
**Final Report on Implementation of
Remedial Action at Landfill 2/3**

**Former Griffiss Air Force Base
Rome, New York**

September 2007



AIR FORCE REAL PROPERTY AGENCY



DEPARTMENT OF THE AIR FORCE
AIR FORCE REAL PROPERTY AGENCY

September 12, 2007

MEMORANDUM FOR SEE DISTRIBUTION LIST

FROM: AFRPA-Griffiss
Environmental Section
153 Brooks Road
Rome NY 13441-4105

SUBJECT: Griffiss Landfill 2/3 Closure

1. Attached is the final Report on Implementation of Remedial Action at Landfill 2/3. Responses to USEPA comments on the draft document are also included.
2. If you have any questions, please contact Cathy Jerrard at (315)356-0810, Ext. 204.

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

MICHAEL F. MCDERMOTT
BRAC Environmental Coordinator

Attachments: As Noted

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Responses to Comments
Report on Implementation of Remedial Action at Landfill 2/3
September 2007

EPA Comments (Doug Pocze 7/25/07)

1) Pg 7, 9th & 10th bullet. I believe there should be some discussion of the fact that annual certifications of any deed restriction would be required to ensure that the RAOs are as required through the designated institutional controls would be performed.

Response: The 9th and 10th bullets will read:

- Implementation of institutional controls in the form of deed restrictions of the main landfill boundary and groundwater to prohibit use of the area and groundwater, and to ensure the cap is not damaged and the area is maintained as a landfill. Routine landfill inspections will be performed in accordance with the Post-closure Operations and Maintenance Manual to ensure that the deed restrictions are being met and the RAOs maintained; and
- Inspections of the landfill on a routine basis (at least semiannually or as agreed to by the AFRPA, EPA, and NYSDEC) and evaluation of site conditions at least once every five years to ensure that the remedy is protective of human health and the environment.

2) Pg 8, 2nd paragraph. Please include that if leachate is detected, EPA and NYSDEC would be notified.

Response: The second paragraph will be changed to read:

As stated in the Landfill 2/3 ROD, any wetlands that were disturbed during the remedial action would be restored. In addition, if leachate discharges are observed during routine walkovers of the landfill, this information will be documented on the inspection form and samples will be collected (see Section 3.4.2). This information and sample results would be included in the subsequent monitoring reports.

3) Pg 14, Leachate. Please discuss why only the groundwater parameters would be utilized if leachate is detected. I would think that a full sweep of constituents would be necessary since you would not know if some other constituent from the landfill is leaching.

Response: This paragraph will be changed to read:

No leachate has been noted. Landfill inspections include observation and documentation of leachate outbreaks. If leachate is observed, samples will be collected and analyzed for the baseline sample parameters included in the Final LTM Work Plan, Table 3-2 (VOCs, metals, cyanide, and landfill leachate indicators).

**FINAL REPORT ON IMPLEMENTATION
OF REMEDIAL ACTION AT
LANDFILL 2/3
Former Griffiss Air Force Base, Rome, New York**

1.0 INTRODUCTION AND SITE BACKGROUND

The purpose of this report is to document the implementation and performance of remedial actions for Landfill 2/3 at the former Griffiss Air Force Base (AFB).

1.1 Site History

Landfill 2/3 is an approximately 13-acre area located in the east-central portion of the former Griffiss AFB (see Figure 1). Landfill 3 is an asbestos cell located within the eastern portion of Landfill 2. Because Landfill 3 is located within the boundary of Landfill 2, the two units are designated as a single area of concern (AOC) (see Figure 2) and referred to as Landfill 2/3. The landfills are unlined but three areas of Landfill 2 were capped with up to 1 foot of natural soils and clay prior to construction of a new cap (completed in 2004). The landfills are bounded by the installation boundary on the north, east, and south sides. Areas to the west, southwest, and northeast have been identified as wetlands.

Landfill 2 was in operation from 1973 to 1982. An area formerly used as a skeet shooting range is located in the northern portion of Landfill 2. Hardfill, primarily demolition and construction debris, was disposed of in the southern portion of Landfill 2 using the area method, whereby debris is placed on the ground surface and periodically covered with soil. Other solid wastes were disposed of in trenches and covered with soil in both the northern and southern portions of Landfill 2. In 1982, on-board wastes from overseas aircraft were boiled and disposed of in one trench in the northern portion of Landfill 2.

Landfill 3, which operated from 1980 to 1981, received approximately 1 ton of asbestos wastes from demolition activities. The wastes were reportedly wetted, double bagged, and disposed of in pits approximately 8 feet deep.

1.2 Characterization Results

Investigations and remedial actions conducted at Landfill 2/3 between 1981 and 2002 included an initial site investigation, a remedial investigation (RI), an RI supplemental investigation (SI), a landfill cover investigation, a landfill surface debris consolidation program, a landfill boundary investigation, and a soil gas survey.

As part of the initial site investigation in 1981, a groundwater monitoring well was installed downgradient of Landfill 2/3. Two additional monitoring wells were installed in 1983. The wells were sampled after installation and during the 1992/1993 quarterly sampling program at the former base. Metals as well as some nitrate, sulfate, and phenols were detected in the three wells. In 1992 and 1993, no volatile organic compounds (VOCs), semivolatile organic compounds (SVOCs), or pesticides were detected in well LF2MW2-1. Concentrations of metals detected in this AOC were not found to be outside the range of concentrations encountered off-site, and were not included in the base-wide quarterly sampling program.

The RI was performed in 1994. The RI included a geophysical survey consisting of a magnetometry survey and ground-penetrating radar (GPR) survey; a passive soil gas survey; the installation and sampling of six groundwater monitoring wells; and sampling and analysis of surface water, sediment, and surface soil.

The RI geophysical survey results indicated the presence of several buried metallic objects in the southern portion of the landfill. The passive soil gas survey, which was performed at 43 points across the site, identified VOCs at 21 of the 43 locations sampled.

Analysis of the groundwater samples collected during the RI indicated the presence of nine VOCs, seven SVOCs, eight pesticides/PCBs, 19 metals, glycols, petroleum hydrocarbons, and cyanide. The concentrations of two VOCs, seven metals, and petroleum hydrocarbons exceeded the most stringent criterion for groundwater (see Table 1 in the Final Record of Decision [ROD] for the Landfill 2/3 Area of Concern [AOC], March 2000).

Analysis of surface water samples indicated the presence of three VOCs, 13 SVOCs, 27 pesticides/PCBs, 14 metals, glycols, and petroleum hydrocarbons. The

concentrations of six SVOCs, six pesticides, six metals exceeded the most stringent criterion (see Table 2 in the Final ROD for the Landfill 2/3 AOC).

Analysis of the sediment samples indicated the presence of four VOCs, 22 SVOCs, 10 pesticides/PCBs, 24 metals, 16 dioxins, cyanide, and petroleum hydrocarbons. The concentrations of 14 SVOCs, five pesticides/PCBs, eight metals, and one dioxin exceeded the most stringent criterion for sediments (see Table 3 in the Final ROD for the Landfill 2/3 AOC).

Analysis of the surface soil samples collected during the RI indicated the presence of 18 SVOCs, four pesticides/PCBs, and two metals of potential concern. Seven SVOCs and two metals were detected at concentrations exceeding the most stringent criterion for surface soil (see Table 4 in the Final ROD for the Landfill 2/3 AOC). All seven SVOCs were detected at one sample location (sample LF2SS-1 north of the skeet range).

An RI supplemental investigation was performed in 1997 for the Landfill 2/3 AOC to investigate two strong subsurface geophysical anomalies detected during the RI geophysical investigations. However, no buried drums were located as a result of the investigation, and no samples were taken in these pits.

A Landfill Cover Investigation performed in 1997 included the following tasks: historical records search, field survey, aerial photographic survey, auger investigation, permeability sample collection, and a landfill performance model analysis. The investigation further defined the areal extent of the landfill and the landfill boundary and revealed that the thickness of the existing landfill soil cover ranges from 0.5 to 4 feet.

In 1998, a surface debris consolidation project was performed in which accumulated surface debris from the various on base landfills was collected and placed into Landfill 2. Localized soil contamination at one location was excavated and consolidated into the landfill. Twenty-seven drums that were found along the southern toe of the landfill were inspected and monitored with portable field equipment for VOCs and radiation. Nineteen of the drums were designated empty and were excavated and disposed. The remaining eight drums containing product were excavated, sampled, and properly disposed. Drum sample results indicated that four drums were nonhazardous; three drums contained flammable solids (tar); and one drum contained a flammable liquid (paint). Soil beneath the drums was examined and one area of stained soil was removed

to a depth of 2 feet in a 10-foot radius surrounding the stain. Confirmatory soil samples were collected at all excavation areas and analyzed for VOCs, SVOCs, pesticides/PCBs, PAHs, and metals. The results indicated there was no residual contamination from the drums.

In 2002, as part of a landfill boundary investigation, a series of exploratory test pits were excavated to verify the actual limit of waste at the landfill (see Section 3.3). A wetland site assessment also was conducted in 2002 and a Wetland Remediation Plan was developed for the area.

In 2002, a soil gas survey was performed to evaluate the level of landfill gas emissions from Landfill 2/3. The results of the survey indicated that soil gases were present at concentrations greater than 25 percent of the lower explosive limit. Landfill gases were detected at concentrations ranging from 26.7 to 100 of the lower explosive limit at 15 locations within the footprint of the landfill. The results of the survey initiated design and construction of a passive gas venting layer for the landfill cover system and installation of gas monitoring probes around the perimeter of the landfill (see Section 3.3).

Additional details on the site characterization and investigation results for Landfills 2/3 are provided in the draft-final *Remedial Investigation Report* (Law Environmental [Law], 1996); final *Supplemental Investigation Report* (Ecology & Environment, Inc. [E & E], 1998), *Landfill Cover Investigation Report* (Law, 1998); *Baseline Study Report, AOC Long Term Monitoring Baseline Study* (FPM Group Ltd. [FPM], 2000); *Soil Gas Survey Report* (FPM, 2002); *Landfill 2/3 Post-Closure Operations & Maintenance Manual* and its *Addendum* (Conti Environmental Infrastructure, Inc. [Conti], 2004 and 2006); *Landfill 2/3 Cover Improvements, Engineer's Certification Report* (Conti, 2005); and *Long Term Monitoring Report, Landfill AOCs LTM Program* (FPM, 2007).

2.0 REAL ESTATE ISSUES

2.1 Property Proposed for Transfer

This document will be used in conjunction with the preparation and submission of a Finding of Suitability to Transfer (FOST), as required in Section 120(h) of the

Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA). A complete description of the Landfill 2/3 AOC can be found in the Landfill 2/3 ROD.

2.2 Institutional Controls/Deed Restrictions

CERCLA Section 120(h)(3) requires that deeds transferring property where hazardous substances had been stored, released or disposed of, shall contain a covenant warranting that: “all remedial action necessary to protect human health and the environment with respect to any [hazardous] substance remaining on the property has been taken before the date of such transfer.” CERCLA Section 120(h)(3) was amended in October 1992 to add language stating that all necessary actions have been taken “if the construction and installation of an approved remedial design has been completed and the remedy has been demonstrated to the [United States Environmental Protection Agency [EPA]] Administrator to be operating properly and successfully.”

Institutional controls in the form of deed restrictions and signage will be implemented and enforced during the 30-year post-closure maintenance period. Through deed restrictions, the property owner is restricted as follows:

- Groundwater extraction/utilization/consumption within the designated groundwater restriction area (see Figure 2) is not permitted without prior testing and written approval from the New York State Department of Health (NYSDOH);
- Activities that disrupt or interfere with the post-closure activities are not permitted;
- Intrusive work within the groundwater restriction area is not permitted without prior written approval from the Air Force, New York State Department of Environmental Conservation (NYSDEC), and EPA; and
- Intrusive work or other activities that impact the effectiveness or integrity of the landfill closure, or effectiveness of post-closure activities is not allowed within the restricted landfill boundary.

Signs erected during closure construction serve to minimize the potential for interference with closure and post-closure activities. Signs have been posted along the landfill property boundary that read: “SOLID WASTE LANDFILL - CONTAINS

HAZARDOUS SUBSTANCES - NO TRESPASSING,” and “DANGER – NO SMOKING, MATCHES, OR OPEN LIGHTS.”

Each identified institutional control specifies the restriction imposed on the property, and how such a restriction will be implemented, monitored, and later enforced if a violation occurs.

2.3 Adjacent Properties

Jurisdictional wetlands are directly adjacent to the toe-of-slope at the southwest border of the site. Groundwater flow is generally to the southwest across the site. Surface water features in the area of Landfill 2/3 are as follows: surface runoff from the north and northeastern portion of Landfill 2/3 drains to the wetlands northeast of the site, off the landfill and former base property. These wetlands discharge toward a southerly flowing tributary of Slate Creek, located approximately 300 feet east of Landfill 2/3. Slate Creek, flowing from east to west, eventually drains into Six Mile Creek. The remainder of the site, comprising the main portion of the landfill surface, drains south into the wetlands that are adjacent to the southwest border and also directly to the floodplain of Six Mile Creek. At this location, Six Mile Creek is approximately one mile from its confluence with the New York State Barge Canal.

3.0 DOCUMENTATION OF REMEDIAL ACTION IMPLEMENTATION

3.1 Record of Decision

The Landfill 2/3 ROD was issued after the public comment period (February 7, 2000 to March 8, 2000). A public meeting on the proposed plan was held on February 23, 2000. The ROD was signed on June 5, 2000, by the Air Force and the EPA, with concurrence from NYSDEC.

The Landfill 2/3 ROD presented the following remedial action objectives (RAOs) to address existing and future potential threats to the environment posed by Landfill 2/3:

- Consolidation of various debris and waste areas into the main landfill boundary in order to reduce the area to be capped and the potential for nearby wildlife and human populations to be exposed to the landfill mass;

- Reduce infiltration of rainwater and snow-melt water through the landfill mass in order to minimize the potential for leachate generation and groundwater contamination;
- Monitoring the groundwater and stream environment (which may include, but is not necessarily limited to, sediment, surface water, and biota) downgradient of the site; and
- Implementation of institutional controls in the form of deed restrictions of the main landfill boundary to prohibit use of the area and groundwater.

To address the RAOs listed above, the presumptive remedy (i.e., preferred alternative) in the Landfill 2/3 ROD called for the following:

- Installation of a low-permeability soil cover in accordance with 6 NYCRR Part 360 landfill closure regulations, dated April 1, 1987;
- Placement of a minimum of 18 inches of low-permeability soil and 6 inches of topsoil over the entire landfill surface to reduce the amount of water infiltration through the landfill;
- Maintenance of the cover and long-term monitoring of groundwater and surface water;
- Groundwater monitoring in accordance with the Air Force's Long Term Monitoring (LTM) program and the stream environment monitoring in accordance with a plan prepared for the Six Mile Creek (SMC) AOC (both plans have been reviewed and approved by the EPA and NYSDEC);
- Monitoring the groundwater and stream environment (which may include, but is not necessarily limited to, sediment, surface water, and biota) downgradient of the site to evaluate the effectiveness of the selected remedy;
- Implementation of institutional controls in the form of deed restrictions of the main landfill boundary and groundwater to prohibit use of the area and groundwater, and to ensure the cap is not damaged and the area is maintained as a landfill. Routine landfill inspections will be performed in accordance with the Post-closure Operations and Maintenance Manual to ensure that the deed restrictions are being met and the RAOs maintained; and
- Inspections of the landfill on a routine basis (at least semiannually or as agreed to by the AFRPA, EPA, and NYSDEC) and evaluation of site conditions at least once every five years to ensure that the remedy is protective of human health and the environment.

The presumptive remedy provides adequate protection from exposure to groundwater by limiting the future use of the landfill through the implementation of institutional controls. The AFRPA plans on maintaining Landfill 2/3 as open space and wetlands/surface water throughout the post-closure period as required by the ROD. In addition, the additional landfill cover materials eliminate the possibility of human exposure to the landfill mass. The presumptive remedy is effective in limiting infiltration of rain water, which will potentially reduce leachate generation and the potential transportation of contaminants from the landfill to the creek via groundwater migration.

As stated in the Landfill 2/3 ROD, any wetlands that were disturbed during the remedial action would be restored. In addition, if leachate discharges are observed during routine walkovers of the landfill, this information will be documented on the inspection form and samples will be collected (see Section 3.4.2). This information and sample results would be included in the subsequent monitoring reports.

Contaminant concentrations in the groundwater would not immediately comply with the groundwater applicable or relevant and appropriate requirements (ARARs) under the selected remedy. Treatment of the groundwater would not be employed because no distinct sources of contamination were identified in the landfill. However, the institutional controls would restrict the ingestion of groundwater, which is the primary pathway that poses a potential risk to human health at this AOC. In addition, the installation and maintenance of the landfill cover would potentially benefit groundwater quality by reducing the amount of leachate generated thereby limiting potential transportation of contaminants to the creek through groundwater migration. Further, groundwater monitoring will be conducted to assure that there is no further contaminant migration and that groundwater standards will be achieved over time.

3.2 Remedial Design

The final design for Landfill 2/3 cover improvements included the clearing and grubbing of vegetation, subgrade preparation, placement of an 18-inch-thick layer of low permeability soil over the landfill, placement of topsoil (or approved alternate material) over the low permeability soil, and installation of erosion control features. Details of the

remedial design are presented in Landfill 2/3 Cover Improvements at the Former Griffiss Air Force Base (USACE, 2005). The final design of the Landfill 2/3 cap met the substantive requirements of 6 NYCRR Part 360, dated April 1, 1987, and the requirements of the ROD for Landfill 2/3 dated June 2000.

3.3 Remedial Action Construction

In May 2002, the final versions of the Landfill 2/3 Closure Plan, Project Work Plan, Site Safety and Health Plan, Contractor Quality Control Plan (CQCP), and Sampling and Analysis Plan were approved by USACE. These documents were subsequently approved by the EPA and NYSDEC.

Field work was initiated in June 2002. Site preparation activities included erosion and sedimentation control, a soil gas investigation, wetland remediation, limit of waste verification, installation of a decontamination pad, and subgrade preparation.

Erosion and sedimentation control involved installing a silt fence around the perimeter of the landfill prior to any intrusive construction activities and the clearing of trees from within the limit of waste and mowing the existing surface of Landfill 2/3 with a brushhog.

A soil gas survey was conducted by FPM for AFRPA in order to evaluate the level of landfill gas emissions from Landfill 2/3. The results of this evaluation led to the inclusion of a passive gas venting layer in the design and construction of the landfill cap. The gas venting system included a geocomposite layer, passive gas vents, and gas monitoring probes that were installed around the perimeter of the landfill (see Figure 1).

A wetland site assessment was conducted by EA Engineering, P.C. and its affiliate EA Engineering, Science, and Technology (EA) in August 2002 and a Wetland Restoration Plan specific to the area was developed. In September 2002, Conti excavated a 10 ft x 10 ft x 1 ft in an area northeast of the landfill. Conti and EA collected soil sample LF2SD-7 for analytical testing from the excavated area and the testing was performed by Severn Trent Laboratories. The test results demonstrated compliance with NYSDEC's Technical and Administrative Guidance Memorandum (TAGM) standards and additional sampling or excavation was not required.

Based on field conditions identified during preliminary construction activities, EA and Conti, with approval from USACE, excavated a series of exploratory test pits to verify the actual limit of waste. A total of 38 test pits were excavated along the landfill extents and the limit of waste was modified based on these results.

Prior to the cap construction activities, Conti installed a decontamination pad adjacent to the access road in accordance with the Closure Plan. Upon completion of the landfill construction operations, this pad was removed and disposed of in accordance with the project requirements.

Preparation of the cap subgrade included mowing and scarification of the native grass cover to a minimum depth of 6 inches. The surface was then proof-rolled and subsequently tracked with a bulldozer. Landfill debris was not exposed during this operation.

To construct the cap, a minimum of 18 inches of low permeability soil was installed over the gas venting layer. Topsoil was placed on top of the low permeability soil and the area was seeded and mulched. A dense vegetative cover was established by August 2004. Details of field modifications during construction of the cap can be found in *Landfill 2/3 Cover Improvements, Engineer's Certification Report* (Conti, 2005).

3.4 Remedial Action Performance

3.4.1 Operations and Maintenance. *The Landfill 2/3 Post-Closure Operations & Maintenance Manual* (Conti, December 2004) provides a comprehensive guide to the landfill owners for maintenance and facility monitoring for a period of 30 years. The manual fulfills NYSDEC's requirements for post-closure operations and maintenance for closed solid waste landfills (6 NYCRR Part 360-2.15[k]).

In accordance with the Operations and Maintenance (O&M) Manual, periodic inspections of the landfill have been and continue to be performed. During the first year after final inspection of the construction, quarterly inspections of the landfill cover and inspections following major rainfall events were performed to ensure that the final landfill cover materials, site drainage swales, and on-site monitoring wells were maintained and functioning within the design standards. The property has also been inspected to ensure compliance with institutional control measures. A checklist is

utilized to facilitate and standardize post-closure inspections. Contingency maintenance measures are performed if any deficiencies are encountered during these inspections, and the AFRPA is notified if unauthorized activity is observed on the landfill property.

The following post-closure inspection activities are included in the quarterly landfill inspections, and inspections following major storm events:

- Soil cover integrity is inspected for holes, rifts, ruts, washouts or similar damage;
- Slopes and the top surface of the landfill are inspected for major deviations from as-built grades and any areas of significant surface water ponding;
- The vegetative cover and grass-lined swales are inspected for proper establishment, thickness of growth, and signs of stress or disturbance due to erosion;
- The landfill, particularly the base of the slopes, is inspected for leachate breakouts;
- The monitoring wells are inspected for integrity and damage to the surface protective casings;
- The landfill surface is inspected for the presence of vectors (intrusive animals such as groundhogs or similar inhabitants);
- Drainage structure is inspected for erosion and soil loss;
- Gas monitoring probes and vents are inspected for integrity and damage during each quarterly inspection;
- All chain-link fencing and gates are inspected for integrity and damage during each quarterly inspection; and
- To ensure compliance with institutional control measures, the landfill property is inspected for any evidence of activities, such as construction activities that have not been approved by the Air Force, NYSDEC, and EPA; and signs and support structures are inspected for damage or wear.

Landfill maintenance activities include grass mowing and any contingency maintenance measures required as a result of the above inspections. The O&M Manual specifies two mowings in the first year (one in late spring/early summer and one after September 1st) and one mowing after September 1st every year thereafter, which allows

for grass germination and full coverage development, and helps to preserve avian habitats. Mowings have been performed at Landfill 2/3 as specified in the O&M manual.

3.4.2 Environmental Monitoring. The LTM program for Landfill 2/3 groundwater is described in the final *Long-Term Monitoring Work Plan, Landfill 2/3 Area of Concern* (FPM, March 2002). The monitoring results through September 2006 are provided in the *Long Term Monitoring Report, Landfill AOCs LTM Program* (FPM, April 2007). Environmental monitoring and summary reports are prepared annually.

Groundwater

The LTM groundwater monitoring network at Landfill 2/3 consists of six groundwater monitoring wells (see Figure 1). Target analyses are based on COCs and 6 NYCRR Part 360 baseline and routine parameters. Baseline parameters are monitored annually, while the routine parameters are monitored quarterly. Data collected from monitoring wells LF2MW2-1, LF2MW-4, -12, and -13 monitor the effectiveness of attenuation process on COCs at the AOC. Bedrock monitoring well LF2MW-100 is sampled to monitor the bedrock aquifer. Upgradient monitoring well LF2MW-14 is sampled during the baseline sampling rounds only.

Quarterly sampling was conducted at five monitoring wells (LF2MW2-1, LF2MW-4, LF2MW-12, LF2MW-13, AND LF2MW-100) from December 2003 to March 2006. All six wells were sampled in the December 2003, March/April 2005, and March 2006 during the baseline monitoring events.

A summary of the groundwater monitoring parameters analyzed from December 2003 through March 2006 and prescribed analytical methodologies are provided in Table 1.

As recommended in the Spring 2006 LTM report (FPM, 2006), and again documented in the April 2007 LTM Report, the Landfill 2/3 LTM groundwater monitoring programs were reduced in frequency to semiannual sampling in September 2006 and the analytical list was altered. VOCs, cyanide, mercury, and phenols were removed from the list due to their low or absent concentrations at the site. The metals analysis was expanded to include both dissolved and total metal concentrations.

Table 1 Groundwater and Surface Water Analytical Parameters

Parameter	EPA (or other) Method
Static Water Level	Field Measurement
Electrical Conductivity	Field Measurement
Temperature	Field Measurement
pH	Field Measurement
Dissolved Oxygen	Field Measurement
Oxidative Reduction Potential	Field Measurement
Turbidity	Field Measurement
VOCs	8260B (baseline and first quarter only)
Metals (except Mercury)	6010B
Mercury	SW-846 (baseline and first quarter only)
Cyanide	9010B (baseline and first quarter only)
Anions	9056
Total Kjeldahl Nitrogen	351.3
Ammonia	350.2
Chemical Oxygen Demand	5220C
Biochemical Oxygen Demand	5210B
Total Organic Carbon	9060
Total Dissolved Solids	160.1
Alkalinity	310.1
Phenols	9065
Total Hardness as CaCO ₃	130.2
Color	110.2 (baseline and first quarter only)
Boron	6010B (baseline and first quarter only)

Surface Water

Monitoring at surface water sampling locations LF2SW-1, -2, and -3 is performed for determining the potential levels of exposure to contamination caused by groundwater/leachate discharge into the jurisdictional wetlands surrounding Landfill 2/3, and ultimately into Six Mile and Slate Creeks. Annual baseline monitoring for VOCs, metals, cyanide, and landfill leachate indicators was conducted at the three locations. Quarterly samples from December 2003 to September 2006 were conducted at the same three locations to determine the water quality of the creek. Sample analytical parameters are provided in Table 1.

As recommended in the Spring 2006 LTM report (FPM, 2006), and again documented in the April 2007 LTM Report, the Landfill 2/3 LTM surface water monitoring program was reduced in frequency to semiannual sampling in September

2006 and the analytical list was altered. VOCs, cyanide, mercury, and phenols were removed from the list due to their low or absent concentrations at the site. The metals analysis was expanded to include both dissolved and total metal concentrations.

Leachate

No leachate has been noted. Landfill inspections include observation and documentation of leachate outbreaks. If leachate is observed, samples will be collected and analyzed for the baseline sample parameters included in the Final LTM Work Plan, Table 3-2 (VOCs, metals, cyanide, and landfill leachate indicators).

Landfill Gas

The gas monitoring LTM network currently consists of nine gas monitoring probes and 14 gas vents (see Figure 1). Gas monitoring probes LF2GMP-8 and LF2GMP-9 were installed along the northern property line following the detection of methane readings in the northern perimeter probes LF2GMP-3 and LF2GMP-4 above the lower explosive limit (LEL) in August 2004. In addition, turbine ventilators were installed on every passive gas vent to expedite venting of landfill gases to the surface of the landfill. Gas monitoring probe and vent sampling was conducted on a monthly basis until December 2006 to identify and evaluate trends in landfill gas concentrations and to assure that the landfill continued to comply with 6 NYCRR Part 360-2.17(f). Because the fluctuating gas readings show no obvious trends, it was recommended that the site transition into the post-closure monitoring period and that the long-term monitoring contractor commence quarterly monitoring at the landfill. Quarterly sampling in accordance with the LTM Plan began in March 2007.

Since there are no structures near the Landfill 2/3 perimeter that would be at risk for explosive gas accumulation, no monitoring of explosive gas within structures is performed.

Gas samples are analyzed for methane in accordance with 6 NYCRR 360-2.17f. In addition, samples initially were analyzed for VOCs to confirm their absence. In the June 2006 and September 2006 sampling rounds, the gas samples were analyzed for

methane, LEL, oxygen concentrations, and carbon dioxide concentrations, which is the recommended analyte list for continued quarterly sampling.

As prescribed in the Landfill 2/3 O&M Plan, if the perimeter gas probe monitoring shows explosive gas levels in excess of 25% of the LEL at the property boundary, the EPA and NYSDEC are to be notified within 7 days of detection and further actions will be evaluated. A remediation plan to address the landfill gas migration will be submitted within 45 days of detection of the elevated levels of explosive gas at the perimeter. The plan will describe the nature and extent of the problem, and the proposed remedy. A schedule for implementation of the proposed remedy within 60 days of the date of the detection will be included with the plan.

Sediment & Biota

The long term monitoring of sediment and biota is being performed under the approved Six Mile Creek LTM plan.

3.4.3 Recordkeeping. Records are maintained of all site inspections, sampling events, and any contingency maintenance measures. The O&M Contractor prepares environmental monitoring reports and annual summary reports outlining the previous year's monitoring and maintenance activities. Site conditions will be evaluated every five years to ensure that the remedy is protective of human health and the environment. Alterations to the frequency and duration of the landfill inspections and environmental monitoring may be sought at any time and are subject to the approval of EPA and NYSDEC.

3.4.4 Remedy Performance. The key to documenting implementation of the remedy is the evaluation of remedy performance as it relates to applicable RAOs presented in the ROD. More than three years of O&M and LTM sampling has been completed for Landfill 2/3. The quarterly reports are provided in the *Long Term Monitoring Report, Landfill AOCs LTM Program* (FPM, 2007). Because this monitoring is a continuance of the monitoring started during the remedial construction period, the quarterly reports start

in the first quarter of 2003, after substantial completion of the remedial construction. An evaluation of the Landfill 2/3 presumptive remedy activities is provided below.

Landfill 2/3 Soil and Solid Waste

The placement of low-permeability cover soil and topsoil was completed in 2002. The additional cover soil reduces infiltration of rainwater and snowmelt water through the landfill and minimizes the potential for leachate generation and groundwater contamination. The potential for nearby wildlife and human populations to be exposed to the landfill has also been reduced by this measure. Thus, this action of the presumptive remedy satisfies the RAOs established for Landfill 2/3.

Groundwater Quality

In 10 sampling rounds, no VOC exceedances were reported in any of the groundwater monitoring wells. Any VOCs detected at the site were well below state standards and clearly showed stabilization. Metal concentrations remain elevated in a couple of groundwater monitoring wells, but the concentrations appear to be stable. Although a small number of leachate indicators remain above NYS Groundwater Standards, none of them appear to be increasing in concentration. The majority of these exceedances are within one order of magnitude of their respective state standard.

The landfill has been capped, thereby removing direct contact exposures to the public. The remedial actions, which included placement of additional landfill cover materials and grading the landfill to reduce rain and surface water infiltration and the migration of contaminated soil, have satisfied the RAOs. In addition, the cover is expected to reduce leachate generation, which in turn will reduce the potential for transporting contaminants from the landfill to the creek via groundwater.

Surface Water Quality

In 10 sampling rounds, no VOC exceedances were reported in any of the surface water sampling locations. Aluminum, iron, and manganese were reported to exceed NYS Surface Water Standards at various sampling locations during different sampling rounds, as well as the color and TKN leachate indicators.

Gas Monitoring

Methane readings were detected at concentrations exceeding the LEL in August 2004. Monthly monitoring of the gas probes continued through December 2006. Sampling results have been reported in the *Long Term Monitoring Report, Landfill AOCs LTM Program* (FPM, April 2007), and a February 5, 2007, letter report from Conti to USACE-New York District. Gas monitoring probes LF2GMP-2, -3, -4, and -5 continue to have fluctuating methane concentrations that occasionally exceed 100% of the LEL, but no trends have been observed. The close proximity of these gas monitoring probes, in particular LF2GMP-3 and -4, to the base boundary along the northern property line of Landfill 2/3 will require continued quarterly monitoring to confirm that the migration of methane off-site is limited.

3.4.5 Protection of Human Health and the Environment. The presumptive remedy implemented at Landfill 2/3 has reduced the risks posed to human health and the environment by eliminating, reducing, or controlling exposure to human and environmental receptors through engineering controls, institutional controls, and monitoring.

Specifically, this has been accomplished through:

- Grading the landfill to promote surface water drainage and minimize infiltration;
- Covering the landfill with low-permeability soils and topsoil to reduce water infiltration and reduce receptor exposure to contaminants by reducing leachate generation and potential transportation of contaminants from the landfill to the creek via groundwater migration;
- Placement of additional landfill cover materials to eliminate the possibility of human exposure to contaminated soils;
- Implementation of institutional controls to provide adequate protection from exposure to groundwater by limiting the future use of the landfill; and
- Conducting LTM and gas monitoring to ensure that the remedial action is continuing to operate properly and successfully.

3.5 Enforceability

Griffiss AFB was placed on the National Priorities List on July 15, 1987. On August 21, 1990, the Air Force, EPA, and NYSDEC entered into a Federal Facility Agreement (FFA) under Section 120 of CERCLA. Both the EPA and NYSDEC have been continuously involved in the enforcement of remedial actions undertaken at the former Griffiss AFB. The FFA provides the enforcement vehicle for continued action at the former Griffiss AFB, including all work associated with implementation and monitoring of remedial actions. Additionally, the Landfill 2/3 ROD is a vehicle of enforceability in itself. These two documents provide sufficient enforcement avenues to ensure actions are continued as necessary to achieve the Landfill 2/3 RAOs.

3.6 Technology Reliability and Uncertainty Analysis

Placement of a low-permeability soil cover is a standard presumptive remedy for closure of landfills and has been demonstrated to be effective for similar military landfills. Landfill 2/3 was covered in accordance with 6 NYCRR 360 regulations dated April 1, 1987, as agreed upon by the EPA, NYSDEC, and the Air Force. At Landfill 2/3, the monitoring results indicate that VOCs are not appearing in the groundwater or surface water at reportable levels, but certain metals and leachate indicators are still fluctuating in both the groundwater and surface water. While fluctuating gas readings occasionally exceed 100% of the lower explosive limit at passive gas vents and perimeter gas monitoring probes, more than two years of data show no obvious trends in the intermittent exceedances.

4.0 CONCLUSIONS

The Air Force concludes that the remedial actions at Landfill 2/3 are being properly and successfully implemented consistent with the provisions of CERCLA Section 120(h)(3) and that further monitoring is needed to confirm successful reduction of COCs to below the NYS Groundwater and Surface Water Standards and acceptable levels of explosive gases.

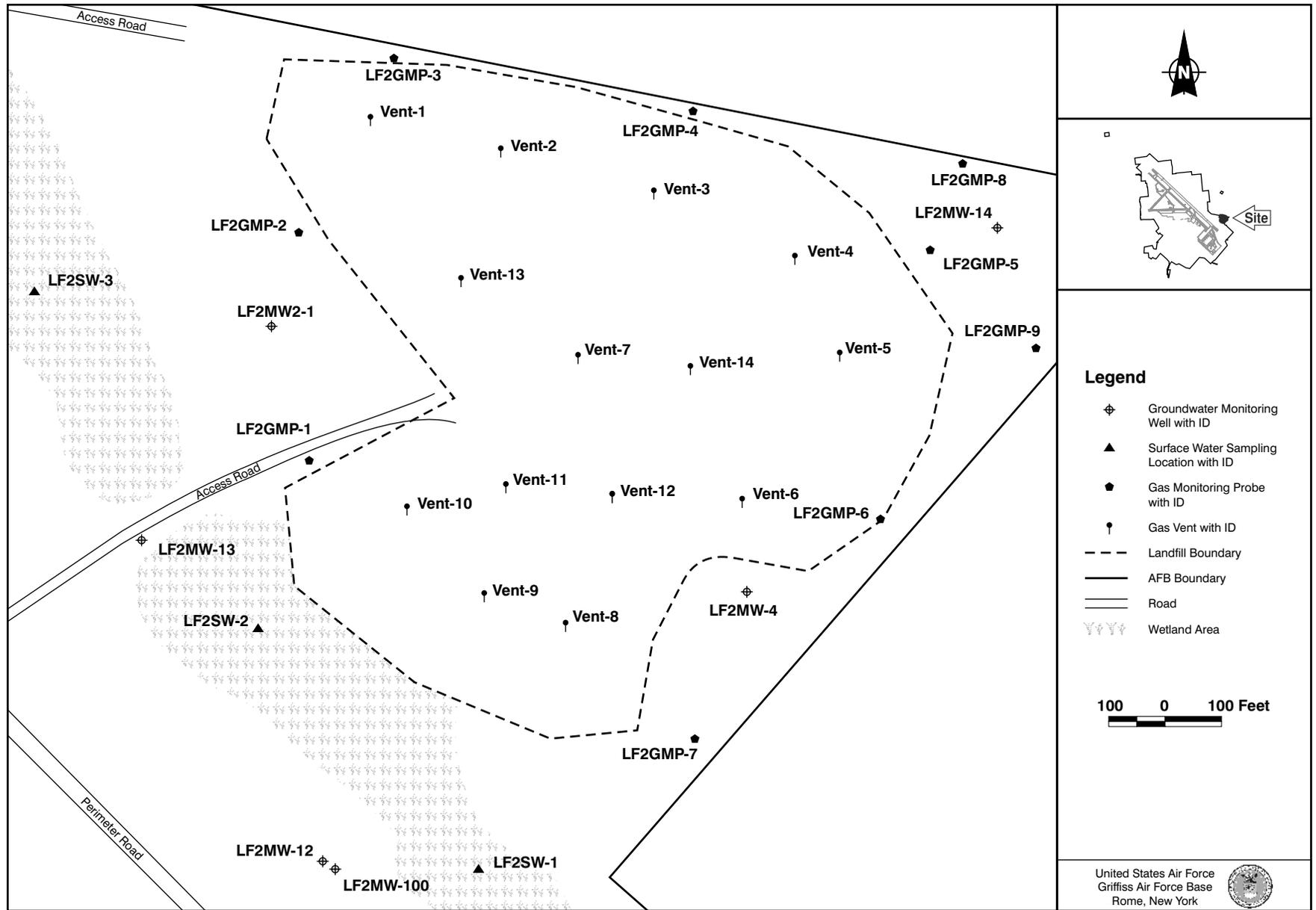


Figure 1 Landfill 2/3 AOC LTM Network

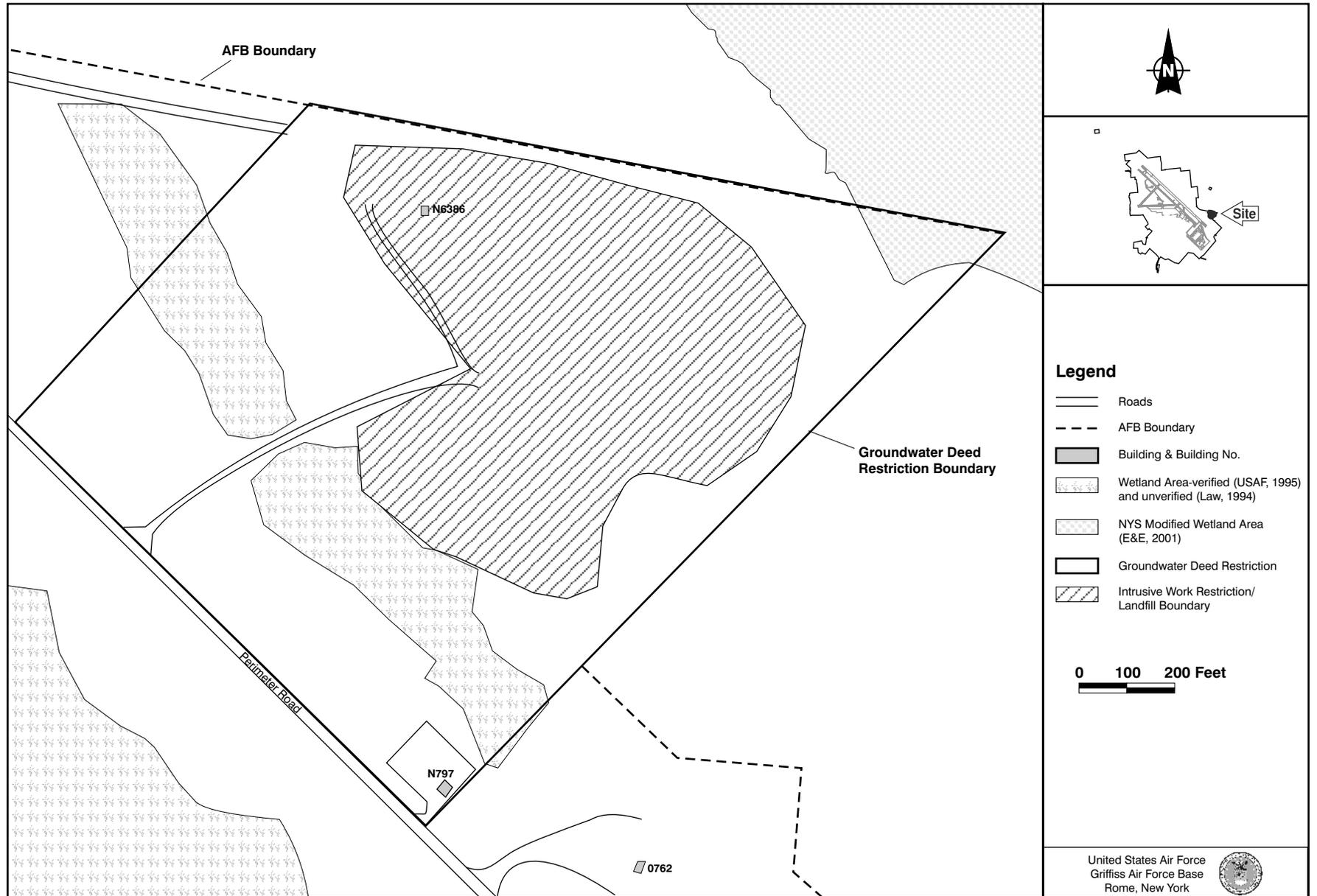


Figure 2 Landfill 2/3 Deed Restrictions