

003

**INSTALLATION RESTORATION PROGRAM
LF-023 (GROUNDWATER SURFACE WATER AND SEDIMENT)**

RECORD OF DECISION

PLATTSBURGH AIR FORCE BASE

PLATTSBURGH, NEW YORK

TECHNOLOGY
SECTION
COPY

FINAL

TECHNOLOGY
SECTION
COPY

JANUARY 1995

TABLE OF CONTENTS

		<u>Page No.</u>
DECLARATION FOR THE RECORD OF DECISION		D-1
1.0	SITE NAME, LOCATION, AND DESCRIPTION	1-1
2.0	SITE HISTORY	2-1
2.1	Land Use and Response History	2-1
2.2	Federal Facilities Agreement History	2-2
3.0	COMMUNITY PARTICIPATION	3-1
4.0	SCOPE AND ROLE OF OPERABLE UNIT	4-1
5.0	SUMMARY OF SITE CHARACTERISTICS	5-1
6.0	SUMMARY OF SITE RISKS	6-1
6.1	Contaminants of Concern	6-1
6.2	Exposure Scenarios	6-1
6.3	Risks to Human Populations	6-2
6.4	Summary of Environmental Risks	6-2
6.5	Remediation Goals	6-2
7.0	DESCRIPTION OF ALTERNATIVES	7-1
8.0	SUMMARY OF COMPARATIVE ANALYSIS OF ALTERNATIVES	8-1
8.1	Threshold Criteria	8-1
8.2	Primary Balancing Criteria	8-2
8.3	Modifying Criteria	8-4
9.0	SELECTED REMEDY	9-1
9.1	Description	9-1
9.2	Action Criteria and Focused Feasibility Studies	9-1
10.0	STATUTORY DETERMINATIONS	10-1
11.0	DOCUMENTATION OF NO SIGNIFICANT CHANGES	11-1
12.0	STATE ROLE	12-1
13.0	RESPONSIVENESS SUMMARY	13-1
REFERENCES		

APPENDIX A - NYSDEC DECLARATION OF CONCURRENCE WITH
 PREFERRED ALTERNATIVE
 LIST OF TABLES

		<u>Following Page No.</u>
6-1	Contaminants of Concern	6-1
6-2	Summary of Human Health Risks	6-2
6-3	Summary of Remediation Goals	6-2

LIST OF FIGURES

		<u>Following Page No.</u>
1-1	Vicinity Location Map	1-1
1-2	Site Location Map	1-1
5-1	Site Conceptual Model	5-1
5-2	Groundwater Flow and Contaminant Plumes	5-1
9-1	Proposed Additional Monitoring Well Locations 9-1	

DECLARATION FOR THE RECORD OF DECISION

SITE NAME AND LOCATION

Plattsburgh Air Force Base (AFB),
Landfill-23 (Site LF-023)
Plattsburgh, New York

STATEMENT OF BASIS AND PURPOSE

This Record of Decision (ROD) presents a selected remedial action for Operable Unit Two, consisting of groundwater, surface water, and sediment at Landfill LF-023 on Plattsburgh AFB in Plattsburgh, New York. This document was developed in accordance with the Comprehensive Environmental Response, Compensation, and Liability Act of 1980 (CERCLA), as amended by the Superfund Amendments and Reauthorization Act of 1986 (SARA), and to the extent practicable, by the National Oil and Hazardous Substances Pollution Contingency Plan (NCP). This decision is based on the Administrative Record for this site, a copy of which is located at Plattsburgh AFB.

The remedy has been selected by the U.S. Air Force (USAF) in conjunction with the U.S. Environmental Protection Agency (USEPA) with the concurrence of the New York State Department of Environmental Conservation (NYSDEC), pursuant to a Federal Facilities Agreement among the parties under Section 120 of CERCLA.

ASSESSMENT OF THE SITE

Releases of hazardous substances from this site present no imminent or substantial endangerment to public health, welfare, or the environment. Groundwater is not presently used as a residential water supply source downgradient of LF-023. However, groundwater has been degraded by site contaminants and, if not addressed by implementing the response action selected in this ROD, represents a potential risk to public health in the future.

DESCRIPTION OF THE REMEDY

This Operable Unit is the second and final Operable Unit for which action has been taken at this site. The first Operable Unit at this site is the contaminant source, which will be addressed by the installation of a multi-layer, low-permeability cap meeting the requirements of 6 NYCRR Part 360. Further degradation of groundwater should be effectively eliminated by the implementation of this source control remedy.

The second Operable Unit, consists of groundwater, surface water, and sediment contamination present as a result of LF-023. Since results of the Baseline Risk Assessment indicate that no unacceptable human health risk or population-level ecological risk is currently posed by surface water or sediments, no remedial action is required with respect to these media. The selected remedy for this Operable Unit therefore addresses groundwater only. This selected remedy is

Institutional Action. Human health and welfare will be protected through this remedy by preventing human exposure to contaminated groundwater. In addition, existing groundwater contamination will be reduced by natural processes of attenuation.

The major components of the selected remedy are:

- Deed restrictions prohibiting withdrawal of groundwater for potable use in this area;
- All elements of the source control remedy provided by Operable Unit One;
- Installation of additional monitoring wells;
- Long-term environmental monitoring of groundwater;
- Action criteria for sidegradient wells to protect drinking water;
- Action criteria for downgradient wells to protect surface water resources;
- Site reviews at five-year intervals to evaluate the effectiveness of the remedy.

Groundwater contamination has the potential to affect two different off-base receptors; therefore, two sets of action criteria were needed. One set of action criteria was established to be protective of a sidegradient, off-base residential community. Action will be triggered if monitoring wells along the base boundary in this vicinity indicate contaminant concentrations in groundwater in contravention of groundwater ARARs. A second set of action criteria will be developed using baseline contaminant concentrations in downgradient monitoring wells for protection of downgradient surface water resources. If either set of action criteria are exceeded during monitoring, or if the five-year review indicates that the selected remedy is not effective, then a focused Feasibility Study will be performed. This study will include re-evaluation of technologies screened in the Feasibility Study for Operable Unit Two and an evaluation of other feasible groundwater remediation technologies that may have been developed in the interim. Upon completion of the study, an appropriate course of action will be recommended. This recommendation will be subject to the approval of USEPA, NYSDEC, and the public. Since the threat to human health is more imminent if sidegradient groundwater is impacted, an immediate measure may be required to protect the health of nearby residents while other remedial actions are being considered.

DECLARATION

The selected remedy is protective of human health and the environment, complies with federal and state action- and location-specific requirements that are legally applicable or relevant and appropriate to the remedial action, and is cost-effective.

This remedy employs permanent solutions to the maximum extent practicable. Because mitigation of this site's principal threats by treatment does not offer a significant advantage in the pace of remediation compared to the selected remedy, and because these threats are not imminent, a treatment option has not been included as a primary element of the remedy. This remedy therefore does not satisfy the statutory preference for treatment as a principal element of the remedy. Remediation, however, may be considered following further review of site conditions and receipt of additional information.

Because this remedy will result in hazardous substances remaining on site at levels above health-based criteria, a review will be conducted five years after commencement of remedial action (and at five year intervals thereafter) to ensure that the remedy continues to provide adequate protection of human health.

JEANNE M. FOX
Regional Administrator, USEPA Region II

Date



ALAN K. OLSEN
Director, Air Force Base Conversion Agency

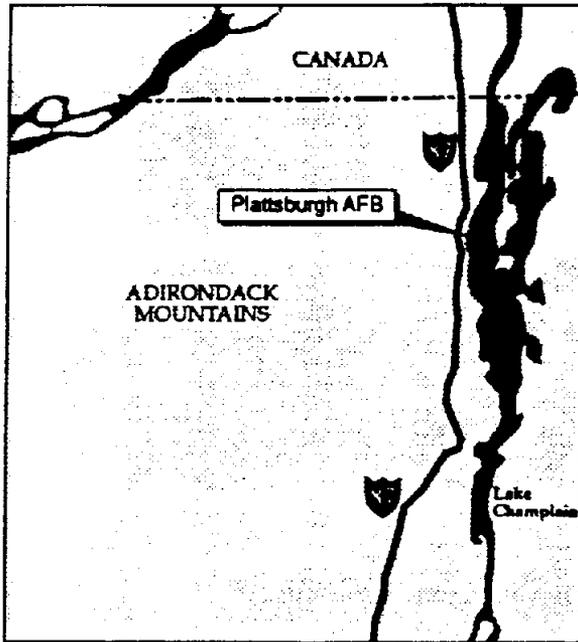
March 15, 1995
Date

1.0 SITE NAME, LOCATION, AND DESCRIPTION

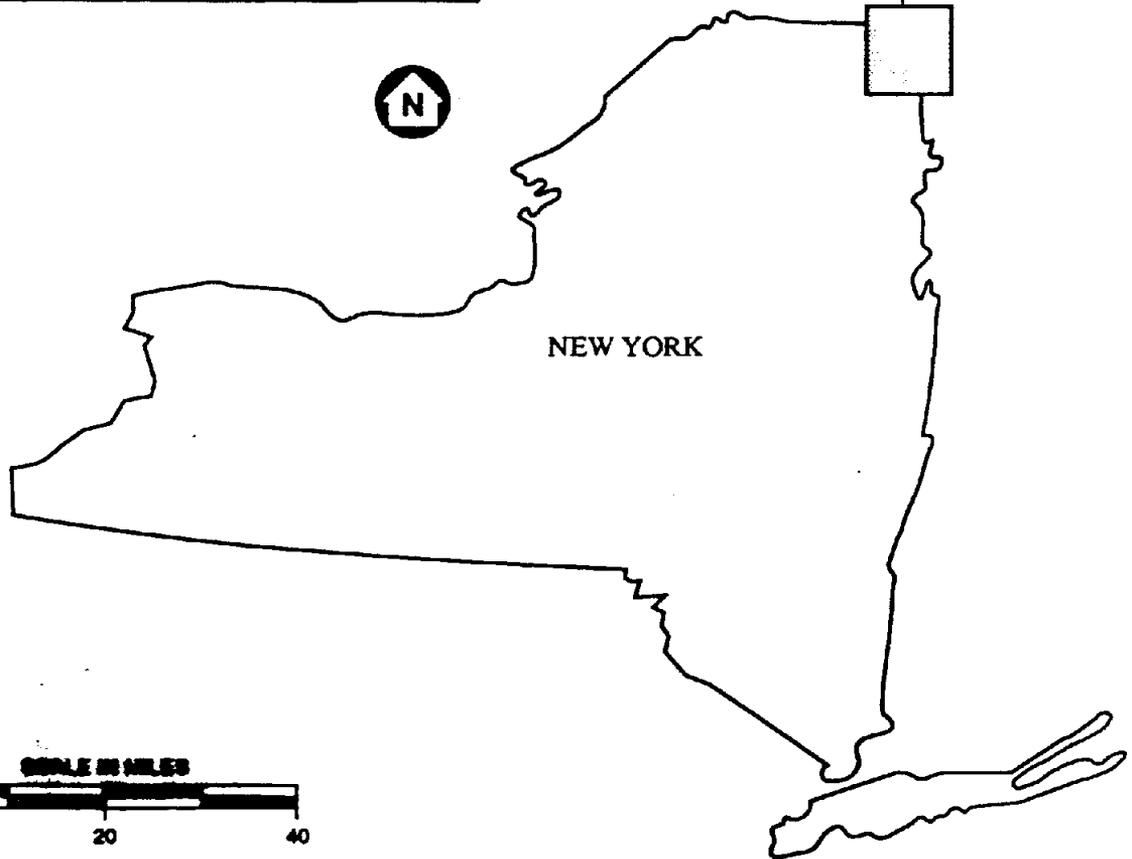
Plattsburgh AFB is located in Clinton County in northeastern New York State. The base is currently slated for closure by the Congress of the United States. It is bordered on the north by the City of Plattsburgh and on the east by Lake Champlain (Figure 1-1). It lies approximately 26 miles south of the Canadian border and 167 miles north of Albany. Landfill LF-023 is situated west of the base runway and south of the FT-002 site and LF-022 (Figure 1-2).

The main portion of the landfilled area is approximately 500 feet wide by 800 feet long, with its western edge approximately 300 feet from the Plattsburgh AFB western boundary. The site slopes toward the east and south, with a surface gradient of approximately 0.026. LF-023, the last active municipal landfill at Plattsburgh AFB, reportedly received domestic wastes for disposal. Since the operations at LF-023 ceased, secondary plant growth has begun to cover the site and an exercise training course had been constructed on the site. In the summer of 1993, the exercise course was removed and installation of an impermeable cap initiated as part of Operable Unit One. Soil within the landfill boundaries consists of poorly graded fine to medium sand with trace silt. The soil appears to be native soil mined in the area and used as cover material after landfill operations ceased.

A more complete description of LF-023 may be found in the LF-023/LF-022 Remedial Investigation Report, Section 1.3 - Site Background and Section 4.1 - Physical Characteristics.



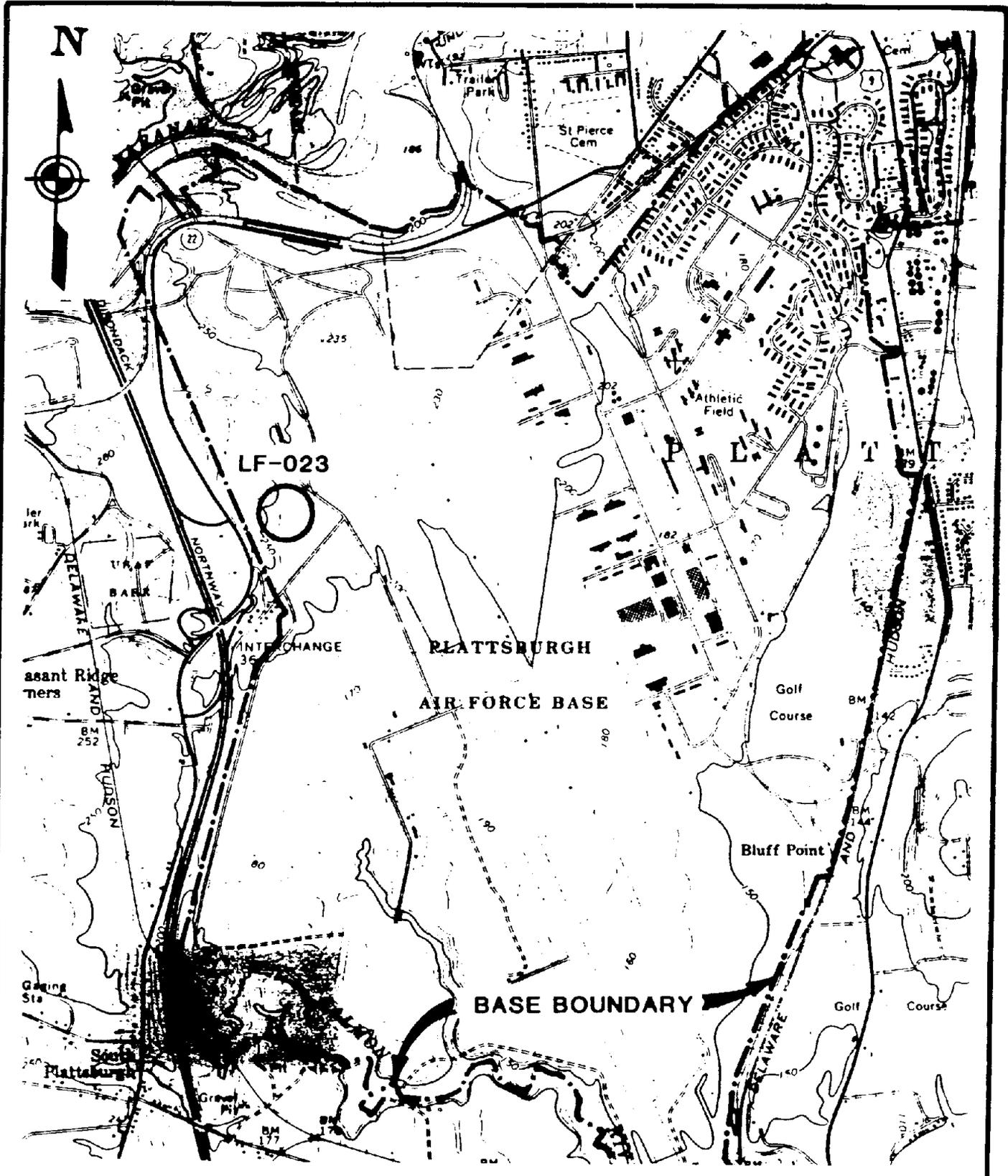
INSET



SOURCES

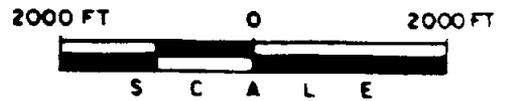
- 1) NORTH AMERICAN ROAD ATLAS,
H.M. GOUSHA CO.; 1982
- 2) E.C. JORDAN CO.; REMEDIAL
INVESTIGATION REPORT

FIGURE 1-1



MAP SOURCE

USGS 7.5 MINUTE SERIES QUADRANGLE
 PLATTSBURGH, N.Y. - VT. (1966)



A-4751

URS
 CONSULTANTS, INC.

**PLATTSBURGH AIR FORCE BASE
 SITE LOCATION MAP**

FIGURE 1-2

2.0 SITE HISTORY

In accordance with Section 117(a) of the Comprehensive Environmental Response, Compensation and Liability Act (CERCLA), Plattsburgh AFB is publishing this Record of Decision (ROD) to address the comments of the public on the selected alternative. Plattsburgh AFB, in conjunction with USEPA and NYSDEC, has considered public comments in selecting the remedy for LF-023. This ROD summarizes the results and conclusions of the Remedial Investigation (RI), Risk Assessment (RA), Feasibility Study (FS), and Proposed Plan and addresses any public comments.

2.1 Land Use and Response History

Landfill LF-023 was the last active municipal landfill at Plattsburgh AFB, reportedly operating from 1966 to 1981. Operations reportedly consisted of digging 25-foot-deep trenches, spreading and compacting the trash, and covering it daily with 6-inch layers of sandy soil. Hazardous and organic wastes were not routinely disposed of in this landfill. There are indications in the record, however, that the landfill contains hazardous materials. Since operations at the landfill ceased, vegetation has begun to cover the site, and an exercise course had been constructed in its northern section. In the summer of 1993, the exercise course was removed and installation of an impermeable cap was initiated as part of site remediation. The cap was completed in April 1994.

A Preliminary Assessment (PA), consisting primarily of a records search, was conducted at LF-023 in 1985. Among the 13 sites rated during the PA, LF-023 ranked sixth.

Based on the results of the PA, a Site Inspection (SI) was conducted. This included a ground-penetrating radar survey, a magnetometer survey, excavation of test pits, and installation of three water table monitoring wells. The magnetometer survey was conducted to establish the landfill boundaries and to detect subsurface anomalies. Test pit locations were established on the basis of these findings. Monitoring wells were installed to observe groundwater gradients and to provide samples to evaluate groundwater quality. A supplemental SI was also conducted at LF-023. This included the installation of seven additional monitoring wells and sampling of private wells along the western boundary of the base. Data from the SI indicated the presence of vinyl chloride and aromatic organic chemicals in groundwater east and southeast of the landfill. Dichlorobenzene was detected in samples of waste and soil collected from test pits. No site contaminants were detected in groundwater from the private wells.

Because SI results indicated the presence of contaminants, an RI was conducted at LF-023 in the fall of 1988, with supplemental RI sampling conducted during the fall of 1989. RI activities included a topographic survey, geophysical surveys, and sampling of groundwater, surface soil, sediment, and surface water. Contaminants were detected in all media sampled. In the fall of 1991, to further define the extent of contamination attributable to LF-023, additional downgradient groundwater, surface water, and sediment samples were collected.

In the fall of 1992, a supplemental investigation was conducted to fill in the remaining data gaps. The supplemental data confirmed the presence of an off-base source for fuel-related organics detected at MW-23-008 during the RI.

In 1992, a Feasibility Study (FS) was conducted in order to select a remedy to control the source of contamination (Operable Unit One) at LF-023. The selected remedy includes the installation of a multilayer, low-permeability cap meeting the requirements of 6 NYCRR Part 360. This remedy is expected to effectively eliminate further contamination of groundwater resources, will prevent human contact with waste materials, and will remove the waste from contact with environmental receptors. A Record of Decision for Operable Unit One was signed on September 30, 1992.

A second Feasibility Study was conducted in 1993, to address contamination (attributable to LF-023) currently present in groundwater, surface water, and sediments (Operable Unit Two). Several remedial alternatives were developed and screened, and a preferred alternative selected by Plattsburgh AFB, in conjunction with USEPA and NYSDEC. This second Operable Unit is the subject of this Record of Decision.

2.2 Federal Facilities Agreement History

Activities at LF-023 have been conducted as part of the Defense Environmental Restoration Program (DERP), which was established to clean up hazardous waste disposal and spill sites at Department of Defense facilities nationwide. The Installation Restoration Program (IRP) is the U.S. Air Force subcomponent of the DERP. The IRP operates under the scope of CERCLA, as amended by the 1986 Superfund Amendments and Reauthorization Act.

The IRP at Plattsburgh AFB has included (1) a Preliminary Assessment to evaluate which sites are potentially contaminated, (2) SIs to confirm the presence or absence of contamination at identified sites, and (3) an ongoing RI program at sites confirmed to have contamination. On November 21, 1989, Plattsburgh AFB was included on the National Priorities List (NPL) of hazardous waste sites. It will be remediated according to the Federal Facilities Agreement entered into among the U.S. Air Force, USEPA, and NYSDEC on July 10, 1991.

3.0 COMMUNITY PARTICIPATION

Plattsburgh AFB has kept the community and other interested parties apprised of activities at LF-023 through informational meetings, fact sheets, press releases, and public meetings. On August 1, 1989, Plattsburgh AFB held its first Technical Review Committee (TRC) meeting to involve residents of Clinton County and state and federal regulatory agencies in decisions concerning IRP environmental response activities. The TRC currently meets quarterly to discuss plans and results of the RI/FS activities. In December 1990, Plattsburgh AFB released a community relations plan outlining a program to address community concerns and to keep citizens informed about and involved in activities during remedial activities.

The Plattsburgh AFB LF-023 Administrative Record has been available for public review at Plattsburgh AFB in Plattsburgh, New York, since October 20, 1990, and developments related to it have been advertised several times during the RI/FS process. Plattsburgh AFB published a notice and brief analysis of the Proposed Plan in the Press-Republican on August 27, 1993 and made the Proposed Plan available to the public at the Plattsburgh public library on the same date.

On September 7, 1993, Plattsburgh AFB held a public informational meeting to discuss the results of the FS and the preferred alternative, to present the Proposed Plan, and to answer questions from the public. On August 27, 1993, Plattsburgh AFB opened a 30-day public comment period to accept public comment on the alternative presented in the Proposed Plan and on any other documents previously released to the public. The written comments received during the public comment period and Plattsburgh AFB's response to comments are included in the attached Responsiveness Summary (See Section 14.0 of this document).

4.0 SCOPE AND ROLE OF OPERABLE UNIT

As mentioned in Section 2.1, the work elements of remedial action at LF-023 have been divided into two manageable components called "Operable Units (OUs)". These are as follows:

- OU One: Contaminant Source
- OU Two: Contaminated Groundwater, Surface water, and Sediments

In conjunction with USEPA and NYSDEC, and with public input, Plattsburgh AFB has already selected a remedy for OU One. This was done to meet the following remedial action objectives:

- minimize potential future human health and current and future ecological risks associated with exposure to chemicals in surface soil.
- minimize potential human health risks associated with exposure to groundwater by a hypothetical resident living downgradient of LF-023 sometime in the future.
- minimize potential human health risks associated with exposure to fugitive dust emissions by a hypothetical resident living in the vicinity of LF-023.
- minimize infiltration of precipitation to waste materials.
- minimize the potential for contaminant migration from waste material.
- minimize erosion of cover soil.

These objectives will be met by the selected remedy, which includes a multi-layer, low-permeability cap meeting the requirements of 6 NYCRR Part 360. The cap was completed in April 1994.

This Record of Decision addresses OU Two, for which the following remedial action objectives (specific to the groundwater medium) have been established:

- Prevent ingestion of water having carcinogens in excess of groundwater Applicable or Relevant and Appropriate Requirements (ARARs) and a total cancer risk of greater than 1×10^{-4} .
- Prevent ingestion of water having noncarcinogens in excess of groundwater ARARs or having a total Hazard Index greater than one.

Control of the source of contamination has been provided under the remedy for OU One. With the implementation of this remedy, continued degradation of groundwater should be prevented, and natural attenuation should occur. The remedial plan for OU Two focuses on the contamination that has already impacted groundwater as a result of LF-023. No remedial action objectives were developed for cleanup of surface water and sediments in OU Two because, based

upon calculations performed using data collected in the RI and supplemental investigations, these media appear to pose no unacceptable risk to human receptors or the environment.

5.0 SUMMARY OF SITE CHARACTERISTICS

As described previously, from 1987 to 1992 several investigations were undertaken at LF-023, including a two-phased Site Inspection (SI), a two-phased Remedial Investigation (RI), and a Supplemental Investigation. Collectively, the objectives of these studies were to: (1) determine the nature and extent of contamination attributable to LF-023; (2) determine and describe potential migration pathways for contaminants; and (3) quantify risks posed to human health and the environment. During these investigations, the site was physically and chemically characterized in order to accomplish these objectives. The site conceptual model is given as Figure 5-1.

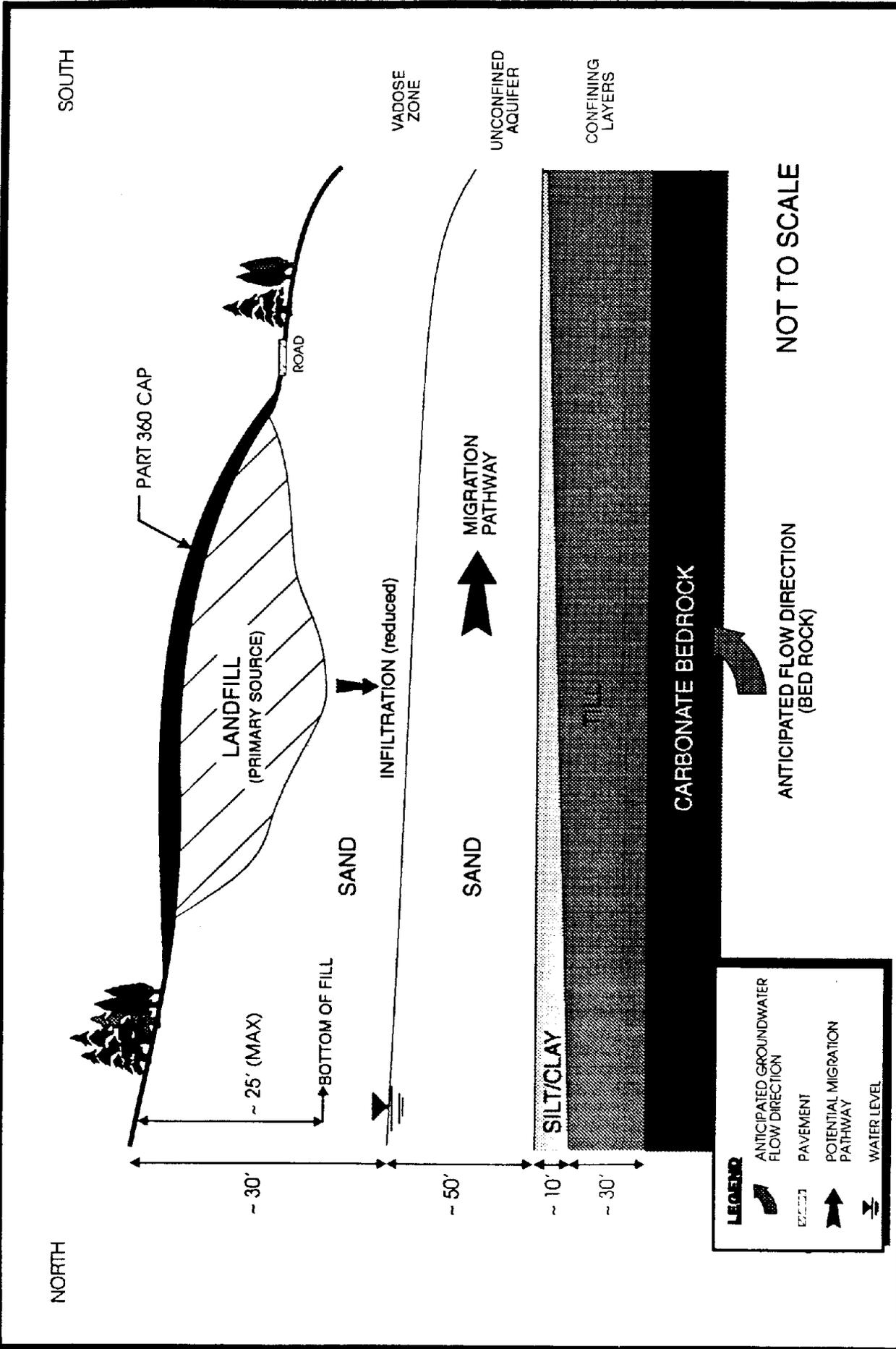
The areal extent of the main portion of the landfill was delineated by a magnetometer survey conducted during the SI. Two satellite sections of the landfill were defined by visual observation and by the results of a ground-penetrating radar survey. The areal extent of fill is indicated on Figure 5-2. Information from test pits within the landfill and from aerial photographs taken while the landfill was still active indicate that solid wastes were disposed of in trenches that varied in depth and length, and no consistent trenching pattern was observed. The maximum depth of the trenches observed during excavation of test pits was 13 feet. Information obtained from the Preliminary Assessment, however, indicated that wastes may have been buried as deep as 25 feet below ground surface (bgs) in some areas of the landfill. This information has been supported by interviews with Plattsburgh AFB employees. It is estimated that a few feet of undisturbed unsaturated sands separate the bottom of fill from the top of the water table. Plattsburgh AFB employees present at the time of landfill operation report that operational trenches were never deep enough to expose groundwater-saturated soil.

Four hydrogeologic units underlie the LF-023 area. These include, from the top down, an unsaturated zone, an unconfined sand aquifer, a silty-clay and till confining unit, and a confined bedrock aquifer. The groundwater table is located about 30 feet below ground surface and the saturated thickness ranges from 40 to 50 feet. Local groundwater flow is to the southeast, toward a system of wetlands and streams located approximately 1,500 feet south and southeast of the site. Vertical gradients in the vicinity of the site are consistently upward.

Surface soil, subsurface soil, groundwater, sediment, surface water, and waste samples were collected for chemical analysis to evaluate the nature and extent of contamination at the site. Contaminants detected in surface soils were predominantly polycyclic aromatic hydrocarbons (PAHs) (i.e. pyrene, fluorene), which are common landfill contaminants. One polychlorinated biphenyl (PCB), Aroclor 1254, and one metal (silver) were also detected.

Test pits were excavated during the SI to evaluate the nature of contamination in subsurface soil and buried waste. Material uncovered during test pitting indicates that the type of wastes disposed of at this site ranged from bagged household trash to construction debris and car parts. Metals were detected in all samples. No organic contaminants were identified in the subsurface soil. One waste sample obtained at the site contained 1,2-dichlorobenzene.

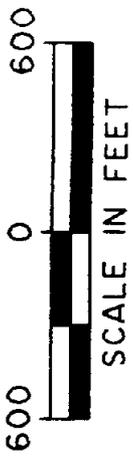
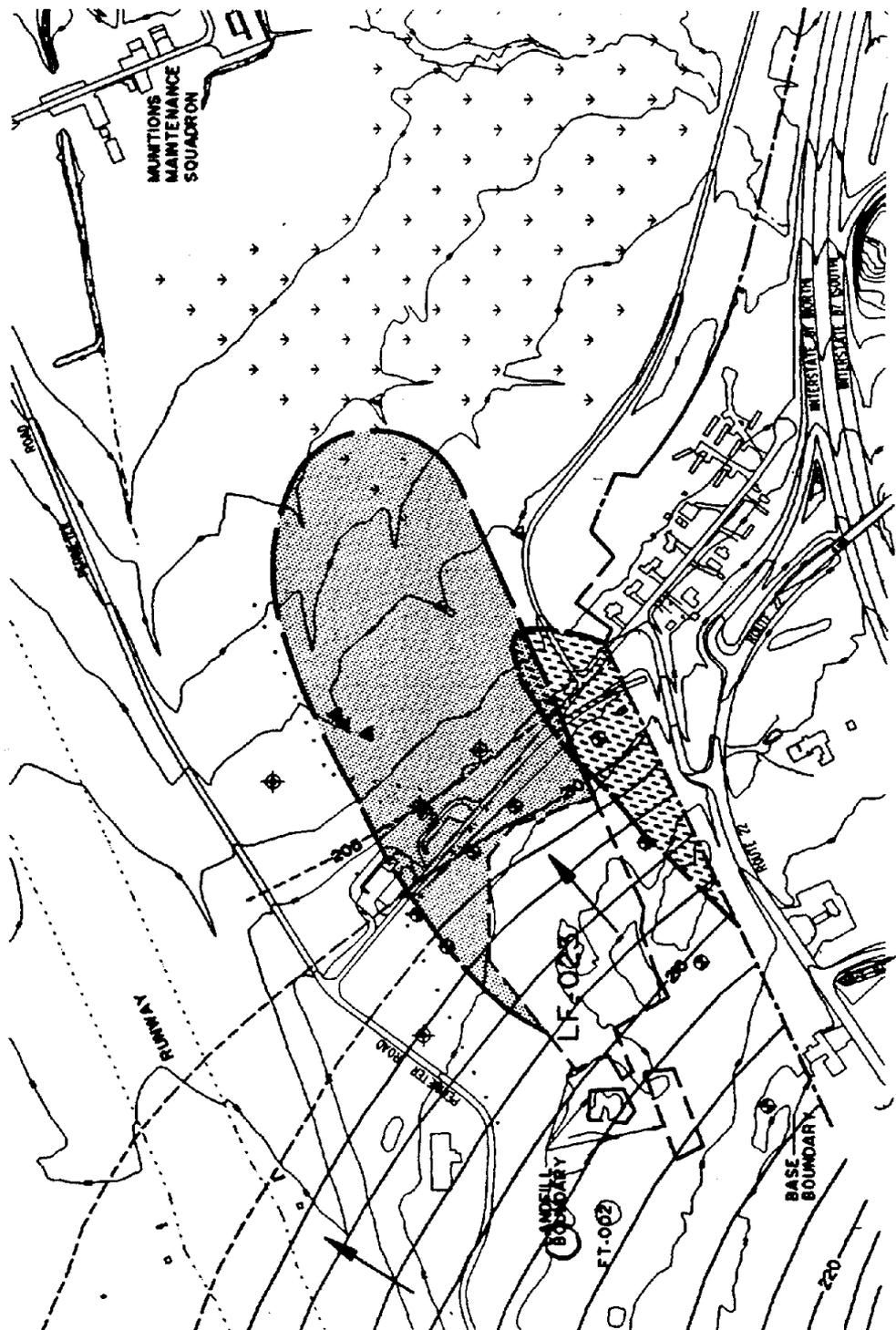
Four (4) surface water and 6 sediment samples have been taken downgradient (downstream) from LF-023 since 1988, each at a separate location. Four (4) of the 6 sediment sample locations were co-located with surface water sample locations. Ten (10) metals were





LEGEND

- ◆ CONE PENETROMETER LOCATION
- ▲ SURFACE WATER/SEDIMENT SAMPLE LOCATION (ABB, 1988 AND 1991)
- ▲ SEDIMENT SAMPLE LOCATION (URS, 1992)
- ⊕ MONITORING WELL LOCATION (E.C. JORDAN, 1987-1988)
- WATER TABLE SURFACE CONTOUR JAN. 1989 (FT.-002; DRAFT R1)
- GROUNDWATER FLOW DIRECTION
- [Hatched Box] INTRUDING PLUME OFFBASE SOURCE
- [Stippled Box] APPROX. CONTAMINANT PLUME (BASED ON OBSERVED AND MODELLED CONCENTRATIONS)



GROUNDWATER FLOW AND CONTAMINANT PLUMES

FIGURE 5-2

detected among the surface water samples. The maximum detected concentrations of these chemicals are listed in Table 6-1. Three (3) of the metals (calcium, magnesium, and sodium) were detected at levels within the range of those same metals found in sidegradient groundwater samples.

Five (5) metals (aluminum, arsenic, iron, manganese, and zinc) were detected in surface water at levels exceeding their range of concentrations in all groundwater samples. Two (2) metals (barium and lead), absent in all groundwater samples, were detected in the surface water samples. Organic compounds were not detected in any surface water samples. Nineteen (19) metals and one organic compound (xylenes) were detected in the sediment samples. Mercury was detected in one of the six sediment samples at a concentration of 22 ppm. PAFB will take additional sediment samples to confirm the presence of mercury at this location.

Thirty-five (35) Target Compound List (TCL) analytes, including 18 volatiles, 6 semivolatiles, and 11 metals, were detected among the four rounds of groundwater samples collected at LF-023. The maximum detected concentration of these chemicals are listed in Table 6-1. The greatest number and highest concentrations of analytes were consistently observed in groundwater from monitoring wells MW-23-003 and MW-23-011. These wells are located immediately downgradient from LF-023. The plume of groundwater contamination currently emanating from LF-023 appears to be proceeding predominantly southeastward, and, as indicated by the pattern of contamination observed in the well network, is limited to the unconfined aquifer. A second plume (of fuel-related chemical) appears to be entering the base near LF-023 from the west, as indicated by the results of the Supplemental Investigation. These two groundwater plumes are shown on Figure 5-2. Within the unconfined aquifer, contaminant concentrations tend to decrease with depth.

6.0 SUMMARY OF SITE RISKS

A baseline risk assessment (RA) was conducted as part of the RI to evaluate whether site contaminants pose an unacceptable risk to public health or the environment.

6.1 Contaminants of Concern

This Record of Decision addresses groundwater, surface water, and sediment impacted by LF-023. Contamination associated with surface soil and subsurface soils/waste material is being addressed under OU One (Source Control). All chemicals detected in groundwater that were considered site contaminants in the RI were selected as contaminants of potential concern for use in the risk assessment. All chemicals detected in surface water and sediment, regardless of source, were selected as contaminants of concern for these media. These analytes are listed by medium in Table 6-1. Only validated data were utilized in the calculations for the RA.

6.2 Exposure Scenarios

Exposure scenarios were developed for human exposure to groundwater, surface water, and sediment. Groundwater is not currently used as a drinking water source downgradient of the site. However, the following potential future groundwater exposure scenarios were developed and evaluated:

- Ingestion of Contaminated Groundwater by a Future Resident
- Direct Contact with Contaminated Groundwater by a Future Resident
- Inhalation of Volatile Compounds from Groundwater While Showering by a Future Resident

These pathways would be viable only if the base were closed and the site were developed for residential use, with groundwater obtained from the plume as the primary water supply source.

In the RI, two present-use and two future-use scenarios were evaluated for exposure to surface water. These included:

- Ingestion of Contaminated Surface Water by a Child Trespasser
- Direct Contact with Contaminated Surface Water by a Child Trespasser
- Ingestion of Contaminated Surface Water by a Future Child Resident
- Direct Contact with Contaminated Surface Water by a Future Child Resident

Potential risks from surface water and sediment were reevaluated following the additional sampling and analysis conducted during the Supplemental Investigation. At that time, risks posed by surface water were recalculated and the following sediment exposure pathways were added:

- Ingestion of Contaminated Sediments by a Child Trespasser
- Direct Contract with Contaminated Sediments by a Child Trespasser
- Ingestion of Contaminated Sediments by a Future Child Resident
- Direct Contact with Contaminated Sediment by a Future Child Resident

6.3 Risk to Human Populations

Based upon the results of the RA, and upon additional calculations performed subsequent to the Supplemental Investigation (which appear in the Groundwater FS; URS, 1993b), no unacceptable threat to public health is currently posed by surface water or sediments in the vicinity of LF-023. However, a significant potential threat to human health would exist for future users of groundwater contaminated by LF-023.

No unacceptable carcinogenic or chronic risk based upon USEPA guidelines is evident given the present use of the site. However, analysis of risk given a future residential scenario yields hazard indices of 1.1 and 7.0 from ingestion for adult and child receptors, respectively. A hazard index over one is a potential cause for concern for chronic health effects. Cancer risks given the future-use scenario are 1×10^{-3} for both the adult and child receptor. This indicates that 1,000 additional persons out of one million are at risk of developing cancer if no further action is taken and the site is developed in the future for residential use that obtains drinking water from the plume. This risk exceeds the acceptable range (1×10^{-6} to 1×10^{-4}) established for remedial action by the National Contingency Plan (USEPA, 1990a). Potential carcinogenic and chronic risks in exceedance of recommended risk ranges and target values for LF-023 result entirely from ingestion of groundwater from the plume in the future-use scenario. Carcinogenic chemicals that individually contribute a cancer risk of greater than 10^{-4} include vinyl chloride and arsenic. Noncarcinogenic chemicals that individually contribute a noncancer risk of greater than 1 include arsenic, chromium, and nickel.

A summary of calculated carcinogenic and chronic risks for each exposure pathway is presented in Table 6-2.

6.4 Summary of Environmental Risks

An ecological exposure assessment, hazard identification, and risk assessment were undertaken to evaluate the potential for exposure of terrestrial organisms and aquatic invertebrates to chemicals from LF-023, and to quantify any adverse effects. Conclusions of the study are that surface waters have no adverse effects upon terrestrial organisms but may have both acute and chronic adverse effects upon aquatic invertebrates. Because these samples were collected in a relatively small area of the wetland, in the only area directly impacted by contaminants, it is assumed that population effects over the wetland as a whole are minimal.

6.5 Remediation Goals

In accordance with the NCP and USEPA guidance, remediation goals (cleanup levels) for groundwater at LF-023 were developed primarily from New York State and federal standards, criteria, and guidance for groundwater, and from the results of the human health risk assessment. These goals were developed for individual carcinogenic and non-carcinogenic contaminants. The remediation goals serve as a benchmark for determination of the adequacy of technologies in achieving overall protection of human health and for comparison of the permanence of various potential remedies. Cleanup of the groundwater to meet remediation goals will eliminate

unacceptable chronic risk associated with the ingestion of groundwater and will reduce excess lifetime cancer risk to within the acceptable range (1×10^{-6} to 1×10^{-4}). Remediation goals are listed in Table 6-3.

TABLE 6-1
CONTAMINANTS OF CONCERN
UTILIZED IN HEALTH RISK ASSESSMENT
LF-023 (GROUNDWATER, SURFACE WATER, & SEDIMENT)

GROUNDWATER			
ANALYTE	RANGE OF CONCENTRATIONS (ppb)	NO. OF SAMPLES*	NO. OF DETECTIONS*
Chloroform	ND - 0.4	26	5
Vinyl Chloride	ND - 31	26	11
Chlorobenzene	ND - 10	26	5
Benzene	ND - 14	26	9
Ethylbenzene	ND - 54	26	8
Xylene	ND - 72	26	9
Naphthalene	ND - 11	15	2
2-Butanone	ND - 70	26	5
Chloroethane	ND - 0.7	8	1
1,1-Dichloroethane	ND - 1	26	2
1,2-Dichloroethane	ND - 1	26	2
1,1-Dichloroethene	ND - 0.5	26	1
Bis(2-ethylhexyl)phthalate	ND - 14	15	4
Arsenic	ND - 24	13	3
Nickel	ND - 46	13	2
Chromium	ND - 80	13	3
Zinc	ND - 200	13	4

ppb = parts per billion
 * = only downgradient wells included
 ND = Not detected

TABLE 6-1 (Cont'd)

SURFACE WATER				SEDIMENT			
ANALYTE	RANGE OF CONCENTRATIONS (ppb)	NO. OF DETECTIONS	NO. OF SAMPLES	ANALYTE	RANGE OF CONCENTRATIONS (ppm)	NO. OF DETECTIONS	NO. OF SAMPLES
Aluminum	ND - 2180	1	4	Xylenes	ND - 0.072	1	6
Arsenic	ND - 376	1	4	Aluminum	800 - 7,030	6	6
Barium	ND - 502	1	4	Arsenic	ND - 55	4	6
Calcium	62,300 - 69,300	4	4	Barium	ND - 151	2	6
Iron	ND - 165	3	4	Cadmium	ND - 27	2	6
Lead	ND - 9.3	1	4	Calcium	1,580 - 45,300	6	6
Magnesium	2,100 - 23,900	4	4	Chromium	5.6 - 38.4	6	6
Manganese	187 - 2,620	4	4	Cobalt	ND - 58	2	6
Sodium	21,100 - 53,300	4	4	Copper	ND - 113,000	2	6
Zinc	ND - 407	1	4	Iron	12,700 - 279,000	6	6
				Lead	1.2 - 1,290	6	6
				Magnesium	ND - 9,260	2	6
				Manganese	205 - 7,730	6	6
				Mercury	ND - 22	1	6
				Nickel	ND - 50	2	6
				Selenium	ND - 2.1	1	6
				Sodium	ND - 513	1	6
				Thallium	ND - 0.6	1	6
				Vanadium	ND - 52	1	6
				Zinc	10.5 - 100	6	6

ppb - parts per billion
 ppm - parts per million

**TABLE 6-2
SUMMARY OF HUMAN HEALTH RISKS**

PATHWAY-SPECIFIC RISK

SCENARIO	PATHWAY	RECEPTOR	CANCER RISK	HAZARD QUOTIENT
PRESENT USE	Ingestion of Surface Water	Child Trespasser	2×10^{-6}	0.01
	Direct Contact with Surface Water	Child Trespasser	4×10^{-8}	0.0002
	Ingestion of Sediment	Child Trespasser	5×10^{-7}	0.1
	Direct Contract with Sediment	Child Trespasser	NV	0.002
FUTURE USE	Ingestion of Groundwater	Adult Resident	1×10^{-3}	0.02
	Direct Contact with Groundwater	Adult Resident	2×10^{-6}	1.0
	Inhalation of Volatiles While Showering	Adult Resident	4×10^{-5}	0.06
	Ingestion of Groundwater	Child Resident	1×10^{-3}	6.0
	Direct Contact With Groundwater	Child Resident	7×10^{-7}	0.03
	Inhalation of Volatiles While Showering	Child Resident	5×10^{-5}	0.3
	Ingestion of Surface Water	Child Resident	9×10^{-6}	0.05
	Direct Contact with Surface Water	Child Resident	2×10^{-7}	0.001
	Ingestion of Sediment	Child Resident	3×10^{-6}	0.6
	Direct Contact with Sediment	Child Resident	NV	0.009

NV = No value calculated since USEPA-approved dermal absorption factors were unavailable for contaminants of concern.

TOTAL RISK BY RECEPTOR/MEDIA

RECEPTOR	CANCER RISK	HAZARD QUOTIENT

	Surface Water/Sediment	Groundwater	Total	Surface Water/Sediment	Groundwater	Total
Child Trespasser (present)	2×10^{-6}	---	2×10^{-6}	0.1	---	0.1
Adult Resident (future)	---	1×10^{-3}	1×10^{-3}	---	1.1	1.1
Child Resident (future)	1×10^{-5}	1×10^{-3}	1×10^{-3}	0.7	6.3	7.0

**TABLE 6-3
REMEDIATION GOALS**

Compound	Goal (mg/L)	Basis
Vinyl Chloride	0.002	A
Benzene	0.0007	B
1,1-Dichloroethene	0.005	C
Chlorobenzene	0.005	A
Ethylbenzene	0.005	A
Xylene	0.005	A
MethylEthylKetone (2-Butanone)	0.05	D
Naphthalene	0.01	A
Bis(2-ethyl hexyl)phthalate	0.006	F
Arsenic	ND	E
Nickel	ND	E
Chromium	ND	E

- A - New York State DEC Water Quality Standards and guidance Values, TOGS 1.1.1, November, 1991
- B - 6NYCRR Part 703.5, September 1, 1991
- C - Chapter I, New York State Sanitary Code, Subpart 5-1, Principle Organic Contaminant
- D - Chapter I, New York State Sanitary Code, Subpart 5-1, Unspecified Organic Contaminant
- E - Health Risk Assessment
- F - Federal MCL
- ND - Non-detect

7.0 DESCRIPTION OF ALTERNATIVES

The alternatives analyzed for OU Two are presented below. These are numbered to correspond with the numbers in the Feasibility Study (FS) Report. The alternatives are:

- Alternative 1: No Action
- Alternative 2: Institutional Action
- Alternative 3: Slurry Wall
- Alternative 4: Downgradient Extraction Wells, Full Treatment, and Discharge to Surface Water
- Alternative 5: Downgradient Extraction Wells, In-situ Treatment, Reinjection
- Alternative 6: Downgradient Extraction Wells, Full Treatment, Reinjection

These alternative have a number of elements in common. Each includes a cap, to be provided by the implementation of OU One, which will reduce infiltration and contaminant migration to groundwater. Each alternative also includes groundwater monitoring to assess the long-term impact of the landfill on groundwater quality under capped conditions. All alternatives with the exception of Alternative 1 incorporate institutional action to prevent all potable usage of contaminated groundwater. Alternatives that incorporate groundwater treatment (Alternatives 3 through 6) include treatment processes that address the full range of contaminants exceeding health-based goals in groundwater. [Alternative 2 prevents exposure to groundwater by restricting its use.]

A description of all alternatives follows:

Alternative 1:
NO ACTION

Capital Cost: \$0
Annual O&M Costs: \$0
Present Worth: \$0
Months to Implement: 0

Alternative 1 is representative of capped conditions at the landfill, as described in the ROD for OU One. No groundwater remediation or any other action is proposed as part of the No Action alternative. Natural attenuation of landfill contaminants is expected to occur in the absence of remedial measures. The Superfund program requires that the No Action alternative be evaluated at every site to establish a baseline for comparison.

Alternative 2:
INSTITUTIONAL ACTION

Capital Cost: \$10,000
Annual O&M Cost: \$64,000
Present Worth: \$984,000
Months to Implement: 3

The purpose of Alternative 2 is to implement actions that will eliminate human exposure and health risk by restricting public access to groundwater rather than by cleaning up or containing contamination. Alternative 2 includes deed restrictions prohibiting the withdrawal of groundwater for all potable uses, both on site and downgradient of the landfill within the extent of the contaminant plume. Contaminant levels are expected to be reduced over time by the processes of natural attenuation. Alternative 2 also includes installation and monitoring of additional wells beyond those required for Operable Unit One. Action levels will be established for these wells that will be used to determine if further action is required.

Alternative 3:
SLURRY WALL

Capital Cost: \$7,779,000
Annual O&M Cost: \$438,000
Present Worth: \$11,914,055
Months to Implement: 24

Alternative 3 includes onsite extraction of groundwater within a slurry wall which fully encloses the site, full treatment of extracted water, and discharge of treated groundwater to nearby surface water. The purpose of extracting groundwater will be to control the water level within the area enclosed by the slurry wall, and to minimize leakage through the wall. [The steady-state pumping rate is estimated to be approximately 15 gpm]. The slurry wall would extend to a depth of approximately 80 to 100 feet to key into the confining unit beneath the site. It would encompass the entire landfill, having an estimated length of 3,200 feet. Full treatment of the extracted groundwater is expected to consist of air stripping, carbon adsorption and metals precipitation. Treated groundwater, which would meet surface water discharge criteria, would be discharged to the nearest storm sewer, 2,400 feet away, by gravity flow. The storm sewer empties into a tributary of the Salmon River, located south of the landfill.

Alternative 4:
DOWNGRAIDENT EXTRACTION WELLS, FULL TREATMENT, AND
DISCHARGE TO SURFACE WATER

Capital Cost: \$2,211,500
Annual O&M Cost: \$813,200
Present Worth: \$8,879,876
Months to Implement: 12

Alternative 4 includes downgradient extraction of groundwater, full onsite treatment of the water, and discharge of the treated water to surface water. It is anticipated that the steady-state withdrawal rate would be 60 gpm. This groundwater extraction rate is sufficient to prevent offsite migration of contaminants, and to capture the plume downgradient of the site. Full treatment of the extracted groundwater is expected to consist of air stripping, carbon adsorption, and metals precipitation. Treated water, which would meet surface water discharge criteria, would be discharged to the nearest storm sewer, 2,400 feet away, by gravity flow. The storm sewer empties into a tributary of the Salmon River, located south of the landfill.

Alternative 5:
DOWNGRAIENT EXTRACTION WELLS, IN-SITU TREATMENT, AND REINJECTION

Capital Cost: \$2,488,900
Annual O&M Cost: \$772,500
Present Worth: \$9,773,575
Months to Implement: 12

Alternative 5 includes downgradient extraction of groundwater, in-situ treatment (bioremediation), aboveground treatment, and reinjection of treated water upgradient of the landfill. It is anticipated that the steady-state withdrawal rate would be 60 gpm. This extraction rate is sufficient to prevent offsite migration of contaminants, and to capture the plume downgradient of the site. It is estimated that approximately 2 gpm of treated water (the amount that infiltrates through the cap) would have to be discharged to surface water in order not to create a pressure mound upgradient of the landfill. The 2 gpm of treated water, expected to meet surface water discharge criteria, would be discharged to the nearest storm sewer, 2,400 feet away, by gravity flow. The storm sewer empties into a tributary of the Salmon River, located south of the landfill. In-situ treatment (bioremediation) would be effective in removing organic contaminants. Aboveground treatment would, however, be required for metals removal. Treatment for both organics and metals is required to meet groundwater discharge criteria. Treated water would be reinjected upgradient of the landfill beyond the limits of the cap. Reinjection would occur through a series of recharge wells.

Alternative 6:
DOWNGRAIENT EXTRACTION WELLS, FULL TREATMENT, REINJECTION

Capital Cost: \$2,333,900
Annual O&M Costs: \$824,000
Present Worth: \$10,106,106
Months to Implement: 12

Alternative 6 includes downgradient extraction of groundwater, full aboveground treatment of the water, and reinjection of the treated water upgradient of the landfill. It is anticipated that the steady-state withdrawal rate would be 60 gpm. This extraction rate is sufficient to prevent offsite migration of contaminants, and to capture the plume downgradient of the site. Full treatment of the extracted groundwater is expected to consist of air stripping, carbon adsorption, and metals precipitation. Reinjection of the treated water would occur upgradient of the landfill, beyond the limits of the cap. Reinjection would occur through a series of recharge wells. Approximately 2 gpm of water would have to be discharged to surface water in order not to create a pressure mound upgradient of the landfill.

8.0 SUMMARY OF COMPARATIVE ANALYSIS OF ALTERNATIVES

The preferred alternative for the remediation of groundwater contamination at the LF-023 site is Alternative 2 - Institutional Action. Based upon current information, this alternative appears to meet best the nine criteria that USEPA uses to evaluate alternatives. This section profiles the performance of the preferred alternative in relation to the nine criteria, noting how it compares to the other alternatives under consideration.

8.1 Threshold Criteria

- **Overall Protection of Human Health and the Environment**

If Alternative 2 through 6, which prohibit groundwater withdrawal for potable use, were implemented, the potential risk to human health posed by contaminants at the site through groundwater ingestion would be eliminated. Alternatives 4 through 6 also reduce the risks to human health associated with onsite and downgradient groundwater to acceptable levels over the long term by treatment. The potential risks to human health from ingestion of groundwater downgradient of the landfill would be eliminated slowly, over an extended period by Alternatives 2 and 3, as natural attenuation processes gradually result in groundwater cleanup goals being met. Alternative 1 does not provide protection to human health or the environment beyond what source remediation will accomplish.

- **Compliance with Applicable or Relevant and Appropriate Requirements**

Site-specific ARAR concentrations are currently being exceeded in the upper aquifer at the site. Each of the alternatives includes provisions to meet these ARARs, with the exception of Alternative 1 (No Action). Alternatives 4, 5, and 6 propose to actively remediate both onsite and downgradient groundwater to comply with ARARs.

Action-specific ARARs, which include discharge criteria (for surface water and/or groundwater injection) and treatment standards (for air quality) will be met under all alternatives. Alternatives 3 through 6 include treatment of extracted groundwater, and discharge to either surface water or groundwater. The treatment processes proposed for all alternatives should meet the ARARs, although some uncertainty exists regarding Alternative 5, which includes bioremediation, since treatability tests have not been performed and the capacity of this technology to meet discharge criteria is uncertain.

Location-specific ARARs include those pertaining to remediation near the wetland area downgradient of the site (see Figure 9-1). Alternatives 1 and 2 propose no remediation that impacts the wetland. Alternatives 3, 4, 5, and 6 propose the operation of extraction wells that could negatively impact the wetland. Groundwater levels in this area would be lowered as groundwater was withdrawn, potentially destroying the viability of the wetland. The wetland, or some part of it, may have to be relocated if these alternatives were implemented.

8.2 Primary Balancing Criteria

- **Long-Term Effectiveness and Permanence**

The long-term effectiveness and permanence of the alternatives is measurable in how well they meet the remedial action objectives (RAOs) developed for the site. The RAOs are as follows:

- Prevent ingestion of water having carcinogens in excess of ARARs and a total excess cancer risk of greater than 1×10^{-4} .
- Prevent ingestion of water having non-carcinogens in excess of ARARs or a total hazard index greater than one.

Alternative 1 (No Action) does not meet the RAOs developed for the site. Alternative 2 - (Institutional Action) does meet the RAOs for the site, since the deed restrictions that are part of this alternative would prohibit groundwater withdrawal for use as a potable supply source. Neither of these alternatives is a permanent remedy, and a review five years after implementation (and at five year intervals thereafter) would be needed to assess groundwater quality.

Based on current data, it appears that under Alternative 2, groundwater contaminants would be attenuated to meet cleanup goals in several hundred years. However, a better estimate of the period required could be made after the cap is installed and monitoring data are collected.

The remaining alternatives, which include treatment of contaminated groundwater, are effective and permanent remedies. Alternative 3, which includes treatment of only onsite groundwater, is less effective than Alternatives 4, 5, and 6 which include treatment of the entire contaminant plume.

The time required to reach cleanup goals under Alternative 3 would be similar to the time requirement under Alternatives 1 and 2, namely, several hundred years. The time required to achieve cleanup goals under Alternatives 4, 5, and 6 is estimated to be on the order of 100 years, indicating that active restoration is not likely to contribute to reducing cleanup to a reasonable time frame.

Operation of the wells and treatment facilities for Alternatives 3 through 6 would continue for a relatively long period. Bioremediation may shorten the required operation time of Alternative 5 compared to the other treatment alternatives. The actual impact cannot, however, be estimated without a treatability study.

- **Reduction of Toxicity, Mobility and Volume**

Alternatives 1 and 2 would not reduce the mobility or volume of contaminants present in the groundwater, except over an extended period, as concentrations become lower through natural processes of attenuation.

Alternative 3, which includes a slurry wall, would most effectively reduce the mobility of contaminants in groundwater from the site. Alternatives 4 through 6 effectively reduce the mobility of contaminants both on site and downgradient of the site by extraction of downgradient groundwater. The toxicity of contaminants in groundwater will be reduced to acceptable levels following treatment of both onsite and downgradient groundwater. Alternatives 4 through 6 would be more effective in reducing the volume of toxic groundwater, since the entire plume would be treated.

- **Short-term Effectiveness**

Since no construction is required to implement Alternatives 1 and 2, no associated short-term impacts would occur to the community, workers, or the environment. Short-term impacts for Alternatives 4, 5 and 6 are not expected to be significant. The alternative posing the greatest short-term impact is Alternative 3, which includes construction of a slurry wall and probable excavation of wastes. During the anticipated two-phased construction period, short-term impacts to workers, the community, and the environment would exist through many different pathways: surface water runoff, erosion of exposed wastes, fugitive dust, and vapors from exposed wastes. These impacts would have to be mitigated through extensive controls such as: appropriate health and safety measures for workers in contact with waste materials; precautions against fugitive dust generation and vapors; and the installation of temporary controls against runoff or erosion of contaminated soils. Once the exposed wastes are covered, however, the short-term impacts to the community, workers, and the environment posed by construction will no longer be present.

- **Implementability**

Alternatives 1 and 2 could be implemented with little difficulty. These alternatives would not impede the implementation of future groundwater remedial actions. Alternative 3 is expected to be the most difficult to implement since it includes construction of an extensive slurry wall around the landfill perimeter. The time required for construction of the slurry wall is expected to make implementation of this alternative a relatively long process compared to the other alternatives.

Construction of extraction wells proposed in the remaining alternatives is not expected to be difficult, although onsite wells in Alternative 3 may be located in filled areas, requiring special health and safety controls. Injection wells proposed upgradient of the site should similarly not be difficult to construct. Construction of the treatment facilities and gravity flow systems would be similar for all alternatives.

The technologies proposed for Alternatives 3, 4, and 6 are generally proven and reliable, with the possible exception of the injection wells proposed for Alternative 6. [This technology is also included in Alternative 5.] Injection wells can be subject to operational problems, including air locks and the need for frequent maintenance and well rehabilitation. The reliability of the bioremediation proposed as part of Alternative 5 is uncertain, as this is not a proven method of treating groundwater contaminated by a landfill. Treatability testing is needed to more adequately assess the reliability of this technology. The availability of technical specialists needed to implement this technology is also somewhat limited.

- **Cost**

Costs are presented as capital costs, annual O&M costs, and the present-worth cost of each alternative.

Since no groundwater remedial actions are included in Alternative 1, no costs are associated with this alternative. Long term monitoring associated with Alternative 2 would result in a nominal capital cost. Alternative 3, which includes a slurry wall, has the highest capital cost. The capital costs of Alternatives 4, 5 and 6 are comparable.

The lowest annual O&M cost is associated with Alternative 2, which does not incorporate groundwater treatment. Alternative 3 has the second lowest annual O&M cost since the required groundwater treatment system has the smallest capacity. O&M costs for Alternatives 4, 5 and 6 are comparable. O&M costs have been estimated based on a 30-year treatment and monitoring program.

The present-worth cost of all alternatives (based on 30 year operation period) involving treatment of groundwater (Alternatives 3 through 6) range from \$9,773,575 to \$11,914,055. In order of increasing cost they are as follows: Alternative 5 (\$9,713,575), Alternative 4 (\$9,879,976), Alternative 6 (\$10,106,106) and Alternative 3 (\$11,914,055). The present worth of Alternative 2 is \$984,000.

8.3 Modifying Criteria

- **State Acceptance**

NYSDEC has reviewed all project documents including the RI, RA, FS and Proposed Plan, and concur with the selected remedy.

- **Community Acceptance**

Plattsburgh AFB has kept the community and other interested parties apprised of activities at LF-023 through informational meetings, fact sheets, press releases, and public meetings. On August 27, 1993, Plattsburgh AFB opened a 30-day public comment period to accept public comment on the alternative presented in the Proposed Plan and on any other documents previously released to the public. The written comments received during the public comment period and Plattsburgh AFB's response to comments are included in the attached Responsiveness Summary (See Section 13.0 of this document).

9.0 THE SELECTED REMEDY

9.1 Description

Plattsburgh AFB in conjunction with USEPA, and with the concurrence of NYSDEC, have selected Alternative 2 - Institutional Action as the response action to be implemented for OU Two at LF-023. Human health will be protected by preventing human exposure to contaminated groundwater. This remedy satisfactorily addresses groundwater contamination at the site, since further degradation of groundwater resources will be prevented by landfill capping, and existing groundwater contamination will then be reduced by natural attenuation.

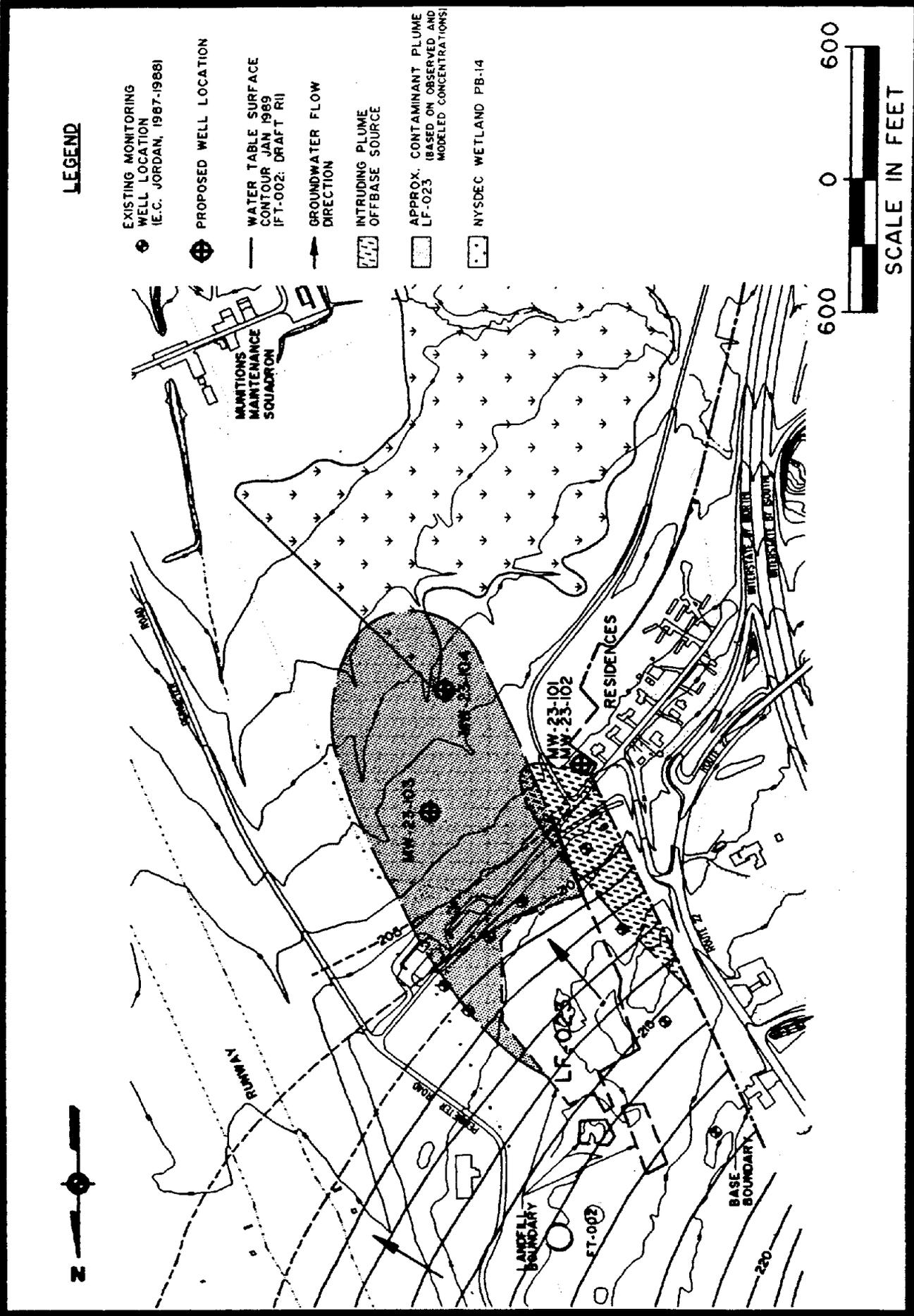
The primary preferred alternative (Alternative 2) includes the following elements:

- 1) Deed restrictions prohibiting withdrawal of groundwater for all potable uses in this area;
- 2) All elements of the source control remedy provided by Operable Unit One;
- 3) Installation of additional monitoring wells;
- 4) Environmental monitoring of groundwater; and
(See page D-2 for "Action Criteria")
- 5) Periodic (five-year intervals) site reviews to evaluate the effectiveness of the remedy.

9.2 Action Criteria and Focused Feasibility Studies

Groundwater has the potential to affect two different off base receptors; therefore, two sets of action criteria are needed. One set of action criteria has been established for the area sidegradient to LF-023. Contamination migrating toward the west from LF-023 has the potential to impact groundwater that is currently being used by an off base residential community for drinking water. Results from the proposed monitoring wells located sidegradient of LF-023 near the base boundary (see Figure 9-1) will be used to determine if contamination is migrating from the landfill toward these off base residents. Results from the sidegradient monitoring wells will be compared to groundwater ARARs. Quarterly samples will be obtained from the proposed wells and analyzed for the groundwater contaminants of concern identified in Table 6-1 plus MTBE. If any analysis indicates that any contaminant is at or above standards established in 10 NYCRR Part 5-1, 6 NYCRR Part 703.5, or by Federal Maximum Contaminant Levels then another sample must be obtained from the same well within two weeks of receipt of the initial analysis. PAFB will initiate action as indicated below if the results from two consecutive samples are at or above standards established in either 10 NYCRR Part 5-1, 6 NYCRR Part 703.5, or by Federal Maximum Contaminant Levels.

A second set of action criteria will be developed for the two proposed downgradient wells. Downgradient action criteria will be established by sampling each of these wells twice, as soon as feasible after their construction, for the groundwater contaminants of concern identified in Table 6-1. The highest levels of each contaminant in any of these samples will become the baseline levels for that contaminant in either well. The action levels for each contaminant will be established after



determining the baseline levels. PAFB will initiate action as indicated below if the results from two consecutive quarterly samples are at or above the action levels.

The effectiveness of Alternative 2 will be evaluated every five years using all data generated from the monitoring program. This evaluation will determine the effectiveness of Alternative 2 by comparing analytical results to cleanup goals. It is possible that progress toward cleanup goals will be unsatisfactory even though remedial action may not be required based on the action criteria. If so, further action will be required.

In the event that either action criteria or the five year site evaluation indicate further action is required, a focused feasibility study will be prepared. Since action, if required, will occur in the future it is likely that groundwater conditions will have changed, i.e. groundwater concentrations and the number of analytes detected will decrease. It is also possible that regulatory requirements will change and that technical advances will occur during the interim period. There are a number of technologies (e.g. passive treatment walls) that are in the developmental stages that may be feasible at the time the study is initiated. Therefore, the focused feasibility study will re-evaluate the alternatives discussed in this FS with respect to future site conditions and regulatory requirements, and will include an evaluation of state-of-the art technologies.

There are two sets of action criteria, i.e. sidegradient and downgradient. A focused feasibility study will be required if either set of criteria indicate action is required. Since the threat to human health is more imminent if sidegradient groundwater is impacted, an immediate measure may be required to protect the drinking water supply of nearby residences while other remedial actions are being considered. Therefore, a focused feasibility study that addresses sidegradient contamination will be prepared in two phases. The first phase will consider immediate measures (For example, provision of potable water to affected residences) to protect human health. The second phase will consider additional remedial measures, if required. Recent investigations have indicated that groundwater sidegradient to the landfill is being contaminated by an off base source. Therefore, a focused feasibility study that addresses sidegradient contamination will include an assessment of the source of this contamination (in the second phase). This assessment will be used to determine PAFB's contribution to sidegradient contamination and consequently the appropriate basis for further action.

Since the threat to human health is not imminent downgradient of LF-023, immediate measures and the two phased focused feasibility study approach used for sidegradient contamination will not be required. A focused feasibility study that addresses downgradient contamination will also consider the source of contamination. Sources other than LF-023, that could impact the Salmon River include site SS-013 (Munitions Maintenance Facility) site downgradient of LF-023, FT-002 (Fire Training Area) or an off base source upstream of the base.

Determination of the source of downgradient contamination will be based on a comparison of concentrations of contaminants in samples in the Salmon River near the base to concentrations in downgradient monitoring wells, surface water samples from on base drainage, and upstream samples in the Salmon River. The evaluation will be used to determine the landfill's contribution to the contamination detected, if any, and the appropriate action required.

10.0 STATUTORY DETERMINATIONS

The selected remedy is protective of human health and the environment, complies with federal and state action- and location-specific requirements that are legally applicable or relevant and appropriate to the remedial action, and is cost-effective.

This remedy employs permanent solutions to the maximum extent practicable. Because mitigation of this site's principal threats by treatment does not offer a significant advantage in the pace of remediation compared to the selected remedy, and because these threats are not imminent, a treatment option has not been included as a primary element of the remedy. This remedy therefore does not satisfy the statutory preference for treatment as a principal element of the remedy. Remediation, however, may be considered following further review of site conditions and receipt of additional information.

Because this remedy will result in hazardous substances remaining on site at levels above health-based criteria, a review will be conducted five years after commencement of remedial action to ensure that the remedy continues to provide adequate protection of human health.

11.0 DOCUMENTATION OF NO SIGNIFICANT CHANGES

The chosen remedial action for LF-023 (OU Two) is Alternative 2 - Institutional Action. This action does not differ from the preferred alternative presented in the Proposed Plan.

12.0 STATE ROLE

NYSDEC, on behalf of the State of New York, has reviewed the RI, RA, FS and the preferred alternative, both from the viewpoint of health and environmental risk, and from the viewpoint of compliance with ARARs. NYSDEC concurs with the selection of the preferred alternative. A copy of NYSDEC's declaration of concurrence may be found in Appendix A.

13.0 RESPONSIVENESS SUMMARY

A responsiveness summary is required by Superfund policy. It summarizes all comments and concerns received during the public comment period and during the public meeting, and provides Plattsburgh Air Force Base's responses to those comments and concerns. All comments summarized in this section have been considered in the final decision for selection of a remedial alternative for LF-023, OU Two. Comments are listed below.

Comment #1: Has the travel rate of contaminants within the plume been computed?

Response: Migration of plume contaminants, including rate of travel, is evaluated in Appendix A of the Feasibility Study. This evaluation was used to determine the extent of the plume.

Comment #2: Why isn't PAFB taking a more proactive role in cleaning up groundwater at LF-023?

Response: The remedy proposed for cleanup of groundwater at LF-023 is protective of both human health and the environment. The remedy includes monitoring wells located sidegradient of LF-023 that will be used to protect residents of Plattsburgh near the western boundary of the base that are currently using groundwater as a source of potable water. This protection is offered even though it is not expected that the contaminant plume from LF-023 will migrate toward these residents. Groundwater downgradient of LF-023 is not currently being used. The proposed remedy will include restrictions on use of groundwater in areas potentially affected by LF-023 to prevent human exposure to contaminants.

Remediation of LF-023 includes installation of a cap that will prevent infiltration through the landfill, eliminate the source of groundwater contamination, and prevent further degradation of groundwater. It is expected that groundwater will be cleaned up over time by natural processes. Monitoring wells will be installed downgradient of the landfill that will monitor the effectiveness of the cap and ensure that potential downgradient receptors are protected.

An evaluation of treatment options for cleanup of groundwater indicated that such options required significant time to achieve cleanup goals and offered no significant advantage over natural processes. This evaluation is presented in the Feasibility Study (Appendix A).

Comment #3: How will base closure affect remedial efforts?

Response: The exact mechanism for the implementation of remediation after base closure is unknown. However, the Air Force will maintain its responsibility for remediating the landfill, and will act to ensure that both human health and the environment are protected.

REFERENCES

ABB-Environmental Services, Inc., 1992a. "Installation Restoration Program (Remedial Investigation/Feasibility Study) at Plattsburgh Air Force Base, New York: Final LF-022/LF-023 Remedial Investigation Report"; ABB-Environmental Services, Inc., Portland, Maine February 1992.

ABB-Environmental Services, Inc., 1992b. "Installation Restoration (Remedial Investigation/Feasibility Study) at Plattsburgh Air Force Base, New York; Final LF-023 Source Control Feasibility Study Report"; ABB Environmental Services, Inc.; Portland, Maine; May 1992.

E.C. Jordan Co., 1989. "Installation Restoration Program (Remedial Investigation/Feasibility Study) at Plattsburgh Air Force Base, New York: Site Inspection Report"; E.C. Jordan Co.; Portland, Maine; July 1989.

URS Consultants, Inc., 1993a. "Supplemental Investigation to the Remedial Investigation Report of LF-023". URS Consultants, Inc.; Buffalo, New York, January 1993.

URS Consultants, Inc., 1993b. "Draft Final Landfill LF-023, Groundwater Operable Unit Feasibility Study Report"; URS Consultants, Inc.; Buffalo, New York, August 1993.

U.S. Environmental Protection Agency (USEPA), 1988a. "Guidance for Conducting Remedial Investigations and Feasibility Studies Under CERCLA"; Office of Solid Waste and Emergency Response; Washington, DC; October 1988.

U.S. Environmental Protection Agency (USEPA), 1988b. "Guidance on Remedial Actions for Contaminated Groundwater at Superfund Sites"; Office of Emergency and Remedial Response; Washington, DC; March 1988.

U.S. Environmental Protection Agency (USEPA), 1989a. "Risk Assessment Guidance for Superfund: Volume 1 - Human Health Evaluation Manual (Part A); Interim Final"; Office of Emergency and Remedial Response, EPA/540/1-89/002; December 1989.

U.S. Environmental Protection Agency (USEPA), 1989b. "Risk Assessment Guidance for Superfund: Volume 2 - Environmental Evaluation Manual"; Interim Final; Office of Emergency and Remedial Response; EPA/540/1-89/001; Washington, DC; March 1989.

U.S. Environmental Protection Agency (USEPA), 1990a. "National Oil and Hazardous Substance Pollution Contingency Plan"; 40 CFR Part 300; Washington, DC; March 8, 1990.

USEPA, 1989. Guidance on Preparing Superfund Decision Documents; The Proposed Plan, The Record of Decision, Explanation of Significant Differences, The Record of Decision Amendment, Interim Final, July 1989.