosmetic products been used recently? Y / N When & Type? _________________

j. Has painting/staining been done in the last 6 months? Y / N Where & When? _______________

k. Is there new carpet, drapes or other textiles? Y / N Where & When? _______________

l. Have air fresheners been used recently? Y / N When & Type? ________________

m. Is there a kitchen exhaust fan? Y / N If yes, where vented?____________

n. Is there a bathroom exhaust fan? Y / N If yes, where vented?____________

o. Is there a clothes dryer? Y / N If yes, is it vented outside? Y / N

p. Has there been a pesticide application? Y / N When & Type?_________________

Are there odors in the building? Y / N
If yes, please describe: ____

Do any of the building occupants use solvents at work? Y / N
(e.g., chemical manufacturing or laboratory, auto mechanic or auto body shop, painting, fuel oil delivery, boiler mechanic, pesticide application, cosmetologist

If yes, what types of solvents are used? ____

If yes, are their clothes washed at work? Y / N

Do any of the building occupants regularly use or work at a dry-cleaning service? (Circle appropriate response)

Yes, use dry-cleaning regularly (weekly) No
Yes, use dry-cleaning infrequently (monthly or less) Unknown
Yes, work at a dry-cleaning service

Is there a radon mitigation system for the building/structure? Y / N Date of Installation: ____________
Is the system active or passive? Active/Passive

9. WATER AND SEWAGE

Water Supply: Public Water Drilled Well Driven Well Dug Well Other: _______

Sewage Disposal: Public Sewer Septic Tank Leach Field Dry Well Other: _______

10. RELOCATION INFORMATION (for oil spill residential emergency)

a. Provide reasons why relocation is recommended: _____________________________________

b. Residents choose to: remain in home relocate to friends/family relocate to hotel/motel

c. Responsibility for costs associated with reimbursement explained? Y / N

d. Relocation package provided and explained to residents? Y / N

11. FLOOR PLANS

Draw a plan view sketch of the basement and first floor of the building. Indicate air sampling locations, possible indoor air pollution sources and PID meter readings. If the building does not have a basement, please note.

Basement:

First Floor:

12. OUTDOOR PLOT

Draw a sketch of the area surrounding the building being sampled. If applicable, provide information on spill locations, potential air contamination sources (industries, gas stations, repair shops, landfills, etc.), outdoor air sampling location(s) and PID meter readings.

Also indicate compass direction, wind direction and speed during sampling, the locations of the well and septic system, if applicable, and a qualifying statement to help locate the site on a topographic map.

13. PRODUCT INVENTORY FORM

Make & Model of field instrument used: ____

List specific products found in the residence that have the potential to affect indoor air quality.

Location	Product Description	Size (units)	Condition*	Chemical Ingredients	Field Instrument Reading (units)	Photo ** Y / N

* Describe the condition of the product containers as **Unopened (UO), Used (U),** or **Deteriorated (D)**
** Photographs of the **front and back** of product containers can replace the handwritten list of chemical ingredients. However, the photographs must be of good quality and ingredient labels must be legible.