DEPARTMENT OF THE AIR FORCE

AIR FORCE CENTER FOR ENGINEERING AND THE ENVIRONMENT

March 6, 2012

MEMORANDUM FOR: See Distribution List

FROM: AFCEE/EXC - Griffiss
Building 770
428 Phoenix Drive
Rome, New York 13441

SUBJECT: Final Site Closure Sampling Work Plan
DP011 (Building 3 Drywell AOC)
Former Griffiss Air Force Base (AFB) Rome, New York
Contract Number FA8903-10-D-8595
Delivery Order 0014

1. Accompanying this letter please find the "Final Site Closure Sampling Work Plan for DP011 (Building 3 Drywell AOC)" for your review and comment.

2. The overall objective of this effort is to eliminate the requirement for Land use Controls/ Institutional Controls at the site.

3. We would appreciate review comments by April 20, 2012 so that project schedules and performance milestones can be maintained in accordance with this PBR Contract.

4. Should you have any questions or concerns please contact me at 315 356 0810 ex 202.

MICHAEL F. MCDERMOTT
Air Force Center for Engineering and the Environment – AFCEE/EXC Griffiss

Attachments: As noted

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FINAL

SITE CLOSURE SAMPLING WORK PLAN

Prepared for:

DP011 (Building 3 Drywell AOC)
Former Griffiss Air Force Base
Rome, New York

Prepared for

The Air Force Center for Engineering and the Environment
Building 770
428 Phoenix Drive
Rome, New York 13441

Prepared by:

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Contract Number FA8903-10-D-8595
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March 2012

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LIST OF ACRONYMS AND ABBREVIATIONS

Air Force	United States Air Force
AFB	Air Force Base
AFCEE	Air Force Center for Engineering and the Environment
AFRL	Air Force Research Laboratory
ARARs	Applicable or Relevant and Appropriate Requirements
AOC	Area of Concern
bgs	Below Ground Surface
CAPE	CAPE Environmental, Inc.
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
COC	Contaminant of Concern
DP	Drainage Pit
FPM	FPM Remediations, Inc.
ft	feet
HI	Hazard Index
LUC/IC	Land Use Control/Institutional Controls
NCP	National Oil and Hazardous Substances Pollution Contingency Plan
NFA	No Further Action
NYS	New York State
NYSDEC	New York State Department of Environmental Conservation
NYSDOH	New York State Department of Health
RI	Remedial Investigation
ROD	Record of Decision
SI	Supplemental Investigation
SVOC	Semi-Volatile Organic Compound
TAL	Target Analyte List
TRPH	Total Recoverable Petroleum Hydrocarbons
USEPA	United States Environmental Protection Agency
VOC	Volatile Organic Compound
WP	Work Plan

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1 Introduction

FPM Remediations, Inc. (FPM), in association with CAPE Environmental, Inc. (CAPE), has been contracted by the Air Force Center for Engineering and the Environment (AFCEE), to perform Land Use Control/Institutional Control (LUC/IC) site maintenance at the former Griffiss Air Force Base (AFB), New York. This Work Plan (WP) was developed to conduct site closure sampling at Drainage Pit (DP) 011 – Building 3 Drywell Area of Concern (AOC). The work will be conducted through contract number FA8903-10-D-8595-0014.

All work conducted at this site will be performed in accordance with the former Griffiss AFB Uniform Federal Policy Quality Assurance Project Plan (CAPE/FPM/AECOM, July 2011). Section 2 provides a site description, previous investigations, and proposed closure sampling activities.

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2 DP011 (Building 3 Drywell AOC)

2.1 Site Description

The Building 3 Drywell AOC is located in the center of the former Griffiss AFB on Air Force owned property [Parcel Air Force Research Laboratory (AFRL)-5] south of the Tank Farms 1 and 3 Source Removal AOC and northwest of the Building 20 AOC. Surface water drains to Six Mile Creek on the eastern side (drywell area) of the building and to Three Mile Creek on the western side. A drywell associated with the site was used to dispose of cleaning solvents, etching acids with metal salts, and paint thinners from 1960 to 1984 as stated in the Remedial Investigation (RI) (LAW, December 1996).

2.2 Previous Investigations

2.2.1 Drywell Removal

The drywell associated with Building 3 was removed in 1987. During removal, surrounding soils were excavated. The excavation was completed at a depth of 10 feet (ft) below ground surface (bgs). Following excavation, one soil sample was collected and analyzed for toxicity characteristic metals. The results did not show detectable levels of metals. The soil sample was not analyzed for organic compounds.

2.2.2 Remedial Investigation

The Building 3 Drywell AOC RI was conducted at the site in 1994. Groundwater and soil sampling were performed as part of the RI. The Building 3 Drywell AOC RI Report is included in Appendix A. The objective of the RI was to determine the presence/absence of residual contamination remaining below the depth of the original drywell. Since the drywell was excavated and backfilled with clean soil in 1987, soil sampling for chemical analysis was not performed as it was deemed to not satisfy the objective of the RI. Two soil borings were conducted and soil samples were sent for geotechnical analysis. In addition, groundwater samples were collected from each boring. Results indicated Volatile Organic Compounds (VOCs), Semi-Volatile Organic Compounds (SVOCs), Target Analyte List (TAL) inorganics, hexavalent chromium, and total recoverable petroleum hydrocarbon (TRPH) detections. Two more groundwater samples were collected in November 1994 using a HydroPunch™ groundwater sampling tool. Four VOCs were detected in both samples; however the concentrations were not above New York State (NYS) Groundwater Standards. SVOCs, metals (11 exceedances), and TRPH were also detected in the groundwater samples. VOC and SVOC concentrations did not exceed Applicable or Relevant and Appropriate Requirements (ARARs).

In addition to the groundwater and soil sampling, a baseline risk assessment was also conducted as part of the RI. The baseline risk assessment evaluated the current and future (commercial/ administrative use) potential risks to human health and the environment associated with contaminants of concern (COCs) found in the groundwater at the site. Under commercial/administrative use, the potentially exposed future populations are utility and construction workers. However, the risks to these workers were not quantitatively addressed due

to the inability to collect soil samples from 6 to 8 ft bgs at the site. Soil samples were not collected at this interval because of poor recovery due to the presence of rocks and cobbles. It is important to note that soils up to 10 ft bgs were excavated as part of the drywell removal in 1987. One boring location was in the excavated area and one soil boring was slightly offset from the excavation.

A hypothetical groundwater exposure scenario was evaluated which assumes that future industrial workers may use the groundwater as a potable supply (LAW, December 1996). The total carcinogenic risk associated with exposure by industrial/commercial workers to contaminants in the groundwater was below the acceptable United States Environmental Protection Agency (USEPA) target risk range (1×10^{-6}). The hazard index (HI) was below the acceptable level of 1.

2.2.3 Supplemental Investigation

A vertical profile well (B3VMW-1) was installed and sampled as part of the Supplemental Investigation (SI) in 1997. Results showed the presence of VOCs and SVOCs; however no concentrations exceeded the most stringent criteria. For the ecological baseline risk assessment, it was identified that there were no complete exposure pathways for ecological receptors.

2.3 Record of Decision

The Record of Decision (ROD) for the Building 3 Drywell AOC was issued by the Air Force in November 2004 and signed by the USEPA in March 2005 (Appendix B). According to the ROD, the selected remedy for the Building 3 Drywell AOC is LUC/ICs for industrial/commercial use and groundwater use restrictions. The ROD states that:

- Development and use of the entire Building 3 Drywell AOC property for residential housing, elementary and secondary schools, childcare facilities and playgrounds will be prohibited unless prior approval is received from the Air Force, USEPA, and New York State Department of Environmental Conservation (NYSDEC); and
- The owner or occupant of this site shall not extract, utilize, consume, or permit to be extracted; any water from the subsurface aquifer within the boundary of the site unless such owner or occupant obtains prior written approval from the New York State Department of Health (NYSDOH).

2.4 LUC/IC Inspections

The LUC/IC boundary at the site is roughly 20 ft by 20 ft in size. Annual LUC/IC inspections have been performed at the site since 2006 to ensure that the LUC/ICs continue to be implemented. The confirmation of the LUC/ICs is obtained through on-site inspections and LUC/IC confirmation forms signed by the owner/occupant of the property.

2.5 Five Year Reviews

5-Year Reviews were conducted at this site in 2005 and 2010. Both reviews found that the

LUC/IC remedy for DP011 is currently protective of human health and the environment.

2.6 Regulatory Drivers

DP011 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 USEPA, Region II and NYSDEC.

2.7 Proposed Outcome

The proposed outcome for this site is site closure.

2.8 Pathways to Achieve Proposed Outcome

2.8.1 Pathway to Proposed Outcome

Conduct localized groundwater sampling at the existing monitoring well, B3VMW-1. The location of this monitoring well is shown on Figure 1.

2.8.2 Metric Development: Proposed End Point, Metrics, and Approach

Groundwater Sampling:

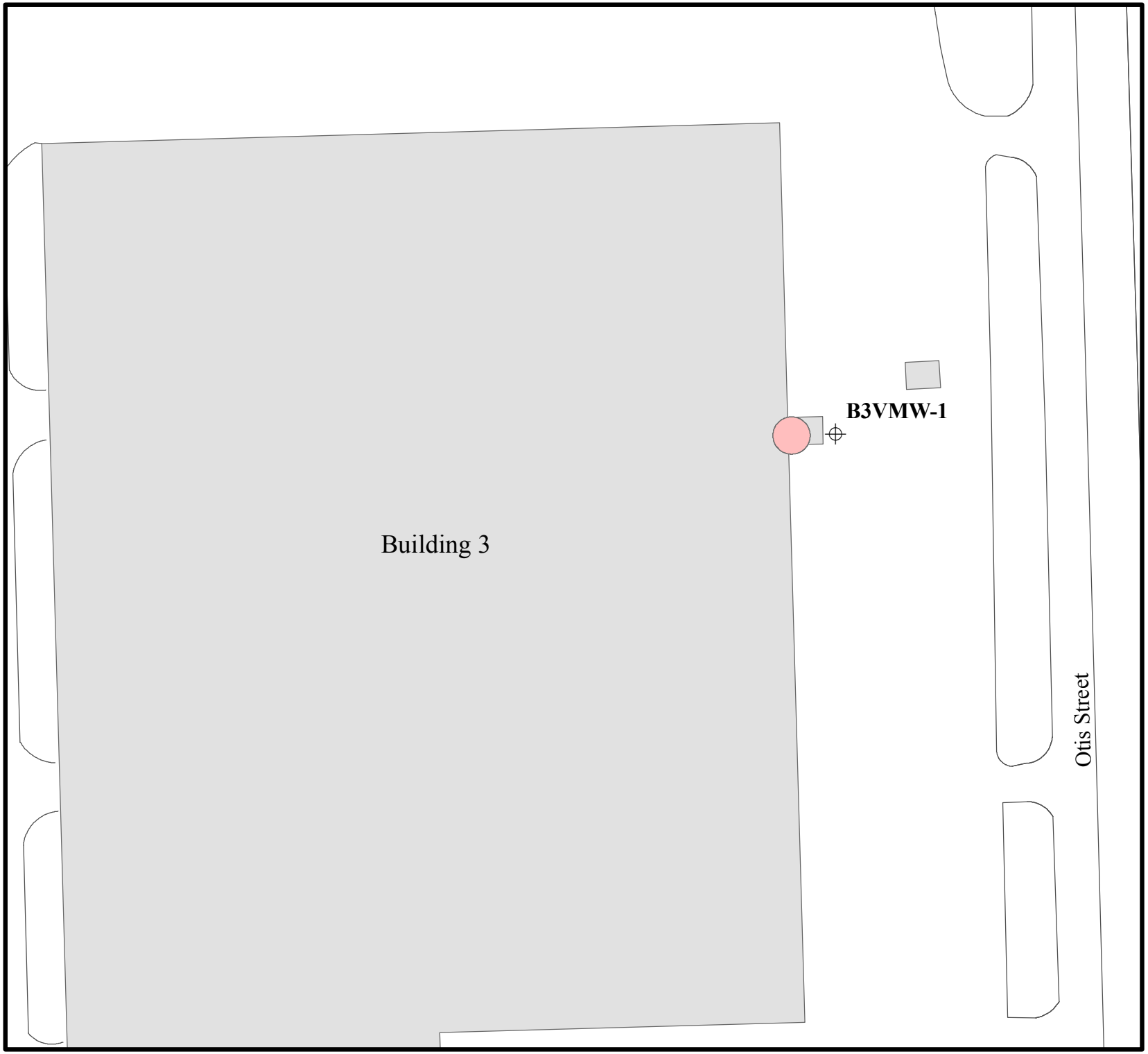
Based on the RI and SI sampling results, one groundwater sample from the existing monitoring well B3VMW-1 will be collected utilizing low flow sampling procedures and analyzed for VOCs (using USEPA Method SW8260), SVOCs (using USEPA Method SW8270), and Metals (using USEPA Method SW6010). The metals analysis will include total and dissolved metals. The results will be compared to the NYSDEC Division of Water Technical and Operational Guidance Series "Ambient Water Quality Standards and Guidance Values and Groundwater Effluent Limitations", NYSDEC, June 1998 (NYSDEC Class GA Groundwater Standards).

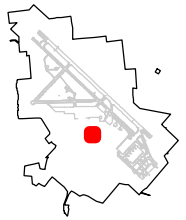
Site Closure:

The 5-gallon capacity drywell was removed, soils were excavated to 10 ft bgs, and the site was backfilled with clean soil in June 1987. The 1994 RI and 1997 SI reported VOCs, SVOCs, and metals present in groundwater at the site. If groundwater sampling results from B3VMW-1 show that the COC levels are below NYS Class GA Groundwater Standards; or are indicative of basewide background conditions identified during the RI, no further action will be recommended.

2.9 Contingencies

If NFA cannot be achieved at DP011, the LUC/ICs will not be removed and annual inspections and reporting will continue.





Site Location

Legend

- Groundwater Monitoring Well
- Road
- Existing Facility
- Demolished Facility
- LUC/IC Site Boundary/Former Drywell Location and Excavation

0 15 30 60
Feet

United States Air Force
Former Griffiss Air Force Base
Rome, New York

Figure 1
DP011 (Building 3 Drywell AOC) Sampling Location

FPM Remediations, Inc CAPE

Y:\GIS_Projects\Griffiss\Projects\1015-11-01\B3_SampLocs.mxd

Table 1
DP011 (Building 3 Drywell AOC) Sampling Summary

Sampling Locations	Sampling Rationale	Target Analytes/ Method Numbers	Sampling Intervals	Sample Medium	Evaluation Criteria
B3VMW-1	Adjacent to LUC/IC Boundary	VOCs/SW8260 SVOCs/SW8270, Metals/SW6010 (dissolved and total)	10 to 20 ft bgs	Groundwater	Verify the absence of contamination below NYS Class GA Groundwater Standards; or are indicative of basewide background conditions identified during the RI.

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3 References

AFRPA, *Final Record of Decision for Building 3 Drywell Area of Concern at the Former Griffiss Air Force Base, Rome, NY*, November 2004.

Law Environmental, *Draft-Final Primary Report, Remedial Investigation, Building 3 Drywell Area of Concern, Volume 17*, December 1996.

NYSDEC Division of Water Technical and Operational Guidance Series, *Ambient Water Quality Standards and Guidance Values and Groundwater Effluent Limitations*, June 1998.

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Appendix A
(Building 3 Drywell AOC Remedial Investigation)

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M.M.

GRIFFISS AFB
NEW YORK

ADMINISTRATIVE RECORD
COVER SHEET

AR File Number 943

943 1
File: M.M. 17A-62
AIR 943

UNITED STATES AIR FORCE

GRIFFISS AIR FORCE BASE
NEW YORK

DRAFT-FINAL PRIMARY REPORT

VOLUME 17
REMEDIAL INVESTIGATION
BUILDING 3 DRYWELL
AREA OF CONCERN

11-2588-0211

DECEMBER 1996

PROJECT NO. 11-2588-0211
00047-2588-0211.17

CONTRACT NO. DACA41-92-D-8001
JREZ NO. 92-0082

VOLUME 17

DRAFT-FINAL PRIMARY REPORT

REMEDIAL INVESTIGATION
BUILDING 3 DRYWELL AREA OF CONCERN

GRIFFISS AIR FORCE BASE, NEW YORK

Prepared For:

U.S. Army Corps of Engineers
Kansas City District
601 East 12th Street
Kansas City, Missouri 64106



Prepared By:

Law Engineering and Environmental Services, Inc.
114 TownPark Drive
Kennesaw, Georgia 30144

DECEMBER 1996

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1.0 BACKGROUND AND HISTORY

This section of the Remedial Investigation (RI) report describes the physical location and site characteristics of the Building 3 Drywell Area of Concern (AOC) and summarizes the site's history and previous uses.

The Building 3 Drywell AOC is located in the central portion of the base (Figure 1.1). The site is located approximately 400 feet south (downgradient) of the Tank Farms 1 and 3 Source Removal AOC and 800 feet north-northwest of the Lot 69 and Building 20 AOCs. The drywell at Building 3 was located at the east side of the building adjacent to a liquid nitrogen aboveground storage tank. The area in which the drywell was located is presently covered with gravel.

The drywell was used from the 1960s to 1984 to dispose of cleaning solvents (1 to 5 gallons per day); etching acids with metal salts (less than 2 gallons per day); and paint thinner, methanol, acetone and trichloroethylene (less than 1 gallon per day) from the industrial shop located within Building 3. The drywell was an open-bottomed earthen cylinder with a 5-gallon capacity. In June 1987, the drywell and contaminated soils were excavated. Records reviewed regarding the drywell removal included the contractual Statement of Work for the project, a Site Plan and Detail sheet noting activities required for the project, progress reports for the project, and the laboratory analytical data for one soil sample analyzed for the Extraction Procedure (EP) Toxicity Characteristic for metals.

The Statement of Work for the project "Decontaminate Drywell Building 3" dated May 16, 1986, listed the following activities pertinent to the drywell removal:

1. Removal of bituminous pavement around existing abandoned acid disposal drywell and contaminated bituminous pavement adjacent to building near electrical transformer enclosure.

2. Hand excavate, test (EP Toxic), and containerize contaminated soil in area of drywell. The EP Toxic test was to be performed on a representative sample of the soil for soil disposal purposes.

3. Backfill excavated material, 6-inch lifts, compacted. All backfill material to be free of stones larger than one inch in any dimension.

4. Disconnect and cap plumbing leading to drywell.

The notes for the Site Plan and Detail sheet dated May 28, 1986, noted the following actions to be performed:

1. Disconnect existing exterior waste line
2. Remove 5-gallon earthenware acid retention tank
3. Excavate contamination area 10 feet deep
4. Cap exterior waste line at the building exterior wall
5. Backfill area with satisfactory material

The contract file indicated that the work had been completed. No field notes or as-built drawings of the excavation were submitted by the contractor, so there is no detailed information about the actual extent of excavation performed. A soil sample analyzed for EP Toxicity Characteristic metals from this site on August 14, 1987, after excavation of the drywell, did not indicate detectable levels of metals (Table 1.1) (UNC, 1988). This soil sample was not analyzed for organic compounds.

In accordance with the Federal Facility Agreement and Resolution of Disputes between the U.S. Air Force (USAF), U.S. Environmental Protection Agency, Region II (EPA) and the New York State Department of Environmental Conservation (NYSDEC), an RI was performed at this AOC to evaluate the nature, levels, and extent of potential contamination at the site and perform a baseline risk assessment to evaluate the potential effects of chemicals of potential concern (COPCs) on human health and the environment. The following sections overview the field investigations performed at the AOC during the RI, report the results of the investigations, present the baseline risk assessment, and provide conclusions and recommendations for this site based on the data and risk assessment. Background information pertaining to Griffiss AFB and the RI is presented in Volume 1.

2.0 SITE-SPECIFIC INVESTIGATIONS

The following sections describe the field sampling program performed at the Building 3 Drywell AOC. The field investigation activities included the following:

- Drilled two soil borings to ground water near the abandoned drywell
- Collected three soil samples for geotechnical analysis from the soil borings
- Collected one grab ground-water sample from each soil boring
- Abandoned the soil borings
- Performed topographic and sample location surveys

The boring locations are shown on Figure 2.1. The procedures for soil sampling, visual soil classification, drilling, borehole abandonment, grab ground-water sample collection, and the methods used for geotechnical analysis are described in Volume 1 of the RI report.

2.1 SURFACE FEATURE INVESTIGATION

Topographic and location surveys were performed by Whitfield Engineering, Inc., at the Building 3 Drywell AOC. The topographic survey established elevations at 2-foot intervals and the location survey established horizontal and vertical coordinates for each soil boring. The elevation of the site is shown on Figure 2.1; topographic contour lines are not depicted on Figure 2.1, because the site is flat with less than 1 foot of relief.

2.2 CONTAMINANT SOURCE INVESTIGATION

The contaminant source includes the solvents, etching acids, and paint thinners disposed in the drywell from the 1960s to 1984. A visual site reconnaissance was performed at the Building 3 Drywell AOC in May 1992 to determine the scope of the field investigations for this RI.

2.3 SOIL AND SHALLOW GROUND-WATER INVESTIGATIONS

The following sections describe the investigations performed that involved the subsurface soil and ground-water conditions.

2.3.1 Soil Boring Drilling and Sampling

Two soil borings, designated B3SB-1 and B3SB-2, were drilled by Parratt-Wolff, Inc., to ground water at Building 3 on April 26 and 27, 1994. Soil boring B3SB-1 was drilled in the area of the former drywell, between the footer of Building 3 and the liquid nitrogen tank. Auger refusal was encountered in this boring at 3 feet below ground surface (bgs), and the offset boring was designated B3SB-1A (shown as B3SB-1 on Figure 2.1). Boring B3SB-2 was drilled at the southeast corner of the nitrogen tank and the northeast corner of Building 5869. The boring was relocated in the field due to the inaccessibility of the proposed boring location (too close to the buildings). The boring logs for this AOC are presented in Appendix A.

The subsurface soil sample for chemical analysis planned for the 6- to 8-foot depth interval of B3SB-1A could not be collected because of poor recovery from the split spoon sampler due to the presence of gravel and cobbles. In consultation with oversight personnel, offsetting the soil boring was determined to be unfeasible due to access constraints. Also in consultation with oversight personnel, a surface soil sample was proposed but it was decided that a surface soil sample would not satisfy the objective of determining the presence or absence of residual subsurface contamination from the drywell. The drywell at Building 3 was excavated and backfilled with clean soil in June 1987. The purpose of this investigation was to determine if any residual contamination remained below the depth of the original drywell. Therefore, neither a surface soil sample from B3SB-1A nor a subsurface soil sample from B3SB-2 (offset from the original drywell location) would satisfy this objective.

One soil sample from the 4- to 6-foot bgs sample interval in boring B3SB-1A was submitted for geotechnical analysis. Two soil samples, one from the 2- to 4-foot sample interval and one from the 8- to 10-foot sample interval, from boring B3SB-2 were submitted for geotechnical analysis. The results are presented in Appendix B.

2.3.2 Grab Ground-Water Sampling

Two grab ground-water samples, one from each boring, were collected on April 27, 1994, using a HydroPunch™ II ground-water sampling tool. The grab ground-water samples were designated B3HP-1 and B3HP-2. The samples were submitted to RECRA Environmental, Inc., (RECRA) for chemical

analysis for the parameters listed on Table 2.1. The analytical parameters and methods are listed on Table 2.2. The borings were abandoned after sampling.

Two additional grab ground-water samples were collected from borings drilled adjacent to the original borings on November 15, 1994. These samples were submitted to Lancaster Laboratories, Inc., (Lancaster) for cyanide analysis; the original grab ground-water samples were inadvertently not analyzed for cyanide. The borings were abandoned after sampling.

3.0 SITE-SPECIFIC PHYSICAL CHARACTERISTICS

The following sections describe the geological and hydrological properties which were evaluated during the investigation at the Building 3 AOC.

3.1 SITE SETTING

Building 3 is located in the central portion of the base with less than 1 foot of relief. The site is located in the center of the base industrial complex.

3.2 SURFACE-WATER HYDROLOGY

Building 3 is located along a surface-water divide, with run-off from the west portion of the site draining to Threemile Creek and run-off from the east portion of the site, including the former drywell area, draining to Sixmile Creek. The site is located approximately 2,000 feet northwest of Threemile Creek, and approximately 5,520 feet northeast of Sixmile Creek.

3.3 SOILS

Based on field descriptions of soils encountered in soil boring B3SB-1A, the upper 2 feet of soil consist of silty, fine to medium sand with gravel below 0.25 to 0.5 feet of asphalt. The subsurface soils in boring B3SB-1A were described as silty sands from 2 to 4 feet bgs and sandy gravels and gravelly sands from 4 to 12 feet bgs (boring completion). The geotechnical analysis of the 4- to 6-foot sample from the soil boring classifies the soil as poorly graded gravel with silt and sand. The soil profile in boring B3SB-1A represents fill material placed after the drywell was excavated.

The subsurface soils encountered in boring B3SB-2 were described as silty sand from 2 to 9 feet bgs and gravelly sand from 9 to 12 feet bgs (boring completion). The geotechnical analysis of the 2- to 4-foot sample classifies the soil as poorly graded gravel with silt and sand and the 8- to 10-foot sample as well graded gravel with sand. The field descriptions of geotechnical classifications of the soil samples collected for geotechnical analysis are provided in Table 3.1.

3.4 STRATIGRAPHY

Since only two soil borings were drilled at Building 3 and the soils are not considered to be representative of the soils in the area, a cross section was not prepared for this AOC.

3.5 HYDROGEOLOGY

The ground-water zone investigated at Building 3 exists under unconfined conditions within the unconsolidated aquifer. The saturated zone at Building 3 was encountered at depths ranging from 8 feet bgs to 8.5 feet bgs in the soil borings. No monitoring wells have been installed at the Building 3 AOC.

As generated by the three-point triangulation method, Figure 3.1 depicts the ground-water flow direction of the surficial aquifer in the vicinity of Building 3 as to the south/southwest.

The hydraulic conductivities for the wells installed for the RI were input into the numerical ground-water flow model, presented in the On-Base Ground-Water Contamination AOC, and average hydraulic conductivities were modelled for the areas in and around base relative to each other. These values are used to determine the ground-water flow rate in the Building 3 area.

The hydraulic conductivity of the surficial aquifer at Building 3 was estimated to be 30 feet/day (ft/day), or 0.021 feet/minute (ft/min) from the basewide numerical ground-water model. Based on the hydraulic conductivity of 0.021 ft/min, the modeled ground-water gradient of 0.0015 ft/ft, and effective porosity of 20 percent from literature, the rate of ground-water flow at Building 3 was estimated to be 82.8 ft/year using the Darcy flow equation:

$$V = \frac{K(i)}{n_e} \times 525{,}600$$

where:

V	=	average ground-water flow velocity, in ft/yr
K	=	average hydraulic conductivity, in ft/min
i	=	hydraulic gradient, in ft/ft
525,600	=	number of minutes in a year (conversion factor)
n_e	=	effective porosity (expressed as a decimal

4.0 NATURE AND EXTENT OF CONTAMINATION

This section contains information on the nature and extent of contamination at the Building 3 AOC. Information is presented on sampling program results, analytical results, and interpretation of analytical results grouped by sample media. The discussion in this section focuses on the chemicals which were detected at concentrations greater than the potential applicable or relevant and appropriate requirements (ARARs), to-be-considered (TBC) criteria, and background screening levels. The ARARs, TBCs, and background screening levels are presented and defined in Volume 1.

4.1 CONTAMINANT SOURCES

The drywell at Building 3 was used from the 1960s to 1984 to dispose of cleaning solvents, etching acids with metal salts, paint thinner, methanol, acetone, and trichloroethylene from the industrial shop in Building 3. The drywell, an open-bottomed earthen cylinder with a 5-gallon capacity, was removed in 1987.

4.2 SAMPLING PROGRAM AND ANALYTICAL RESULTS

This section of the report provides results for the sampling and analytical program. Subsurface soil samples could not be collected as planned due to poor recovery from the split spoon sampler. The results of a 1987 soil investigation involving analysis for inorganics at the Building 3 Drywell are reported in Section 1.0. The results of the 1987 soil investigation did not indicate detectable concentrations of metals in EP Toxicity Leachate samples of soils from the drywell excavation (Table 1.1).

Ground-water samples were collected from two locations, B3HP-1 and B3HP-2, on April 27 and November 15, 1994 (Figure 2.1). Chemical analyses were performed in order to determine the concentration of analytes as described in Tables 2.1 and 2.2. There were no previous investigations of ground water at Building 3.

The analytes detected in the Building 3 ground-water samples are reported in Table 4.1. Table 4.2 summarizes the detection of analytes that exceeded the most stringent potential ARAR or TBC and/or were greater than the background screening levels in ground water at the two sample locations.

The complete analytical results for samples collected from this site are provided in Appendix C. The results of the data quality evaluation for the grab ground-water samples collected at the Building 3 AOC were provided in the "RI Analytical Data Technical Memorandum No. 2," dated October 1994 (LAW, 1994a).

Four volatile organic compounds were detected (chloroform, tetrachloroethylene, 1,1,1-trichloroethane, and trichloroethylene) in the grab ground-water samples from locations B3HP-1 and B3HP-2. Concentrations of volatiles ranged from 0.24 µg/L for tetrachloroethylene to 2.0 µg/L for trichloroethylene. None of the detected concentrations exceed the most stringent potential ARAR or TBC. There was no apparent difference in the concentrations detected in the two samples.

Seven semi-volatile organic compounds were detected in the grab ground-water samples at Building 3 AOC. Each of the semi-volatile organic compounds were detected at estimated concentrations below the practical quantitation limit (PQL) and did not exceed potential ARARs.

A total of 21 metals were detected (11 of which exceeded potential ARARs or TBCs, and 18 of which exceed background screening levels) in ground water at Building 3 AOC. The detected concentrations of most metals analytes, including aluminum, chromium, iron, and lead, were higher in sample B3HP-2 than in B3HP-1. Soil boring B3SB-2 is located approximately 6 feet southeast of soil boring B3SB-1, the former drywell, and a liquid nitrogen storage tank. Concentrations of metals are typically elevated in grab ground-water samples. Grab ground-water samples are more turbid than ground-water samples from a monitoring well because they are not collected from a well which has been developed and purged prior to sampling. Because of this turbidity, concentrations of metals in grab ground-water samples are elevated, sometimes several orders of magnitude, above concentrations in ground-water samples collected from monitoring wells. The results of a statistical analyses performed comparing metals concentrations in grab ground-water samples to those in samples obtained from monitoring wells is presented in Volume 1, Section 2.17.6.3. This evaluation of the data indicated a statistically significant difference between metals concentrations in grab ground-water samples and monitoring well ground-water samples.

Total recoverable petroleum hydrocarbons were detected in both samples at the Building 3 AOC. Sample B3HP-1, taken from the location of the former drywell, contained a higher concentration of petroleum hydrocarbons (10.1 mg/L) than sample B3HP-2 (1.1 mg/L). Concentrations in both samples exceeded the NYSDEC Ground-Water Standard of 0.1 mg/L. Note that petroleum hydrocarbons are regulated as a group of Unspecified Organic Compounds (UOCs) and thus have a NYSDEC MCL of 0.1 mg/L.

5.0 CHEMICAL FATE AND TRANSPORT

This section discusses fate and transport mechanisms that may affect chemicals of potential concern identified in ground water at Building 3.

Chemical persistence and potential routes of chemical migration are based primarily on the physical and chemical characteristics of individual chemicals and their degradation products, as well as site-specific geological, hydrological, and chemical conditions. Physical and chemical properties for individual constituents are discussed in Volume 1 of this RI Report.

As discussed in Section 3, the subsurface soils consisted mainly of sandy gravels and gravelly sands. Ground water was encountered between 8 and 8.5 feet bgs at this location. Due to the relatively impermeable nature of the underlying bedrock, ground-water flow and constituent migration should be restricted to the overlying gravelly sands and sandy gravels. The following sections describe the chemicals present at this location, and address potential migration routes for groups of chemicals having generally similar transport characteristics.

5.1 METALS

A total of 11 metals were identified in the ground water at concentrations above potential ARARs. These included aluminum, arsenic, barium, beryllium, chromium, copper, iron, lead, manganese, nickel, and zinc. The potential for migration of these metals depends on the solubility of their various forms in ground water. Metals in solution will exist in an ionic form, whereas non-ionic forms tend to precipitate and bind to soil and sediments. Metals in soluble form, and not bound to the soil, may be expected to migrate with ground water.

Metals present in the soils tend to sorb to the soil and natural organics, and form metallic hydroxide precipitates. A variety of factors, including pH, determine whether or not these metals will be mobilized in soil. Most metals present in soils with a pH range of 5 to 8 will be present as insoluble metal hydroxides. The metals will remain in their predominantly insoluble form unless soil and/or ground-water conditions change. For acidic and basic solutions, the solubility of metal ions in solution increases significantly. Acidic soil conditions, as caused by acid rain, may promote the leaching of metals from

the soil. The metal species may then be transported with the water or undergo a series of ion exchange reactions with other compounds or elements.

Water at this location was within the anticipated pH range of most ground waters, 6.5 to 7.5. This pH is within the pH range where most metals are insoluble and does not support conditions where metals could be present at concentrations greater than their solubility. Since the water samples at this location were collected as grab ground water and had high turbidity, the elevated metals concentrations are probably a result of the turbidity and do not represent actual ground-water conditions.

5.2 VOLATILE ORGANIC COMPOUNDS

As a class, volatiles exhibit a wide range of solubility in water. The volatile organic compounds identified in ground water at this location included chloroform, tetrachloroethylene, trichloroethylene, and 1,1,1-trichloroethane. None of the VOCs exceeded potential ARARs. However, the results from Total Recoverable Petroleum Hydrocarbon (TRPH) test exceeded the potential ARAR for TPHs. Based on the analytical results for volatiles and semi-volatiles, there is no evidence to support the concentrations of 1.1 to 10.1 mg/L of petroleum-based compounds. TRPH results are obtained through 418.1 methodology. Natural products, including plant waxes, are sometimes measured as part of the TRPH. As a result, the data may actually be biased high and does not necessarily indicate contamination.

Vertical and horizontal transport in the aqueous phase of the soil-water interface is a possible transport process of volatile organic compounds. As a class, volatiles exhibit a wide range of solubility in water. Organic chemicals move in the ground-water system by advection and dispersion, and transport is retarded by adsorption, hydrophobic partitioning and biological and chemical degradation. All of these factors influence the direction and rate of transport as well as the ultimate fate of organic contaminants in a ground-water system. Since none of the volatiles identified at this site exceeded potential ARARs, there is a low potential for off-site impact.

5.3 SEMI-VOLATILE ORGANIC COMPOUNDS

Seven semi-volatile organic compounds were detected in ground water, none at concentrations exceeding potential ARARs. Semi-volatile organics are expected to remain adsorbed to soil particles in unsaturated

soils. In saturated soils, the soluble semi-volatile organics are available for transport with ground-water flow.

Ground-water flow is normally linear with no vertical mixing by turbulence or convection as in surface water. As a result, the downward dispersion of soluble constituents is only by molecular diffusion and by downward displacement as new water enters at the water table (Farmer, 1983). Like volatiles, semi-volatile organic compounds also move in the ground-water system by advection and dispersion. Adsorption, hydrophobic partitioning and biological and chemical degradation act as retardation factors. Since none of the semi-volatiles identified at this site exceeded potential ARARs, there is a low potential of off-site impact.

6.0 BASELINE RISK ASSESSMENT

A baseline risk assessment was conducted for the Building 3 AOC to determine whether chemicals detected at the site pose a risk to human and/or ecological receptors. This assessment consisted of three components: (1) data evaluation, (2) human health risk assessment, and (3) ecological risk assessment. Analytical results collected at the AOC indicate that volatile organic compounds (volatiles); semi-volatile organic compounds (semi-volatiles), and petroleum hydrocarbons were detected in grab ground-water samples collected from 2 soil borings at the site.

6.1 DATA EVALUATION

Analytical data for grab ground-water samples collected from the Building 3 AOC were evaluated for use in the human health and ecological risk assessments, using the analytical data quality evaluation methodologies outlined in the risk assessment methodology presented in Volume 1 of this report. The ground-water samples obtained during the RI were analyzed using EPA- and NYSDEC-approved methods. The appropriate and required data quality evaluation procedures were employed throughout the evaluation process. The laboratory quality control (QC) procedures for calibration, method validation, and performance evaluation included such procedures as analysis of method blanks, matrix spike/matrix spike duplicate (MS/MSD) analyses, analysis of laboratory control samples, and assessment of surrogate analytes.

6.1.1 Analytical Methods and Quantitation Limits

The analytical data used for the risk assessment were obtained from EPA-approved methods incorporating additional quality assurance (QA) procedures to meet the requirements for definitive data as listed in the Data Quality Objectives Process for Superfund (EPA, 1993a). According to EPA's Guidance for Data Useability in Risk Assessment (Part A) (EPA, 1992a), such data are appropriate for assessing risk as well as the nature and extent of site contamination.

The practical quantitation limit (PQL) is the lowest concentration that can be reliably assessed given the limits of precision and accuracy of routine laboratory operations and conditions. The PQL is generally five to ten times greater than the method detection limit. During the planning process for the RI, the

PQLs were compared to chemical-specific potential ARARs and TBC criteria for soil and ground water to determine whether the analytical methods used were sensitive enough for regulatory review. These comparisons are presented in Appendix L of the RI Work Plan (LAW, 1993). The laboratory PQLs used for analysis of chemicals at the site were at or below the most stringent ARARs and/or TBCs except for a few chemicals analyzed by EPA Method 524.2 in aqueous media. Specifically, the PQLs for the analysis of acrylonitrile and 1,1,2,2-tetrachloroethane in ground water by EPA Method 524.2, exceeded the most stringent regulatory criteria identified (NYS Ground-Water Standards). These exceedances are due to the fact that available analytical methods are not sensitive enough to meet the most stringent regulatory criteria for compounds mentioned above.

The sample quantitation limit (SQL) is a sample-specific detection limit that accounts for sample characteristics, sample preparation, and analytical adjustments such as dilution. The SQL's for samples analyzed from the Building 3 AOC were consistent with the PQLs established during the planning process.

6.1.2 Data Qualification

The data quality indicators which were evaluated during the data quality evaluation process included sample integrity, holding times, method blanks, internal standards, surrogate recoveries, MS/MSD recoveries, matrix spike blank recoveries, and duplicate precision. Analytical results associated with noncompliant QC indicators were assigned with the appropriate qualifiers. Based on the results of the data quality evaluation process, sample results were considered acceptable as presented, qualified as estimates ("J" flag), or rejected ("R" flag).

As a component of the data evaluation process, chemical concentrations in laboratory and field blanks were analyzed to validate analytical results. If common laboratory contaminants were detected in samples at concentrations less than 10 times the amount measured in associated blanks, or if other "uncommon" laboratory contaminants were detected in samples at concentrations less than five times the amount reported in any associated blank, the results are flagged "U." Chemicals qualified in this manner are considered nondetect results. Duplicate samples (i.e., QC samples) collected at the Building 3 AOC were utilized in the risk assessment. They were not, however, considered as individual data points. Rather, the highest value in the sample or its duplicate was selected for calculations of exposure point

concentrations. The results of the data quality evaluation process were summarized in the "RI Analytical Data Technical Memorandum No. 2" (LAW, 1994a).

Positively detected data with no flags, nondetect data with "U" flags, and estimated data with "J" flags were used in the risk assessment. However, rejected data with "R" flags and "U"-flagged data for chemicals that were not detected in at least one sample in a particular medium were not used in the risk assessment. In cases where the chemical was detected in at least one other sample, "U" qualified data were incorporated into the calculation of the exposure point concentration through use of one-half the SQL as a surrogate value for nondetect results.

6.1.3 Summary of Data Evaluation

The grab ground-water samples from the Building 3 AOC were collected and analyzed in accordance with EPA's Functional Guidelines (EPA, 1988a,b; 1991) and EPA Region II data quality evaluation protocols (EPA, 1992b,c). The analytical results which were considered acceptable as presented (no flags) and the estimated results ("J" flags) were considered acceptable for use in the baseline risk assessment. The "U"-flagged data were also considered acceptable for use in the baseline risk assessment if there was at least one positive detection of the chemical in a medium. The rejected analytical results ("R" flags) were not used in the baseline risk assessment. The analytical data for the Building 3 AOC are presented in Appendix C (Table C.1) and the sampling locations are identified on Figure 2.1.

6.2 HUMAN HEALTH EVALUATION

The purpose of the human health evaluation was to establish whether contaminants present at the Building 3 AOC could pose a potential health risk to individuals under current and foreseeable future land uses in the absence of remediation. The human health evaluation consisted of the following components: identification of chemicals of potential concern, exposure assessment, toxicity assessment, risk characterization, and uncertainty evaluation.

6.2.1 Identification of Chemicals of Potential Concern

The results of the data collection and data evaluation efforts are presented in this section. Based on the results of the data evaluation, a subset of chemicals present at the site were selected as chemicals of potential concern (COPCs) for the human health and ecological risk assessments. The COPCs at this AOC were identified in accordance with the general procedures for COPC selection presented in Volume 1 of the RI Report. The COPC selection is summarized in Table 6.1.

Chemicals were not selected as COPCs if they were essential human nutrients (iron, magnesium, calcium, potassium, and sodium), or if the maximum sample concentration was less than the background screening concentrations (metals only). Chemicals detected in less than 5 percent of the total samples were also excluded from the risk assessment unless they were class A carcinogens. Total recoverable petroleum hydrocarbons (TRPH) were not selected as a COPC because of a lack of toxicity data for this mixture of chemicals and the uncertainties associated with the analytical method used (see Volume 1 for additional discussion). However, any of the individual constituents of TRPH detected at the site (e.g., benzene, toluene, xylenes, PAHs, etc.) were selected as COPCs and included in the quantitative risk evaluation.

Grab Ground Water

For the purpose of evaluating exposure to ground water, it is assumed that future industrial workers may be exposed to grab ground water at the site should ground water be used as a potable water supply in the future. The analytical data from 2 grab ground-water samples collected during the RI at the Building 3 AOC comprised the grab ground-water data set.

Table 6.1 summarizes the chemicals detected in the grab ground-water samples and the COPCs selected. A total of 11 COPCs were detected in ground water including 4 volatiles and 7 semi-volatiles. Grab ground-water sampling locations are presented on Figure 2.1.

Soil

For the purpose of evaluating exposure to soils, it is assumed that future utility and construction workers may be exposed to residual contamination in the subsurface soils if excavation were to occur at the site.

However, due to poor recovery from the split spoon because of a high percentage of gravel and cobbles in the soil boring, no soil sample could be collected for chemical analysis at this site. Therefore, no COPCs were identified for the soils because no analytical data are available.

It is important to note that soils up to 10 feet bgs were excavated as part of the drywell removal action in 1987. Therefore, no residual soil contamination is expected at this site. However, for the reasons described above, no confirmatory samples could be collected to either prove or disprove this point. This data gap will be addressed in the Uncertainties Evaluation of this risk assessment (Section 6.2.5).

Summary

The COPCs selected for grab ground water at the Building 3 AOC are as follows: chloroform, 1,1,1-trichloroethane, tetrachloroethene, trichloroethene, anthracene, 2,4-dichlorophenol, fluorene, N-nitrosodiphenylamine, phenanthrene, pyrene, and simazine.

6.2.2 Exposure Assessment

Under existing and proposed future land use scenarios for the Building 3 AOC, receptors may be at risk through potential exposure to residual contamination in soils and ground water. The following sections describe present and potential future land uses at the Building 3 AOC, medium-specific exposure pathways, exposure point concentrations, and pathway-specific intakes for the COPCs. The exposure parameters and intake equations used for estimating risks through exposure pathways identified for this AOC are presented in Volume 1. A subset of these exposure parameters was used for the Building 3 AOC and are presented in Appendix D.

6.2.2.1 Characterization of Exposure Setting

The physical characteristics of the site which may impact potential exposure include climate, vegetation, soil type, and hydrology. The hydrology, geology, stratigraphy, and hydrogeology of this AOC are discussed in Section 3.0 of this volume. The climate and vegetation are discussed in Volume 1.

6.2.2.2 Potentially Exposed Populations

The human populations residing at and/or working in the vicinity of the AOC are discussed in the following sections. Demographic information for Griffiss AFB and surrounding areas can be found in Volume 1.

AOC and Vicinity

Building 3, a former industrial shop, is located in the central part of Griffiss AFB. The drywell was reportedly used for the disposal of cleaning solvents, methanol, acetone, and trichloroethylene, etching acid solutions, salt containing wastes, and paint thinner. The drywell was formerly located on the east side of the former industrial shop and consisted of an open-bottomed earthen cylinder of 5-gallon capacity.

Following base realignment, this AOC is assumed to be part of a research and development complex. Accordingly, the future land use for this AOC will be commercial/administrative. Personnel are expected to continue working in this building and in nearby facilities. However, these people are not expected to be exposed to potential contaminants previously placed in the drywell adjacent to Building 3 because the drywell and surrounding soils were removed during remedial activities performed in 1987. If, however, contaminated soils were not completely removed during previous remedial activities at this AOC, construction workers may be exposed to constituents present in subsurface soils if the site were to undergo development in the future. Consequently, construction and utility workers, therefore, are considered potentially affected human receptors who could be potentially exposed to residual soil contamination through incidental ingestion, dermal absorption, inhalation of fugitive dusts, and inhalation of volatile emissions.

Current Land Use

The current land use designation for the Building 3 Drywell is industrial. People are currently employed in Building 3 and neighboring facilities.

Future Land Use

According to the Griffiss Redevelopment Planning Council (GRPC) redevelopment scenario, the area that encompasses this AOC is recommended for commercial/administrative use (LAW, 1994b). Under this scenario, the potentially exposed future populations are utility and construction workers working at the site. The risks to utility and construction workers arising from potential exposure to contaminants detected in subsurface soils will not be quantitatively addressed in this risk assessment because no soil samples could be collected at the site due to excess cobbles.

In addition, a hypothetical ground-water exposure scenario will be evaluated which assumes that future industrial workers may use the ground water at this site as a potable water supply. Future industrial workers could be exposed to contaminants in ground water via ingestion, dermal contact and inhalation of volatiles.

6.2.2.3 Identification of Exposure Pathways

Exposure pathways for this AOC are identified in the conceptual site model (CSM) presented in Figure 6.1. Exposure to residual contamination at this AOC may occur through several pathways. The media evaluated for potential impact on human health are the subsurface soil and ground water. In the following sections, the potential exposure pathways for the Building 3 Drywell AOC are identified.

Sources and Receiving Media

The most probable sources of contamination associated with Building 3 derive from residual soils remaining at the site after excavation of the drywell. The drywell and surrounding soils were removed during the remedial actions performed in 1987. Contaminants released into the drywell may have infiltrated surrounding soils and percolated through deep soils to ground water. Should subsurface soils be exposed at this site, residual soil contaminants remaining at the site after excavation of the drywell may be released to the air as fugitive dusts or volatile emissions.

Fate and Transport in Release Media

The purpose of the fate and transport evaluation is to identify the possible extent and magnitude of environmental contamination and to identify environmental media potentially affected. The fate and transport of analytes detected in site media are discussed in Section 5.0. The primary environmental transport pathways for chemicals detected at the site is through infiltration and percolation to deep soils and ground-water movement. Ground water in the area of Building 3 flows toward Threemile Creek located approximately ½ mile south of the site. However, the impact of constituents on surface waters and sediments would be diminished due to dilution and degradative processes prior to discharge to surface waters. Contaminants released to the atmosphere as fugitive dust and volatile emissions may be transported through air over considerable distances. Fugitive dust and volatile emissions are likely to occur during intrusive activities at or near the location of the former drywell.

6.2.2.4 Exposure Points and Exposure Routes

Because contaminants historically released in the Building 3 AOC would likely impact subsurface soil and percolate to deep soil and ground water, persons who come into contact with these media are likely to be affected by site contaminants. Accordingly, occupational receptors, (including industrial workers), are the most probable target populations because their work may involve future use of site ground water as process water. This hypothetical use of ground water as industrial process water or as a source of potable water for industrial workers was considered for this AOC in the event that future industrial use of this site will include use of ground water beneath the site as a water supply. Industrial workers could potentially be exposed to chemicals in ground water through ingestion, dermal contact, and inhalation of volatiles if ground water is used for process water.

6.2.2.5 Quantification of Exposure

Potential exposure is quantified by estimating exposure point concentrations and calculating pathway-specific intakes. Intake variables and exposure point concentrations are selected so that the combination of all variables results in an estimate of reasonable maximum exposure (RME) for each pathway. In the event that the RME exposure results in a hazard index greater than 1 or an excess cancer risk value

greater than 1 x 10^{-4}, the risk is then quantified based on central tendency values as discussed in Volume 1, Section 5.1.7 of the RI Report.

Estimation of Exposure Point Concentrations

The maximum detected concentration of COPCs were used as the exposure point concentration for grab ground water because the data set was limited to less than 10 samples (i.e., only 2 samples in the ground-water data set). The maximum ground-water concentrations were used directly as the exposure point concentration for the ingestion and dermal contact exposure pathways. For the inhalation of volatiles from industrial use of ground water (e.g., washing vehicles), ambient air concentrations were estimated using the maximum ground-water concentration and a conversion factor of 6.29 x 10^{-3}L/m^3. The conversion factor is based on the Simple Box Model and the conservative assumption that 100 percent of the volatiles in ground water will be released to the air (see Figure 5-10 from Volume 1 which is duplicated as Table D.4 in Appendix D). A more detailed discussion on the methods used in calculation of exposure point concentrations is provided in Volume 1 of the RI Report.

Pathway-Specific Intake Estimates

The values for each exposure parameter and the assumptions used in their derivation (e.g., frequency and duration of exposure), as well as intake values for each exposure pathway evaluated, are presented in Volume 1 as well as in Appendix D of this document. The pathway-specific intakes used are incorporated into Tables D.1 through D.3 which are presented in Appendix D.

Dermal Contact Exposure Estimates

Dermal exposures to analytes in water were adjusted to absorbed dose estimates using chemical-specific permeability constants (Kp values) and absorption coefficients, respectively. The permeability constants used to calculate absorbed dose(s) through dermal contact with contaminated ground water were obtained either from the EPA's guidance document Dermal Exposure Assessment: Principles and Applications or calculated using equations provided in this document (EPA, 1992d). The permeability constants, as well as the equations used in the derivation of those that were not available in the guidance document, are

provided in Table 5.3a of Volume 1. The permeability coefficient (Kp values) for compounds detected in grab ground water at the Building 3 AOC are also provided in Table D.3 of Appendix D.

6.2.2.6 Summary of Exposure Assessment

Three potential exposure scenarios were evaluated in this risk assessment for the Building 3 AOC. Two potential exposure scenarios are evaluated qualitatively in this risk assessment. These scenarios, which cannot be quantified due to lack of analytical data, include:

1. Occupational Worker - Utility Worker (Future)

   - Incidental ingestion of soils
   - Dermal contact with soils
   - Inhalation of fugitive dust

2. Occupational Worker - Construction Worker (Future)

   - Incidental ingestion of soils
   - Dermal contact with soils
   - Inhalation of fugitive dust

3. Occupational Worker - Industrial Worker (Future)

   - Ingestion of ground water
   - Dermal contact with ground water
   - Inhalation of volatiles from ground water

The exposure pathways for each scenario were developed under the assumption that land use for this AOC will remain commercial/administrative following base realignment. The future industrial worker is included in the risk assessment to evaluate hypothetical future exposures to ground water. It is assumed that this individual works inside an industrial facility or shop and thus exposure to soil would be minimal, as compared to the other occupational receptors.

6.2.3 Toxicity Assessment

The toxicity assessment provides information regarding the potential for a specific chemical to cause adverse effects in humans and characterizes the relationship between the dose of a chemical and the incidence of adverse health effects in the exposed population. The systemic and carcinogenic effects of chemicals are evaluated based on reference doses (RfDs) and cancer slope factors. The following sections describe toxicity values used to evaluate potential risks from exposure to chemicals detected at the site.

6.2.3.1 Toxicity Values for Noncarcinogenic and Carcinogenic Effects

The EPA has developed toxicity values that reflect the magnitude of the adverse noncarcinogenic and carcinogenic effects from exposure to specific chemicals. The toxicity values for COPCs detected in site soil and ground water were obtained from the Integrated Risk Information System (IRIS, 1996). If the toxicity values were not provided in IRIS, secondary sources included the Health Effects Assessment Summary Tables for 1995 (HEAST, 1995) and the National Center for Environmental Assessment (NCEA, 1996). Available toxicity values for COPCs detected at the site are incorporated into Tables D.1 through D.3 of Appendix D. Brief toxicological profiles for each COPC are provided in Volume 1.

Toxicity values were not available for phenanthrene. The potential risks from exposure to this chemical is evaluated qualitatively in Section 6.2.4.3.

Noncarcinogenic Effects

Chronic RfDs were used for the evaluation of noncarcinogenic effects because potential exposure is likely to occur over an extended period of time.

Carcinogenic Effects

Several constituents detected in grab ground water at the Building 3 AOC are considered human carcinogens or potential suspected human carcinogens. Cancer slope factors were available for most of the carcinogenic COPCs detected.

6.2.3.2 Toxicity Assessment of Dermal Exposures

Currently, no RfDs or cancer slope factors are available for the dermal route of exposure. The oral RfDs and cancer slope factors may be adjusted by chemical-specific gastrointestinal absorption values, resulting in absorbed-dose RfDs or cancer slope factors (EPA, 1989). Based on the recommendations of EPA Region II, the oral toxicity values (RfDs and cancer slope factors) were not adjusted because of lack of adequate data to determine gastrointestinal absorption (EPA, 1995). Thus, the oral RfDs and cancer slope factors were used for quantitation of dermal exposure for all analytes (i.e., assuming 100 percent absorption from the gastrointestinal tract identified as COPCs for this site).

6.2.4 Risk Characterization

The risk characterization integrates the results of exposure and toxicity assessments into quantitative and qualitative expressions of risk associated with exposure to COPCs. Risks that a particular type of receptor (e.g., industrial workers) might experience are determined by combining the relevant pathways with appropriate exposure factors into a risk scenario. Quantitative estimates of carcinogenic risk and noncarcinogenic benchmark values have been calculated for the Building 3 AOC. Risk estimates were calculated using the maximum detected concentrations of COPCs identified in grab ground water. Pathway risk estimates were summed by medium (e.g., ground-water exposures equal the sum of ingestion, inhalation of volatiles, and dermal contact) to obtain the total risk from exposure by a given receptor. The chronic hazard index estimates and carcinogenic risks for the potentially exposed populations (i.e., industrial workers) are presented in Appendix D, Tables D.1 through D.3.

6.2.4.1 Noncarcinogenic Health Effects Characterization

The benchmark level for evaluating noncarcinogenic effects, according to the EPA, is a hazard index (HI) of 1.0. A hazard index of 1.0 or less indicates that exposure to potential contaminants is not expected to result in adverse noncarcinogenic health effects. The potential noncarcinogenic health effects arising from exposure to grab ground water at the Building 3 AOC are summarized below.

Industrial Workers (Grab Ground Water)

The cumulative hazard index for industrial workers exposed to grab ground water was 0.006 (Table 6.2). This cumulative hazard index is below the benchmark value of 1.0. The calculated hazard indices for ingestion of ground water, dermal exposure to ground water, and inhalation of volatiles released from ground water were 0.005, 0.0005, and 0.000002, respectively (Tables D.1 through D.3).

6.2.4.2 Carcinogenic Risk

The National Contingency Plan (NCP) defines the target risk range for exposure to carcinogenic compounds as an excess upper bound lifetime risk within the range 10^{-4} to 10^{-6}. This translates to one excess cancer in a population of ten thousand to one excess cancer in a population of one million. Potential risks from exposure to carcinogens at the Building 3 AOC were evaluated for industrial workers. The potential carcinogenic risks from exposure to grab ground water at the Building 3 AOC are summarized below.

It is important to note that the cancer risk estimates quantified in the risk assessment are upper bound estimates. That is, a cancer risk of 2×10^{-4} means that if 1,000,000 people were exposed to site-related contaminants, most likely fewer than 200 people might be expected to develop cancer as a specific consequence of the exposure.

Industrial Workers (Grab Ground Water)

The cumulative carcinogenic risk from exposure to contaminants in grab ground water by industrial workers is 2×10^{-7} (Table 6.2). Therefore, the carcinogenic risk from exposure to contaminants in ground water by industrial workers is within the EPA's target risk range. The pathway-specific risks from ingestion, inhalation of volatiles released from ground water, and dermal exposure to ground water were 2×10^{-7}, 1×10^{-8} and 2×10^{-8}, respectively (Tables D.1 through D.3).

6.2.4.3 Qualitative Evaluation of Risk

Toxicity values were not available for phenanthrene and, it was not possible therefore, to perform a quantitative assessment of the potential risk arising from exposure to this compound detected at the Building 3 AOC. Thus, this compound is discussed qualitatively in this section on the basis of the results of analysis for all of the grab ground-water samples collected at the Building 3 AOC.

Phenanthrene was detected in 1 of 2 grab ground-water samples at a concentration of 0.00012 mg/L. This concentration is below the most stringent potential ARAR for ground water of 0.005 mg/L (NYS Ground-Water Standards). Phenanthrene is reported to cause lung tumors in rats, but there is no evidence that this compound may induce cancer in humans (IRIS, 1996).

Based on the results of the ground-water investigations at the Building 3 AOC, possible exposure to detected concentrations of phenanthrene is unlikely to pose a health hazard to industrial receptors. This chemical is below the NYS Ground-Water Standards of 0.005 mg/L which is a default value for Principal Organic Compounds (POCs).

Two exposure scenarios could only be evaluated qualitatively due to the lack of analytical data for soils. Future utility workers and construction workers could be exposed to residual contamination in subsurface soils, if any, during excavation activities at the site. The drywell and upper 10 feet of soils at the drywell location were removed in 1987. The water table was encountered between 8 and 8.5 feet bgs in the soil borings at this site. Thus, it is unlikely that any residual contamination remains in the soils above the water table. Therefore, the potential risks to utility and construction workers from exposure to soils at this site are expected to be minimal because the contaminated soils were removed.

6.2.5 Uncertainties Evaluation

Uncertainty exists in many areas of the human health assessment. However, use of conservative variables in intake calculations and conservative assumptions throughout the risk assessment results in an assessment that is protective of human health. A summary of uncertainties in the risk assessment process is included in Table 6.3. A detailed discussion of the uncertainties inherent in the risk assessment process

is provided in Volume 1. The site-specific uncertainties for the baseline risk assessment for the Building 3 AOC are identified below.

Uncertainties Associated with Exposure Assessment

- In quantifying exposure, it was assumed that chemicals are uniformly distributed over a defined area. At this AOC, chemical samples were collected from the suspected source(s) of contamination. Areas thought to be free of contamination were not investigated. Data collected in this manner, rather than through random sampling, result in a biased data set which may overestimate risk.

- Exposure point concentrations in air were derived using an EPA-approved model: the Simple Box Model. As discussed in Section 5.1 of Volume 1 of the RI Report, the inherent assumptions and input parameters used in these models are likely to overestimate exposure point concentrations and, ultimately, the calculated risk through the inhalation pathway.

- It was assumed that ground water would be used for industrial purposes in the future. This is very unlikely since the site has ready access to the existing water supplies at the base and in the city of Rome which are more than adequate for industrial purposes.

- Subsurface soil samples could not be collected from the two soil borings due to excessive cobblestones at the AOC. This is a data gap which resulted in the soil pathway not being quantified in this risk assessment.

- The ground water collected to characterize the Building 3 Drywell AOC consisted of two grab samples collected with a HydroPunch™. Analytical samples collected in this manner are typically very turbid. This results in reported analytical concentrations that are most likely elevated, particularly for metals. As discussed in Volume 1, the metals results for grab ground-water samples are not included in the baseline risk assessment because they are not representative of metals in the ground water.

Uncertainties Associated with Toxicity Assessment

- Inhalation RfDs and cancer slope factors were unavailable for several chemicals detected in site ground water. The risks of potential exposure to compounds of unknown toxicity could not be quantified. This may result in an underestimation of the overall risk.

- Toxicity values were not available for one COPC at this site: phenanthrene. This may result in an underestimation of the overall risk.

While some of the uncertainties identified above may underestimate the potential risks from exposure to ground water at the Building 3, overall the use of conservative assumptions throughout the risk assessment results in an assessment that is protective of human health.

6.2.6 Summary of the Baseline Risk Assessment

The analytical data used in the risk assessment were acquired and evaluated according to approved EPA procedures. The data were deemed suitable for the needs of the risk assessment. The risk assessment was performed on grab ground-water data collected from 2 soil borings advanced at the Building 3 AOC. According to the Griffiss Redevelopment Planning Council, the current industrial use of land at this AOC is expected to remain unchanged following base realignment.

The exposure scenarios were developed based on assumed current and future commercial/administrative land use at the Building 3 AOC. Occupational receptors (future industrial workers) were identified as populations potentially exposed to ground water. Potential exposure pathways identified for ground water included ingestion, dermal contact, and inhalation of volatiles released from ground water. Future utility workers and construction workers could be exposed to residual contaminants in soil, if any, via incidental ingestion, dermal contact, and inhalation of fugitive dust.

The cumulative carcinogenic risk associated with the industrial worker exposure scenario was 2×10^{-7} which is below EPA's target risk range. Carcinogenic risks were not calculated for soil because no samples could be collected at the site due to excessive cobbles in the soil.

The cumulative noncarcinogenic hazard indices for all ground-water exposure pathways for the industrial workers were below the benchmark level of 1.0. The ground-water ingestion pathway was the greatest contributor to the cumulative hazard index of 0.006 for grab ground water with a hazard index of 0.005. A hazard index could not be calculated for soils at the site because excessive cobbles at the site prevented sampling in the area.

The results of the human health baseline risk assessment indicate that chemicals detected in grab ground water should not present a risk to future industrial workers. Risks to future utility and construction workers from exposure to soils could not be quantified but are expected to be minimal because a removal

action was completed in 1987. Moreover, the quantitative evaluation of risk is subject to several conservative assumptions and should not be considered as an absolute quantitative measure of risk.

6.3 ENVIRONMENTAL EVALUATION

This section evaluates the potential for adverse impacts to ecological receptors at the base due to contamination at the Building 3 Drywell site. The methodology for this evaluation is presented in Volume 1 of the RI.

6.3.1 Identification of Chemicals of Concern

No soil samples were obtained and analyzed as part of the RI. The drywell and surrounding soils were excavated in 1987. Therefore, no surface soil contamination would be expected to remain at this site.

Neither surface-water bodies nor sediments are associated with this AOC and, therefore, COPCs were not identified and no environmental assessment was conducted for these media at the Building 3 AOC.

6.3.2 Exposure Assessment

Building 3 is located within a highly developed portion of the base, with little habitat available for ecological receptors. Contamination that may be associated with the site is expected to be well below ground surface, underneath the building. In addition, future land use is expected to be commercial/ administrative. Therefore, potential exposures related to this AOC are not considered to exist for ecological receptors.

There are no plant or animal species at the base or in the immediate vicinity of the base that are considered threatened or endangered by the U.S. Department of the Interior (50 CFR 17). Though some plant species present at the base are protected in the state of New York, these species have not been found in this portion of the base. Therefore, threatened and/or endangered species are not considered to be a concern at this AOC.

6.3.3 Conclusions, Limitations, and Uncertainties

Risks to ecological receptors due to contamination at this AOC have not been quantitatively assessed because no complete exposure pathways exist. Therefore, risks are considered to be virtually nonexistent. If it were discovered that surface soil surrounding the Building 3 Drywell was contaminated, this conclusion would need to be reevaluated.

7.0 CONCLUSIONS AND RECOMMENDATIONS

The purpose of this section of the RI report is to briefly summarize the site background, scope of the field investigation, site characteristics, nature and extent of contamination, and the baseline risk assessment and to provide recommendations as to whether no further action, removal action(s), feasibility study, or additional field investigation is needed at the Building 3 Drywell AOC.

7.1 SUMMARY AND CONCLUSIONS

Site Background

- Building 3 is located in the central portion of the base. The drywell at this building was located on the east side of the building adjacent to a liquid nitrogen aboveground storage tank. The area in which the drywell was located is presently covered with gravel.

- The Building 3 Drywell was used from the 1960s through 1984 to dispose of cleaning solvents and etching acids from the industrial shop. In June 1987, the drywell and contaminated soils were removed. The analytical results for EP leachate samples from the confirmatory sampling conducted in August 1987 did not indicate elevated concentrations of metals. Volatile and semi-volatile organic compounds were not analyzed for in the confirmatory soil samples.

Scope of Field Investigations

- Two soil borings were drilled to ground water near the former drywell location.

- One grab ground-water sample was collected from each boring using the HydroPunch™ sampler.

- The subsurface soil sample, planned for collection from 6 to 8 feet bgs in B3SB-1, could not be collected because of poor recovery from the split spoon sampler due to gravel and cobbles.

Site Characteristics

- Building 3 is located along a surface-water divide; run-off from the west portion of the site drains to Threemile Creek and run-off from the eastern portion of the site, including the former drywell location, drains to Sixmile Creek.

- Subsurface soils encountered at Building 3 were described as silty sands from 2 to 4 feet bgs and sandy gravels to gravelly sands from 4 to 12 feet bgs.

- The saturated zone was encountered at depths ranging from 8 to 8.5 feet bgs in the soil borings at this site. Ground water flows to the south/southwest towards Threemile Creek.

Nature and Extent of Contamination

- Volatile organic compounds detected in the grab ground-water samples were 1,1,1-trichloroethane, chloroform, tetrachloroethene, and trichloroethene. The detected concentrations ranged from 0.24 μg/L for tetrachloroethene to 2.0 μg/L for trichloroethene. None of the detected concentrations exceeded potential ARARs.

- Semi-volatile organic compounds detected included 2,4-dichlorophenol, anthracene, fluorene, n-nitrosodiphenylamine, phenanthrene, pyrene, and simazine. All of the detected concentrations were estimated concentrations below the PQL. None of the detected concentrations exceeded potential ARARs.

- Eleven metal analytes were detected at concentrations which exceeded potential ARARs. Eighteen metals were detected at levels exceeding background screening levels. However, it must be noted that the grab ground-water samples were collected using the HydroPunch™ sampler and were turbid. Therefore, the metals concentrations for these samples are biased high due to turbidity rather than site-related contamination.

- Petroleum hydrocarbons (as TRPH) were detected in both grab ground-water samples at concentrations ranging from 1.1 mg/L to 10.1 mg/L, exceeding the NYSDEC standard of 0.1 mg/L.

Baseline Risk Assessment

- The baseline risk assessment assumed future commercial/administrative land use for this site which is the use projected by the GRPC re-use plan. Potential exposure pathways identified include utility and construction workers exposed to

surface and subsurface soils via ingestion, inhalation of fugitive dusts, and dermal contact.

- Exposures to chemicals of potential concern in ground water were evaluated for a future industrial worker using the ground water as a potable water supply. Exposures via ingestion, dermal contact and inhalation of volatile emissions were evaluated.

- The cumulative hazard index for ground-water exposures was 0.006 which is below the benchmark level of 1.0. The estimated lifetime excess cancer risk for ground-water exposures was 2×10^{-7} which is below the EPA's target risk range.

- Potential risks from exposure to soils at this site could not be quantified because no soil sample could be collected for chemical analysis. However, it should be noted that the contaminated soils were excavated when the drywell was removed in 1987. Therefore, risks from exposure to soils are considered to be unlikely.

- Building 3 is located in the developed portion of the base where there is little habitat available for ecological receptors. Thus, the potential exposures for ecological receptors are considered minimal.

7.2 RECOMMENDATIONS

- No further action is recommended at this site based on the results of the environmental sampling and the risk assessment.

- The absence of analytical results for a soil sample from this site is not considered to be a significant data gap because the contaminated soils were excavated when the drywell was removed in 1987. Confirmatory soil samples collected at that time did not indicate elevated concentrations of metals.

- In addition, no organic chemicals were detected in the ground water at concentrations exceeding potential ARARs; therefore, the soils do not appear to be a continuing source of ground-water contamination.

7.3 SUPPLEMENTAL INVESTIGATIONS

Based on the comments received from the regulators on the Draft RI reports, the USAF will perform supplemental investigations at the Building 3 Drywell AOC to address the data gaps identified above. The supplemental investigations to be performed at this AOC include the installation of a ground-water monitoring well adjacent to the former drywell location. Soil samples will be collected at 10-foot intervals to bedrock for field screening. One ground-water sample will be collected from the well and

analyzed for volatiles and semi-volatiles. The supplemental investigations, which are summarized in Table 7.1 and Figure 7.1, describe in more detail in the work plan which was submitted under separate cover (E & E, 1996).

8.0 REFERENCES

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TAB

Tables

Table 1.1: Maximum Concentration of Inorganics in Residual Soil After Drywell Excavation at Building 3 on August 14, 1987 Building 3 Drywell Remedial Investigation Griffiss Air Force Base, Rome, New York

PARAMETER	EXTRACTION PROCEDURE TOXICITY CHARACTERISTIC LEACHATE CONCENTRATION (mg/L)
Arsenic	<0.001
Barium	<0.3
Cadmium	<0.005
Chromium	<0.05
Lead	<0.1
Mercury	<0.0004
Selenium	<0.001
Silver	<0.05

NOTES: mg/L = milligrams per liter
< = less than

Reference: UNC, 1988.

PREPARED/DATE: DLG 6/29/95
CHECKED/DATE: LAS 7/12/95

Table 2.1: Summary of Samples Collected for Chemical Analysis[a]
Building 3 Drywell Remedial Investigation
Griffiss AFB, Rome, New York

Matrix	Samples Collected	Date Sampled	Laboratory[b]	Volatiles	Semi-Volatiles	TAL Inorganics	Hexavalent Chromium	Cyanide	TRPH
Grab Ground Water	B3-HP-1	04/27/94	R	1	1	1	1	0	1
	B3-HP-1	11/15/94	L	0	0	0	0	1	0
	B3-HP-2	04/27/94	R	1	1	1	1	0	1
	B3-HP-2	11/15/94	L	0	0	0	0	1	0
	B3-HP-1MS	04/27/94	R	1	1	1	1	0	1
	B3-HP-1MD	04/27/94	R	1	1	1	1	0	1
	B3-HP-2-01	04/27/94	R	1	1	1	1	0	1
	B3-HP-2-01	11/15/94	L	0	0	0	0	1	0
	TB-1	04/27/94	R	1	0	0	0	0	0

(a) Analytical methods for each matrix are presented in Table 2.2.
(b) Laboratories: R - RECRA Environmental, Inc.; L - Lancaster Laboratories, Inc.

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Table 2.2: Analytical Parameters and Methods
Building 3 Drywell Remedial Investigation
Griffiss Air Force Base, Rome, New York

PARAMETER	METHODS	
	SOIL	WATER
TCL Organics:		
Volatiles	-	EPA 524.2
Semi-Volatiles	-	EPA 525.1
TAL Inorganics:		
Metals by ICP	-	SW3005/6010
Metals by GFAA		
Antimony	-	SW3005/7041
Arsenic	-	SW3020/7060
Lead	-	SW3020/7421
Molybdenum	-	SW3020/7480
Selenium	-	SW3020/7740
Thallium	-	SW3020/7841
Mercury by CVAA	-	SW7470
Hexavalent Chromium:	-	SW7195
Total Cyanide	-	SW9012
TRPH:	-	EPA 418.1

CVAA = Cold Vapor Atomic Absorption
GFAA = Graphite Furnace Atomic Absorption
ICP = Inductively Coupled Argon Plasma
TAL = Target Analyte List
TCL = Target Compound List
TRPH = Total Recoverable Petroleum Hydrocarbons

PREPARED/DATE: DLG 6/29/95
CHECKED/DATE: LAS 7/12/95

Table 3.1: Summary of Soil Properties
Building 3 Drywell Remedial Investigation
Griffiss Air Force Base, Rome, New York

Boring No.	Depth Interval (feet bgs)	Field Description*	Geotechnical (USCS) Classification and Description
B3SB–1A	4 to 6	Fine to coarse sandy GRAVEL, and silty fine sand	POORLY GRADED GRAVEL with SILT and SAND (GP–GM)
B3SB–2	2 to 4	Silty, fine to coarse SAND with coarse gravel	POORLY GRADED GRAVEL with SILT and SAND (GP–GM)
B3SB–2	8 to 10	Fine to coarse SAND with gravle and trace to no silt	WELL GRADED GRAVEL with SAND (GW

NOTE:

* – Field descriptions included on this table are for the soil sample intervals submited for geotechnical analysis.

PREPARED/DATE: JLB 7/5/95
CHECKED/DATE: GPM 7/20/95

Table 4.1: Detection of Analytes in Grab Ground-Water Samples
Building 3 Drywell Remedial Investigation
Griffiss Air Force Base, Rome, New York

Sample I.D.	B3-HP-1	B3-HP-1 *	B3-HP-2	B3-HP-01 (1)	B3-HP-2 *	B3-HP- (2)
Sample Date	04-27-94	11-15-94	04-27-94	04-27-94	11-15-94	11-15-94
METHOD: EPA 524.2						
VOLATILES: (µg/L)						
1,1,1-Trichloroethane	0.82	--	0.82	0.77	--	--
Chloroform	1.1	--	1.1	1.0	--	--
Tetrachloroethene	0.24 J	--	0.26 J	0.25 J	--	--
Trichloroethene	2.0	--	2.0	2.0	--	--
METHOD: EPA 525.1						
SEMI-VOLATILES: (µg/L)						
2,4-Dichlorophenol	1.1 U	--	0.016 J	1.1 U	--	--
Anthracene	0.011 J	--	2.2 U	2.2 U	--	--
Fluorene	0.024 J	--	0.0089 J	5.6 U	--	--
N-nitrosodiphenylamine	0.070 J	--	0.030 J	4.4 U	--	--
Phenanthrene	0.12 J	--	0.036 J	0.046 J	--	--
Pyrene	0.047 J	--	0.0089 J	5.6 U	--	--
Simazine	5.6 U	--	0.046 J	5.6 U	--	--
METALS: (mg/L)						
Aluminum (3005/6010)	3.3 J	--	140 J	14.7 J	--	--
Arsenic (3020/7060)	0.0050	--	0.027	0.0080	--	-
Barium (3005/6010)	0.073	--	1.2	0.66	--	--
Beryllium (3005/6010)	0.0030 U	--	0.0050	0.0030 U	--	--
Calcium (3005/6010)	79.9	--	306	170	--	--
Chromium (3005/6010)	0.010 U	--	0.27	0.028	--	--
Cobalt (3005/6010)	0.010 U	--	0.21	0.080	--	--
Copper (3005/6010)	0.039	--	1.1	0.19	--	--
Hexavalent Chromium (7195)	0.014	--	0.010 U	0.011	--	--
Iron (3005/6010)	11.7	--	613	44.0	--	--
Lead (3020/7421)	0.014	--	0.26	0.086	--	--
Magnesium (3005/6010)	7.8	--	82.6	15.7	--	--
Manganese (3005/6010)	2.8	--	58.0	30.5	--	--
Mercury (7470)	0.00040 U	--	0.00075	0.00050	-	-
Molybdenum (3020/7480)	0.050 J	--	0.080 J	0.050 U	--	--
Nickel (3005/6010)	0.030 U	--	0.66	0 31	--	--
Potassium (3005/6010)	2.6	--	17.0	2.8	--	--
Sodium (3005/6010)	17.1	--	17.7	16.8	--	--
Strontium (3005/6010)	0.23	-	0.80	0.43	--	--
Vanadium (3005/6010)	0.010 U	--	0.31	0.010 U	--	
Zinc (3005/6010)	0.060	--	1.6	0.25	--	--
WET CHEMISTRY : (mg/L)						
Total Recoverable Petroleum Hydrocarbons (418.1)	10.1 J	--	1.1 J	0.93 J	--	--

* Samples collected on November 15, 1994 were analyzed for totalcyanides only.
(1) = Duplicate of B3-HP-2 (04-27-94)
(2) = Duplicate of B3-HP-2 (11-15-94)

µg/L = micrograms per liter
mg/L = milligrams per liter
J = Estimated concentration
U = Analyte not detected
-- = Analyte not analyzed

PREPARED/DATE: DLG 6/29/95
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Table 4.2: Frequency of Detection and Exceedance of Potential ARARs or TBCs for Grab Ground-Water Samples
Building 3 Drywell Remedial Investigation
Griffiss Air Force Base, New York

Parameter	Frequency of Detection	Range of Detected Concentrations	Comparison to Potential ARARs and TBCs: Frequency of Detection Above Most Stringent	Comparison to Potential ARARs and TBCs: Most Stringent Criterion	Comparison to Background: Frequency of Detection Above Background	Comparison to Background: Background Screening Concentration
Volatiles (µg/L)						
1,1,1-Trichloroethane	2/2	0.82 – 0.82	0	5.0	--	N
Chloroform	2/2	1.1 – 1.1	0	7.0	--	N
Tetrachloroethylene	2/2	0.24 J – 0.26 J	0	0.7	--	NA
Trichloroethylene	2/2	2.0 – 2.0	0	3.0	--	NA
Semi-Volatiles (µg/L)						
2,4-Dichlorophenol	1/2	0.016 J	0	1.0	--	N
Anthracene	1/2	0.011 J	0	50.0	--	NA
Fluorene	2/2	0.0089 J – 0.024 J	0	50.0	--	NA
n-Nitrosodiphenylamine	2/2	0.03 J – 0.07 J	0	50.0	--	N
Phenanthrene	2/2	0.046 JB – 0.12 J	0	50.0	--	N
Pyrene	2/2	0.0089 J – 0.047 J	0	50.0	--	N
Simazine	1/2	0.046 J	0	4.0	--	NA
Metals (mg/L)						
Aluminum	2/2	3.3 J – 140 J	2	0.05	2	0.
Arsenic	2/2	0.005 – 0.027	1	0.025	1	0.0
Barium	2/2	0.073 – 1.2	1	1.0	2	0.057
Beryllium	1/2	0.005	1	0.003	0	0.008 U
Calcium	2/2	79.9 – 306	--	NA	2	7
Chromium, hexavalent	2/2	0.011 – 0.014	0	0.05	0	0.0
Chromium, total	1/2	0.27	1	0.05	1	0.0
Cobalt	1/2	0.21	--	NA	1	0.02 U
Copper	2/2	0.039 – 1.1	1	0.1	2	0.0
Iron	2/2	11.7 – 613	2	0.3	2	0.
Lead	2/2	0.014 – 0.26	1	0.015	2	0.0
Magnesium	2/2	7.8 – 82.6	--	NA	1	14
Manganese	2/2	2.8 – 58	2	0.05	2	0.14
Mercury	1/2	0.00075	0	0.002	1	0.00
Molybdenum	2/2	0.05 J – 0.08 J	--	NA	2	0.0
Nickel	1/2	0.66	1	0.1	1	0.0
Potassium	2/2	2.6 – 17	--	NA	1	12
Sodium	2/2	17.1 – 17.7	0	20	0	23
Strontium	2/2	0.23 – 0.8	--	NA	2	0.
Vanadium	1/2	0.31	--	NA	1	0.0
Zinc	2/2	0.06 – 1.6	1	0.3	2	0.0
Wet Chemistry (mg/L)						
Petroleum Hydrocarbons	2/2	1.1 J – 10.1 J	2	0.1	--	N

NA – Not available or not applicable
J – Estimated concentration
U – Analyte not detected at indicated detection limit

PREPARED/DATE: DLG 6/29/95
CHECKED/DATE: LAS 7/1

Table 6.1: Selection of Chemicals of Potential Concern Detected in Grab Ground–Water Samples
Building 3 Drywell Remedial Investigation
Griffiss Air Force Base, Rome, New York

Parameter (a)	Frequency of Detection	Range of Detected Concentrations (b)	Background Screening Concentration
VOLATILES (µg/L):			
* Chloroform	2/2	1.1–1.1	NA
* 1,1,1–Trichloroethane	2/2	0.82–0.82	NA
* Tetrachloroethene	2/2	0.24 J–0.26 J	NA
* Trichloroethene	2/2	2.0–2.0	NA
SEMI–VOLATILES (µg/L):			
* Anthracene	1/2	0.011 J	NA
* 2,4–Dichlorophenol	1/2	0.016 J	NA
* Fluorene	2/2	0.0089 J–0.024 J	NA
* N–Nitrosodiphenylamine	2/2	0.03 J–0.07J	NA
* Phenanthrene	1/2	0.12 J	NA
* Pyrene	2/2	0.0089 J–0.047 J	NA
* Simazine	1/2	0.046 J	NA
WET CHEMISTRY (mg/L):			
Petroleum Hydrocarbons	2/2	1.1 J–10.1 J	NA

(a) * Denotes Chemical of Potential Concern (COPC)
(b) – Based on chemical results for two grab ground–water samples (B3–HP–1 and B3–HP–2)
J – Indicates an estimated value
NA – Not applicable

PREPARED/DATE: COK 6/29/95
CHECKED/DATE: LAS 7/12/95

Table 6.2: Summary of Occupational Human Health Risks – Future Industrial Worker Exposure Scenario
Building 3 Drywell Remedial Investigation
Griffiss Air Force Base, Rome, New York

Pathway	Industrial Worker			
	Adult HQ	Chemical(s) Driving (a)	Lifetime Excess Cancer Risk	Chemical(s) Driving Risk (a)
	Noncarcinogenic Hazard			
GROUND WATER				
Ingestion	0.005	--	2E-07	--
Inhalation of volatiles	2E-06	--	1E-08	--
Dermal Contact	0.0005	--	2E-08	--
Total for Ground Water	0.006		2E-07	
TOTAL FOR ALL PATHWAYS	0.006		2E-07	

-- Not applicable or available
(a) Chemicals contributing cancer risk > $1x10^{-6}$ and/or HQ>1 are listed.

PREPARED/DATE: EFC 8/13/96
CHECKED/DATE: SRT 8/13/96

Table 6.3: Evaluation of Uncertainties
Building 3 Drywell Remedial Investigation
Griffiss Air Force Base, Rome, New York

ASSUMPTIONS	POTENTIAL EFFECT ON RISK: May Overestimate	POTENTIAL EFFECT ON RISK: May Underestimate
Environmental Sampling and Analysis:		
Probability of insufficient samples taken to characterize ground water at the site	X	X
Subsurface soil samples could not be collected to confirm removal action		X
Fate and Transport of Constituents:		
Use of an industrial use of ground water model to estimate concentrations of volatiles in air	X	
No degradation or dispersion of contaminants assumed for estimating future exposure point concentrations	X	
Exposure Pathways and Parameters:		
Possible future change in land use assumptions	X	X
Standard exposure parameters may not be respresentative of the actual exposed population	X	X
Assumed use of ground water in the future as a potable water supply	X	
Maximum concentrations of COPCs detected in ground water used as exposure point concentration	X	
Intakes by ground–water pathways are assumed to be constant over the exposure duration	X	X
Toxicity Assessment:		
Use of administered RfDs and CSFs for dermal risk calculations		X
Qualitative toxicity evaluation when no toxicity values available		X
Metals results for grab ground–water samples not included in risk estimates		X

PREPARED/DATE: CHR 7/31/95
CHECKED/DATE: LAS 8/1/95

TABLE 7.1

FORMER GRIFFISS AFB PROPOSED SUPPLEMENTAL INVESTIGATIONS
BUILDING 3 DRYWELL

Proposed Investigations

SI Activity	Sample Type	No. of Locations	No. of Samples Per Location	Approximate Boring Depth (feet BGS)	Sample Depth (feet BGS)	Sample Identification	Analytical Tests to be Conducted
Vertical Profile Well Installation	GW (see On-Base Groundwater AOC)						

Key:

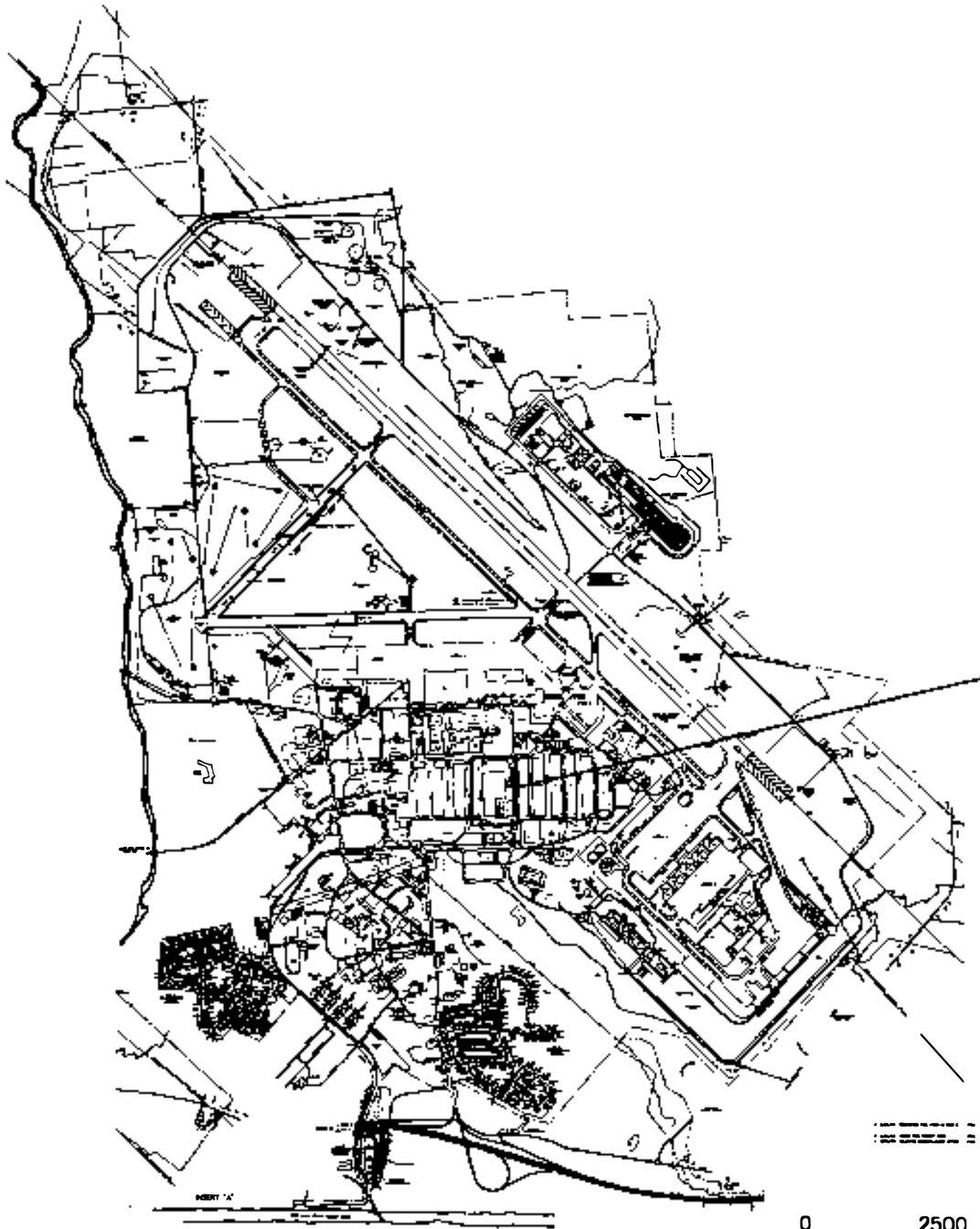
AFB = Air Force Base.
AOC = Area of Concern.
BGS = Below ground surface.
GW = Groundwater.
SI = Supplemental Investigation.

TAB

Figures

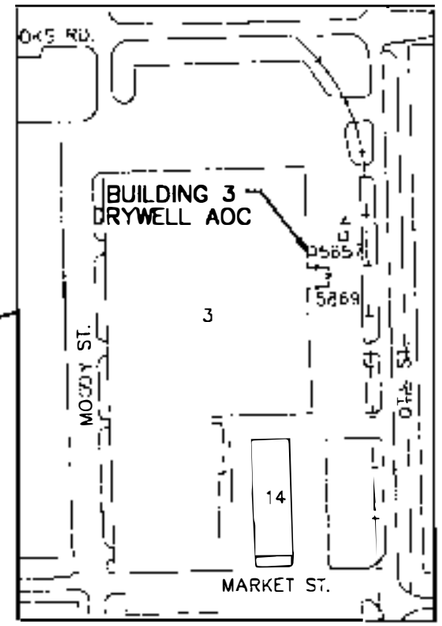
943 55

N



0 2500 5000

SCALE IN FEET



0 300 600

SCALE IN FEET

UNITED STATES ARMY CORPS OF ENGINEERS

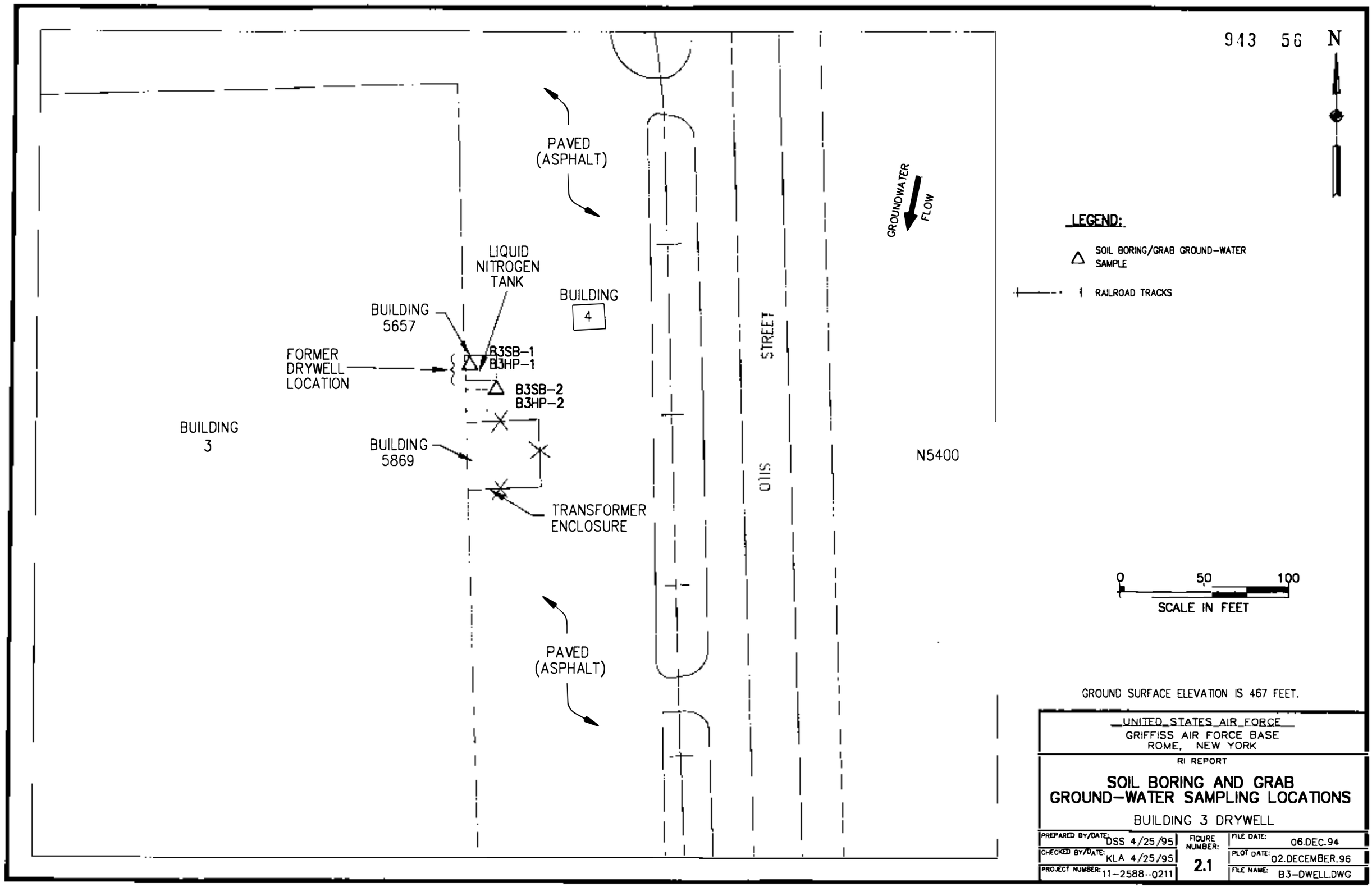
GRIFFISS AIR FORCE BASE
ROME, NEW YORK

REMEDIAL INVESTIGATION

AREA OF CONCERN LOCATION

BUILDING 3 DRYWELL

PREPARED BY: DSS 4/25/95	FIGURE NUMBER: 1.1	FILE DATE:	25.APRIL.95
CHECKED BY: KLA 4/25/95		PLOT DATE:	02.DECEMBER.96
PROJECT NO. 11-2588-0221		FILE NAME:	BLDG-03.DWG



GROUND SURFACE ELEVATION IS 467 FEET.

UNITED STATES AIR FORCE
GRIFFISS AIR FORCE BASE
ROME, NEW YORK

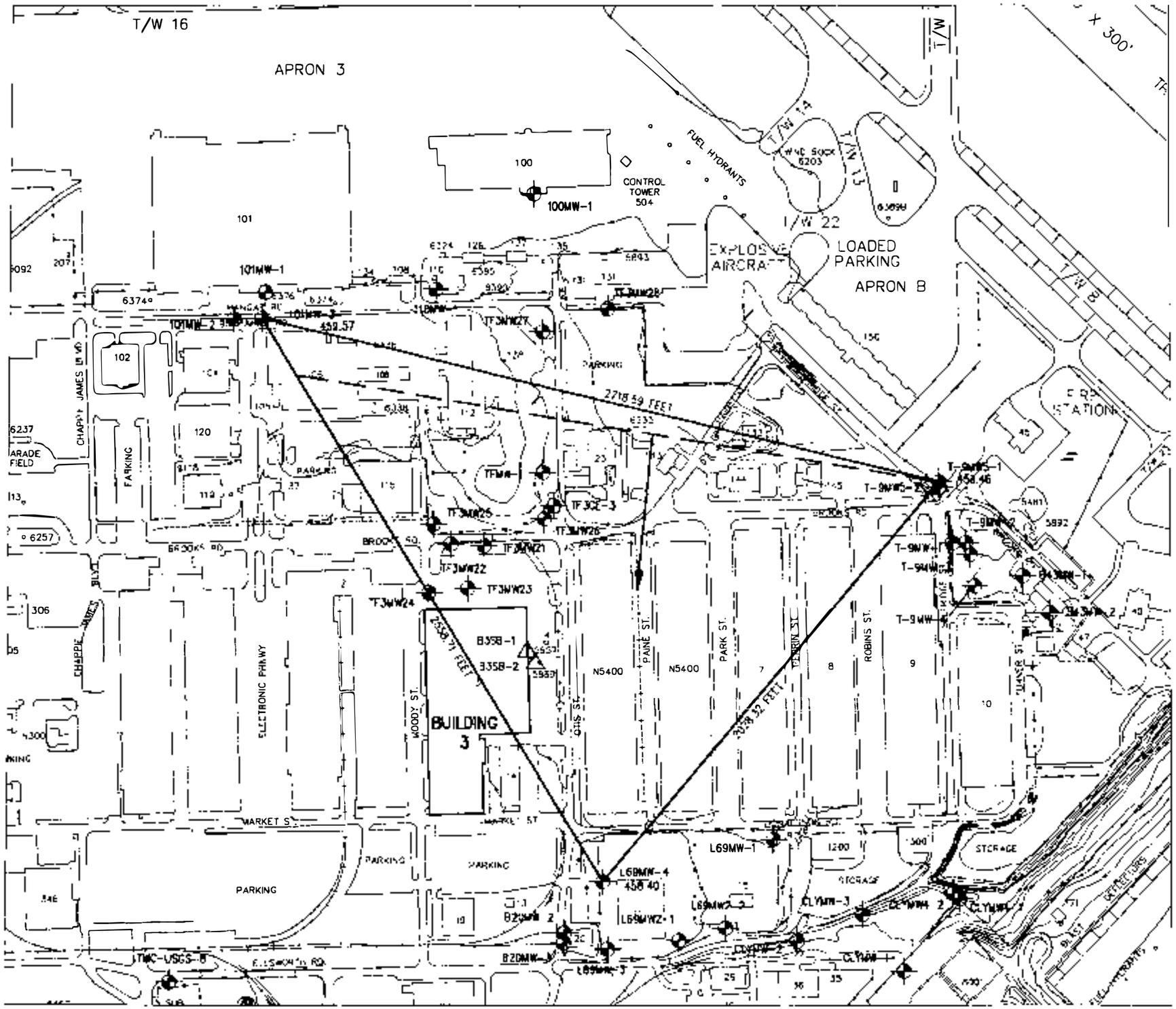
RI REPORT

SOIL BORING AND GRAB GROUND-WATER SAMPLING LOCATIONS

BUILDING 3 DRYWELL

PREPARED BY/DATE: DSS 4/25/95	FIGURE NUMBER:	FILE DATE:	06.DEC.94
CHECKED BY/DATE: KLA 4/25/95	2.1	PLOT DATE:	02.DECEMBER.96
PROJECT NUMBER: 11-2588-0211		FILE NAME:	B3-DWELL.DWG

943 57



LEGEND:

- MONITORING WELL
- SOIL BORING SAMPLE
- 459.46 TOPOGRAPHIC CONTOUR
- TRIANGLE USED FOR CALCULATION
- 459.46 GROUNDWATER ELEVATIONS MEASURED AUGUST, SEPTEMBER 1994
- CALCULATED DIRECTION OF GROUND-WATER FLOW

0 400 800

SCALE IN FEET

TOPOGRAPHIC CONTOUR INTERVAL 2 FEET

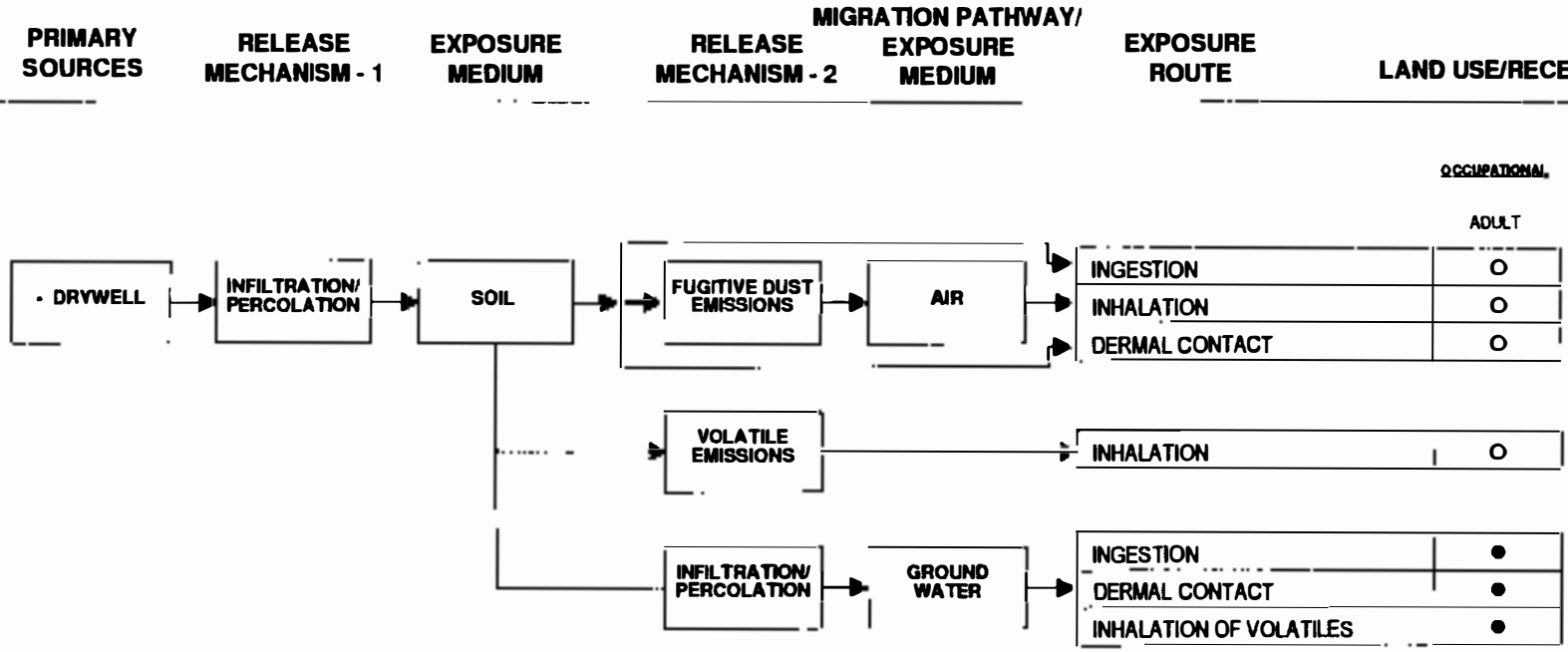
UNITED STATES AIR FORCE
GRIFFISS AIR FORCE BASE
ROME, NEW YORK

RI REPORT

GROUND-WATER FLOW VECTOR MAP

BUILDING 3 DRYWELL

PREPARED BY: HAL	FIGURE NUMBER: 3.1	FILE DATE: 16.MAY.95
CHECKED BY: JRK		PLOT DATE: 09.DECEMBER.96
PROJECT NUMBER: 11-2588-0211		FILE NAME: TRI-MAP1.DWG



LEGEND

O EXPOSURES COULD NOT BE QUANTIFIED FOR THIS AOCDUE TO THE LACK OF DATA

● EXPOSURES WERE EVALUATED QUANTITATIVELY

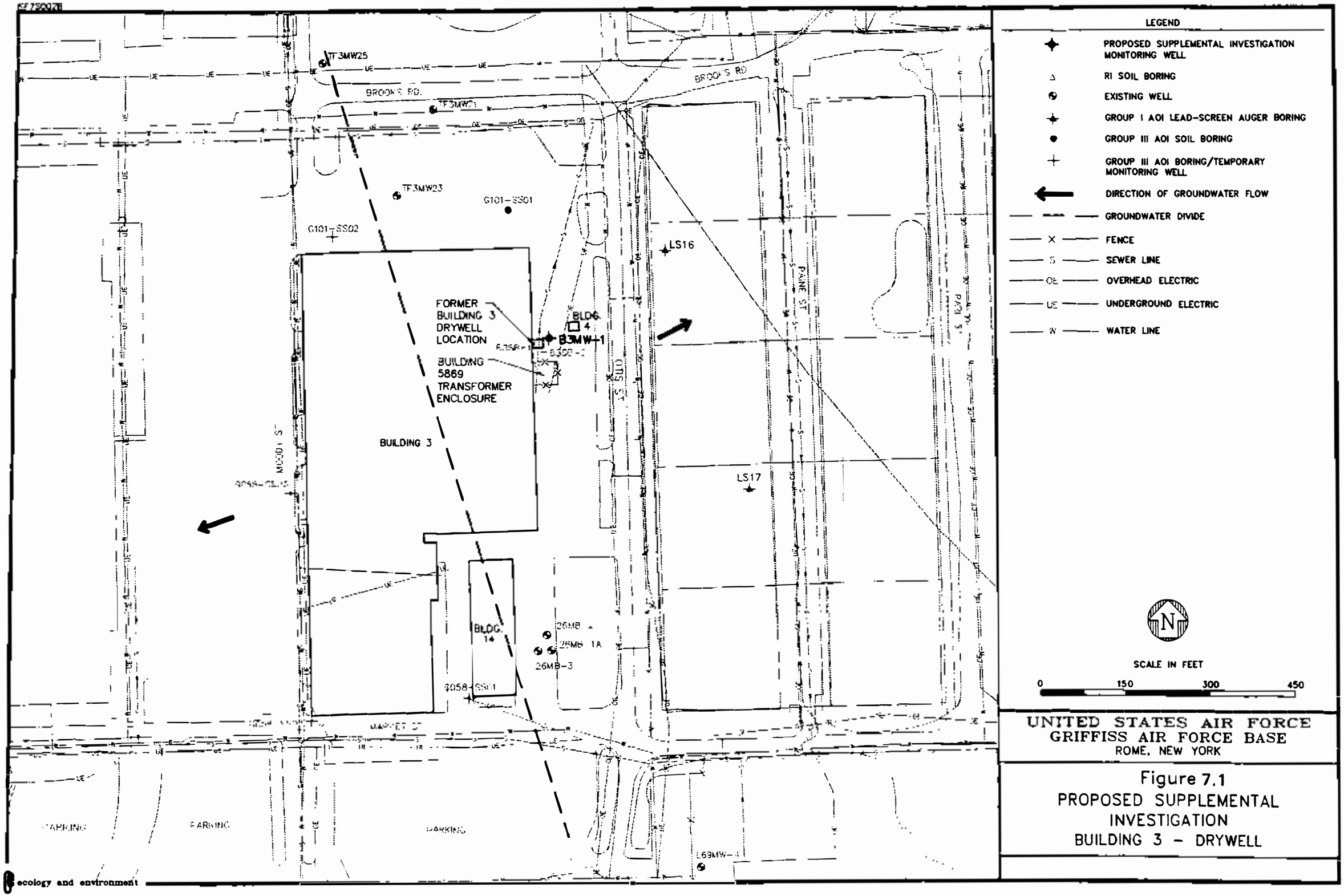
UNITED STATES AIR FORCE
GRIFFISS AIR FORCE BASE
ROME, NEW YORK

RI REPORT

CONCEPTUAL SITE MODEL–

HUMAN HEALTH EVALUATION– BUILDING 3

PREPARED BY:	COK 15 JUL 95	FIGURE NUMBER: 6.1	FILE DATE: 13 JUL 95
CHECKED BY:	LAS 15 JUL 95		PLOT DATE: 11 NOV 96
PROJECT No:	11-2588-0211		FILE NAME: 2588-0211.17



UNITED STATES AIR FORCE
GRIFFISS AIR FORCE BASE
ROME, NEW YORK

Figure 7.1
PROPOSED SUPPLEMENTAL INVESTIGATION
BUILDING 3 – DRYWELL

ecology and environment

TAB

Appendix A

APPENDIX A

SOIL BORINGS - HTW DRILLING LOGS
Building 3 Drywell

HTW DRILLING LOG

HOLE No. B3-SB-1

1. COMPANY NAME: Law Environmental, Inc.	2. DRILLING SUBCONTRACTOR: Parratt-Wolff
SHEET 1 OF 1 SHEETS	
3. PROJECT: Griffiss AFB RI	4. LOCATION (CITY, STATE): Reno, N.V.
5. NAME OF DRILLER: Butch Steven	6. MANUFACTURER'S DESIGNATION OF DRILL: PVA (shop-built) motor driven cathead
7. SIZE AND TYPES OF DRILLING AND SAMPLING EQUIPMENT: 220V motor-driven electric cathead w/ portable tripod; 2" carbon steel split spoons; 3" stainless steel split spoons	9. HOLE LOCATION (SITE): Building 3 drywell
	10. SURFACE ELEVATION: N/A
8. WEATHER: partly cloudy, warm	11. DATE STARTED: 4/27/94
	12. DATE COMPLETED: 4/27/94
13. OVERBURDEN THICKNESS: 0.25' Asphalt	16. DEPTH GROUNDWATER ENCOUNTERED: N/A
14. DEPTH DRILLED INTO ROCK: N/A	17. DEPTH TO WATER AND ELAPSED TIME AFTER DRILLING COMPLETED: N/A
15. TOTAL DEPTH OF HOLE: 3'	18. OTHER WATER LEVEL MEASUREMENTS (SPECIFY): N/A

19. GEOTECHNICAL SAMPLES (#)	DISTURBED	UNDISTURBED	20. TOTAL NUMBER OF CORE BOXES
N/A	—	—	N/A

21. SAMPLES FOR CHEMICAL ANALYSIS	VOC	METALS	OTHER (SPECIFY)	OTHER (SPECIFY)	OTHER (SPECIFY)	22. TOTAL CORE RECOVERY %
N/A	—	—	—	—	—	N/A

23. DISPOSITION OF HOLE	BACKFILLED	MONITORING WELL	OTHER (SPECIFY)	24. SIGNATURE OF INSPECTOR
Vertical	✓	—	—	[signature]

25. CHECKED BY:	26. NAME OF INSPECTOR
DSS 6-17-94	John M. Quinn

ELEV a	DEPTH b	DESCRIPTION OF MATERIALS c	FIELD SCREENING RESULTS (ppm) d	GEOTECH SAMPLE OR CORE BOX No. e	ANALYTICAL SAMPLE No. f	BLOW COUNTS g	REMARKS h
		0.25' asphalt (broke thru with pick)	BZ				
		Brown, moist, silty GRAVEL, rounded, with black sandy SILT (ML-GM)	HNu 0.2 ppm B.G. 0.2 ppm O_2 20.9 ppm CO 3 ppm LEL 0% H_2S 0			0.5'-2.0	0.5' Recovery for 0.5'-2.0'
	1.0						
		CONCRETE at 3 feet					Refusal at 3'; boring terminated; will offset.
	2.0						
	3.0	BORING TERMINATED; AT 3 feet; Refusal; CONCRETE					
	4.0						

MRK FORM JUN 89 55

PROJECT NAME & NO: Griffiss AFB RI 11-2588-0204

HOLE No: B3-SB-1

HF — Rev. 4

HTW DRILLING LOG

HOLE No. B3-SB-1
SHEET 1 OF 2 SHEETS

1. COMPANY NAME: Law Environmental, Inc.	2. DRILLING SUBCONTRACTOR: Parratt-Wolff
3. PROJECT: Griffiss AFB RI	4. LOCATION (CITY, STATE): Rome, NY
5. NAME OF DRILLER: Butch Steven	6. MANUFACTURER'S DESIGNATION OF DRILL: N/A
7. SIZE AND TYPES OF DRILLING AND SAMPLING EQUIPMENT: 220 V [illegible] 2" carbon steel split spoon 3" [illegible]	9. HOLE LOCATION (SITE): Building 3 dry well
	10. SURFACE ELEVATION: 468.37
8. WEATHER: partly cloudy, warm	11. DATE STARTED: 4/27/94 — 12. DATE COMPLETED: 4/27/94
13. OVERBURDEN THICKNESS: 0.25' asphalt	16. DEPTH GROUNDWATER ENCOUNTERED: 8.5'
14. DEPTH DRILLED INTO ROCK: N/A	17. DEPTH TO WATER AND ELAPSED TIME AFTER DRILLING COMPLETE: N/A
15. TOTAL DEPTH OF HOLE: 12'	18. OTHER WATER LEVEL MEASUREMENTS (SPECIFY): N/A

19. GEOTECHNICAL SAMPLES (#)	DISTURBED	UNDISTURBED	20. TOTAL NUMBER OF CORE BOXES
1 (4-6')	✓		N/A

21. SAMPLES FOR CHEMICAL ANALYSIS	VOC	METALS	OTHER (SPECIFY)	OTHER (SPECIFY)	OTHER (SPECIFY)	22. TOTAL CORE RECOVERY%
Hydrogen only N/A	–	–	–	–	–	–

23. DISPOSITION OF HOLE	BACKFILLED	MONITORING WELL	OTHER (SPECIFY)	24. SIGNATURE OF INSPECTOR
Vertical	[illegible] per AOP	—	—	John M. Quinn

25. CHECKED BY: DSS 6-17-94

26. NAME OF INSPECTOR: John M. Quinn

ELEV a	DEPTH b	DESCRIPTION OF MATERIALS c	FIELD SCREENING RESULTS (ppm) d	GEOTECH SAMPLE OR CORE BOX No. e	ANALYTICAL SAMPLE No. f	BLOW COUNTS g	REMARKS h
		0.25' asphalt @ surface					offset from B3-SB-1
			BZ HNu 0.2 ppm BG 0.2 ppm Borehole O_2 20.8% LEL 0% CO 3.0 ppm H_2S 0			0'-2'	0.2' [illegible] (asphalt only)
	1.0						
	2.0						
		Gray, sl. moist, mod to co silty SAND w/ fine to coarse [illegible] (subangular); also includes black inclusions ("cinder" appearance, hard, dry) (SM-SP)					2'-4' Recovery 0.4'
	3.0		BZ HNu 0 ppm BG 0 ppm Borehole O_2 20.8% LEL 0% CO 2 ppm H_2S 0 ppm				
	4.0						
		Red brown moist silty fine SAND w/ fine to fine gravel [illegible]					4'-6' 0.4' [illegible] 5'

MRK FORM JUN 89 55 — PROJECT NAME & NO: GAFB-RI — HOLE No. B3-SB-1

HTW DRILLING LOG

HOLE No. B3-SB-1 A
SHEET 2 OF 2 SHEETS

PROJECT: Griffiss AFB RI
INSPECTOR: John Rivera

ELEV a	DEPTH b	DESCRIPTION OF MATERIALS c	SCREENING RESULTS (ppm) d	GEOTECH SAMPLE OR CORE BOX No. e	ANALYTICAL SAMPLE No. f	BLOW COUNTS g	REMARKS h
	5.0	Tan slightly moist co to fi sandy co to fgp GRAVEL (rounded) (GM)	BZ HNu 0.2 ppm BG 0.2 ppm Borehole O_2 20.8% CO 0.3 ppm H_2S 0 ppm LEL 0%	(1) 4'-6'			4'-6' 0.9' recovery
	6.0					6'-8'	Recovery for sample 1' (not enough sample for chem sample)
	7.0	Brown, moist, silty med to co SAND w/ fine to co gravel and cobbles (SM-SP)					
	8.0						
8.5'							
	9.0	Brown, wet Fine GRAVEL (rounded) w/ silty med to coarse sand (GM)	BZ HNu 0.0 ppm BG 0.0 ppm Borehole O_2 20.8% LEL 0% CO 3.0 ppm H_2S 0 ppm			8'-10'	0.1' recovery No recovery for chemical sampling
	10.0						
	11.0						Hydropunch driven to 12 feet
	12.0	BORING TERMINATED AT 12 feet (Hydropunch driven to 12 feet)					
	13.0						

MRK FORM JUN 89 55-2

PROJECT NAME & NO. GAFO - RI 11-2588-02.04

HOLE No. B3-SB-1A

HTW DRILLING LOG

HOLE No. 8-3-SB-2

1. COMPANY NAME: Law Environmental, Inc.	2. DRILLING SUBCONTRACTOR: Parratt-Wolff
SHEET 1 OF 3	
3. PROJECT: Griffiss AFB RI	4. LOCATION (CITY, STATE): Rome N.Y.
5. NAME OF DRILLER: Butch Steven	6. MANUFACTURER'S DESIGNATION OF DRILL: Ingersoll Rand A-200
7. SIZE AND TYPES OF DRILLING AND SAMPLING EQUIPMENT: Ingersoll R 1 A-200; 4 1/4" H-Seven; 2" dia. split spoon	9. HOLE LOCATION (SITE): Building 2
	10. SURFACE ELEVATION: ~~unknown (not surveyed)~~ 465.2
8. WEATHER: sunny, warm (75°F)	11. DATE STARTED: 4/26/94
	12. DATE COMPLETED: 4/26/94
13. OVERBURDEN THICKNESS: 6" asphalt	16. DEPTH GROUNDWATER ENCOUNTERED: 8'
14. DEPTH DRILLED INTO ROCK: N/A	17. DEPTH TO WATER AND ELAPSED TIME AFTER DRILLING COMPLETED: N/A
15. TOTAL DEPTH OF HOLE: 12'	18. OTHER WATER LEVEL MEASUREMENTS (SPECIFY): N/A

19. GEOTECHNICAL SAMPLES (#)	DISTURBED	UNDISTURBED	20. TOTAL NUMBER OF CORE BOXES
	2	—	N/A

21. SAMPLES FOR CHEMICAL ANALYSIS	VOC	METALS	OTHER (SPECIFY)	OTHER (SPECIFY)	OTHER (SPECIFY)	22. TOTAL CORE RECOVERY
N/A	—	—	—	—		N/A

23. DISPOSITION OF HOLE	BACKFILLED	MONITORING WELL	OTHER (SPECIFY)	24. SIGNATURE OF INSPECTOR
Abandoned	[illegible]	—	—	John M. [illegible]

25. CHECKED BY:	26. NAME OF INSPECTOR
DSS 6-17-94	John M. [illegible]

ELEV a	DEPTH b	DESCRIPTION OF MATERIALS c	FIELD SCREENING RESULTS (ppm) d	GEOTECH SAMPLE OR CORE BOX No. e	ANALYTICAL SAMPLE No. f	BLOW COUNTS g	REMARKS h
		6" asphalt				0.5-2.0' 18/11/12	6" asphalt
	1.0	Brown, dry silty med. to fine SAND w/ coarse gravel (subangular) (SW); medium dense	BZ HNu 0.2 ppm B.G. 0.2 ppm Borehole O_2 20.9 ppm LEL 0% CO 2.5 ppm H_2S 0 ppm	1 2.0'-4.0'		2'-4' 19/4/10/9	
	2.0	Tan, dry sl silty coarse to fine SAND w/ coarse gravel (subangular) (SW); medium dense					
	3.0						
	4.0	Brown, sl moist, sl. silty med SAND with subangular co to fine gravel (SW); medium dense	BZ HNu 0.2 ppm B.G. 0.2 ppm Borehole O_2 20.5 ppm LEL 0% CO 0.5 ppm H_2S 0 ppm			4'-6' 6/6/6/8	

MRK FORM 55 JUN 89 | PROJECT NAME & NO. GAFB - RI 1K2588-0214 | HOLE No. 83-SB-2

HTW DRILLING LOG

HOLE No. A-3-SB-2
SHEET 2 OF 2 SHEETS

PROJECT: Griffiss AFB RI
INSPECTOR: John Quinn

ELEV a	DEPTH b	DESCRIPTION OF MATERIALS c	FIELD SCREENING RESULTS (ppm) d	GEOTECH SAMPLE OR CORE BOX No. e	ANALYTICAL SAMPLE No. f	BLOW COUNTS g	REMARKS h
	5	Brown, sl. moist, sl. silty med. SAND w subangular co to fine ~~SAND~~ gravel (SW) one vein medium dense					
	6						
	7	Brown, moist, sl. silty co to fine SAND w co to fine gravel (SW) medium dense	BZ HNu 0.0ppm B.G. 0.2ppm Borehole O_2 20.9ppm LEL 0% CO 25ppm H_2S 0ppm			6'-8' (10/8/8/7)	
▼	8						
				(2) 8'-10' 4/4/2/2		8'-10' 4/4/2/2	water @ 8 feet
	9	Brown, wet, coarse to fine SAND w/ trace silt w/ co to fine ~~SAND~~ gravel; loose (SW)					
	10						
	11						Drive Hydropunch to 12'; attempt 3 times before successful
	12	BORING TERMINATED AT 12 feet (Hydropunch advanced to 12')					
	13						

MRK FORM JUN 89 55-2

PROJECT NAME & NO. GAFB - RI 11-2581-0244

HOLE No. B3-SB-2 ~~B-3-SB-2~~

TAB

Appendix B

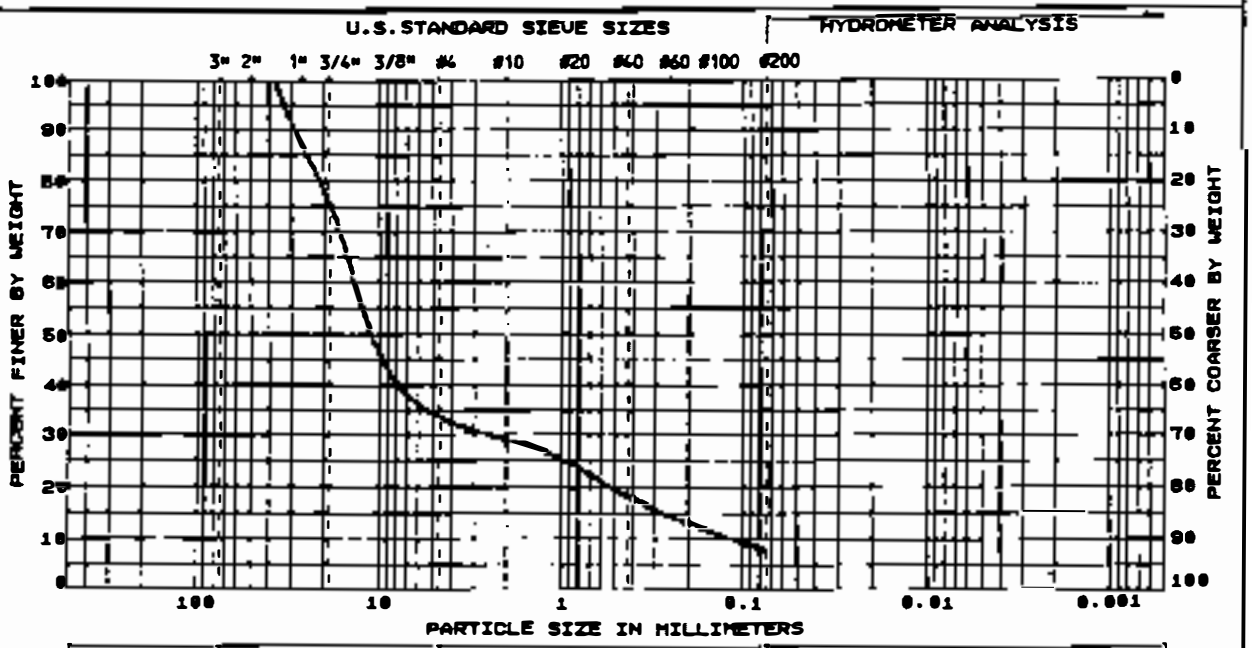
APPENDIX B

GEOTECHNICAL ANALYTICAL RESULTS
Building 3 Drywell

LAW ENVIRONMENTAL, INC.
300 CHASTAIN CNTR BLVD, SUITE 315
KENNESAW, GEORGIA 30144
404-425-7879

PARTICLE SIZE DISTRIBUTION & PHYSICAL PROPERTIES

CLIENT Government Services
CLIENT JOB NO./PO#
JOB NO. 11-2688-0204 DATE October 14, 1994
LAB NO. 04781 PAGE 10
PROJECT Griffiss AFB - RI
SAMPLE ID B-3 SB-1 4-6 JAR



U.S. STANDARD SIEVE SIZE		*PERCENT PASSING	HYDROMETER
SIEVE NO.	SIEVE SIZE (MILLIMETERS)		PARTICLE DIAMETER (MILLIMETERS)
3"	75		0.050
2"	50		0.020
1-1/2"	37.5	100.0	0.005
1"	25	84.8	0.002
3/4"	19	76.1	0.001
1/2"	12.5	54.8	
3/8"	9.5	44.7	
No.4	4.75	33.8	
No.10	2.00	29.2	
No.20	0.850	24.3	
No.40	0.425	18.2	
No.60	0.250	14.5	
No.100	0.150	11.5	
No.200	0.075	8.1	

*REMARKS: TABULATED HYDROMETER VALUES ARE COMPUTER INTERPOLATED FROM A LINEAR DATA PLOT. PLOTTED VALUES MAY BE MORE ACCURATE FOR THE 0.050 mm PARTICLE DIAMETER.

TESTED BY: SC JM MO

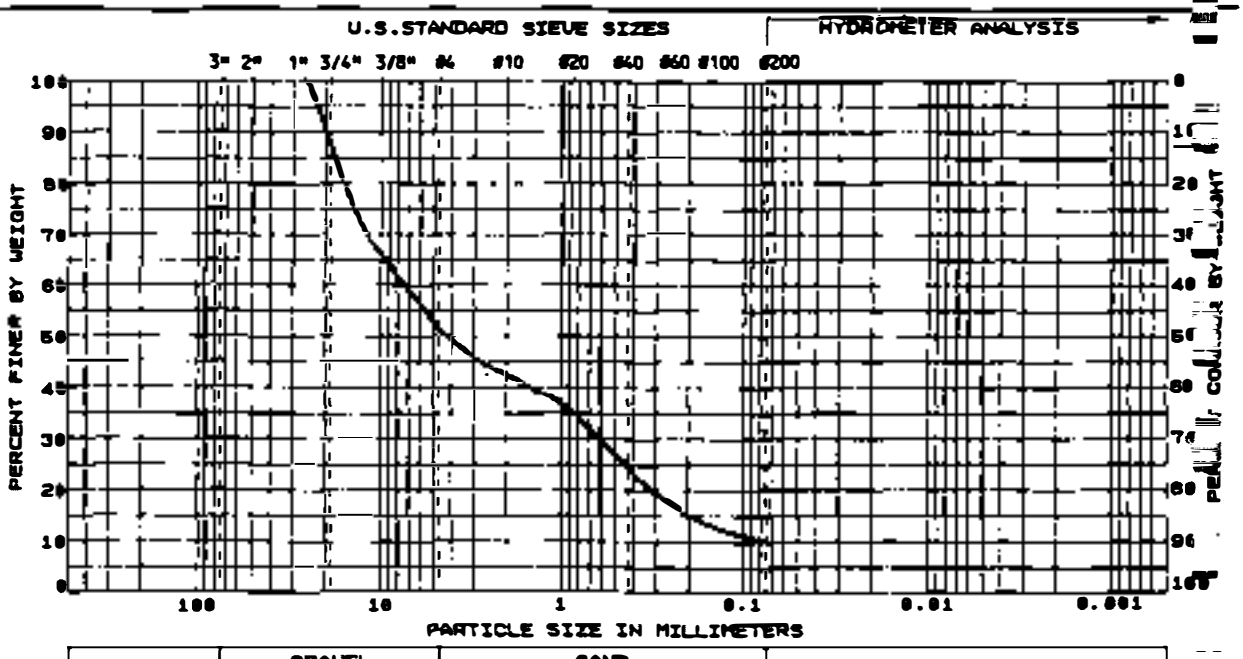
TOTAL POROSITY (%)
EFFECTIVE SIZE (mm)
COEFFICIENT OF UNIFORMITY 124.99
COEFFICIENT OF CURVATURE 3.56
LIQUID LIMIT NP
PLASTIC LIMIT NP
PLASTICITY INDEX NP
CLASSIFICATION POORLY GRADED GRAVEL with SILT and SAND (GP-GM)
WATER CONTENT (%) 6.7
DRY DENSITY (PCF)
SPECIFIC GRAVITY OF SOLIDS
HYDRAULIC CONDUCTIVITY (cm/sec - 20C)
TEST PROCEDURES: ASTM D422, D2216, D4318, D2487,

LAW ENVIRONMENTAL, INC.
M. A. O'Kelley

LAW ENVIRONMENTAL, INC.
300 CHASTAIN CNTR BLVD, SUITE 315
KENNESAW, GEORGIA 30144
404-425-7879

PARTICLE SIZE DISTRIBUTION & PHYSICAL PROPERTIES

CLIENT Government Services
CLIENT JOB NO./PO#
JOB NO. 11-2588-0204 DATE October 14, 1994
LAB NO. 84762 PAGE 19
PROJECT Griffiss AFB - RI
SAMPLE ID B-3 SB-2 2-4 JAR



COBBLES	GRAVEL		SAND			SILT & CLAY
	COARSE	FINE	CO.	MEDIUM	FINE	

U.S.STANDARD SIEVE SIZE		*PERCENT PASSING	HYDROMETER
SIEVE NO.	SIEVE SIZE (MILLIMETERS)		PARTICLE DIAMETER (MILLIMETERS)
3"	75		0.050
2"	50		0.020
1-1/2"	37.5		0.005
1"	25	100.0	0.002
3/4"	19	88.2	0.001
1/2"	12.5	71.0	
3/8"	9.5	65.2	
No.4	4.75	52.0	
No.10	2.00	42.4	
No.20	0.850	36.1	
No.40	0.425	24.5	
No.60	0.250	17.3	
No.100	0.150	13.3	
No.200	0.075	10.1	

*REMARKS: TABULATED HYDROMETER VALUES ARE COMPUTER INTERPOLATED FROM A LINEAR DATA PLOT. PLOTTED VALUES MAY BE MORE ACCURATE FOR THE 0.050 mm PARTICLE DIAMETER.

TESTED BY: SC JM MO

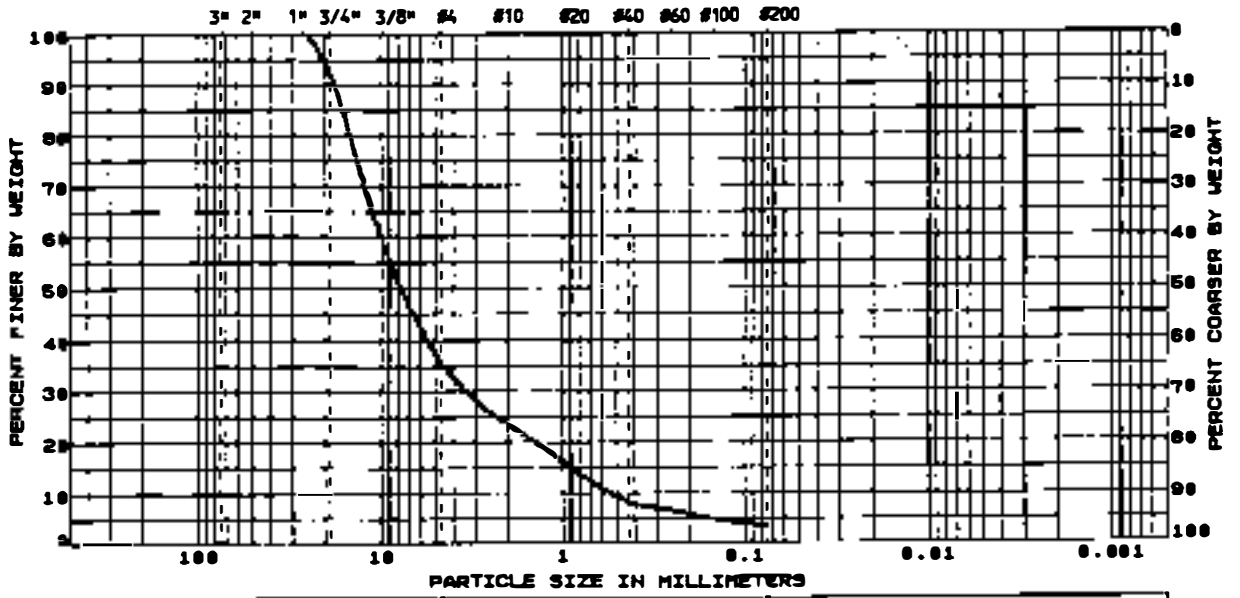
TOTAL POROSITY (%)
EFFECTIVE SIZE (mm)
COEFFICIENT OF UNIFORMITY 193.41
COEFFICIENT OF CURVATURE 0.73
LIQUID LIMIT NP
PLASTIC LIMIT NP
PLASTICITY INDEX NP
CLASSIFICATION POORLY GRADED GRAVEL with SILT and SAND (GP-GM)
WATER CONTENT (%) 3.1
DRY DENSITY (PCF)
SPECIFIC GRAVITY OF SOLIDS
HYDRAULIC CONDUCTIVITY (cm/sec - 20C)
TEST PROCEDURES: ASTM D422, D2216, D4318, D2487.

LAW ENVIRONMENTAL, INC.
M. A. Kelley

LAW ENVIRONMENTAL, INC.
300 CHASTAIN CNTR BLVD, SUITE 315
KENNESAW, GEORGIA 30144
404-425-7879

PARTICLE SIZE DISTRIBUTION & PHYSICAL PROPERTIES

CLIENT Government Services
CLIENT JOB NO./PO# _____
JOB NO. 11-2668-0204
LAB NO. 84763
PROJECT Griffiss AFB - RI
SAMPLE ID B-3 SB-2 8-10 JAR
DATE October 14, 1994
PAGE 20



U.S.STANDARD SIEVE SIZE		*PERCENT PASSING
SIEVE NO.	SIEVE SIZE (MILLIMETERS)	
3"	75	
2"	50	
1-1/2"	37.5	
1"	25	100.0
3/4"	19	92.6
1/2"	12.5	78.5
3/8"	9.5	67.9
No.4	4.75	35.2
No.10	2.00	23.7
No.20	0.850	14.7
No.40	0.425	8.3
No.60	0.250	6.5
No.100	0.150	5.0
No.200	0.075	3.6

HYDROMETER	
PARTICLE DIAMETER (MILLIMETERS)	
0.050	
0.020	
0.005	
0.002	
0.001	

*REMARKS: TABULATED HYDROMETER VALUES ARE COMPUTER INTERPOLATED FROM A LINEAR DATA PLOT. PLOTTED VALUES MAY BE MORE ACCURATE FOR THE 0.050 mm PARTICLE DIAMETER.

TESTED BY: SC JM MO

TOTAL POROSITY (%) _____
EFFECTIVE SIZE (mm) _____
COEFFICIENT OF UNIFORMITY 19.45
COEFFICIENT OF CURVATURE 1.88
LIQUID LIMIT NP
PLASTIC LIMIT NP
PLASTICITY INDEX NP
CLASSIFICATION WELL GRADED GRAVEL with SAND (GW)
WATER CONTENT (%) 10.0
DRY DENSITY (PCF) _____
SPECIFIC GRAVITY OF SOLIDS _____
HYDRAULIC CONDUCTIVITY (cm/sec - 20C) _____
TEST PROCEDURES: ASTM D422, D2216, D4318, D2487.

LAW ENVIRONMENTAL, INC.

TAB

Appendix C

APPENDIX C

ANALYTICAL DATA SUMMARY TABLE
Building 3 Drywell

Table C.1: Analytical Data Summary for Grab Ground-Water
Building 3 Drywell Remedial Investigation
Griffiss Air Force Base, Rome, New York

Sample I.D.	B3-HP-1	B3-HP-1	B3-HP-2	B3-HP-01 (1)	B3-HP-2	B3-I
Laboratory	(R)	(L)	(R)	(R)	(L)	(L
Sample Date	04-27-94	11-15-94	04-27-94	04-27-94	11-15-94	11-1
METHOD: EPA 524.2						
VOLATILES: (ug/L)						
1,1,1,2-Tetrachloroethane	0.50 U	--	0.50 U	0.50 U	--	
1,1,1-Trichloroethane	0.82	--	0.82	0.77	--	
1,1,2,2-Tetrachloroethane	0.17 U	--	0.17 U	0.17 U	--	
1,1,2-Trichloro-1,2,2-trifluoroethane	0.50 U	--	0.50 U	0.50 U	--	
1,1,2-Trichloroethane	0.50 U	--	0.50 U	0.50 U	--	
1,1-Dichloroethane	0.50 U	--	0.50 U	0.50 U	--	
1,1-Dichloroethene	0.50 U	--	0.50 U	0.50 U	--	
1,1-Dichloropropene	0.50 U	--	0.50 U	0.50 U	--	
1,2,3-Trichlorobenzene	0.50 U	--	0.50 U	0.50 U	--	
1,2,3-Trichloropropane	0.50 U	--	0.50 U	0.50 U	--	
1,2,4-Trichlorobenzene	0.50 U	--	0.50 U	0.50 U	--	
1,2,4-Trimethylbenzene	0.50 U	--	0.50 U	0.50 U	--	
1,2-Dibromo-3-chloropropane	0.50 U	--	0.50 U	0.50 U	--	
1,2-Dibromoethane	0.50 U	--	0.50 U	0.50 U	--	
1,2-Dichlorobenzene	0.50 U	--	0.50 U	0.50 U	--	
1,2-Dichloroethane	0.50 U	--	0.50 U	0.50 U	--	
1,2-Dichloropropane	0.50 U	--	0.50 U	0.50 U	--	
1,3,5-Trimethylbenzene	0.50 U	--	0.50 U	0.50 U	--	
1,3-Dichlorobenzene	0.50 U	--	0.50 U	0.50 U	--	
1,3-Dichloropropane	0.50 U	--	0.50 U	0.50 U	--	
1,4-Dichlorobenzene	0.50 U	--	0.50 U	0.50 U	--	
2,2-Dichloropropane	0.50 U	--	0.50 U	0.50 U	--	
Acrolein	10 U	--	10 U	10 U	--	
Acrylonitrile	1.4 UJ	--	1.4 UJ	1.4 UJ	--	
Benzene	0.50 U	--	0.50 U	0.50 U	--	
Bromobenzene	0.50 U	--	0.50 U	0.50 U	--	
Bromochloromethane	0.50 U	--	0.50 U	0.50 U	--	
Bromodichloromethane	0.50 U	--	0.50 U	0.50 U	--	
Bromoform	0.50 U	--	0.50 U	0.50 U	--	
Bromomethane	0.50 U	--	0.50 U	0.50 U	--	
Carbon Tetrachloride	0.40 U	--	0.40 U	0.40 U	--	
Chlorobenzene	0.50 U	--	0.50 U	0.50 U	--	
Chloroethane	0.50 U	--	0.50 U	0.50 U	--	
Chloroform	1.1	--	1.1	1.0	--	
Chloromethane	0.50 U	--	0.50 U	0.50 U	--	
cis-1,2-Dichloroethene	0.50 U	--	0.50 U	0.50 U	--	
cis-1,3-Dichloropropene	0.50 U	--	0.50 U	0.50 U	--	
Cyanogen chloride	0.50 W	--	0.50 W	0.50 W	--	
Dibromochloromethane	0.50 U	--	0.50 U	0.50 U	--	
Dibromodichloromethane	5.0 U	--	5.0 U	5.0 U	--	
Dibromomethane	0.50 U	--	0.50 U	0.50 U	--	
Dichlorodifluoromethane	0.50 U	--	0.50 U	0.50 U	--	
Dichlorofluoromethane	0.50 U	--	0.50 U	0.50 U	--	
Ethyl benzene	0.50 U	--	0.50 U	0.50 U	--	
Hexachlorobutadiene	0.45 U	--	0.45 U	0.45 U	--	
Isopropylbenzene	0.50 U	--	0.50 U	0.50 U	--	
Methyl methacrylate	2.0 U	--	2.0 U	2.0 U	--	
Methylene chloride	0.50 U	--	0.50 U	0.50 U	--	
n-Butylbenzene	0.50 U	--	0.50 U	0.50 U	--	
n-Propylbenzene	0.50 U	--	0.50 U	0.50 U	--	
Naphthalene	0.50 U	--	0.50 U	0.50 U	--	
o-Chlorotoluene	0.50 U	--	0.50 U	0.50 U	--	
p-Chlorotoluene	0.50 U	--	0.50 U	0.50 U	--	
p-Cymene	0.50 U	--	0.50 U	0.50 U	--	
sec-Butylbenzene	0.50 U	--	0.50 U	0.50 U	--	
Styrene	0.50 U	--	0.50 U	0.50 U	--	
tert-Butylbenzene	0.50 U	--	0.50 U	0.50 U	--	
Tetrachloroethene	0.24 J	--	0.26 J	0.25 J	--	
Toluene	0.50 U	--	0.50 U	0.50 U	--	
Total Xylenes	0.50 U	--	0.50 U	0.50 U	--	
trans-1,2-Dichloroethene	0.50 U	--	0.50 U	0.50 U	--	
trans-1,3-Dichloropropene	0.50 U	--	0.50 U	0.50 U	--	
Trichloroethene	2.0	--	2.0	2.0	--	
Trichlorofluoromethane	0.50 U	--	0.50 U	0.50 U	--	
Vinyl chloride	0.50 U	--	0.50 U	0.50 U	--	
SURROGATE RECOVERY (%)						
p - Bromofluorobenzene	90	--	97	89	--	
1,2 - Dichlorobenzene - d4	95	--	101	98	--	
METHOD: EPA 525.1						
SEMI-VOLATILES: (ug/L)						
1,2-Diphenylhydrazine	0.66 U	--	0.66 U	0.66 U	--	
2,3-Dichlorobiphenyl	8.9 U	--	8.9 U	8.9 U	--	
2,4,5-Trichlorobiphenyl	5.6 U	--	5.6 U	5.6 U	--	
2,4,5-Trichlorophenol	5.6 U	--	5.6 U	5.6 U	--	

Table C.1: Analytical Data Summary for Grab Ground-Water
Building 3 Drywell Remedial Investigation
Griffiss Air Force Base, Rome, New York

Sample I.D.	B3-HP-1	B3-HP-1	B3-HP-2	B3-HP-01 (1)	B3-HP-2	B3-E
Laboratory	(R)	(L)	(R)	(R)	(L)	(L
Sample Date	04-27-94	11-15-94	04-27-94	04-27-94	11-15-94	11-15
2,4,6-Trichlorophenol	1.3 U	--	1.3 U	1.3 U	--	
2,4-Dichlorophenol	1.1 U	--	0.016 J	1.1 U	--	
2,4-Dinitrotoluene	0.56 U	--	0.56 U	0.56 U	--	
2-Chlorobiphenyl	8.9 U	--	8.9 U	8.9 U	--	
2-Chlorophenol	0.56 UR	--	0.56 UR	0.56 UR	--	
2-Nitrophenol	0.56 UR	--	0.56 UR	0.56 UR	--	
2,2',3,4,4,6-Heptachlorobiphenyl	8.9 UJ	--	8.9 U	8.9 U	--	
2,2',3,4,5,6,6-Octachlorobiphenyl	8.9 UJ	--	8.9 U	8.9 U	--	
2,2',3,4,6-Pentachlorobiphenyl	8.9 U	--	8.9 U	8.9 U	--	
2,2,4,4-Tetrachlorobiphenyl	8.9 U	--	8.9 U	8.9 U	--	
2,2,4,4,5,6-Hexachlorobiphenyl	8.9 U	--	8.9 U	8.9 U	--	
3,3'-Dichlorobenzidine	5.6 UJ	--	5.6 U	5.6 U	--	
4-Chloro-3-methylphenol	5.6 U	--	5.6 U	5.6 U	--	
4-Nitrophenol	0.56 U	--	0.56 U	0.56 U	--	
Acenaphthylene	5.6 U	--	5.6 U	5.6 U	--	
Alachlor	5.6 U	--	5.6 U	5.6 U	--	
Aldrin	5.6 U	--	5.6 U	5.6 U	--	
alpha-Chlordane	5.6 UJ	--	5.6 U	5.6 U	--	
Aminoazenals	5.6 W	--	5.6 W	5.6 W	--	
Anthracene	0.011 J	--	2.2 U	2.2 U	--	
Atrazine	5.6 U	--	5.6 U	5.6 U	--	
Benzidine	4.4 U	--	4.4 U	4.4 U	--	
Benzo(a)anthracene	0.21 UJ	--	0.21 U	0.21 U	--	
Benzo(a)pyrene	0.66 UJ	--	0.66 U	0.66 U	--	
Benzo(b)fluoranthene	0.73 UJ	--	0.73 U	0.73 U	--	
Benzo(ghi)perylene	5.6 UJ	--	5.6 U	5.6 U	--	
Benzo(k)fluoranthene	0.44 UJ	--	0.44 U	0.44 U	--	
Bis(2-chloroethyl) ether	0.11 U	--	0.11 U	0.11 U	--	
Bis(2-ethylhexyl) phthalate	5.6 U	--	5.6 U	5.6 U	--	
Butyl benzyl phthalate	5.6 U	--	5.6 U	5.6 U	--	
Captan	5.6 U	--	5.6 U	5.6 U	--	
Chrysene	0.23 UJ	--	0.23 U	0.23 U	--	
Di-2-ethylhexyladipate	5.6 UJ	--	5.6 U	5.6 U	--	
Di-n-butyl phthalate	5.6 U	--	5.6 U	5.6 U	--	
Dibenzo(a,h)anthracene	1.1 U	--	1.1 U	1.1 U	--	
Diethyl phthalate	5.6 U	--	5.6 U	5.6 U	--	
Dimethyl phthalate	5.6 U	--	5.6 U	5.6 U	--	
Endrin	5.6 U	--	5.6 U	5.6 U	--	
Fluorene	0.024 J	--	0.0089 J	5.6 U	--	
gamma-BHC (Lindane)	1.1 U	--	1.1 U	1.1 U	--	
gamma-Chlordane	5.6 UJ	--	5.6 U	5.6 U	--	
Heptachlor	5.6 U	--	5.6 U	5.6 U	--	
Heptachlor epoxide	5.6 U	--	5.6 U	5.6 U	--	
Hexachlorobenzene	0.78 U	--	0.78 U	0.78 U	--	
Hexachlorocyclopentadiene	0.98 U	--	0.98 U	0.98 U	--	
Indeno(1,2,3-cd)pyrene	1.3 UJ	--	1.3 U	1.3 U	--	
Methoxychlor	0.56 UJ	--	0.56 U	0.56 U	--	
N-Nitrosodi-n-butylamine	1.4 U	--	1.4 U	1.4 U	--	
N-Nitrosodiethylamine	0.056 U	--	0.056 U	0.056 U	--	
N-Nitrosodimethylamine	0.28 U	--	0.28 U	0.28 U	--	
N-nitrosodiphenylamine	0.070 J	--	0.030 J	4.4 U	--	
Nitrobenzene	1.1 U	--	1.1 U	1.1 U	--	
o-Toluidine	5.6 W	--	5.6 W	5.6 W	--	
Pentachlorophenol	2.1 UJ	--	2.1 U	2.1 U	--	
Phenanthrene	0.12 J	--	0.036 J	0.046 J	--	
Propham	5.6 W	--	5.6 W	5.6 W	--	
Pyrene	0.047 J	--	0.0089 J	5.6 U	--	
Simazine	5.6 U	--	0.046 J	5.6 U	--	
Thiram	5.6 W	--	5.6 W	5.6 W	--	
Toxaphene	56 UJ	--	56 U	56 U	--	
trans-Nonachlor	5.6 UJ	--	5.6 U	5.6 U	--	
SURROGATE RECOVERY (%)						
Perylene - d12	118	--	80	87	--	
METALS: (mg/L)						
Aluminum (3005/6010)	3.3 J	--	140 J	14.7 J	--	
Antimony (3005/7041)	0.030 U	--	0.030 U	0.030 U	--	
Arsenic (3020/7060)	0.0050	--	0.027	0.0080	--	
Barium (3005/6010)	0.073	--	1.2	0.66	--	
Beryllium (3005/6010)	0.0030 U	--	0.0050	0.0030 U	--	
Cadmium (3005/6010)	0.010 U	--	0.010 U	0.010 U	--	
Calcium (3005/6010)	79.9	--	306	170	--	
Chromium (3005/6010)	0.010 U	--	0.27	0.028		
Cobalt (3005/6010)	0.010 U	--	0.21	0.050		
Copper (3005/6010)	0.039	--	1.1	0.19	--	
Hexavalent Chromium (7195)	0.014	--	0.010 U	0.011	--	
Iron (3005/6010)	11.7	--	613	44.0	--	

2588-0211.17(ads-gw)

Table C.1: Analytical Data Summary for Grab Ground-Water
Building 3 Drywell Remedial Investigation
Griffiss Air Force Base, Rome, New York

Sample I.D.	B3-HP-1	B3-HP-1	B3-HP-2	B3-HP-01 (1)	B3-HP-2	B3-
Laboratory	(R)	(L)	(R)	(R)	(L)	(L
Sample Date	04-27-94	11-15-94	04-27-94	04-27-94	11-15-94	11-1
Lead (3020/7421)	0.014	--	0.26	0.086	--	
Magnesium (3005/6010)	7.8	--	82.6	15.7	--	
Manganese (3005/6010)	2.8	--	58.0	30.5	--	
Mercury (7470)	0.00040 U	--	0.00075	0.00050	--	
Molybdenum (3020/7480)	0.050 J	--	0.080 J	0.050 U	--	
Nickel (3005/6010)	0.050 U	--	0.66	0.31	--	
Potassium (3005/6010)	2.6	--	17.0	2.8	--	
Selenium (3020/7740)	0.0030 U	--	0.0030 U	0.0030 U	--	
Silver (3005/6010)	0.010 U	--	0.010 U	0.010 U	--	
Sodium (3005/6010)	17.1	--	17.7	16.8	--	
Strontium (3005/6010)	0.23	--	0.80	0.43	--	
Thallium (3020/7841)	0.0040 U	--	0.0040 U	0.0040 U	--	
Vanadium (3005/6010)	0.010 U	--	0.31	0.010 U	--	
Zinc (3005/6010)	0.060	--	1.6	0.25	--	
WET CHEMISTRY: (mg/L)						
Total Cyanide (9012)	--	0.005 U	--	--	0.005 U	0
Total Recoverable Petroleum Hydrocarbons (418.1)	10.1 J	--	1.1 J	0.93 J	--	

(1) = Duplicate of B3-HP-2(04-27-94)
(2) = Duplicate of B3-HP-2(11-15-94)

(R) = Recra Environmental, Inc.
(L) = Lancaster Laboratories
µg/L = micrograms per liter
mg/L = milligrams per liter
D = Diluted
J = Estimated concentration
R = Rejected
U = Analyte not detected
UJ = Estimated concentration possibly biased low
W = Compound not detected by comparing extracted ion profile against NIST library
-- = Analyte not analyzed

PREPARED/DATE: DLG 6/29/95
CHECKED/DATE: LAS 7/12/95

TAB

Appendix D

APPENDIX D

RISK ASSESSMENT CALCULATION TABLES
Building 3 Drywell

LIST OF TABLES

Table	
D.1	Industrial Workers - Ingestion of Ground Water
D.2	Industrial Workers - Inhalation of Volatiles from Ground Water
D.3	Industrial Workers - Dermal Contact with Ground Water
D.4	Model for Ambient Air Concentrations of Volatile Organic Compounds Released from Ground Water During Industrial Use

Table D.1: Calculations of Risk from Ground Water
Industrial Workers - Ingestion of Ground Water
Building 3 Drywell Remedial Investigation
Griffiss Air Force Base, Rome, New York

Parameter	Exposure Point Concentration (mg/L)	Exposure Value Type [a]	Intake Factor (L/kg-d) [b]		Intake (mg/kg-d) [c]		Administered Toxicity Values [d]		Adult Hazard Quotient [e]	Excess Cancer Risk [f]
			Noncarc. (Adult)	Carcinogen (Lifetime)	Noncarc. (Adult)	Carcinogen (Lifetime)	Oral RfD (mg/kg-d)	Slope Factor (kg-d/mg)	(unitless)	(unitless)
VOLATILES										
Chloroform	0.0011	Conc.	9.78E-03	3.49E-03	1.08E-05	3.84E-06	1.00E-02	6.10E-03	1.08E-03	2.34E-08
Tetrachloroethene	0.00026	Conc.	9.78E-03	3.49E-03	2.54E-06	9.07E-07	1.00E-02	5.20E-02	2.54E-04	4.72E-08
1,1,1-Trichloroethane	0.00082	Conc.	9.78E-03	3.49E-03	8.02E-06	2.86E-06	--	--	--	
Trichloroethene	0.002	Conc.	9.78E-03	3.49E-03	1.96E-05	6.98E-06	6.00E-03	1.10E-02	3.26E-03	7.68E-08
SEMI-VOLATILES										
Anthracene	0.000011	Conc.	9.78E-03	3.49E-03	1.08E-07	3.84E-08	3.00E-01	--	3.59E-07	--
2,4-Dichlorophenol	0.000016	Conc.	9.78E-03	3.49E-03	1.56E-07	5.58E-08	3.00E-03	--	5.22E-05	--
Fluorene	0.000024	Conc.	9.78E-03	3.49E-03	2.35E-07	8.38E-08	4.00E-02	--	5.87E-06	--
N-Nitrosodiphenylamine	0.00007	Conc.	9.78E-03	3.49E-03	6.85E-07	2.44E-07	2.00E-02	4.90E-03	3.42E-05	1.20E-09
Phenanthrene	0.00012	Conc.	9.78E-03	3.49E-03	1.17E-06	4.19E-07	--	--	--	--
Pyrene	0.000047	Conc.	9.78E-03	3.49E-03	4.60E-07	1.64E-07	3.00E-02	--	1.53E-05	--
Simazine	0.000046	Conc.	9.78E-03	3.49E-03	4.50E-07	1.61E-07	5.00E-03	1.20E-01	9.00E-05	1.93E-08
								TOTAL:	0.005	2E-07

-- Not available or applicable
a - "Conc." refers to the maximum detected concentration.
b - Intake Factors from Figure 5.7 of Volume I
c - Intake = Exposure Point Concentration * Intake Factor
d - Toxicity Values from Table 5.4 of Volume I
e - Hazard Quotient = Intake/RfD
f - Excess Cancer Risk (Carcinogens) = Intake * Slope Factor

PREPARED/DATE: CHR 7/31/95
CHECKED/DATE: LAS 8/1/95

Table D.2: Calculations of Risk from Ground Water
Industrial Workers - Inhalation of Volatiles
Building 3 Drywell Remedial Investigation
Griffiss Air Force Base, Rome, New York

Parameter	Exposure Point Concentration (mg/L)	Exposure Value Type [a]	Conversion Factor [b] (l/m^3)	Intake Factor [c] (m^3/kg-day)		Intake [d] (mg/kg-day)		Toxicity Values [e]		Adult Hazard Quotient [f] (unitless)	Excess Cancer Risk [g] (unitless)
				Noncarc. (Adult)	Carcinogen (Lifetime)	Noncarc. (Adult)	Carcinogen (Lifetime)	Inhalation RfD (mg/kg-d)	Inhalation Slope Factor (kg-d/mg)		
VOLATILES											
Chloroform	0.0011	Conc.	6.29E-03	4.89E-02	1.75E-02	3.38E-07	1.21E-07	--	8.05E-02	--	9.75E-09
Tetrachloroethene	0.00026	Conc.	6.29E-03	4.89E-02	1.75E-02	8.00E-08	2.86E-08	1.14E-01	2.03E-03	7.02E-07	5.81E-11
1,1,1-Trichloroethane	0.00082	Conc.	6.29E-03	4.89E-02	1.75E-02	2.52E-07	9.03E-08	2.86E-01	--	8.82E-07	--
Trichloroethene	0.002	Conc.	6.29E-03	4.89E-02	1.75E-02	6.15E-07	2.20E-07	--	6.00E-03	--	1.32E-09
									TOTAL:	2E-06	1E-08

-- Not available or applicable
a - "Conc." refers to the maximum detected concentration.
b - Conversion factor from Box Model (see Figue 5.10 of Volume 1)
c - Intake Factors from Figure 5.8 of Volume 1
d - Intake = Exposure Point Concentration * Intake Factor
e - Toxicity Values from Table 5.4 of Volume 1
f - Hazard Quotient = Intake/RfD
g - Excess Cancer Risk (Carcinogens) = Intake * Slope Factor

PREPARED/DATE: SRT 8/16/96
CHECKED/DATE: EFC 8/16/96

Table D.3: Calculations of Risk from Ground Water
Industrial Workers - Dermal Contact With Ground Water
Building 3 Drywell Remedial Investigation
Griffiss Air Force Base, Rome, New York

Parameter	Exposure Point Concentration (mg/L)	Exposure Value Type [a]	Permeability Factor (cm/hr) [b]	Intake Factor (L-hr/kg-d-cm) [c]		Intake (mg/kg-d) [d]		Administered Toxicity Values [e]		Adult Hazard Quotient [f] (unitless)	Excess Cancer Risk [g] (unitless)
				Noncarc. (Adult)	Carcinogen (Lifetime)	Noncarc. (Adult)	Carcinogen (Lifetime)	Oral RfD (mg/kg-d)	Slope Factor (kg-d/mg)		
VOLATILES											
Chloroform	0.0011	Conc.	8.90E-03	6.01E-02	2.15E-02	5.88E-07	2.10E-07	1.00E-02	6.10E-03	5.88E-05	1.28E-09
Tetrachloroethene	0.00026	Conc.	4.80E-02	6.01E-02	2.15E-02	7.50E-07	2.68E-07	1.00E-02	5.20E-02	7.50E-05	1.40E-08
1,1,1-Trichloroethane	0.00082	Conc.	1.70E-02	6.01E-02	2.15E-02	8.38E-07	3.00E-07	--	--	--	--
Trichloroethene	0.002	Conc.	1.60E-02	6.01E-02	2.15E-02	1.92E-06	6.88E-07	6.00E-03	1.10E-02	3.21E-04	7.57E-09
SEMI-VOLATILES											
Anthracene	0.000011	Conc.	2.25E-01	6.01E-02	2.15E-02	1.49E-07	5.32E-08	3.00E-01	--	4.96E-07	--
2,4-Dichlorophenol	0.000016	Conc.	2.30E-02	6.01E-02	2.15E-02	1.52E-08	5.44E-09	3.00E-03	--	5.07E-06	--
Fluorene	0.000024	Conc.	1.55E-01	6.01E-02	2.15E-02	1.49E-07	5.34E-08	4.00E-02	--	3.73E-06	--
N-Nitrosodiphenylamine	0.00007	Conc.	1.96E-02	6.01E-02	2.15E-02	2.83E-08	1.01E-08	2.00E-02	4.90E-03	1.42E-06	4.97E-11
Phenanthrene	0.00012	Conc.	2.30E-01	6.01E-02	2.15E-02	9.68E-07	3.46E-07	--	--	--	--
Pyrene	0.000047	Conc.	3.24E-01	6.01E-02	2.15E-02	2.34E-06	8.37E-07	3.00E-02	--	7.80E-05	--
Simazine	0.000046	Conc.	1.32E-03	6.01E-02	2.15E-02	3.74E-09	1.34E-09	5.00E-03	1.20E-01	7.48E-07	1.60E-10
									TOTAL:	0.0005	2E-08

-- Not available or applicable

a - "Conc." refers to the maximum detected concentration.

b - Dermal Exposure Assessment - Principles and Applications (EPA, 1992) (see Table 5.3a of Volume 1)

c - Intake Factors from Figure 5.11 of Volume 1

d - Intake = Exposure Point Concentration * Permeability Factor * Intake Factor

e - Toxicity Values from Table 5.4 of Volume 1

f - Hazard Quotient = Intake/RfD

g - Excess Cancer Risk (Carcinogens) = Intake * Slope Factor

PREPARED/DATE: CHR 7/31/95
CHECKED/DATE: LAS 8/1/95

Table D.4: Ambient Air Concentrations of Volatile Organic Compounds Released from Ground Water During Industrial Use Building 3 Drywell Remedial Investigation Griffiss Air Force Base, Rome, New York

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Emission Rate of Volatile Organic Compounds from Ground Water:

$$Q = FR \times 3.8\ L/gal \times 1\ min/60 \times CGW = 0.63\ L/sec \times CGW\ (mg/L)$$

Q = Emission Rate (mg/sec)
FR = Flow Rate of ground water through the hose (assumed 10 gal/min)

CGW = Contaminant concentration in ground water (mg/L)

Concentration of Volatile Organic Compounds:

$$C_{air} = Q/(LS \times V \times M)$$

$$C_{air} = \frac{0.63\ L/sec \times CGW\ mg/L}{25\ m \times 2.015\ m/sec \times 2\ m} = 6.29 \times 10^{-3}$$

C_{air} = Constituent concentration in air (mg/m^3)
Q = Emission Rate (mg/sec)
LS = Width dimension of the contaminated area perpendicular to the prevailing wind direction (25 m)
V = Average wind speed in the mixing zone - one-half the average wind speed at the mixing height (2.015 m/s)
M = Mixing height (2 m)

Source: Hwang and Falco, 1986.

PREPARED/DATE: BLG 5/30/95
CHECKED/DATE: LAS 6/15/95

Summary of Reasonable Maximum Exposure Parameters and Intake Factors for Human Health Risk Assessment
Griffiss Air Force Base, Rome, New York

Exposure Parameter	Symbol	Residential				Recreational			Agricultural						Occupational			
		Adult	Adolescent	Youth	Child	Adult	Adolescent	Youth	Child	Adult	Adolescent	Youth	Child	Child	Flightline Worker	Construction Worker	Landscape Worker	Industrial Worker
Exposure Frequency (days/year)	EF	175	175	175	175	350	350	350	350	350	350	350	350	39	175	250	125	250
Exposure Duration (years)	ED	30	6	6	6	30	6	6	6	30	6	6	6	33	33	1	25	25
Cancer/Non-cancer		12	NA	NA	NA	12	NA	NA	NA	12	NA	NA	NA	NA	NA	NA	25	25
Body Weight (kg)	BW	70	61	36	15	70	61	36	15	70	61	36	15	70	70	70	70	70
Averaging Time (days)	AT																	
Non-cancer		10,950	2,190	2,190	2,190	10,950	2,190	2,190	2,190	10,950	2,190	2,190	2,190	8,179	8,395	365	9,125	9,125
Carcinogens		25,550	NA	NA	NA	25,550	NA	NA	NA	25,550	NA	NA	NA	25,550	25,550	25,550	25,550	25,550
Conversion Factors																		
Convert milligrams to kilograms (kg/mg)	CF_1	1.00E-06	1.00E-06	1.00E-06	1.00E-06	1.00E-06	1.00E-06	1.00E-06	1.00E-06	1.00E-06	1.00E-06	1.00E-06	1.00E-06	1.00E-06	1.00E-06	1.00E-06	1.00E-06	1.00E-06
Convert cubic centimeters to liters (l/cm^3)	CF_2	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001
Incidental Ingestion of Soils (Intake Factor = IR_s * EF * ED / BW * AT); (Non-carcinogens) Intake Factor = IR_{s-ag} * LF_1 * EF / AT (carcinogens))																		
Soil or Sediment Ingestion Rate (mg/day)	IR_s	100	100	100	200	NA	NA	NA	NA	NA	NA	NA	NA	100	480	480	100	NA
Fraction Ingested from Source (unitless)	FI	1	1	1	1	NA	NA	NA	NA	NA	NA	NA	NA	1	1	1	1	NA
Age Adjusted Intake Factor (mg/kg body weight)*	IF_{adj}	3.16E-8	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Intake Factor (Non-carcinogens) (day^{-1})		3.95E-07	1.84E-07	1.12E-06	8.19E-06	NA	NA	NA	NA	NA	NA	NA	NA	1.13E-07	1.81E-01	4.79E-06	6.85E-07	NA
Intake Factor (Carcinogens) (day^{-1})		1.41E-07	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	3.45E-08	1.03E-07	4.11E-06	3.43E-07	NA
Inhalation of Airborne (Vapor Phase) Chemicals (Intake Factor = Inhal * EF * ED / BW * AT))																		
Inhalation Rate (m^3/day)	Inhal	8.9	8.4	7.4	8	20	21	24	16	20	21	24	16	20	20	20	20	NA
Intake Factor (Non-carcinogens) (m^3/kg-day)		2.47E-01	6.03E-02	1.17E-01	2.56E-01	7.14E-01	3.30E-01	9.39E-01	1.91E+00	7.14E-01	3.30E-01	6.39E-01	1.02E+00	1.09E-02	1.17E-01	1.96E-01	1.37E-01	NA
Intake Factor (Carcinogens) (m^3/kg-day)		8.11E-01	NA	NA	NA	1.17E-01	NA	NA	NA	1.17E-01	NA	NA	NA	1.09E-02	4.89E-02	2.80E-03	4.89E-02	NA
Inhalation of Particulate Soils (Intake Factor = Inhal * EF_{adj} * ED / (BW * AT))																		
Exposure Frequency for Dust (days/year)	EF_{adj}	135	135	135	135	245	245	245	245	245	245	245	245	39	175	250	125	250
Intake Factor (Non-carcinogens) (m^3/kg-day)		2.47E-02	6.03E-03	1.17E-01	2.56E-01	1.93E-01	2.31E-01	6.47E-01	1.16E-01	1.93E-01	2.31E-01	6.47E-01	1.16E-01	1.68E-03	1.17E-01	1.96E-01	1.37E-01	NA
Intake Factor (Carcinogens) (m^3/kg-day)		1.16E-01	NA	NA	NA	8.22E-02	NA	NA	NA	8.22E-02	NA	NA	NA	1.68E-03	4.89E-02	2.80E-03	4.89E-02	NA
Dermal Contact with Soils (Intake Factor = SA_s * AF * ABS_d * EF * ED * CF_1 / (BW * AT))																		
Surface Area of Exposed Skin (cm^2/day)	SA_s	1,680	4,944	1,701	1,914	NA	NA	NA	NA	NA	NA	NA	NA	1,070	2,000	1,070	1,070	NA
Soil to Skin Adherence Factor (mg/cm²)	AF	1	1	1	1	NA	NA	NA	NA	NA	NA	NA	NA	1	1	1	1	NA
Absorption Factor (unitless)																		
Dioxin	ABS_d	0.03	0.03	0.03	0.03	NA	NA	NA	NA	NA	NA	NA	NA	0.03	0.03	0.03	0.03	NA
Cadmium	ABS_d	0.001	0.001	0.001	0.001	NA	NA	NA	NA	NA	NA	NA	NA	0.001	0.001	0.001	0.001	NA
PCBs	ABS_d	0.06	0.06	0.06	0.06	NA	NA	NA	NA	NA	NA	NA	NA	0.06	0.06	0.06	0.06	NA
Arsenic	ABS_d	0.03	0.03	0.03	0.03	NA	NA	NA	NA	NA	NA	NA	NA	0.03	0.03	0.03	0.03	NA
Pentachlorophenol	ABS_d	0.25	0.25	0.25	0.25	NA	NA	NA	NA	NA	NA	NA	NA	0.25	0.25	0.25	0.25	NA
Intake Factor - Dioxin (Non-carcinogens) (day^{-1})		1.04E-06	1.11E-06	1.48E-06	1.84E-06	NA	NA	NA	NA	NA	NA	NA	NA	1.68E-07	4.15E-07	9.61E-07	6.31E-07	NA
Intake Factor - Dioxin (Carcinogens) (day^{-1})		4.47E-07	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	5.85E-08	2.48E-07	1.29E-06	2.25E-07	NA
Intake Factor - Cadmium (Non-carcinogens) (day^{-1})		3.48E-08	3.69E-08	4.93E-08	6.13E-08	NA	NA	NA	NA	NA	NA	NA	NA	4.89E-09	1.38E-08	1.85E-08	2.10E-08	NA
Intake Factor - Cadmium (Carcinogens) (day^{-1})		1.49E-08	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	1.67E-09	4.94E-09	4.29E-08	7.51E-09	NA
Intake Factor - PCBs (Non-carcinogens) (day^{-1})		2.07E-06	2.18E-06	2.96E-06	3.67E-06	NA	NA	NA	NA	NA	NA	NA	NA	3.91E-07	8.30E-07	1.80E-06	1.26E-06	NA
Intake Factor - PCBs (Carcinogens) (day^{-1})		8.93E-07	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	1.03E-07	2.96E-07	2.51E-06	4.51E-07	NA
Intake Factor - Arsenic (Non-carcinogens) (day^{-1})		1.04E-06	1.11E-06	1.48E-06	1.84E-06	NA	NA	NA	NA	NA	NA	NA	NA	1.81E-07	4.15E-07	9.01E-07	6.31E-07	NA
Intake Factor - Arsenic (Carcinogens) (day^{-1})		4.47E-07	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	5.01E-08	1.48E-07	1.29E-06	2.25E-07	NA
Intake Factor - Pentachlorophenol (Non-carcinogens) (day^{-1})		8.29E-06	9.24E-06	1.23E-05	1.53E-05	NA	NA	NA	NA	NA	NA	NA	NA	1.51E-06	3.46E-06	7.51E-06	5.26E-06	NA
Intake Factor - Pentachlorophenol (Carcinogens) (day^{-1})		3.72E-06	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	4.18E-07	1.24E-06	1.08E-05	1.88E-06	NA

Summary of Reasonable Maximum Exposure Parameters and Intake Factors for Human Health Risk Assessment
Griffiss Air Force Base, Rome, New York

Exposure Parameters	Symbol	Recreational			Residential				Agricultural					Occupational			
		Adult	Adolescent	Youth	Child	Adult	Adolescent	Youth	Child	Adult	Adolescent	Youth	Child	Utility	Flightline Worker	Construction Worker	Landscaper Worker	Industrial Worker
Ingestion of Ground Water. [Intake Factor = (IR_{gw} * EF * ED) / (BW * AT)(Noncarcinogens); Intake Factor = IR_{adj} / AT (carcinogens)]																		
Ingestion Rate of Ground Water (L/day)	IR_{gw}	NA	NA	NA	NA	2	2	2	1	2	2	2	1	NA	NA	NA	NA	1
Age-Adjusted Intake Factor (L/kg)[1]	IR_{adj}	NA	NA	NA	NA	446	NA	NA	NA	446	NA	NA	NA	NA	NA	NA	NA	NA
Intake Factor (Noncarcinogens) (L/kg-day)		NA	NA	NA	NA	2 74E-02	3 14E-02	5.33E-02	6 39E-02	2 74E-02	3 14E-02	5 33E-02	6 39E-02	NA	NA	NA	NA	9.78E-03
Intake Factor (carcinogens) (L/kg-day)		NA	NA	NA	NA	1.74E-02	NA	NA	NA	1 74E-02	NA	NA	NA	NA	NA	NA	NA	3.49E-03
Inhalation of Airborne (Vapor Phase) Chemicals from Ground Water while Showering. (Intake Factor = EF * ED / AT)																		
Intake Factor (Noncarcinogens) (unitless)		NA	NA	NA	NA	9 59E-01	9 59E-01	9 59E-01	9 59E-01	9 59E-01	9 59E-01	9 59E-01	9 59E-01	NA	NA	NA	NA	NA
Intake Factor (carcinogens) (unitless)		NA	NA	NA	NA	4.11E-01	NA	NA	NA	4 11E-01	NA	NA	NA	NA	NA	NA	NA	NA
Inhalation of Airborne (Vapor Phase) Chemicals from Ground Water while Truck Washing. [Intake Factor = InhR * ET * EF * ED / (BW * AT)]																		
Inhalation Rate (m^3/hour)	InhR	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	2 5
Exposure Time (hours/day)	ET	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	4
Intake Factor (Noncarcinogens) (m^3/kg-day)		NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	4 89E-02
Intake Factor (carcinogens) (unitless) (m^3/kg-day)		NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	1 75E-02
Dermal Contact with Ground Water. (Intake Factor = SA * ET * EF * ED * CF_3 / (BW * AT))																		
Surface Area of Exposed Skin (cm^2)	SA	NA	NA	NA	NA	18,150	13,550	10 425	7,195	18,150	13,550	10,425	7,195	NA	NA	NA	NA	3,070
Exposure Time (hours/day)	ET	NA	NA	NA	NA	0 25	0 25	0 25	0 25	0 25	0 25	0 25	0.25	NA	NA	NA	NA	2
Intake Factor (Noncarcinogens) (hour-L/kg-day-cm)		NA	NA	NA	NA	6 22E-02	5 33E-02	6 94E-02	1 15E-01	6 22E-02	5 33E-02	6 94E-02	1 15E-01	NA	NA	NA	NA	6 01E-02
Intake Factor (carcinogens) (hour-L/kg-day-cm)		NA	NA	NA	NA	2 66E-02	NA	NA	NA	2 66E-02	NA	NA	NA	NA	NA	NA	NA	2 15E-02
Ingestion of Contaminated Fruits and Vegetables. [Intake Factor = $IngR_c$ * FI_{crop} * EF * ED / (BW * AT) (Noncarcinogens); Intake Factor = IR_{adj} * FI_{crop} / AT (carcinogens)]																		
Ingestion Rate Root Crops (kg/day)	IR_{root}	NA	NA	NA	NA	0.02	0.02	0.02	0.01	0.02	0.02	0.02	0.01	NA	NA	NA	NA	NA
Ingestion Rate Leaf/Stem Crops (kg/day)	IR_{veg}	NA	NA	NA	NA	0 102	0 102	0 102	0 051	0.102	0 102	0 102	0 051	NA	NA	NA	NA	NA
Fraction Ingested from Source (unitless)	FI_{crop}	NA	NA	NA	NA	0 5	0 5	0 5	0 5	0 8	0 8	0 8	0 8	NA	NA	NA	NA	NA
Age-Adjusted Intake Factor - Root Crops (mg/kg)[1]	IR_{adj}	NA	NA	NA	NA	446	NA	NA	NA	4 46	NA	NA	NA	NA	NA	NA	NA	NA
Age-Adjusted Intake Factor - Leaf/Stem Crops (mg/kg)[1]	IR_{adj}	NA	NA	NA	NA	227	NA	NA	NA	22 7	NA	NA	NA	NA	NA	NA	NA	NA
Intake Factor (Noncarcinogens (day^{-1})																		
Root Crops		NA	NA	NA	NA	1 37E-04	1 57E-04	2 66E-04	3 20E-04	2 19E-04	2 52E-04	4 26E-04	5.11E-04	NA	NA	NA	NA	NA
Leaf/Stem Crops		NA	NA	NA	NA	6 99E-04	8 02E-04	1.36E-03	1 63E-03	1 12E-03	1 28E-03	2 17E-03	2.61E-03	NA	NA	NA	NA	NA
Intake Factor (carcinogens) (day^{-1})																		
Root Crops		NA	NA	NA	NA	8 72E-05	NA	NA	NA	1 39E-04	NA	NA	NA	NA	NA	NA	NA	NA
Leaf/Stem Crops		NA	NA	NA	NA	4 45E-04	NA	NA	NA	7.11E-04	NA	NA	NA	NA	NA	NA	NA	NA
Incidental Ingestion of Surface Water. [Intake Factor = IR_{sw} * EF_{sw} * ED / (BW * AT)(Noncarcinogens); Intake Factor = IR_{adj} / AT (carcinogens)]																		
Ingestion Rate of Surface Water (L/event)	IR_{sw}	0 05	0 05	0 05	0 05	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Exposure Frequency for Swimming (events/year)	EF_{sw}	26	26	26	26	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Age-Adjusted Ingestion Rate for Swimming (L/kg)[1]	IR_{adj}	1 09	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Intake Factor (Noncarcinogens) (L/kg-day)		5.09E-05	5 84E-05	9 89E-05	2 37E-04	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Intake Factor (carcinogens) (L/kg-day)		4.26E-05	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Dermal Contact with Surface Water. [Intake Factor = SA_{sw} * ET * EF_{sw} * ED * CF_3 / (BW * AT)]																		
Surface Area of Exposed Skin (cm^2)	SA_{sw}	3,050	5,628	3,480	2,255	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Exposure Time (hours/event)	ET	1	1	1	1	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Intake Factor (Noncarcinogens) (hour-L/kg-day-cm)		3 10E-03	6 57E-03	6 89E-03	1 07E-02	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Intake Factor (carcinogens) (hour-L/kg-day-cm)		1 33E-03	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA

Summary of Reasonable Maximum Exposure Parameters and Intake Factors for Human Health Risk Assessment
Griffiss Air Force Base, Rome, New York

Exposure Parameters	Symbol	Recreational				Residential				Agricultural				Utility	Occupational Flightline Worker	Occupational Construction Worker	Occupational Landscaper Worker	Occupational Industrial Worker
		Adult	Adolescent	Youth	Child	Adult	Adolescent	Youth	Child	Adult	Adolescent	Youth	Child					
Incidental Ingestion of Sediment. [Intake Factor = IR_s * EF_m * FI * ED * CF_1 / (BW * AT) (Noncarcinogens). Intake Factor = IR_{adj} * FI * CF_1 / AT (carcinogens)]																		
Age-Adjusted Intake Factor (mg/kg)[1]	IR_{adj}	3210	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Intake Factor (Noncarcinogens) (day^{-1})		1.02E-07	1.17E-07	1.98E-07	9.50E-07	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Intake Factor (carcinogens) (day^{-1})		1.26E-07	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Dermal Contact with Sediment. [Intake factor = SA_m * AF * ABS * EF_m * ED * CF_1 / (BW * AT)]																		
Intake Factor - Dioxins (Noncarcinogens) (day^{-1})		9.31E-08	1.97E-07	2.07E-07	3.21E-07	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Intake Factor - Dioxins (Carcinogens) (day^{-1})		3.99E-08	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Intake Factor - Cadmium (Noncarcinogens) (day^{-1})		3.10E-09	6.57E-09	6.89E-09	1.07E-08	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Intake Factor - Cadmium (Carcinogens) (day^{-1})		1.33E-09	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Intake Factor - PCBs (Noncarcinogens) (day^{-1})		1.86E-07	3.94E-07	4.13E-07	6.43E-07	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Intake Factor - PCBs (Carcinogens) (day^{-1})		7.98E-08	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Intake Factor - Arsenic (Noncarcinogens) (day^{-1})		9.31E-08	1.97E-07	2.07E-07	3.21E-07	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Intake Factor - Arsenic (Carcinogens) (day^{-1})		3.99E-08	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Intake Factor - Pentachlorophenol (Noncarcinogens) (day^{-1})		7.76E-07	1.64E-06	1.72E-06	2.68E-06	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Intake Factor - Pentachlorophenol (Carcinogens) (day^{-1})		3.33E-07	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA

1 - Ingestion rates for residential, recreational, and agricultural adults are age-adjusted based on child, youth, adolescent exposures (total 18 years) and a 12-year adult exposure

$$IR_{adj} = \frac{IR_c \cdot EF_c \cdot ED_c}{BW_c} + \frac{IR_y \cdot EF_y \cdot ED_y}{BW_y} + \frac{IR_{ad} \cdot EF_{ad} \cdot ED_{ad}}{BW_{ad}} + \frac{IR_a \cdot EF_a \cdot ED_a}{BW_a}$$

Subscripts "c", "y", "ad", and "a" denote child, youth, adolescent, and adult, respectively

Summary of Central Tendency Exposure Parameters and Intake Factors for Human Health Risk Assessment
Griffiss Air Force Base, Rome, New York

Exposure Parameters	Symbol	Recreational				Residential				Agricultural					Occupational			
		Adult	Adolescent	Youth	Child	Adult	Adolescent	Youth	Child	Adult	Adolescent	Youth	Child	Infant	Pipeliner Worker	Construction Worker	Landscaper Worker	Industrial Worker
Exposure Frequency (days/year)	EF	175	175	175	175	350	350	350	350	350	350	350	350	350	250	250	175	250
Exposure Duration (years)	ED	30	8	8	8	9	8	6	6	9	8	8	6	1.0	10	1	10	10
Body Weight (kg)	BW	70	61	45	15	70	61	45	15	70	61	45	15	10	70	70	70	70
Averaging Time (days)	AT																	
Noncarcinogens		10,950	2,920	2,920	2,920	7,300	2,920	2,190	2,190	7,300	2,920	2,190	2,190	365	3,650	365	1,650	1,650
Carcinogens		25,550	NA	NA	NA	25,550	NA	NA	NA	25,550	NA	NA	NA	25,550	25,550	25,550	25,550	25,550
Conversion Factors																		
Conversion kilograms to milligrams (kg/mg)	CF	1.00E-06	1.00E-06	1.00E-06	1.00E-06	1.00E-06	1.00E-06	1.00E-06	1.00E-06	1.00E-06	1.00E-06	1.00E-06	1.00E-06	1.00E-06	1.00E-06	1.00E-06	1.00E-06	1.00E-06
Conversion factor conversion to liters (L/cm^3)	CF_2	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001
Incidental Ingestion of Soils (Intake Factor = IR_s * EF * ED * CF_1 * F_{SM} / (BW * AT))																		
Soil or Sediment Ingestion Rate (mg/day)	IR_s	200	100	100	200	NA	NA	NA	NA	NA	NA	NA	NA	100	50	100	100	NA
Fraction Ingested from Source (unitless)	FI	1	1	1	1	NA	NA	NA	NA	NA	NA	NA	NA	1	1	1	1	NA
Intake Factor (Noncarcinogens) (day^{-1})		8.57E-07	7.86E-07	1.33E-06	6.39E-06	NA	NA	NA	NA	NA	NA	NA	NA	8.57E-01	3.43E-07	8.57E-07	6.85E-07	NA
Intake Factor (Carcinogens) (day^{-1})		3.43E-07	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	7.71E-06	4.84E-06	1.14E-06	9.78E-08	NA
Dermal Contact with Soils (Intake Factor = SA_s * AF_s * ABS_d * EF * ED * CF_2 / (BW * AT))																		
Surface Area of Exposed Soils (cm^2/day)	SA_s	5,080	4,944	9,701	1,514	NA	NA	NA	NA	NA	NA	NA	NA	3,070	2,809	3,070	1,070	NA
Soil to Skin Adherence Factor (mg/cm^2)	AF	1	1	1	1	NA	NA	NA	NA	NA	NA	NA	NA	1	1	1	1	NA
Absorption Factor (unitless)																		
Dioxins	ABS_d	0.03	0.03	0.03	0.03	NA	NA	NA	NA	NA	NA	NA	NA	0.03	0.03	0.03	0.03	NA
Cadmium	ABS_d	0.001	0.001	0.001	0.001	NA	NA	NA	NA	NA	NA	NA	NA	0.001	0.001	0.001	0.001	NA
PCBs	ABS_d	0.06	0.06	0.06	0.06	NA	NA	NA	NA	NA	NA	NA	NA	0.06	0.06	0.06	0.06	NA
Arsenic	ABS_d	0.03	0.03	0.03	0.03	NA	NA	NA	NA	NA	NA	NA	NA	0.03	0.03	0.03	0.03	NA
Pentachlorophenol	ABS_d	0.25	0.25	0.25	0.25	NA	NA	NA	NA	NA	NA	NA	NA	0.25	0.25	0.25	0.25	NA
Intake Factor - Dioxins (Noncarcinogens) (day^{-1})		2.04E-06	1.87E-06	3.48E-06	1.84E-06	NA	NA	NA	NA	NA	NA	NA	NA	1.41E-01	4.21E-07	9.81E-07	6.76E-07	NA
Intake Factor - Dioxins (Carcinogens) (day^{-1})		8.17E-07	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	3.61E-04	5.83E-06	1.29E-06	9.61E-08	NA
Intake Factor - Cadmium (Noncarcinogens) (day^{-1})		2.04E-08	2.89E-08	4.92E-08	6.12E-08	NA	NA	NA	NA	NA	NA	NA	NA	6.69E-06	1.78E-08	2.09E-08	2.10E-08	NA
Intake Factor - Cadmium (Carcinogens) (day^{-1})		1.47E-08	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	9.47E-10	1.39E-09	4.35E-10	3.00E-09	NA
Intake Factor - PCBs (Noncarcinogens) (day^{-1})		2.07E-06	2.11E-06	3.96E-06	1.87E-06	NA	NA	NA	NA	NA	NA	NA	NA	2.81E-01	8.39E-07	1.96E-06	1.34E-06	NA
Intake Factor - PCBs (Carcinogens) (day^{-1})		1.63E-07	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	4.63E-04	1.16E-06	2.57E-07	1.92E-07	NA
Intake Factor - Arsenic (Noncarcinogens) (day^{-1})		1.04E-06	1.12E-06	1.98E-06	1.84E-06	NA	NA	NA	NA	NA	NA	NA	NA	1.41E-01	4.15E-07	9.81E-07	6.71E-07	NA
Intake Factor - Arsenic (Carcinogens) (day^{-1})		4.47E-07	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	2.01E-04	5.91E-06	1.39E-06	9.85E-08	NA
Intake Factor - Pentachlorophenol (Noncarcinogens) (day^{-1})		8.70E-06	9.71E-06	1.31E-01	1.51E-05	NA	NA	NA	NA	NA	NA	NA	NA	1.17E-06	3.46E-06	7.11E-06	5.26E-06	NA
Intake Factor - Pentachlorophenol (Carcinogens) (day^{-1})		3.71E-06	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	1.67E-03	4.84E-05	1.09E-05	7.91E-07	NA
Ingestion of Ground Water (Intake Factor = IR_{gw} * EF * ED / (BW * AT))																		
Ingestion Rate of Ground Water (L/day)	IR_{gw}	NA	NA	NA	NA	1.4	1.4	1.4	0.9	1.4	1.4	1.4	0.9	NA	NA	NA	NA	0.7
Intake Factor (Noncarcinogens) (L/kg-day)		NA	NA	NA	NA	3.43E-02	2.88E-02	3.19E-02	3.75E-02	1.92E-02	2.20E-02	2.73E-02	1.13E-02	NA	NA	NA	NA	4.81E-03
Intake Factor (Carcinogens) (L/kg-day)		NA	NA	NA	NA	3.47E-03	NA	NA	NA	1.47E-03	NA	NA	NA	NA	NA	NA	NA	6.86E-04
Inhalation of Airborne Vapors From Chemicals from Ground Water while Showering (Intake Factor = EF * ED / AT)																		
Inhalation Factor (Noncarcinogens) (unitless)		NA	NA	NA	NA	9.59E-01	9.59E-01	9.59E-01	9.59E-01	9.59E-01	9.59E-01	9.59E-01	9.59E-01	NA	NA	NA	NA	NA
Intake Factor (carcinogens) (unitless)		NA	NA	NA	NA	1.23E-01	NA	NA	NA	1.23E-01	NA	NA	NA	NA	NA	NA	NA	NA

Summary of Central Tendency Exposure Parameters and Intake Factors For Human Health Risk Assessment
Griffiss Air Force Base, Rome, New York

Exposure Parameter	Symbol	Recreational				Residential				Agricultural				Occupational				
		Adult	Adolescent	Youth	Child	Adult	Adolescent	Youth	Child	Adult	Adolescent	Youth	Child	Utility Worker	Pipeline Worker	Commercial Worker	Landscape Worker	Industrial Worker
Ingesting of Antigens (Vapor Phase) Chemicals from Ground Water while Adult Trucks Workers (Intake Factor = InhR * ET * EF * ED / (BW * AT))																		
Inhalation Rate (m³/hour)	InhR	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	1.7
Exposure Time (hours/day)	ET	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	8
Intake Factor (Noncarcinogens) (m³/kg-day)		NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	1.11E-03
Intake Factor (Carcinogens) (unitless) (m³/kg-day)		NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	4.76E-01
Dermal Contact with Ground Water (Intake Factor = SA * ET * EF * ED * CF / (BW * AT))																		
Surface Area of Exposed Skin (cm²)	SA	NA	NA	NA	NA	18,150	17,150	10,435	7,195	18,150	13,550	10,435	7,195	NA	NA	NA	NA	3,070
Exposure Time (hours/day)	ET	NA	NA	NA	NA	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	NA	NA	NA	NA	2
Intake Factor (Noncarcinogens) (hour-L/kg day-cm²)		NA	NA	NA	NA	1.32E-02	5.11E-02	8.94E-01	1.15E+01	6.23E-02	5.33E-02	8.94E-01	1.15E+01	NA	NA	NA	NA	4.01E-03
Intake Factor (Carcinogens) (hour-L/kg day-cm²)		NA	NA	NA	NA	1.99E-03	NA	NA	NA	7.99E-03	NA	NA	NA	NA	NA	NA	NA	8.58E-01
Ingestion of Contaminated Fruits and Vegetables (Intake Factor = $IngR_c * FI_{ag} * EF * ED / (BW * AT)$)																		
Ingestion Rate Root Crops (kg/day)	IR_{rc}	NA	NA	NA	NA	0.02	0.03	0.01	0.01	0.01	0.02	0.03	0.01	NA	NA	NA	NA	NA
Ingestion Rate Leaf/Stem Crops (kg/day)	IR_{lsc}	NA	NA	NA	NA	0.100	0.100	0.100	0.051	0.100	0.102	0.100	0.054	NA	NA	NA	NA	NA
Fraction Ingested from Source (unitless)	FI_{ag}	NA	NA	NA	NA	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	NA	NA	NA	NA	NA
Intake Factor (Noncarcinogens) (day⁻¹)																		
Root Crops		NA	NA	NA	NA	1.17E-04	1.57E-04	2.68E-04	1.32E-04	2.19E-04	2.52E-04	4.46E-04	5.11E-04	NA	NA	NA	NA	NA
Leaf/Stem Crops		NA	NA	NA	NA	6.99E-04	9.80E-04	1.96E-03	1.83E-03	1.12E-03	1.28E-03	2.17E-03	2.61E-03	NA	NA	NA	NA	NA
Intake Factor (Carcinogens) (day⁻¹)																		
Root Crops		NA	NA	NA	NA	1.34E-03	NA	NA	NA	2.50E-03	NA	NA	NA	NA	NA	NA	NA	NA
Leaf/Stem Crops		NA	NA	NA	NA	8.00E-03	NA	NA	NA	1.28E-02	NA	NA	NA	NA	NA	NA	NA	NA
Incidental Ingestion of Sediments (Intake Factor = $IR_s * CF_{ss} * FI * EF * ED / (BW * AT)$)																		
Exposure Frequency for Swimming (events/year)	EF_{sw}	26	26	26	26	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Intake Factor (Noncarcinogens) (day⁻¹)		1.07E-07	8.17E-07	1.96E-07	9.58E-07	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Intake Factor (Carcinogens) (day⁻¹)		4.56E-08	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Dermal Contact with Sediments (Intake Factor = $SA_{sw} * AF * ABS * EF_{sw} * ED * CF / (BW * AT)$)																		
Surface Area of Exposed Skin (cm²)	SA_{sw}	3,650	1,428	3,480	2,256	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Intake Factor - Dioxins (Noncarcinogens) (day⁻¹)		8.51E-08	1.97E-07	3.09E-07	1.21E-07	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Intake Factor - Dioxins (Carcinogens) (day⁻¹)		2.99E-08	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Intake Factor - Cadmium (Noncarcinogens) (day⁻¹)		3.10E-09	4.11E-09	6.99E-09	1.07E-08	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Intake Factor - Cadmium (Carcinogens) (day⁻¹)		1.51E-09	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Intake Factor - PCBs (Noncarcinogens) (day⁻¹)		1.36E-07	5.94E-07	4.19E-07	6.43E-07	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Intake Factor - PCBs (Carcinogens) (day⁻¹)		7.65E-08	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Intake Factor - Arsenic (Noncarcinogens) (day⁻¹)		9.51E-09	1.97E-07	3.09E-07	1.21E-07	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Intake Factor - Arsenic (Carcinogens) (day⁻¹)		2.99E-08	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Intake Factor - Pentachlorophenol (Noncarcinogens) (day⁻¹)		2.89E-07	1.26E-06	1.79E-06	2.74E-06	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Intake Factor - Pentachlorophenol (Carcinogens) (day⁻¹)		1.89E-07	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA

FINAL PAGE

ADMINISTRATIVE RECORD

FINAL PAGE

FINAL PAGE

ADMINISTRATIVE RECORD

FINAL PAGE

Appendix B
(Building 3 Drywell AOC Record of Decision)

Final Records of Decision for Areas of Concern (AOCs)

Former Griffiss Air Force Base
Rome, New York

November 2004



- Building 3 (DP-11)
- Lot 69 (SS-17)
- Electrical Power Substation (SS-44)

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

MAR 17 2005

Ms. Kathryn M. Halvorson
Director
AFBCA/DR
1700 North Moore Street, Suite 2300
Arlington, VA 22209-2802

Re: Records of Decision - Building 3, Lot 69 & Electric Power Substation
Griffiss Air Force Base, Rome, New York

Dear Ms. Halvorson:

This is to inform you that after considering public comments on the Proposed Plans, Griffiss Air Force Base's responsiveness summary to those comments, the Draft Records of Decision and other supporting documents, the U.S. Environmental Protection Agency (EPA) concurs with the Records of Decision for Building 3, Lot 69 and the Electric Power Substation. I have co-signed the copies of the Records of Decision on behalf of EPA and have mailed the signed Records of Decision to the New York State Department of Environmental Conservation and to Griffiss AFB.

The Records of Decision for the sites require the following: 1)institutional controls restricting the use of the site to industrial/commercial; 2) prohibiting the use of groundwater unless approval from the New York State Department of Health is received; and 3) joint 5-year reviews of the remedy.

These Records of Decision address only the above mentioned areas of concern. All other areas of Griffiss Air Force Base are being addressed under separate operable units.

If you have any questions regarding the subject of this letter, please contact me at (212) 637-4405 or have your staff contact Douglas Pocze at (212) 637-4432.

Sincerely,

William McCabe,
Acting Director,
Emergency and Remedial Response Division

cc: Mr. Dale A. Desnoyers, Director, NYSDEC w/encl.

DEPARTMENT OF THE AIR FORCE
AIR FORCE REAL PROPERTY AGENCY

U.S. EPA, REGION II
EMER. & REM. RES. DIV.
2004 DEC 21 AM 7:39
DIRECTOR'S OFFICE
DEC 20 2004

AFRPA/DR
1700 North Moore Street, Suite 2300
Arlington, VA 22209-2802

Mr. William McCabe
Acting Director
Emergency & Remedial Response Division
U.S. EPA, Region II
290 Broadway - 26th Floor
New York, NY 10007-1866

Dear Mr. McCabe,

We are pleased to forward for your signature the Records of Decision (RODs) for the Building 3 Drywell Area of Concern (DP-11), the Lot 69 Area of Concern (SS-17), and the Electrical Power Substation Area of Concern (SS-44) at the former Griffiss Air Force Base (AFB), New York. These RODs represent another milestone in the successful clean up of Griffiss AFB and is a result of our partnership with the State of New York and U. S. Environmental Protection Agency. We would like to thank Mr. Douglas Pocze for his assistance in accomplishing these RODs.

After signature, please retain one copy of each ROD for your records. Forward one copy of each ROD to New York State Department of Environmental Conservation, Attn: Ms. Heather Bishop, Bureau of Eastern Remedial Action, 625 Broadway, 11th Floor, Albany, NY 12233-7015, and send the final copy of each ROD to the Air Force Real Property Agency/Griffiss, Attn: Mr. Michael F. McDermott, 153 Brooks Road, Rome, NY 13441-4105.

Our point of contact for this effort is Mr. James Waldron, our Environmental Coordinator for Griffiss who can be reached at (703) 696-5243.

Sincerely

KATHRYN M. HALVORSON
Director

Attachment:
RODs, Building 3 (DP-11), Lot 69 (SS-17), and
Electrical Power Substation (SS-44)

DEPARTMENT OF THE AIR FORCE
AIR FORCE REAL PROPERTY AGENCY

November 5, 2004

MEMORANDUM FOR Mr. James Waldron
AFRPA/DA-EC
1400 Key Blvd., 4th Floor
Arlington, VA 22209

FROM: AFRPA/DA-Griffiss
153 Brooks Road
Rome, NY 13441-4105

SUBJECT: Submittal - Final Records of Decision for Area of Concern Sites
Building 3, Lot 69, Electrical Power Substation

1. Enclosed, please find the final Records of Decision (RODs) for Area of Concern Sites (AOCs) Building 3 Drywell (DP-11), Lot 69 (SS-17) and Electrical Power Substation (SS-44). Please forward to the Acting Director for her signature and send three (3) signed copies to the U.S. Environmental Protection Agency, Region II.

2. If you have any questions, please contact Cathy Jerrard at (315) 330-2275.

for MICHAEL F. MCDERMOTT
Site Manager/BRAC Environmental Coordinator

Enclosure: Final RODs for AOCs Building 3 Drywell, Lot 69, Electrical Power Substation

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

Erin M. Crotty
Commissioner

SEP 10 2004

Mr. George Pavlou
Director
Emergency & Remedial Response Division
US Environmental Protection Agency
Floor 19 - #E38
290 Broadway
New York, New York 10007-1866

RE: Former Griffiss Air Force Base, Site #633006
August 2004 Records of Decision (RODs):
Record of Decision Lot 69 Area of Concern
Record of Decision Building 3 Drywell Area of Concern
Record of Decision Electrical Power Substation Area of Concern

Dear Mr. Pavlou:

The New York State Department of Environmental Conservation and the New York State Department of Health have reviewed the three August 2004 Record of Decision (ROD) documents for the above Areas of Concern at the Former Griffiss Air Force Base. The State concurs with the selected actions in each of the RODs involving the application of industrial / commercial land use and groundwater use restrictions.

If you have any questions, please contact Dr. Chittibabu Vasudevan at (518) 402-9625.

Sincerely,

Dale A. Desnoyers
Director
Division of Environmental Remediation

cc: J. Malleck, USEPA
D. Pocze, USEPA
M. McDermott, AFRPA/DA



Final
Record of Decision for the Building 3 Drywell Area of Concern (DP-11) at the Former Griffiss Air Force Base Rome, New York

November 2004

AIR FORCE REAL PROPERTY AGENCY

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List of Abbreviations and Acronyms

AFB	Air Force Base
AFRPA	Air Force Real Property Agency (formerly Air Force Base Conversion Agency)
AOC	Area of Concern
ARAR	Applicable or Relevant and Appropriate Requirements
ATSDR	Agency for Toxic Substances and Disease Registry
BGS	below ground surface
BRAC	Base Realignment and Closure Act
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
COPCs	chemicals of potential concern
DBCRA	Defense Base Closure and Realignment Act
DoD	United States Department of Defense
EIS	Environmental Impact Statement
EPA	United States Environmental Protection Agency
FFA	Federal Facility Agreement
HI	Hazard Index
HQ	Hazard Quotient
IRP	Installation Restoration Program
NCP	National Oil and Hazardous Substances Pollution Contingency Plan
NPL	National Priorities List
NYSDEC	New York State Department of Environmental Conservation
NYSDOH	New York State Department of Health
PCB	polychlorinated biphenyl
RI	remedial investigation
ROD	Record of Decision
SARA	Superfund Amendments and Reauthorization Act
SVOC	semivolatile organic compound
VOC	volatile organic compound

1 Declaration

1.1 Site Name and Location

The Building 3 Drywell Area of Concern (AOC) (site identification designation DP-11) is located at the former Griffiss Air Force Base (AFB) in Rome, Oneida County, New York.

1.2 Statement of Basis and Purpose

This Record of Decision (ROD) presents land and groundwater use restrictions as the Selected Remedy for the Building 3 Drywell AOC at the former Griffiss AFB. This alternative has been chosen in accordance with the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) of 1980, as amended by the Superfund Amendments and Reauthorization Act (SARA), and the National Oil and Hazardous Substances Pollution Contingency Plan (NCP). The remedy has been selected by the United States Air Force (Air Force), in conjunction with the United States Environmental Protection Agency (EPA), and with the concurrence of the New York State Department of Environmental Conservation (NYSDEC) pursuant to the Federal Facility Agreement (FFA) among the parties under Section 120 of CERCLA. This decision is based on the administrative record file for this site.

1.3 Assessment of the Site

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

1.4 Description of Selected Remedy

The Selected Remedy for the Building 3 Drywell AOC is land use restrictions for industrial/commercial use and groundwater use restrictions. Land and groundwater use restrictions will be implemented to minimize the exposure of any future users of the property including Air Force personnel, lessees/sublessees, transferees, and construction workers to any remaining hazardous substances located on the property encompassed by the Building 3 Drywell AOC. Under the Base Realignment and Closure Act (BRAC) 1993 realignment, this site is located on property that is being retained by the United States Department of Defense (DoD) and is being utilized by the Air Force Research Laboratory Information Directorate as a research and development facility. The following use restrictions and controls will be placed on the property to ensure that use of the property is consistent with the risk assessment:

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

- The owner or occupant of this site shall not extract, utilize, consume, or permit to be extracted, any water from the subsurface aquifer within the boundary of the site (see Figure 3) unless such owner or occupant obtains prior written approval from the NYSDOH.

The baseline risk assessment indicated that the concentrations of contaminants present in the groundwater were within or below EPA's acceptable carcinogenic risk range and posed no noncarcinogenic risk to utility, construction, and industrial workers.

A qualitative risk assessment of soil indicated that the potential risk to utility and construction workers from exposure to soil at the site are expected to be minimal. Therefore, the concentrations of the contaminants in the groundwater and any potential remaining contaminants in the soil, and the results of the baseline risk assessment demonstrate that site contaminants, in conjunction with the land and groundwater use restrictions mentioned earlier, pose no current or potential threat to public health or the environment.

The Air Force is responsible for implementing, maintaining, monitoring, and enforcing the land and groundwater use restrictions. The above restrictions will be maintained until the concentrations of hazardous substances in the soil and groundwater have been reduced to levels that allow for unlimited exposures and unrestricted use. It is anticipated that successful implementation, operation, maintenance, and enforcement of these land use restrictions in accordance with the terms of this ROD will achieve protection of human health and the environment and compliance with all legal requirements. Approval by the Air Force and EPA, with concurrence from NYSDEC, is required for any modification or termination of land use or groundwater use restrictions.

To ensure implementation of land use restrictions, the Air Force has administrative procedures that require project approvals for projects that require construction or subsurface soil disturbance (for example, Air Force Instruction [AFI] 32-1021, Planning and Programming of Facility Construction Projects, and work request procedures under AFI 32-1001, Operations Management, or their equivalents as they may be amended). Air Force instructions and procedures require coordination with and prior approval by environmental personnel if a proposed project is located on or near an environmental restoration project (ERP) site. The Air Force will ensure that these or equivalent instructions, processes, and/or requirements will be complied with for all proposed construction or subsurface soil-disturbing activities at the Building 3 Drywell site.

In the future, if this property is transferred to a non-federal entity, the deed from the United States will contain the above restrictions to ensure that the reuse of the site is consistent with the risk assessment. The Air Force will notify the EPA and NYSDEC prior to such transfer.

1.5 Statutory Determinations

It has been determined that no additional removal action is necessary at the Building 3 Drywell AOC. The Air Force Real Property Agency (AFRPA) and EPA, with concurrence from NYSDEC, have determined that land use restrictions for industrial/commercial use and groundwater use restrictions are warranted at this site. Future landowners will be bound, through the property deed, to the industrial/commercial reuse of the area and groundwater use restrictions within the Building 3 Drywell AOC boundary.

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) any groundwater use has been approved by the NYSDOH prior to use.

1.6 ROD Data Certification Checklist

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

- The chemicals of potential concern (COPCs) and their respective concentrations are presented in Section 2.5, Site Characteristics.
- Current and reasonably anticipated future land and groundwater use assumptions used in the baseline risk assessment and ROD are presented in Section 2.6, Current and Potential Future Site and Resource Uses.
- The baseline risk represented by the COPCs is presented in Section 2.7, Summary of Site Risks.

1.7 Authorizing Signatures

On the basis of the remedial investigation performed at the Building 3 Drywell AOC, there is no evidence that residual contamination at this site poses a current or future potential threat to human health or the environment when used for industrial/commercial purposes and when groundwater use is restricted. Future landowners will be bound, through the property deed, to the industrial/commercial reuse of the property. The New York State Department of Environmental Conservation has concurred with the Selected Remedy presented in this Record of Decision.

Kathryn M. Halvorson — DEC 2 0 2004

Kathryn M. Halvorson
Director
Air Force Real Property Agency

Date

William McCabe — March 17, 2005

William McCabe
Acting Director, Emergency and Remedial Response Division
United States Environmental Protection Agency, Region 2

Date

2 Decision Summary

2.1 Site Name, Location, and Brief Description

The Building 3 Drywell AOC (site identification designation DP-11) is located at the former Griffiss AFB in Rome, Oneida County, New York. Pursuant to Section 105 of CERCLA, Griffiss AFB was included on the NPL on July 15, 1987. On August 21, 1990, the EPA, NYSDEC, and the Air Force entered into a FFA under Section 120 of CERCLA.

The Building 3 Drywell AOC is located in the central industrialized portion of the former Griffiss AFB (see Figure 1). Building 3 was the location of a former industrial shop. The drywell was located on the east side of Building 3 (see Figure 2).

2.2 Site 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 Air Force Research Laboratory Information Directorate, established with the mission of accomplishing applied re-

search, development, and testing of electronic air-ground systems). The 49th Fighter Interceptor Squadron was also added. The Headquarters of the Ground Electronics Engineering Installations Agency was established in June of 1958 to engineer and install ground communications equipment throughout the world. On July 1, 1970, the 416th Bombardment Wing of the Strategic Air Command was activated with the mission of maintenance and implementation of both effective air refueling operations and long-range bombardment capability. Griffiss AFB was designated for realignment under the Base Realignment and Closure Act in 1993 and 1995, resulting in deactivation of the 416th Bombardment Wing in September 1995. The Air Force Research Laboratory Information Directorate and the Northeast Air Defense Sector will continue to operate at their current locations; the New York Air National Guard 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 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 materiel; research and development; and aircraft operations and maintenance.

Numerous studies and investigations under the DoD 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 included a records search in 1981 (Engineering Science 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 (Weston 1982) and 1985 (Weston 1985); soil and groundwater analyses in 1986; a basewide health assessment in 1988 performed by the U.S. Public Health Service,

Agency for Toxic Substances and Disease Registry (ATSDR) (ATSDR 1988); base-specific hydrology investigations in 1989 and 1990; a groundwater investigation in 1991 (Geotech 1991); and site-specific investigations between 1989 and 1993. ATSDR issued a Public Health Assessment for Griffiss AFB, dated October 23, 1995 (ATSDR 1995), and an addendum, dated September 9, 1996. A remedial investigation (RI) was conducted in 1994 and the draft-final RI report covering 31 AOCs was delivered to EPA and NYSDEC in December 1996 (Law 1996). A Supplemental Investigation Report was delivered in July 1998 (E & E 1998).

2.3 Community Participation

A proposed plan for the Building 3 Drywell AOC (AFRPA 2002), indicating land and groundwater use restrictions was released to the public on Wednesday, January 23, 2002. The document was made available to the public in both the administrative record file located at 153 Brooks Road in the Griffiss Business and Technology Park and in the Information Repository maintained at the Jervis Public Library. The notice announcing the availability of this document was published in the *Rome Sentinel* on Monday, January 21, 2002. A public comment period lasting from January 23, 2002 to February 21, 2002 was set up to encourage public participation in the alternative selection process. In addition, a public meeting was held on Thursday, February 7, 2002. The AFRPA, NYSDEC, and the NYSDOH held an information session at the beginning of the public meeting and answered questions about issues at the AOC and the proposal under consideration. A response to the comments received during this period is included in the Responsiveness Summary, which is part of this ROD (see Section 3).

2.4 Scope and Role of Site Response Action

The scope of the plan for land and groundwater use restrictions for the Building 3 Drywell AOC addresses the concerns for human health and the environment. The land use restrictions for industrial/commercial use are consistent with the risk assessment performed for occupational workers.

2.5 Site Characteristics

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

The Building 3 Drywell AOC is located in the central industrialized portion of the base (see Figure 1). Surface water runoff in the area of the former drywell drains to Six Mile Creek. Groundwater flows in an easterly direction at this location and is at a depth of 8 to 8.5 feet below ground surface (BGS). Subsurface soil in the area of Building 3 is silty sands from 2 to 4 feet BGS and sandy gravel to gravelly sand from 4 to 12 feet BGS.

Building 3 was the location of a former industrial shop. The drywell was located on the east side of Building 3 next to an aboveground storage tank for liquid nitrogen (see Figure 2).

Usage of the drywell began in the 1960s and continued through 1984. The drywell was an open-bottom, earthen pit with a 5-gallon capacity. Materials disposed of included cleaning solvents, etching acids with metal salts, and paint thinner, methanol, acetone, and trichloroethylene. The drywell and contaminated soil were removed in June 1987. The former drywell area is now covered with gravel. The site boundary is illustrated in Figure 3. The following actions were taken during removal of the drywell:

- The existing exterior waste line was disconnected;
- The 5-gallon earthenware acid retention tank was removed;
- The contaminated area was excavated to a depth of 10 feet;
- Post-excavation soil samples were collected and analyzed for metals (organic compounds were not analyzed for);

- The exterior waste line at the building exterior wall was capped; and
- The area was backfilled with clean soil.

Site Investigations

In June 1987, the drywell and surrounding contaminated soil were excavated to 10 feet BGS. Subsurface soil sampling was conducted in August 1987 after excavation of the drywell. The soil samples were analyzed for metals and all of the results were nondetect using the toxicity characteristic leaching procedure (TCLP) extraction process. The soil was not analyzed for organic compounds.

In 1994, an RI was performed. 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 if any remedial action was necessary to prevent potential threats to human health and the environment that might arise from exposure to site conditions. Subsurface soil sampling was attempted in 1994 as part of the RI to confirm whether any residual soil contamination remained below the depth of the original drywell. However, the presence of gravel and cobbles prevented collection of the subsurface samples at the desired depth.

Two groundwater samples, one from each soil boring were collected and designated B3HP-1 and B3HP-2. Analysis of the samples indicated the presence of four volatile organic compounds (VOCs), seven semivolatile organic compounds (SVOCs), and 21 metals. The concentrations of 11 metals and total recoverable petroleum hydrocarbons exceeded the most stringent criterion for groundwater (see Table 1). Groundwater samples from soil borings are typically more turbid than groundwater samples from a monitoring well because they are not collected from a well that has been developed and purged prior to sampling. Due to this turbidity, concentrations of metals in soil boring groundwater samples are often elevated above concentrations in groundwater samples from monitoring wells.

An RI supplemental investigation was performed for the Building 3 Drywell in 1997. A single new vertical profile well was installed (B3VMW-1) because the RI groundwater sample results indicated the presence of low levels of chlorinated VOCs (be-

low most stringent criteria but detected at less than 2 µg/L). The samples were collected at 10-foot intervals beginning at the top of the water table (11 feet) to the top of bedrock and analyzed in the field. Five samples were collected to a depth of 48 feet. The well screen was then placed in the zone with the highest concentration of contaminants. Trichloroethylene was detected at the first screening interval only, and no other VOCs were detected. Therefore, the well screen was placed at the 8- to 18-foot depth interval. The groundwater sample indicated the presence of four VOCs and one SVOC (see Table 1A). None of the concentrations exceeded the most stringent criterion.

2.6 Current and Potential Future Site and Resource Uses

Griffiss AFB was designated for realignment under the Defense Base Closure and Realignment Act (DBCRA) in 1993 and 1995, resulting in deactivation of the 416th Bombardment Wing in September 1995. As a result of the realignment, a Master Reuse Strategy was developed by the Griffiss Local Development Corporation to provide the framework for reuse of the base after realignment and closure. The proposed reuse plan recommended in the final Master Reuse Strategy was evaluated in the Final Environmental Impact Statement (EIS) dated November 1995. As outlined in the Master Reuse Plan and EIS, the current land use designation for the Building 3 AOC is industrial. Following base realignment, this building was retained as part of an Air Force research and development complex with a land use designation of commercial/administrative. Currently, groundwater at the site is not being used as a resource. In the future, if this property is transferred to a non-federal entity, the deed from the United States will designate the use of the property for industrial/commercial use only and will prohibit the use of groundwater at the site unless prior written approval is granted by the NYSDOH. The Air Force will notify the EPA and NYSDEC prior to such transfer.

2.7 Summary of Site Risks

Site risks were analyzed based on the extent of contamination at the Building 3 Drywell AOC. As part of the RI, a baseline risk assessment was conducted to evaluate current and future potential risks to human health and the environment associated with

contaminants found in the groundwater and any potential remaining contaminants in the soil at the site. The results of this assessment were considered when formulating this land and groundwater use restrictions proposal.

2.7.1 Human Health Risk Assessment

A baseline human health risk assessment was conducted during the RI to determine whether chemicals detected at the Building 3 Drywell 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 [HI] 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 COPCs with the exception of metals 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 evaluated the effects of exposure of potential future utility, construction, and industrial workers that may be exposed to chemicals detected in site media. The various exposure scenarios for each population are described in Table 2. The soil exposure scenarios were evaluated qualitatively due to the lack of analytical data to support a quantitative assessment. Intake assumptions, which are based on EPA guidance, are more fully described in the RI report.

Quantitative estimates of carcinogenic and noncarcinogenic risks from exposure to groundwater were calculated for the Building 3 Drywell 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 increase in the probability of an individual developing cancer over a lifetime as a result of exposure to the potential carcinogen. The risks associated with exposure to 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 less than 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 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.

EPA bases its decision to conduct site remediation on the risk to human health and the environment. Cleanup actions may be taken when EPA determines that the risk at a site exceeds the cancer risk level of 1 in 10,000 (1×10^{-4}) or if the noncarcinogenic HI exceeds a level of 1. If either of these thresholds is exceeded, the 1 in 1,000,000 (1×10^{-6}) risk level and an HI of 1 or less may be used as the point of departure for determining remediation goals for alternatives.

Potential risks from exposure to COPCs at the Building 3 Drywell AOC were evaluated for utility, construction, and industrial workers during the RI. Metals were not included as COPCs in the groundwater because the sample was from a soil boring. The potential carcinogenic and noncarcinogenic risks from exposure to soil and groundwater are summarized below and in Table 3.

Carcinogenic Risk

The total carcinogenic risk from exposure to contaminants in groundwater by industrial workers was 2×10^{-7}, which is below the EPA's target risk range. The pathway-specific risks from ingestion and inhalation of VOCs released from groundwater, and dermal exposure to groundwater were 2×10^{-7}, 1×10^{-8} and 2×10^{-8}, respectively.

Utility and construction workers could be exposed to potential residual contamination in subsurface soil during excavation activities at the site. During the removal of the drywell and the upper 10 feet of soil at the drywell location in 1987, the water table was encountered between 8 and 8.5 feet BGS in the soil borings at the site. Thus, it is unlikely that any residual contamination remains in the soil above the water table. Therefore, the potential risks to utility and construction workers from exposure to soil at this site are expected to be minimal.

Noncarcinogenic Risk

The total HI for industrial workers exposed to groundwater was 0.006, which is significantly less than the benchmark value of 1. The total individual HIs for ingestion of

groundwater, dermal exposure to groundwater, and inhalation of VOCs released from groundwater were 0.005, 0.0005, and 0.000002 respectively.

Summary

The results of the human health baseline risk assessment indicate that contaminants found in the groundwater and any potential remaining contaminants in the soil should not present a risk to current and future utility, construction, and industrial workers. Quantitative evaluation of risk is subject to several conservative assumptions and should not be considered an absolute measure of risk.

2.7.2 Uncertainties

Uncertainties exist in many components 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. Examples of uncertainties associated with the risk assessment for this AOC include (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) Subsurface soil samples could not be collected from the two soil borings due to excessive cobblestones at the AOC. This data gap could potentially cause an underestimate of risk; (3) A toxicological criterion was not available for one chemical found at the site (phenanthrene), which may result in a potential underestimation of risk; (4) It was assumed that groundwater would be used in the future 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 existing water supplies at the former base and in the city of Rome. This would result in a potential overestimation of risk; and (5) Grab groundwater samples are typically very turbid, which results in reported chemical concentrations that are most likely elevated, and potentially results in an overestimation of risk.

2.7.3 Ecological Risk Assessment

A baseline risk assessment for ecological receptors at the Building 3 Drywell AOC was conducted during the RI. Since Building 3 Drywell 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 industrial/commercial. Therefore, potential exposures related to this AOC are not expected to exist.

Modeling of bioaccumulation to higher order species was not performed, nor was the cumulative effect of multiple contaminants considered; this tends to underestimate the risk to ecological receptors.

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 (Corey 1994). 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 site based upon the site data presented in the RI and Supplemental Investigation reports:

Restrict Exposure to Contamination

Land and groundwater use restrictions within the site boundary (see Figure 3) will be implemented to restrict site use to industrial/commercial use only and restrict use of the groundwater.

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

- Prevent the use of the contaminated groundwater for drinking water or any other purposes that could result in the inhalation of vapors from, dermal absorption of, or ingestion of the contaminated groundwater.

- Prevent the discharge of the contaminated groundwater withdrawn during construction dewatering activities to the ground or surface water, without prior

concurrence of the NYSDEC, since this discharge could exacerbate the spreading of the contamination and may require a discharge permit.

- Prevent residential housing, elementary and secondary schools, childcare facilities and playgrounds on Building 3 AOC since the risk assessment was evaluated for only non-residential use scenarios (future use) and not for unrestricted use.

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 for industrial/commercial use, and (3) any groundwater use has been approved by the NYSDOH prior to use.

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 groundwater use restrictions 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 3 Drywell 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 Groundwater Use Restrictions Alternative

This alternative includes land use restrictions for industrial/commercial use and groundwater use 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 3 Drywell 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 3 AOC property for residential housing, elementary and secondary schools, childcare facilities and playgrounds will be prohibited unless prior approval is received from the Air Force, EPA, and NYSDEC; and

- The owner or occupant of this site shall not extract, utilize, consume, or permit to be extracted, any water from the subsurface aquifer within the boundary of the site (see Figure 3) unless such owner or occupant obtains prior written approval from the NYSDOH.

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) any groundwater use has been approved by the NYSDOH prior to use. 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 3 Drywell 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 fully after the formal public comment period on the Proposed Plan is complete:

8. State acceptance indicates whether, based on its review of the RI and the Proposed Plan, the State supports or opposes the 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 3 Drywell AOC to restrict its use. Based on the concentrations of contaminants in the groundwater, however, the results of the baseline risk assessment indicate that, although the concentrations of some chemicals exceed the groundwater standards, Building 3 Drywell poses no unacceptable health risk from exposure to the groundwater for utility, construction, and industrial workers. The potential risks to utility and construction workers from exposure to soil are expected to be minimal because the contaminated soil around the drywell was removed and it is unlikely that any residual contamination remains in the soil above the water table.

   The proposed alternative will prevent unnecessary exposure to the soil and groundwater (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. Currently there are no chemical specific ARARs for soil (other than for polychlorinated biphenyls [PCBs]). Therefore, other non-promulgated federal and state advisories and guidance values, referred to as To-Be-Considereds and background levels of the contaminants were used.

   The Selected Remedy alternative applies to soil and groundwater at the site. The Selected Remedy alternative will limit exposure to soil and groundwater through the implementation of land use and groundwater use restrictions. There is no evidence that chemical concentrations in the soil or in the groundwater at this site pose a current or future potential threat to human health or the environment when used for industrial/commercial purposes and when groundwater use 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) any groundwater use has been approved by the NYSDOH prior to use.

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 future ingestion of groundwater and exposure to potentially contaminated soil by portions of the human population other than utility, construction, and industrial workers.

   For the Selected Remedy alternative, the implementation of land use and groundwater use restrictions will eliminate human contact with any potentially contaminated soil and groundwater. 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, and therefore, does not result in any reduction of toxicity, mobility, or volume. However, the levels of contamination found in the soil and groundwater do not warrant treatment. Although treatment will not be employed, this alternative will eliminate potential exposures to the soil and groundwater.

5. Short-term Effectiveness

   The No Action alternative would not be an effective alternative because the potential for human exposure to contaminated soil and ingestion of groundwater would continue to exist.

   For the Selected Remedy alternative, land use and groundwater use 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 (under 1993 BRAC realignment, this site is located on property that is being retained by the DoD) with no utilization of groundwater. Any future deed restrictions will ensure that these controls remain intact.

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 groundwater use 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 groundwater 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 3 Drywell AOC.

2.12 Selected Remedy

The Selected Remedy for the Building 3 Drywell AOC is land use restrictions for industrial/commercial use and groundwater use restrictions. Land and groundwater use restrictions will be implemented to minimize the exposure of any future users of the property including Air Force personnel, lessees/sublessees, transferees, and construction workers to any remaining hazardous substances located on the property encompassed by the Building 3 Drywell AOC (see Figure 3).

The Air Force is responsible for implementing, maintaining, monitoring, and enforcing the land and groundwater use restrictions. It is anticipated that successful implementation, operation, maintenance, and enforcement of these land use restrictions in accordance with the terms of this ROD will achieve protection of human health and the environment and compliance with all legal requirements. Approval by the Air Force and

EPA, with concurrence from NYSDEC, is required for any modification or termination of land use or groundwater use restrictions.

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

- Prevent the use of the contaminated groundwater for drinking water or any other purposes that could result in the inhalation of vapors from, dermal absorption of, or ingestion of the contaminated groundwater.

- Prevent the discharge of the contaminated groundwater withdrawn during construction dewatering activities to the ground or surface water, without prior concurrence of the NYSDEC, since this discharge could exacerbate the spreading of the contamination and may require a discharge permit.

- Prevent residential use of Building 3 AOC since the risk assessment was evaluated for only non-residential use scenarios (future use) and not for unrestricted use.

To achieve these goals and objectives, the Air Force is requiring that use restrictions and controls be placed on the property to ensure that reuse is consistent with the risk assessment. The following are the corresponding use restrictions and controls on the property:

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

- The owner or occupant of this site shall not extract, utilize, consume, or permit to be extracted, any water from the subsurface aquifer within the boundary of the site (see Figure 3) unless such owner or occupant obtains prior written approval from the NYSDOH.

The baseline risk assessment indicated that the concentrations of contaminants present in the groundwater were within or below EPA's acceptable carcinogenic risk range and posed no noncarcinogenic risk to utility, construction, and industrial workers. A qualitative risk assessment of soil indicated that the potential risk to utility and construction workers from exposure to soil at the site are expected to be minimal. Therefore,

the concentrations of the contaminants in the groundwater and any potential remaining contaminants in the soil, and the results of the baseline risk assessment demonstrate that site contaminants, in conjunction with the land and groundwater use restrictions mentioned earlier, pose no current or potential threat to public health or the environment.

The above restrictions shall be maintained until the concentrations of hazardous substances in the soil and groundwater has been reduced to levels that allow for unlimited exposures and unrestricted use. Approval by the Air Force and EPA with concurrence from NYSDEC is required for any modification or termination of land use or groundwater use restrictions. Under the Base Realignment and Closure Act (BRAC) 1993 realignment, this site is located on property that is being retained by the United States Department of Defense (DoD) and is being utilized by the Air Force Research Laboratory Information Directorate as a research and development facility. To ensure implementation of land use restrictions, the Air Force has administrative procedures that require project approvals for projects that require construction or subsurface soil disturbance (for example, Air Force Instruction [AFI] 32-1021, Planning and Programming of Facility Construction Projects, and work request procedures under AFI 32-1001, Operations Management, or their equivalents as they may be amended). Air Force instructions and procedures require coordination with and prior approval by environmental personnel if a proposed project is located on or near an environmental restoration project (ERP) site. The Air Force will ensure that these or equivalent instructions, processes, and/or requirements will be complied with for all proposed construction or subsurface soil-disturbing activities at the Building 3 Drywell site.

If this property is transferred to another federal entity or a non-federal entity in the future, the EPA and NYSDEC will be notified at least six months prior to such transfer. If the six-month notification is not possible, the EPA and NYSDEC will be notified no later than 60 days prior to such transfer.

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

Deed Restrictions: The transfer of fee title from the United States will include a CERCLA 120(h)(3) covenant which will contain a description of the residual contamination on the property and the environmental use restrictions, described above, expressly prohibiting activities inconsistent with the performance measure goals and objectives.

The environmental restrictions will be included in the deed for any property that has had hazardous substances stored for one year or more, known to have been released or disposed of on the property. The Air Force will consult with the EPA and NYSDEC on the deed restriction language. The deed will contain appropriate provisions to ensure that the restrictions continue to run with the land. The deed will also contain a reservation of access to the property for the Air Force, EPA, and the NYSDEC, and their respective officials, agents, employees, contractors, and subcontractors for purposes consistent with the Air Force IRP and the FFA.

Lease Restrictions: Prior to conveyance by deed of property where the residual contamination is located, and when such property is leased, the Air Force will include in the lease a description of the residual contamination and language explicitly prohibiting activities inconsistent with such goals and include lease terms that are equivalent to the use restrictions and controls described in this ROD. The lease restrictions will be operational and will remain in place until the property is transferred by deed. At the moment of deed transfer, the lease restrictions will be superseded by the restrictions in the federal deed, which will include lease terms that are equivalent to the use restrictions and controls described in this ROD.

Notice: Concurrent with the transfer of fee title, information regarding the environmental use restrictions controls will be communicated in writing to the property owners and to appropriate state and local agencies to ensure such agencies can factor such conditions into their oversight and decision-making activities regarding the property. The Air Force will also provide a copy of the deeds to the regulatory agencies as soon as practicable after the transfer of fee title.

Monitoring and Enforcement:

Monitoring: Monitoring of the environmental use restrictions will be conducted on an annual basis. The monitoring results will be included in a separate report or as a section in another environmental report, if appropriate, and provided to EPA and NYSDEC. The environmental use monitoring reports will be used in the preparation of the five-year reviews to evaluate the effectiveness of the remedy. Five-year review reports will make recommendations on the continuation or modification of the monitoring reports and environmental use monitoring frequencies. The Five-year review reports will be submitted to the regulatory agencies in accordance with the FFA.

The environmental use monitoring report, submitted to the regulatory agencies by the Air Force, will evaluate the status of the land and groundwater use restrictions and how any use restriction deficiencies have been addressed. The annual evaluation will address whether the use restrictions were communicated in the deed(s), whether the owners and state and local agencies were notified of the use restrictions affecting the property, and whether use of the property has conformed to such restrictions.

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

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

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

State Land Use Notification Requirements: Consistent with the stated purposes of recent amendments to the New York Environmental Conservation Law enacting Section 27-1318, Institutional and Engineering Controls, the Air Force will meet the annual certification of Section 27-1318(C) through the annual monitoring report described above. Prior to property transfer, any grantee will be notified of any state land use control notification or reporting requirements.

The Air Force may arrange for third parties or other entities to perform any and all of the above actions. Any such arrangement shall be undertaken and executed in accordance with all applicable legal requirements, to include the Air Force's functions, obligations, and responsibilities under CERCLA. However, the Air Force shall retain ultimate responsibility for remedy integrity.

2.13 Statutory Determinations

It has been determined that no additional removal action is necessary at the Building 3 Drywell AOC. The AFRPA and EPA, with concurrence from NYSDEC, have determined that land use restrictions for industrial/commercial use and groundwater use restrictions are warranted for this site. Future landowners will be bound, through the property deed, to the industrial/commercial reuse of the area within the Building 3 Drywell AOC boundary and groundwater use restrictions.

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) any groundwater use has been approved by the NYSDOH prior to use.

2.14 Documentation of Significant Changes

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

Table 1
COMPOUNDS EXCEEDING STANDARDS AND GUIDANCE VALUES
BUILDING 3 DRYWELL AOC
RI GROUNDWATER SAMPLES

Compound	Range of Detected Concentrations	Frequency of Detection Above Most Stringent Criterion	Most Stringent Criterion
Metals (mg/L)			
Aluminum	3.3 J - 140 J	2/2	0.05 [a]
Arsenic	0.005 - 0.027	1/2	0.025 [a]
Barium	0.073 - 1.2	1/2	1.0 [b]
Beryllium	0.005	1/2	0.003 [b]
Chromium	0.27	1/2	0.05 [b]
Copper	0.039 - 1.1	1/2	0.2 [b]
Iron	11.7 - 613	2/2	0.3 [b]
Lead	0.014 - 0.26	1/2	0.015 [d]
Manganese	2.8 - 58	2/2	0.05 [a]
Mercury	0.00075	1/2	0.0007 [b]
Nickel	0.66	1/2	0.1 [b]
Wet Chemistry (mg/L)			
Petroleum Hydrocarbons	1.1 J - 10.1 J	2/2	0.1 [a]

[a] Federal secondary maximum contaminat level

[b] NYSDEC Class GA groundwater standard; June 1998

[c] NYSDEC Class GA groundwater guidances; June 1999

[d] Federal primary maximum contaminat level

Key:
J = Estimated concentration

Table 1A
FREQUENCY OF DETECTION
SI GROUNDWATER SAMPLE

Compound	Range of Detected Concentrations	Frequency of Detection Above Most Stringent Criterion	Most Stringent Criterion
VOCs (µg/L)			
1,1,1Trichloroethane	0.83	0	5 [a]
Chloroform	1.0	0	7 [a]
Tetrachloroethene	0.36 J	0	5 [a]
Trichloroethene	2.7	0	5 [a]
SVOCs (µg/L)			
Bis(2-ethylhexyl)phthalate	5.7	0	6 [b]

[a] NYSDEC Class GA groundwater standard; June 1998

[b] Federal primary maximum contaminant level

Key:
J = Estimated concentration

Table 2
BUILDING 3 DRYWELL AOC
RISK ASSESSMENT
EXPOSURE SCENARIOS

UTILITY AND CONSTRUCTION WORKERS	INDUSTRIAL WORKER
• Incidental ingestion of soil • Inhalation of fugitive dust • Dermal contact with soil	• Ingestion of groundwater • Dermal contact with groundwater (during showering) • Inhalation of VOCs from groundwater (during showering)

Table 3
BUILDING 3 DRYWELL AOC
RI SUMMARY OF RISKS

HUMAN HEALTH RISKS

Pathway	Receptor	Site Condition	Cancer Risk	Noncancer Risk
Subsurface Soil (ingestion, inhalation, dermal contact)	Utility worker	Future	Qual*	Qual*
	Construction worker	Future	Qual*	Qual*
Groundwater (ingestion, inhalation of VOCs, dermal)	Industrial workers	Future	2×10^{-7}	0.006

* Evaluated qualitatively due to presence of gravel and cobbles, which prevented collection of samples.

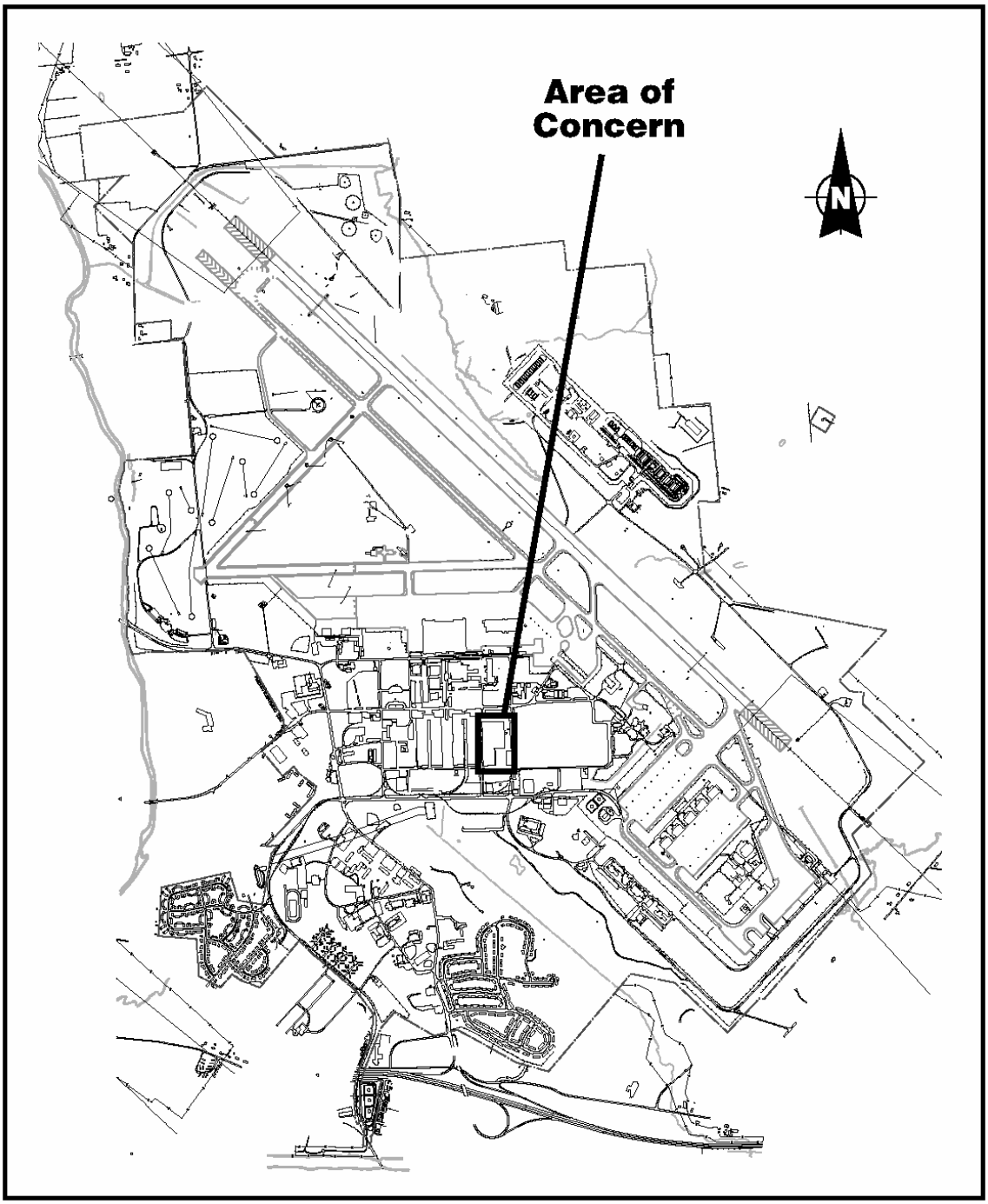

Figure 1 Location of Building 3 Drywell AOC

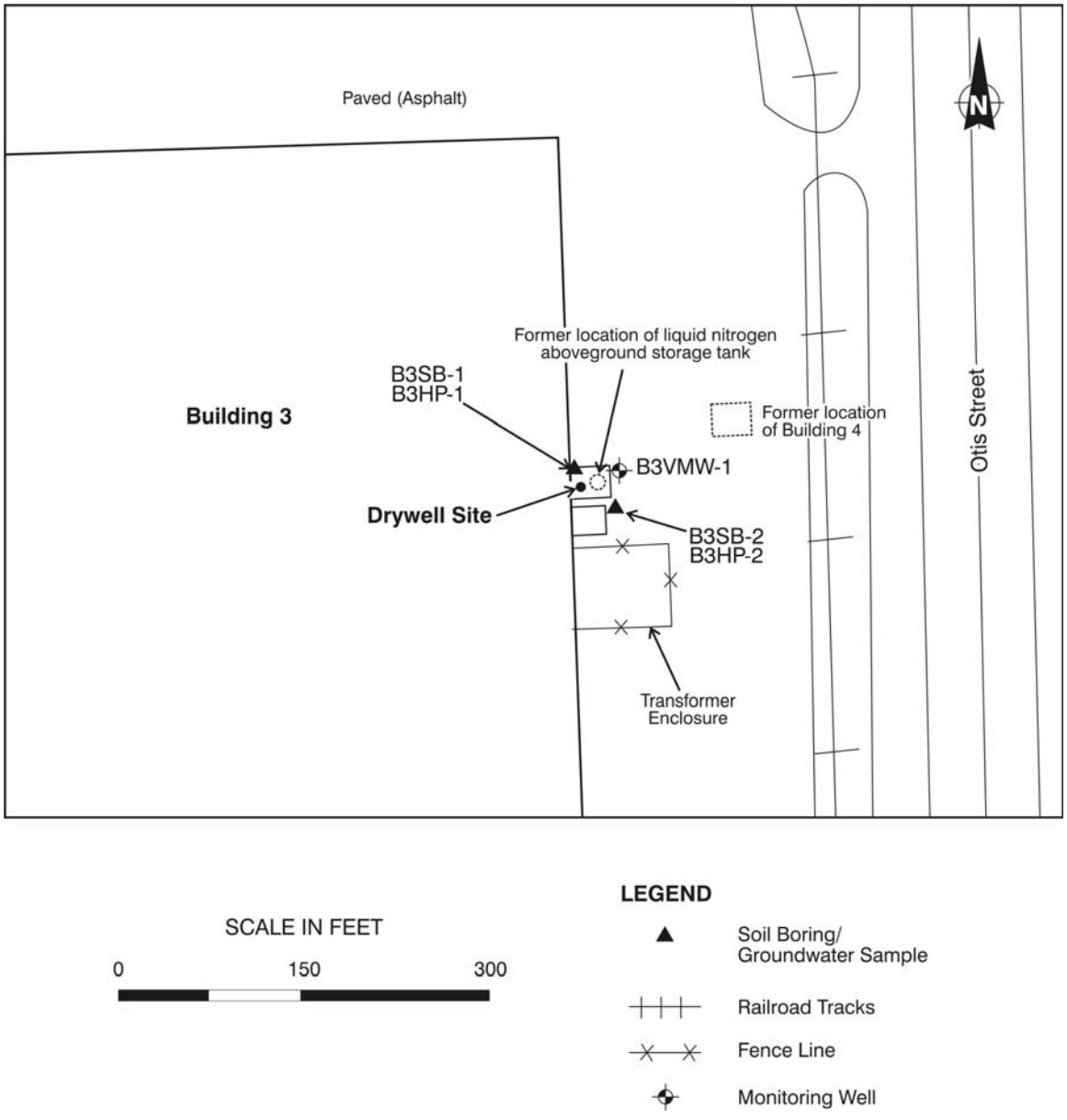

Figure 2 Building 3 Drywell AOC Site Map

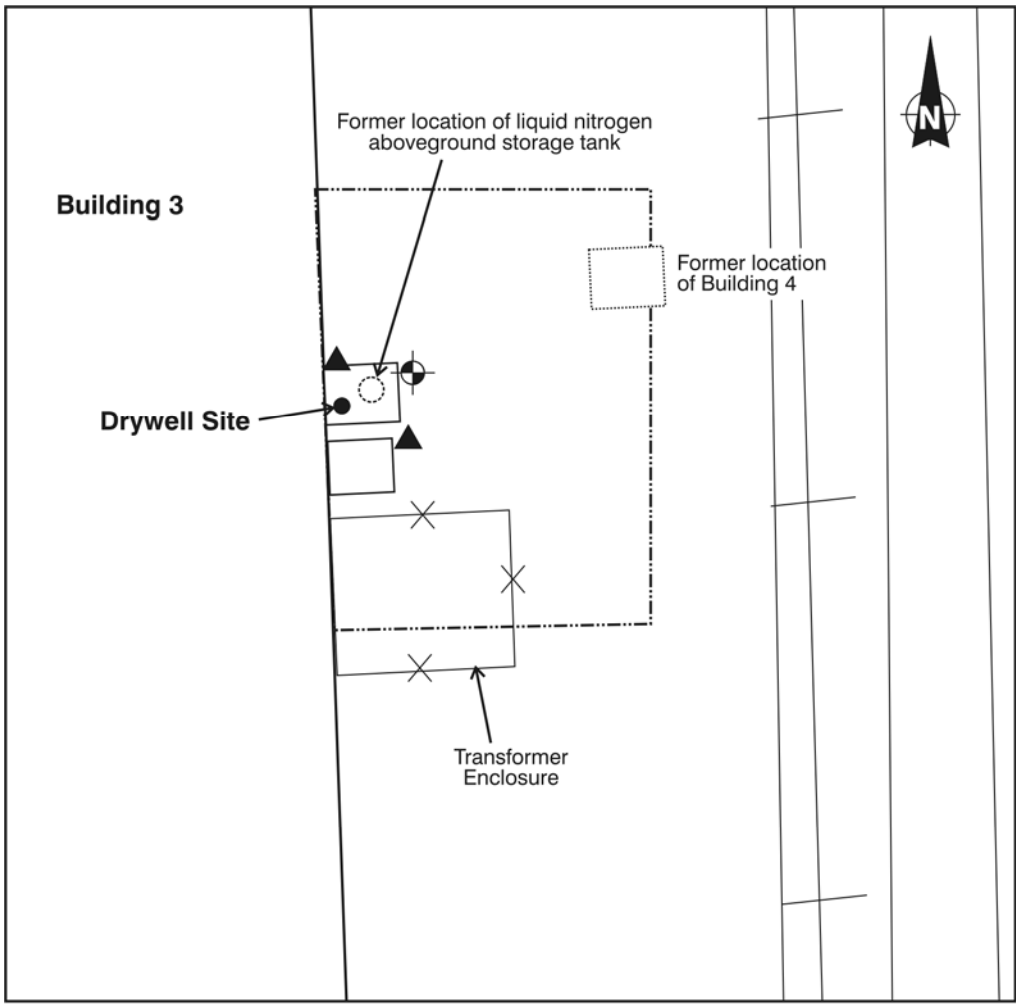

Figure 3 Site Boundary/Land Use Control Boundary

3 Responsiveness Summary

On Wednesday, January 23, 2002, AFRPA, following consultation with and concurrence of the EPA and NYSDEC, released for public comment the proposed plan for land use and groundwater use restrictions at the Building 3 Drywell AOC at the former Griffiss AFB. The release of the proposed plan initiated the public comment period, which concluded on February 21, 2002.

During the public comment period, a public meeting was held on Thursday, February 7, 2002, at 5:00 p.m. at the Floyd Town Hall located at 8299 Old Floyd Road, Rome, New York. A court reporter recorded the proceedings of the public meeting. Copies of the transcript and attendance list are included in the Administrative Record. The public comment period and the public meeting were intended to elicit public comment on the proposed plan for this site.

This document summarizes and provides responses to the verbal comments received at the public meeting and the written comments received during the public comment period. Several of the oral and written comments do not pertain to the six proposed plans that were issued for public comment but do relate to the base closure in general. Responses to such general comments, however, are also provided in this Responsiveness Summary.

ORAL COMMENTS

Comment #1 (Freda Melkun)

Mrs. Melkun inquired as to why there was no mention of groundwater contamination and contamination in the air in Building 3. She also asked if chemical vapors could rise up through the soil to the air and whether TCE could seep down into the soil.

Response #1

Groundwater samples were taken near the location of the former drywell. The results from sampling efforts in 1994 and 1997 are presented on page 6 of the proposed plan. The 1997 groundwater sampling indicated the presence of four VOCs and one SVOC, however, none of the concentrations exceeded the most stringent criterion. The risk assessment associated with the chemical concentrations found during the Remedial Investigations (RI) is presented on page 10 of the proposed plan. The results of the human health baseline risk assessment indicate that chemicals in the soil and groundwater should not present a risk under the current and future scenarios. The drywell and surrounding soil were totally removed in 1987. There is no contamination present to move from soil to air or soil to groundwater. The most recent groundwater sampling detected concentrations of TCE less than the most stringent drinking water standards. Contamination at levels equal to or less than the drinking water standards should not pose a significant threat to indoor air quality.

Comment #2 (Freda Melkun)

a) Mrs. Melkun asked a general question regarding potential movement of contamination off base and asked if any off-base investigations will take place.

b) She stated that Three Mile Creek and Six Mile Creek are contaminated, so their groundwater wells should be contaminated, and asked what the chemical effects are when you start mixing everything together.

c) She stated that ethylene glycols were found in some of the off-base wells and her well was supposed to be tested and it never was.

d) She stated that children are still swimming in the creeks.

Response #2

a) Several off-base investigations have been completed and it has been determined that there is no contamination at levels of health concern affecting off-base property, with the possible exception of Three Mile and Six Mile Creeks. Twenty-seven monitoring wells were sampled as part of the Off-Base Groundwater Contamination Area of Concern. Also, more than 300 domestic wells were sampled.

Reference report: Volume 32 of the Draft-final Remedial Investigations Report dated December 1996.

b) There has been contamination found in both Six Mile and Three Mile Creeks. As part of our assessment of the creeks, we have evaluated the effects of individual and combined chemicals on various receptors. However, such chemical effects, whether dealing with one or several chemicals, are unique and must be evaluated on a case-by-case basis. For the off-base portion of Six Mile Creek, the contaminants include low-level concentrations of polycyclic aromatic hydrocarbons (PAHs) and PCBs in the surface water and sediments. For the off-base portion of Three Mile Creek, the contaminants include moderate level concentrations of VOCs, SVOCs, metals, PAHs and PCBs in the surface water and sediments. Remedies are being evaluated for these sites and proposed plans will be issued within the next year. Several of the off-base monitoring wells and private wells that were sampled were adjacent to the creeks. The results showed that contamination has not traveled from the creeks to the wells. Furthermore, during the investigations, it was found that groundwater in the area south and southeast of the base flows into Six Mile Creek and not from the creek into the surrounding groundwater, therefore, it is extremely unlikely that contaminants in the creek would be transferred to adjacent homeowner wells. Proposed plans for Three Mile Creek (Remedial Action with Long-term Monitoring) and Six Mile Creek (source Control and Long-term Monitoring) were issued for public review and comment on July 24, 2003. A public meeting was held on August 5, 2003, to present the proposed alternatives. A final Record of Decision was signed by the EPA on March 26, 2004.

Reference reports: Volumes 6 and 11 of the Draft-final Remedial Investigations Report dated December 1996; Draft Feasibility Study Report for Three Mile Creek AOC and Six Mile Creek AOC dated January 1999; Six Mile Creek Summary Report dated March 2000; Final Three Mile Creek and Final Six Mile Creek Records of Decision dated December 2003.

c) The off-base investigations that sampled monitoring wells and private wells concluded that there is no evidence that people were exposed to ethylene glycol in drinking water at levels of health concern in the Griffiss area. The results of the investigations were well publicized. Several fact sheets were issued and several public meetings were held. Although NYSDOH acknowledges that Mrs. Melkun's well was not tested, it was not a deliberate oversight. Results of the sampling in the early 1980s in the vicinity of Mrs. Melkun's home did not indicate any pattern of groundwater contamination, nor were results above drinking water standards and, therefore, the sampling effort was discontinued. As a result, further testing of wells, including Mrs. Melkun's well, was not performed.

Reference reports: Volume 32 of the Draft-final Remedial Investigations Report dated December 1996; Public Health Assessment Addendum for Griffiss AFB, dated September 9, 1996 (Agency for Toxic Substances and Disease Registry).

d) The water and the sediments of Six Mile and Three Mile Creeks were thoroughly tested. The results analyzed under the CERCLA program showed that there is no significant risk to adults or children when playing or fishing in the creeks. However, NYSDOH does include statewide fish advisories for all stream, creeks and water bodies. These restrictions known as the NYSDOH Fish Consumption Advisories provide general warnings or restrictions for recreational fishers who may eat the fish. The NYSDOH Fish Consumption Advisories are provided to all individuals who seek a NYS fishing license and a copy can be obtained by contacting the NYSDOH. The NYSDOH Fish Consumption Advisories are issued independent of the CERCLA process.

Reference reports: Volumes 6 and 11 of the Draft-final Remedial Investigations Report dated December 1996, Draft Feasibility Study Report for Three Mile Creek AOC and Six Mile Creek AOC dated January 1999, Six Mile Creek Summary Report dated March 2000.

Comment #3 (Paul Landry)

Mr. Landry asked for a summary of the overall status of base cleanup.

Response #3

A brief summary was provided after the meeting. The status will be documented and passed out at the next Restoration Advisory Board meeting.

WRITTEN COMMENTS

One letter was received during the public comment period. That letter was sent by Mrs. Freda Melkun and was dated February 14, 2002. The comments in the letter are summarized below. Many of the comments are general comments not related to a specific proposed plan. Two comments, however, are related to specific proposed plans that were presented at the February 7, 2002, public meeting.

Comment #1

Mrs. Melkun stated that her well was not tested, although she requested the Health Department to sample.

Response #1

The NYSDOH acknowledges that Mrs. Melkun's well was not tested. It was not a deliberate oversight. Results of the sampling in the early 1980s in the vicinity of Mrs. Melkun's home did not indicate any pattern of groundwater contamination, nor were results above drinking water standards and the sampling effort was discontinued.

Comment #2

Mrs. Melkun reported suspecting chemical contamination to be the source of an illness in 1980 and also reported green bath water, dead fish and animals.

Response #2

There are reports that occasionally the green dye used to mark the runways in winter appeared in Six Mile Creek. NYSDOH and the Air Force have no records of reports of dead fish and animals in the vicinity of the base. As stated above, the off-base investigations that sampled monitoring wells and private wells concluded that there is no evidence that people were exposed to ethylene glycol or other contaminants in drinking water at levels of health concern in the Griffiss area.

Comment #3

Mrs. Melkun witnessed run-off from spraying planes going into the ground along with trichloroethylene.

Response #3

A comprehensive environmental investigation has been completed at Griffiss Air Force Base and no records exist of trichloroethylene being sprayed on the planes. De-icing sprays comprised of glycols were used at various parts of the base. The status of the projects and maps of the contaminated areas are regularly reported at Restoration Advisory Board Meetings. The Apron areas where planes were parked do have petroleum and solvent contamination and these areas of contamination have been defined. However, please note that these areas are located well within the base boundary and are being addressed by the Air Force.

Comment #4: **Comment on Building 3 Drywell Proposed Plan**

Mrs. Melkun repeated her concern with contamination from the drywell moving to the air or groundwater.

Response #4

Groundwater samples were taken near the location of the former drywell. The results from sampling efforts in 1994 and 1997 are presented on page 6 of the proposed plan. The 1997 groundwater sampling indicated the presence of four VOCs and one SVOC, however, none of the concentrations exceeded the most stringent criterion. The risk assessment associated with the chemical concentrations found during the Remedial Investigations is presented on page 10 of the proposed plan. The results of the human health baseline risk assessment indicate that chemicals in the soil and groundwater should not present a risk under the current and future scenarios. The drywell and surrounding soil were totally removed in 1987. There is no contamination present to move from soil to air or soil to groundwater. The most recent groundwater sampling detected concentrations of TCE less than the most stringent drinking water standards. Contamination at levels equal to or less than the drinking water standards pose no threat to indoor air quality.

Comment #5

Mrs. Melkun stated her disappointment that no further sampling will be performed as contamination has shifted from Griffiss to her area.

Response #5

As stated above, extensive off-base investigations have been completed and it has been determined that there is no contamination at levels of health concern affecting off-base property, with the possible exception of Three Mile and Six Mile Creeks. Twenty-seven monitoring wells were sampled as part of the Off-Base Groundwater Contamination Area of Concern. Also, more than 300 domestic wells were sampled.

Comment #6

Mrs. Melkun repeated her concern for swimmers in Six Mile Creek and requested the posting of notices.

Response #6

The water and the sediments of Six Mile and Three Mile Creeks were thoroughly tested. The results were analyzed and showed that there is no significant risk to adults or children when playing or fishing in the creeks provided adherence to the NYSDOH Fish Consumption Advisories. Therefore, there are no additional restrictions or warnings beyond the fishing health advisory required for recreational use of the creeks.

Comment #7

Mrs. Melkun stated there should have been compensation for the health problems resulting from contaminated water.

Response #7

There is no documentation that contamination released by Griffiss AFB has caused health problems to off-base residents.

Comment #8: **Comment on Electrical Power Substation Proposed Plan**

Mrs. Melkun is concerned about the dioxins and furans and wants to know the cause.

Response #8

When transformer fluids get extremely hot, dioxins and furans are released. They are also associated with PCBs. Therefore, the dioxins and furans were associated with PCB transformer spills. Dioxin (2,3,7,8-TCDD) concentrations did not exceed the 40 nanograms per kilogram (ng/kg) soil guidance value in any sample. There were no high levels detected.

4 References

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