New York State Department of Environmental Conservation
Division of Environmental Remediation
Bureau of Eastern Remedial Action, Room 242
50 Wolf Road, Albany, New York 12233-7010
Phone: (518) 457-4349 FAX: (518) 457-4198

John P. Cahill
Commissioner

Dept. of Environmental Conservation
RECEIVED
DEC 14 2000
Regional Engineer - Region 5
Ray Brook, NY 12977

MEMORANDUM

TO: Daniel Steenberge, RHWRE, Region 5 - Ray Brook

FROM: Marsden Chen, Bureau of Eastern Remedial Action, DER

SUBJECT: Plattsburgh Air Force Base ID No. 510003

DATE: December 7, 2000

Attached is a copy of the Final Proposed Plan for the FT-002 (Fire Training Area) Source Operable Unit at the Plattsburgh site. The public comment period will begin on December 7, 2000 and is scheduled to end January 5, 2001. A public meeting is scheduled for December 14, 2000 at the Old Court House in Plattsburgh.

If you have any questions, please contact Jim Quinn at 457-3976.

Attachment

TABLE OF CONTENTS

TABLES

FIGURES

APPENDICES

1.0 INTRODUCTION

This Proposed Plan presents the proposed remedial action for the Fire Training Area (FT-002) Source Operable Unit at the Plattsburgh Air Force Base (AFB) in Plattsburgh, New York (Figure 1-1). The United States Air Force (USAF) is proposing this plan to address product and contaminated soil that are present as a result of fire training activities at the site. The plan has been evaluated in detail as part of the Department of Defense's Installation Restoration Program (IRP) at the base. Technical terms referenced in this document are defined in the Glossary, starting on page 39.

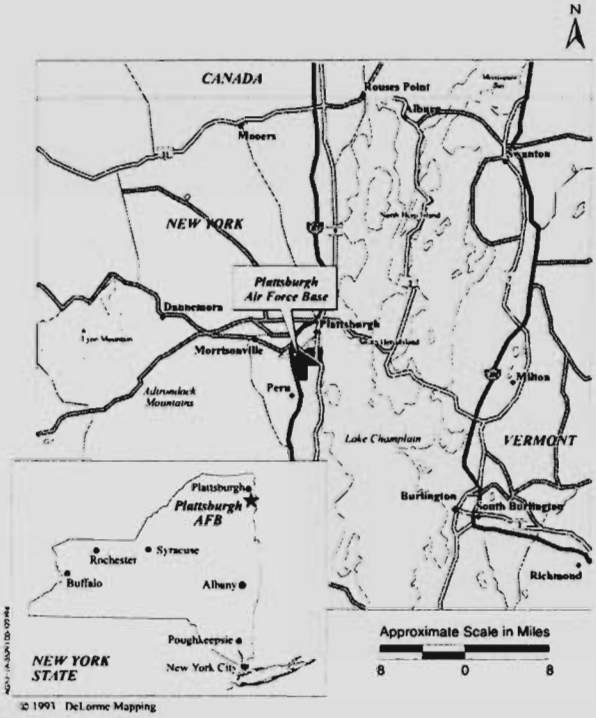


Figure 1-1: Vicinity Location Map

The Proposed Plan is being published in accordance with Section 117(a) of the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA). Its purpose is to summarize information that can be found in greater detail in the remedial investigation (RI) and feasibility study (FS) reports and other related documents for this site. Additionally, it provides information for public review and comment on the remedial alternative being considered. The USAF, in consultation with the United States Environmental Protection Agency (USEPA) and the New York State Department of Environmental Conservation (NYSDEC), will consider public input while selecting the final response action for FT-002. Therefore, the public is encouraged to review and comment on all the alternatives identified in this Proposed Plan. The **administrative record file** contains the information upon which the selection of the response action will be based. This information is available to the public at the **information repository**, which is located at the Feinberg Library on the campus of the State University of New York at Plattsburgh. The repository documents are on reserve (see the Special Collections Librarian). Photocopying equipment is available.

Administrative Record File Location

Feinberg Library
SUNY at Plattsburgh
Plattsburgh, NY 12901
Special Collections Department

Hours:

Monday through Thursday	8:00 a.m. to 11:30 p.m.
Friday	8:00 a.m. to 8:00 p.m.
Saturday	10:00 a.m. to 8:00 p.m.
Sunday	Noon. to 11:30 p.m.

The FT-002 site has been divided into two operable units (OUs) to facilitate remedial activities. The first operable unit, the Source OU, focuses on product and contaminated soils at the site (i.e., soils that contain chemicals of concern at concentrations above remediation goals). Percolation of rainwater through soils above the water table and dissolution of product has caused contamination of groundwater resources. In addition, product adhering to soil is located below

the water table within the zone where the water table has historically fluctuated. Soil located at or near the surface of the site does not require remediation to protect human health and the environment. The remediation of soils and the recovery of product at FT-002 will lower concentrations of contaminants in soil to remediation goals and effectively will mitigate the source of groundwater contamination. The cleanup and control of groundwater contamination resulting from the FT-002 site is being addressed as part of a separate operable unit, the FT-002/Industrial Area Groundwater OU (Groundwater OU). This Proposed Plan addresses only the Source OU. A separate proposed plan will be issued for the Groundwater OU.

The remedial objectives for the Source OU are 1) to cleanup contaminated soil and residual product located in the vadose zone and in the zone of water table fluctuation at the site to concentrations less than or equal to applicable standards (remediation goals are established on Table 4-2) and 2) to recover floating free (pumpable) product at the site to the extent practicable.

Using the authority vested in it by the President of the United States under Executive Order 12580, the USAF has initiated two separate removal actions at the Fire Training Area in an attempt to reduce the continuing contamination of the groundwater aquifer by attacking the sources of contamination. A Product Recovery Removal Action was implemented at the site in 1993 to remove free product floating on top of the groundwater aquifer. The product is a mixture of jet fuel, waste oil, and solvents which was poured on the ground, then ignited during fire training exercises. This removal action involved constructing four groundwater product recovery wells, installing a dual recovery pump system, and constructing a treatment plant to clean recovered groundwater prior to discharge. This system was upgraded in 1996 to include nine new recovery wells (10 pumping wells are currently operational including 1 well location from the original 4), new pumps, and improved systems in the treatment plant.

In 1996, a second removal action was implemented at the site to begin remediating the contaminated subsurface soils. Subsurface soil contamination is caused by product adhering to the soil (residual product). The residual product cannot be extracted by the product recovery wells. This second removal action included the use of bioventing to treat all soils exceeding remediation goals, soil vapor extraction (SVE) in areas contaminated by chlorinated compounds, a catalytic oxidizer to control emissions from the SVE system, and water table depression to expose residual product near or below the groundwater table.

The preferred remedial alternative for addressing the source of groundwater contamination presented in this Proposed Plan is a combination of soil vapor extraction and bioventing of the contaminated soil, free product collection, water table depression enabling remediation of residual product adhering to soil below the water table, hydraulic containment of the remaining source, institutional controls, progress monitoring and sampling, and five-year site reviews. The existing infrastructure of both ongoing removal actions, with upgrade and expansion, would be utilized by the USAF in the execution of the alternative.

The USAF, in consultation with the USEPA and NYSDEC, may modify the proposed remedial action presented in this Plan based on new information or public comments. Therefore, the public is encouraged to review and comment on all the alternatives identified herein.

2.0 SITE BACKGROUND

2.1 Site Description and Background

Plattsburgh AFB, located in Clinton County in northeastern New York State, is bordered on the north by the City of Plattsburgh,

the south by the Salmon River, on the west by Interstate 87, and on the east by Lake Champlain. The base is approximately 26 miles south of the Canadian border and 167 miles north of Albany.

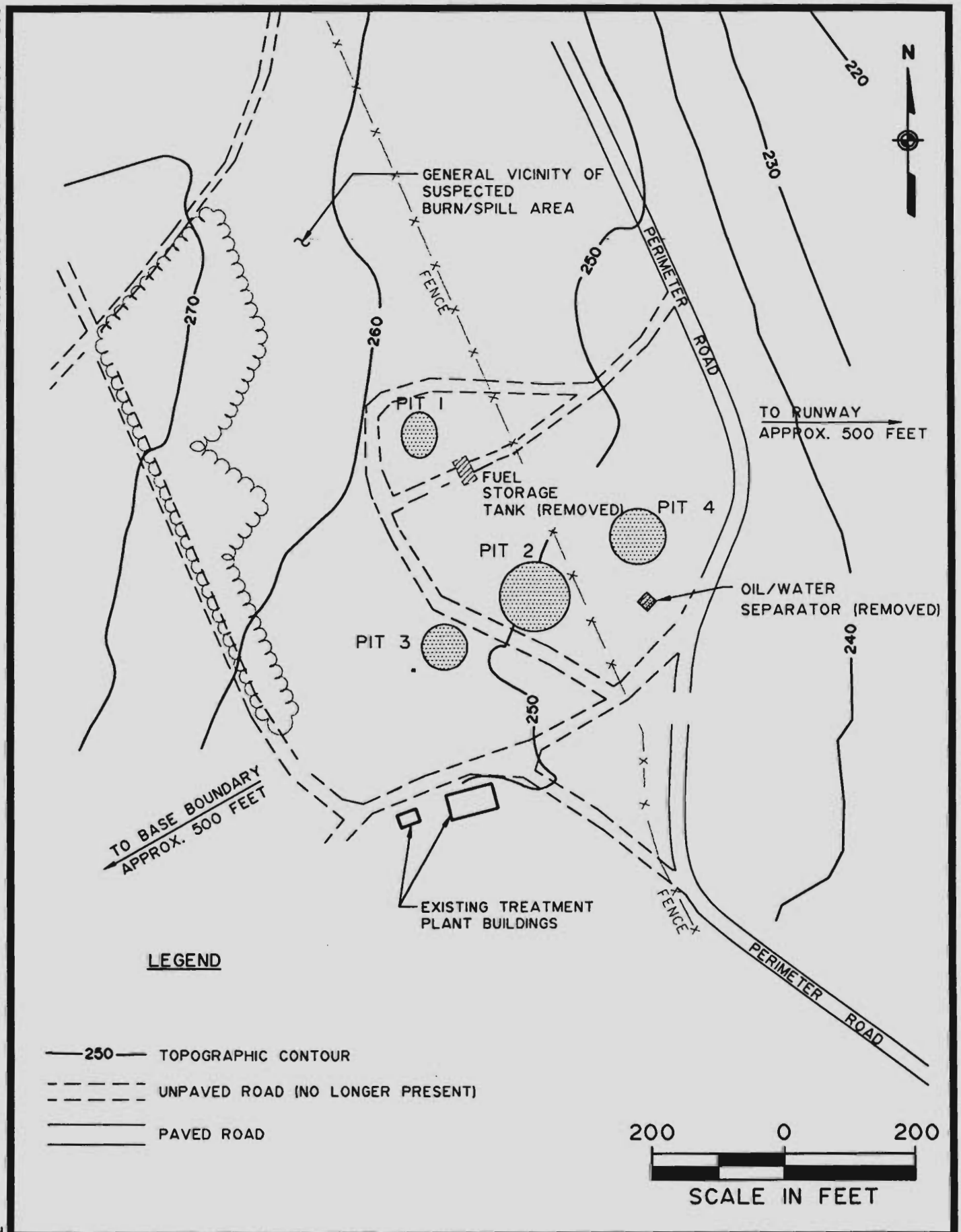
Plattsburgh AFB was closed on September 30, 1995 as part of the (third round of) base closures mandated under the Defense Base Closure and Realignment Act of 1993, and its reuse is being administered by the Plattsburgh Airbase Redevelopment Corporation (PARC). PARC is responsible for maintaining base property, marketing and controlling base reuse, leasing and managing property, and developing base facilities, as necessary, to promote advantageous reuse. According to land use plans (PARC 1995), the planned use of FT-002 and its surrounding area is commercial/industrial. The base land use plans developed by PARC were incorporated into the Environmental Impact Statement (Tetra Tech 1995). As part of the USAF's IRP, Plattsburgh AFB has initiated activities to identify, evaluate, and restore identified hazardous material disposal areas. The IRP at Plattsburgh AFB is being implemented according to a Federal Facilities Agreement (Docket No.: II-CERCLA-FFA-10201) signed between the USAF, USEPA, and NYSDEC on July 10, 1991. Plattsburgh AFB was placed on the National Priorities List on November 21, 1989. Cleanup is being funded by the USAF.

The USAF has kept the community informed regarding progress at site FT-002 and other base IRP sites during quarterly Restoration Advisory Board (RAB) meetings open to the public. This board consists of the BRAC Cleanup Team (BCT) members (key representatives from the USAF, USEPA, and NYSDEC) and seventeen representatives from municipalities, community organizations, and associations including community members with environmental/ engineering expertise. The RAB, which was chartered in 1995, serves as a forum for the community to become familiar with the restoration activities ongoing at Plattsburgh AFB and to provide input to the BCT. In addition to the formal quarterly meetings, several "working group" meetings were held in 1999, on base or on site, specifically to discuss outstanding issues regarding the FT-002 site among RAB members.

The FT-002 site is located approximately 500 feet west of the runway and approximately 500 feet east of the Plattsburgh AFB boundary. The site formerly consisted of four fire training pits, each 50 to 100 feet in diameter, centered within an approximately 8-acre area as shown in Figure 2-1. The area has since been extensively regraded.

Fire training activities at Plattsburgh AFB began in the middle to late 1950s and continued until the site was closed permanently to operations on May 22, 1989, with the exception of limited emergency rescue training. Prior to 1980, the four training pits found on the site were unlined sand and gravel depressions. During training exercises, base firefighters and local municipal firefighters saturated the pits with water, then poured in off-specification jet fuel mixed with waste oil, solvents, or other chemicals, and ignited the mixture. In 1980, Pits 2 and 3 were lined with cement-stabilized soil and Pits 1 and 4 were deactivated. Pits 2 and 3 were given a semi-permanent fuel supply via a storage tank with gravity feed. The storage tank, an underground oil/water separator, and associated underground piping have been removed from the site. The location of the effluent release from the oil/water separator is unknown but was likely the ground within or near Pit 4.

Existing contamination at the site includes the following: 1) free product (primarily fuel) which is floating on groundwater below the ground surface; 2) soil contamination above the water table (i.e. in the vadose zone) which is mainly confined to the area of the four former pits; 3) residual product adhering to soil in the zone of water table fluctuation which has resulted from the horizontal and vertical movement of product in the subsurface; and 4) groundwater contamination which has resulted from product


J:\35291.00\CAD 1=200 8/28/00-4 BJG
N
220
230
240
250
260
270
GENERAL VICINITY OF SUSPECTED BURN/SPILL AREA
FENCE
PERIMETER ROAD
TO RUNWAY APPROX. 500 FEET
PIT 1
FUEL STORAGE TANK (REMOVED)
PIT 4
PIT 2
OIL/WATER SEPARATOR (REMOVED)
PIT 3
TO BASE BOUNDARY APPROX. 500 FEET
EXISTING TREATMENT PLANT BUILDINGS
FENCE
PERIMETER ROAD
LEGEND
250 TOPOGRAPHIC CONTOUR
UNPAVED ROAD (NO LONGER PRESENT)
PAVED ROAD
200 0 200
SCALE IN FEET
AC-10992
URS CONSULTANTS, INC.
FT-002 SITE FEATURES
FIGURE 2-1

and soil contamination. The first three elements of contamination are the subject of the Source OU and this Proposed Plan. The fourth element, contaminated groundwater, is being considered under the Groundwater OU. Soil located at the surface of the site does not require remediation to protect human health and the environment. The site conceptual model, which depicts the contamination described above, is presented as Figure 2-2. The nature and extent of contamination are described further in Section 2.3.

2.2 Summary of Previous and Ongoing Site Activities

2.2.1 Preliminary Assessment/Site Inspection

In 1984-85, a preliminary assessment (PA) consisting primarily of a records search was conducted at FT-002. Based upon the results of the PA, a site inspection (SI) was conducted in 1987 (E.C. Jordan 1989). It included the advancement of three borings completed as monitoring wells, soil sampling, an active soil gas survey, and geophysical surveys. The study confirmed the presence of fuel-related compounds and solvents in the subsurface soil. In addition, free product was detected floating on the water table surface.

2.2.2 Remedial Investigation/Feasibility Study

From 1988 to 1993, a multi-phased RI was undertaken at the FT-002 site (ABB and URS 1993). The comprehensive study determined the vertical and horizontal extent of soil contamination and identified an approximately 1-mile long groundwater plume trending east-southeastward from the site. The investigation included extensive soil sampling, monitoring well installation, and groundwater sampling. The study also included an evaluation of current and potential future human and ecological health risks posed by the contaminants attributed to FT-002.

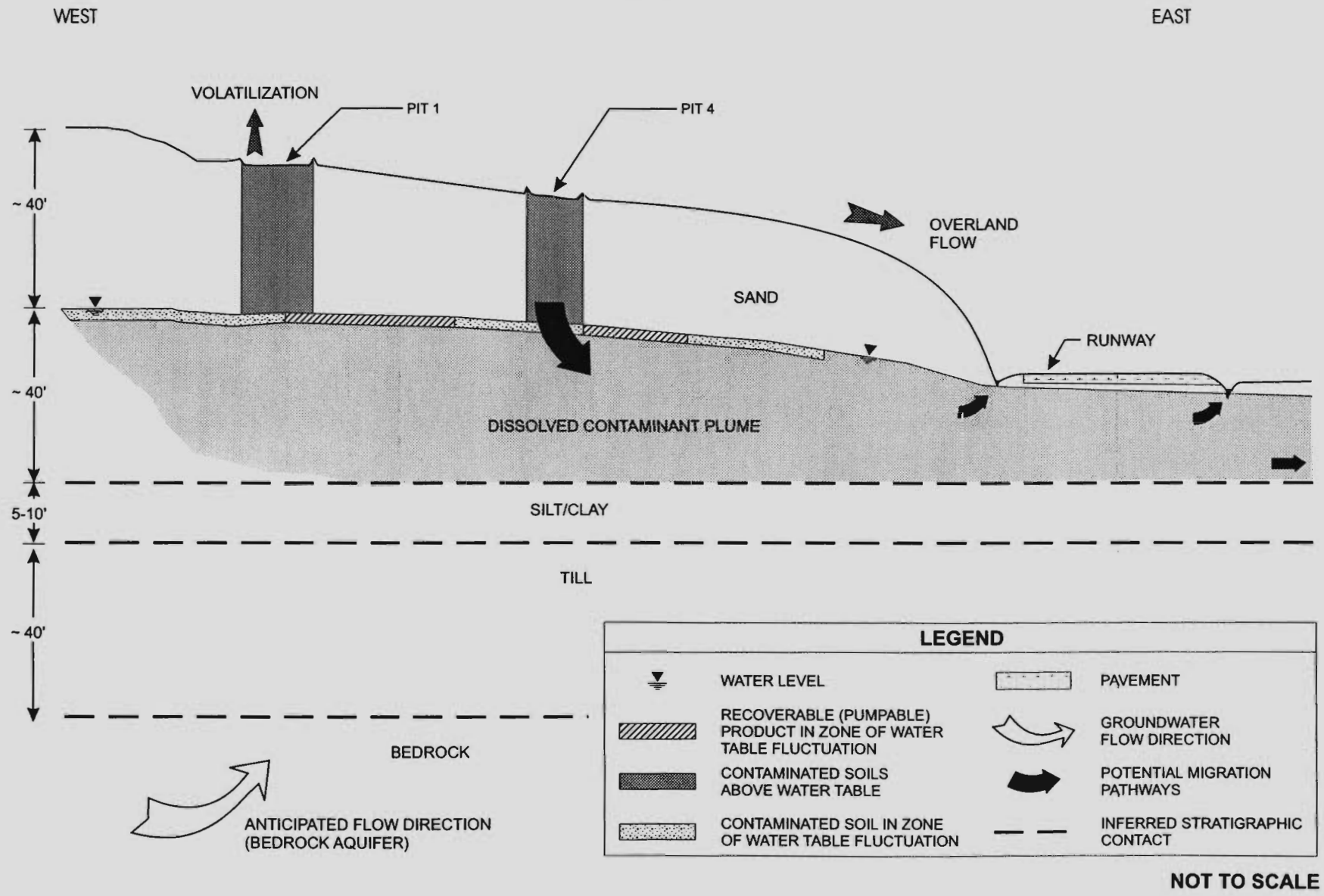
In 1995, an FS was conducted which included a detailed evaluation and comparison of nine alternatives based on USEPA criteria related to the effectiveness, implementability, and cost of the alternatives (URS 1995).

2.2.3 Product Removal Action

In 1990, an Engineering Evaluation/Cost Analysis (EE/CA) was prepared to evaluate alternatives for the recovery of free floating (pumpable) product from FT-002 (E.C. Jordan 1990). As a result of past practices, product migrated vertically from the ground surface to the water table and formed a floating layer above the water table. Based on EE/CA results, a removal action was implemented by the USAF which involved installing four recovery wells, four dual product/groundwater extraction pumps, and treatment of recovered groundwater prior to discharge to a tributary of the Salmon River. System construction began in June 1992 and it went on-line in 1993. Approximately 19,986 gallons of product has been recovered as of July 2000. It is estimated that a maximum of 10,580 gallons of free pumpable product remains at the site. In the summer of 1996, the system was upgraded to include nine new recovery wells, new separate product and groundwater pumps, and upgraded treatment equipment for the groundwater treatment plant.

2.2.4 Engineering Evaluation/Cost Analysis

An Intrinsic Remediation Engineering Evaluation/Cost Analysis was conducted in 1993 and 1994 (Parsons 1995). The purpose of the study was to determine whether naturally occurring attenuation processes for fuel hydrocarbons are occurring in groundwater at the site and to evaluate the impact of these processes on contaminant migration. The effort was part of a greater study by USAF to evaluate attenuation processes at bases across the country. This study included laser-induced fluorescence (LIF) data and soil analytical data which were used to further delineate the extent of the product and refine the



URS CONSULTANTS, INC.

CONCEPTUAL CROSS SECTION
FT-002 SOURCE AREA

FIGURE 2-2

delineation of soil contamination in the unsaturated (above the water table) zone. The estimated extent of product reported in this study is shown in Figure 2-3.

2.2.5 Action Memorandum

In 1996, an Action Memorandum was prepared which included a recommendation and conceptual design for a removal action to address contaminated soil (Parsons & OHM 1996). Components of the removal action are described below.

A. Implement SVE in the vicinity of Pit 1 to remove chlorinated hydrocarbons from soils in that area, with a catalatic oxidizer to destroy vapors from the SVE system.

B. Biovent all contaminated soils to remove all other contaminants of concern.

C. Pump groundwater to depress the water table so soils and residual product in the zone of water table fluctuation are exposed and treatable by SVE and bioventing.

Several public meetings were held, both prior to the initiation of the soil removal action, to give the public an opportunity to comment on the action and during the action, to inform the public of progress.

2.2.6 Informal Technical Information Report

Copper and lead were identified as contaminants of concern in the surface soil in the RI report because of potential effects on ecological receptors identified in the Ecological Risk Assessment (Section 4.2). Consequently, an additional sampling program (URS 1998b) was implemented which included the collection of 52 surface and 18 near surface soil samples. Samples were analyzed for lead and copper. Results are discussed in Section 2.3.

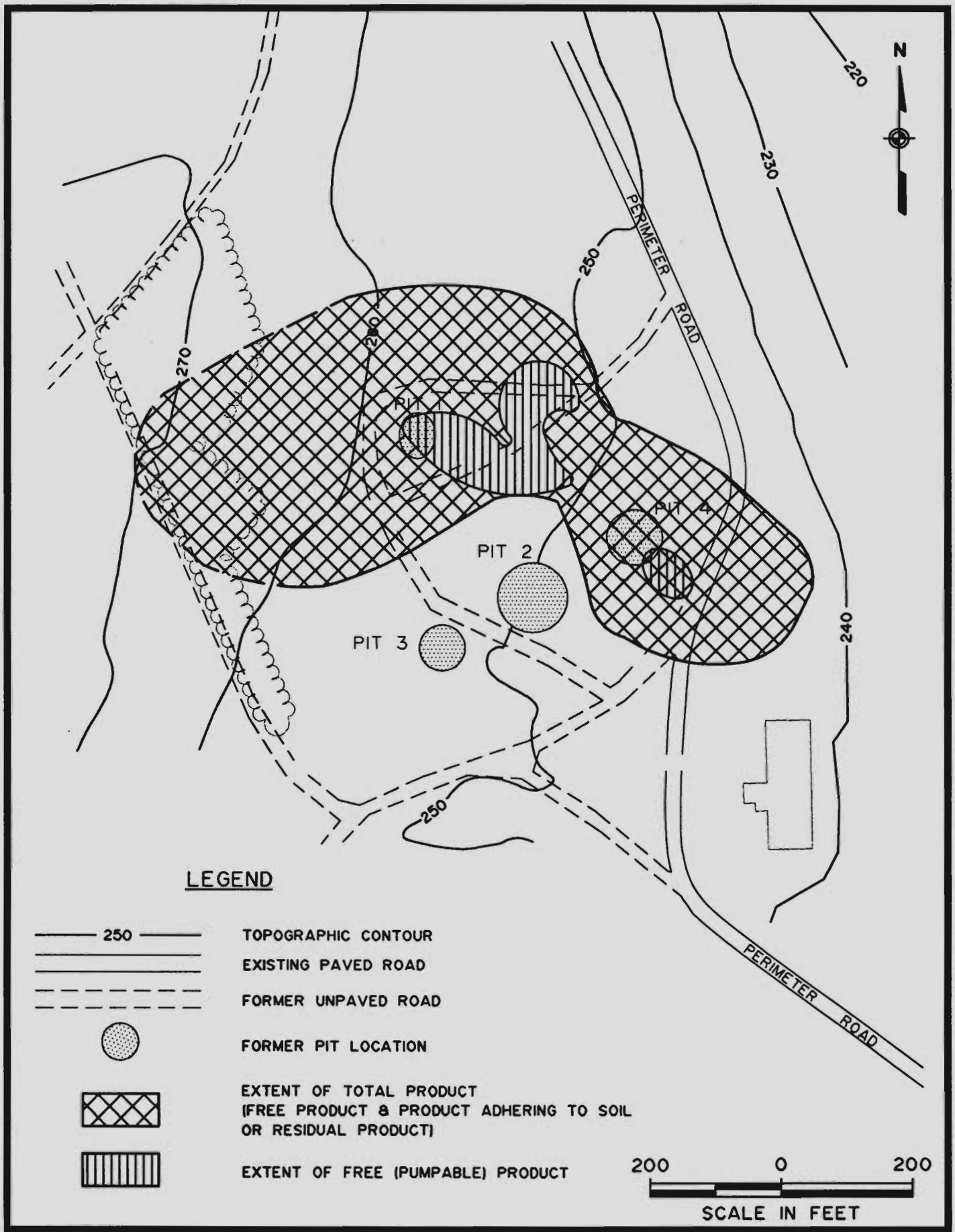
2.2.7 October 1999 Letter Report

In August 1999, the USAF advanced three soil borings at the site, at the request of the NYSDEC, to evaluate the progress of bioventing in the easternmost portion of the contaminated area. Soil samples were collected from both above and below the water table and analyzed for contaminants of concern. Results were presented in a letter report in October 1999 (Hunt 1999). The analytical results showed that bioventing had been successful in remediating fuel-contaminated soil above and slightly below the water table in that area (preliminary remediation goals were achieved; goals are shown on Table 4-2). However, fuel-related contamination associated with residual product still remained deeper below the water table. It was concluded that, to accomplish remediation of this contamination by bioventing, it would be necessary to lower the water table by pumping in this area (also see Section 7.2 - Bioventing).

2.3 Summary of Site Soil Contamination

2.3.1 Product

The estimated extent of product reported in the EE/CA (Section 2.2.4) is shown in Figure 2-3. The limits of product reported in the EE/CA represents the maximum extent of product, and includes free (pumpable) product and product adhering to soil in the smear zone (residual product). In addition, the groundwater treatment and product recovery system has been in operation for six years since this study was undertaken. URS used recent monitoring data to define the extent of pumpable free product at the site under current conditions (URS 1999). The estimated extent of pumpable free product based on the detection of measurable quantities of product in monitoring wells is shown in Figure 2-3. Based on these data, it is conservatively estimated that there are approximately 10,580 gallons of free product remaining at the site (Appendix B). Product also has adhered to soil in the zone of water table fluctuation; however, this product is



URS CONSULTANTS, INC.

EXTENT OF PRODUCT

FIGURE 2-3

not believed to be pumpable, (i.e., it cannot be removed by the product recovery system). Product adhering to soil in the zone of water table fluctuation must be addressed by methods other than pumping.

2.3.2 Surface Soil

Surface soil (0 to 2 feet deep) sampling results from the RI (1988 and 1991) are presented in Table 2-1. These results show that the top 2 feet of soil are less contaminated by organic chemicals than deeper soils. Lesser contamination in surface soil is believed to have resulted from volatilization and biodegradation in the oxygen-rich environment. Metals are more concentrated in surface soils. Lead and copper were identified as chemicals of potential ecological concern in surface soil in the RI report, since these two metals were detected at levels that represented a potential ecological risk.

The site was resampled in 1997 (URS 1998b) after the construction of an underground piping network as part of the removal action, to further evaluate levels of copper and lead in surface soil (Table 2-2). Results showed that none of the 70 samples exceeded the screening level for lead [400 milligrams per kilogram (mg/kg)] and only one of the 70 samples exceeded the screening level for copper (100 mg/kg). On the basis of this sampling, the USEPA and NYSDEC have agreed that remediation of surface soil to address lead and copper is not required.

Data from the RI show that benzene, toluene, ethylbenzene, and xylene (BTEX) compounds were detected in surface soil in a small number of samples in the pit area. These compounds, along with all other detected organic and inorganic chemicals, were identified as chemicals of potential concern for the human health risk evaluation. The BTEX contamination, which tends to migrate with infiltrating precipitation to groundwater, was evaluated along with other soil contamination above the water table. The extent of contaminated soil above the water table is discussed below.

2.3.3 Subsurface Soil

As shown in Table 2-1, compounds detected in subsurface soils at the highest levels include 1,2-dichloroethene [47,000 micrograms per kilogram (μg/kg) maximum], cis-1,2-dichloroethene [151,000 (μg/kg) maximum], trichloroethene [500,000 (μg/kg) maximum], toluene [230,000 (μg/kg) maximum], ethylbenzene [100,000 (μg/kg) maximum], total xylenes [670,000 (μg/kg) maximum], m&p xylenes [350,000 (μg/kg) maximum], 1,2-dichlorobenzene [163,000 (μg/kg) maximum], and naphthalene [111,000 (μg/kg) maximum].

Contamination has occurred by repeated infiltration of fuel and solvents to the water table during fire training exercises. Soil is contaminated vertically downward in the vicinity of each fire training pit. Soil contamination above the water table (in the vadose zone) is limited to the pit areas and an area adjacent to Pit 1 (Figure 2-4). Contaminated soil (impacted by residual product) also exists at depth within the zone of water table fluctuation. The water table fluctuation has been measured to range from a minimum of 2 feet to a maximum of 7 feet between historical highs and lows in various wells at the FT-002 site. It is estimated that 215,000 cubic yards of soil is contaminated with chemicals at concentrations above the remedial goals listed in Table 4-2 (URS 1995). The areal extent of soil contamination in the zone of water table fluctuation is much greater than above the water table because floating product migrated away from the pits after reaching the water table. In addition, some contamination appears to have migrated upgradient and side-gradient from the pits, possibly as a result of dispersion during periods of significant contaminant release.

The extent of fuel-related organic chemicals [i.e., total petroleum hydrocarbons (TPH) and BTEX] estimated by LIF and reported

TABLE 2-1
FT-002 SITE - REMEDIAL INVESTIGATION
SUMMARY OF ANALYTES DETECTED IN SOIL

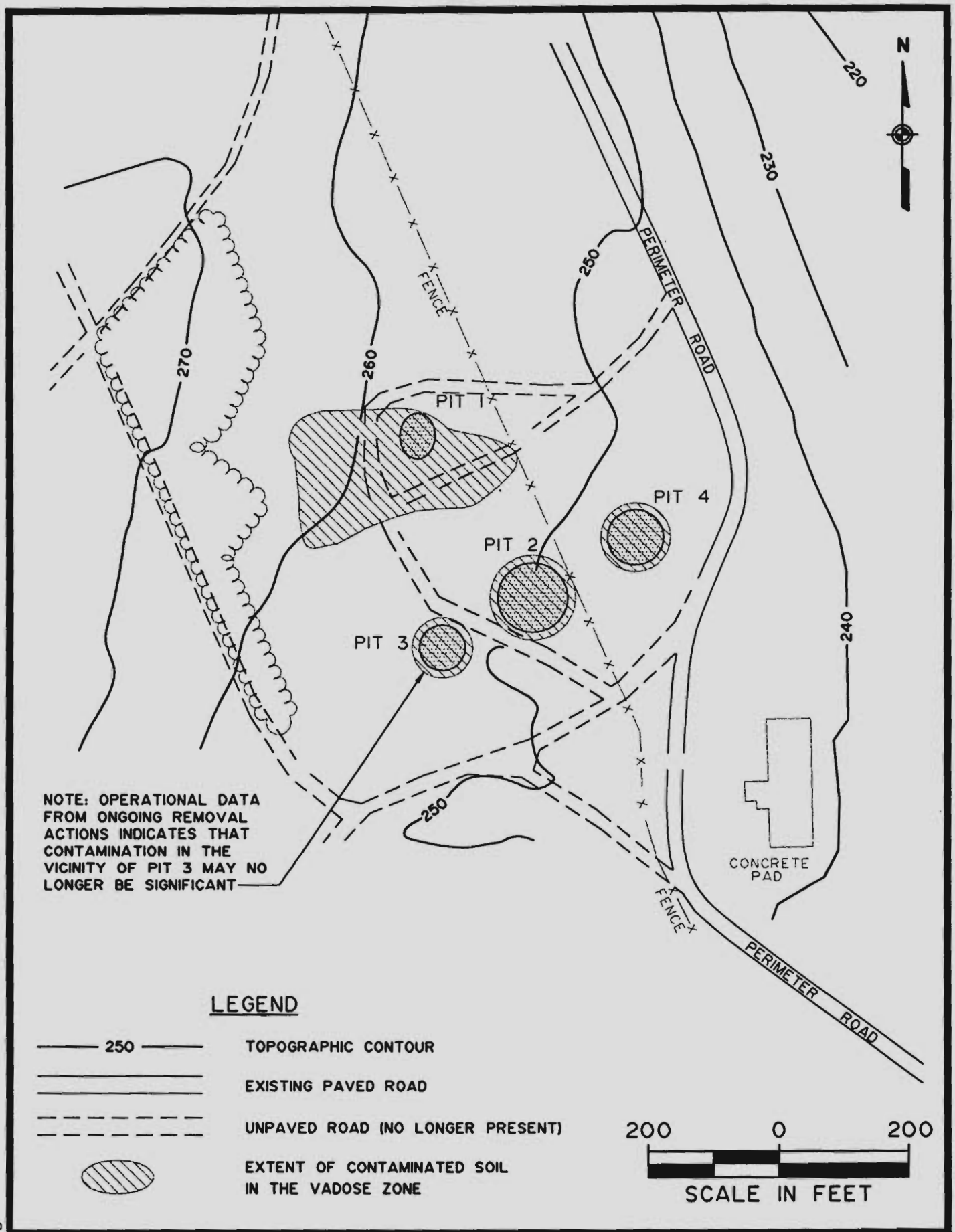
ANALYTE	SURFACE SOIL (0 - 2 FEET)		SUBSURFACE SOIL (2 - 46 FEET)	
	Frequency of Detection	Range of Detected Concentrations	Frequency of Detection	Range of Detected Concentrations
Acetone	ND	ND	2/72	190 - 2,500
Methylene Chloride	3/23	8 - 23	ND	ND
1,2-Dichloroethene (total)	NA	NA	11/72	7 - 47,000
cis-1,2-Dichloroethene	7/47	2.7 - 56.5	45/87	0.9 - 151,000
trans-1,2-Dichloroethene	1/46	16.3	NA	NA
2-Butanone	ND	ND	3/72	11 - 34
Trichloroethene	7/70	2.1 - 149	51/130	1.2 - 500,000
Benzene	1/70	73	11/130	270 - 28,100
4-Methyl-2-pentanone	ND	ND	3/72	18,000 - 32,000
2-Hexanone	ND	ND	3/72	7,500 - 7,800
Tetrachloroethene	1/70	4.6	2/130	2.4 - 1,200
Toluene	3/70	30 - 230	46/130	5.5 - 230,000
Ethylbenzene	3/70	23 - 3,400	54/130	6.4 - 100,000
Styrene	ND	ND	1/72	26
Xylene (total)	NA	NA	36/72	5 - 670,000
m,p Xylene	5/47	18 - 730	29/88	33 - 350,000
Phenol	ND	ND	1/21	460
1,2-Dichlorobenzene	ND	ND	21/155	3.7 - 163,000
1,3-Dichlorobenzene	1/68	149	16/155	2.3 - 15,300
1,4-Dichlorobenzene	1/68	71.9	21/155	2.1 - 41,700
1,2,4-Trichlorobenzene	ND	ND	1/67	460
Naphthalene	8/68	20 - 26,000	50/155	28 - 111,000
4-Chloroaniline	ND	ND	1/67	2,800
2-Methylnaphthalene	ND	ND	26/67	370 - 55,000
Phenanthrene	1/23	1,100	2/67	890 - 1,300
Fluoranthene	1/23	1,300	ND	ND
Pyrene	1/23	1,300	ND	ND
Benzo(a)anthracene	1/23	740	ND	ND
Di-n-octylphthalate	1/23	680	ND	ND
bis(2-Ethylhexyl)phthalate	ND	ND	9/67	390 - 2,100
Benzo(b)fluoranthene	2/23	830 - 860	1/67	660
Benzo(k)fluoranthene	1/23	1,100	1/67	660
Benzo(a)pyrene	1/23	680	ND	ND
Indeno(1,2,3-cd)pyrene	1/23	570	ND	ND
Benzo(g,h,i)perylene	1/23	450	ND	ND
Heptachlor Epoxide	1/13	140	1/3	8.2
4,4' - DDD	2/13	18 - 24	1/3	310
Endosulfan Sulfate	2/13	20 - 22	ND	ND
Aluminum (mg/kg)	13/13	1,430 - 21,850	5/5	1,240 - 4,200
Barium (mg/kg)	1/13	69	1/5	1
Cadmium (mg/kg)	1/13	32	ND	ND
Calcium (mg/kg)	8/13	1,010 - 9,980	3/5	3,060 - 6,520
Chromium (mg/kg)	7/13	2.1 - 11	4/5	2.4 - 4.5
Copper (mg/kg)	4/13	5 - 1,300	4/5	5.2 - 7.3
Iron (mg/kg)	13/13	2,850 - 5,230	5/5	3,030 - 5,200
Lead (mg/kg)	13/13	1.9 - 1,610	4/5	1.1 - 2.6
Magnesium (mg/kg)	7/13	946 - 4,000	3/5	1,120 - 2,460
Manganese (mg/kg)	13/13	25 - 250	5/5	30.9 - 116
Vanadium (mg/kg)	1/13	12.9	ND	ND
Zinc (mg/kg)	13/13	7.1 - 191	1/5	10.4
PHC (mg/kg)	74/248	85 - 19,789	71/213	63 - 46,296
PAH (mg/kg)	131/340	22 - 11,000	60/182	36 - 39,506

Results reported in µg/kg (ppb) unless otherwise indicated
NA - Not Analyzed
ND - Not Detected
PHC - Petroleum Hydrocarbons
PAH - Polycyclic Aromatic Hydrocarbons
Includes samples collected during both phases of the RI which occurred in 1988 and 1991, respectively.

TABLE 2-2
FT-002 SITE - PROPOSED PLAN
SUMMARY OF OCTOBER 1997 SAMPLING

ANALYTE	SURFACE SOIL (0 - 0.5 FEET)		SURFACE SOIL (1 - 1.5 FEET)	
	Frequency of Detection	Range of Detected Concentrations	Frequency of Detection	Range of Detected Concentrations
Lead (mg/kg)	52/52	3.1 - 290	18/18	0.9 - 137
Copper (mg/kg)	52/52	1.7 - 71.8	18/18	1.6 - 200

Note: Although one detection of copper (200 mg/kg) occurred at a level above its screening level of 100 mg/kg, the duplicate sample at that same location contained less than 100 mg/kg of copper. Lead was not detected above its screening level of 400 mg/kg in any sample collected.


J:\35291.00\CAD 1=200 8/29/00-10 BJG
N
220
230
240
250
260
270
PERIMETER ROAD
FENCE
PIT 1
PIT 2
PIT 3
PIT 4
CONCRETE PAD
NOTE: OPERATIONAL DATA FROM ONGOING REMOVAL ACTIONS INDICATES THAT CONTAMINATION IN THE VICINITY OF PIT 3 MAY NO LONGER BE SIGNIFICANT
LEGEND
250
TOPOGRAPHIC CONTOUR
EXISTING PAVED ROAD
UNPAVED ROAD (NO LONGER PRESENT)
EXTENT OF CONTAMINATED SOIL IN THE VADOSE ZONE
200 0 200
SCALE IN FEET
AC-4810B
URS CONSULTANTS, INC.
EXTENT OF CONTAMINATED SOIL IN THE VADOSE ZONE
FIGURE 2-4

in the EE/CA (Parsons 1995) is shown in Figure 2-5. The estimated extent of contamination based on analytical data from soil borings was also included in the FS. However, the extent of contamination reported in the FS, although in a similar location, is somewhat smaller than that shown in Figure 2-5. Figure 2-5 is a conservative estimate of the extent of contamination, since it represents the area where soil contaminants were detected. The extent of contaminated soil exceeding remediation goals is expected to be somewhat less than that shown.

LIF data also were used to delineate the extent of trichloroethene (TCE) contamination in the zone of water table fluctuation (Parsons 1995). TCE is the major solvent of concern in soil and is present in the vicinity of Pit 1. The extent of TCE contamination as shown in Figure 2-6 is much smaller than the extent of fuel contamination. Moreover, the extent of TCE soil contamination is conservative, since it represents the limits of TCE detection. The extent of soil contamination exceeding the remediation goal for TCE (and other chlorinated hydrocarbons) is expected to be somewhat less than shown.

3.0 SCOPE AND ROLE OF OPERABLE UNIT

Site FT-002 is one of a number of sites administered under the Plattsburgh AFB IRP. Records of Decision (RODs) have previously been signed for twelve operable units at the base, and additional RODs are planned for other IRP sites. Because of the complex nature of the FT-002 site, site remediation has been divided into two OUs:

- Source OU
- Groundwater OU

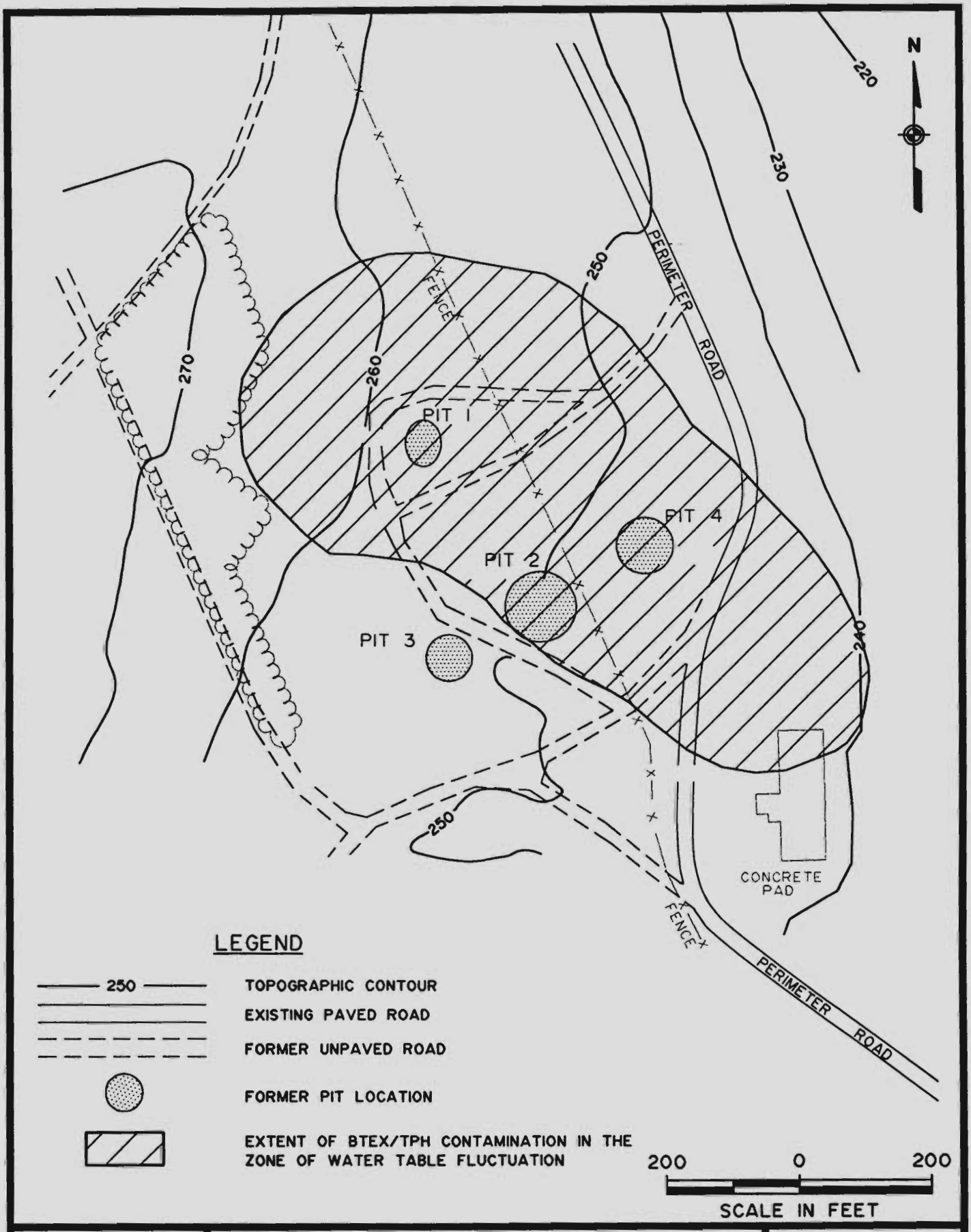
The Source OU is the subject of this Proposed Plan. It addresses the entire source of contamination including floating free (pumpable) product, contaminated soil in the vadose zone, and contaminated soil and residual product in the zone of water table fluctuation which has been caused by the horizontal and vertical movement of free product in the subsurface. The Source OU addresses contamination vertically downward only to the depth at which soil has been directly contaminated by free product at the lowest point of water table fluctuation. The horizontal extent of the source (based on LIF data) is shown on Figures 2-5 and 2-6 (note that this extent is conservative; the extent of soil contamination exceeding remediation goals is expected to be somewhat less than shown). Efforts to recover free product to date are detailed in Section 2.2.3. A removal action to address contaminated soil also is ongoing (see Section 2.2.5).

The principal threat of this contamination is its continuing impact on groundwater quality. The proposed action for the Source OU addresses this potential threat by mitigating the entire source (i.e., floating and residual product and contaminated soil) of groundwater contamination and by providing for source containment during remediation. It is intended that the proposed action be the final action for the FT-002 Source OU.

Groundwater contamination is migrating away from the source southward and eastward (Figure 3-1). An RI/FS, including a groundwater transport model, currently is underway which evaluates potential impacts and remedies for the groundwater plume. A Proposed Plan for the Groundwater OU is expected to be presented to the public in the fall of 2000.

4.0 SUMMARY OF SITE RISKS

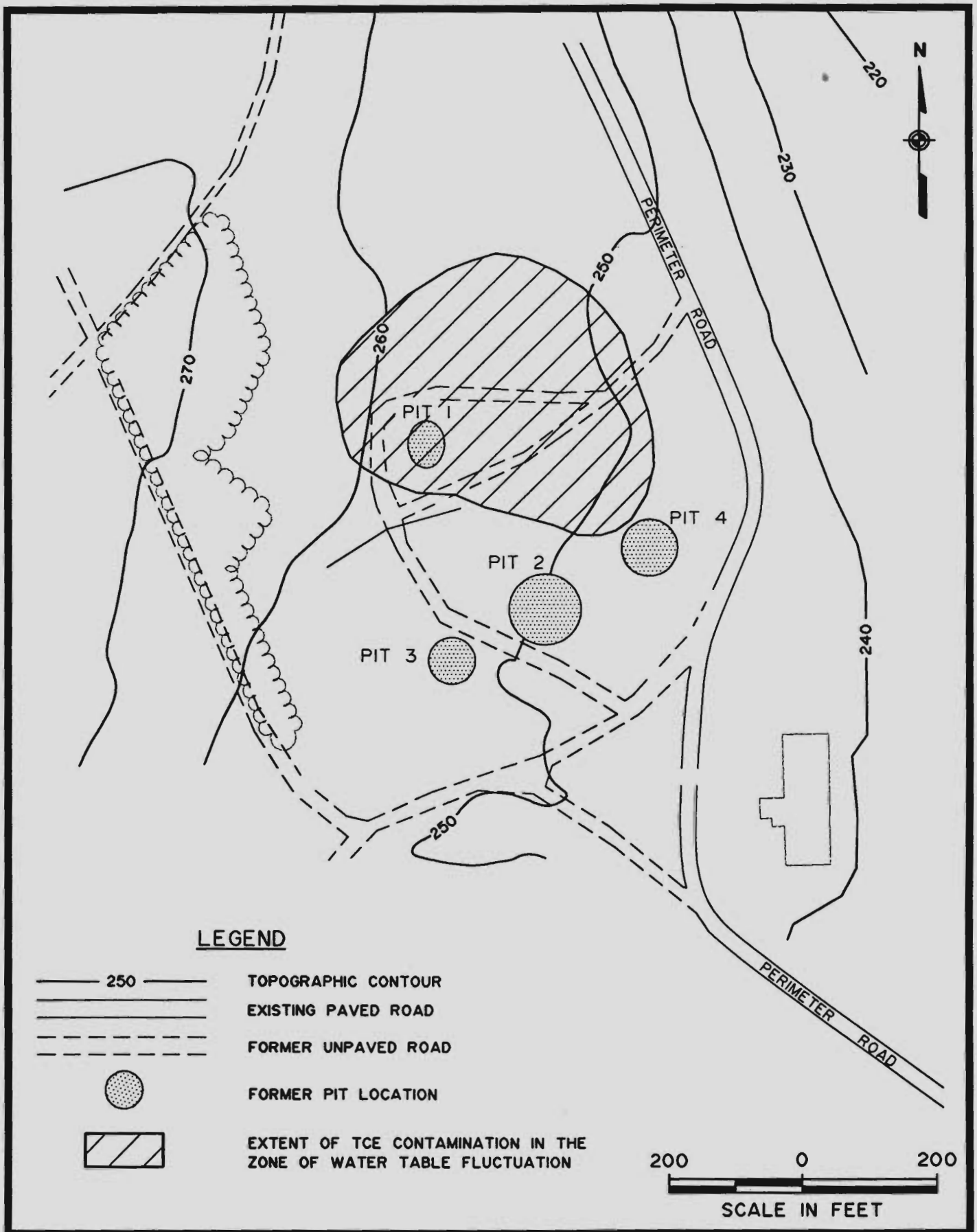
Based on the results of the RI, a baseline risk assessment (RA) was conducted to estimate the risks associated with current and future site conditions. The baseline risk assessment estimates the human health and ecological risk which could result from the contamination at the site if no remedial action was taken.

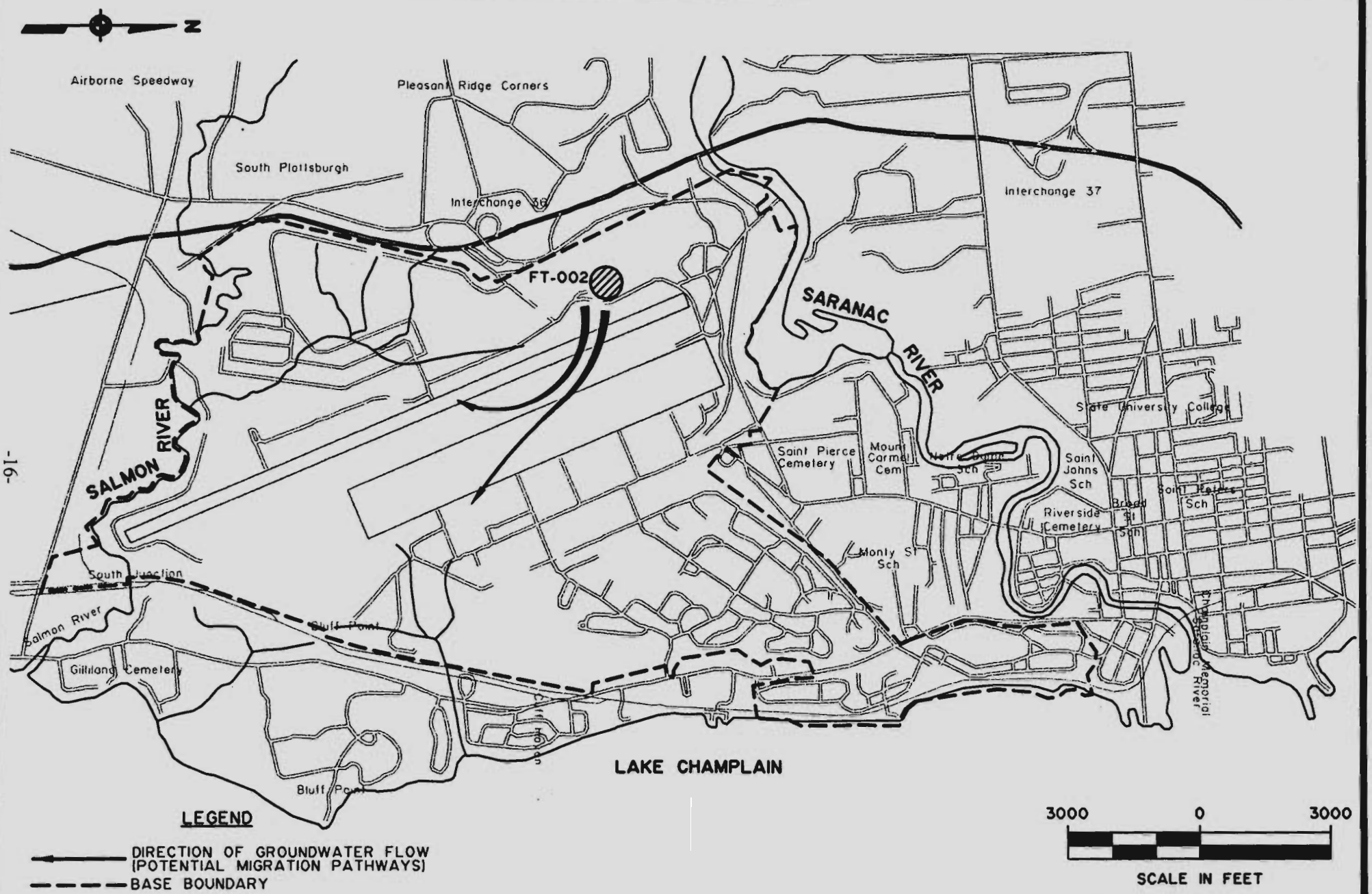


URS CONSULTANTS, INC.

EXTENT OF BTEX/TPH CONTAMINATION IN THE ZONE OF WATER TABLE FLUCTUATION (SMEAR ZONE)

FIGURE 2-5


J:\053529.0\CAD\ 1=200 2/28/00-4 PAL
N
220
230
240
250
260
270
PERIMETER ROAD
PIT 1
PIT 2
PIT 3
PIT 4
LEGEND
250
TOPOGRAPHIC CONTOUR
EXISTING PAVED ROAD
FORMER UNPAVED ROAD
FORMER PIT LOCATION
EXTENT OF TCE CONTAMINATION IN THE ZONE OF WATER TABLE FLUCTUATION
200 0 200
SCALE IN FEET
AC-10705
URS CONSULTANTS, INC.
EXTENT OF TCE SOIL CONTAMINATION IN THE ZONE OF WATER TABLE FLUCTUATION (SMEAR ZONE)
FIGURE 2-6



URS CONSULTANTS, INC.

GENERAL DIRECTION OF GROUNDWATER FLOW FROM FT-002

FIGURE 3-1

4.1 Human Health Risk Assessment

A four-step process is utilized for assessing 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 pathways (e.g., ingesting contaminated well water) 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). *Risk Characterization* - summarizes and combines outputs of the exposure and toxicity assessments to provide a quantitative assessment of site-related risks.

All chemicals detected in surface and subsurface soil (Table 2-1) were considered potential chemicals of concern and were utilized in the risk assessment. All data from the RI, except data for 2-butanone and mercury in surface and shallow subsurface soil, were used to develop exposure concentrations for the chemicals detected. Data for 2-butanone and mercury were not used because the data did not meet USEPA criteria for validation of chemical data.

Two human exposure scenarios were evaluated as part of the RA. The first of these scenarios evaluated human health effects based on possible exposure under current conditions (current conditions were based on base conditions before closure). The pathway evaluated was the following:

- Dermal contact with and incidental ingestion of surface soil

The second scenario evaluated human health effects based on projected future site conditions (assuming that residential development would occur on or near the FT-002 site). The following exposure pathways were evaluated under those assumed future conditions:

- Incidental ingestion of and dermal contact with surface soil by a future resident
- Inhalation of volatile vapor emissions from shallow subsurface soil by a future resident
- Ingestion of contaminated groundwater (derived from leaching of deep soils) by a future resident
- Incidental ingestion of and dermal contact with shallow subsurface soil by a temporary worker during construction activities
- Inhalation of volatile vapor emissions and fugitive dust derived from shallow subsurface soil by a temporary worker during construction activities

Based upon the results of the RA, the estimated cancer risk associated with exposure to contaminants under the current scenario (2×10^{-7}) is less than the USEPA's target cancer risk range of 10^{-6} to 10^{-4} (i.e., one-in-ten thousand to one-in-one million excess cancer risk) that can be considered acceptable on a site-specific basis. The noncancer risk is also less than the USEPA-specified upper limit of 1. These risk estimates indicate that there are no risks under current site conditions.

Risk estimates associated with worker exposure during construction activities were also

less than the USEPA's target risk values, indicating there is no potential human health risk from construction activities.

The estimated cancer risk for future residents (6×10^{-4}) is greater than the USEPA target range. This means that if no cleanup action is taken, six persons per ten thousand have a chance of contracting cancer if they are exposed to contamination by drinking groundwater. Benzene and TCE are the contaminants primarily responsible for the cancer risk. The total cancer risk derived from the pathways other than ingestion of groundwater is within the range of 10^{-6} to 10^{-4}, and can be considered acceptable by the USEPA on a site-specific basis.

The total noncancer risk for future residents is also greater than the USEPA-specified upper limit of 1. This means that there may be concern for potential noncancer health effects. This risk is almost entirely attributable to ingesting groundwater impacted by contaminants released (dissolved) from product or soil. Contaminants responsible for the elevated risk include: cis-1,2-dichloroethene, acetone, 4-methyl-2-pentanone, and toluene.

A summary of estimates of cancer (carcinogenic) and noncancer (noncarcinogenic) risks for each exposure pathway is presented in Table 4-1. The risk levels shown indicate that ingestion of groundwater is the only exposure pathway of concern. Exposure to soil contamination by direct contact is not a significant human health hazard. Soil contamination represents a potential health hazard because it is a source of groundwater contamination. By cleaning up the contaminated soil to the soil remediation goals (Table 4-2), risks attributable to soil contamination will be reduced to acceptable levels. The soil remediation goals presented are site-specific goals developed by the NYSDEC which were developed to protect groundwater.

4.2 Ecological Risk Assessment

A four-step process is utilized for assessing site-related ecological risks for a reasonable maximum exposure scenario: *Problem Formulation* - a qualitative evaluation of contaminant release, migration, and fate; identification of contaminants of concern, receptors, exposure pathways, and known ecological effects of the contaminants; and selection of endpoints for further study. *Exposure Assessment* - a quantitative evaluation of contaminant release, migration, and fate; characterization of exposure pathways and receptors; and measurement or estimation of exposure point concentrations. *Ecological Effects Assessment* - literature reviews, field studies, and toxicity tests linking contaminant concentrations to effects on ecological receptors. *Risk Characterization* - measurement or estimation of current adverse effects.

A screening level ecological risk assessment was performed to assess the potential impact on terrestrial organisms from exposure to contaminated surface soil. Risk posed to five representative species (white-footed mouse, wood thrush, garter snake, red fox, and red-tailed hawk) was examined. The results of the assessment are expressed as hazard indices. A hazard index of 1.0 or greater indicates possible health effects. A summary of hazard indices for both acute and chronic ecological effects is presented in Table 4-1.

The summary of hazard indices presented in Table 4-1 indicated that health effects were possible for individuals represented by most of the species evaluated. These potential effects to individuals were attributable to the presence of lead and copper detected in surface soil.

Additional sampling (Section 2.3) was conducted, after the construction phase of the removal action, to reassess levels of copper and lead in surface soil. None of the 70 samples collected exceeded the screening level for lead

TABLE 4-1
PLATTSBURGH AFB FT-002 SITE - PROPOSED PLAN
SUMMARY OF RISKS

HUMAN HEALTH RISKS

SCENARIO	PATHWAY	RECEPTOR	CANCER RISK	NONCANCER RISK
Current Site Conditions	Dermal Contact and Incidental Ingestion of Surface Soil	Child Trespasser	2×10^{-7}	0.04
Future Site Conditions	Dermal Contact and Incidental Ingestion of Surface Soil	Child Resident	2×10^{-5}	0.1
		Adult Resident	7×10^{-6}	0.11
	Inhalation of Volatile Vapor Emissions	Adult Resident	6×10^{-6}	0.02
	Ingestion of Groundwater	Adult Resident	6×10^{-4}	10.0
	Dermal Contact and Incidental Ingestion of Subsurface Soil	Temporary Worker	9×10^{-8}	0.009
	Inhalation of Volatile Vapor Emissions and Fugitive Dust	Temporary Worker	1×10^{-8}	0.0003

ECOLOGICAL RISKS

INDICATOR SPECIES	ACUTE RISK	CHRONIC RISK
White-footed Mouse	1.9	3.4
Wood Thrush	9.9	3.3
Garter Snake	15.0	2.2
Red Fox	21.0	0.2
Red Tailed Hawk	48.0	0.1

TABLE 4-2
PLATTSBURGH AFB FT-002 SITE - PROPOSED PLAN
SOIL REMEDIATION GOALS

SUBSURFACE SOIL	Acetone	0.198 mg/kg
	Benzene	0.036 mg/kg
	1,2-Dichloroethene	0.18 mg/kg
	1,2-Dichlorobenzene	4.74 mg/kg
	1,3-Dichlorobenzene	0.9 mg/kg
	1,4-Dichlorobenzene	5.1 mg/kg
	2-Methylnaphthalene	18.2 mg/kg
	4-Methyl-2-Pentanone	0.6 mg/kg
	Ethylbenzene	3.3 mg/kg
	bis(2-ethylhexyl)phthalate	217.5 mg/kg
	Naphthalene	6.5 mg/kg
	Tetrachloroethene	0.84 mg/kg
	Toluene	0.9 mg/kg
	Trichloroethene	0.42 mg/kg
	Xylenes	0.72 mg/kg

Goals developed by NYSDEC Technology Section, Bureau of Project Management.

(400 mg/kg). Only one of the 70 samples collected exceeded the screening level for copper (100 mg/kg). However, a duplicate sample collected at the location of the copper exceedance was well below the screening level. On this basis, remediation to address copper and lead contamination in surface soil is not required.

5.0 SUMMARY OF ALTERNATIVES

Remedial alternatives for the Source OU were originally evaluated in the FS report. The alternatives evaluated included the following:

- **No Action**
- **Institutional Action**
- **Low-Permeability Cap and Bioventing of Subsurface Soils**
- **Low-Permeability Cap and Soil Vapor Extraction of Subsurface Soils**
- **Stabilization/Solidification of Surface Soils and Bioventing of Subsurface Soils**
- **Stabilization/Solidification of Surface Soils and Soil Vapor Extraction of Subsurface Soils**
- **Soil Cover and Bioventing of Subsurface Soils**
- **Soil Cover and Soil Vapor Extraction of Subsurface Soils**
- **Excavation and Onsite Treatment**

Four of the nine alternatives evaluated in the FS included measures (soil cover and stabilization/solidification) exclusively to address the remediation of copper and lead in surface soils. However, as discussed in Section 2.3, the results of field investigations undertaken subsequent to the FS showed that remediation of lead and copper in surface soils is not required. Consequently, these four alternatives are no longer relevant as they are presented in the FS.

Two other alternatives address the remediation of surface soil using a low-permeability cap. Such a cap would prevent contact with contaminated surface soil and would have an added benefit of reducing infiltration of precipitation through contaminated subsurface soils in the vadose (unsaturated) zone, thus reducing leaching of contaminants to groundwater. However, the reduction of infiltration would not prevent leaching from contaminated subsurface soil and residual product located near or below the water table. Recent borings advanced to assess the interim progress of the current removal action indicated that considerable progress has been made since the FS was finalized in reducing contaminant levels in the vadose zone, but that considerable contamination remains below the water table (see Section 2.2.7). Thus, reducing infiltration by capping would have an overall minimal effect on preventing leaching to groundwater. Consequently, these two alternatives also are no longer relevant as they are presented in the FS.

The technical elements to address subsurface soils common to the above six alternatives are SVE and bioventing. Three additional alternatives can be formulated from the above two common technological elements including:

- **Bioventing of All Contaminated Soils**
- **Soil Vapor Extraction of All Contaminated Soils**
- **Soil Vapor Extraction of Soils Combined with Bioventing of Contaminated Soils**

and leaching) to reduce contaminant concentrations in the source slowly over time. Alternative 2 includes deed restrictions to control future development on site and groundwater use restrictions prohibiting withdrawal of groundwater for drinking water or other potable uses. This alternative also includes monitoring of groundwater to track the natural reduction in the strength of the contaminant leaching to groundwater—although the leaching would continue for an extended period of time (many decades). It is assumed that the ongoing removal actions would be discontinued. The alternative also includes site reviews, every five years, in accordance with Section 121(c) of CERCLA to ensure that human health and the environment are protected.

Alternative 3:

EXCAVATION AND ONSITE TREATMENT

Capital Cost: $65,771,500
Present Worth O&M Cost: $250,000
Total Present Worth:$66,021,500
Years of Active Remediation: 2
Years of Monitoring: 10 (assumed)

In Alternative 3, approximately 444,000 cubic yards (cy) of surface and subsurface soil would be excavated and segregated based on the level of contamination. Soil that does not meet remediation goals (an estimated 215,000 cy) would be treated on site. The remaining 229,000 cy of clean soils would be stockpiled and subsequently used to backfill the excavated area. Approximately 215,000 cy of subsurface soils would be treated by solvent extraction. The excavation would be backfilled with treated and untreated soils, capped with 6 inches of topsoil, and seeded with grass. The excavation would be dewatered by groundwater extraction wells and the contaminated water collected would be treated at the existing FT-002 groundwater treatment facility before disposal. The alternative includes deed and groundwater restrictions (as described under Alternative 2), groundwater monitoring, and five-year site reviews.

Alternative 4:

SOIL VAPOR EXTRACTION OF ALL CONTAMINATED SOILS

Capital Cost: $1,647,000
Present Worth O&M Cost: $3,206,500
Total Present Worth: $4,853,500
Years of Active Remediation: approximately 10
Years of Monitoring: 15

Alternative 4 includes soil vapor extraction of contaminated soil, free product collection, water table depression, and hydraulic containment of the source. Alternative 4 would be implemented using the existing technological infrastructure of the two removal actions that already have been implemented at the site with upgrade and expansion. It includes the continuation of free product removal (Section 2.2.3) and treatment of contaminated soils (Section 2.2.5), although the bioventing system components would be modified to enable SVE over the entire site. All air emissions would be treated by catalytic oxidation. The existing treatment facility would be utilized to lower the groundwater table to enable SVE of residual product adhering to soil below the water table.

A comprehensive soil boring and sampling program would be undertaken to optimize these systems and expand them as necessary. It is expected that additional recovery and water table pumping wells would be necessary to effect complete remediation of all residual product below the water table and to recover all pumpable product at the site. The alternative also includes source containment by groundwater pumping, at a minimum, until remediation goals are achieved. Additional well installation with piping to and treatment by the existing treatment facility would be required to effectively prevent further migration of groundwater contaminants from the source area.

Under this alternative, up to 10,580 additional gallons of pumpable product would be removed by the product recovery system and approximately 215,000 cy of contaminated soil would be remediated by SVE. This alternative also includes deed and groundwater restrictions (as described under Alternative 2), groundwater monitoring, and five-year site reviews.

Alternative 5:

SOIL VAPOR EXTRACTION OF SOILS IN THE VICINITY OF PIT 1 AND BIOVENTING OF ALL CONTAMINATED SOILS

Capital Cost: $539,500
Present Worth O&M Cost: $2,882,000
Total Present Worth: $3,421,500
Years of Active Remediation: approximately 10
Years of Monitoring: 15

Alternative 5 includes a combination of soil vapor extraction and bioventing of contaminated soil, free product collection, water table depression, and hydraulic containment of the source. Alternative 5 would be implemented using the existing technological infrastructure of the two removal actions that already have been implemented at the site with upgrade and expansion. It includes continuation of free product removal (Section 2.2.3) and SVE/bioventing of contaminated soils (Section 2.2.5). The existing treatment facility would be utilized to lower the groundwater table to enable SVE and bioventing below the water table. A comprehensive soil boring and sampling program would be undertaken to optimize these systems and expand them as necessary. It is expected that additional product recovery and water table pumping wells will be necessary to complete remediation of all residual product adhering to soil below the water table and to recover all pumpable product at the site. The alternative also includes source containment by groundwater pumping, at a minimum, until remediation goals are achieved. Additional well installation with piping to and treatment by the existing treatment facility would be required to effectively prevent further migration of groundwater contaminants from the source area. Under this alternative, up to 10,580 additional gallons of pumpable product would be removed by the product recovery system and approximately 215,000 cy of contaminated soils would be remediated by SVE and bioventing. This alternative also includes deed and groundwater restrictions (as described under Alternative 2), groundwater monitoring, and five-year site reviews.

6.0 EVALUATION OF ALTERNATIVES

The alternatives for the Source OU were analyzed with respect to nine criteria specified in the National Contingency Plan which direct remediation of inactive hazardous waste sites. A brief description of each criteria and evaluation of alternatives based on these criteria is presented below. The USEPA has categorized the evaluation criteria into three principal groups:

Threshold Criteria - The recommended alternative must meet these requirements.

- Overall protection of human health and the environment.
- Compliance with ARARs

Primary Balancing Criteria - The most favorable and cost effective alternative is determined using these criteria (a remedy is cost effective if its costs are proportional to its overall effectiveness).

- Long-term effectiveness and permanence
- Reduction of toxicity, mobility, and volume
- Short-term effectiveness
- Implementability
- Cost

Modifying Criteria - The recommended alternative may be modified by public input before it is finalized and presented in the ROD.

- State Acceptance
- Community Acceptance

A detailed discussion and comparative analysis is contained in the FS.

Analysis

- **Overall Protection of Human Health and the Environment** addresses whether a remedy provides adequate protection to potential human and ecological receptors.

Alternatives 1 (No Action) and 2 (Institutional Action) are not expected to provide adequate protection of human health and the environment. Alternatives 3 (Excavation and Onsite Treatment), 4 (SVE), and 5 (SVE and Bioventing) are expected to be protective of human health and the environment.

- **Compliance with ARARs** addresses whether a remedy will meet all of the applicable or relevant and appropriate requirements of federal and state environmental statutes, and/or provide grounds for invoking a waiver.

No federal or state ARARs specify concentration limits for contaminants in soil. Chemical-specific NYSDEC guidance documents are considered TBC (To Be Considered) for the FT-002 site and were used to develop remediation goals for soil cleanup (Table 4-2). NYSDEC TBCs were developed to prevent groundwater contamination by soil contaminants. Alternatives 1 and 2 do not achieve these TBCs. Alternatives 3 through 5 are expected to meet chemical-specific TBCs for soil through treatment.

- **Long-Term Effectiveness and Permanence** refers to the magnitude of residual risk and the ability of a remedy to maintain reliable protection of human health and the environment over time once cleanup goals have been met.

Alternatives 1 and 2 do not offer long-term effectiveness or permanence. Although institutional controls, such as deed restrictions, lower the risk from ingesting contaminated groundwater by preventing exposure, these controls do not reduce contaminant levels.

Alternatives 3 through 5 provide long-term effectiveness because they include permanent treatment of subsurface soils. Alternative 3 offers the highest degree of long-term effectiveness and permanence because the alternative includes more complete treatment than Alternatives 4 and 5 (see Reduction of TMV below).

- **Reduction of Toxicity, Mobility, or Volume** addresses the anticipated performance of treatment technologies employed in the remedy.

Alternatives 1 and 2 do not include treatment and will not reduce the toxicity, mobility, or volume of contaminated soil at the site. The toxicity of contaminants present in the soil would be reduced over an extended period through natural processes.

Alternative 3 (Excavation and Onsite Treatment of All Contaminated Soil) would most effectively reduce the toxicity, mobility, and volume of soil contaminants at the site. Alternative 3 likely would remove 90 percent or more of the contaminants from soil. Alternatives 4 and 5 includes in situ technologies which may not be as reliable as the ex situ technologies (excavation and solvent extraction) included in Alternative 3. Alternatives 4 and 5 would achieve comparatively less removal of contaminants from soil than Alternative 3. However, these alternatives are expected to be able to achieve the remediation goals for soil (Table 4-2) which are considered protective of groundwater resources.

- **Short-Term Effectiveness** refers to the speed with which the remedy achieves protection, as well as the remedy's potential to create adverse impacts on human health or the environment during its implementation.

Alternatives 1 and 2 include no treatment and reduce contaminant levels by natural processes. Remediation goals would be achieved only after an extended period (likely over 100 years).

It is estimated that Alternative 3 will achieve remediation goals after two years. Alternatives 4 and 5 include in situ technologies which will require longer to achieve remediation goals. The estimated time to achieve remediation goals is approximately 10 years for both of these alternatives. The estimated time to achieve remediation goals for Alternative 5 is discussed further in Section 7.0.

Alternatives 1 and 2 will have little, if any, impact on the community, workers, or the environment during implementation. Potential impacts are the greatest for Alternative 3. Potential exposure pathways include: 1) direct exposure of workers to soil and groundwater contamination; 2) potential exposure of workers, caretaker personnel, the community, or the environment to contaminated dust or vapors resulting from excavation. Potential exposures for Alternatives 4 and 5 are similar to Alternative 3; however, potential impacts are much less since no excavation of contaminated material is required. Air emissions from the SVE would be controlled by catalytic oxidation for Alternatives 4 and 5.

- **Implementability** addresses aspects of implementing the remedial alternatives, such as the ability to construct and operate technologies, reliability, ability to monitor effectiveness, availability of materials and services, permitting, and coordination with other agencies.

Alternative 1 (No Action) does not require implementation of a remedy.

Alternative 2 includes monitoring and deed restrictions, which are relatively easy to implement.

Alternative 3 would be the most difficult to implement because it requires deep excavation and removal, sampling, and staging of large quantities of contaminated soil. Furthermore, excavation would require extensive worker health and safety measures and other environmental controls. Associated administrative difficulties could delay implementation.

Alternatives 4 and 5 are less difficult to implement because extensive excavation is not required. These alternatives include a period of O&M for treatment that is not included in Alternative 3. Similar remedial systems have been on-line at the site since 1993 as part of the two ongoing removal actions.

- **Cost** includes the capital and O&M cost of each alternative, as well as its present worth.

The present worth costs of the alternatives range from $0.0 million to $66.0 million. In order of increasing cost, they are as follows: Alternative 1 ($0.0 million), Alternative 2 ($0.3 million), Alternative 5 ($3.4 million), Alternative 4 ($4.8 million), and Alternative 3 ($66.0 million). Capital cost is the greatest for Alternative 3. O&M cost is the greatest for Alternative 4.

- **State acceptance** addresses technical and administrative concerns of the State with regard to remediation.

The NYSDEC has provided input during the preparation of the Proposed Plan and their concurrence with the recommended alternative is expected.

- **Community acceptance** addresses public comments

received on the Administrative Record and the Proposed Plan.

Community acceptance of the recommended alternative will be evaluated after the public comment period ends and will be described in the ROD for the site.

7.0 DESCRIPTION OF THE PREFERRED ALTERNATIVE

The USAF has selected **Soil Vapor Extraction of Soils in the Vicinity of Pit 1 and Bioventing of All Contaminated Soils** as the preferred alternative for the FT-002 Source O U. The alternative also includes source containment by groundwater pumping, at a minimum, until remediation goals, which were established in coordination with the NYSDEC and USEPA, are achieved. In addition, institutional controls will be used to restrict land use and well installation while the remediation is underway and monitoring will be conducted at the site to evaluate the progress of remediation. There also will be five-year reviews of the selected remedy in accordance with Section 121(c) of CERCLA.

It is anticipated that the infrastructure currently in place at the site present as components of the two removal actions (including an 80 gpm capacity water treatment facility, a product and groundwater recovery system, a soil bioventing system, and an SVE/catalytic oxidation system) will be used, with possible upgrade and likely expansion to achieve remediation of the contaminated source, to collect the remaining recoverable product, and to provide source containment.

7.1 Basis

The preferred alternative described above is recommended by the USAF because it is technically efficient and cost effective. The alternative addresses remedial objectives to cleanup contaminated soil and residual product in the zone of water table fluctuation at the site to concentrations less than or equal to established remediation goals and to recover floating free (pumpable) product at the site to the extent practicable. The potential of the proposed remedial alternative to effectively remediate the source and to achieve remedial objectives has been demonstrated by the progress of remediation under the two removal actions underway at the site (URS 1997). Further, human health will be protected during the period of time necessary to achieve source remediation, currently estimated to be 10 years, by implementing institutional controls to prevent human exposure, and by pumping and treating groundwater to prevent contaminant migration from the source.

7.2 Identification of Alternative

The preferred alternative for remediation of the FT-002 Source OU includes the following components:

- Product Removal
- Soil Vapor Extraction (Pit 1)
- Bioventing (All Soils)
- Water Table Depression
- Source Containment
- Institutional Controls (Land Use and Groundwater Well Installation Restrictions)
- Progress Soil Monitoring
- Five-Year Site Reviews

These components are discussed individually below.

Product Removal

The product removal system is a dual pump system. Groundwater is pumped to lower the water table which induces product to move toward extraction (recovery) wells by gravity. Product that accumulates in the wells is pumped to a product storage tank and disposed of at a permitted waste oil recycling and disposal facility. Groundwater is treated in the existing site groundwater treatment system before being discharged to a nearby surface stream according to NYSDEC effluent criteria. Currently, an air stripper is utilized with carbon polishing to remove volatile organics from recovered

groundwater. Stripped chemicals are emitted to the atmosphere without treatment. The need for treatment of the air stripper emissions will be re-evaluated as necessary when a change in remedial system operating conditions occurs basewide, or when changes in reuse at the base significantly shifts receptor proximity. The current system includes ten groundwater extraction wells and ten product recovery wells. The recovery wells and the estimated extent of pumpable free product are shown in Figure 7-1. Because some pumpable product lies downgradient from the influence of the most downgradient product recovery well, one or more additional product recovery wells will need to be installed to effect complete capture of the remaining recoverable product. Expansion of the product recovery network will be evaluated following a comprehensive soil boring and sampling event that will be completed following the signing of the ROD (See Section 7.3).

Soil Vapor Extraction

SVE will be used to remediate chlorinated compounds (primarily TCE and DCE) from contaminated soil in the vicinity of Pit 1. Currently the major SVE system components include 14 vapor extraction wells, a 20-horsepower blower to extract soil gas from the wells, and a catalytic oxidizer which destroys volatile organic compounds (VOCs) before they are released to the atmosphere. The current SVE components and their relationship to chlorinated compound contamination are shown in Figure 7-1.

Bioventing

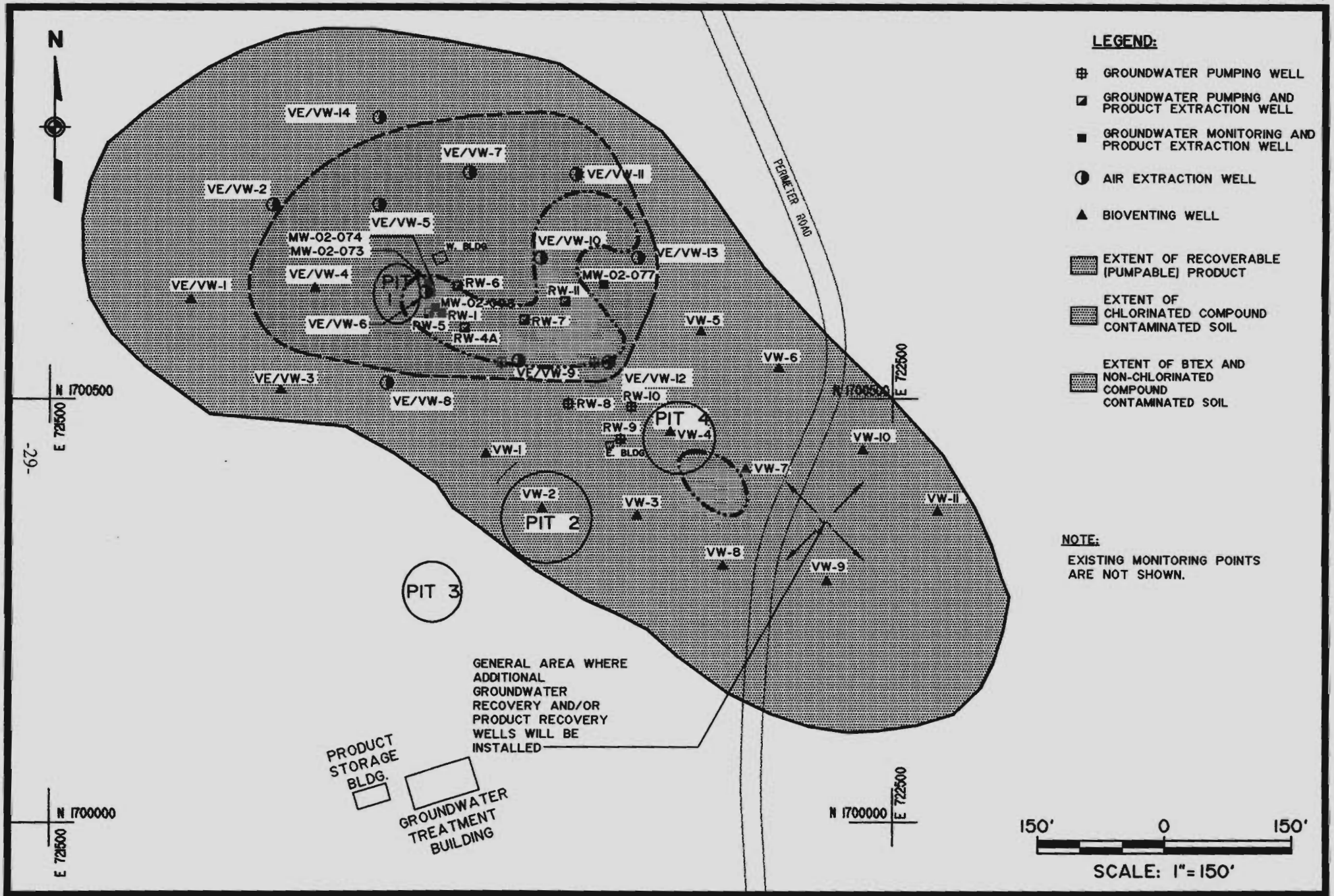
Bioventing will be used to remediate nonchlorinated, petroleum-related compounds from contaminated soil. Bioventing is used to promote the growth of biological organisms, by supplying oxygen, which consume petroleum-related contamination. Bioventing is ineffective in remediating chlorinated compounds, therefore, it is used in areas where chlorinated compounds are not present at significant levels. The current bioventing system consists of 11 air injection wells and a 7.5-horsepower blower (located in the east equipment building shown in Figure 7-1) and 14 air injection wells and a 7.5-horsepower blower (located in the west equipment building). The wells used to remediate soil by bioventing in the vicinity of Pit 1 (west building) are the same wells currently being used for SVE. Three of the 14 wells currently are being employed in bioventing mode, since these wells were not extracting appreciable quantities of chlorinated compounds in SVE mode. Similarly, the other wells at Pit 1 can be switched to bioventing mode, from SVE mode, when chlorinated compounds are no longer being remediated. This will enable the complete remediation of petroleum-related compounds in the vicinity of Pit 1. Note that it is believed, based upon operational data (URS 2000), that contamination near Pit 3 has been remediated. However, this will be confirmed by the comprehensive soil boring and sampling event, and additional remediation will be undertaken by modification of the existing site systems, if necessary.

Water Table Depression

The water table elevation at the FT-002 site has fluctuated several feet as a result of seasonal changes. This fluctuation has caused floating product to smear onto subsurface soil, thereby creating a deep zone of contamination below the water table. Ten existing extraction wells (Figure 7-1) currently are used to extract groundwater to lower the water table in the contaminated zone, enabling remediation of the soil below the water table by SVE or bioventing. Recent borings have shown that contamination (petroleum related) is present below the water table in areas that are outside the influence of the ten existing extraction wells. Thus, it will be necessary to install additional extraction wells to complete remediation of all onsite soil contamination. An evaluation of the pumping network relative to the locations where residual product adhering to soil is found below the water table will be completed following the comprehensive soil boring and sampling event.

AC-14749

J:\35291.00\CAD I=150 8/28/00-3 BJG (COLOR)



URS CONSULTANTS, INC.

SVE, BIOVENTING, AND GROUNDWATER AND PRODUCT RECOVERY SYSTEM COMPONENTS

FIGURE 7-1

Source Containment

Further migration of contamination dissolving into groundwater in the source area will be prevented by pumping in the source area. Currently, most of the source, including the area contaminated by chlorinated compounds, is being contained by the existing groundwater recovery system. An evaluation of the containment capture zone will be performed using existing pumping and piezometric data, and analytical methods following ROD signing. To accomplish containment over the entire source area, additional recovery wells will need to be installed. Routine piezometric monitoring will be undertaken to ensure that the entire source is adequately contained.

Source containment will continue, at a minimum, until the Source OU remedial objectives are achieved. After the remedial objectives for the Source OU have been achieved, operation of the extraction wells used for containment may be extended if significant contaminant mass continues to be present in extracted groundwater. This continued operation would assist in achieving the remedial objectives for the Groundwater OU, which addresses the contaminated groundwater from the FT-002 source area. A decision to continue or terminate operation of each component of the preferred alternative would be made in cooperation and concurrence between the USAF, USEPA, and NYSDEC.

It is anticipated that treatment of contaminated water collected for water table depression (for both SVE/bioventing and product removal) and source containment will be accomplished using the existing onsite water treatment facility. It is expected that the 80-gpm capacity of the facility will be adequate to treat all recovered groundwater necessary for both depression and containment. Improvements to the facility capacity will be considered should a larger capacity be needed to achieve remedial objectives. Once all pumpable product has been recovered, it may be possible to discontinue some treatment elements at the existing facility or to discharge collected groundwater to an alternate facility that may be constructed as part of the Groundwater OU.

Institutional Controls

Institutional controls are included in the preferred alternative. These are:

- Prohibition of the installation of any wells for drinking water or any other purposes which could result in the use of the underlying groundwater.

- Prohibition of development or land use which interferes with remedial operations.

The USAF will incorporate language implementing the institutional controls outlined in this Plan, and as specified by the ROD, in deeds/property transfer documents with any grantees, successors, or transferees upon property transfer of any or all of the areas subject to restriction. Because the USAF is the owner of the subject parcels, it is legally able to implement the restrictions via deeds/property transfer documents. Further, language will be included in the deeds/transfer documents binding the grantee, successor, or transferee to include the language implementing the institutional controls in all future deeds/transfer documents. Review of the effectiveness of the institutional controls will be undertaken, at a minimum, every five years by the USEPA and USAF according to Section 121(c) of CERCLA. Deeds/property transfer documents will be recorded with the Clinton County Clerk's Office, currently located at 137 Margaret Street, in Plattsburgh, New York.

After the ROD is signed, the USAF will incorporate the areal limits (including map coordinates) of the institutional controls onto a basewide map that denotes the extent of all controls that have been agreed upon to date for other IRP sites. This map has been submitted to the NYSDEC, USEPA, and local agencies, and will continue to be updated and distributed as new controls are agreed upon. The areal extent of the

controls specific to the FT-002 Source OU are shown on Figure 7-2.

Progress Monitoring

Soil monitoring activities will be conducted at the site to evaluate the progress of remediation. These activities include the following:

- Periodic sampling of soil gas monitoring locations for oxygen, carbon dioxide, and methane will be conducted to evaluate the progress of soil remediation by bioventing.

- Periodic sampling of extracted soil gas for VOCs will be conducted to assess the progress of soil remediation by SVE.

- Periodic soil sampling for site contaminants both above and below the water table will be conducted every five years to evaluate the progress of source remediation until remediation goals are achieved. Samples will be analyzed for at least the parameters listed in Table 4-2. An initial comprehensive soil sampling event will be conducted as soon as practicable following ROD signing. This initial event will be used to target areas of the site that may require expansion of remedial components. An additional soil sampling event will be undertaken when other monitoring methods (noted above) indicate that remediation of soil has been completed.

- Periodic groundwater monitoring at several monitoring well locations will be conducted to evaluate the impact of the source remediation on groundwater within the area of groundwater use restriction specified for this Operable Unit. This monitoring will be used to determine when the groundwater use restriction can be rescinded.

Five-Year Site Review

Every five years (at minimum), a review of the selected remedy will be undertaken by the USAF and USEPA in accordance with Section 121(c) of CERCLA. Remedial progress and the need to continue institutional controls to protect human health and the environment will be evaluated as part of the review.

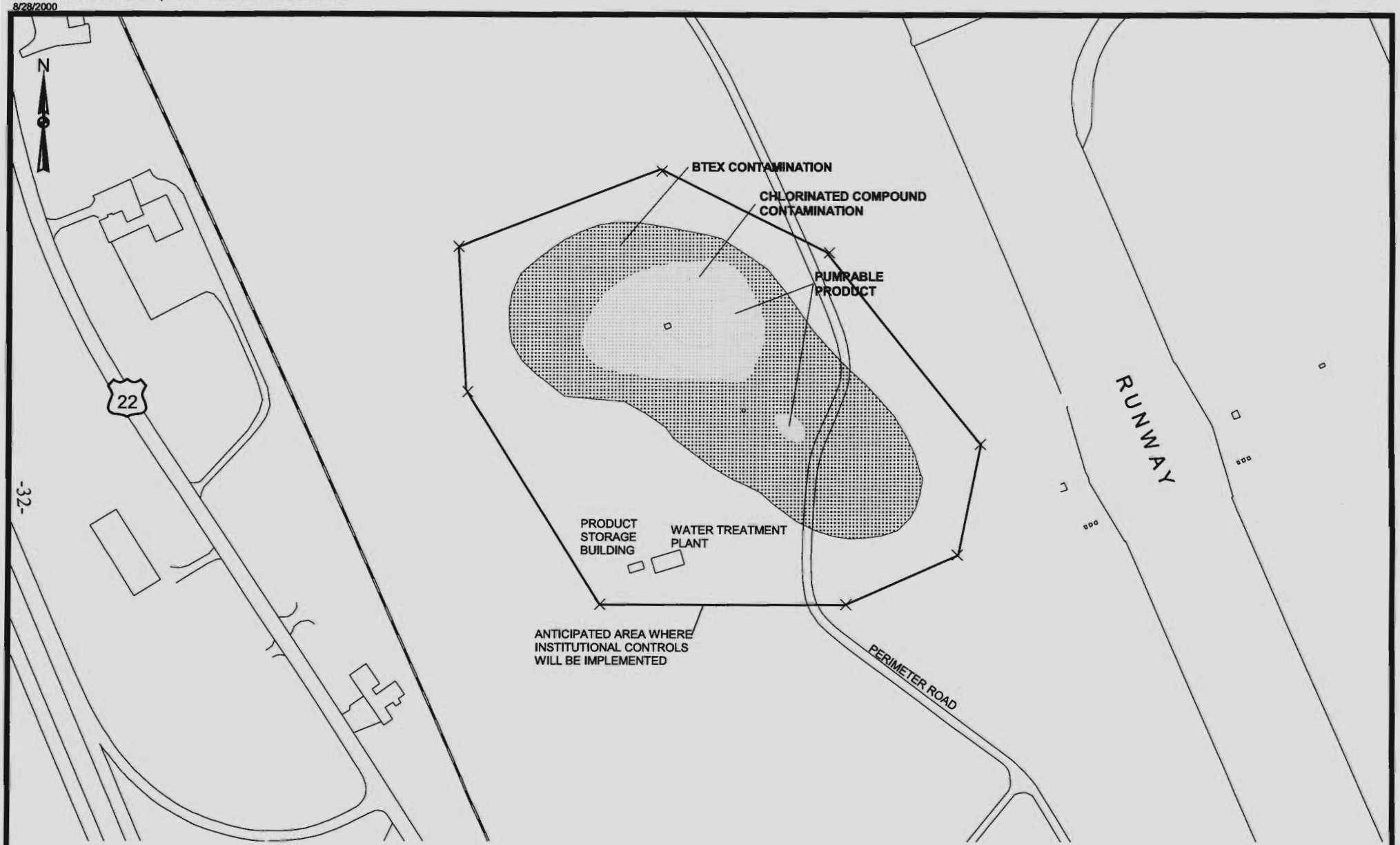
7.3 Coordination and Design

The NYSDEC and USEPA will be involved in the coordination and design of the expansion of remediation through the review process described in the Federal Facilities Agreement. The NYSDEC and USEPA were provided with design documents for the remedial systems currently in place on site. The following design documents will be prepared in sequence:

- *Remediation Progress Soil Boring and Sampling Event Work Plan*
- *Report on the Initial Remediation Progress Soil Boring and Sampling Event*
- *Remedial System Upgrade and Expansion Plan*
- *Remedial Action Work Plan*
- *Operation and Monitoring Plan*

The *Remediation Progress Soil Boring and Sampling Event Work Plan* will describe the locations and depths of samples, and the sampling and analytical procedures that will be used in initial and subsequent soil boring and sampling events. The initial event will be used to target areas of the site that require expansion of the existing site remedial components and to provide a baseline for future analysis of the remedy's effectiveness toward achieving remediation goals. These areas will be identified in the *Report on the*

J:\0100013\DB\GIS\1999\ft-002.apr AREA OF INSTITUTIONAL CONTROLS
8/28/2000



URS Consultants, Inc.	FT-002 SOURCE OPERABLE UNIT ANTICIPATED AREA OF INSTITUTIONAL CONTROLS	FIGURE 7-2

Initial Remediation Progress Soil Boring and Sampling Event. Subsequent comprehensive events will be used to evaluate the progress of the remediation, and to determine when remediation goals have been achieved and the remediation can be discontinued. The *Remedial System Upgrade and Expansion Plan* will utilize the data gathered in the initial sampling event to propose specific modifications and upgrades to the existing remediation systems necessary to affect complete mitigation of onsite contamination present at concentrations above remediation goals. The *Remedial Action Work Plan* will detail the procedures for implementation of the recommendations of the *Remedial System Upgrade and Expansion Plan.* The *Operation and Monitoring Plan* will describe locations, procedures, and frequencies of air, soil, and groundwater sampling, and propose a reporting schedule for progress monitoring events. The *Remedial System Upgrade and Expansion Plan* and the *Remedial Action Work Plan* will meet the requirements of remedial design and remedial action work plan preparation specified in Part IX, Items G and H, respectively, of the Federal Facilities Agreement.

7.4 Comparison of the Preferred Alternative to Nine USEPA Criteria

The USEPA has developed nine evaluation criteria, which are specified in the National Contingency Plan, that are used to assess remedial alternatives. These criteria are listed in Table 7-1 and compared to USAF's preferred alternative.

8.0 COMMUNITY PARTICIPATION

The following paragraphs explain how the public can become involved in the selection process after reviewing the Proposed Plan. Note that the preferred alternative can change in response to public comment or as a result of new information.

Public Comment Period

Plattsburgh AFB will hold a 30-day public comment period from December 7, 2000 to January 5, 2000 to solicit public input. During this period, the public is invited to review the Proposed Plan, the FT-002 Soil Remedial Investigation/Feasibility Study, and other project documents and to comment on the proposed action. These documents are included in the Administrative Record of the FT-002 site. The full-length reports are available at the Information Repository located at the Feinberg Library at the SUNY Plattsburgh Campus (see page one of this Proposed Plan for the address and available hours.

Public Informational Meeting

Plattsburgh AFB will host a public meeting on December 14, 2000 at the old Court House, Second Floor Meeting Room, 133 Margaret Street. The actual date and time of the meeting will be published in the Plattsburgh *Press Republican*. The meeting will be divided into two segments. In the first segment, data gathered at the site, the preferred alternative, and the decision-making process will be discussed. The public is encouraged to attend this presentation and to ask questions. Immediately after the informational presentation, USAF will accept comments about the remedial action being considered for the FT-002 site. The meeting will provide the opportunity for people to comment officially on the plan. Public comments will be recorded and transcribed, and a copy of the transcript will be added to the Administrative Record and Information Repository.

Written Comments

If you would like to submit written comments about Plattsburgh AFB's preferred alternative or other issues relevant to the site remediation, please deliver your comments to Plattsburgh AFB's IRP Coordinator at the Public Hearing or mail your written comments (to be received no later than January 5, 2000 to:

TABLE 7-1
FT-002 SITE-PROPOSED PLAN
COMPARISON OF PREFERRED ALTERNATIVE TO USEPA EVALUATION CRITERIA

CRITERION	DESCRIPTION OF CRITERION	COMPARISON OF ALTERNATIVE TO CRITERION
Overall Protection of Human Health and the Environment	Addresses whether a remedy provides adequate protection to human and ecological receptors.	The preferred alternative is protective of human health and the environment. Onsite contamination will be remediated to levels that no longer pose a threat. Institutional controls will be used to provide protection during remediation.
Compliance with ARARs	Addresses whether a remedy will meet all of the applicable or relevant and appropriate requirements of all state and federal environmental statutes.	It is anticipated that the preferred alternative will achieve NYSDEC TBCs over the course of the next10 years. These TBCs have been adopted as the remediation goals for the source operable unit and the remedial action will continue until they are achieved.
Long-Term Effectiveness and Permanence	Refers to the magnitude of residual risk and the ability of the remedy to maintain reliable protection of human health and the environment once cleanup goals have been met.	After remediation goals have been met, little or no threat to human health and the environment due to residual contamination is anticipated.
Reduction of Toxicity, Mobility, or Volume	Addresses the anticipated performance of treatment technologies employed in the remedy.	The preferred alternative uses catalytic oxidation in conjunction with SVE and bioremediation to destroy contamination. It is anticipated that remediation goals will be achieved in 10 years. During that time, contaminants will be prevented from leaving the source by pumping.

TABLE 7-1 (Continued)

CRITERION	DESCRIPTION OF CRITERION	COMPARISON OF ALTERNATIVE TO CRITERION
Short-Term Effectiveness	Refers to the speed with which the remedy achieves protection, as well as the remedy's potential to create adverse impacts during its implementation.	Because many elements of the preferred alternative are already in place as part of the two removal actions underway, the alternative can be implemented relatively quickly. There are no adverse impacts expected due to the implementation of the alternative.
Implementability	Address aspects of implementing the remedy such as the ability to construct and operate technologies, reliability, ability to monitor effectiveness, availability of materials, permitting, and coordination with other agencies.	The preferred alternative incorporates components of two removal action technologies already implemented. The performance of these systems to date validates the implementability of the preferred alternative.
Cost	Refers to the capital and O&M cost of a remedy and its present worth.	In addition to the costs already incurred to implement the two removal actions underway, it is expected that about $550,000 will be required to implement the necessary capital improvements to the onsite remedial components and about $400,000 will be needed annually for O&M.
State Acceptance	Addresses the technical and administrative concerns of the State with regard to remediation.	The NYSDEC has provided input during the preparation of the Proposed Plan and its concurrence with the preferred alternative is expected.
Community Acceptance	Addresses public comments received on the Administrative Record and the Proposed Plan.	Community acceptance of the recommended alternative will be evaluated after the public comment period ends and will be described in the Record of Decision for the site. A description of how the community can become involved in the selection process is presented in Section 8.0.

to:

Mr. Michael D. Sorel
BRAC Environmental Coordinator/Site Manager
Air Force Base Conversion Agency
22 U.S. Oval, Suite 2200
Plattsburgh, NY 12903
(518) 563-2871

Plattsburgh AFB's Review of Public Comment

Public comments are part of the process of reaching a final decision on an appropriate remedial alternative for the FT-002 Source OU. Plattsburgh AFB's final choice of a remedial alternative will be issued in a ROD for the site and will be submitted to the USEPA for review, approval, and signature and to the NYSDEC for review and concurrence. A Responsiveness Summary of public comments and Plattsburgh AFB's responses to them will accompany the ROD. Once the ROD is signed, it becomes part of the Administrative Record.

Additional Public Information

Because the Proposed Plan only summarizes the field investigation and remedial alternative for FT-002, the public is encouraged to consult the Information Repository which contains the complete RI, FS, and other supporting reports.

REFERENCES

ABB Environmental Services, Inc. and URS Consultants, Inc. (ABB-ES & URS). 1993. *Final FT-002 Soil Remedial Investigation Report, Plattsburgh Air Force Base.* Buffalo, NY and Portland, ME. March.

E.C. Jordan. 1989. *Installation Restoration Program, Site Inspection Report.* July. Portland, ME.

E.C. Jordan. 1990. *Installation Restoration Program at Plattsburgh Air Force Base, New York. Engineering Evaluation/Cost Analysis, Site FT-002 Free-Product Removal Action.* Portland, ME. July.

Engineering-Science, Inc. 1993. *Interim Pilot Test Results Report Fire Training Pit 1 (FT-002) Plattsburgh AFB, New York.* Denver, Colorado.

Hunt, Donald D. 1999. Letter from Donald D. Hunt, URS Greiner Woodward Clyde to Kevin Thomas, AFCEE/ERB regarding FT-002 Bioventing Soil Sampling Results, 13 October.

New York State Department of Environmental Conservation (NYSDEC). 1994. *Determination of Soil Cleanup Objectives and Cleanup Levels,* TAGM #4046. Albany: Bureau of Hazardous Waste Remediation.

Parsons Engineering Science, Inc. (Parsons). 1995. *Intrinsic Remediation Engineering Evaluation/Cost Analysis for Site FT-002, Plattsburgh Air Force Base, Plattsburgh, New York.* Denver, CO. April.

Parsons Engineering Science, Inc. and OHM Remediation Services Corp. (Parsons). 1996. *Installation Restoration Program, Action Memorandum, Fire Training Area 2 (Site FT-002).* April. Parsons Engineering Science, Inc, Liverpool, NY and OHM Remediation Services, Corp, Austin, TX.

Plattsburgh Airbase Redevelopment Corporation (PARC). 1995. *Comprehensive Reuse Plan for Plattsburgh Air Force Base.* 15 September.

Tetra Tech. 1995. *Final Environmental Impact Statement, Disposal and Reuse of Plattsburgh Air Force Base, New York.* Prepared for the Plattsburgh Air Base Redevelopment Corporation.

URS Consultants, Inc. (URS). 1995. *Draft Final Site FT-002 Source Control (Soil) Operable Unit Feasibility Study Report.* May. Buffalo, New York.

_____. 1997 (ongoing). Monthly operations report for soil vapor extraction, bioventing, and groundwater and product recovery system for the Fire Training Area (FT-002) at Plattsburgh Air Force Base, Plattsburgh, New York. 10 March. Buffalo, New York.

_____. 1998a. *Draft Fire Training Area (FT-002)/Industrial Area Groundwater Operable Unit Remedial Investigation/Feasibility Study.* Buffalo, New York.

_____. 1998b. *Draft Information Technical Information Report Fire Training Area (FT-002) October 1997 Copper and Lead Sampling Event.* Buffalo, New York.

_____. 1999. AFBCA Response to Comments from NYSDEC, dated August 7, 1998 on the March 1998 Draft Final Proposed Plan for the Fire Training (Site FT-002) Soil/Source Operation Unit. 22 April. Buffalo, NY.

_____. 2000. Summary of FT-002 Operations During September 1999. 24 July.

United States Environmental Protection Agency (USEPA). 1985. *Handbook, Remedial Action at Waste Disposal Site* (Revised), EPA/625/6-85/006. October. Cincinnati, OH: USEPA.

_____. 1986. *Handbook for Stabilization/Solidification of Hazardous Wastes.* EPA/540/2-86/001. June. Cincinnati, OH: USEPA

_____. 1988. *Guidance for Conducting Remedial Investigations and Feasibility Studies Under CERCLA*. October. Washington, DC: Office of Solid Waste and Emergency Response.

_____. 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. Cincinnati, OH: USEPA.

GLOSSARY

AFBCA: Air Force Base Conversion Agency

Administrative Record: A file established and maintained in compliance with Section 113(K) of CERCLA, consisting of information upon which the lead agency bases its final decisions on the selection of remedial method(s) for a Superfund site. The Administrative Record is available to the public.

Adsorption: The adhesion of molecules (as of gases, liquids) to the surfaces of solid bodies or liquids with which they are in contact.

Air Stripping: A technology used to remove VOCs from water. In an enclosed vessel air passing through the contaminated water removes and carries volatiles to a collection point.

Alternative: Combination of technologies used for remediation of the site.

Ambient: Around, surrounding.

Applicable or Relevant and Appropriate Requirements (ARARs): ARARs include any state or federal statute or regulation that pertains to protection of public health and the environment in addressing certain site conditions or using a particular remedial technology at a Superfund site. A state law to preserve wetland areas is an example of an ARAR. USEPA must consider whether a remedial alternative meets ARARs as part of the process for selecting a remedial alternative for a Superfund site.

Aquifer: A water-bearing formation or group of formations.

BTEX: Volatile Organic Compounds (benzene, toluene, ethylbenzene, xylene) typically associated with gasoline and other fuel product contamination.

Carcinogenic: Chemicals which, when exposure occurs at a particular level, may produce cancer.

Chlorinated Compounds: An organic compound that contains chlorine such as trichloroethene (TCE) and dichloroethene (DCE). Also referred to as chlorinated hydrocarbons or chlorinated solvents.

Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA): A federal law passed in 1980 and modified in 1986 by the Superfund Amendments and Reauthorization Act (SARA). The act requires federal agencies to investigate and remediate abandoned or uncontrolled hazardous waste sites.

Contaminant Plume: A volume of contaminated groundwater with measurable horizontal and vertical dimensions. Plume contaminants are dissolved in and move with groundwater.

Ecological Receptors: Fauna or flora (plant and animals) in a given area that could be affected by contaminants in surface soils, surface water, and/or sediment.
EE/CA: Engineering Evaluation / Cost Analysis

FS: Feasibility Study

Floating Product: A chemical or mixture of chemicals in pure form (non-aqueous or not dissolved in water) that is of lighter density than water and therefore floats on the top of the water table.

Free Product: A chemical or mixture of chemicals in pure form (non-aqueous or not dissolved in water). The substance is free if it can be recovered by pumping.

Groundwater: Water found beneath the earth's surface that fills pores within materials such as sand, soil, gravel, and cracks in bedrock, and often serves as a source of drinking water if found in an adequate quantity.

Heavy Metals: Toxic metallic contaminants such as cadmium, lead, copper, and mercury.

Inorganic Compounds: A class of naturally occurring compounds that includes metals, cyanide, nitrates, sulfates, chlorides, carbonate, bicarbonate, and other oxide complexes.

In-situ Treatment: Physical, chemical, or biological treatment that is applied without extracting or excavating the contaminated medium (soil or groundwater) from its natural location.

Installation Restoration Program (IRP): The U.S. Air Force subcomponent of the Defense Environment Restoration Program (DERP) that specifically deals with investigating and remediating sites associated with suspected releases of toxic and hazardous materials from past activities. The DERP was established to cleanup hazardous waste disposal and spill sites at Department of Defense facilities nationwide.

Interim Remedial Measure (IRM): An IRM is an immediate action to eliminate or mitigate a release or threatened release of hazardous wastes. An IRM can be carried out without extensive investigation.

Leachate: Solution produced by percolating liquid in contact with contaminated matter.

LIF: Laser-Induced Fluorescence

Low-Permeability: Permeability is a measure of the capacity of a liquid to pass through a given material. A low-permeability soil would therefore allow only a small amount of water to pass through.

Monitoring: Ongoing collection of information about the environment that helps gauge the effectiveness of a cleanup action. Information gathering may include groundwater well sampling, surface water sampling, soil sampling, air sampling, and physical inspections.

National Oil and Hazardous Substances Pollution Contingency Plan (NCP): The NCP provides the organization, structure and procedures for preparing for and responding to discharges of oil and releases of hazardous substances, pollutants, and contaminants. The NCP is required under CERCLA and the Clean Water Act, and USEPA has been delegated the responsibility for preparing and implementing the NCP. The NCP is applicable to response actions taken pursuant to the authorities under CERCLA and the Clean Water Act.

National Priorities List: USEPA's list of the most serious uncontrolled or abandoned hazardous waste sites identified for possible long-term remedial action under the Superfund program.

Natural Attenuation: Processes by which contaminant levels are reduced in nature. Contaminants in soil or groundwater are reduced by aerobic (oxygen-using) bacteria, other biological activity, volatilization, and dilution/dispersion.

New York State Registry of Inactive Hazardous Waste Sites: The state's compilation of all known hazardous waste sites, comprising nine volumes with site descriptions and locations. (Copies available for review in NYSDEC offices).

Noncarcinogenic: Chemicals that may produce adverse health effects that are not related to cancer.

NYSDEC: The New York State Department of Environmental Conservation.

Operation and Maintenance. (O&M): A step in the remedial program. While a site is being remediated it is overseen to make sure that the remedy is working as planned and that the construction remains intact.

Operable Unit (OU):. A separate and distinct remedial project that is part of a large, complex hazardous waste site. Each OU has its own ROD, RI/FS, design and construction.

Organic Compounds: Any chemical compounds built on the carbon atom, i.e., methane, propane, phenol, etc.

Polynuclear Aromatic Hydrocarbons (PAHs): Compounds often associated with combustion process and distillation tars.

Polychlorinated Biphenyls (PCBs): Formerly used as a lubricant and transformer coolant.

Petroleum Hydrocarbons (PHCs): The mixture of hydrocarbons (hydrogen and carbon molecules) and small amounts of other substances that make up petroleum. Hydrocarbons are chemical compounds consisting of carbon and hydrogen, and are found in gasoline, naphtha, and other products produced by refining processes.

Proposed Plan: A public document that solicits public input on a recommended remedial alternative to be used at a National Priorities List (NPL) site. The Proposed Plan is based on information and technical analysis generated during the RI/FS. The recommended remedial action could be modified or changed based on public comments and community concerns.

Product: A chemical or mixture of chemicals in pure form (non-aqueous or not dissolved in water).
Preliminary Site Assessment (PSA): The first stage investigation of a site to determine if disposal of hazardous waste poses a significant threat to public health and the environment. The PSA combines the former Phase I and Phase II investigations.

Pumpable Product: A chemical or mixture of chemicals in pure form (non-aqueous or not-dissolved in water) that can be recovered by pumping (a.k.a. free product).

Pump and Treat: Pumping and treating groundwater to remove contamination. Treatment is usually by air stripping; cleaned water is returned to the ground or discharged to nearby surface water.

Site Investigation (SI): An investigation that determines the nature and composition of contamination at a hazardous waste site. Not as in-depth as a remedial investigation

Record of Decision (ROD): A public document that explains the remedial alternative to be used at a National Priorities List (NPL) site. The ROD is based on information and technical analysis generated during the Remedial Investigation, and on consideration of the public comments and community concerns received on the Proposed Plan. The ROD includes a Responsiveness Summary of public comments.

Remedial Action: An action that stops or substantially reduces a release or threat of a release of hazardous substances that is serious but not an immediate threat to human health or the environment.

Remedial Alternatives: Options evaluated to address the source and/or migration of contaminants to meet health-based or ecology-based remediation goals.

Remedial Investigation (RI): The Remedial Investigation determines the nature and extent and composition of contamination at a hazardous waste site, and is used to assess the types of remedial options that are developed in the Feasibility Study.

Residual Product: A chemical or mixture of chemical in pure form (non-aqueous or not dissolved in water). The substance is considered residual if it is predominantly found adhering between soil particles, and cannot be recovered by pumping.

SARA: The Superfund Amendments and Reauthorization Act of 1986 amended the 1980 CERCLA environmental statues. The amendments re-authorized the federal Superfund which had expired in 1985 and established the preference for remedies that permanently reduces toxicity, volume or mobility of hazardous constituents.

Semivolatile Organic Compounds (SVOCs): Organic constituents which are generally insoluble in water and are not readily transported in groundwater.

Standards, Criteria and Guidance Values (SCGs): Values set by regulatory agencies (e.g. NYSDEC, NYSDOH) that are used to evaluate the relative amount of contamination.

Solidification: Process by which materials are added to soil or sediments to reduce the release of contaminants.

Solvents: Organic liquids used to dissolve grease and other oil-based materials. Many solvents are toxic at high concentrations.

Source: Area at a hazardous waste site from which contamination originates.

Source Control: A remedy that addresses contamination problems at their source, rather than at some other more distant point along the chain of exposure.

Smear Zone: The area below the ground surface where the water table rises and fills with the seasons over a period of years. Also known as the zone of water table fluctuation. Residual product is found in this area if floating product has historically been present on the water table.

SVE: Soil vapor extraction.

Superfund: The trust fund, created by CERCLA out of special taxes, used to investigate and clean up abandoned or uncontrolled hazardous waste sites. Out of this fund USEPA either: (1) pays for site remediation when parties responsible for the contamination cannot be located or are unwilling or unable to perform the work or (2) takes legal action to force parties responsible for site contamination to cleanup the site or pay back the federal government for the cost of the remediation. Federal facilities are not eligible for Superfund monies.

Terrestrial Wildlife: Animals living on land (e.g., reptiles, small mammals, small birds, predatory mammals, predatory birds).

To Be Considered (TBC): Federal and state policies, advisories, and other non-promulgated health and environment criteria, including numerical guidance values, that are not legally binding. TBCs are used for the protection of public health and the environment if no specific ARARs for a chemical or other site conditions exist, or if ARARs are not deemed sufficiently protective.

USEPA: United States Environmental Protection Agency

Vadose Zone: The volume located between the ground surface and the water table. Also known as the unsaturated zone.

Volatile Organic Compounds (VOCs): Organic constituents which tend to volatilize or to change from a liquid to a gas form when exposed to the atmosphere. Many VOCs are readily transported in groundwater.

Zone of Water Table Fluctuation: The area below the ground where the water table rises and falls with the seasons over a period of years. Also known as the smear zone. Residual product is found in this area if product has historically been present floating on the water table.

APPENDIX A

COST ESTIMATES FOR CONSIDERED ALTERNATIVES

TABLE A-1
CAPITAL COSTS

ALTERNATIVE	Alternative	1	2	3	4	5
COMPONENT CAPITAL COSTS	Deed restrictions (No Indirect Costs)		$30,000	$30,000	$30,000	30,000
	New Groundwater Extraction Wells (4)				$114,500	$114,500
	New SVE Extraction Wells (2), Air Lines				$22,000	$22,000
	Conversion of East Building to SVE				$605,000	
	Site preparation			$537,500		
	Soil Excavtion - Surface soils			$211,000		
	Soil Excavtion - Subsurface, with sheetpiling			$8,531,500		
	Dewatering			$143,500		
	Soil Treatment			$22,930,500		
	Progress/Confirmation Sampling, Int. & Final*				$106,000	$106,000
	Soil Backfill			$3,553,500		
	System Decommoissioning				$35,500	$35,500
	Site Restoration			$16,500		
SUBTOTAL - CAPITAL COSTS		**$0**	**$30,000**	**$35,954,000**	**$913,000**	**$308,000**
INDIRECT COSTS	Mobilization/Demobilization (5% of Directs)		$0	$1,796,000	$44,500	$14,000
	Health and Safety (25% of Directs)		$0	$8,981,000	$221,000	$69,500
	Facility Costs (10% of Directs)		$0	$3,592,500	$88,500	$28,000
	Construction, Administration, and Design Engineering (15% of Directs)		$0	$5,389,000	$132,500	$42,000
	Bonds and Insurance (3% of Directs)		$0	$1,078,000	$26,500	$8,500
	Cost Estimate Contingency (25% of Directs)		$0	$8,981,000	$221,000	$69,500
SUBTOTALS	**SUBTOTAL - INDIRECT COSTS**	**$0**	**$0**	**$29,817,500**	**$734,000**	**$231,500**
	SUBTOTAL CAPITAL COSTS	**$0**	**$30,000**	**$35,954,000**	**$913,000**	**$308,000**
TOTAL CAPITAL COSTS	**TOTAL CAPITAL COSTS**	**$0**	**$30,000**	**$65,771,500**	**$1,647,000**	**$539,500**

Alternatives:
1 = No Action
2 = Institutional Action
3 = Excavation and Onsite Treatment
4 = Soil Vapor Extraction of All Contaminated Soil
5 = Soil Vapor Extraction of the Soils in the Vicinity of Pit 1 with the Bioventing of All Contaminated Soils

*Confirmation Sampling estimates, 22 boreholes, $18,000; 98 VOC and SVOC samples, $35,000; 2 rounds = $106,000

TABLE A-2
O & M COSTS
COMPONENT O & M COSTS (ANNUAL)

ALTERNATIVE		1	2	3	4	5
COMPONENT O&M COSTS						
	Groundwater Monitoring		$12,000	$12,000	$12,000	12,000
	Reporting		$1,500	$1,500	$1,500	1,500
	Groundwater Treatment, Includes Reporting Costs			$313,500	$313,500	$313,500
	Propane				$87,500	$44,000
	Supplies and Parts -SVE				$8,000	$4,000
	Maintenance -SVE				$31,500	$16,000
	Air Compiance Sampling - SVE				$13,000	$6,500
	Reporting				$16,000	$16,000
	Supplies and Parts, Bioventing					$2,000
	Maintanence -Bioventing					$10,500
	Reporting					$2,000
SUBTOTAL - ANNUAL O&M COSTS Sum of component technologies costs and reporting costs.	Groundwater Monitoring	$0	$13,500	$13,500	$13,500	$13,500
	Product Removal/Groundwater Extract	$0	$0	$313,500	$313,500	$313,500
	SVE	$0	$0	$0	$156,000	$70,500
	Bioventing	$0	$0	$0	$0	$13,000
Annual O & M COSTS	Subtotal	**$0**	**$13,500**	**$327,000**	**$483,500**	**$410,500**

TABLE A-3 CONTINUED
PRESENT WORTH SUMMARY

ALTERNATIVE		1	2	3	4	5
	Groundwater Monitoring		$13,500	$13,500	$13,500	$13,500
SUBTOTAL - ANNUAL O&M COSTS	Product Removal/Groundwater Extract			$313,500	$313,500	$313,500
Sum of component technologies	SVE				$156,000	$70,500
costs and reporting costs.	Bioventing					$13,000
Annual O & M COSTS	Subtotal	**$0**	**$13,500**	**$327,000**	**$483,500**	**$410,500**
O & M OPERATIONAL PERIOD	Groundwater Monitoring	0 Yrs	100 Yrs +	10 Yrs	15 Yrs	15 Yrs
Cross referenced by technology	Product Removal/Groundwater Extract.	0 Yrs	0 Yrs	0.5 Yrs	10 Yrs	10 Yrs
and operational period	SVE	0 Yrs	0 Yrs	0 Yrs	6 Yrs	6 Yrs
	Bioventing	0 Yrs	0 Yrs	0 Yrs	0 Yrs	10 Yrs
PRESENT WORTH OF O & M	Groundwater Monitoring	$0	$224,500	$99,500	$131,500	$131,500
annual O & M cost indexed for the	Product Removal/Groundwater Extract.	$0	$0	$150,500	$2,307,500	$2,307,500
operational period of the technology	SVE	$0	$0	$0	$767,500	$347,000
	Bioventing	$0	$0	$0	$0	$96,000
TOTAL PRESENT WORTH (O & M)		**$0**	**$224,500**	**$250,000**	**$3,206,500**	**$2,882,000**
TOTAL CAPITAL COSTS FROM TABLE A1		**$0**	**$30,000**	**$65,771,500**	**$1,647,000**	**$539,500**
TOTAL PRESENT WORTH BY ALTERNATIVE		**$0**	**$254,500**	**$66,021,500**	**$4,853,500**	**$3,421,500**

APPENDIX B

TIME FRAME FOR REMEDIATION BY VARIOUS TECHNOLOGICAL COMPONENTS

TIME FRAME FOR REMEDIATION

The estimated time frames for remediation were determined based on product recovery, SVE, and bioventing operations from the ongoing removal actions. Time frames for various components are discussed below.

Product Recovery

As of the end of July 2000, 19,986 gallons of product have been removed by the onsite recovery system since system startup in 1993. At the end of 1998, the amount of recoverable (free) product remaining at the site was estimated to be approximately 12,000 gallons (URS 1999). Between January 1999 and July 2000, 1,420 gallons of product were recovered. Therefore, 10,580 gallons of free product are estimated to remain as of the end of July 2000. Because of wide variations in historic rates of product recovery from month to month, estimates of the duration of time needed to recover the remaining free product are highly speculative. If the average monthly rate of recovery over the eight year operation of the current system (208 gal/month) is assumed, then all of the remaining free product would be recovered in less than 5 years. The average rate of recovery over the last 6 months of operation (February through July 2000) is 167 gallons/ month. Even if an annual 15% drop off in monthly recovery rate from the current rate is assumed (first year monthly average equals 167 gallons/month, second year monthly average equals 142 gallons/month, etc.) then all of the remaining free product would be recovered in less than 10 years. Residual (non-pumpable) product located above and below the water table will be addressed by SVE, bioventing, and water table depression.

SVE

The estimated quantity of TCE and DCE at the source, as of 1 September 1999, is 1,300 pounds. Approximately 313 pounds of TCE and DCE has been removed by the SVE system since February 1998. The current rate of TCE/DCE removal by SVE is approximately 20 pounds per month. At this rate, all TCE/DCE will be removed in approximately six years.

Bioventing

It is estimated that bioventing treatment will be completed in five to 10 years.

An average biodegradation rate of 1,400 mg/kg/year for petroleum hydrocarbons was reported in the bioventing treatability study (Parsons 1995). The average petroleum hydrocarbon concentration reported in the FS (URS 1995) is approximately 6,500 mg/kg. Using these two values, the estimated time frame for completion of bioventing is approximately five years.

A maximum biodegradation rate of 4,300 mg/kg/year for petroleum hydrocarbons also was reported in the treatability study (Parsons 1995). The maximum petroleum hydrocarbon concentration reported in the FS (URS 1995) is approximately 46,000 mg/kg. Using these two values, the estimated time frame for completion of bioventing is approximately 10 years.