CITY OF ELMIRA

FINAL REMEDIAL ALTERNATIVES REPORT

FOR THE
FORMER AMERICAN LAFRANCE SITE
100 LAFRANCE STREET
ELMIRA, NEW YORK

MUNICIPAL ASSISTANCE BROWNFIELD PROGRAM

N Y S D E C
1996 CLEAN WATER / CLEAN AIR BOND ACT
ENVIRONMENTAL RESTORATION PROJECTS

SUBMITTED TO:

NYS DEPARTMENT OF ENVIRONMENTAL CONSERVATION
DIVISION OF ENVIRONMENTAL REMEDIATION
AND
NYS DEPARTMENT OF HEALTH

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REMEDIAL ALTERNATIVES REPORT
FORMER AMERICAN LAFRANCE SITE
MUNICIPAL ASSISTANCE BROWNFIELD PROGRAM
ENVIRONMENTAL RESTORATION PROJECT

TABLE OF CONTENTS

REMEDIAL ALTERNATIVES REPORT
FORMER AMERICAN LAFRANCE SITE
MUNICIPAL ASSISTANCE BROWNFIELD PROGRAM
ENVIRONMENTAL RESTORATION PROJECT

TABLE OF CONTENTS

TABLE OF CONTENTS

LIST OF FIGURES

REMEDIAL ALTERNATIVES REPORT
FORMER AMERICAN LAFRANCE SITE
MUNICIPAL ASSISTANCE BROWNFIELD PROGRAM
ENVIRONMENTAL RESTORATION PROJECT

ACRONYMS

ALF	American LaFrance Site
AOC	Area of Concern
C&D	Construction and Demolition Debris
DER	Division of Environmental Remediation
DLP	Duplicate Sample
ECD	Election Capture Detectors
EL	Elevation
EWB	Elmira Water Board
GC	Gas Chromatograph
GRAs	General Response Actions
GW	Groundwater
H	Surface Soil Sample Identification
KG	Kilogram
MG	Milligram
MGD	Million Gallons per Day
MW	Monitoring Wells
NYS	New York State
NYCRR	New York State Code of Rules and Regulations
NYSDEC	New York State Department of Environmental Conservation
NYSDOH	New York State Department of Health
N_2	Nitrogen Carrier Gas
PBS	Petroleum Bulk Storage
PCB	Polychlorinated Biphenyls
PID	Photoionization Detector
PPM	Parts Per Million
QC	Quality Control

ACRONYMS (Continued)

RA	Remedial Alternatives
RAA	Remedial Action Alternatives
RAO	Remedial Action Objectives
RAR	Remedial Alternatives Report
RSCO	Recommended Soil Cleanup Objectives
SAC	State Assistance Contract
SAMP	Sampling and Analytical Monitoring Plan
SCGs	Standards, Criteria and Guidance
SEQR	State Environmental Quality Review Act
SI	Site Investigation
SVOC	Semi-Volatile Organic Compounds
SVS	Soil Vapor Survey
TAGM	Technical Assistance Guidance Memorandum
TCL	Target Compound List
TCLP	Toxicity Characteristic Leaching Procedure
TOGS	Technical and Operational Guidance Series
US	United States
USDA	United States Department of Agriculture
USEPA	United States Environmental Protection Agency
USGS	United States Geological Survey
UST	Underground Storage Tank
VOC	Volatile Organic Compounds

EXECUTIVE SUMMARY

This RAR report has been prepared for the former American LaFrance site in accordance with the Municipal Assistance Brownfields Program Procedures Handbook for Title 5 of the 1996 Clean Water/Clean Air Bond Act outline.

A Site Investigation (SI) report has been completed for this site. The SI has provided sufficient data to describe groundwater characteristics and gradients, to evaluate the extent to which natural or manmade barriers currently contain the contamination, and fully characterize contaminants in all matrices.

The property's potential contribution to air, land, water, biota, or food chain contamination mechanisms have been qualitatively analyzed and a final determination made as to the extent to which contamination levels pose an unacceptable risk to public health and/or the environment.

Remedial Action Alternative 2 is preferred as the remedial choice for this site. This selection is premised on the ability of the RAA to fulfill the remedial action objectives (RAO's) based on the assessed risk to human health and the environment and the projected future site use (commercial or industrial). Alternative 2 provides a responsible cost-effective remedial effort.

(Seal)

Dennis A Fagan, P.E.
Fagan Engineers

1. INTRODUCTION

1.1 Purpose and Organization of Report

The development of RAO's provides for the protection of human health and the environment and have been evaluated on a risk based assessment.

Four remedial action alternatives (RAA's) have been identified to mitigate issues of concern identified during the SI. The RAO's target the specific waste streams characterized in the SI for remediation. Please refer to the SI report for site investigation details.

1.2 Background Information (Summarized from SI Report)

1.2.1 Site Description

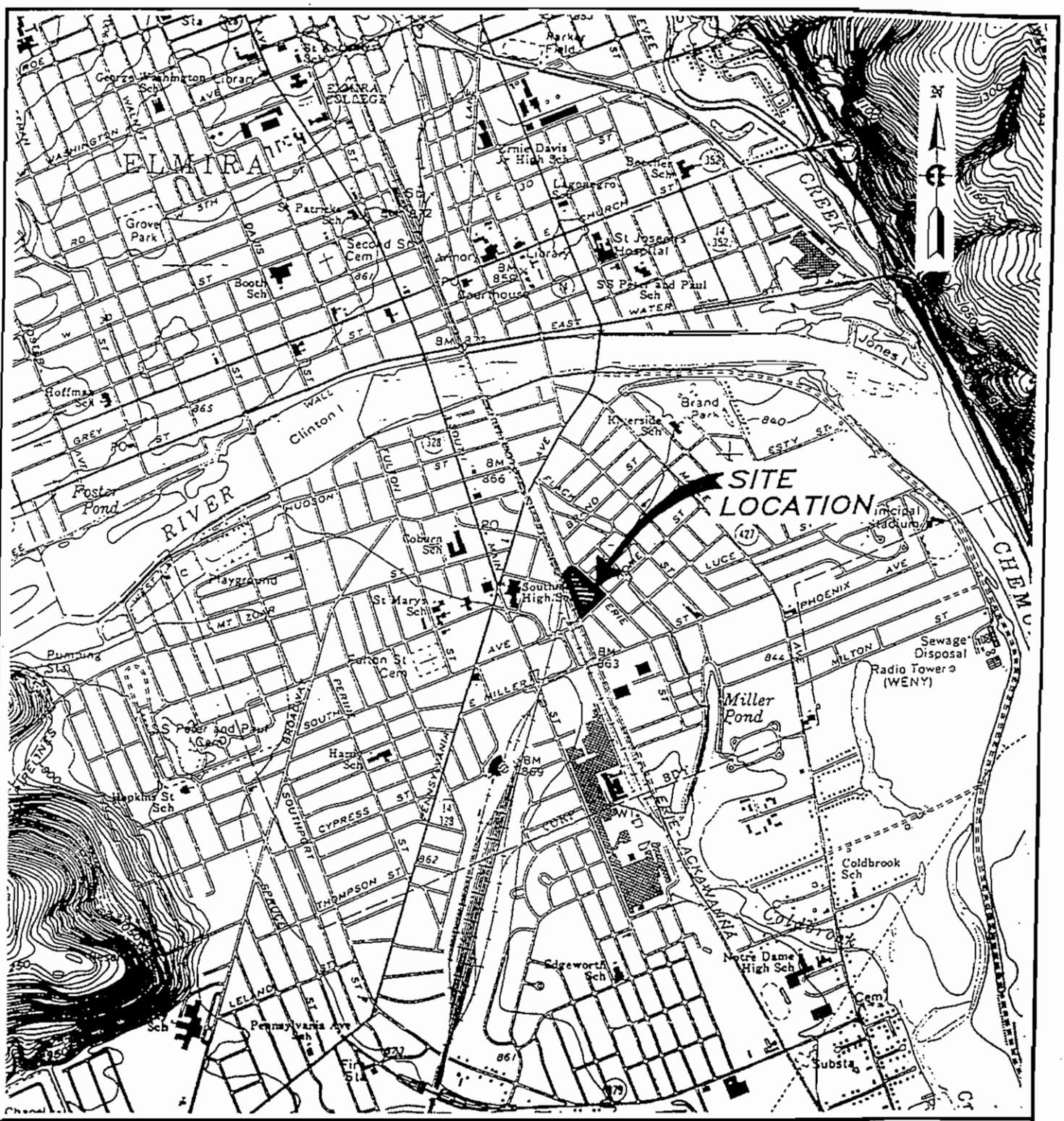
The American LaFrance Brownfield site is located within the City of Elmira in Chemung County, New York **(see Figure 1)**. The site includes the former American LaFrance Fire Engine Company. The facility property covers a 4.357 acre irregular shaped vacant parcel located on the west side of Erie Street in the City of Elmira, Chemung County, New York **(see Figure 2)**. The Owner of Record is the City of Elmira. The site is located in an Economic Development Zone. Structures on the site have been demolished and C & D materials removed from the location. Subsurface foundations have not been removed from the site. The previous structures consisted of five former factory buildings and a smoke stack area. Buildings on the parcel were separated by paved corridors and staging areas.

1.2.2 Site History

Various manufacturing operations were ultimately abandoned by their owners and acquired by the City through tax foreclosure proceedings at this site that was home to the former American LaFrance Fire Engine Company since the turn of the century. This site was acquired by the City in the 1980's via a tax foreclosure proceeding. In 1984, the site buildings were demolished by the City. A Phase I environmental assessment was recently completed for the City which showed the need for a detailed Phase II assessment due to the presence of a former foundry area, painting areas, paint spray booths and machine shops. The Phase I assessment also showed the presence of liquid tar on the ground surface adjacent to the nearby Conrail property.

Former uses of the subject site relate to fire truck and fire extinguisher manufacturing with approximate dates of operation as follows:

1903	LaFrance Fire Engine Company
1925-1930	American LaFrance Fire Engine Company
1935-1950	American LaFrance and Foamite Company
1955-1960	American LaFrance Foamite Corporation
1965-1970	American LaFrance, a division of Sterling Precision Instruments
1975-1980	American LaFrance, a division of Automatic Sprinkler Corporation



AMERICAN LAFRANCE BROWNFIELDS SITE

FIGURE 1

LOCATION MAP

SCALE: 1" = 2,000'

FORMER AMERICAN-LAFRANCE PROPERTY
TAX MAP # 99.12-2-1.1
ELMIRA, NEW YORK
AUGUST 2000

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ERIE STREET

E. LA FRANCE ST.

HOME STREET

MANDEL'S RESTAURANT PROPERTY

FORMER FACTORY BUILDING

MACHINE SHOP

PAINTING

PAINT SHOP

N.Y.S.D.O.T. JOB TRAILER

SMOKE STACK AREA

PAVED AREAS

FOUNDRY

MACHINE SHOP

SPRAY BOOTH AREA

UST

NO GW RECOVERY

837.8

838

838

838.2

839

838.4

838.6

838.8

839

839.2

839.4

CONSOLIDATED ARTERIAL RAIL

MW-1 (COUNTY PROPERTY) OFF-SITE

MAINTENANCE BUILDING

LEGEND

- G-12 GEOPROBE LOCATIONS (18)
- GW-5 GEOPROBE GROUNDWATER SAMPLE LOCATIONS (5)
- H SURFACE SOIL SAMPLES, DOH (4)
- MONITORING WELL LOCATIONS (3)
- UST UNDERGROUND STORAGE TANK
- G-B2 GEOPROBE BACKGROUND LOCATIONS (2)
- GRID SPACING = 50'
- PROPERTY BOUNDARY

NOTE:
GEOPROBE, SURFACE SOIL AND MONITORING WELL DATA IS AVAILABLE IN THE SITE INVESTIGATION REPORT DATED SEPTEMBER 2000.

FORMER FACTORY BUILDING LOCATION REFERENCE :

NEW YORK STATE DEPARTMENT OF TRANSPORTATION
CITY OF ELMIRA NORTH – SOUTH ARTERIAL
PENNSYLVANIA AVENUE TO CEDAR STREET
MAP # 2, SHEET 1. DATED : MAY 1980.
FORMER BUILDING LOCATIONS ARE APPROXIMATE AS SITE IS CURRENTLY VACANT.

AMERICAN LAFRANCE
BROWNFIELDS SITE
REMEDIAL ACTION REPORT

FORMER AMERICAN–LAFRANCE PROPERTY
TAX MAP # 99.12–2–1.1
ELMIRA, NEW YORK
SEPTEMBER 2000

FIGURE 2

SITE PLAN

SCALE : 1"=60'

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FILE: 97150–2 JOB # 97.150

1980	NYS Department of Transportation
1984	According to Steve Avery of the City of Elmira, a demolition permit was issued to L. M. Sessler on March 28, 1984. The completion date of record is November 1984.
1990	Vacant

The LaFrance Fire Engine Company occupied the site in 1903 according to the 1903 Sanborn map. A municipal sewer was not installed in the area until 1906. Therefore the original manufacturing facility initially was not, and may never have been, connected to the sewer.

1.2.3 Nature and Extent of Contamination

The SI results indicate the nature and extent of contamination on the subject site. The Areas of Concern (AOC) are described in this section.

1.2.3.1 AOC: Surface Soil

Surface soil samples were collected at a depth of zero to three inches from select locations. Sampling was conducted per NYSDOH requirements. Laboratory results are summarized in the SI.

Mercury levels exceeded Recommended Site Cleanup Objectives (RSCO) at several locations including the off-site location H1. Location H2 shows elevated Mercury levels of 6.5 mg/kg.

Chromium was detected at 51.9 mg/kg at off-site location H1. This level exceeded the Chromium concentration detected in the on-site samples by approximately three times.

A Cadmium level of 0.99 mg/kg was detected in sample H2.

The following semi volatile organic compounds (SVOC's) were detected at or above RSCO at the indicated locations:

H1: Benzo(a)anthracene, Indeno(1,2,3-cd)pyrene, Benzo(b)fluoranthene, Benzo(k)fluoranthene, Benzo(a)pyrene, Chrysene, Benzo(g,h,i)perylene

H2: Benzo(a)anthracene, Anthracene, Benzo(b)fluoranthene, Chrysene, Benzo(k)fluoranthene, Benzo(a)pyrene, Indeno(1,2,3-cd)pyrene, Benzo(g,h,i)perylene

H3: None

H4: Chrysene, Benzo(b)fluoranthene, Benzo(a)anthracene, Benzo(k)fluoranthene, Benzo(a)pyrene, Indeno(1,2,3-cd)pyrene, Benzo(g,h,i)perylene

Arochlor 1260 was detected at 1.4 mg/ kg in location H2 and 0.44 mg/kg at location H4. The level of contamination at H2 is slightly above the USEPA 1.0 ppm maximum for surface soils.

The petroleum contamination, which exists both above and below grade and is marbled in the soil, was sampled for toxicity characteristic leaching procedure (TCLP) and full target compound list (TCL) analyses. Diesel-type constituents were detected in the sample. The sample passed the TCLP test and hence the petroleum contamination is not considered hazardous.

1.2.3.2 AOC: Geophysical Survey Test Pits

The geophysical survey identified 16 anomalies on the subject site, which were indicative of potential underground storage tanks (UST's), foundations, or other buried metals. The anomalies were surveyed for accurate location and test pits were subsequently performed at each anomaly location.

Visibly stained material was sampled and analyzed for TCL analyses based on field findings at three locations (B, J, and H). The laboratory results of these samples are presented in the IS and presented in figures and tables in the SI.

Anomaly B exhibited a limited vein of sandy burnt appearance and visible staining at a depth of 19"-29". The following metals of interest were detected above RSCO's:

Arsenic	17.2	mg/l
Cadmium	4.32	mg/l
Copper	1160.0	mg/l
Lead	640.0	mg/l
Mercury	0.85	mg/l
Zinc	766.0	mg/l

Anomaly H corresponds to the UST location. The contaminant was sampled for TCLP and full TCL analysis. Copper and Zinc detected in the sample were slightly above RSCO's. SVOC's were also detected above RSCO's.

Gray ash was encountered at anomaly J at a depth of 12"-36". This ash was sampled for target analyte list (TAL) Metals. Arsenic, Copper, and Zinc detected in this sample were slightly above RSCO's.

1.2.3.3 Soil Vapor Survey (SVS)

Two separate chromatograms were prepared for each analysis, that is, the Photoionization Detector (PID) and the Electron Capture Detector (ECD), which detect their respective compounds.

The SVS detected several volatile organic compounds (VOC's) in trace quantities at depths between 2-8 feet. The VOC's detected are below RSCO's.

VOC's above ambient levels were primarily detected in the eight to twelve foot depth macro cores, which exhibited odors or visible staining. This interval corresponds with the groundwater interface (vadose) zone or capillary fringe. Elevated PID readings above ambient levels were detected at this interval as well and the material was sampled for TCL analysis.

Trace levels of 1,2-Dichlorodifluoroethane, 1,1-Dichloroethane, and Chloroethane have been detected with the gas chromatograph with electron capture detector (GC-ECD) in the Geoprobe macro core samples. However, the 1,2-Dichlorodifluoroethane peak corresponds with the injection peak, which occurs during injection of the sample, and is likely the result of said injection due to the short run time utilized during the SI.

The following concentrations were detected:

Location	Depth (in feet)	Compound	Concentration (in mg/l)	Detector/Run#
G-2/G-2Dup	8-12	Styrene	12.646	PID/187
		o-Xylene	7.452	PID/188
		4-Methyltoluene	10.500	PID/188
G-8*	8-12	Chlorobenzene	2.022	PID/204
		Ethylbenzene	2.022	PID/204
		p-Xylene	1.159	PID/204
		Styrene	1.489	PID/204
		4-Methyltoluene	1.896	PID/204
G-9	0-4	1,2-Dichloroethane	6.595	ECD/205
	8-12	(see SI Appendix D)		PID/207
G-13**	8-12	(see SI Appendix D)		PID/220
GW-2	4-8	1,3-Dichlorobenzene	4.376	PID/226
G-12	0-4	4-Methyltoluene	5.951	PID/229
		1,3,5-Trimethylbenzene	5.951	PID/229
		1,3-Dichlorobenzene	4.725	PID/229
		Carbon Tetrachloride	3.097	ECD/229
		1,1,2,2-Tetrachloroethane	4.775	ECD/229
	4-8	1,2,4-Trimethylbenzene	3.879	PID/230
	8-12	1,2,4-Trimethylbenzene	2.286	PID/231
GW-5	4-8	1,3-Dichlorobenzene	6.923	PID/241
	8-12	1,3-Dichlorobenzene	6.787	PID/242
GW-4***	0-4	1,3-Dichlorobenzene	9.641	PID/243
	4-8	(see SI Appendix D)		PID/244
	8-12	(see SI Appendix D)		PID/245,246
G-7	0-4	Chlorobenzene	4.044	PID/265
GW-3	4-8	1,1,1-Trichloroethane	5.900	ECD/269

G-5	8-12	(see SI Appendix D)	PID/283
G-6	8-12	(see SI Appendix D)	PID/290
B-1	4-8	****	PID/302

* A dilution of 1.0ml headspace in 1000ml N_2 carrier gas due to elevated PID readings was prepared for sampling to minimize potential column damage.

** VOC concentrations above site-wide levels were detected at location G-13. However, the compounds were not duplicated in the laboratory sample analyzed. This location is downgradient to the UST.

*** Location GW-4 shows elevated VOC levels at the 4-8 foot and 8-12 foot intervals.

**** Location B-1 shows trace VOC levels at the 4-8 foot interval.

All Geoprobe macro core samples were screened with a PID equipped with a 10.2 eV lamp prior to sampling with the GC.

The SVS results have been summarized in Tables 4, 5, and 6 of the SI. Undifferentiated "peaks" occurring subsequent to all compounds eluting off the column at 12 to 16 minutes, are the result of septa bleed at the higher temperature (during ramping). This has been verified with the manufacturer.

Comparison of site-wide Soil Vapor Survey (SVS) results versus location GW-4 results at depths of 4-8 and 8-12 feet show marginally elevated VOC levels at the aforementioned GW-4 depths. However, this does not appear to be a significant source of contamination as the soil and groundwater laboratory results do not support the SVS results for VOC's detected.

1.2.3.4 AOC: Subsurface Soils

Subsurface soils obtained from Geoprobe Macro Cores, which exhibited odors or visible staining from the surface to the depth of groundwater, were sampled for full TCL analysis. The laboratory results of these samples are presented in the IS and presented in figures and tables in the SI.

The metals and VOC's listed below were detected in the subsurface soils as follows:

Location	Contaminant	Level Detected	Depth
G-4	Cadmium	12.70 mg/l	2-4 feet
G-8	Mercury	0.22 mg/l	1-3 feet
G-3	Trichloroethene	68.00 µg/kg	6-7 feet
GW-3	Trichloroethene	1400.00 µg/kg	3.5-4 feet

VOC's consistent with those detected at the UST were detected at levels above RSCO's in the subsurface soils at locations B-2, G-3 and G-4.

1.2.3.5 Geoprobe Macro Core Vadose Zone

Geoprobe macro cores locations at the Vadose Zone exhibiting odors or visible staining were sampled for full TCL analysis. The samples exhibited a diesel petroleum odor characteristic of that encountered at the UST. The laboratory results of these samples are presented in the IS and presented in figures and tables in the SI.

The laboratory results for location G-13 show SVOC compounds below RSCO. This is consistent with the petroleum compounds detected at the UST. Location G-13 is downgradient from the UST.

A Trichloroethene level of 910.0 µg/kg was detected at location G-7.

1.2.3.6 AOC: UST

Excavation in the UST area was conducted to determine the nature and extent of potential contamination from the tank. The estimated 12,000-gallon UST contains approximately 6,000 gallons of material resembling and purported to be #6 fuel oil. The immediately surrounding soil is impacted with the same contaminant.

The contaminant was sampled and analyzed for TCLP and full TCL analyses. The lab results reflect diesel-type constituents. The contaminant was determined to be non-hazardous by TCLP for disposal at a municipal solid waste landfill.

The dominant threat to groundwater contamination has been determined to be from the UST, which contains a diesel-based fuel oil (presumably #6 fuel oil).

1.2.3.7 AOC: Groundwater

Five on-site groundwater samples were obtained as part of the Geoprobe macro cores at GW-1, GW-2, GW-3, GW-4, and background location B-2 for TCL analysis. A clay lens was encountered at the proposed GW-5 groundwater sampling point. The clay extended to 22-feet, at which point the macro coring was terminated due to lack of groundwater. Background location B-2 was substituted for GW-5. The laboratory results of these samples are presented in the IS and presented in figures and tables in the SI. The results of these groundwater samples are presented in Appendix G of the SI.

The on-site Geoprobe groundwater laboratory results detected the following VOC's and SVOC's:

Compound	GW Standard	W-ALFGW2-092299	W-ALFGW4-092399
Acetone	50 µg/l	44.0 µg/l	-------
Carbon Disulfide	50 µg/l	------	26.0 µg/l
2-Methylnapthalene	50 µ/l	250.0 µg/l	-------
Phenanthrene	50 µg/l	160.0 µg/l	-------

Groundwater samples were also obtained from two on-site downgradient and one off-site upgradient monitoring wells constructed as part of the SI.

The following VOC's were detected in the first sampling of the monitoring wells:

Compound	GW Standard	MW-1	MW-2	MW-3
Chloroform	7.0 µg/l	5.0 µg/l	--------	--------
Acetone	50.0 µg/l	---------	41.0 µg/l	--------

Iron, Manganese, Aluminum, and Sodium all exceeded NYS Ambient Water Quality Standards in the background well (MW-1). Therefore, these potential contaminants are ubiquitous in nature.

The number of exceedences for the remaining metals that were detected slightly above NYS Groundwater Standards is as follows (see Table 9):

Metal	**Number of Exceedences**
Antimony:	1
Arsenic:	2
Barium:	1
Chromium:	1
Cobalt:	3
Lead:	3
Magnesium:	4
Vanadium:	2

The exceedences for metals is low, infrequent, and random. The groundwater laboratory results for the cross gradient background monitoring well at the adjacent Chemung Foundry Brownfields site (MW-3), also shows exceedences for Arsenic, Lead, and Vanadium.

There were no PCB's, Pesticides or Herbicides detected in the groundwater samples.

1.2.3.8 PCB Soil Samples

Soils sampled for the presence of PCB's did not detect the presence of PCB's at the previous PCB cleanup area.

1.2.3.9 Surface Water and Sediments

Although no sediment deposits or staining beyond the surface petroleum contamination area was observed on the site, stormwater runoff could act as a conduit for the surface migration of trace surface petroleum compounds if the UST were left in place.

1.2.3.10 Air

The compact surface soils and vegetation reduce the occurrence of airborne particulates. However, during heavy wind or during any ground intrusive activities on the site, loose surface soil particles could become airborne.

The SI results indicate localized surface contaminants in the area of sample H2. The laboratory results of these samples are presented in the IS and presented in figures and tables in the SI. Mercury, Cadmium, PCB's, and SVOC's were detected in levels exceeding the TAGM 4046 RSCO.

The SI results indicate subsurface soil pockets or veins of contaminants at various locations on the site with elevated contaminant levels in area GW-4 at a depth of 4' to 12'. Metals and SVOC's have been detected in levels exceeding RSCO.

The SI results indicate that groundwater contamination consisting of the detected SVOC's originate from the UST area as the SVOC's are consistent with #6 fuel oil. 2-Methylnapthalene and Phenanthrene were detected in concentrations above NYS Ambient Water Quality Standards.

The UST SVOC's, laboratory results, and historical record show that virgin #6 fuel oil is the contaminant of concern. The UST is purported to be a 12,000-gallon tank buried two feet below the surface. The tank contains approximately 6,000-gallons of gelled fuel oil. Further investigation as to actual size and depth were not conducted due to the spill surrounding the immediate tank area.

1.2.4 Contaminant Fate and Transport

1.2.4.1 Contaminants in Surface Soil

Metals

The Mercury, Chromium, and Cadmium levels represent total metals analysis. Metals are not readily dissolved in water. As the result of a significant rain event, elevated metals detected in the surface soil at specific

locations on the site could migrate via sheet flow to other surficial areas on the site, or slowly migrate horizontally and be adsorbed by localized soil particles.

PCB's

Arochlor 1260 was detected in trace quantities (1.4 mg/kg and 0.44 mg/kg) at two sample locations. There was no evidence of surface staining or contaminant migration patterns in the Geoprobe soil cores. As PCB's are not readily soluble in water, significant migration is not expected.

SVOC's

The SVOC's are expected to remain bound to the soil just below the surface. There was no evidence of surface staining or contaminant migration patterns in the Geoprobe soil cores. As the SVOC's are not readily soluble in water, significant migration is not expected.

1.2.4.2 Contaminants in Subsurface Soils

Metals

The levels of metals detected represent total metals analysis. Metals are not readily dissolved in water. Geoprobe macro cores exhibit compact dry soil horizons and show no visible contaminant migration patterns. There is no correlation of metals levels with respect to depth detected.

The compact soil conditions could inhibit significant percolation of rainfall to the subsurface. Bands of contaminants were observed to be intact and did not exhibit visible signs of migration. Significant migration of contaminants is not expected.

VOC's

Trichloroethene was detected in trace quantities (68 µg/kg to 1400 µg/kg) at unrelated locations and depths. The Geoprobe macro cores exhibit compact dry soil horizons and show no visible contaminant migration patterns. Bands of contaminants were observed to be intact and did not exhibit visible signs of migration. Trichloroethene was not detected in groundwater. Significant migration of contaminants is not expected.

The SVS data does not support a significant source of Trichloroethene on the subject site.

SVOC's

The SVOC's are expected to remain bound to the soil just below the surface. There was no evidence of contaminant migration patterns in the Geoprobe soil cores. As the SVOC's are not readily soluble in water, significant migration is not expected.

The SVOC's are expected to remain in the areas detected and the subsurface contaminants show little indication of vertical migration as is confirmed by the SVS data.

1.2.4.3 Contaminants in Groundwater

Metals

The exceedences for metals is low, infrequent, and random. The groundwater laboratory results for the cross gradient background monitoring well at the adjacent Chemung Foundry Brownfields site (MW-3), also shows exceedences for Arsenic, Lead, and Vanadium.

VOC's

A Chloroform level of 5.0 µg/l was detected in upgradient MW-1, and an Acetone level of 41 µg/l was detected at MW-2 (both within groundwater standards). The Acetone is likely a laboratory error and Chloroform was not detected on-site.

SVOC's

The SVOC's detected in the Vadose Zone indicate migration with the groundwater gradient. The SVOC's detected in groundwater will migrate in groundwater and be naturally attenuated.

1.2.5 Baseline Risk Assessment

A risk assessment evaluates the present and potential future impacts on public health and the environment caused by contaminants found on the project site. The baseline risk assessment determines the risk to public health and the environment for the site with no remedial action. This baseline is used to determine if and to what extent the site must be remediated. Any remedy considered for this site will address identified current and future exposure pathways.

The objective of site remediation is to lower or eliminate the potential risk to human health. Since groundwater is not being used on or near the site, the potential risk from groundwater contaminants, or subsurface soil contaminants leaching into the groundwater, is minimal. The most significant AOC is the surface soil. Metals, pesticides, and SVOCs have been identified in the first six inches of soil.

Exposure pathways could exist for the surface soil. The site is presently vacant. Remediation will be performed on the site to include placement of a barrier layer above the existing surface soils and the use of an air monitoring program during such remediation to eliminate any health risk posed by the site.

2. IDENTIFICATION AND DEVELOPMENT OF REMEDIAL ALTERNATIVES

2.1 Introduction

The development of remedial alternatives consists of the following:

1. Identification of site issues and potential pathways
2. Identification of general response actions
3. Identification and review of technologies applicable to each issue
4. Development of appropriate general response actions
5. Review technologies with regard to effectiveness, implementability, and prepare initial cost projections.
6. Configure the selected technologies into remedial alternatives

Identification of site issues and potential pathways have been previously described. The remaining steps in the procedure to develop remedial alternatives is elucidated in the subsections that follow.

2.2 Remedial Action Objectives

The overall remedial objectives for the subject site are designed to provide for the protection of human health and the environment and are consistent with the City of Elmira's proposed commercial/industrial use of the property. General response actions are identified to achieve the remedial action objectives and to identify technologies that may be used to implement the response actions.

2.2.1 Contaminants of Interest

The primary contaminants of interest and applicable AOC's have been identified and described in Section 1 of the SI.

The remedial objective for surface soil is to reduce or eliminate the conduit by which the contaminants that exceed RSCO may impact public health and the environment. The conduits are inhalation of surface particles and absorption via dermal contact and ingestion of the soils (primarily by children).

2.2.2 Identification of Standards, Criteria, and Guidelines

Title 6 of the New York Codes, Rules & Regulations (NYCRR), Inactive Hazardous Waste Sites, Part 375-1.10, Remedy Section, establishes the general rules for the selection of a remedy for the entire site or any portion of the site thereof.

The chosen remedial program must be designed to conform to the standards, criteria, and guidances (SCG's) set forth in this section unless good cause exists why conformity should be dispensed with. The remedy selection must also be in compliance with federal guidelines, specifically the National Oil and Hazardous Substances Pollution Contingency Plan of March 8, 1990, applicable to the remedy selection.

Such requirements may be chemical specific standards that assist in establishing safe exposure levels of contaminants of interest, action specific standards relating to the technology and performance of remedial actions, location specific restrictions on activities at specific locations.

Potential applicable SCG's for remedial actions are identified as follows:

Chemical specific SCG's

6 NYCRR Parts 702 and 703

Part 702; the Derivation and Use of Standards and Guidance Values, and Part 703; the Surface Water and Groundwater Quality Standards and Groundwater Effluent Standards are standards and guidance values established according to procedures in Part 702 to protect surface and groundwaters in the State of New York as defined in Part 703.

NYSDEC Technical and Operational Guidance Series 1.1.1 (TOG's)

The Technical and Operational Guidance Series 1.1.1 (TOG's) provides a compilation of ambient water quality guidance values and groundwater effluent limitations to be used when no standard or effluent limitation is set forth in 6 NYCRR 703.5 and 703.6, respectively.

NYSDEC Technical Assistance Guidance Memorandum (TAGM) HWR 94-4046

TAGM HWR (NYSDEC Division of Hazardous Waste Remediation) 94-4046 provides a basis and procedure to determine soil cleanup levels at sites that will, at a minimum, eliminate all threats to human health and/or the environment posed by inactive hazardous waste sites.

USEPA Publication 9355.4-14FSA, Soil Screening Guidance: Fact Sheet

This EPA Soil Screening Guidance Fact Sheet has been referred to and presents the key aspects of soil screening guidance developed by the USEPA to aid in standardization and accelerate evaluation and cleanup of contaminated sites for anticipated future residential use. Step-by-step methodology to calculate risk-based site-specific soil screening levels contaminants in soil and may be used to identify areas that may need future investigation.

Action Specific SCG's

6 NYCRR Part 360

Part 360 presents solid waste management regulations that may be applicable in part to any solid waste remedial activities at the American LaFrance site.

6 NYCRR Part 375

Part 375 specifically addresses inactive hazardous waste disposal site remediation and remedy selections for contaminated sites based on the standards, criteria, and guidance set forth in this Part. Evaluation of the remedial alternatives will be performed in accordance with Part 375-1.10(c)(1-7).

6 NYCRR Parts 364, 370, 371, 372, 373, 374, 376

The Parts under this subheading present the hazardous waste management and transporter regulations including the identification and listing of hazardous waste. Federal regulations 40 CFR 261-268 also pertain to hazardous waste management.

6 NYCRR Parts 612 and 613

Parts 612 and 613 present the Petroleum Bulk Storage (PBS) regulations. The registration of PBS facilities is presented in Part 612. Part 613 addresses the handling and storage of petroleum products including closure of UST's. Federal regulation 40 CFR 280 also pertains to UST closures.

6 NYCRR Part 617

Part 617 is the State Environmental Quality Review Act (SEQR) presents the process by which a determination is made as to whether the actions to be taken will have a significant impact on the environment. Certain potential remedial actions that may affect the environment are subject to SEQR review.

6 NYCRR Parts 200, 201, 211

Parts 200, 201, and 211 present the regulations for prevention and control of air contaminants, general provisions, permit requirements, and general prohibitions. The above referenced regulations may be applicable during cleanup activities that could generate airborne particulates.

Location Specific SCG's

6 NYCRR Part 701

Part 701.15 presents the classification of surface waters and groundwaters. According to these regulations, Class GA, fresh water groundwater, is relevant to the subject site.

2.3 Identification of General Response Actions

General Response Actions (GRA) are a class of responses that address remedial objectives for areas of interest on the subject site. For each area of concern, a GRA identifies individual response actions that will meet the cleanup goals. The possible/feasible remedial actions at this site are limited by the extent of the (limited) contamination identified.

GRA's are developed for each AOC. The estimated areas or volumes to which treatment, containment, or exposure reduction technologies may be applied are intended to satisfy the remedial action objectives.

Possible Alternative Response Actions

For each medium of interest treatment, containment, or exposure reduction technologies may be applied. Because the problems at each AOC are related to or are affected by the other AOC's, remedial alternatives were developed for the site, and are designed to address this combination of different AOC's. These alternatives are described in greater detail later in this report. The possible alternative response actions are as follows:

No Action: There are no compounds on the site at hazardous levels although there is significant petroleum contamination in the ground. No action has been the course of action that has taken place to date at the site. Currently the petroleum contamination is mobile, and will continue to spread over time. Surface contaminants are currently covered with vegetation, which will limit the exposure pathway. However, even though the downgradient area has a public water supply, which limits the petroleum exposure pathways, the lack of action would allow for the continued spread of contamination. This alternative would include continued monitoring of groundwater.

The future use of the site is intended to be commercial or light industrial. Until such a time as the site is developed, surface and subsurface soil contamination present on the site, if not remediated, could cause a concern in the future with respect to direct contact and ingestion of contaminated soil.

Contamination Source Removal: All alternatives except no action involve the removal of the UST and immediate soils surrounding the UST. This will prevent the addition of more contaminants to the site from the UST. The UST removal will protect human health and the environment by preventing potential exposure and/or reducing the mobility of contaminants.

Containment of Contamination: One or more alternatives involve containment of waste with little or no treatment. This will protect human health and the environment by preventing potential exposure and/or reducing the mobility of contaminants.

Treatment Alternatives: Alternatives can range from removal of select areas of contamination to in-situ treatments of remaining contamination.
Components of the remedial alternatives could also consist of Access Restrictions, Deed Restrictions and Environmental Monitoring.

Deed Restrictions: A deed restriction can restrict, limit or control the future use of affected portions of the site land and groundwater resources, include a notification indicating the presence of soil contamination on the site, and provide integrity for other selected remedial actions.

Environmental monitoring at the site could include routine monitoring of groundwater quality and air quality. In addition to documenting current conditions and judging alternative effectiveness, environmental monitoring provides an alert mechanism for public health threats so that timely action can be taken. It is assumed that the existing groundwater well network would be adequate for long term environmental monitoring.

2.4 Development of Alternatives

The rationale for combination of general response actions into alternatives is to provide a responsible cleanup level that will satisfy the environmental concerns for all mediums of interest. The alternatives chosen utilize a cost efficient, responsible approach based on the future intended use of the site.

Four remedial action alternatives (RAA's) have been developed to address each AOC identified in the SI. The specific waste streams characterized in the SI are targeted for remediation in the RAA's.

2.5 Identification of Available Technologies

The identification and screening of available technologies is based on the feasibility and practicality of the technologies for development of potential remedial alternatives. Based on the site specific waste characterization, technologies that clearly are not feasible or are not applicable, do not receive further consideration.

Level one screening of selected technologies eliminates technologies that are clearly not applicable to the subject site. Level two screening selects technologies based on evaluation of effectiveness, implementability and cost.

The following terms in the screening process are defined as follows:

Not Viable: The technology and/or response action is precluded from further consideration due to site specific conditions.

Not Applicable: The technology and/or response action addresses an issue that is non-existent.

Feasible: The technology and/or response action is possible although impractical or difficult to implement.
Practical: The technology and/or response action warrants further evaluation.

2.6 Remedial Alternatives

The areas identified as needing remedial action are identified in **Figure 3**.

2.6.1 Remedial Alternative for AOC: Surface Soil

The contaminants of interest which were identified during the SI are Chromium, Cadmium, Copper, Mercury, Nickel, Zinc and SVOC's. Metals and compounds were detected in concentrations that exceed RSCO.

The remedial objective for surface soil is to reduce or eliminate the conduit by which the contaminants, which exceed RSCO, may pose a threat to human health and the environment. The conduit is the potential for dermal contact or inhalation of contaminants. Removal of the surface soils or covering of the soils are the options evaluated.

2.6.2 Remedial Alternative for AOC: Subsurface Soil

The contaminants of interest which were identified during the SI are Arsenic, Cadmium, Copper, Mercury, and SVOC's. Metals and compounds were detected in concentrations that exceed RSCO. Also, the petroleum plume from the leaking UST is in the subsurface soil.

The remedial objective for subsurface soil is to reduce or eliminate the conduit by which the contaminants which exceed RSCO may pose a threat to human health and the environment. The conduit is the potential for subsurface migration of contaminants to groundwater or disturbance of soils by ground intrusive activities. Removal of contaminated subsurface soil is the remedial alternative that is evaluated in this Report.

2.6.3 Remedial Alternative for AOC: Groundwater

The remedial objective for groundwater is to reduce or eliminate the source of the contaminants, which exceed NYS Ambient Water Quality Standards that may pose a threat to human health and the environment.

The contaminants of interest, which have been identified in the SI are 2-Methylnapthalene and Phenanthrene. These were detected in concentrations slightly exceeding NYS Ambient Water Quality Standards.

Groundwater treatment is not considered appropriate since groundwater is not used as a potable water source immediately down gradient of the LaFrance site.

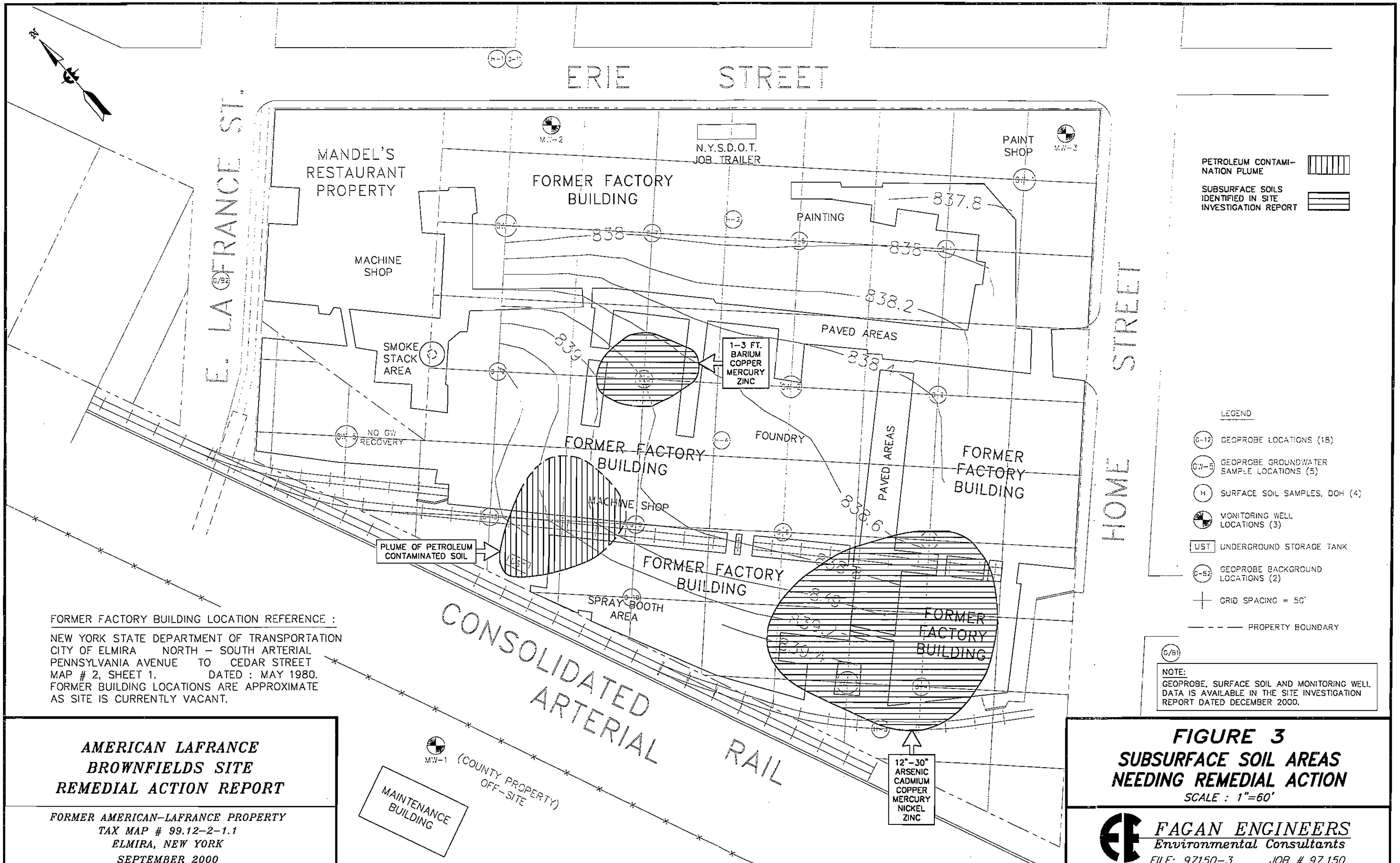


FIGURE 3
SUBSURFACE SOIL AREAS NEEDING REMEDIAL ACTION
SCALE : 1"=60'

FAGAN ENGINEERS
Environmental Consultants
FILE: 97150-3 JOB # 97.150

3. DETAILED ANALYSIS OF REMEDIAL ACTION ALTERNATIVES (RAA's)

3.1 Introduction

Four alternatives have been analyzed to provide a cleanup effort over the entire site. The four RAA's are cumulative from Alternative 1 to Alternative 4. The RAA's studied are no action, contamination source removal, containment of contamination and treatment.

The future use of the site is intended to be commercial or light industrial. Until such a time as the site is developed, surface and subsurface soil contamination present on the site, if not remediated, could cause a concern in the future with respect to direct contact and ingestion of contaminated soil.

All RAA's provide for the protection of human health and the environment, are effective on both the long and short term, and reduce toxicity in groundwater by removal of the mobile source contaminants. Areas of remedial action alternative activities may be seen in **Figure 4.**

3.2 Individual Analysis of Alternatives

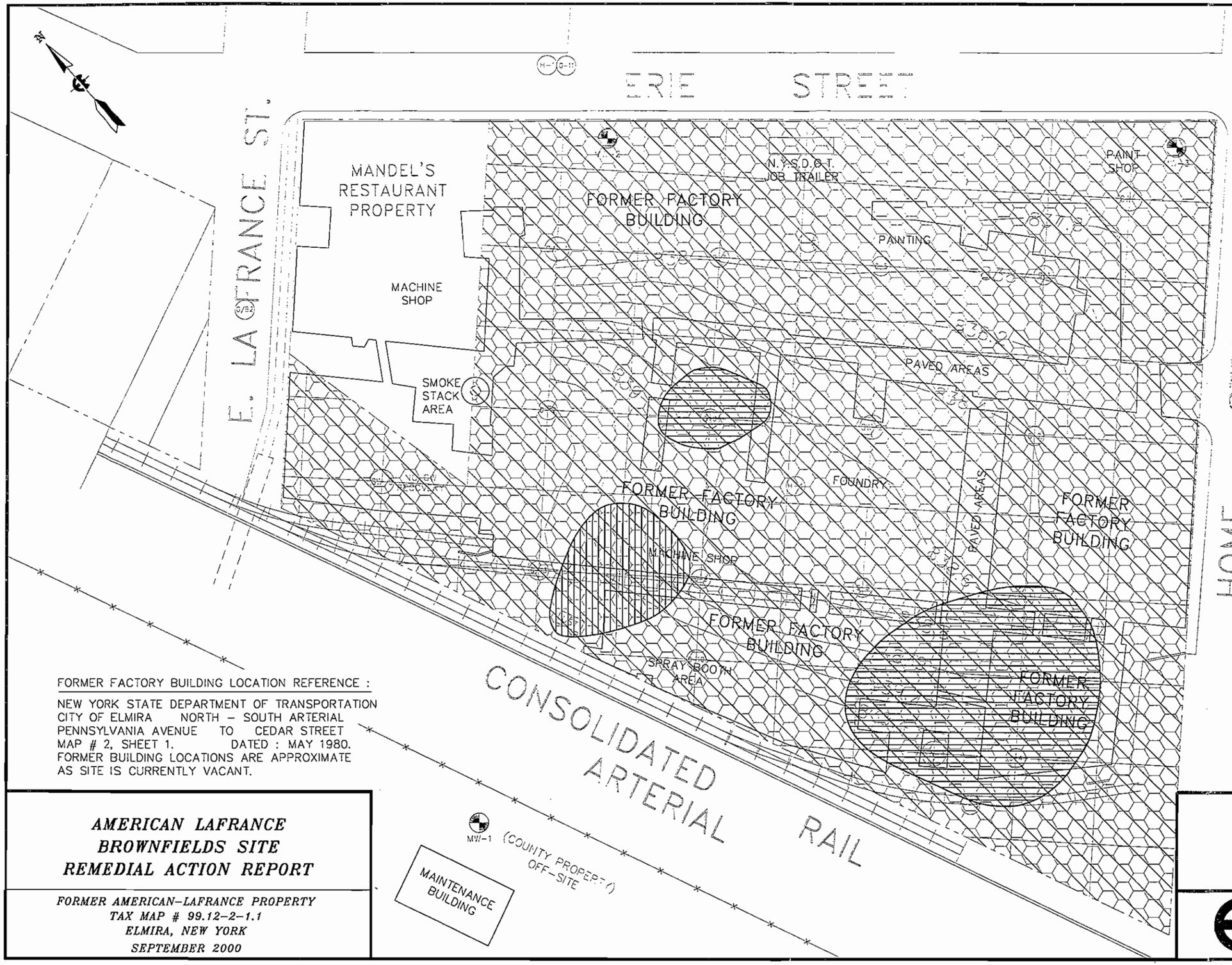
3.2.1 RAA 1 No Action

3.2.1.1 Description

Alternative 1 will involve no action to the site. There are currently no compounds detected at a hazardous level. There are currently limited exposure pathways. Inhalation and dermal absorption risk at the site at this time is very limited. The vegetation cover on the site provides a natural barrier for this exposure pathway. Risk is not eliminated, however, a very deliberate action must be taken to gain an increased risk. Furthermore, there is a public water supply in the vicinity of the site, which eliminates the exposure pathway from groundwater. Continued monitoring of groundwater is expected to show over time that natural attenuation will reduce the petroleum contamination at the site, and dilution through the further spreading of the contaminant will also lower the peak concentration of the contamination.

3.2.1.2 Assessment

No action is not a responsible alternative, since there is a continued supply of contaminant source material. If the source were not present, then this alternative could be considered more viable. A no action alternative prior to site development could lead to direct contact and ingestion of surface and subsurface contaminated soil above RSCO and not be protective of human health and the environment. It is therefore considered not appropriate.



FORMER FACTORY BUILDING LOCATION REFERENCE :

NEW YORK STATE DEPARTMENT OF TRANSPORTATION
CITY OF ELMIRA NORTH – SOUTH ARTERIAL
PENNSYLVANIA AVENUE TO CEDAR STREET
MAP # 2, SHEET 1. DATED : MAY 1980.
FORMER BUILDING LOCATIONS ARE APPROXIMATE
AS SITE IS CURRENTLY VACANT.

NOTE:
~~RAA'S ARE CUMULATIVE FROM RAA-1 TO~~ RAA-4.
THE HIGHER NUMBER INCLUDES THE ACTIONS OF
ALL LOWER ITEM NUMBERS.

REMEDIAL ACTION ALTERNATIVE (RAA) ITEMS

RAA-1 : NO ACTION
PERIODIC TESTING OF MONITORING WELL

RAA-2 : CLEAN UP PETROLEUM SPILL AND ENCAPSULATION OF SITE.

RAA-3 : REMOVAL OF SELECT SURFACE CONTAMINATION ABOVE STANDARDS.

RAA-4 : REMOVAL OF SELECT SUBSURFACE CONTAMINATION ABOVE STANDARDS.

SITE SPECIFIC REMEDIAL ACTIVITIES :

- REMOVE UST IN ACCORDANCE W/ 6NYCRR 613.9
- REMOVE PETROLEUM CONTAMINATED SOIL 400-800 TONS. IN ACCORDANCE W/ STARS MEMO # 1
- ENCAPSULATE SITE WITH 6" OF TOP SOIL 3200 TONS.
- REMOVAL OF SURFACE SOILS 3200 CUBIC YARDS.
- REMOVAL OF SUBSURFACE SOIL 50-400 TONS.

LEGEND

- (G-12) GEOPROBE LOCATIONS (18)
- (GW-5) GEOPROBE GROUNDWATER SAMPLE LOCATIONS (5)
- (H) SURFACE SOIL SAMPLES, DOH (4)
- (MW-1) MONITORING WELL LOCATIONS (3)
- UST UNDERGROUND STORAGE TANK
- (G-B2) GEOPROBE BACKGROUND LOCATIONS (2)
- GRID SPACING = 50'
- PROPERTY BOUNDARY

(G/B1)

NOTE:
GEOPROBE, SURFACE SOIL AND MONITORING WELL DATA IS AVAILABLE IN THE SITE INVESTIGATION REPORT DATED DECEMBER 2000.

AMERICAN LAFRANCE
BROWNFIELDS SITE
REMEDIAL ACTION REPORT

FORMER AMERICAN-LAFRANCE PROPERTY
TAX MAP # 99.12-2-1.1
ELMIRA, NEW YORK
SEPTEMBER 2000

FIGURE 4
REMEDIAL ACTION ALTERNATIVE ACTIVITIES
SCALE : 1"=60'

FAGAN ENGINEERS
Environmental Consultants
FILE: 97150-4 JOB # 97.150

3.2.2 RAA 2 Source Cleanup of the UST and Encapsulation of Site With Protective Soil Cover

3.2.2.1 Description

Alternative 2 will involve the removal of the UST and contaminated soil in accordance with 6NYCRR 613.9 and NYSDEC STARS Memo #1. Contents and excavation of surrounding visibly contaminated soil to depth of groundwater are estimated to be 2,500-6,000 cubic yards. The site will be encapsulated with a six-inch topsoil protective cover with appropriate seeding. It is estimated that 3,200 cubic yards of topsoil material would be needed to encapsulate the site **(see Figure 4A)**.

Six inches of topsoil is deemed adequate, as the proposed future site use is commercial and light industrial. Development of this site will include structures, asphalt paved areas, and limited landscaped lawn area thereby eliminating the potential for exposure.

In-situ treatment of the petroleum contamination has been determined to be not viable. First, the consistency of the product is such that air sparging and vapor extraction are not appropriate treatments. Also, oxygen release compound (ORC) in-situ treatment has been evaluated and been found to be of extreme cost approximating $90,000 in year one (including monitoring wells), and $68,000 in year two and on-going costs up to $5,000 per year for two to four years. The cost of ORC treatment is prohibitive when compared to source removal.

Clean soil conditions will be verified by laboratory analyses. All contaminated material determined to be non-hazardous utilizing the TCLP analysis, would be subsequently disposed of at the Chemung County Landfill. Follow up monitoring will be in accordance with and typical to a standard petroleum spill cleanup. An additional monitoring well will be installed at the source area to be used in conjunction with the existing down-gradient wells to monitor the natural attenuation of the petroleum remaining in the ground.

A deed restriction would be filed and enforced by the City to include a notification indicating the presence of soil contamination on the site and prohibit the use of on-site groundwater. Any development of this property would be limited to slab-on-grade structures. A Soils Management Program (see section 4) including dust suppression and disposal of visibly stained soil at the Chemung County Landfill, would be followed during any future site development involving ground intrusive activities.

3.2.2.2 Assessment

This alternative would eliminate direct exposure to contaminated soils, provide for the protection of human health and the environment, and takes into consideration the proposed future site use as a commercial or light industrial property.

ERIE STREET

E. LA FRANCE ST.

MANDEL'S RESTAURANT PROPERTY

MACHINE SHOP

SMOKE STACK AREA

N.Y.S.D.O.T. JOB TRAILER

FORMER FACTORY BUILDING

PAINT SHOP

PAINTING

PAVED AREAS

FOUNDRY

MACHINE SHOP

SPRAY BOOTH AREA

NO GW RECOVERY

HOME STREET

ARTERIAL

MW-1 (COUNTY PROPERTY) OFF-SITE

MAINTENANCE BUILDING

FORMER FACTORY BUILDING LOCATION REFERENCE :

NEW YORK STATE DEPARTMENT OF TRANSPORTATION
CITY OF ELMIRA NORTH – SOUTH ARTERIAL
PENNSYLVANIA AVENUE TO CEDAR STREET
MAP # 2, SHEET 1. DATED : MAY 1980.
FORMER BUILDING LOCATIONS ARE APPROXIMATE AS SITE IS CURRENTLY VACANT.

REMEDIAL ACTION ALTERNATIVE (RAA) ITEMS

RAA–2 : CLEAN UP PETROLEUM SPILL AND ENCAPSULATION OF SITE.

SITE SPECIFIC REMEDIAL ACTIVITIES :

- REMOVE UST IN ACCORDANCE W/ 6NYCRR 613.9
- REMOVE PETROLEUM CONTAMINATED SOIL 400–800 TONS. IN ACCORDANCE W/ STARS MEMO # 1
- ENCAPSULATE SITE WITH 6" OF TOP SOIL 3200 TONS.

LEGEND

- G-12 GEOPROBE LOCATIONS (18)
- GW-5 GEOPROBE GROUNDWATER SAMPLE LOCATIONS (5)
- H SURFACE SOIL SAMPLES, DOH (4)
- MW-1 MONITORING WELL LOCATIONS (3)
- UST UNDERGROUND STORAGE TANK
- G-B2 GEOPROBE BACKGROUND LOCATIONS (2)
- GRID SPACING = 50'
- PROPERTY BOUNDARY

G/B1

NOTE:
GEOPROBE, SURFACE SOIL AND MONITORING WELL DATA IS AVAILABLE IN THE SITE INVESTIGATION REPORT DATED DECEMBER 2000.

AMERICAN LAFRANCE
BROWNFIELDS SITE
REMEDIAL ACTION REPORT

FORMER AMERICAN–LAFRANCE PROPERTY
TAX MAP # 99.12–2–1.1
ELMIRA, NEW YORK
SEPTEMBER 2000

FIGURE 4A
PREFERRED ALTERNATIVE RAA2 ACTIVITIES

SCALE : 1"=60'

FAGAN ENGINEERS
Environmental Consultants
FILE: 97150–4A JOB # 97.150

3.2.3 RAA 3 Removal of Select Surface Contamination Above Standards And All The Elements of RAA 2

3.2.3.1 Description

Alternative 3 provides for remediation of the surface soils observed to contain contaminants above RSCO by excavation and removal of these soils off site. It is estimated that 3200 cubic yards of material may be removed from the site as well as including all the elements of RAA 2.

Clean soil conditions would be verified by laboratory analyses. All contaminated material determined to be non-hazardous utilizing the TCLP analysis, would be subsequently disposed of at the Chemung County Landfill. Follow up monitoring of groundwater utilizing existing wells would be done until deemed unnecessary by the lack of any residual contaminants.

A deed restriction would prohibit use of on-site groundwater. Any development of this property would be limited to slab-on-grade structures. A Soils Management Program (see section 4) including dust suppression and disposal of visibly stained soil at the Chemung County Landfill, would be followed during any future site development involving ground intrusive activities.

3.2.3.2 Assessment

RAA 3 provides for further elimination of site contamination with removal of the surface contaminants. This approach involves additional soil excavation, laboratory analyses, and subsequent disposal will be required. This alternative also provides for the protection of human health and the environment.

3.2.4 RAA 4 Removal of Select Subsurface Contamination Above Standards and all the Elements of RAA 2 and RAA 3

3.2.4.1 Description

RAA 4 provides for the comprehensive removal of subsurface soil veins of contamination by excavation and disposal off site. An estimated 50-400 tons of material would be removed. All contaminated material determined to be non-hazardous utilizing the TCLP analysis, will be subsequently disposed of at the Chemung County Landfill. This alternative includes all the elements of the previous two alternatives. Clean soil conditions would be verified by laboratory analyses. All contaminated material determined to be non-hazardous utilizing the TCLP analysis, would be subsequently disposed of at the Chemung County Landfill. Follow up monitoring of groundwater utilizing existing wells would be done until deemed unnecessary by the lack of any residual contaminants.

3.2.4.2 Assessment

This alternative will involve extensive earthmoving, worker/community safety issues, and resulting increase in the risk from airborne exposure during excavation activities. This alternative provides for the protection of human health and the environment and leads to unrestricted site use including recreational and residential use.

3.3 Feasibility of Remedy Selection

This section establishes the general rules for the selection of a remedy for an entire site, or for an operable unit of a site. For purposes of this Part, the term "operable unit" means a discrete area of the site that manages migration or that eliminates or mitigates a release, threat of release, or pathway of exposure.

The goal of the program for a specific site is to restore that site to a usable condition, to the extent feasible and authorized by law. At a minimum, the remedy selected shall eliminate or mitigate all significant threats to the public health and to the environment presented by waste at the site through the proper application of scientific and engineering principles.

The community acceptance criterion will be evaluated by NYSDEC once the 45-day public comment period on the Proposed Remedial Action Plan (PRAP) has concluded. The PRAP will be prepared by NYSDEC based on the RA report.

The program for a site must not be inconsistent with the National Oil and Hazardous Substances Pollution Contingency Plan of March 8, 1990 and must be selected upon due consideration of the following factors:

3.3.1 Standards, Criteria, and Guidance

A site's program must be designed so as to conform to standards and criteria that are generally applicable, consistently applied, and officially promulgated, that are either directly applicable, or that are relevant and appropriate, unless good cause exists why conformity should be dispensed with. Such good cause exists if any of the following is present:

(a) The proposed action is only part of a complete program that will conform to such standard or criterion [of guidance] upon completion:

The SI has shown that site contaminants are mixed with the soils throughout the site. Complete removal of all contaminants would prove to be both impractical and costly.

(b) Conformity to such standard or criterion will result in greater risk to the public health or to the environment:

Surface and subsurface soils were observed to be very dry. Extensive surface and subsurface excavation would result in airborne dispersion of soil particulates in an uncontrolled environment. Contamination adhered to said particles could be transported through the atmosphere to the area residences, restaurants, and businesses. The use of a water mist for dust control in this scenario would be impractical and cleanup would be costly.

3.3.2 Overall Protectiveness of Public Health and the Environment

RAA 1 provides no protection. RAA 2, RAA 3 and RAA 4 provide increasing level of protectiveness for the intended future site use. RAA2 would minimize potential ingestion and dermal pathways for low-level surface metals and petroleum contaminated soils potential additional source contamination to the groundwater. With a Soil Management Plan, RAA 2, RAA 3, and RAA 4 would minimize potential exposure pathways during future ground intrusive activities.

3.3.3 Short-Term Effectiveness

RAA 1 is not applicable since no remedial actions would be undertaken. The soil cover, and contaminated soil excavation may have short term impacts where construction activities could increase potential exposure risks to the public and environment, however such would be minimized by the Soil Management Plan during the remediation.

3.3.4 Long-Term Effectiveness

For all alternatives, reduction of existing low-level organic contaminants in groundwater will occur through natural attenuation over extended periods of time. The low-level inorganics detected in groundwater indicate area wide trace metal concentrations with little to no migration of inorganics through the subsurface soils. Long term effectiveness to subsurface soils is not applicable except in RAA 4 where select areas are removed and in RAA 2, RAA 3 and RAA 4 by the UST removal. For surface soils RAA 3 and RAA 4 are effective in the long term.

3.3.5 Reduction of Toxicity, Mobility, and Volume

RAA 1 does not result in the reduction of toxicity mobility and volume in any AOC. RAA 2, will significantly reduce the volume, toxicity, and/or mobility of the contaminants from the UST removal while minimizing the threat to human health and the environment posed by a more aggressive remedial alternative. The UST liquid phase will be pumped and disposed of by an approved method. The contaminated soil removed from the immediate vicinity of the tank will be disposed of at a municipal solid waste landfill. This will provide a direct reduction of contaminant volume, which in turn will slow the plume's mobility and allow for natural attenuation, which will reduce toxicity over time.

On-site isolation to reduce the mobility of surface and subsurface contaminants will be done by encapsulation in RAA 2 and limiting ground intrusive activity through deed restrictions.

RAA 3 and RAA 4 will reduce the toxicity mobility and volume by removal of contamination.

3.3.6 Feasibility

RAA 1 is feasible, but is not considered a responsible choice nor does it meet leaking UST guidelines. RAA 2, considered feasible as the remedy, is suitable to site conditions, is capable of being successfully carried out with available technology, and is implementable and cost-effective. RAA 3 and RAA 4 also result in a decreased threat to human health and the environment; however, they are not considered to be cost effective in light of intended site usage and therefore not feasible.

3.3.7 Cost

Alternative 1 has no cost except continued monitoring, but also offers little benefit to the site. Alternate RAA 2 offers least cost solution for the planned use of the site. The increase in benefit for the planned use of the site for Alternatives RAA 3 and RAA 4 is not matched to the increase in cost of the work.

The cost of each RAA is based upon the areas identified as needing remedial action as seen in Figure 3. Ranges of quantities are used since actual site conditions will not be known until the remedial action takes place. The greater quantity in the range has been used for estimating costs. Operation and maintenance costs are anticipated to involve only annual testing of the monitoring wells until the level of contaminants fall below site specified target levels established by DEC.

3.4 Comparative Analysis

A comparative analysis of cost and how each RAA meets the protection of human health and the environment is summarized in the table shown on the next page. RAA 2, RAA 3, and RAA 4 are cumulative in the action taken, so the costs are passed on to the next level of effort.

As a result of the comparative analysis of each of the alternatives RAA 1 through RAA 4, the following recommendation has been made.

RAA 1, the no action alternative is not appropriate, while RAA 2, RAA 3 and RAA 4 provide an increase in level of protection to human health and the environment in the sequence presented, the last two alternatives are not practical for the intended site use.

Alternative 2 is preferred since little environmental benefit would be gained if the more costly alternatives were implemented.

RAA 1, the No Action alternative is not appropriate. While RAA2, RAA 3, and RAA 4 provide an increase in the level of protection to human health and the environment in the sequence presented, the last two alternatives are not practical for the intended site use.

EVALUATION REQUIREMENTS	ALTERNATIVES			
	RAA-1	RAA-2	RAA-3	RAA-4
Compliance with NYS Standards and Guidance Values		X	X	X
Overall Protection of Human Health and the Environment		X	X	X
Short Term Effectiveness		X	X	X
Long Term Effectiveness		X	X	X
Reduction in Toxicity, Mobility, and Volume		X	X	X
Reduction of Source Contamination		X	X	X
Feasibility	X	X		
Surface Soil TCL/TCLP Samples	-0-	-0-	$ 4,675	$ 4.675
Subsurface TCL/TCLP Samples	-0-	-0-	-0-	3,475
Command/Decon Center	-0-	$ 3,425	16,275	31,112
Air Monitoring	-0-	-0-	18,400	18,400
Annual Monitoring of Wells	-0-	1,875	1,875	1,875
Engineering Design	-0-	22,532	63,710	84,246
Legal	-0-	10,000	12,500	15,000
Construction	-0-	108,290	169,930	212,841
Disposal Fees @ $40/ton (Assume 125 pcf)	-0-	32,000	248,000	264,000
Construction Management	-0-	5,000	7,500	7,500
UST Closure with Laboratory	-0-	23,640	23,640	23,640
Total Cost	**-0-**	**$201,762**	**$564,005**	**$661,764**
Revised January 15, 2001				

4.0 SOILS MANAGEMENT PROGRAM

The following protocol will be followed during any future site development involving ground intrusive activities to protect the environment and human health. This program will be included as a deed restriction for the property.

4.1 Dust respirators will be used by personnel during ground intrusive activities, which could produce airborne soil particulates.

4.2 Particulate (dust) suppression will be used where such activity produces airborne soil particles during said activity. Fine water mist will be utilized to minimize atmospheric particulate dispersion of soil particles.

4.3 Ground intrusive activities will be limited to that activity which is reasonable and necessary as part of the development project.

4.4 Visibly stained soil encountered during ground intrusive activity will be field screened with a portable photoionization detector and subsequently disposed of at the Chemung County landfill.

4.5 Ground intrusive activities will be supervised by an environmental professional.

4.6 A community air-monitoring program will be prepared and implemented during ground intrusive remedial activities of surface and subsurface soils.

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