Final Record of Decision for the Six Mile Creek Area of Concern (SD-32) at the Former Griffiss Air Force Base Rome, New York

December 2003

AIR FORCE REAL PROPERTY AGENCY

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List of Abbreviations and Acronyms

AFB	Air Force Base
AFFF	aqueous film-forming foam
AFRPA	Air Force Real Property Agency
Air Force	United States Air Force
AOC	Area of Concern
ARAR	Applicable or Relevant and Appropriate Requirement
ATSDR	Agency for Toxic Substances and Disease Registry
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
COPCs	chemicals of potential concern
DRMO	Defense Reutilization and Marketing Office
EIS	Environmental Impact Statement
EPA	United States Environmental Protection Agency
FDA	Food and Drug Administration
FFA	Federal Facility Agreement
FS	Feasibility Study
GLDC	Griffiss Local Development Corporation
HI	Hazard Index
HQ	Hazard Quotient
IRP	Installation Restoration Program
LTM	long-term monitoring
NCP	National Oil and Hazardous Substances Pollution Contingency Plan
NPL	National Priorities List
NYCRR	New York Code of Rules and Regulations
NYS	New York State
NYSDEC	New York State Department of Environmental Conservation
NYSDOH	New York State Department of Health
PAH	polynuclear aromatic hydrocarbon
PCB	polychlorinated biphenyl
PISCES	passive in situ concentration/extraction sampling
ppm	parts per million
RCRA	Resource Conservation and Recovery Act
RI	remedial investigation
ROD	Record of Decision
SARA	Superfund Amendments and Reauthorization Act
SI	Supplemental Investigation
SVOC	semivolatile organic compound
TBCs	To-Be-Considereds
USACE	U.S. Army Corps of Engineers

List of Abbreviations and Acronyms (cont.)

USFWS	U.S. Fish and Wildlife Service
VOC	volatile organic compound
WSA	Weapons Storage Area

1 Declaration

1.1 Site Name and Location

The Six Mile Creek Area of Concern (AOC) (site identification designation SD-32) 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 source control/long-term monitoring alternative for the Six Mile Creek AOC at the former Griffiss AFB. This alternative has been chosen in accordance with the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) of 1980, as amended by the Superfund Amendments and Reauthorization Act (SARA), and the National Oil and Hazardous Substances Pollution Contingency Plan (NCP). The remedy has been selected by the United States Air Force (Air Force) in conjunction with the United States Environmental Protection Agency (EPA) and with the concurrence of the New York State Department of Environmental Conservation (NYSDEC) pursuant to the Federal Facility Agreement (FFA) among the parties under Section 120 of CERCLA. This decision is based on the administrative record file for this site.

1.3 Assessment of the Site

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

1.4 Description of Selected Remedy

The Selected Remedy for the Six Mile Creek AOC is source control with long-term monitoring. Prior activities that may have contributed to the creek contamination are no longer occurring due to previous source remediation and closure of the base. Under the selected remedial approach, improvements to the quality of the creek are expected through the remediation of additional sources of contamination to the creek. These sources include some areas along the Rainbow Creek tributary to Six Mile Creek that have already been remediated, including the Coal Storage Yard Site, the Building 35 Resource Conservation and Recovery Act (RCRA) site, and the Defense Reutilization and Marketing Office (DRMO) site at the head of Rainbow Creek. The remediation that is currently underway for Landfill 1, another source of contamination to Six Mile Creek, includes capping and installation of a leachate collection system. The capping of Landfills 2/3 (underway) and Landfill 7 (complete), which are adjacent to the creek and/or its tributaries, will mitigate any contribution of contaminants to the creek from these sources. In addition, remediation of AOC 9 and Building 817/Weapons Storage Area (WSA), potential sources of contamination to Six Mile Creek, will be performed if recommended by the ongoing feasibility studies. If any ongoing investigations or long-term monitoring reveal additional Air Force sources of contamination to the creek, appropriate remedial actions will be considered and implemented. The source control measures for these AOCs will be addressed under the RODs prepared specifically for these sites.

In general, the relatively low levels of contamination found in the sediment and surface water of Six Mile Creek did not explain the observed impairment of the benthic and fish communities, or the levels of polychlorinated biphenyls (PCBs), pesticides, and metals found in fish collected from the creek. It is likely that ongoing discharges of contamination from these sources along the creek contributed to the observed impacts. It is ex-

pected that by remediating these sources and eliminating the ongoing discharges, the concentration of contaminants in the fish tissue will decline and the ecological community will recover. Because of the quality of the existing habitat in the creek, sediment removal will not be undertaken at this time since the expected disturbance to the flora and fauna may not be warranted.

Long-term monitoring of the creek environment will be performed to determine whether or not the ongoing and completed remedial actions at the sources of contamination to the creek have the intended result of reducing contaminant levels. Annual monitoring of surface water and sediments will be performed and samples analyzed for volatile organic compounds (VOCs), semivolatile organic compounds (SVOCs), metals, pesticides, and PCBs. Fish tissue samples will be collected in the first late summer after the ROD is signed and every third year thereafter, and analyzed for metals, pesticides and PCBs. A benthic community analysis will be performed in the first late summer after the ROD is signed and every third year thereafter. A long-term monitoring plan designating sample locations and protocols will be developed with the concurrence of the EPA, NYSDEC, and the New York State Department of Health (NYSDOH) and they will review the data generated during the program to determine whether any additional actions are necessary. If the results of the long-term monitoring indicate that fish tissue levels do not decline or the ecological community does not recover, additional investigation or remediation may be necessary.

1.5 Statutory Determinations

The Air Force Real Property Agency (AFRPA) and EPA, with concurrence from NYSDEC, have determined that source control/long-term monitoring is warranted for the Six Mile Creek AOC. The Selected Remedy includes remediation of sources of contamination to the creek and then long-term monitoring to ensure that the planned and completed remedial actions have reduced contaminant levels in the creek. The chemical-specific screening values that were developed for sediment and surface water were based on an evaluation of applicable or relevant and appropriate requirements (ARARs), and other criteria and guidance to be considered (TBCs), which includes non-promulgated

federal and state standards or guidance documents (E & E 2000). The screening values for sediments were based on TBCs, including NYSDEC and EPA technical guidance documents for screening contaminated sediments, because there were no chemical-specific ARARs identified for sediments at this site. Surface water screening values were based on ARARs, including the NYSDEC Class C surface water standards and EPA ambient surface water quality standards, and TBCs (NYSDEC water quality guidance values) when ARARs were not available for a specific chemical. The final screening criteria were based on the most stringent ARAR or TBC.

Some chemicals of concern were found to slightly exceed the sediment and surface water screening criteria. The TBCs for sediment and the ARARs and TBCs for surface water would continue to be exceeded under the Selected Remedy until the source control measures result in a natural reduction of contaminant concentrations. Although this remedy does not use treatment as a principal element of the remedy it will accomplish the required end result of protection of human health and the environment by greatly reducing and potentially eliminating the release of hazardous contaminants. As a whole, it is more beneficial to the environment to remediate the sources of contamination rather than to disrupt the aquatic and benthic populations and habitat.

Five-year reviews will be performed by the Air Force, in conjunction with the EPA and NYSDEC, to ensure that the Selected Remedy is still performing as planned and is protective of public health and the environment.

1.6 ROD Data Certification Checklist

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

- The chemicals of potential concern (COPCs) and their respective concentrations are presented in Section 2.5, Site Characteristics.

- Current and reasonably anticipated future use assumptions that were used in the baseline risk assessment are presented in Section 2.6, Current and Potential Future Site and Resource Uses.

- The baseline risk represented by the COPCs is presented in Section 2.7, Summary of Site Risks.

- The key factors that led to the selection of the remedy are presented in Section 2.10, Comparative Analysis of Alternatives.

1.7 Authorizing Signatures

On the basis of the remedial investigations performed at Six Mile Creek and the baseline risk assessment, the selected remedy for the Six Mile Creek AOC is source control/long-term monitoring. The selected remedy meets the requirements for remedial action set forth in CERCLA, Section 121. The NYSDEC has concurred with the selected remedial action presented in this ROD.

Albert F. Lowas, Jr.
Director
Air Force Real Property Agency

December 24, 2003
Date

George Pavlou
Director, Emergency and Remedial Response Division
United States Environmental Protection Agency, Region 2

March 26, 2004
Date

2 Decision Summary

2.1 Site Name, Location, and Brief Description

The Six Mile Creek AOC (site identification designation SD-32) is located at the former Griffiss AFB in Rome, Oneida County, New York. Pursuant to Section 105 of CERCLA, Griffiss AFB was included on the National Priorities List (NPL) on July 15, 1987. On August 21, 1990, the EPA, NYSDEC, and the AFRPA entered into an FFA under Section 120 of CERCLA.

Six Mile Creek, a natural stream bordered by wetlands, enters the former Griffiss AFB from the north and exits to the southeast, running parallel to and underneath the southeastern portion of the base runway (see Figure 1). Prior to base construction, Six Mile Creek reportedly was used for agricultural irrigation. Currently, the on-base portion of the creek serves as a surface water runoff and storm water drainage system for the base. Six Mile Creek receives surface water runoff from the surrounding watershed as well as water from the base storm water system. The on-base portion of the creek is approximately 8,400 feet long (plus an additional 7,200 feet within the runway culvert); the creek continues off base for approximately 2 miles eventually flowing into the NYS Barge Canal. The Six Mile Creek AOC also includes the 50-by-50- foot aqueous film-forming foam (AFFF) lagoon located outside the former WSA.

2.2 Site History and Enforcement Activities

The Former Griffiss AFB Operational History

The mission of the former Griffiss AFB varied over the years. The base was activated on February 1, 1942, as Rome Air Depot, with the mission of storage, maintenance, and shipment of material for the U.S. Army Air Corps. Upon creation of the U.S. Air Force in 1947, the depot was renamed Griffiss Air Force Base. The base became an electronics center in 1950, with the transfer of Watson Laboratory Complex (later Rome Air Development Center [1951], Rome Laboratory, and then the Information Directorate at Rome Research Site, established with the mission of accomplishing applied research, development, and testing of electronic air-ground systems). The 49th Fighter Interceptor Squadron was also added. The Headquarters of the Ground Electronics Engineering Installations Agency was established in June 1958 to engineer and install ground communication equipment throughout the world. On July 1, 1970, the 416th Bombardment Wing of the Strategic Air Command was activated with the mission of maintenance and implementation of both effective air refueling operations and long-range bombardment capability. Griffiss AFB was designated for realignment under the *Base Realignment and Closure Act* in 1993 and 1995, resulting in deactivation of the 416th Bombardment Wing in September 1995. The Information Directorate at Rome Research Site and the Northeast Air Defense Sector will continue to operate at their current locations; the New York Air National Guard operated the runway for the 10th Mountain Division deployments until October 1998, when they were relocated to Fort Drum; and the Defense Finance and Accounting Services has established an operating location at the former Griffiss AFB.

Environmental Background

As a result of the various national defense missions carried out at the former Griffiss AFB since 1942, hazardous and toxic substances were used and hazardous wastes were generated, stored, or disposed at various sites on the installation. The defense missions involved, among others, procurement, storage, maintenance, and shipping of war materiel; research and development; and aircraft operations and maintenance.

Numerous studies and investigations under the U.S. Department of Defense Installation Restoration Program (IRP) have been carried out to locate, assess, and quantify

the past toxic and hazardous waste storage, disposal, and spill sites. These investigations included a records search in 1981 (Engineering Science 1981), interviews with base personnel, a field inspection, compilation of an inventory of wastes, evaluation of disposal practices, an assessment to determine the nature and extent of site contamination, Problem Confirmation and Quantification studies (similar to what is now designated a Site Investigation) in 1982 (Weston 1982) and 1985 (Weston 1985), soil and groundwater analyses in 1986, a basewide health assessment in 1988 by the U.S. Public Health Service, Agency for Toxic Substances and Disease Registry (ATSDR) (ATSDR 1988); base-specific hydrology investigations in 1989 and 1990 (Geotech 1991), 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 (ATSDR 1995), and an addendum, dated September 9, 1996 (ATSDR 1996). An RI was conducted in 1994 and the draft-final RI report covering 31 AOCs was delivered to the EPA and NYSDEC in December 1996 (Law Environmental 1996). The final Supplemental Investigation (SI) Report was delivered in July 1998 (E & E 1998). The Feasibility Study (FS) for Six Mile Creek was issued in January 1999 (E & E 1999), and the Final Six Mile Creek Summary Memorandum was delivered in March 2000 (E & E 2000).

2.3 Community Participation

A proposed plan for the Six Mile Creek AOC (AFRPA 2003), indicating source control/long-term monitoring for recreational use, was released to the public on Thursday, July 24, 2003. The document was made available to the public in both the administrative record file located at 153 Brooks Road in the Griffiss Business and Technology Park and in the Information Repository maintained at the Jervis Public Library. The notice announcing the availability of this document was published in the *Rome Sentinel* on July 23, 2003. The public comment period lasted from July 24, 2003, to August 23, 2003, and was set up to encourage public participation in the alternative selection process. In addition, a public meeting was held on Tuesday, August 5, 2003. The AFRPA, NYSDEC, and NYSDOH held an information session at the beginning of the public meeting and answered questions about issues at the AOC and the proposal under consideration. A response to the comments received during this period is included in the Responsiveness Summary, which is part of this ROD (see Section 3).

2.4 Scope and Role of Site Response Action

The scope of the plan for source control/long-term monitoring for the Six Mile Creek AOC addresses the concerns for human health and the environment. The remedy is consistent with the results of the risk assessment performed for recreational users and terrestrial and aquatic wildlife. Source control, which is a key factor in the restoration of Six Mile Creek, has been or will be attained through the performance of remedial actions at numerous other AOCs in the Six Mile Creek drainage area (see Section 1.4).

2.5 Site Characteristics

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

Six Mile Creek, a natural stream bordered by wetlands, enters the former Griffiss AFB from the north and exits to the southeast, running parallel to and underneath the southeastern portion of the base runway (see Figure 1). The creek is approximately 8 feet wide and 3 feet deep prior to entering the base and approximately 20 feet wide and 4 feet deep after leaving the base. The on-base portion of the creek is approximately 8,400 feet long (plus an additional 7,200 feet within the runway culvert); the creek continues off base for approximately 2 miles, ultimately flowing into the New York State Barge Canal (see Figures 2 and 3).

Prior to base construction, Six Mile Creek reportedly was used for agricultural irrigation. Currently, the on-base portion of the creek serves as a surface water runoff and storm water drainage system for the base. The creek flows through a water-control structure that maintains normal base flow into the creek channel and diverts floodwaters

through a diversion channel to the Mohawk River. A portion of the creek has been culverted (see Figure 1).

Surface water runoff from Landfills 1, 2/3, and 7, the WSA, and the runway, flows to the creek and leachate from the same landfills has been draining directly into the creek. Portions of the base storm water system discharge to the on base lower portion of the creek. In addition to storm water, this system historically received such base waters as rinse water and wash down, which may have contained oils, solvents, and fuels from various base shops. Storm water drainage from the central portion of the base also enters Six Mile Creek via Rainbow Creek, which joins Six Mile Creek under the runway.

The Six Mile Creek AOC includes the AFFF lagoon located on the northeast portion of the base between the WSA fence line and Perimeter Road. The lagoon, a 50-by-50-foot retention pond with no outlet, received overflow from an oil/water separator. The oil/water separator discharges the aqueous phase from an AFFF system at Building 917 to leach fields and collects the non-aqueous phase in holding tanks. The lagoon has periodically overflowed, potentially resulting in surface discharges to Six Mile Creek.

Six Mile Creek has been classified as a Class C stream. According to the New York Code of Rules and Regulations (NYCRR) 701, the best usage for Class C stream waters is fishing, where waters shall be suitable for fish propagation and survival. Based on an Aquatic Habitat Assessment performed in 1993, at least 12 species of fish are found in Six Mile Creek.

Site Investigations

Preliminary studies of Six Mile Creek were performed in 1981 and 1988. Soil, sediment, and fish tissue samples were collected. Numerous metals and polynuclear aromatic hydrocarbon (PAHs) were detected in the sediments. Several metals and PCBs were detected in the fish tissue samples at levels below the Food and Drug Administration's (FDA) action level of 2.0 parts per million (ppm) but above the 0.1 ppm level representing risk to piscivorous wildlife. The results of these studies led to the performance of an RI in 1994 and 1995.

The RI was performed to evaluate the nature and extent of environmental contamination at the site and to determine whether remedial action was necessary to eliminate potential threats to human health and the environment from exposures that might

arise under existing or expected future site conditions. The RI included an aquatic survey that evaluated creek habitat, water quality, benthic and drift macroinvertebrate communities, and fish populations at three stations along the northern course of the creek (SMC-FS1, SMC-FS2, and SMC-FS3) (see Figure 2). At approximately the same three locations, sediment samples were collected for toxicity testing and fish samples were collected for pesticide, PCB, and metals analyses (see Table 1). Results from the sediment toxicity tests done as part of the aquatic survey indicated that chemicals were not present at levels acutely toxic to aquatic life, however, the macroinvertebrate community at one station was classified as slightly impaired. In 1995, NYSDEC conducted a macroinvertebrate community analysis in Six Mile Creek just downstream of the Base boundary at the Route 365 bridge. The water quality was assessed as being moderately impacted based on a significantly impacted benthic community. Fish population data indicated that fish communities were generally in fair condition and whole-body fish tissue concentrations indicated that PCBs, pesticides and mercury were present at levels exceeding NYSDEC ecological risk guidelines. The concentration of PCBs in fish tissue also exceeded the previously mentioned FDA action level.

During the RI, surface water samples were collected over several rounds of sampling from 21 locations (see Figures 2 and 3). Fourteen samples were collected along on- and off-base portions of Six Mile Creek (SMC SW/SD-1 through 8, 10 through 15), one at the AFFF lagoon (SMC SW/SD-9), three in the Mohawk River (not shown on figures), and three in the Barge Canal (BCSW/SD-1 through 3). Two VOCs, 14 SVOCs, four pesticides, six metals, cyanide, and sulfide were detected at concentrations above the most stringent criteria for surface water (see Table 2). Sediment samples were collected at two depths below the surface water/sediment interface from the same 21 locations. Three VOCs, 18 SVOCs, 20 pesticides, one PCB and six metals were detected at concentrations above the most stringent criteria for sediment (see Table 3).

In 1995, NYSDEC performed passive in situ concentration/extraction sampling on the lower portion of Six Mile Creek to test for PCBs and other organochlorines. No contaminants were detected. However, naturally occurring conditions such as below average rainfall and low flow in the stream may affect the ability of passive in situ concentration/extraction sampling (PISCES) samplers to detect contaminants.

As part of the basewide SI performed in June 1997, one water sample was collected from a storm sewer manhole (SMCMH-1) located within the Six Mile Creek culverted section, and two surface water samples were collected from the storm sewer outfalls at the headwaters of Rainbow Creek (RCSW-1 and RCSW-2). No contaminants were detected in these water samples. In addition, ten PISCES samples were collected for pesticides and PCBs analyses from Six Mile Creek (SMCP-1 through 5, SMCP-8, and SMCP-9), two from unnamed tributaries to the creek (SMCP-6 and SMCP-7), and one from the Rainbow Creek Tributary (RCP-1). No PCBs were detected. The pesticides detected are summarized in Table 4. The levels of pesticides found in Rainbow Creek and downstream in Six Mile Creek were higher than in the upper portion of Six Mile Creek and the other tributaries. The PISCES sampling technique provides a time-averaged concentration of contaminants that can be compared to other locations, but there are no screening criteria for PISCES samples. Also in 1997, a removal action was performed at Rainbow Creek (sediment removal) and the adjacent Coal Storage Yard (soil and debris removal).

In July 1998, additional SI samples were taken, primarily from off-base locations, to fill data gaps that had been identified in the RI sampling. These included two surface water samples (SMCSW-16 and SMCSW-26) and 12 sediment samples (SMCSD-16 through 27) (see Figure 3). Three metals were detected above the most stringent criteria for surface water (see Table 5). Ten SVOCs, PCBs, dioxins/furans, and two metals were above the most stringent criteria for sediment (see Table 6).

In July 1999, the habitat quality of the creek was visually inspected by AFRPA, U.S. Army Corps of Engineers (USACE), NYSDEC, EPA, and U.S. Fish and Wildlife Service (USFWS). A brief walkover of the on-base portion revealed the presence of orange floc (iron oxide) at a few locations above and below the culvert. This was attributed to the presence of leachate seeps with extensive orange floc upstream at Landfill 1. A more extensive walkover of the off-base portion of the creek revealed an aquatic habitat of relatively high quality. The surrounding habitat is also of high quality for plants and wildlife, including extensive areas of forest, shrub, and emergent wetlands. The presence of cloudiness and some orange floc in the water column was observed. The floc is probably due to Landfill 1 seepage or other on-base sources and may be partly of natural origin.

Summary

Multiple sampling events have determined that contamination is present in surface water, sediment, and fish tissue samples at certain locations in Six Mile Creek. A summary of the studies and results is presented in the Six Mile Creek Summary Memorandum, March 2000. The contaminants primarily consist of PCBs in fish tissue samples collected during the RI; PCBs, PAHs, several metals, and pesticides in the sediment; and SVOCs in the surface water. PCBs have not been detected in sediment samples in the upper portion of Six Mile Creek above the culvert, even though fish samples collected from above the culvert were found to contain PCBs (may have resulted from elevated levels in surface water or from other on-base sources). However, PCBs have been detected in the sediment of the lower portion of the creek at concentrations above the most stringent criteria but consistently below 0.5 ppm. PCBs were previously identified as entering Six Mile Creek through Rainbow Creek, which joins Six Mile Creek along the culvert under the runway. However, Rainbow Creek is not expected to contribute contamination to Six Mile Creek in the future due to a sediment removal action performed there in 1997 and other removal actions at nearby sites. PCBs have not been detected above screening criteria in the surface water of Six Mile Creek or in PISCES samples collected in the lower portion of Six Mile Creek or Rainbow Creek, and no PCBs were detected in the Barge Canal.

PAHs (e.g., benzo(b)fluoranthene and chrysene) have been consistently detected in the sediment but, during the SI, the highest levels of PAHs were found in the most upgradient sample (SMCSD-1). The PAH concentrations decreased through the northern portion of the creek, and were again at lower levels in the lower portion of the creek both on and off base. Slightly higher levels were measured at SMCSD-11, just before the creek enters the runway culvert. High PAH concentrations were found in the sediment at Six Mile Creek's confluence with the Barge Canal (SMCSD-15). This contamination is most likely due to operations at the adjacent Barge Canal, possibly including canal dredging spoils disposal.

PAHs were detected in the surface water at one downstream location and several other SVOCs were found in both the upper and lower portions of the creek. Several pesticides that exceeded screening criteria were also detected in the surface water at an upgradient location as well as in the leachate from Landfill 1.

Arsenic, copper, and mercury were found in the sediment in the upper portion of Six Mile Creek at levels exceeding screening criteria. Lead was found in the runway culvert and in the lower portion of the creek. However, the highest lead concentrations were found in the upgradient sediment samples.

Iron and aluminum both exceeded screening criteria in the surface water and were determined to be site related. Iron, in particular, is likely contributed by the Landfill 1 leachate. Both cyanide and hydrogen sulfide exceeded screening criteria in two on-base creek samples.

2.6 Current and Potential Future Site and Resource Uses

Griffiss AFB was designated for realignment under the Defense Base Closure and Realignment Act in 1993 and 1995, resulting in deactivation of the 416th Bombardment Wing in September 1995. As a result of the realignment, a Master Reuse Strategy was developed by the Griffiss Local Development Corporation (GLDC) to provide the framework for reuse of the base after realignment and closure (GLDC 1995). The proposed reuse plan recommended in the final Master Reuse Strategy was evaluated in the Final Environmental Impact Statement (EIS) dated November 1995. The current and future land uses for the Six Mile Creek AOC is as public/recreational/open space and wetlands.

2.7 Summary of Site Risks

Site risks were analyzed based on the extent of contamination at the Six Mile Creek AOC. In 1994, 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 contamination found in the surface water, sediments, and fish in Six Mile Creek. The results of this risk assessment were considered when formulating the alternative for source control/long-term monitoring.

2.7.1 Human Health Risk Assessment

A baseline human health risk assessment was conducted during the RI to determine whether chemicals detected at the Six Mile Creek AOC could pose health risks to individuals under current and proposed future land use. As part of the baseline risk as-

sessment, the following four-step process was used to assess site-related human health risks for a reasonable maximum exposure scenario:

- Hazard Identification—identifies the contaminants of concern at the site based on several factors such as toxicity, frequency of occurrence, and concentration;

- Exposure Assessment—estimates the magnitude of actual and/or potential human exposures, the frequency and duration of these exposures, and the pathway (e.g., ingestion of contaminated soil) by which humans are potentially exposed;

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

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

For the Six Mile Creek risk assessment, COPCs were identified based on the analytical results and data quality evaluation from the RI. From the available data, COPCs were selected for surface water, sediment, and fish in Six Mile Creek, and for surface water and sediment in the upstream portion of Six Mile Creek (SMC SW/SD-1, 2, 3), the Mohawk River, and the Barge Canal. All contaminants detected in the surface water, sediment, and fish tissue samples from the site were considered COPCs with the exception of inorganics detected at concentrations less than twice the mean background concentrations; elements considered to be essential human nutrients (iron, magnesium, calcium, potassium, and sodium); and chemicals detected in less than 5% of the total samples and at concentrations below ARARs and TBCs.

The current and future use designations for Six Mile Creek and its immediate vicinity are recreational. Future potentially exposed human receptors are expected to be similar to the current receptors, i.e., recreational users who may wade, fish, or otherwise use the creek on the base or downstream of the base. The receptors and pathways evaluated in the risk assessment are summarized in Table 7. The exposure assumptions for

each pathway and receptor, which were selected in accordance with EPA guidance, are more fully described in the RI report.

Quantitative estimates of carcinogenic and noncarcinogenic risks were calculated for the Six Mile Creek 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 an 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 acceptable 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 the 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 subpopulations, that is likely to be without an appreciable risk of deleterious effects during a portion of a lifetime. The HQs are summed for all contaminants within an exposure pathway (e.g., ingestion of soil) and across pathways to determine the HI. When the HI exceeds 1, there may be concern for potential noncarcinogenic health effects if the contaminants in question are believed to cause similar toxic effects.

EPA bases its decisions to conduct site remediation on the risk to human health and the environment. Generally, cancer risks exceeding 1×10^{-4} will require actions to mitigate exposure. When carcinogenic risks are between 1×10^{-4} and 1×10^{-6} and the HI is greater than 1, cleanup actions may be taken on a case-by-case basis depending on consideration of a variety of risk management factors (scientific, social, political, and regulatory). Risks less than 1×10^{-6} and an HI of less than 1 generally do not require cleanup.

The risk assessment for Six Mile Creek AOC, which was performed during the RI, evaluated potential recreational exposures to COPCs in surface water, sediment, and

fish for receptors in four age groups: a child (exposed from ages 0 through 5 years), a youth (exposed from ages 6 though 11 years), an adolescent (exposed from ages 12 through 17 years), and an adult (exposed over a duration of 30 years). The potential carcinogenic and noncarcinogenic risks from exposure to sediment, surface water, and fish consumption are summarized below.

Carcinogenic Risk

Because carcinogenic risks are based on total lifetime exposure, and because the adult receptor has the greatest estimated total lifetime exposure (due to the longer assumed exposure duration), only the adult's carcinogenic risks were presented in the RI. The greatest carcinogenic risk was associated with consumption of fish from Six Mile Creek. The carcinogenic risk estimate for fish ingestion was 2×10^{-2}, which exceeded EPA's target risk range due to the presence of several pesticides and PCBs in the fish tissue. The RI qualifies this risk as a worst-case estimate because exposure concentrations are based on whole-body fish tissue analysis rather that the concentrations in the edible portions of the fish, which may be considerably lower. In addition, the NYSDOH has evaluated this information and does not feel that the human health risk is as high as indicated by the risk assessment, primarily due to the fact that the only fish species that yielded appreciable amounts of contamination was the "creek chub," which is not consumed by humans. The NYSDOH will be involved in the review of the data generated during the LTM program for Six Mile Creek and will take appropriate actions if warranted.

The carcinogenic risks associated with exposures to sediments and surface water in all areas were either within EPA's target risk range or below this range. The total carcinogenic risks associated with recreational exposures to surface water and sediment at Six Mile Creek were 3×10^{-6} and 2×10^{-6}, respectively. In the upstream portion of Six Mile Creek, the estimated total carcinogenic risks for recreational exposures to sediment and surface water were 2×10^{-6} and 4×10^{-8}, respectively. The total carcinogenic risks estimated for sediment and surface water exposures in the Mohawk River were 2×10^{-6} and 7×10^{-9}, respectively, and in the Barge Canal, they were 9×10^{-6} and 3×10^{-8}, respectively.

Noncarcinogenic Risk

Noncarcinogenic risks were evaluated for recreational receptors in all four age groups. The total HIs calculated for fish consumption ranged from 30 for the adolescent receptor to 80 for the child receptor, all exceeding an HI value of 1. The total HIs were driven by the presence of PCB 1254, manganese, antimony, and dieldrin in fish tissue.

The total HIs associated with recreational exposures to surface water and sediment were all below 1, indicating that direct exposures to chemicals in these media would not be expected to cause non-carcinogenic effects. The highest HIs associated with sediment and surface water exposures, which were calculated for the child receptor, were 0.06 and 0.1 at Six Mile Creek, 0.06 and 0.1 in upper Six Mile Creek, 0.04 and 0.004 in the Mohawk River, and 0.1 and 0.002 in the Barge Canal.

2.7.2 Uncertainties

There are inherent uncertainties associated with the overall risk assessment process and with each of its components. However, conservative assumptions are used throughout the process to ensure that the risk estimates will be protective of human health. Examples of uncertainties associated with the risk assessment of Six Mile Creek include (1) Samples were collected from locations with known or suspected contamination rather than random locations, leading to a biased sample which may result in a potential overestimation of risk; (2) The concentrations of COPCs in fish, which are based on the analysis of whole-body samples, represent a worst-case exposure assumption since many of these chemicals tend to concentrate in portions of the fish that are not generally consumed by humans (e.g., pesticides in fatty tissues, metals in bones and fins); (3) Dermal exposures to most COPCs in sediment were not evaluated quantitatively in the assessment, which may result in a potential underestimation of the risk from this route; (4) Given the small size of fish found in the creek, the rate of fish consumption by recreational fisherman was likely overestimated in the risk assessment; and (5) Due to the lack of toxicity values for some COPCs, some risks were not included in the quantitative risk estimates, which may result in a potential underestimation of risk.

2.7.3 Ecological Risk Assessment

A baseline risk assessment for ecological receptors in Six Mile Creek was also conducted in conjunction with the RI. Terrestrial wildlife including the short-tailed shrew, raccoon, and American woodcock, were evaluated for exposures by ingestion of COPCs in surface water and sediment. In addition, exposure of the northern water snake was estimated by assuming that its entire diet was fish from Six Mile Creek; exposures from incidental ingestion of surface water and sediment were considered negligible in comparison. HQs were calculated for each COPC and indicator species. Most of the calculated HQs were less than 1.0 with one exception, indicating that adverse effects would not be expected. The sole exception was the HQ of 1.1 associated with ingestion of aluminum by the shrew; however, this risk is considered insignificant due to the conservative nature of the risk assessment process.

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

There are no federally listed (U.S. Department of the Interior) threatened or endangered plant or animal species at the former base. One state-listed endangered plant, the *Pycnanthemum verticillatum* var. *verticillatum* (whorled mountain mint) is present alongside the Six Mile Creek Floodplain in the Ammo Storage Area and in the Runway Wetland Area, which lies along the east side of the main runway on top of the buried culverted section of Six Mile Creek. These two areas are also "special-interest natural areas" due to the presence of a rich sloping fen and a hemlock-northern hardwood forest and swamp in the Ammo Storage Area and a rich graminoid fen in the Runway Wetland Area (Corey 1994).

2.8 Remedial Action Objectives

The following are the remedial action objectives developed for this site based upon the site data presented in the RI and SI reports:

Restrict Exposure to Contamination

Source control/long-term monitoring will be implemented to eliminate or reduce exposures that could potentially pose unacceptable risks to human health and the envi-

ronment and to maintain the creek's status as a Class C stream (suitable for fish propagation and survival). Prior activities that may have contributed to the creek contamination are no longer occurring due to previous source remediation and closure of the base. Under the selected remedial approach, improvements to the quality of the creek are expected through the remediation of additional sources of contamination to the creek. These sources include some areas along the Rainbow Creek tributary to Six Mile Creek that have already been remediated, including the Coal Storage Yard Site, the Building 35 Resource Conservation and Recovery Act (RCRA) site, and the Defense Reutilization and Marketing Office (DRMO) site at the head of Rainbow Creek. The remediation that is currently underway for Landfill 1, another source of contamination to Six Mile Creek, includes capping and installation of a leachate collection system. The capping of Landfills 2/3 (underway) and Landfill 7 (complete), which are adjacent to the creek and/or its tributaries, will mitigate any contribution of contaminants to the creek from these sources. In addition, remediation of AOC 9 and Building 817/Weapons Storage Area (WSA), potential sources of contamination to Six Mile Creek, will be performed if recommended by the ongoing feasibility studies. If any ongoing investigations or long-term monitoring reveal additional Air Force sources of contamination to the creek, appropriate remedial actions will be considered and implemented.

Evaluate Effectiveness of the Remedy

Five-year reviews will be performed by the Air Force, in conjunction with the EPA and NYSDEC, to ensure that the Selected Remedy is still performing as planned and is protective of public health and the environment.

In addition, long-term monitoring of the creek environment will be performed to determine whether or not the ongoing and completed remedial actions at the sources of contamination to the creek have the intended result of reducing contaminant levels. Annual monitoring of surface water and sediments will be performed and samples analyzed for VOCs, SVOCs, metals, pesticides, and PCBs. Fish tissue samples will be collected in the first late summer after the ROD is signed and every third year thereafter, and analyzed for metals, pesticides and PCBs. A benthic community analysis will be performed in the first late summer after the ROD is signed and every third year thereafter. A long-term monitoring plan designating sample locations and protocols will be developed with the concur-

rence of EPA, NYSDEC, and NYSDOH and they will review the data generated during the program to determine whether any additional actions are necessary. If the results of the long-term monitoring indicate that fish tissue levels do not decline or the ecological community does not recover, additional investigation or remediation may be necessary.

2.9 Description of Alternatives

CERCLA regulations mandate that a remedial action must be protective of human health and the environment, cost effective, and utilize permanent solutions and treatment technologies to the maximum extent practicable. In accordance with CERCLA, a No Action alternative was considered but determined not to be an option at this AOC due to the need to remediate sources of contamination to the creek and monitor the effectiveness of such actions. Therefore, this ROD evaluates four alternatives, including the source control/long-term monitoring alternative, as described below.

Alternative 1 (Source Control/Long-term Monitoring)

The source control/long-term monitoring alternative includes remediation of the sources of contamination to the creek and implementation of an LTM plan for a period of at least 30 years to monitor the effectiveness of the source control measures taken at several AOCs in the Six Mile Creek watershed.

Alternative 2 (Institutional Actions)

This alternative involves institutional actions in the form of fencing and/or warning signs and educational programs to discourage fishing in the creek and thereby limit exposures of human (but not environmental) receptors.

Alternative 3 (Sediment Excavation, Off-site Disposal, and Clean Backfill)

This alternative involves remedial action in the form of sediment excavation, off-site disposal, and replacement with clean backfill to reduce contaminant concentrations in sediment and surface water (provided that the sources of creek contamination have been addressed).

Alternative 4 (Sediment Excavation, Off-site Incineration, and Clean Backfill)

This alternative involves remedial action in the form of sediment excavation, off-site incineration, and replacement with clean backfill.

2.10 Comparative Analysis of Alternatives

Remedial alternatives are assessed on the basis of both a detailed and a comparative analysis pursuant to the NCP. The analysis of Six Mile Creek 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 source control/long-term monitoring.

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

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

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

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

5. Short-term effectiveness addresses (a) the period of time needed to achieve protection and (b) any adverse impacts on human health and the environment that may be posed during the construction and implementation periods until cleanup goals are achieved.

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

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

Finally, the following "modifying" criteria are considered fully after the formal public comment period on the proposed plan is complete:

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

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

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

1. Overall Protection of Human Health and the Environment

   The main factor behind the consideration and evaluation of remedial alternatives for this AOC is the presence of low levels of PCBs in creek sediments coupled with the finding of PCB levels in fish that exceed ecological risk guidelines and could potentially pose significant risks to receptors who consume the fish. Although the sediment contamination found in the on-base portion of the creek may be a source of exposure for the fish, there is no evidence that this contamination is a major cause of the elevated PCB levels that were found in fish tissue. Rather, the higher levels of PCBs in fish may have resulted from elevated levels in surface water or from other on-base sources. The estimated risks associated with direct contact sediment exposures for human and ecological receptors fall within levels.

   Alternatives 1 (Source control/Long-term Monitoring) and 2 (Institutional Actions) would not address the observed PCB levels in the sediments. The selected alternative (Alternative 1) includes remediation of sources of contamination to the creek and then long-term monitoring to ensure that the planned and completed remedial actions have reduced contaminant levels in the creek.

   Alternatives 3 and 4, which involved sediment excavation, followed by treatment and/or disposal, would remove the PCBs. However, the potential negative impacts to human health and the environment are almost entirely due to the presence of PCBs in fish and, based on the available information, it is not

clear that removal of sediments would provide any increased levels of protection of human health and the environment. Sediment excavation, and the resultant habitat destruction, could have a greater negative impact on benthic organisms and aquatic wildlife than the low levels of contamination now present in creek sediment. Since there is no justification for the disruption of the creek ecosystem that would occur under Alternatives 3 and 4, they were eliminated from consideration.

As a whole, it is more beneficial to the environment to remediate the sources of contamination rather than to disrupt the aquatic and benthic populations and habitat.

2. Compliance with ARARs

Currently there are no chemical-specific ARARs for sediments at this site. The chemical-specific TBCs for sediment that apply to this site and the surface water ARARs and TBCs (see Section 1.5) would continue to be exceeded for certain chemicals under Alternatives 1 (Source Control/Long-term Monitoring) and 2 (Institutional Actions), until the source control measures result in a natural reduction of contaminant concentrations.

Alternatives 3 and 4, which all involve sediment excavation followed by treatment and/or disposal, would meet or approach the ARARs and TBCs.

3. Long-term Effectiveness and Permanence

Primary risks are related to the presence of PCBs in fish collected from upstream parts of the creek. However, it is not possible to relate PCB contamination in upstream fish tissue to contaminated sediments for the downstream portions of Six Mile Creek. Other routes of exposure to the fish may have included discharges to Rainbow Creek and groundwater seeps from Landfill 1 (Rainbow Creek was remediated in 1997 and Landfill 1 remediation is currently underway). Alternatives 1 and 2 provide no removal, destruction, or containment of contaminants in the creek. Environmental monitoring including water quality measurements, sediment surface water, and fish tissue sampling will be performed to track and document site conditions. The remediation of the sources of contamination may allow Alternatives 1 and 2 to have an equally great long-term effectiveness as Alternatives 3 and 4, which call for the removal of sediments from the creek.

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

Alternatives 1 through 3 do not satisfy the preference for selecting remedial actions that employ treatment technologies permanently and significantly reducing the toxicity, mobility, or volume of the contaminants. The remediation of the sources of contamination will greatly reduce and potentially eliminate the release of hazardous contaminants. Incineration, under Alternative 4, would comply with CERCLA's preference for treatment in a selected remedy.

5. Short-term Effectiveness

Because no remedial actions would be taken to remove sediments under Alternative 1, there would be no adverse impacts to human health or the environment in the short term. The duration of Alternative 2 prior to the 30-year environmental monitoring component, is estimated at between 16 and 24 months. There would be minor noise disturbances, as well as dust generation, associated with the construction of a fence under Alternative 2; however, as with Alternative 1, no environmental impacts are expected.

Alternatives 3 and 4 would have significant short-term impacts on Six Mile Creek. Under Alternative 3, the creek flow would be diverted for the duration of the remediation, estimated at between 32 and 44 months. The duration of Alternative 4 is estimated at between 36 and 52 months. Both alternatives require sediment excavation that would temporarily produce dust, noise, and traffic disturbances to the area during implementation. These short-term effects could be minimized through prudent scheduling and the use of various engineering controls. Engineering controls could also be used to minimize sediment suspension and movement during excavation. All temporarily staged sediments would be covered during off-hours to discourage accidental human and wildlife exposure to the contaminants. More importantly, aquatic and benthic populations and their habitat would be destroyed during implementation of these alternatives. Although these populations may be re-established following remedial work, at least a few years would be required for population restoration. In addition, excavation may destroy the state-endangered plant called the whorled mountain mint, which exists in this area.

6. Implementability

Because no construction or preparation activity is required, Alternative 1 is easily implemented. All LTM sampling procedures would be conducted as outlined in the LTM Plan.

The technology, services, equipment, materials, specialists, and labor are readily available to implement all four alternatives, and are likely locally available for Alternatives 2 and 3. Proven operation methods exist for Alternative 4 (incineration). There are no problems anticipated with obtaining the appropriate approvals necessary to implement any of the alternatives or in the coordination with other agencies. The effectiveness of excavation under Alternatives 3 and 4, respectively, would be monitored via verification samples.

7. Cost

The total estimated costs for the four alternatives are provided in the following table:

Cost Estimates for Six Mile Creek Alternatives

Alternative 1	Alternative 2	Alternative 3	Alternative 4
Source Control/LTM	Institutional Actions and LTM	Sediment Excavation, Off-site Disposal, Clean Backfill, and LTM	Sediment Excavation, Off-site Incineration, Clean Backfill, and LTM
$ 3,425,000*	$ 3,771,400	$ 5,877,500	$ 24,684,200

*Does not include costs for source control measures.
Note: All alternative costs include $3,425,000 for long-term monitoring (LTM) for a period of 30 years.

8. Agency Acceptance

   AFRPA, NYSDEC, and EPA have mutually agreed to select Alternative 1 (Source control/Long-term Monitoring) for the Six Mile Creek AOC. The Selected Remedy satisfies the threshold criteria and ensures compliance with applicable regulations.

9. Community Acceptance

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

2.11 Principal Threat Wastes

There are no principal threat wastes at the Six Mile Creek AOC.

2.12 Selected Remedy

The Selected Remedy for the Six Mile Creek AOC is Source Control/Long-term Monitoring. Prior activities that may have contributed to the creek contamination are no longer occurring due to previous source remediation and closure of the base. Under the selected remedial approach, improvements to the quality of the creek are expected through the remediation of additional sources of contamination to the creek. These sources include some areas along the Rainbow Creek tributary to Six Mile Creek that have already been remediated, including the Coal Storage Yard Site, the Building 35 RCRA site, and the DRMO site at the head of Rainbow Creek. The remediation that is currently underway for Landfill, another source of contamination to Six Mile Creek, includes capping and installation of a leachate collection system. The capping of Landfills 2/3 (underway) and Landfill 7 (complete), which are adjacent to the creek and/or its tributaries, will mitigate any contribution of contaminants to the creek from these sources. In

addition, remediation of AOC 9 and Building 817/WSA, potential sources of contamination to Six Mile Creek, will be performed if recommended by the ongoing feasibility studies. If any ongoing investigations or long-term monitoring reveal additional Air Force sources of contamination to the creek, appropriate remedial actions will be considered and implemented. The source control measures for these AOCs will be addressed under the RODs prepared specifically for these sites.

In general, the relatively low levels of contamination found in the sediment and surface water of Six Mile Creek did not explain the observed impairment of the benthic and fish communities, or the levels of PCBs, pesticides, and metals found in fish collected from the creek. It is likely that ongoing discharges of contamination from these sources along the creek contributed to the observed impacts. It is expected that by remediating these sources and eliminating the ongoing discharges, the concentration of contaminants in the fish tissue will decline and the ecological community will recover. Because of the quality of the existing habitat in the creek, sediment removal will not be undertaken at this time since the expected disturbance to the flora and fauna may not be warranted.

Long-term monitoring of the creek environment will be performed to determine whether or not the ongoing and completed remedial actions at the sources of contamination to the creek have the intended result of reducing contaminant levels. Annual monitoring of surface water and sediments will be performed and samples analyzed for VOCs, SVOCs, metals, pesticides, and PCBs. Fish tissue samples will be collected in the first late summer after the ROD is signed and every third year thereafter, and analyzed for metals, pesticides and PCBs. A benthic community analysis will be performed in the first late summer after the ROD is signed and every third year thereafter. A long-term monitoring plan designating sample locations and protocols will be developed with the concurrence of EPA, NYSDEC, and NYSDOH and they will review the data generated during the program to determine whether any additional actions are necessary. If the results of the long-term monitoring indicate that fish tissue levels do not decline or the ecological community does not recover, additional investigation or remediation may be necessary.

2.13 Statutory Determinations

The AFRPA and EPA, with concurrence from NYSDEC, have determined that source control/long-term monitoring is warranted for the Six Mile Creek AOC. The Selected Remedy includes remediation of sources of contamination to the creek and then long-term monitoring to ensure that the planned and completed remedial actions have reduced contaminant levels in the creek. The chemical-specific screening values that were developed for sediment and surface water were based on an evaluation of applicable or relevant and appropriate requirements (ARARs), and other criteria and guidance to be considered (TBCs), which includes non-promulgated federal and state standards or guidance documents (E & E 2000). The screening values for sediments were based on TBCs, including NYSDEC and EPA technical guidance documents for screening contaminated sediments, because there were no chemical-specific ARARs identified for sediments at this site. Surface water screening values were based on ARARs, including the NYSDEC Class C surface water standards and EPA ambient surface water quality standards, and TBCs (NYSDEC water quality guidance values) when ARARs were not available for a specific chemical. The final screening criteria were based on the most stringent ARAR or TBC.

Some chemicals of concern were found to slightly exceed the sediment and surface water screening criteria. The TBCs for sediment and the ARARs and TBCs for surface water would continue to be exceeded under the Selected Remedy until the source control measures result in a natural reduction of contaminant concentrations. Although this remedy does not use treatment as a principal element of the remedy it will accomplish the required end result of protection of human health and the environment by greatly reducing and potentially eliminating the release of hazardous contaminants. As a whole, it is more beneficial to the environment to remediate the sources of contamination rather than to disrupt the aquatic and benthic populations and habitat.

Five-year reviews will be performed by the Air Force, in conjunction with the EPA and NYSDEC, to ensure that the Selected Remedy is still performing as planned and is protective of public health and the environment.

2.14 Documentation of Significant Changes

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

3 Responsiveness Summary

On Thursday, July 24, 2003, AFRPA, following consultation with and concurrence of the EPA and NYSDEC, released for public comment the proposed plan for source control/long-term monitoring at the Six Mile Creek AOC located at the former Griffiss AFB. The release of the proposed plan initiated the public comment period, which concluded on August 23, 2003.

During the public comment period, a public meeting was held on Tuesday, August 5, 2003, at 5:00 p.m. at the Plumley Auditorium, Mohawk Valley Community College, Rome Campus, Floyd Avenue, Rome, New York, to present the selected remedies for Three Mile Creek and Six Mile Creek. A court reporter recorded the proceedings of the public meeting. Copies of the transcript and attendance list are included in the Administrative Record. The public comment period and the public meeting were intended to elicit public comment on the proposed plan for this site.

This document summarizes and provides responses to the verbal comments received at the public meeting and the written comments received during the public comment period.

ORAL COMMENTS

Comment #1

The commentor asked why there have not been signs posted on the creeks warning against fishing and fish consumption although it has been continually requested. When informed of the fish advisory at Three Mile Creek, he mentioned the kids fishing there and asked whether AFRPA is prevented from posting signs. He also stated that he doesn't care about the other streams in New York State; he

just cares about these two creeks and feels it is an "inexpensive pacifier" compared to the millions being spent on this project.

Response #1

This request has been discussed with the EPA, NYSDEC, and NYSDOH and it has been decided that the risk associated with the consumption of fish in Six Mile Creek is not greater than any other body of water in the state and the fish species that exceeded any risk level of concern was the creek chub, which is not usually consumed by humans. Therefore, signs will not be posted at Six Mile Creek.

The response for Three Mile Creek is presented in the Three Mile Creek ROD.

Comment #2

The commentor asked whether the long-term monitoring surface water and sediment sampling locations have been established and whether there will be any off-base downstream locations all the way down to the NYS Barge Canal.

Response #2

During the Remedial Investigation (RI) and Supplemental Investigation (SI), surface water and sediment samples were collected from Six Mile Creek downstream to the NYS Barge Canal. A long-term monitoring (LTM) plan will incorporate the results of the RI and SI sampling efforts in conjunction with the proposed remedial actions for the creek in determining the appropriate monitoring sample locations. A draft long-term monitoring plan has been prepared and is currently under review by the EPA and NYSDEC. Presently the AFRPA does not plan to sample downstream of the confluence of Slate Creek and Six Mile Creek, however, the draft LTM plan has provisions to include additional downstream sample points if during the review of the LTM data, additional sample points are warranted.

The response for Three Mile Creek is presented in the Three Mile Creek ROD.

Comment #3

The commentor asked whether there have been any recent studies, or whether there will be any future studies of the "higher incidence of cancer in this area."

Response #3

NYSDOH completed a study for the Rome/Floyd area, which covered the time period for the years 1978-1987. Cancer rates by zip code are available on the NYSDOH website, www.health.state.ny.us. No additional studies are planned for the area. The commentor was contacted directly by a NYSDOH cancer specialist to discuss cancer and her concerns.

WRITTEN COMMENTS

Two letters were received during the public comment period. One report was received from Stearns and Wheeler Companies, consultant to the Restoration Advisory Board (RAB) under the Technical Assistance for Public Participation (TAPP) program. A second letter was received from a private citizen.

Comment #4 (RAB consultant)

> "The remedial action objectives (RAOs) should more explicitly state the need to maintain the creeks' Class C status (suitable for fish survival and propagation). As written, the RAO[s] reference protecting "the environment," without specifics. This is potentially significant, because the measurables against which the remedy's effectiveness is to be evaluated need to be clearly defined."

Response #4

> The RAOs have been revised to include statements concerning the need to maintain the Six Mile Creek's Class C status.

Comment #5 (RAB consultant)

> "Human consumption of fish should be more aggressively discouraged by posting signs along the creeks. This is easily done, and inexpensive."

Response #5:

> This request has been discussed with the EPA, NYSDEC, and NYSDOH and it has been decided that the risk associated with the consumption of fish from Six Mile Creek is not greater than any other body of water in the state and the fish species that exceeded any risk level of concern was the creek chub, which is not usually consumed by humans. Therefore, signs will not be posted at Six Mile Creek.
>
> The response for Three Mile Creek is presented in the Three Mile Creek ROD.

Comment #6 (RAB consultant)

> "The five-year reviews of remedial progress in the creek[s] will also need to integrate the remedial status at the various other source AOCs."

Response #6

> During the performance of the five-year reviews, all source AOCs with an executed ROD requiring a five-year review will be evaluated collectively. The first

five-year review is scheduled for 2004 and will include many of the source AOCs affecting Six Mile Creek.

Comment #7 (RAB consultant)

"It will be difficult to judge the effectiveness of the proposed remediation until after the remediation at the other AOCs is substantially completed."

Response #7

All of the known potential source sites have undergone or will undergo remedial action in the next few years. AFRPA acknowledges this comment and an LTM Program will be implemented with the intent to determine whether or not the ongoing and completed remedial actions at the potential source sites have the intended results of reducing contamination in the creek environment. The data will be reviewed by EPA, NYSDEC, and NYSDOH to assess whether the contamination levels are associated with former Griffiss AFB potential sources or background conditions (e.g. storm water runoff) and will take appropriate actions if warranted.

Comment #8 (RAB consultant)

"In addition to the planned five-year reviews, annual data summaries should be made available for TAPP Subcommittee review. The annual summaries would not necessarily include extensive interpretations or recommendations (which are to be provided in the five-year review), but will be useful for the subcommittee to develop a preliminary assessment after the fourth year, in preparation for the five-year review."

Response #8

The data obtained throughout the performance of the LTM program will be forwarded to the EPA and NYSDEC on an annual basis and will be made available to the TAPP Subcommittee. The data will also be available to the public through the Administrative Record.

Comment #9 (RAB consultant)

"Groundwater contamination from AOCs that drain into the creek does not appear to be a primary source for the main contaminants of concern, the creek sediments and fish tissue (PCBs, pesticides, and metals). The effects of groundwater in the creek can be more clearly assessed after the other sources (i.e., other AOCs) have been remediated."

Response #9

All of the known potential source sites have undergone or will undergo remedial action within the next few years. AFRPA acknowledges this comment and will review the progress and effectiveness of the remedial efforts collectively.

Comment #10 (RAB consultant)

As a conclusion, TAPP stated that, "The above noted observations are not significant enough to discredit the proposed remedial programs. Overall, the proposed remedial action plans for the creeks are considered to be appropriate, and derived in a manner consistent with regulatory statute. However, because the effectiveness of the creek remediation will be directly related to the success of remediation at the other AOCs, and because the implementation of remedial programs at the other AOCs will take a number of years to complete, it may be many years before the success of the creek remedial program is apparent."

Response #10

AFRPA acknowledges this comment and an LTM program will be implemented with the intent of determining whether or not the ongoing and completed remedial actions at the potential source sites have the intended results of reducing contamination in the creek environment. The data will be reviewed to assess whether the contamination levels are associated with former Griffiss AFB potential sources or background conditions (e.g. storm water runoff) and will take appropriate actions if warranted.

Comment #11 (private citizen)

The commentor stated that she was pleased with the proposed Three Mile Creek clean up but questioned the assessment of Six Mile Creek. She believes that Six Mile Creek is polluted and will remain that way for decades. She is concerned that the creek will continue to pick up contamination as it flows by other AOCs (battery acid pits, the small arms range, the weapons storage area, the former chemical training area, and five landfills). Even if the landfills are capped, she is concerned about leachate. She does not agree that the wildlife is coming back and stated that all the turtles, muskrats, and beavers are gone and the ducks and birds do not stop. The commentor requested that at least signs be posted warning people of the dangers of the pollution, noting that it is unlikely that fishermen read the NYS health advisory booklet and certainly 7-year-olds don't read it.

Response #11

The chosen remedial alternative includes remediation of the sources of contamination to Six Mile Creek and implementation of a long-term monitoring plan for a period of at least 30 years to monitor the effectiveness of the source control measures. In July 1999, the habitat quality of Six Mile Creek was visually inspected by the AFRPA, U.S. Army Corps of Engineers (USACE), NYSDEC, EPA, and the

USFWS. An extensive walkover of the off-base portion of the creek revealed an aquatic habitat of relatively high quality. The surrounding habitat is also of high quality for plants and wildlife, including extensive areas of forest, shrub, and emergent wetlands. Numerous minnows (and larger fish downstream) and frogs were observed throughout the off-base portion of the creek. Signs of wildlife, including duck, raccoon, and deer tracks, and numerous song birds were also common throughout the area. Because of the high quality of habitat along the creek, especially off base, it would be more beneficial to the environment as a whole to address remediation of the sources of contamination rather than performing direct remedial actions on the creek sediments. Direct remedial action would present a significant disruption to the flora and fauna living in or near Six Mile Creek.

The Six Mile Creek risk assessment evaluated potential exposures to recreational receptors. Risk exposures were within acceptable limits with the exception of fish ingestion. The NYSDOH has evaluated this information and does not feel that the human health risk is as high as indicated by the risk assessment, primarily due to the fact that the only fish species that yielded appreciable amounts of contamination was the creek chub, which is not consumed by humans. The request for signs was discussed with the EPA, NYSDEC, and NYSDOH and it has been decided that the risk associated with the consumption of fish from Six Mile Creek is not greater than any other body of water in the state. Therefore, signs will not be posted at Six Mile Creek.

Comment #12 (private citizen)

The commentor inquired as to whether ethyl glycol will be used again to de-ice planes now that the runway is going to be utilized for an aircraft maintenance company and asked where the chemical runoff will go. She asked if the creek will be fluorescent green again every spring.

Response #12

Ethylene glycol is typically no longer used for de-icing. The aircraft maintenance company would be required to meet all current federal, state, and local regulations regarding the management of de-icing fluids.

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A Tables

Table 1
COMPOUNDS EXCEEDING STANDARDS AND GUIDANCE VALUES
SIX MILE CREEK AOC
RI COMPOSITE WHOLE-BODY FISH TISSUE SAMPLES

Compound	Range of Detected Concentrations	Frequency of Detection Above Most Stringent Criterion	Most Stringent Criterion
Pesticides/PCBs (mg/kg)			
4,4'- DDT and metabolites	0.03 - 0.87	3/9	0.2 [a]
Dieldrin	0.3	1/9	0.022 [a]
PCBs (total of Aroclors)	0.075 J - 13.5	7/9	0.11 [a]
Metals (mg/kg)			
Mercury	0.18 - 1.3	4/9	0.5 [a]

[a] NYSDEC Ecological Risk Guidelines for Piscivorous Wildlife.

Key:
J - estimated concentration

Table 2
COMPOUNDS EXCEEDING STANDARDS AND GUIDANCE VALUES
SIX MILE CREEK AOC
RI SURFACE WATER SAMPLES

Compound	Range of Detected Concentrations	Frequency of Detection Above Most Stringent Criterion	Most Stringent Criterion
VOCs (µg/L)			
cis-1,2-Dichloroethene	0.37	1/21	0.033 [a,b]
Vinyl chloride	2.2	1/21	2.0 [a,b]
SVOCs (µg/L)			
Anthracene	0.0029 J - 0.04 J	2/27	0.0028 [a,b]
Benzo(a)anthracene	0.0038 J - 0.2 J	5/26	0.0028 [a,b]
Benzo(a)pyrene	0.06 J - 0.2 J	3/25	0.0028 [a,b]
Benzo(b)fluoranthene	0.1 J - 0.4 J	3/25	0.0028 [a,b]
Benzo(g,h,i)perylene	0.06 J - 0.2 J	3/25	0.0028 [a,b]
Benzo(k)fluoranthene	0.021 J - 0.1 J	4/26	0.0028 [a,b]
Bis (2-Ethylhexyl) Phthalate	0.19J - 2	4/26	0.6 [d]
Chrysene	0.005 J - 0.4 J	4/26	0.0028 [a,b]
Dibenzo(a,h)anthracene	0.03 J - 0.05 J	2/24	0.0028 [a,b]
Fluorene	0.014 J - 0.03 J	2/26	0.0028 [a,b]
Indeno(1,2,3-cd)pyrene	0.06 J - 0.2 J	3/25	0.0028 [a,b]
Pentachlorophenol	0.9 - 1.0	3/25	0.4 [a,c]
Phenanthrene	0.02 J - 0.3 J	19/40	0.0028 [a,b]
Pyrene	0.062 J - 0.6 J	14/35	0.0028 [a,b]
Pesticides/PCBs (µg/L)			
Aldrin	0.52 J - 0.52 J	2/24	0.000074 [a,b]
Heptachlor	0.058 J - 0.058 J	2/24	0.00028 [a,b]
Hexachlorobenzene	0.001 J - 0.002 J	5/23	0.00072 [a,b]
Malathion	0.18 J - 0.18 J	2/24	0.1 [d]
Metals (mg/L)			
Aluminum	0.12 - 0.17	11/21	0.1 [d]
Copper	0.11 - 0.43	6/21	0.012 [a,c]
Iron	0.49 - 1.2	14/21	0.3 [d]
Lead	0.002 - 0.006	3/21	0.001 [d]
Manganese	0.008 - 0.48	12/21	0.05 [a,b]
Selenium	0.00031 J - 0.003	1/21	0.001 [d]
Wet Chemistry (mg/L)			
Cyanide	0.038 - 0.11	2/22	0.005 [d]
Sulfide	0.03J - 0.04J	4/4	0.002 [a,c]

[a] Federal Aquatic Water Quality Criterion (AWQC), EPA 440/5-86-001, May 1, 1987.

[b] AWQC for protection of human health.

[c] AWQC for protection of aquatic organisms.

[d] NYSDEC Surface Water Standard for protection of aquatic organisms (Class C).

Key:
J - estimated concentration

Table 3
COMPOUNDS EXCEEDING STANDARDS AND GUIDANCE VALUES
SIX MILE CREEK AOC
RI SEDIMENT SAMPLES

Compound	Range of Detected Concentrations	Frequency of Detection Above Most Stringent Criterion	Most Stringent Criterion
VOCs (µg/kg)			
Benzene	12	1/42	0.6 [a,b]
Chlorobenzene	0.7 J - 32 J	1/42	3.5 [a,c]
Trichloroethene	2 J - 5 J	2/42	2.0 [a,b]
SVOCs (µg/kg)			
1,2-Dichlorobenzene	30 J - 59 J	3/42	12.0 [a,b]
2-Methylnaphthalene	11 J - 1,000	5/42	70 [e]
Acenaphthene	15 J - 410 J	10/42	16 [e]
Acenaphthylene	23 J - 2,300 J	7/42	44 [e]
Anthracene	21 J - 2,300 J	8/42	85 [e]
Benzo(a)anthracene	76 J - 11,000	17/42	1.3 [a,b]
Benzo(a)pyrene	42 J - 13,000	20/42	1.3 [a,b]
Benzo(b)fluoranthene	31 J - 20,000	25/42	1.3 [a,b]
Benzo(k)fluoranthene	23 J - 8,600	23/42	1.3 [a,b]
Bis(2-ethylhexyl)phthalate	33 J - 2,500	21/42	199.5 [a,b]
Chrysene	89 J - 15,000	20/42	1.3 [a,b]
Dibenzo(a,h)anthracene	66 J - 1,400 J	4/42	63 [e]
Fluoranthene	88 J - 20,000 J	6/42	600 [e]
Fluorene	27 J - 1,300 J	7/42	19 [e]
Indeno(1,2,3-cd)pyrene	59 J - 4,300	13/42	1.3 [a,b]
Naphthalene	250 J - 280 J	3/42	160 [e]
Phenanthrene	68 J - 14,000	13/42	240 [e]
Pyrene	100 J - 38,000	5/42	665 [e]
Pesticides/PCBs (µg/kg)			
Aldrin	25	1/42	0.1 [a,b]
alpha-BHC	2.8 J	1/42	0.06 [a,b]
alpha-Endosulfan	1.2 J - 8.7 J	3/42	0.03 [a,c]
alpha-Chlordane	0.3 J - 5.3 J	3/42	0.001 [a,b]
Azinphos, Methyl (Guthion)	2.2 J - 1,400	8/42	0.001 [a,c]
beta-BHC	0.59 J - 10	2/42	0.06 [a,b]
beta-Endosulfan	1.1 J - 32 J	5/42	0.03 [a,c]
BHC (hexachlorocyclohexane)	1.2J - 21	3/42	0.06
delta-BHC	0.7 J	1/42	0.06 [a,b]
Dieldrin	6.4 J - 310 J	6/42	0.1 [a,b]
Endosulfan sulfate	35 J	1/42	0.03 [a,c]
Endrin	27	1/42	0.8 [a,b]
gamma-Chlordane	1.9 J - 23 J	2/42	0.001 [a,b]
Heptachlor	0.84 J - 26	4/42	0.0008 [a,b]
Heptachlor epoxide	1.8 J - 8.6	3/42	0.0008 [a,b]
Methoxychlor	26 J - 180 J	2/42	0.6 [a,c]
Parathion, Ethyl	3.1 J - 4.8 J	2/42	0.003 [a,c]
4,4'- DDD	1.6 J - 2.7 J	3/42	0.01 [a,b]
4,4'- DDE	3.2 J - 7 J	4/42	0.01 [a,b]
4,4'- DDT	4.2 J - 72 J	3/42	0.01 [a,b]
PCB 1254	6.4 J - 320	6/42	0.0008 [a,b]
Metals (mg/kg)			
Arsenic	0.49 - 17.2	3/42	6.0 [a,d]
Copper	2.3 - 50.1	13/42	16 [a,d]
Lead	6.2 - 62.5	11/42	31 [a,d]
Manganese	108 - 1,520	11/42	460 [a,d]
Nickel	5.4 - 28.5 J	19/42	16 [a,d]
Zinc	19.7 - 449	4/42	120 [a,d]

[a] NYSDEC Technical Guidance for Screening Contaminated Sediments, November 1993.

[b] Human Health Bioaccumulation (assuming 0.1% organic carbon in sediment).

[c] Benthic Aquatic Life Chronic Toxicity (assuming 0.1% carbon in sediment).

[d] Lowest Effect Level, Sediment Criteria for Metals.

[e] Effects Range - Low (Long, MacDonald, Smith, and Calder, 1995).

Key:
J - estimated concentration

Table 4
FREQUENCY OF DETECTION
SIX MILE CREEK AOC
SI PISCES SAMPLES

Compound	Frequency of Detection	Range of Detected Concentrations
Pesticides (µg)		
4,4'- DDD	4/10	0.007 J - 0.011
4,4'- DDE	2/10	0.005 J - 0.025
4,4'- DDT	1/10	0.036
Aldrin	4/10	0.005 J - 0.025
alpha-BHC	3/10	0.0028 J - 0.008 J
beta-BHC	1/10	0.0064
Chlordane	3/10	0.035 J - 0.11
Dieldrin	3/10	0.025 - 0.067 J
Endosulfan II	1/10	0.018
Endosulfan sulfate	2/10	0.008 J - 0.013 J
gamma-BHC (Lindane)	2/10	0.0036 J - 0.0040 J
Heptachlor	3/10	0.008 J - 0.028

Key:
J - estimated value

PISCES - Passive in situ chemical extraction sampling

Table 5
COMPOUNDS EXCEEDING STANDARDS AND GUIDANCE VALUES
SIX MILE CREEK AOC
SI SURFACE WATER SAMPLES

Compound	Range of Detected Concentrations	Frequency of Detection Above Most Stringent Criterion	Most Stringent Criterion
Metals (mg/L)			
Aluminum	1.4	1/2	0.1[a]
Iron	1.2 - 3.2	2/2	0.3[a]
Lead	0.002 - 0.006	3/21	0.001[a]

[a] NYSDEC Surface Water Standard for protection of aquatic organisms (Class C)

Table 6
COMPOUNDS EXCEEDING STANDARDS AND GUIDANCE VALUES
SIX MILE CREEK AOC
SI SEDIMENT SAMPLES

Compound	Range of Detected Concentrations	Frequency of Detection Above Most Stringent Criterion	Most Stringent Criterion
SVOCs (µg/kg)			
2-Methylnaphthalene	140 J - 340 J	2/12	65[a]
Anthracene	49 J - 450 J	2/12	85[a]
Benzo(a)anthracene	67 J - 260 J	6/12	2.6[b,c]
Benzo(a)pyrene	70 J - 290 J	7/12	2.6[b,c]
Benzo(b)fluoranthene	68 J - 300 J	7/12	2.6[b,c]
Benzo(k)fluoranthene	80 J - 370 J	7/12	2.6[b,c]
Chrysene	48 J - 360 J	7/12	2.6[b,c]
Fluorene	59 J	1/12	35[a]
Indeno(1,2,3-cd)pyrene	67 J	1/12	2.6[b,c]
Pyrene	46 J - 390 J	2/12	350[a]
Pesticides/PCBs (µg/kg)			
PCB 1254	42 - 180	6/12	0.0016[b,c]
PCB 1260	33 - 270	9/12	0.0016[b,c]
Dioxins/Furans (µg/kg)			
2,3,7,8-TCDD equivalents	0.000005 - 0.00366	6/12	0.0006[b,d]
Metals (mg/kg)			
Lead	10 - 37	1/12	36[e]
Mercury	1.3	1/12	0.15[a]

[a] Effects Range - Low (Long and Morgan 1991)

[b] NYSDEC Technical Guidance for Screening Contaminated Sediments, November 1993

[c] Human Health Bioaccumulation (assuming 0.2% organic carbon in sediment)

[d] Wildlife Bioaccumulation (assuming 0.2% carbon in sediment)

[e] Background

Key:
J - estimated concentration

Table 7
RISK ASSESSMENT SCENARIO & EXPOSURE PATHWAYS

RECREATIONAL SCENARIO (ADULT, CHILD, YOUTH, AND ADOLESCENT RECEPTORS)

- Incidental ingestion of surface water
- Dermal contact with surface water
- Incidental ingestion of sediment
- Dermal contact with sedimen
- Ingestion of fish from Six Mile Creek

B Figures

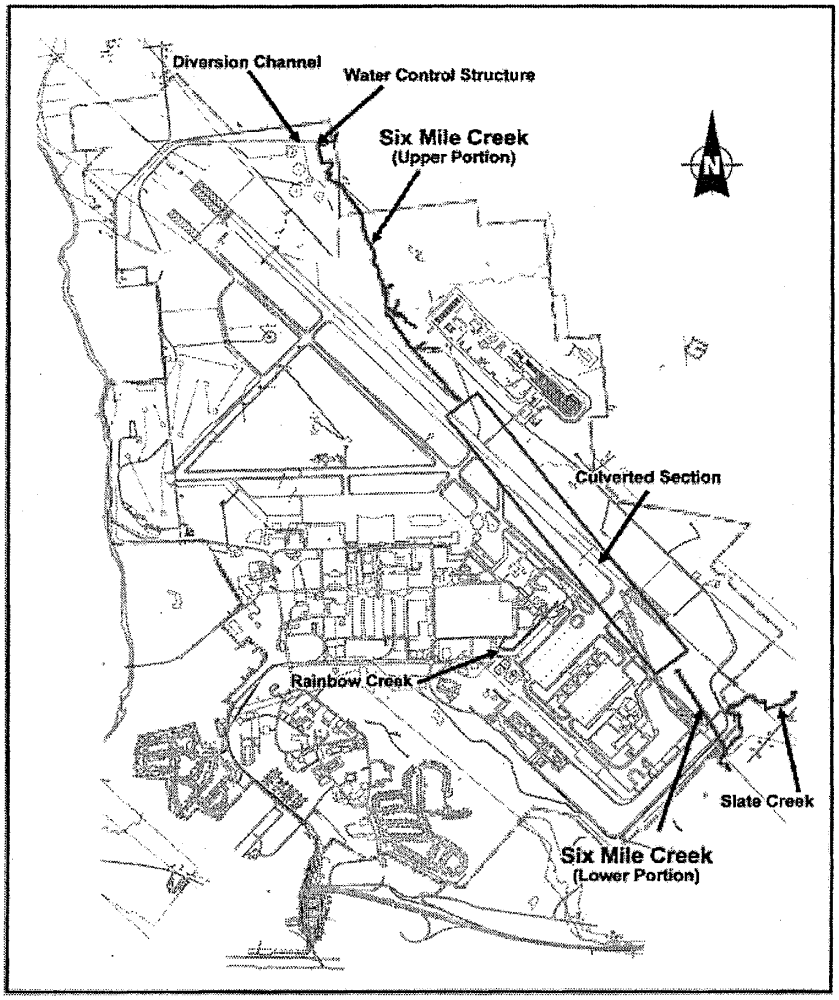

Figure 1 On-Base Portions of Six Mile Creek AOC

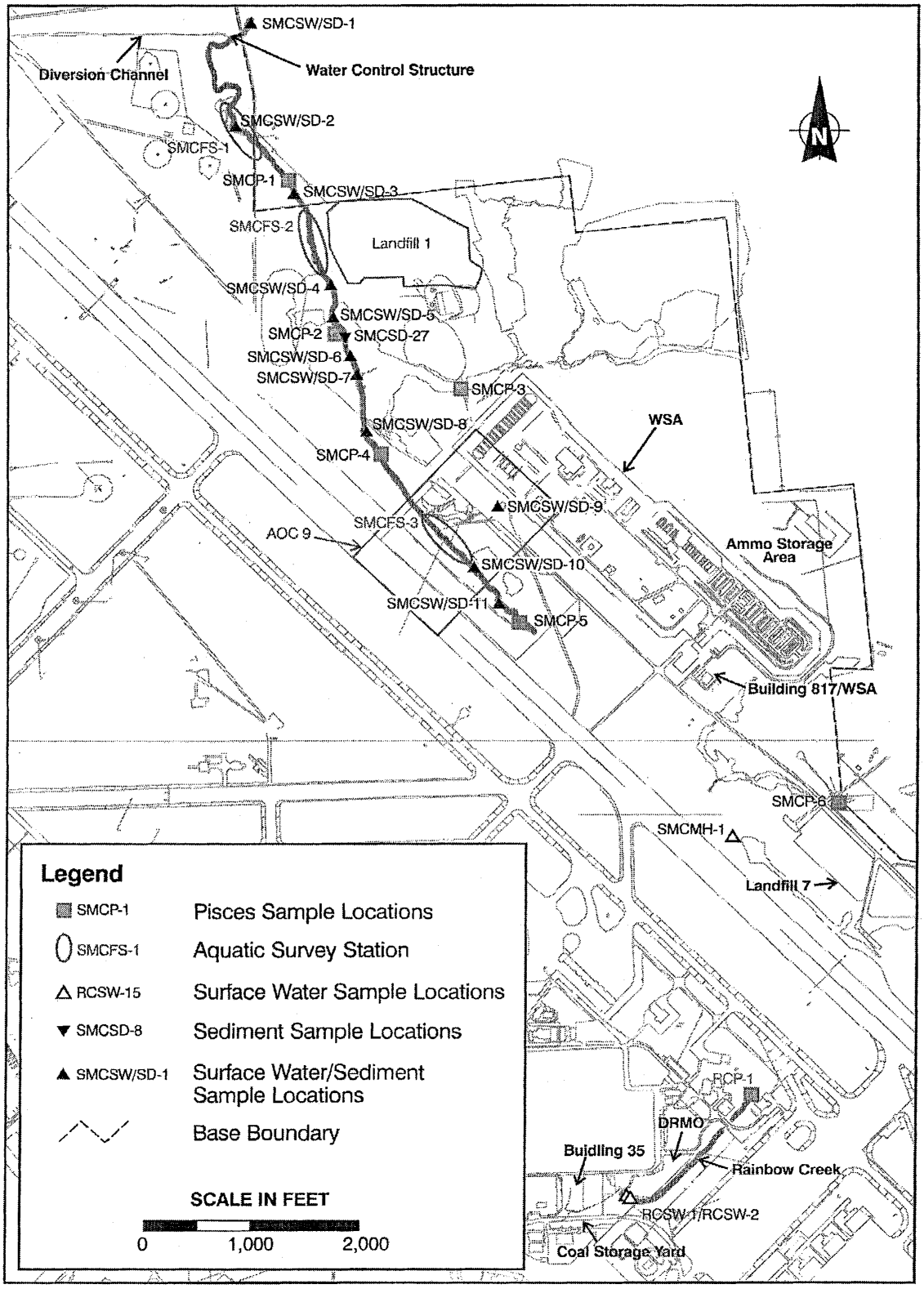

Figure 2 Six Mile Creek – Sample Locations, Upper Portion

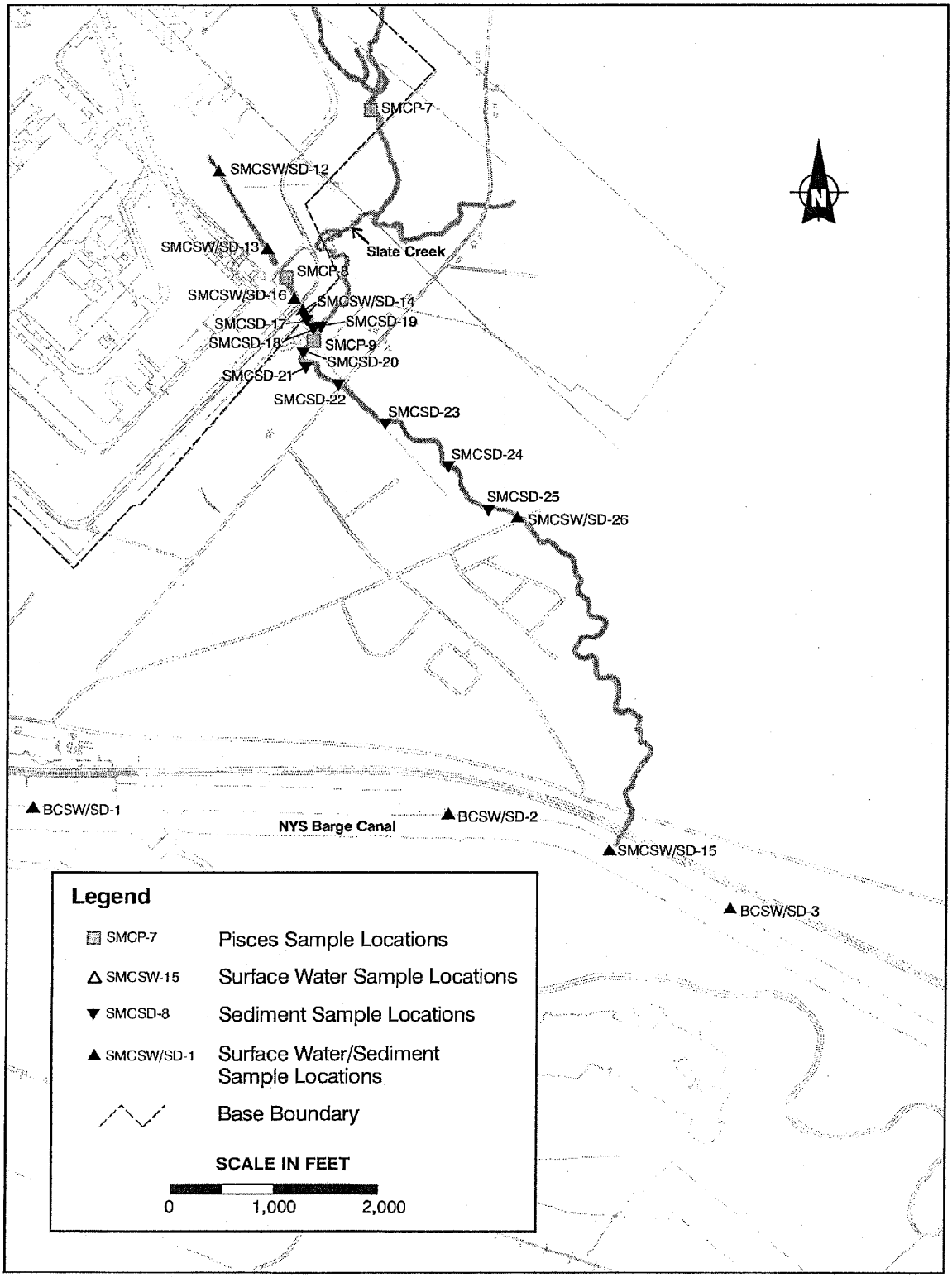

Figure 3 Six Mile Creek – Sample Locations, Lower Portion