EPA/ROD/R02-00/130
2000

EPA Superfund
Record of Decision:

GRIFFISS AIR FORCE BASE (11 AREAS)
EPA ID: NY4571924451
OU 05
ROME, NY
06/05/2000

Final Record of Decision for the Landfill 1 Area of Concern at the Former Griffiss Air Force Base Rome, New York

February 2000

Prepared for:

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List of Acronyms

AFB	Air Force Base
AFBCA	Air Force Base Conversion Agency
AOC	Area of Concern
ARAR	Applicable or Relevant and Appropriate Requirement
ATSDR	Agency for Toxic Substances and Disease Registry
BGS	below ground surface
BOD	biological oxygen demand
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
DFAS	Defense Finance and Accounting Services
DoD	Department of Defense
EPA	United State Environmental Protection Agency
FFA	Federal Facility Agreement
GPR	ground-penetrating radar
HI	Hazard Index
HQ	Hazard Quotient
IRP	Installation Restoration Program
NCP	National Oil and Hazardous Substances Pollution Contingency Plan
NEADS	Northeast Air Defense Sector
NPL	National Priorities List
NYANG	New York Air National Guard
NYCRR	New York Code of Rules and Regulations
NYSDEC	New York State Department of Environmental Conservation
PCB	polychlorinated biphenyl
RAB	Restoration Advisory Board
RCRA	Resource Conservation and Recovery Act
RI	Remedial Investigation
ROD	Record of Decision
SAC	Strategic Air Command
SAR	Small Arms Range
SPDES	New York State Pollution Discharge Elimination System
SVOC	semivolatile organic compound

List of Acronyms (Cont.)

TCLP	Toxicity Characteristic Leaching Procedure
TOC	total organic carbon
VOC	volatile organic compound

1 Declaration

1.1 Site Name and Location

The Landfill 1 Area of Concern (AOC) is located at the former Griffiss Air Force Base (AFB) in Rome, Oneida County, New York.

1.2 Statement of Basis and Purpose

This Record of Decision (ROD) presents the presumptive remedy alternative as the selected remedial action for Landfill 1 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, and the National Oil and Hazardous Substances Pollution Contingency Plan (NCP). The Air Force Base Conversion Agency (AFBCA), The United States Environmental Protection Agency (EPA), and the New York State Department of Environmental Conservation (NYSDEC) have adopted this ROD through joint agreement. Information supporting this decision is contained in the administrative record file for this site.

1.3 Assessment of the Site

Actual or threatened release of hazardous substances from the AOC, if not addressed by implementing the response action selected in this ROD, may present a potential threat to public health, welfare, or the environment.

1.4 Description of Selected Remedy

The selected remedy for the Landfill 1 AOC is the Presumptive Remedy, which was developed in accordance with EPA Presumptive Remedy Guidance for Military Landfills, dated April 29, 1996, for the expeditious cleanup of sites that are similar in character to a large number of CERCLA sites that have already been remediated. Presumptive remedies are preferred technologies for common categories of sites based on historical patterns of remedy selection and EPA's scientific and engineering evaluations of performance data on technology implementation. The remedy addresses the threats to human health and the environment that are posed by exposure to soil, sediment, surface water, and groundwater at the site. The major components of the selected remedy include:

- Implementation of institutional controls in the form of deed restrictions of the main landfill boundary and the contaminated groundwater plume area to prevent exposure to the contaminated landfill mass and groundwater;

- Collection of groundwater/leachate from a trench located at the landfill toe;

- Treatment of collected groundwater/leachate by carbon adsorption and discharge of treated water into Six Mile Creek. All water to be discharged to the creek will be in compliance with the New York State Pollution Discharge Elimination System (SPDES) requirements;

- Installation of an impermeable cover in accordance with 6 NYCRR Part 360 landfill closure regulations, dated November 26, 1996;

- Maintenance of the impermeable cover and long-term monitoring of the groundwater, surface water, and sediment in accordance with 6 NYCRR Part 360 landfill post-closure regulations, dated November 26, 1996;

- 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 presumptive remedy. Any rare plants, significant communities or wetlands disturbed during the remedial action will be restored; and

- Evaluation of site conditions at least once every five years to ensure that the remedy is protective of human health and the environment.

1.5 Declaration Statement

The AFBCA, EPA, and NYSDEC have determined that the selected remedy meets the requirements for remedial action set forth in CERCLA, Section 121, because it:

- Protects human health and the environment;
- Provides a level or standard of control of the contaminants that attains, at a minimum, the legally applicable or relevant and appropriate requirements (ARARs) under federal and state laws;
- Is cost-effective;
- Utilizes permanent solutions, alternative treatment technologies, and resource recovery technologies to the maximum extent practicable;
- Satisfies the statutory preference for remedies that employ treatment(s) to reduce the toxicity, mobility, or volume of hazardous substances, pollutants, or contaminants at a site to the extent that it requires treatment of collected groundwater/leachate; and
- Includes a review of the remedial action, which is to be conducted five years after commencement of the remedial action, to ensure that the remedy continues to provide adequate protection to human health and the environment.

1.6 Signature of Adoption of the Remedy

On the basis of the remedial investigations (RIs) performed at the Landfill 1 AOC and the baseline risk assessment, the presumptive remedy is the selected remedy for the Landfill 1 AOC. The selected remedy meets the requirements for remedial action set forth in CERCLA, Section 121.

_____ _____

Albert F. Lowas, Jr. Date
Director
Air Force Base Conversion Agency

_____ _____

Jeanne M. Fox Date
Regional Administrator
United States Environmental Protection Agency, Region 2

2 Decision Summary

2.1 Site Name, Location, and Description

Regional Site Description

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 to the south of the base), and several state-designated wetlands are located on the former Griffiss AFB, which is bordered by the Mohawk River on the west. Due to its high average precipitation and predominantly silty sands, the former Griffiss AFB is considered a groundwater recharge zone.

Landfill 1 Area of Concern

Landfill 1 is an approximately 19.6-acre area located in the north-central portion of the former Griffiss AFB (see Figures 1 and 2). The bottom and sides of the landfill are unlined but three surface portions were capped in the 1970s and regraded and recapped in 1984 with natural soils and clay. The thickness of the existing landfill soil cover ranges from 1 to 4 feet. The landfill is bounded by the installation boundary on the north side, regulated wetlands and a tributary of Six Mile Creek on the east side, Six Mile Creek and regulated wetlands on the west side, and woodlands on the south side. The central

portion of Landfill 1 consists of planted trees; the northeastern area of the landfill is vegetated with grasses; and the remaining areas are planted with red pine, white spruce, scotch pine, American cedar, larch, black walnut, and evergreens. Two areas of the Landfill 1 AOC are considered significant natural communities by the New York State Natural Heritage Program. These areas consist of: (1) a white-cedar-dominated rich sloping fen wetland adjacent to the wetlands on the east side; and (2) an undisturbed hemlock hardwood swamp located in a mature forest adjacent to the northeast corner of the site.

The Landfill 1 AOC is located in an area of variable topography, with 45 feet of relief occurring primarily in the western portion of the site, adjacent to Six Mile Creek. Most of the landfill drains southeast toward a tributary of Six Mile Creek; the western portion drains to the west toward the Six Mile Creek flood plain and adjacent wetland area.

Landfill 1 rests at the toe of a sloping plane of low permeability bedrock. Information obtained from groundwater monitoring wells at the site indicates that the water table slopes 2% to the southwest toward Six Mile Creek. Leachate seeps emerging from several points along the base of the slope leading to the wetlands adjacent to Six Mile Creek have been observed at Landfill 1 since 1982.

The uppermost soils of the native geology, from ground surface to 2.5 feet below ground surface (BGS), consist of clayey sand to silty fine sand. Deeper soils consist predominantly of fine to medium, variably silty and gravelly sand.

2.2 Site History and Investigation 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 Laboratory). The 49th Fighter Interceptor Squadron was also added in that

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

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.

Landfill 1 was operated primarily as a trench-and-cover landfill from 1960 to 1973. Early cells were constructed in an east-west orientation and were from 40 to 50 feet wide and 300 to 500 feet long. Wastes were disposed in the landfill to depths of 15 to 18 feet. According to historical records, wastes received by the landfill included fire debris in the western portion, steam plant ash in the eastern portion, unlabeled 55-gallon drums, partially filled cans of an unknown crystalline chemical, and miscellaneous debris containing metallic and sheetrock components.

Numerous studies and investigations under the U.S. Department of Defense (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, interviews with base personnel, a field inspection, compilation of an inventory of wastes, evaluation of disposal practices, and an assessment to determine the nature and extent of site contamination; Problem Confirmation and Quantification studies (similar to what is now designated a Site Investigation) in 1982 and 1985; soil and groundwater analyses in 1986; a base-wide health assessment in 1988 by the U.S. Public Health Service, Agency for Toxic Substances and Disease Registry (ATSDR); base-specific hydrology investigations in 1989 and 1990; a groundwater investigation in 1991; and site-specific investigations between 1989 and 1993. ATSDR issued a Public Health Assessment for Griffiss AFB, dated October 23, 1995, and an addendum, dated September 9, 1996.

Pursuant to Section 105 of CERCLA, Griffiss AFB was included on the National Priorities List (NPL) on July 15, 1987. On August 21, 1990, USAF, EPA, and NYSDEC entered into a Federal Facility Agreement (FFA) under Section 120 of CERCLA.

Under the terms of the agreement, the Air Force was required to prepare and submit numerous reports to NYSDEC and EPA for review and comment. These reports address remedial activities that the Air Force is required to undertake under CERCLA and include identification of Areas of Concern on base; a scope of work for an RI; a work plan for the RI, including a sampling and analysis plan and a quality assurance project plan; a baseline risk assessment; a community relations plan; an RI report; a work plan and the report for a supplemental investigation; and a Landfill Cover Investigation Report. The Air Force delivered the draft-final RI report covering 31 AOCs to EPA and NYSDEC on December 20, 1996, and the final SI report was delivered on July 24, 1998. The Final Landfill Cover Investigation Report was delivered on December 8, 1997.

This ROD for remedial action is based on an evaluation of potential threats to human health and the environment due to contamination in the soil, sediment, surface water, and groundwater media at the Landfill 1 AOC and adjacent areas. During the RI, a site-specific baseline risk assessment (using appropriate toxicological and exposure assumptions to evaluate cancer risks and non-cancer health hazards) was conducted in order to evaluate the risks posed by detected site contaminants to the reasonably maximally exposed individual under current and future land use assumptions. In the RI report, the results of the risk assessment were compared to available standards and

guidance values using federal and state environmental and public health laws that were identified as potentially applicable or relevant and appropriate requirements (ARARs) at the site. Chemical-specific ARARs are usually health- or risk-based numerical values or methodologies that result in a numerical value when applied to site-specific conditions. Currently, there are no chemical-specific ARARs for soil (other than for PCBs), sediments, or air. Therefore, other non-promulgated federal and state advisories and guidance values, referred to as To-Be-Considereds (TBCs), and background levels of the contaminants in the absence of TBCs, were considered. This comparison was used in the selection of the preferred remedial action.

Initial Site Investigations

Initial site investigations were performed in 1981 and 1982. Visually identified wastes at the site included unlabeled 55-gallon drums, decomposed cardboard drums, and several open burning areas with partially filled cans of an unknown crystalline chemical (the cans and some of the drums were later removed at an unknown date). Rust-tinted seeps were observed at the base of the slope heading toward wetlands adjacent to Six Mile Creek, and iron, zinc, and toluene were identified in the 1981 and 1982 samples.

As part of this preliminary investigation, nine groundwater monitoring wells were installed at Landfill 1 and were sampled in January and February of 1982. A tenth well was installed in January 1990. In May 1991, samples collected from five of the wells indicated the presence of four organic compounds that exceeded the current state standards for groundwater. In 1992 and 1993, the Air Force conducted a baseline investigation of the chemical contamination of site groundwater. As part of the investigation, all ten wells at Landfill 1 were sampled on a quarterly basis for one year. NYSDEC groundwater standards for several volatile organic compounds (VOCs), manganese, zinc, lead, cadmium, and glycols were exceeded.

Remedial Investigation

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 whether any remedial action was necessary to prevent potential threats

to human health and the environment. The RI included a geophysical survey consisting of a magnetometry survey and ground-penetrating radar (GPR) survey; a passive soil gas survey; sampling and analysis of surface soil, surface water, sediment, leachate and fish tissue analysis (collected during the Six Mile Creek Remedial Investigation); the installation of four additional groundwater monitoring wells; and the collection and analysis of groundwater samples from up to 13 monitoring wells (two wells were not sampled due to high turbidity and potential grout contamination, and another well was resampled and analyzed for specific chemicals).

Geophysical Surveys. The geophysical survey results indicated several anomalies representing eight disposal trenches and discrete disposal locations. Of these anomalies, GPR profiles indicated that two strong subsurface reflections were buried metallic objects.

Passive Soil Gas Survey. The passive soil gas survey indicated the presence of chlorinated solvents and petroleum fuel constituents.

Fish Analyses. Several species of fish were collected and analyzed for hazardous constituents as part of the Six Mile Creek AOC. Pesticides/Polychlorinated biphenyls (PCBs) were among the chemicals of potential concern detected in the composite whole-body fish tissue samples taken from the brown trout, creek chub, and white sucker. The detected concentrations of pesticides/PCBs ranged from 0.165 mg/kg (for the creek chub taken upstream of the site) to 13.5 mg/kg (creek chub taken approximately 4000 feet downstream of the site). The presence of pesticides/PCBs found in the whole-body fish tissue samples (which were similar to the contaminants found in the leachate samples from Landfill 1) was considered in the selection of the preferred remedial action.

Surface Soil Investigation. Seven surface soil samples collected during the RI were analyzed for chemicals potentially present in Landfill 1. One VOC, 13 semivolatile organic compounds (SVOCs), seven pesticides, and 21 metals were detected. The

concentrations of three SVOCs and five metals exceeded the most stringent criterion (see Table 1).

Groundwater Investigation. Analysis of groundwater samples indicated the presence of 23 VOCs, nine SVOCs, 11 pesticides, and 23 metals. The concentrations of eight VOCs, one pesticide, and 12 metals exceeded the most stringent criterion (see Table 2).

Leachate Investigation. Groundwater has also been observed seeping as leachate from the southwestern end of the landfill. The leachate samples collected during the RI contained 18 VOCs, 10 SVOCs, 24 pesticides, one PCB, and 14 metals. The compounds that exceeded groundwater effluent standards (6 NYCRR 703.6) and Class GA groundwater standards (6 New York Code of Rules and Regulations [NYCRR] 703.5) are identified in Table 3.

Surface Water Investigation. Analysis of surface water samples indicated the presence of two VOCs, 13 SVOCs, 11 pesticides/PCBs, and nine metals. The concentrations of six SVOCs, two pesticides, five PCBs, and three metals exceeded the most stringent criterion (see Table 4).

Sediment Investigation. Analysis of the sediment samples collected for the RI indicated the presence of 8 VOCs, 20 SVOCs, 21 pesticides/PCBs, and 23 metals. The concentrations of two VOCs, 13 SVOCs, 14 pesticides/PCBs, and seven metals exceeded the most stringent criterion (see Table 5).

Supplemental Investigations

An RI supplemental investigation was performed in 1997 for Landfill 1 to investigate two significant subsurface geophysical anomalies detected during the RI and to analyze the surrounding soils and contents of a partially buried drum located in Landfill 1 just north of the Small Arms Range (SAR). No drums were found in the test pits, and scrap steel appeared to be the cause of the significant geophysical anomalies.

Because no drums were found, no samples were collected at these pits. The partially buried drum mentioned above was labeled "Lube Oil, Sinclair REF-1" and contained a black, very viscous, grease-like material. The drum contents were sampled for toxicity characteristic leaching procedure (TCLP) VOCs and SVOCs, PCBs, and Resource Conservation and Recovery Act (RCRA) characteristics to determine methods of disposal. The partially buried drum and surrounding stained soils were excavated and disposed of at a permitted facility in January 1998. Verification soil sampling for VOCs, SVOCs, pesticides/PCBs, and metals following the drum and stained soil removal indicated no residual contamination from the drum.

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 hydrologic evaluation of 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 one to four feet. In addition, several exposed empty drums were observed that were later excavated and removed. Visual inspection and verification sampling using a photoionization detector following excavation of soil surrounding the drums indicated no residual contamination.

2.3 Highlights of Community Participation

The final proposed plan and a fact sheet for the Landfill 1 AOC indicating Presumptive Remedy as the selected remedial action were released to the public on **July 16, 1999**. The document was made available to the public in both the administrative record file located at Building 301 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 **July 19, 1999.** A public comment period lasting from July 20, 1999, to August 19, 1999, was set up to encourage public participation in the remedial action selection process. In addition, a public meeting was held on August 10, 1999. At this meeting, representatives from AFBCA, EPA, and NYSDEC answered questions about issues at the AOC and the Presumptive Remedy proposal under consideration. A response to the comments

received during this period is included in the Responsiveness Summary, which is part of this Record of Decision (see Section 3).

2.4 Scope and Role of Site Response Action

The scope of the Presumptive Remedy Alternative for the Landfill 1 AOC addresses the concerns for human health and the environment. Three portions of the landfill (approximately 6 acres) were originally capped in the 1970s; in 1984, the same portions were regraded with locally available soils and clay. No other response actions have been taken at this site. The Presumptive Remedy will bring the landfill cap into compliance with NYSDEC's standards of November 1996 and will address the contaminated groundwater/leachate at the site.

2.5 Summary of Site Risks

Site risks were analyzed based on the extent of contamination at the Landfill 1 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 soils, sediments, surface water, and groundwater at the site. The results of this assessment were considered in the cleanup goal selection process.

Human Health Risk Assessment

A baseline human health risk assessment was conducted during the RI to determine whether chemicals detected at the Landfill 1 AOC could pose health risks to individuals under current and proposed future land uses if no remediation occurs. 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 soils) by which humans are potentially exposed;

- Toxicity Assessment-determines the types of adverse health effects associated with chemical exposures and the relationship between magnitude of exposure (dose) and severity of adverse effects (response); and

- Risk Characterization-summarizes and combines outputs of the exposure and toxicity assessments to provide a quantitative (e.g., one-in-a-million excess cancer risk and non-cancer Hazard Index value) assessment of site-related risks and a discussion of uncertainties associated with the evaluation of the risks and hazards for the site.

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

The current and anticipated future land use designations for the Landfill 1 AOC are open space and wetlands. The human health risk assessment evaluated exposure to potential residential, agricultural, recreational, and occupational (landscape worker and future industrial worker) populations that may be exposed to chemicals detected in the site media. The various exposure scenarios for each population are described in Table 6.

Intake assumptions, which are based on EPA guidance, are more fully described in the RI.

Quantitative estimates of carcinogenic and noncarcinogenic risks were calculated for the Landfill 1 AOC as part of a risk characterization. The risk characterization evaluates potential health risks based on estimated exposure intakes and toxicity values.

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

To assess the overall noncarcinogenic effects posed by more than one contaminant, EPA has developed the Hazard Quotient (HQ) and Hazard Index (HI). The HQ is the ratio of the chronic daily intake of a chemical to the reference dose for the chemical. The reference dose is an estimate (with uncertainty spanning perhaps an order of magnitude or greater) of a daily exposure level for the human population, including sensitive sub-populations, that is likely to be without an appreciable risk of deleterious effects during a portion of a lifetime. The HQs are summed for all contaminants within an exposure pathway (e.g., ingestion of soils) 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 1. Once either of these thresholds has been exceeded, the 1 in 1,000,000 (1×10^{-6}) risk level and an HI of 1 or less may be used as the point of departure for determining remediation goals for alternatives.

Because carcinogenic risks are based on total lifetime exposure, the calculated risk to the adult residential, agricultural, and recreational receptor (30-year exposure assumption versus a 6-year exposure assumption for a child) was used; therefore, only the carcinogenic risks to the adults were presented in the RI report. Additional specific exposure assumptions are described in the RI report.

The total carcinogenic risk to an adult resident and an adult agricultural receptor was calculated as 3 in 10,000 (3×10^{-4}), exceeding EPA's target lifetime excess cancer risk range as a result of the risk posed by ingestion of groundwater.

The total carcinogenic risk for an adult recreational receptor was calculated as 9 in 1,000,000 (9×10^{-6}), which is within the EPA's target risk range.

The total carcinogenic risk for landscape workers (25-year exposure assumption) was calculated as 9 in 10,000,000 (9×10^{-7}), which is below the EPA's target range. The total carcinogenic risk for an industrial worker (25-year exposure assumption) exposed to groundwater was 6 in 100,000 (6×10^{-5}), which is within the EPA's target risk range.

For noncarcinogenic risks, the child is the receptor generally assumed to have the greatest estimated risk; therefore, HIs were calculated for the adult, adolescent, youth, and child. The total HIs for the future residential adult, adolescent, youth, and child were calculated as 8, 9, 10, and 20, respectively, all exceeding the threshold level of 1. Ingestion of groundwater contaminated with manganese, cadmium, and arsenic contributed the majority of the risk. The HIs for all other exposure pathways for receptors of all ages were below the threshold level of 1.

The total HIs for adult, adolescent, youth, and child agricultural receptors were calculated as 8, 9,10, and 20, respectively, due to the ingestion of groundwater contaminated with manganese, cadmium, and arsenic. The HIs for all other exposure pathways for receptors of all ages were below the threshold level of 1.

The total HIs for the current and future recreational adult, adolescent, youth, and child were calculated as 0.06, 0.06, 0.1, and 0.4, respectively, all less than the threshold level of 1, indicating that adverse noncarcinogenic health effects are not expected to occur.

The total HI for a landscape worker was 0.02, which is below the threshold level of 1. Therefore, potential adverse noncarcinogenic health effects are not expected to occur. The total HI for an industrial worker exposed to groundwater was 2, which exceeds the threshold level. Ingestion of groundwater contaminated with manganese was the greatest contributor to the risk.

The results of the human health baseline risk assessment indicate that chemicals detected in air, surface soil, groundwater, surface water, and sediments likely do not

present an unacceptable risk to potentially exposed populations as long as groundwater is not used for drinking water. The quantitative evaluation of risk is subject to several conservative assumptions and should not be considered an absolute measure of risk.

Uncertainties exist in many areas of the human health risk assessment process. However, use of conservative variables in intake calculations and health protective assumptions throughout the entire risk assessment process results in an assessment that is protective of human health and the environment. Examples of uncertainties associated with the risk assessment for the Landfill 1 AOC include: (1) Chemical samples for the groundwater and leachate were collected from the suspected source of contamination rather than through random sampling, which may result in a potential overestimate of risk for those pathways; (2) The noncarcinogenic risks associated with dermal contact with soil and sediment were not quantified for the majority of COPCs, which may lead to underestimation of the overall risk due to dermal contact; (3) The models used in the RI are likely to overestimate exposure point concentrations in air, which would cause an overestimation of risk for the inhalation pathway; (4) Inhalation reference doses and cancer slope factors were not available for many chemicals detected in site soils and groundwater which would result in a potential underestimation of risk for the inhalation pathway; and (5) The model used in the RI to estimate exposure point concentrations in crops irrigated with groundwater may under- or overestimate risk through the crop ingestion pathway.

Ecological Risk Assessment

A baseline risk assessment for ecological receptors at the Landfill 1 AOC was conducted during the RI. The environmental evaluation modeled risks to raccoons, shrews, and American woodcocks from exposures to surface soil, surface water, and sediment.

The HQs indicative of risks to the raccoon were calculated to be below 1; therefore, the potential for adverse effects to this ecological receptor is considered to be insignificant. The HQ for the short-tailed shrew exceeded 1 for one out of over 100 chemicals (4 chloro-2-methyl phenoxyacetic acid [MCPA], HQ = 6.6). For the American

woodcock, the HQ exceeded 1 for two chemicals (MCPA, HQ =3.6; and strontium, HQ = 1.2). These values indicate a potential for adverse effects.

Modeling of bioaccumulation to higher order species was not performed, which tends to underestimate the risk to ecological receptors. Also, the risks to ecological receptors in impacted areas (e.g., Six Mile Creek) were not considered in this AOC's risk assessment but were considered in the selection of the preferred remedial action.

There are no plant or animal species at the former base that are considered to be threatened or endangered by the U.S. Department of the Interior. However, whorled-mountain mint, a listed New York State threatened plant species, has been identified adjacent to the wetlands along Six Mile Creek.

Actual or threatened release of contaminants from the AOC, if not addressed by implementing the response action selected in this ROD, may present a potential threat to public health, welfare, or the environment.

2.6 Remedial Action Objectives

The following are the remedial action objectives developed for this site based upon the use of the presumptive remedy guidance and the site data:

- 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;

- Significantly reduce infiltration of rain water and snow-melt water through the landfill mass in order to minimize the potential for leachate generation and groundwater contamination;

- Collection and treatment of groundwater/leachate in order to reduce or eliminate the discharge of contaminants to the environment; and

- Monitoring 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 presumptive remedy.

2.7 Description and Evaluation of Remedial Action 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. These regulations also establish a preference for remedial actions that employ, as a principal element, treatment to permanently and significantly reduce the volume, toxicity, or mobility of contaminants at a site. As part of the presumptive remedy approach, the proposed plan evaluated a no action scenario as dictated by CERCLA and compared it to the presumptive remedy 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 Landfill 1 AOC. The site would remain as it is now and there would be no monitoring of contaminants in the groundwater. Contaminated groundwater would continue to seep as leachate from the west side of the landfill possibly contaminating Six Mile Creek. No institutional controls restricting habitation or use would be established. Costs and construction time are not associated with this alternative.

Presumptive Remedy Alternative

The Presumptive Remedy Alternative includes (1) implementation of institutional controls in the form of deed restrictions of the main landfill boundary and the contaminated groundwater plume area to prevent exposure to the contaminated landfill mass and groundwater; (2) collection of groundwater/leachate from a trench located at the landfill toe; (3) treatment of collected groundwater/leachate by carbon adsorption and discharge of treated water into Six Mile Creek; (4) installation of an impermeable cover in accordance with 6 NYCRR Part 360 landfill closure regulations, dated November 26, 1996; (5) maintenance of the impermeable cover and long-term monitoring of the groundwater, surface water, and sediment in accordance with 6 NYCRR Part 360 landfill post-closure regulations, dated November 26, 1996; and (6) monitoring the groundwater and stream environment downgradient of the site to evaluate the effectiveness of the

presumptive remedy. Any rare plants, significant communities or wetlands disturbed during the remedial action will be restored. Construction costs will be in the range of $5 million to $7 million, and operation and maintenance (O & M) costs will be approximately $30,000 per year. The project duration will be 9 to 12 months.

2.8 Summary of Comparative Analysis

Remedial alternatives are assessed on the basis of both a detailed and a comparative analysis pursuant to the NCP. The detailed analysis of Landfill 1 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 ARARs addresses whether a remedy would (1) meet all of the ARARs or (2) provide grounds for invoking a waiver.

In addition, the following "primary balancing" criteria are used to make comparisons and identify the major trade-off 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 (1) the period of time needed to achieve protection and (2) 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 not contribute to protection of human health and the environment. The groundwater is not currently being used for domestic purposes; therefore it does not currently pose a threat to human health. However, ARARs would continue to be exceeded in the aquifer, which would pose a risk should the groundwater be used for domestic purposes in the future. In addition, groundwater would continue to discharge into Six Mile Creek at the west side of the landfill. While specific human health and environmental hazards have not been documented from this release, the groundwater discharging as leachate has been found to contain a variety of organic compounds at very low levels that would continue to discharge into the creek.

   The Presumptive Remedy alternative would actively reduce concentrations in the aquifer to help prevent future exposures to contaminants and thus provide future benefit to human health and the

environment in future potential exposure scenarios. Furthermore, the discharge of contaminated groundwater into Six Mile Creek would be halted, thus preventing future adverse impacts on the creek from this release.

2. Compliance with ARARs

   With no treatment of contaminated groundwater and leachate, the No Action alternative would not comply with the groundwater ARARs.

   The Presumptive Remedy alternative will comply with ARARs. By actively recovering contaminated groundwater from the aquifer, great strides will be made to reduce the concentrations in the aquifer to below ARARs. Because groundwater will be collected immediately downgradient of the landfill, ARARs may continue to be exceeded in groundwater immediately beneath the aquifer. However, the location of the collection trench will prevent contaminated groundwater from passing under Six Mile Creek and contaminating groundwater west of the creek as well as achieving compliance ARARs in this portion of the aquifer. The carbon adsorption treatment system will be fully capable of meeting action-specific ARARs and the spent carbon is not expected to be considered hazardous waste. Because the collection would be located adjacent to a wetland and construction activities may impact the wetland, location-specific ARARs for wetlands may apply. Wetland construction permits would likely be necessary to comply with location-specific ARARs.

3. Long-term Effectiveness and Permanence

   The No Action alternative would not treat or contain contaminant migration and, therefore, would not be effective in the long-term.

   Groundwater treatment by carbon adsorption does not represent a completely permanent solution to contamination at the site, as the presumed sources of groundwater contamination would likely remain within the landfill. However, the combination of capping and groundwater collection present the most aggressive approach to this contamination short of landfill excavation, which was not considered due to the large size of the landfill. Landfills are typically not excavated and removed to other disposal areas unless specific sources of contamination are present. Thorough investigations during the RI and SI demonstrated that no distinct sources of contamination are present in the landfill. Thus, the approach adopted by the presumptive remedy alternative represents the greatest long-term effectiveness appropriate for the AOC.

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

   The no action alternative provides no treatment or containment of contaminant migration, therefore, it does not result in any reduction in toxicity, mobility, or volume.

   The Presumptive Remedy alternative through its carbon adsorption treatment provides a high level of toxicity reduction because it treats all compounds that would otherwise discharge from the landfill as leachate. Compounds adsorbed to carbon would be thermally destroyed when the spent carbon is regenerated by the supplier.

5. Short-term Effectiveness

   Because there would be no remedial actions associated with the No Action alternative, no short-term impacts would be realized.

   The Presumptive Remedy alternative is considered to be effective in the short-term. Construction of the trench may result in some minor disruptions to wetland habitat. However, the areal extent of this disruption would be limited and re-establishment of the aquatic and benthic communities would be expected. Clearing and grubbing of the landfill would result in the loss of about 20 acres of upland habitat. This area is currently mostly well-vegetated, with both transition vegetation and mature stands of forest.

6. Implementability

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

   There would be no significant impediments to implementing the Presumptive Remedy alternative.

7. Cost

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

   Capital costs for implementation of the Presumptive Remedy will be $5 million to $7 million. O & M costs will be approximately $30,000 per year.

8. Agency Acceptance

   AFBCA, NYSDEC, and EPA have mutually agreed to select the Presumptive Remedy alternative. The Presumptive Remedy alternative satisfies the threshold criteria and ensures compliance with applicable regulations.

9. Community Acceptance

   Community acceptance of the Presumptive Remedy alternative was assessed at the public meeting and during the public comment period. The Restoration Advisory Board (RAB) supported selection of the Presumptive Remedy Alternative.

2.9 Description of the Selected Remedy

The selected remedial action alternative for the Landfill 1 AOC is the Presumptive Remedy. This alternative was chosen because it has been demonstrated to be effective for similar military landfills and is known to be both cost-effective and easy to implement. The threshold criteria are satisfied by the Presumptive Remedy. The Presumptive Remedy includes the following actions.

1. Implementation of institutional controls in the form of deed restrictions of the main landfill boundary and the contaminated groundwater plume area to prevent exposure to the contaminated landfill mass and groundwater.

2. Preparation of the landfill surface prior to providing cover materials. The landfill cover will be cleared and grubbed, and low areas will be backfilled. The landfill surface also will be regraded to prevent future erosion or ponding. Any rare plants, significant natural communities, or wetlands disturbed during the remedial action will be restored.

3. Decommissioning of monitoring wells located within the construction limits.

4. Collection of groundwater/leachate from a trench located at the landfill toe. Groundwater flow will be collected in a trench and then pumped to a treatment facility. Groundwater from the collection trench will enter a vault, where a pump will move the groundwater up to the treatment facility.

5. Treatment of collected groundwater by a carbon-adsorption system. A liquid-phase, activated-carbon system will remove contaminants of concern in the leachate. The treated water will be discharged on site to Six Mile Creek. All water to be discharged will be in compliance with the SPDES requirements.

6. Installation of an impermeable cover in accordance with 6 NYCRR, Part 360, landfill closure regulations, dated November 26, 1996. The cover at Landfill 1 will consist of a foundation layer, gas-venting layer, geomembrane, drainage layer, geotextile, barrier protection layer, and topsoil layer. The foundation layer will consist of borrow soils placed to establish the final contour and slope requirements. Other component details include: a passive gas-venting layer with trenches and gas vents; a 40-mil-thick geomembrane that will serve as the impermeable layer required by 6 NYCRR 360; a six-inch-thick drainage layer placed above the geomembrane primarily to drain water from the overlying soil; a geotextile placed above the drainage layer to restrict the movement of fine particles; and an 18-inch-thick barrier protection layer consisting of borrow soils placed above the geotextile to support vegetative growth and prevent penetration of the geomembrane. Six inches of topsoil will be placed above the barrier protection layer to support vegetation.

7. Maintenance of the impermeable cover and long-term monitoring of the groundwater, surface water, and sediment in accordance with 6 NYCRR, Part 360, landfill post-closure regulations dated November 26, 1996.

8. Monitoring the groundwater and stream environment (which may include, but is not limited to, sediment, surface water, and biota) downgradient of the site to evaluate the effectiveness of the presumptive remedy.

9. Evaluation of site conditions at least once every five years.

2.10 Statutory Determinations

The selected remedy must meet the statutory requirements of CERCLA, Section 121, which are itemized in Section 1.5 of this ROD and described below.

Protection of Human Health and the Environment

The selected remedy would actively reduce concentrations of contaminants in the groundwater, thus helping to prevent future exposures. The risks from potential future

exposure levels will be reduced to within 10^{-4} to 10^{-6}, the acceptable range within which EPA manages carcinogenic risk, and the hazard indices for noncarcinogens will be reduced to less than 1. In addition, the discharge of contaminated groundwater/leachate into Six Mile Creek will be halted, thus preventing future adverse impacts on the creek, the wildlife, and the environment from this source.

Compliance with ARARs

The selected remedy alternative will comply with chemical-specific ARARs for groundwater (see Table 2).

The carbon-adsorption treatment system will meet action-specific ARARs (technology- or activity-based requirements for remedial actions).

Because the collection trench would be located adjacent to a wetland and construction activities may impact the wetland, location-specific ARARs (restrictions placed on the concentration of hazardous substances or the conduct of activity solely because they occur in special locations) for wetlands may apply. Wetland construction permits requirements will be followed, as required, to comply with the location-specific ARARs.

Cost-Effectiveness

The cost of the remedy is typical for the scope of the remedial action.

Utilization of Permanent Solutions and Alternative Treatment Technologies to the Maximum Extent Practicable

Groundwater treatment by carbon adsorption does not represent a completely permanent solution to contamination at the site, as the presumed sources of groundwater contamination would likely remain within the landfill. However, the combination of capping and groundwater collection present the most aggressive approach to this contamination short of landfill excavation, which was not considered due to the large size of the landfill. Landfills are typically not excavated and removed to other disposal areas unless specific sources of contamination are present. Thorough investigations during the RI and SI demonstrated that no distinct sources of contamination are present in the

landfill. Thus, the approach adopted by the selected remedy represents the greatest long-term effectiveness appropriate for this AOC.

Preference for Treatment as a Principal Element

The groundwater treatment system meets the statutory preference for treatment as a principal element. The contaminated groundwater will be treated by the carbon-adsorption system, and measures to improve the landfill cover will also benefit groundwater quality.

2.11 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 OR GUIDANCE VALUES
LANDFILL 1 AOC
SURFACE SOIL SAMPLES

Compound	Range of Detected Concentrations	Frequency of Detection Above Most Stringent Criterion	Most Stringent Criterion
SVOCs (µg/kg)			
Benzo(a)anthracene	110 J - 270 J	1/7	224[a]
Benzo(a)pyrene	16 J - 240 J	5/7	61[a]
Dibenzo(a,h)anthracene	55 J - 75 J	2/7	14[a]
Metals (mg/kg)			
Chromium, hexavalent	0.26 - 2.1	5/7	0.45[b]
Chromium, total	6.4 J - 25.2	1/7	22.6[b]
Copper	27.1 - 443 J	7/7	43[b]
Molybdenum	5.8 - 15 J	3/7	ND[b]
Thallium	0.48 - 0.94	1/7	0.9[b]

[a] NYS-recommended soil cleanup objective.
[b] Background screening concentration.
Key:
J = Estimated concentration.
ND = Nondetect.

Table 2
COMPOUNDS EXCEEDING STANDARDS OR GUIDANCE VALUES
LANDFILL 1 AOC
GROUNDWATER SAMPLES

Compound	Range of Detected Concentrations	Frequency of Detection Above Most Stringent Criterion	Most Stringent Criterion
VOCs (µg/L)			
1,4-Dichlorobenzene	0.044 J - 7.2	1/13	4.7[a]
Benzene	0.16 J - 6	4/13	0.7[a]
Chlorobenzene	0.34 J - 11	1/13	5[a]
Ethylbenzene	0.49 J - 12	1/13	5[a]
Isopropylbenzene	0.19 J - 12	2/13	5[a]
1,2,4-Trimethylbenzene	1.8 - 100	4/13	5[a]
1,3,5-Trimethylbenzene	1.1 - 92	4/13	5[a]
Xylenes, total	1.8 - 110	3/13	5[a]
Pesticides/PCBs (µg/L)			
Dieldrin	0.001 J - 0.002 J	2/12	ND[a]
Metals (mg/L)			
Aluminum	0.097 - 141	5/12	0.05[b]
Antimony	0.00106 J - 34.9	1/12	0.003[c]
Barium	0.023 - 49	1/12	1[a]
Beryllium	0.29	1/12	0.003[c]
Cadmium	0.097 - 7.6	2/12	0.01[a]
Chromium, total	0.13 - 18.6	2/12	0.05[a]
Copper	0.01 - 5.8	2/12	0.2[a]
Iron	0.17 - 219	11/12	0.3[a]
Manganese	0.16 - 13.7	12/12	0.05[b]
Nickel	0.07 - 0.23	1/12	0.1[d]
Sodium	3.6 - 51.1	5/12	20[a]
Zinc	0.011 - 32.9	2/12	0.3[a]

[a] NYSDEC Class GA groundwater standard.
[b] Federal secondary maximum contaminant level.
[c] NYSDEC Class GA groundwater guidance value.
[d] Federal maximum contaminant level.
Key:
J = Estimated concentration.
ND = Nondetect.

Note: The calculated 95% upper confidence limit (UCL) levels are presented in the RI report.

Table 3
COMPOUNDS EXCEEDING STANDARDS OR GUIDANCE VALUES
LANDFILL 1 AOC
LEACHATE SAMPLES

Compound	Range of Detected Concentrations	Frequency of Detection Above Most Stringent Criterion	Most Stringent Criterion
VOCs (µg/L)			
1,2,4 Trimethylbenzene	4.9 - 320	1/3	5[a,b]
1,3,5 Trimethylbenzene	2.1 - 250	1/3	5[a,b]
1,4 Dichlorobenzene	0.06 J - 20	2/3	3[a,b]
Benzene	1.3	1/3	1[a,b]
Chlorobenzene	5 J - 9.4 J	2/3	5[a,b]
Ethylbenzene	0.45 J - 110	1/3	5[a,b]
Xylenes, Total	2.1 - 600	1/2	5[a,b]
Pesticides/PCBs (µg/L)			
Aldrin	0.007 J - 0.015 J	2/4	ND[a,b]
Endrin	0.001 J	1/4	ND[a,b]
gamma BHC (lindane)	0.007 J	1/4	ND[b]
Aroclor 1242	1	1/3	0.09[a,b]
Silvex (2,4,5-TP)	0.26 J - 5.6 J	2/5	0.26[a,b]
p,p'-DDE	0.009 J	1/4	ND[a]
p,p'-DDT	0.005 J	1/4	ND[a]
Metals (mg/L)			
Iron	9.82 - 26.5	3/3	0.3[a]
Manganese	0.248 - 0.85	2/3	0.3[a]

[a] NYSDEC groundwater effluent standard (6 NYCRR 703.6).
[b] NYSDEC Class GA groundwater standard (6 NYCRR 703.5).
Key:
J = Estimated concentration.
ND = Nondetect.

Table 4
COMPOUNDS EXCEEDING STANDARDS OR GUIDANCE VALUES
LANDFILL 1 AOC
SURFACE WATER SAMPLES

Compound	Range of Detected Concentrations	Frequency of Detection Above Most Stringent Criterion	Most Stringent Criterion
SVOCs (µg/L)			
Anthracene	0.0029 J - 0.031 J	2/3	0.003[a]
Benzo(a)anthracene	0.014 J - 0.031 J	2/3	0.003[a]
Chrysene	0.014 J - 0.032 J	3/3	0.003[a]
Fluorene	1.1 J	1/3	0.003[a]
Phenanthrene	0.091 J	1/3	0.003[a]
Pyrene	0.054 J	1/3	0.003[a]
Pesticides/PCBs (µg/L)			
Dieldrin	0.001 J	1/5	0.000071[a]
Hexachlorobenzene	0.001 J - 0.002 J	3/5	0.00072[a]
2,2,3,4,6-Pentachlorobiphenyl	0.046 J	1/3	0.000001[b]
2,2,4,4,5,6-Hexachlorobiphenyl	0.013 J - 0.036 J	3/3	0.000001[b]
2,2,4,4-Tetrachlorobiphenyl	0.034 J - 0.058 J	2/3	0.000001[b]
2,3-Dichlorobiphenyl	1 J	1/3	0.000001[b]
2,4,5-Trichlorobiphenyl	0.038 J	1/3	0.000001[b]
Metals (mg/L)			
Iron	0.21 - 0.68	2/3	0.3[c]
Lead	0.002	1/3	0.001[a]
Manganese	0.006 - 0.084	1/3	0.05[a]

[a] Federal ambient water quality criterion for protection of human health.
Reference: Quality Criteria for Water, EPA 440/5-86-001 (May 1, 1986).
[b] NYSDEC Class C surface water standard.
Key:
J = Estimated concentration.

Table 5
COMPOUNDS EXCEEDING STANDARDS OR GUIDANCE VALUES
LANDFILL 1 AOC
SEDIMENT SAMPLES

Compound	Range of Detected Concentrations	Frequency of Detection Above Most Stringent Criterion	Most Stringent Criterion
VOCs (µg/kg)			
Benzene	4 J - 6 J	2/19	0.6*[a]
Chlorobenzene	16 J	2/19	3.5*[b]
SVOCs (µg/kg)			
3-Methylphenol	290 J	1/19	0.5[b]
3-Methylphenol (P-cresol)	240 J	1/19	0.5[b]
Acenaphthylene	62 J - 69 J	2/19	44[c]
Benzo(a)anthracene	110 J - 660	3/19	1.3*[a]
Benzo(a)pyrene	130 J - 500 J	5/19	1.3*[a]
Benzo(b)fluoranthene	40 J - 1100	7/19	1.3*[a]
Benzo(k)fluoranthene	30 J - 550 J	5/19	1.3*[a]
Bis(2-ethylhexyl)phthalate	22 J - 9400 J	8/19	199.5*[b]
Chrysene	210 J - 800	3/19	1.3*[a]
Fluoranthene	15 J - 1300	2/19	600*[c]
Indeno(1,2,3-cd)pyrene	72 J - 240 J	3/19	1.3*[a]
Phenanthrene	12 J - 320 J	4/19	120*[b]
Pyrene	72 J - 1300	1/19	665[c]
Pesticides/PCBs (µg/kg)			
2,4-Dichlorobiphenyl	25 J - 66 J	3/19	0.0008*[a]
alpha Endosulfan	6.6	1/18	0.03*[b]
alpha Chlordane	0.94 J - 3.2	2/18	0.001*[a]
beta Endosulfan	9 J	1/18	0.03*[b]
BHC (Hexachlorcyclohexane)	0.82 J - 5.6	3/18	0.06*[b]
Dieldrin	3.7 J - 7.1 J	3/18	0.1*[a]
Endrin	2.1 J - 5.8 J	3/18	0.8*[a]
gamma Chlordane	1.1 J - 7.4	3/18	0.001*[a]
Malathion	50	1/18	0.02*[b]
Methoxychlor	3.6 J - 11 J	4/18	0.6*[b]
Aroclor 1260	190 J - 790	2/18	0.0008*[a]
p,p'-DDD	2 J - 540	8/18	0.01*[a]
p,p'-DDE	0.97 J - 250	9/18	0.01*[a]
p,p'-DDT	3.4 J - 1,000	8/18	0.01*[a]
Metals (mg/kg)			
Antimony	19.9	1/19	2.0[d]
Arsenic	1.3 - 76.8	9/19	6[d]
Copper	2.7 - 28.3	4/19	16[d]
Lead	8.5 - 209	9/19	31[d]
Manganese	30.8 - 11,600	7/19	460[d]
Mercury	0.44	1/19	0.15[d]
Nickel	6.4 - 23	2/19	16[d]

* Criterion expressed as µg per gram of organic carbon; sediment concentrations adjusted based on sample-specific total organic carbon before comparison reported in "Frequency of Detection Above Most Stringent Criterion" column.

[a] NYSDEC criterion for protection of human health -bioaccumulation.

[b] NYSDEC criterion for protection of benthic aquatic life.

[c] Federal guidance value, National Oceanic and Atmospheric Administration.

[d] State criterion for metals in sediment.

Key:
J = Estimated concentration.

Note: The calculated 95% upper confidence limit (UCL) levels are presented in the RI report.

Table 6
LANDFILL 1 AOC
RISK ASSESSMENT EXPOSURE SCENARIOS

RESIDENTIAL AND AGRICULTURAL RECEPTORS	RECREATIONAL RECEPTOR	LANDSCAPE WORKER	INDUSTRIAL WORKER
Adult, Child, Youth, Adolescent	**Adult, Child, Youth, Adolescent**	**Adult**	**Adult**
• Ingestion of groundwater • Dermal contact with groundwater • Inhalation of VOCs from groundwater • Ingestion of crops irrigated with groundwater	• Inhalation of airborne chemicals • Inhalation of fugitive dust from surface soil • Incidental ingestion of surface soil • Dermal contact with surface soil • Incidental ingestion of surface water • Dermal contact with surface water • Incidental ingestion of sediments • Dermal contact with sediments	• Incidental ingestion of surface soil • Inhalation of fugitive dust from surface soil • Dermal contact with surface soil • Inhalation of airborne chemicals	• Ingestion of groundwater • Dermal contact with groundwater • Inhalation of VOCs from groundwater

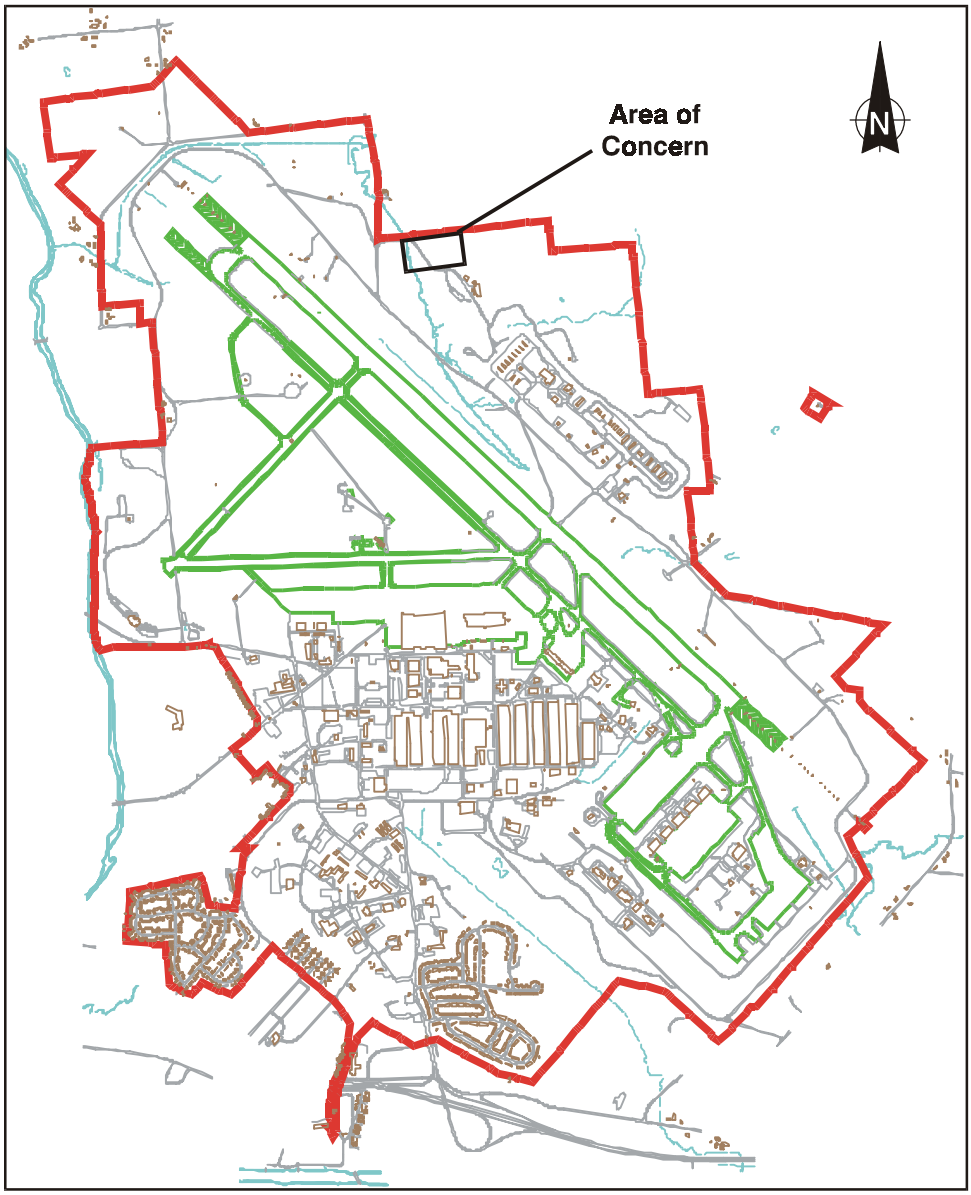

Figure 1: Landfill 1 AOC Location Map

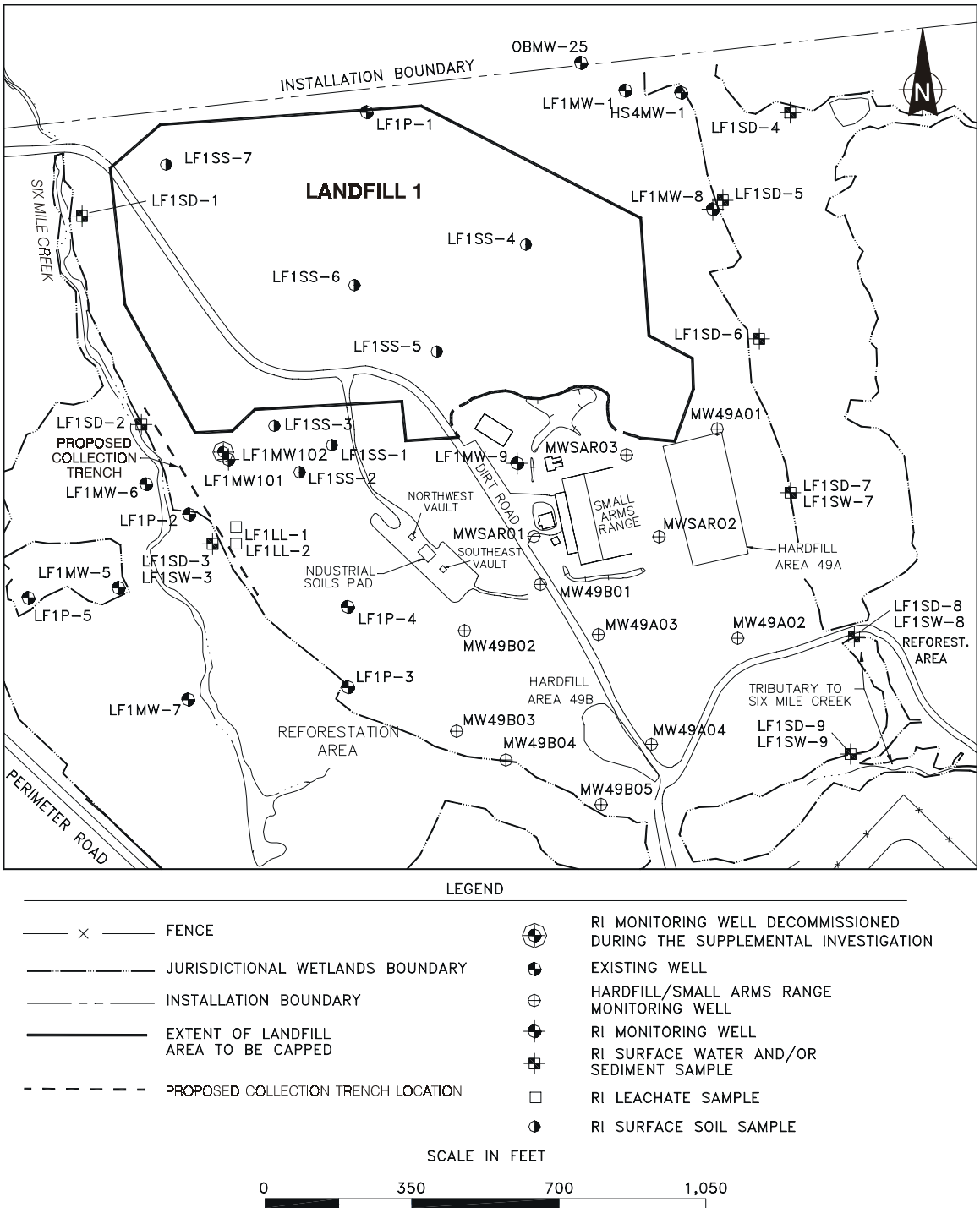

Figure 2: Landfill 1 AOC Site Map

3 Responsiveness Summary

On Tuesday July 20, 1999, AFBCA, following consultation with and concurrence of the EPA and NYSDEC, released for public comment the proposed plan for remedial action at Landfill 1 AOC at the former Griffiss Air Force Base. The release of the proposed plan initiated the public comment period, which concluded on August 19, 1999.

During the public comment period, a public meeting was held on Tuesday August 10, 1999, at 5:00 p.m. at the former base chapel located at 525 Kirkland Drive. A court reporter recorded the proceedings of the public meeting. A copy 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 proposal for remedial action at the 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.

Comment #1 (oral)

Following a description of the proposal to treat leachate and discharge it to Six Mile Creek in accordance with standards established by the SPDES requirements, one commentor asked if the AFBCA was aware that a lot of children still swim and play in the Six Mile Creek.

Response #1

The AFBCA is aware that children may swim and play in the creek which was a consideration in selecting the presumptive remedy alternative. The proposed remedial action should help improve the current creek environment for the following reasons: 1) the landfill cap should help to minimize the leaching of contaminants from the landfill mass into the groundwater; 2) leachate/groundwater that may migrate toward the creek will be collected and treated prior to discharge; and 3) the discharge criteria established by the NYSDEC in the SPDES requirements represent stringent standards that are protective of human health and the environment.

Comment #2

One commentor asked about Landfill 7 which is still draining into Six Mile Creek.

Response #2

Separate proposed plans and proposed remedies are being developed for both Landfill 7 and Six Mile Creek.

Comment #3 (oral)

One commentor indicated that the Restoration Advisory Board had an independent consultant review the proposed plan for Landfill 1. The consultant's report is available in the public record. The commentor stated, "Basically, the report says that the approach put forth by the BCA is reasonable and, under current-day expectation for the technology of how to treat landfills, is acceptable." The commentor indicated, however, that the report "is not without dissent, and other members of the Board do not agree."

Response #3

Yes, in the report, the consultant states, "The remedies selected for the Landfill 1 AOC are standard industry responses and technologies and should adequately address the

environmental risks associated with the site. In fact, there are redundant levels of protection in the remedy." See Comment and Response #4 for dissenting views.

Comment #4 (oral)

A dissenting member of the Restoration Advisory Board voiced two concerns. a) "Number one is that there are some unknown substances in this landfill that are leaching out." The commentor states that, based on a report by the Department of Health, State of New York, "there are some farms in the nearby vicinity of Griffiss that have dairy cows that have significant amounts of dioxin and furans in their milk." The commentor further states that the report was issued to "see if there was a relationship between the dioxin in the milk and the garbage-burning plants that were in existence in the past near Griffiss. Overall, the results suggest, but do not prove, that the incinerator or emissions of some chemicals may have had an impact on the chemical levels in the milk around some of the incinerators. Well, that means maybe there is some other source or other sources. And maybe this landfill or other landfills on the Base may have been a source for these dioxins and furans that are in the food chain in significantly higher amounts." The commentor suggests that the presence of dioxins and furans should be checked. b) As a second concern, the commentor believes that "capping an unlined landfill doesn't make any sense at all. I think it's been proven that we need lined landfills with leachate collection systems…I think that the material should be removed and place in a lined landfill with a proper leachate collection system."

Response #4

a) The purpose of the Department of Health study referred to was to determine (as quoted from the study) "if air contaminant emissions from municipal solid waste incinerators can be detected in cow's milk and other environmental media at nearby dairy farms." The investigators did not initiate the study because high concentration of dioxins and furans had been detected in the milk. The results of the study did not demonstrate significant impacts and the report observed that all of the results for dioxins and furans, metals and chlorobenzenes in milk and environmental media were similar to levels in

background samples reported by other investigators. Nevertheless, the proposed remedy will reduce or eliminate both known and unknown substances from leaching to the creek.

b) Capping the landfill as it exists now is expected to reduce the amount of rain water/snow melt that infiltrates the landfill, comes into contact with the waste, and creates leachate. Capping, installation of a leachate treatment system**,** and long-term monitoring of environmental media is often the preferred remedy for unlined landfills vs the excavation, removal, and reburial of the landfill mass. This is due to the chemical exposure potential (both to the workers and the nearby residents due to wind dispersion and runoff) and the potential for release of contaminants and creation of more leachate when the existing cap is removed. The physical hazards and the considerable additional costs associated with waste excavation and reburial are also taken into consideration. It has been estimated that to excavate a 21-acre landfill, it would probably take approximately 22,000 dump truck loads of outgoing material and at least half that again for incoming clean fill. At a rate of 10 trucks per day, excavating the landfill may take about 10 years. The selected remedy for the Landfill 1 AOC is a Presumptive Remedy, which was developed in accordance with EPA Presumptive Remedy Guidance for Military Landfills, dated April 29, 1996, for the expeditious cleanup of sites that are similar in character to a large number of CERCLA sites that have already been remediated.

Comment #5 (written)

One commentor asked if the leachate/groundwater collection system will be a covered underground collector or an open trench because “open collection trenches are inappropriate for the collection of landfill leachate.”

Response #5

At a minimum, a grate will cover the trench, but it will most likely be a completely subsurface design.

Comment #6 (written)

One commentor is concerned that the proposed treatment method, carbon adsorption, is not an acceptable treatment method for biological contaminants that may be present in the leachate. The commentor further states that "the leachate should, after carbon treatment, be collected and transported to a municipal sewage treatment facility for final treatment before being discharged."

Response #6

The final design of the treatment system will address biological contaminants (e.g. biological oxygen demand [BOD], total organic carbon [TOC], etc.). All water to be discharged to the creek will be in compliance with the SPDES requirements. If necessary, the final design will include pretreatment and post-treatment components so that standards can be achieved. In addition, a long term monitoring program (groundwater and the discharge from the treatment system) will be implemented which will include the monitoring of BOD parameters.

Comment #7 (written)

One commentor expressed the following concerns: a) Landfill 1 is not actually being cleaned up. "Everything is still there in the ground. To me, cleaning it properly means digging up the toxic chemicals and removing them to a hazardous waste landfill." b) The water from the higher elevation will flow through the landfill because the sides won't be lined and each spring as the water table rises, it will dissolve the water-soluble toxins. c) Collecting the leachate will be a challenge due to seepage from several areas and since seepage has been going on for many years, the damage has already been done. d) In the late 60s there were turtles, frogs and lots of wildlife but now the creek is just dead; the color of the creek indicates something is amiss. e) "Too many people have had their health and well being affected by these toxic chemicals flowing from GAFB via Six Mile Creek." f) The only way to have a decent cleanup is that "those responsible for doing the cleanup should be made to live in the affected area." g) The commentor requests that signs be posted warning people not to swim, fish, or wade in Six Mile Creek.

Response #7

a) As stated in Response #4 b): Capping the landfill as it exists now is expected to reduce the amount of rain water/snow melt that infiltrates the landfill, comes into contact with the waste, and creates leachate. Capping, installation of a leachate treatment system**,** and long-term monitoring of environmental media is often the preferred remedy for unlined landfills vs the excavation, removal, and reburial of the landfill mass. This is due to the chemical exposure potential (both to the workers and the nearby residents due to wind dispersion and runoff) and the potential for release of contaminants and creation of more leachate when the existing cap is removed. The physical hazards and the considerable additional costs associated with waste excavation and reburial are also taken into consideration. It has been estimated that to excavate a 21-acre landfill, it would probably take approximately 22,000 dump truck loads of outgoing material and at least half that again for incoming clean fill. At a rate of 10 trucks per day, excavating the landfill may take about 10 years. The selected remedy for the Landfill 1 AOC is a Presumptive Remedy, which was developed in accordance with EPA Presumptive Remedy Guidance for Military Landfills, dated April 29, 1996, for the expeditious cleanup of sites that are similar in character to a large number of CERCLA sites that have already been remediated.

b) Any leachate seeping from the landfill will be significantly stopped by the collection trench thereby minimizing its entry into Six Mile Creek. It should also be noted that while some of the waste materials in the landfill are in direct contact with the groundwater table, the bulk of waste is well above.

c) The leachate collection system will be designed to capture as much of the leachate going toward Six Mile Creek as possible thereby reducing or eliminating any further degradation of the creek.

d) Recently, several government agencies, including NYSDEC and the United States Fish and Wildlife Service, evaluated the aquatic life in Six Mile Creek and determined that the habitat is of a relatively high quality for fish and wildlife. Fish and frogs were observed and there was evidence of wildlife that would eat the fish and use the creek. The cloudiness and orange-staining of some portions of the creek may be due to

elevated colloidal iron, which is present in the Landfill 1 leachate. This discoloration was considered during the selection of this presumptive remedy. A separate proposed plan will be issued for Six Mile Creek.

e) While no documented cases of illness from exposure to chemicals in Six Mile Creek are known to us, the AFBCA nonetheless recognizes that any exposure can cause concern. We believe the remedy selected for Landfill 1 will aid in the reduction of contaminant loading to the creek and, in conjunction with future remedies at other sites along the creek, will restore the entire length of the stream to a condition approximating that which existed prior to the establishment of the base. As a final note, please understand that chemical sampling of off-base portions of the creek have never indicated an unacceptable risk to humans was present, rather, the bulk of the actions being taken are targeted at environmental receptors.

f) The remedial action objectives have been designed to reduce exposure to nearby wildlife and human populations; minimize the potential for leachate generation and groundwater contamination; reduce or eliminate the discharge of contaminants to the environment and establish long-term monitoring to evaluate the effectiveness of the presumptive remedy.

g) When purchasing a New York State fishing license, a pamphlet is also provided which indicates the fish advisories for each individual body of water within the limits of the state. This advisory is based upon the results of independent periodic sampling performed by the NYSDEC. Presently there are no NYSDEC fish advisories indicated for Six Mile Creek. In addition, a human health risk assessment was performed during the remedial investigations for Six Mile Creek. The results of the assessment indicate that the incidental ingestion of surface water and sediments and the dermal exposure to them resulting from swimming or wading in the water are within the acceptable limits required by the EPA. As stated earlier, a separate proposed plan will be issued for Six Mile Creek which will address these concerns.