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Interim Remedial Measure Work Plan for Contaminated Soil Removal at the Wyoming County Fire Training Area Wethersfield, New York

Prepared For:

Wyoming County
143 North Main Street
Warsaw, New York 14569

Prepared By:

URS Corporation
640 Ellicott Street
Buffalo, New York 14203

August 2003

G3707

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Work Plan
For
Contaminated Soil Removal
at the
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Wethersfield, New York

Prepared For:

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143 North Main Street
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Prepared By:

URS Corporation – New York
282 Delaware Avenue
Buffalo, New York 14202

August 2003

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PART B - QUALITY ASSURANCE PROJECT PLAN

PART C - HEALTH AND SAFETY PLAN

PART A

WORK PLAN

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A1.0 INTRODUCTION

A1.1 General

Wyoming County has operated a fire training center located at 3651 Wethersfield Road in the Town of Wethersfield, New York (Figure A1-1). Remedial activities consisting of drum removal, AST removal and contaminated soil excavation were conducted at the site in July/August of 2001. A limited site investigation program, conducted in September/October of 2001, has shown that VOCs consisting primarily of toluene and tetrachloroethene (PCE) have contaminated the soils and/or groundwater in various areas at the site. Additionally, VOCs have been detected in groundwater in the two adjacent residential parcels located immediately east of the site.

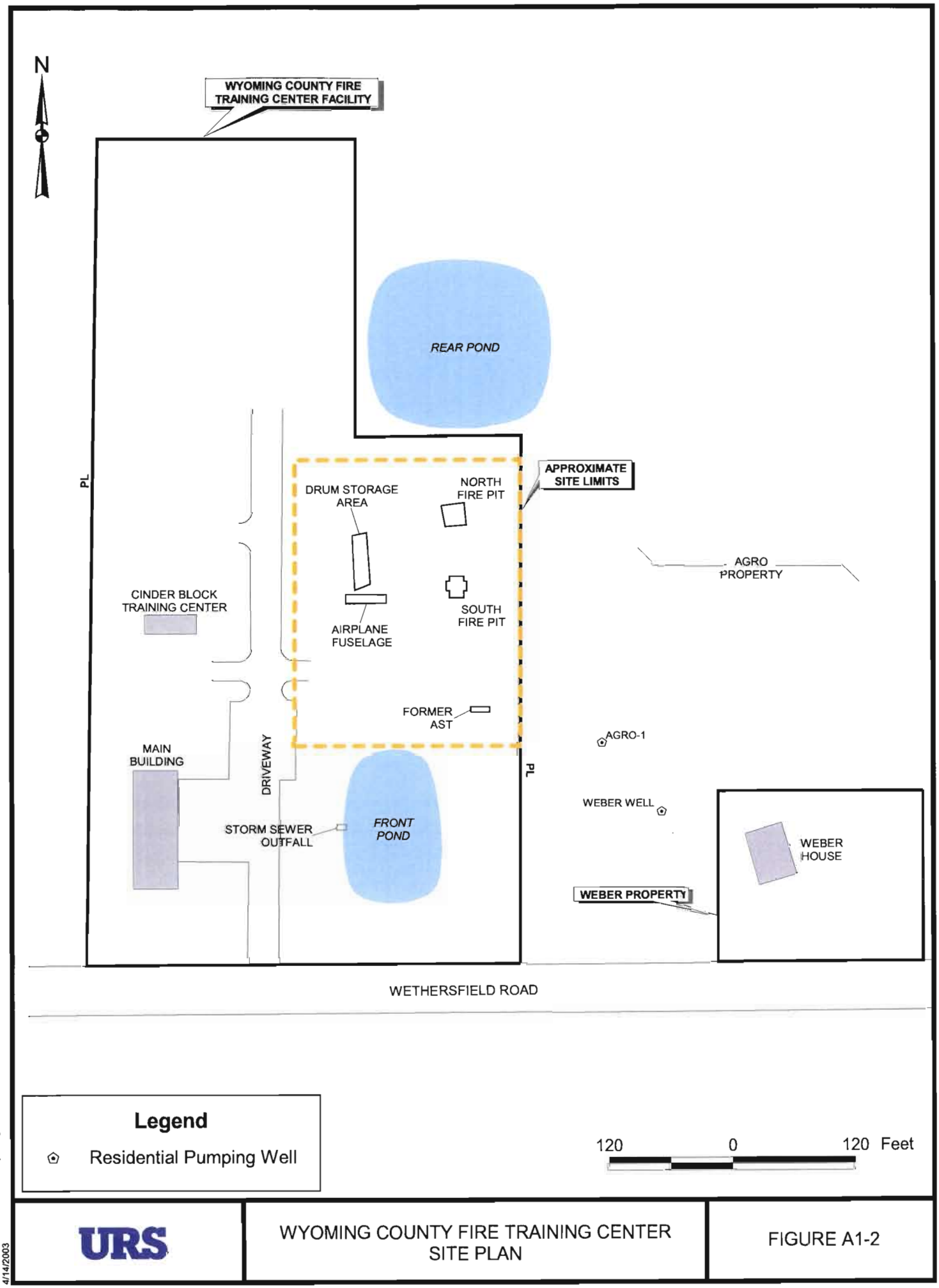
URS Corporation – New York (URS) has been retained by Wyoming County (County) to develop and implement an Interim Remedial Measure (IRM) Work Plan for removal of contaminated soils at the site. The scope of the IRM includes the excavation of VOC-contaminated soils from selected areas of the site with on-site treatment of the soils utilizing soil vapor extraction methods.

This document constitutes the IRM Work Plan and consists of the following sections:

- IRM Work Plan
- Health and Safety Plan

A1.2 Site Description and History

The Wyoming County Fire Training Center (WCFTC) facility is located on the north side of Wethersfield Road approximately one-half mile east of the intersection of Poplar Hill Road in the Town of Wethersfield, Wyoming County (Figure A1-1).



URS

WYOMING COUNTY FIRE TRAINING CENTER
SITE PLAN

FIGURE A1-2

N:\11172991.00000\DB\Gis\wyoming.apr SITE FEATURES
4/14/2003

The overall WCFTC facility occupies approximately 6.8 acres and includes several permanent structures/installations and is completely enclosed by a chain link fence about its perimeter. The main features of the WCFTC facility are the Training Center building and attached garage in the southwest section of the property, two smaller support buildings, a storm water retention pond and several fire training structures across the remaining portions of the property. The site, which was previously investigated and is the subject of this IRM, includes a former steel Aboveground Storage Tank (AST) used for storage of flammable liquids, two former subgrade concrete fire pits connected to the AST via underground piping and, a former drum storage area that was utilized for storage of drums containing flammable liquids. These features are all located on about one acre in the eastern portion of the WCFTC facility (Figure A1-2), the site.

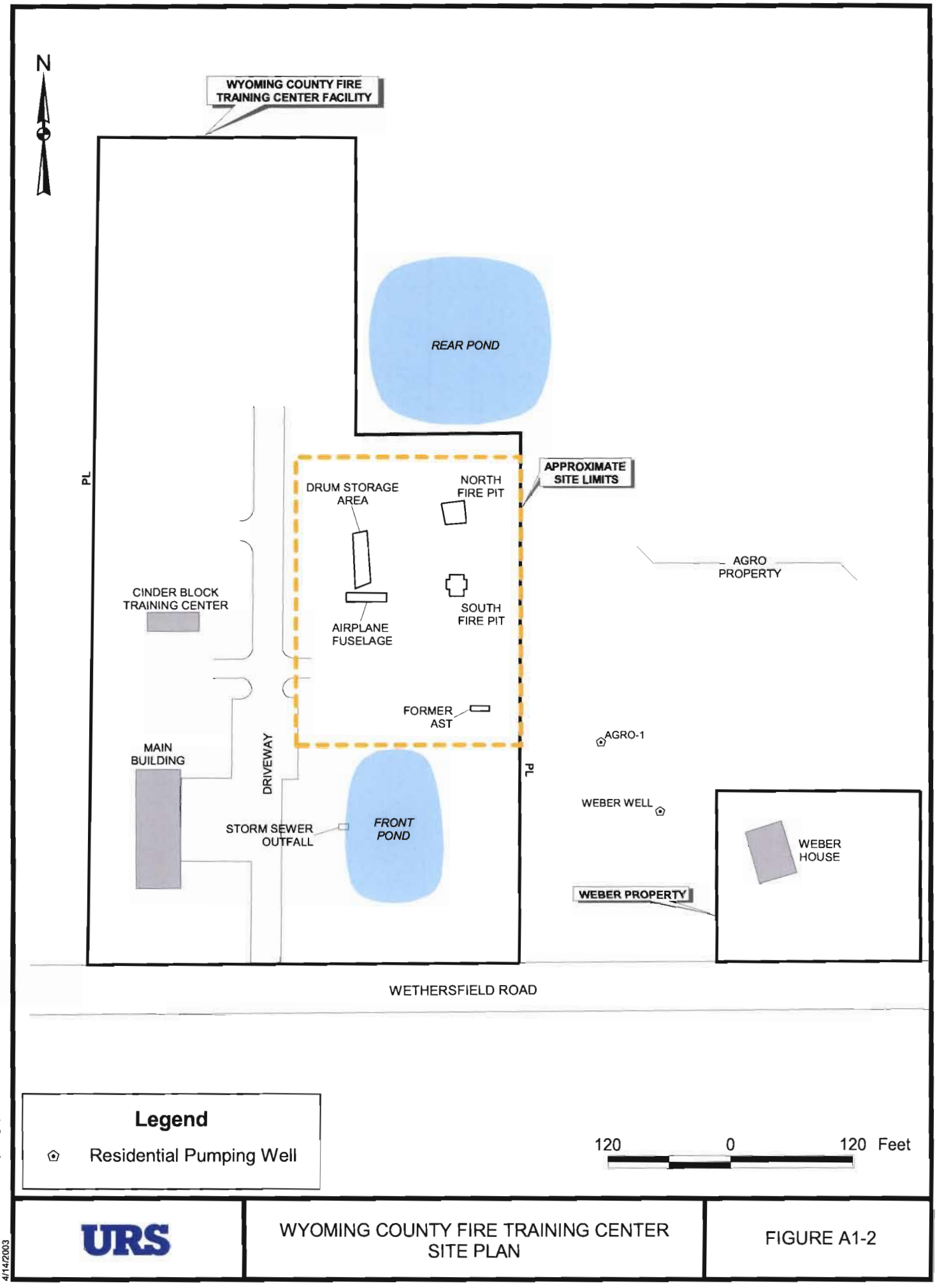
The site topography is generally flat, with a graded bank along the eastern boundary. Vegetative cover consists primarily of turf grass. The property to the east and northeast slopes more steeply to the northeast.

Surrounding land uses are generally agricultural and recreational with low-density residential housing along Wethersfield Road. The two neighboring parcels to the east are occupied by a seasonal home and a permanent residence. The Agro property, adjacent to the eastern and northern boundaries of the WCFTC, is occupied by a seasonal residence. This property has approximately two-hundred feet of frontage on Wethersfield Rd. and widens to the east and west some distance from the road.

The Weber property, 3689 Wethersfield Rd., is the closest permanent residence to the WCFTC. The Weber property is situated immediately to the east of the Agro property and occupies similar frontage.

A mixture of vegetation is present on nearby parcels, ranging from mature trees to brush and lawn areas. There are two ponds present on the Agro property, the closest being located immediately northeast of the subject property.

The site and immediately surrounding properties are depicted on Figure A1-2.


N
WYOMING COUNTY FIRE TRAINING CENTER FACILITY
REAR POND
PL
APPROXIMATE SITE LIMITS
DRUM STORAGE AREA
NORTH FIRE PIT
AGRO PROPERTY
CINDER BLOCK TRAINING CENTER
SOUTH FIRE PIT
AIRPLANE FUSELAGE
FORMER AST
AGRO-1
MAIN BUILDING
DRIVEWAY
PL
WEBER WELL
STORM SEWER OUTFALL
FRONT POND
WEBER HOUSE
WEBER PROPERTY
WETHERSFIELD ROAD
Legend
Residential Pumping Well
120 0 120 Feet
URS
WYOMING COUNTY FIRE TRAINING CENTER SITE PLAN
FIGURE A1-2
N:\11172991.00000\DB\Gis\wyoming.apr SITE FEATURES
4/14/2003

The WCFTC was operated by the County commencing in the 1970's. Flammable liquids consisting of solvents, petroleum products, paint thinners, degreasers, etc. were brought to the site and stored in the AST and/or in drums of various sizes in the unlined drum storage area. Liquids from the AST were conveyed to two subgrade concrete-lined fire pits via an underground steel piping/valve system. Liquids from the drums were dumped directly into the fire pits, ignited and subsequently extinguished during fire training exercises.

In 2002, the County executed a Voluntary Cleanup Agreement (VCA) with the state of New York. Pursuant to paragraph II, A, 2, of the Agreement, the County submits this IRM Work Plan to address on-site contaminated soils consistent with previous discussions with the Department.

A1.3 Purpose

Based on the data from the previous investigations, the probable extent of soil contamination at the site has been adequately delineated. The purpose of this IRM is to remove contaminated soils that may be providing an ongoing "source" of contaminants to the shallow groundwater. This document presents the rationale and proposed methods to be utilized in removing and treating the contaminated soils onsite.

Delineation of the nature and extent of groundwater contamination is beyond the scope of this IRM Work Plan. A Supplemental Hydrogeologic Site Investigation Work Plan is being prepared to address groundwater issues at the site and will be submitted to the Department under separate cover.

A2.0 PREVIOUS REMEDIAL ACTIONS AND INVESTIGATIONS

The County retained Nature's Way of Crittenden, New York to conduct site investigation activities to determine the potential source of the VOCs and to conduct remedial actions aimed at removing probable source materials exposed at the ground surface. A detailed discussion of the remedial actions and site investigation are presented in, "*Subsurface Investigation Report – Wyoming County Fire Training Facility, Wethersfield Road, Town of Wethersfield, New York*" prepared by Nature's Way and dated January 25, 2002. A summary of the work completed is presented in the following sections.

A2.1 Remedial Actions

During July and August 2001, Nature's Way consolidated, characterized, labeled and transported drums of flammable liquids off-site for disposal and/or recycling at permitted facilities. Additionally, the flammable liquids were drained from the AST and transported off-site for recycling. The AST was inerted, cut open, cleaned and taken off-site for recycling as scrap steel.

Approximately 40 cubic yards (cy) of surface soils in the drum storage and AST areas that exhibited visual and/or olfactory evidence of contamination (i.e., staining, discoloration, petroleum or solvent smell, etc.) were excavated and staged on plastic sheeting (Figure A2-1). Characterization testing for disposal indicated that these soils were hazardous for toxicity based on the results of the toxicity characteristic leaching procedures (TCLP) analysis for VOCs. The soils were covered with plastic sheeting to prevent contact with precipitation and/or surface water runoff at the site and remain on-site pending additional investigation and remediation.

A2.2 Previous Investigations

Based on the preliminary site activities, four areas of concern (AOCs) were identified for investigation. These areas are identified below and shown on Figure A2-1:

N

REAR POND

MW-05

MW-06

MW-02

MW-01

MW-08

MW-03

MW-07

SEE INSET

MW-04

DRIVEWAY

FRONT POND

AGRO-1

ROCK WELL

WEBER WELL

MW-09

WEBER HOUSE

MW-10

WEBER PROPERTY

WETHERSFIELD ROAD

INSET

AREA 3

EP-50

NORTH FIRE PIT

EP-36

EP-37

EP-38

EP-49

EP-34

EP-35

EP-51

EP-48

EP-33

DRUM STORAGE AREA

EP-46

EP-47

EP-45

EP-44

AREA 4

MW-03

EP-42

EP-41

EP-43

EP-40

EP-53

EP-52

EP-39

AIRPLANE FUSELAGE

EP-23

EP-24

EP-29

EP-21

EP-28

SOUTH FIRE PIT

EP-22

EP-27

EP-32

EP-25

EP-20

EP-19

EP-26

EP-31

EP-18

EP-30

AREA 2

EP-16

EP-13

EP-12

EP-14

EP-15

EP-11

AREA 1

EP-01

FORMER AST

EP-02

EP-03

EP-10

EP-08

EP-06

EP-17

EP-09

EP-07

EP-04

EP-05

MW-04

0 50 Feet

Legend

- Monitoring Well Location
- Residential Pumping Well
- Soil Boring Location

100 0 100 Feet

WYOMING COUNTY FIRE TRAINING CENTER
PREVIOUS INVESTIGATION LOCATIONS

URS

FIGURE A2-1

N:\11172991.00000\DBGis\wyoming.apr PREVIOUS SAMPLING LOCATIONS
4/14/2003

- Area 1 – AST Area
- Area 2 – North Fire Pit
- Area 3 – South Fire Pit
- Area 4 – Drum Storage Area

The site investigation included installation of 53 soil borings (Figure A2-i) of 16 feet or refusal, whichever was less. An Earthprobe drilling rig equipped with holl cm augers was used to advance the borings. The soil column encountered at each borin on was continuously sampled in 2.0 foot intervals using standard split spoon sampling methods. All soils were screened with an organic vapor analyzer (OVA) and logged by a geologist.

Additionally, a total of ten temporary shallow monitoring wells (Figure A2- re installed. At each location, 2-inch diameter OD split-spoon sampling tools were adva e required depth, thereby providing an open borehole for installation of one-inch PVC m wells. Each well was constructed with 1" ID, 10 slot, schedule 40 threaded P straddling the apparent water table. The tops of the screens were fitted with schedule 40 PVC riser pipe, extending approximately two feet above ground surfa

One boring (Rock Well 1), located near the northwest corner of the (Figure A2-1), was completed through overburden soils and advanced to a depth o the upper portion of the siltstone unit. This allowed for installation of a 2-inc monitoring well. The overburden was effectively "cased off" by installing casing two feet into the bedrock and then tremie grouting it to the surface. Thi infiltration of surface water and/or shallow groundwater into the bedrock portion o

All the monitoring wells were surveyed to determine their location an elevations were based on an arbitrary benchmark datum established for the si The groundwater elevation of each well was gauged prior to sampling so combined with surveyed measurements of the top of casing and ground s calculation of the shallow groundwater surface elevations. Surface water el ponds also were surveyed. A groundwater contour map was developed by plott elevation data from the shallow groundwater-monitoring wells (MW–1 through

Both groundwater and soil samples were analyzed for the presence of VOCs by EPA Method 8260 and for the RCRA (8) list of Heavy Metals. Lozier Laboratories, Inc. (Expresslab) and Friend Laboratory, Inc. (FLI), both New York State Department of Health Certified laboratories performed analysis of groundwater and soil samples respectively.

Worst case samples (i.e., those exhibiting the highest OVA readings or visual evidence of contamination) encountered in each Area Of Concern (AOC) were submitted to FLI for analysis via TCLP protocol to allow for hazardous vs. non-hazardous determination. Additionally, each worst case sample also was analyzed by FLI for the full Target Compound List (TCL) of analytes and Resource Conservation Recovery Act (RCRA) Metals. This testing included an extended list of Volatile and Semi-Volatile Organic Compounds (SVOCs) by EPA Methods 8260 and 8270 respectively, Pesticides and polychlorinated biphenyls (PCBs).

In addition to the worst case sample, soil samples were selected from borings that did not exhibit any, or only minimally elevated, OVA readings. The intent was to select borings located north, south east and west of the borings exhibiting elevated OVA readings to delineate the "boundary" of contamination in each area. These boundary samples were analyzed for TCL VOCs and RCRA metals.

TCL analysis was performed in accordance with Contract Laboratory Protocol (CLP) and reported with Category B Deliverables. All Category B Deliverables were then forwarded to Data Validation Services, Inc. for review and preparation of Data Usability Summary Reports (DUSR).

A3.0 NATURE AND EXTENT OF CONTAMINATION

A3.1 Regional Geology

Natural surface soils present in this area are classified as glacial Kame deposits as indicated on the Surficial Geologic Map of New York. The Soil Survey of Wyoming County lists a series of silt loams as the predominant surface soils in the study area, although significant grading and filling operations have obviously altered site topography and almost certainly the general soil profile.

The bedrock formation present below these unconsolidated sediments consists of Upper Devonian shales and siltstones of the Machias Formation of the Canadaway Group (as indicated on the Geologic Map of New York 1970 Niagara Sheet by the New York State Museum of Science Service Map and Chart Series #15). This formation is typically gray in color, very thinly to thinly bedded, and becomes more competent with depth, ranging from moderately soft to moderately hard.

A3.2 Site Geology

The overburden soil material encountered in the study area consists of a thin surficial topsoil and/or fill layer underlain by glacial drift and till deposits. Much of the WCFTC property has been reworked and filled to present grade and appearance. Buried topsoil horizons suggestive of original grade were encountered at some boring locations. The fill layer varies in thickness from about 0.5 to 3.0 feet.

Subsurface soils encountered below the shallow fill consists chiefly of glacial drift possessing a predominant (SAND-SILT-CLAY) texture with varying amounts of gravel. These deposits are weakly stratified in nature and extend to depths of 12.0-16.0 feet BGS across the site. The primary shallow water bearing unit appears to be thin silty-sand layers observed in the 10 -12 foot depths. The glacial drift overlays several layers of variable glacial till with predominant textures ranging from clay to coarse silt, that extend to bedrock. The glacial till is generally very

dense and has low permeability and appears to effectively isolate shallow groundwater from the underlying deeper bedrock water-bearing unit.

Natural soils extend to a depth of 36.5 feet at which point thinly bedded weathered shale bedrock is encountered. The shale unit extends to a depth of 64.0 feet and possesses iron stained vertical fractures and similar staining along bedding planes, indicative of groundwater movement. Siltstone is encountered below the shale from 64.0 feet to greater than 72.5 feet BGS, the well completion depth. The siltstone also contains numerous iron-stained vertical fractures. While coring through this sequence of rock, approximately 200 gallons of water were lost to the formation indicating that this section may have sufficient hydraulic conductivity to constitute an adequate water-bearing zone.

Groundwater elevations (referenced to the assumed datum of 100.00) within the shallow overburden ranged from 90.37 to 68.56 feet across the site. The apparent shallow groundwater flow direction across the site is generally to the east northeast and east southeast, being split along a small east-west trending ridge located to the east of the WCFTC. Observed groundwater flow within the shallow overburden generally mimics site surface topography. Groundwater flow directions within the bedrock were not determined.

A3.3 Nature and Extent of Soil Contamination

Based on the data collected during the SI, the nature and extent of contamination in the soils has been evaluated. The following sections describe the analytical results and comparison to applicable regulatory standards.

A3.3.1 Applicable Standards, Criteria, and Guidance

The analytical data obtained from site soils have been compared to applicable New York State standards, criteria, and guidance (SCG) values. The matrix-specific SCGs are shown below.

Soil

NYSDEC Technical Administrative Guidance Memorandum (TAGM) 4046: *Determination of Soil Cleanup Objectives and Cleanup Levels,* January 1994/January 2000.

A3.3.2 Areas of Concern

A3.3.2.1 Area 1 – AST Area

As shown on Figure A3-1, a total of 17 soil borings (EP-1 through EP-17) were advanced in the vicinity of the Aboveground Storage Tank (AST). Elevated OVA readings (i.e., > 10 ppm) indicative of probable VOC contamination were observed in samples from seven of the boring locations (EP-1, -2, -4, -6, -10, -11 and –14) as shown in Table A3-1. In five of the seven borings (i.e., EP-1, -2, -4, -6 and –1), elevated OVA readings were present in all intervals from the ground surface to the bottom of the hole. However, the readings decreased significantly with depth in all five borings. The highest OVA readings were observed in samples from EP-2 (1998 ppm at 2'-4') and EP-6 (3141 ppm at 0'-2'), located approximately twenty feet west and southwest of the AST.

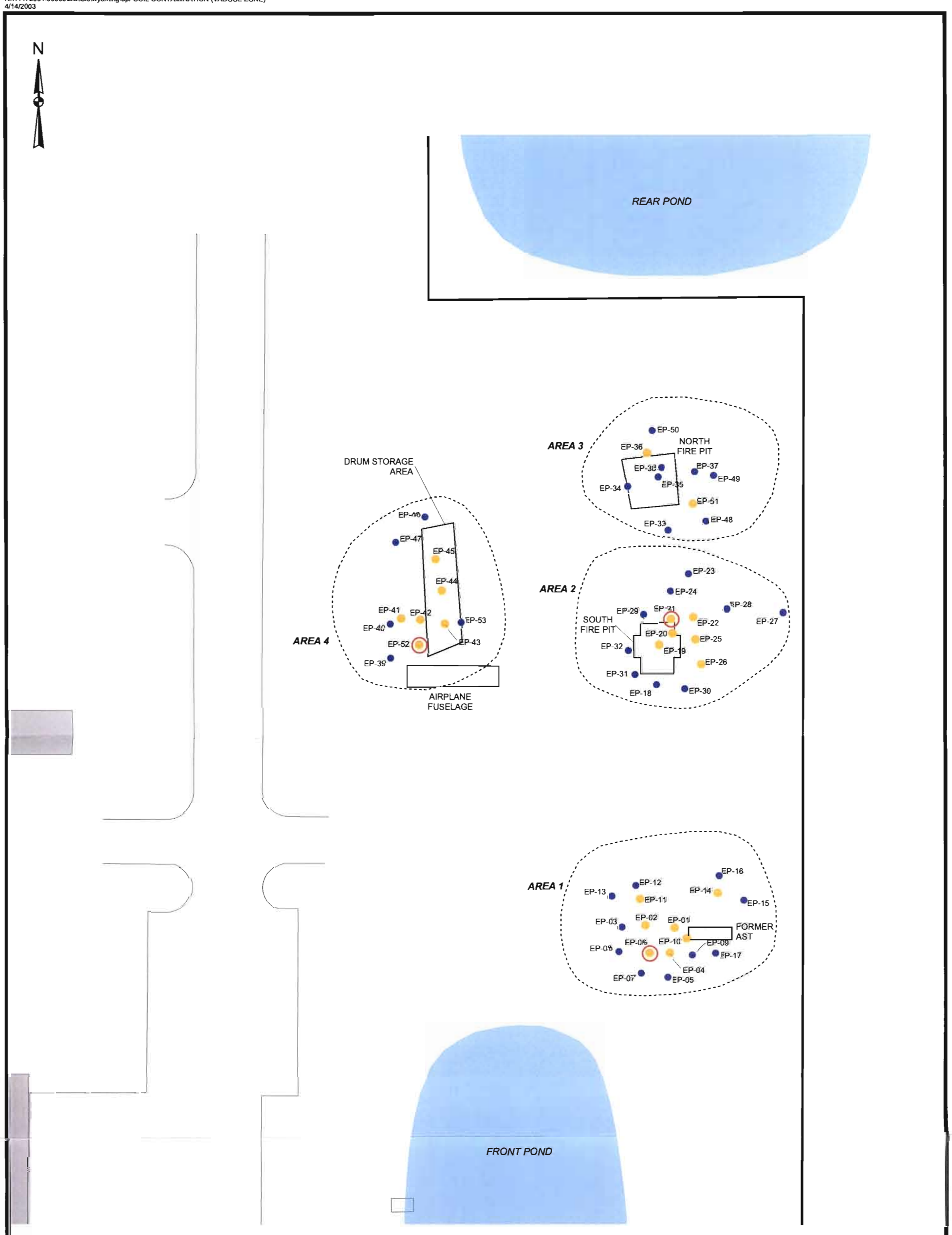
As indicated in Table A3-5, analysis of the worst case sample form EP-6 (0 – 8') identified only one VOC compound (toluene) at a concentration above the SCGs.

None of the four boundary samples (EP-3, -7, -12 and –15) from the AST Area were shown to contain VOC's or metals in excess of the SCGs, indicating that contamination is most likely limited to the area enclosed by the boundary samples.

A3.3.2.2 Area 2 – South Fire Pit

Test pitting demonstrated that the concrete walls and bottom of the cross-shaped South Fire Pit remain intact, approximately 1'-4' BGS respectively.

N:\11172991.00000\DB\Gis\wyoming.apr SOIL CONTAMINATION (VADOSE ZONE)
4/14/2003



Legend

- OVA Reading < 10 ppm
- OVA Reading > 10 ppm
- VOCs Exceed TAGM 4046 Criteria

40 0 40 Feet

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WYOMING COUNTY FIRE TRAINING CENTER
LIMITS OF SOIL CONTAMINATION
(ABOVE THE SHALLOW GROUNDWATER SURFACE)

FIGURE A3-1

Table A3-1
OVA/PID Readings (Results in ppm)
Area 1 - AST Area

	EP1	EP2	EP3	EP4	EP5	EP6	EP7	EP8	EP9	EP10	EP11	EP12	EP13	EP14	EP15	EP16	EP17
0'-2'	**729.0**	1105.0	0.0	**246.0**	0.0	**3141.0**	**1.3**	0.0	0.0	**35.0**	153.0	0.0	0.0	0.0	0.0	0.0	0.0
2'-4'	617.0	**1998.0**	0.0	48.0	0.0	2300.0	0.0	0.0	0.0	6.8	30.0	**1.1**	0.0	**74.0**	0.0	0.0	0.0
4'-6'	75.0	109.0	0.0	16.0	0.0	2955.0	0.0	0.0	0.0	0.0	79.0	0.0	0.0	3.0			0.0
6'-8'	34.0	88.0	0.0	29.0	0.0	243.0	0.0	0.0	0.0	0.0	**381.0**	0.0	0.0	1.0			0.0
8'-10'	70.0	10.0	0.0		0.0	49.0	0.0	0.0	0.0	0.0	42.0	0.0	0.0	0.0			0.0
10'-12'	14.0	1.8	0.0		0.0	21.0	0.0	0.0	0.0	0.0	30.0	0.0	0.0	0.0			

Bolded Interval = highest OVM reading per bore hole.

Fifteen Earthprobe soil borings (EP-18 through EP-32) were advanced in the area of the South Fire Pit (Figure A3-1). Two of these borings (EP-19 and –20) were installed in soils contained within the fire pit itself. As indicated in Table A3-2, samples from four of the borings (EP-21, -22, -25 and –26) exhibited elevated (i.e., > 10 ppm) OVM readings. There was little indication of surficial or shallow impact in this area, with the exception of samples from the 2.0'-4.0' interval of borings EP-19 and EP-20 located within the Fire Pit, and EP-25 located just east of the pit.

In general, the OVA readings are very low (i.e., < 10 ppm) or non-detect (ND) at the surface and gradually increase with depth. The highest levels were recorded in EP-21 and EP-22 in the 8 – 12' zone at, or just above, the shallow groundwater surface.

As indicated in Table A3-5, the analysis of the worst case sample from EP-21 (8 – 12') indicated several VOCs (i.e., toluene, PCE, ethylbenzene and xylene) at concentrations exceeding the SCGs. A single RCRA metal, Cadmium, also was identified at a concentration exceeding SCGs. Additionally, this sample was shown to be characteristically hazardous for toxicity based on the TCLP results for PCE.

There were no metals or VOCs reported at concentrations above the SCGs in the four boundary samples (EP-18, -24, -28 and –32) from the South Fire Pit Area.

The highest concentration of VOCs, as defined by OVA readings, were observed in the deepest (8 - 12 feet BGS) samples from borings advanced adjacent and to the northeast of the South Fire Pit, with much less evidence of impact to shallower soils. Although no borings were advanced through the buried concrete floor of the fire pit, it is likely that VOC impacted soil is present below the floor, based on samples from adjacent borings.

Based on the OVA and analytical data it appears that soils around the South Fire Pit are not impacted at, or near, the ground surface. The only impact is in the deeper soils at, or near, the shallow groundwater surface (i.e., 8 – 12').

Table A3-2
OVA/PID Readings (Results in ppm)
Area 2 - South Fire Pit

	EP18	EP19	EP20	EP21	EP22	EP23	EP24	EP25	EP26	EP27	EP28	EP29	EP30	EP31	EP32
0'-2'	0.0	0.0	1.0	3.1	0.0	0.0	0.0	4.9	0.0	0.0	0.0	0.0	0.0	0.0	0.0
2'-4'	0.0	**191.0**	**29.0**	3.0	9.0	0.0	0.0	54.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
4'-6'	1.0			1.0	13.0	0.0	0.0	**138.0**	8.1	0.0	0.0	0.0	0.0	0.0	0.0
6'-8'	**1.3**			54.0	16.0	**3.0**	0.0	14.0	**28.0**	0.0	0.0	0.0	0.0	0.0	0.0
8'-10'	0.0			284.0	266.0	-	0.0	14.0	6.0	0.0	0.0	0.0	0.0	0.0	0.0
10'-12'	0.0			**595.0**	**533.0**	0.0	0.0	3.1	5.0	0.0	0.0	0.0	0.0	0.0	0.0

Bolded Interval = highest OVM reading per bore hole

A3.3.2.3 Area 3 – North Fire Pit

The concrete walls and bottom of the North Fire Pit also were shown to be intact through test pit investigation.

As shown on Figure A3-1, ten soil borings (EP-33 through EP-38 and EP-48 through EP-51) were advanced to depths of up to 12' BGS in the vicinity of the North Fire Pit. OVA readings were recorded in soil samples from six borings (EP-36, -37, -48, -49, -50 and –51). All six borings show relatively low or non-detect (ND) OVA readings (Table A3-3) at, or near, the surface with gradually increasing concentrations with depth. Most of the readings are < 10 ppm with the exception of borings EP-36 and –51. The highest readings are in the zone at, or near the shallow groundwater surface (i.e., 6 – 12'). There was no instrument response to any of the samples from EP-38 which was advanced through the center of the pit. Based on the OVA readings it is probable that there have been some minor discharges of VOCs onto the ground surface in the vicinity of EP-36 and –51, with vertical migration of contaminants downward to the shallow groundwater.

As indicated in Table A3-5, the worst case sample from EP-51 (8 – 12') contained detectable levels of VOCs and SVOCs, with only one SVOC compound exceeding the SCGs. RCRA metals analysis identified the presence of Cadmium at a concentration that slightly exceeded the SCGs.

There were no RCRA metals reported at concentrations exceeding the SCGs for the four boundary samples (EP-33, EP-34, EP-49 and EP-50) from the North Fire Pit. VOCs were detected in three of the four samples. However, only one compound (1,2 Dichloroethane) was noted in EP-50 at a concentration greater than the SCGs.

Overall, contaminant concentrations as measured by OVA readings, were the lowest observed at any of the AOCs and appears most concentrated at depths greater than 6 feet. Additionally, only two organic contaminants were reported in the soil samples at concentrations above SCGs (one each in two of the five samples), and only a single metal was identified slightly over SCGs in this area

Table A3-3
OVA/PID Readings (Results in ppm)
Area 3 - North Fire Pit

	EP33	EP34	EP35	EP36	EP37	EP38	EP48	EP49	EP50	EP51
0'-2'	0.0	0.0	0.0	8.0	0.0	-	0.0	0.0	0.0	15.0
2'-4'	0.0	0.0		19.0	0.0	-	2.0	0.0	4.0	4.0
4'-6'	0.0	0.0		1.3	1.2	0.0	0.0	0.0	7.3	5.0
6'-8'	0.0	0.0		16.6	3.0	0.0	0.0	2.5	2.7	46.0
8'-10'	0.0	0.0		13.0	1.8	0.0	**23.0**	**4.8**	33.0	41.0
10'-12'	0.0	0.0		**23.0**	**4.3**	0.0	1.6	0.0	**46.0**	**48.0**

Bolded Interval = highest OVM reading per bore hole

A3.3.2.4 Area 4 – Drum Storage Area

Eleven soil borings (EP-39 through EP-47, EP-52 and EP-53), were advanced throughout the Drum Storage Area (Figure A3-1) to depths ranging from 8'-12' BGS. As indicated in Table A3-4, elevated (i.e., > 10 ppm) OVA readings were recorded for samples from borings EP-41 through EP-45 at varying depths. Samples from boring EP-52 exhibited significantly elevated OVA readings in all intervals. In general, the elevated readings in these five borings were noted in the soils at or near the ground surface, and extended down to the top of the shallow groundwater surface (i.e., 8 – 12'). This is particularly true in boring EP-52 where the OVA readings are one to two orders of magnitude greater than in the other four borings, with the highest concentration (4,174 ppm) being recorded in the 6 – 8' interval.

As indicated in Table A3-6, TCLP analysis of the worst case sample from EP-52 showed that soils at the 6 – 8' interval in this boring exhibit the hazardous characteristic of Toxicity based on Tetrachloroethene (PCE) concentration. VOC analysis of this sample (Table A3-5) identified PCE as the only VOC contaminant at a concentration in excess of SCGs. Cadmium also was identified at levels above the SCGs in this worst case sample.

There were no VOCs reported in any of the four boundary samples (EP-39, -46, -53 and – 55), and only arsenic in EP-55 slightly exceeded the SCGs.

There appears to be limited VOC impact to soils in the Drum Storage Area as indicated in EP-41, -42, -43 and –44. In boring EP-52, there is strong evidence of a PCE spill at the ground surface extending down to the shallow groundwater surface.

A3.3.3 Conclusions

Based on the geologic and analytical data collected during the previous investigations it is concluded that selected areas of the site contain contaminated soils that have previously contributed contaminants to the shallow groundwater unit and may continue to do so in the future. A brief summary of the rationale for delineating these areas is presented below:

Table A3-4
OVM/PID Readings (Results in ppm)
Area 4 -Drum Storage Area

	EP39	EP40	EP41	EP42	EP43	EP44	EP45	EP46	EP47	EP52	EP53	EP55
0'-2'	0.0	0.0	0.0	**80.0**	**17.0**	22.0	0.0	0.0	0.0	1799.0	0.0	0.0
2'-4'	0.0	0.0	2.0	9.0	13.0	17.0	0.0	0.0	0.0	714.0	0.0	0.0
4'-6'	0.0	0.0	8.0	19.0	0.0	13.0	**21.0**	0.0	0.0	185.0	0.0	0.0
6'-8'	0.0	0.0	**61.0**	3.0	0.0	**31.0**	9.0	0.0	0.0	**4174.0**	0.0	0.0
8'-10'	0.0	0.0	17.0		14.0	0.0				511.0	0.0	0.0
10'-12'	0.0	0.0	13.0		0.0	0.0				69.0	0.0	0.0

Bolded Interval = highest OVM reading per bore hole

Table A3-5
VOC Analytical Data Summary
Worst Case Samples
EPA Method 8260 Soil Analytical Results ug/kg (ppb)

Analyte	EP-6 0'-8' (R)	EP 21 8'-12'	EP 51 8'-12'	EP 52 6'-8'	TAGM Guidance Value
Chloromethane	-	-	-	-	
Dichlorodifluoromethane	-	-	-	-	
Bromomethane	-	-	-	-	
Vinyl Chloride	-	-	-	-	
Chloroethane	-	-	-	-	
Trichlorofluoromethane	-	-	-	-	
Methylene Chloride	-	-	-	-	
Acetone	-	-	-	-	
Carbon disulfide	-	-	-	-	
Methyl Acetate	-	-	-	-	
1,1,-Dichloroethane	-	-	-	-	200.0
trans-1,2-Dichloroethene	-	-	-	-	
Methyl-Tert-Butyl-Ether	-	-	-	-	
1,1-Dichloroethene	-	-	-	-	
1,1,2-Trichloro-1,2,2-trifluoroethane	-	-	-	-	
cis-1,2-Dichloroethene	-	-	-	-	
Methyl ethyl ketone	-	-	-	-	
Chloroform	-	-	-	-	
1,1,1-Trichloroethane	-	-	-	-	
Cyclohexane	-	-	-	-	
Carbon Tetrachloride	-	-	-	-	
Benzene	-	-	-	-	
1,2-Dichloroethane	-	-	-	-	
Trichloroethene	-	-	-	-	
Methylcyclohexane	-	-	-	-	
1,2-Dichloropropane	-	-	-	-	
Bromodichloromethane	-	-	-	-	
cis-1,3-Dichloropropene	-	-	-	-	
MIBK	-	-	-	-	
Toluene	**30000**	**2400j**	-	-	

Table A3-5 (cont'd)
EPA Method 8260 Soil Analytical Results ug/kg (ppb)

Analyte	EP-6 0'-8' (R)	EP 21 8'-12'	EP 51 8'-12'	EP 52 6'-8'	TAGM Guidance Value
trans-1,3-Dichloropropene	-	-	-	-	
1,1,2-Trichloroethene	-	-	-	-	
Tetrachloroethene	-	**16000**	-	**37000**	1400.0
2-Hexanone	-	-	-	-	
Dibromochloromethane	-	-	-	-	
1,2 Dibromomethane	-	-	-	-	
Chlorobenzene	-	-	-	-	170.0
Ethylbenzene	-	**7400j**	-	-	5500.0
m&p Xylene	-	**33000**	-	-	1200.0
o-Xylene	-	**10000**	-	-	1200.0
Styrene	-	-	-	-	
Bromoform	-	-	-	-	
Isopropylbenzene	-	-	-	-	
1,1,1,2-Tetrachloroethane	-	-	-	-	
1,3-dichlorobenzene	-	-	-	-	
1,4-dichlorobenzene	-	-	-	-	
1,2—dichlorobenzene	-	-	-	-	
1,2-Dibromo-3-chloropropane	-	-	-	-	
1,2,4-Trichlorobenzene	-	-	-	-	
Total 8260 Direct	**30000**	**68800j**	0.0	**37000.0**	

Bolded Intervals Exceed TOGS 1.1.1 Guidance Values and/or Standards for Drinking Water Standards
- = below laboratory detection limits

Standards for analytes detected were researched within the published TAGM 4046, with the exclusion of library search compounds.

Table A3-5 (cont'd)
EPA Method 8260 Soil Analytical Results ug/kg (ppb)

	EP 6 0'-8' (R)	EP 21 8'-12'	EP 51 8'-12'	EP 52 6'-8'
1-ethyl-2-methyl benzene	26000			
Unknown Aromatic	6300			
1,1,2,2-tetracholor-1,2-di-fluoroethane		26000		
Unknown Cyclic		30000		
D-limonene		37000		
1-methyl-2-(1-methyl ethyl) benzene		19000		
Unknown		8600	2700	2700
Decane			5500	
4-methyl decane			3000	
(2-methyl propyl)-cyclohexane			4300	
Undecane			11000	
Unknown Hydrocarbon			3600	
Unknown			2600	
Unknown Hydrocarbon			2300	
Unknown			2400	
Unknown Cyclic			6300	
Decahydro-2-methyl naphthalene			3600	
Unknown Hydrocarbon			6800	
Unknown			4900	
4-ethyl-1,2-dimethyl-benzene			7100	
Unknown PAH			3300	
Unknown PAH			7600	
Tridecane			7900	
Unknown			2800	

Table A3-6
TCLP VOCS ANALYTICAL DATA SUMMARY
WORST CASE SAMPLES

TCLP 8260 - Soil
Results in mg/l (ppm)

Parameter	EP 6 R 0'-8'	EP 21 8'-12'	EP 51 8'-12'	EP 52 6'-8'	Hazardous Limit
Vinyl chloride	U	U	U	U	0.2
1,1-Dichloroethene	U	U	U	U	0.7
MEK (2-butanone)	U	U	U	U	200.0
Chloroform	U	U	U	U	6.0
Carbon tetrachloride	U	U	U	U	0.5
Benzene	U	U	U	U	0.5
1,2-Dichloroethane	U	U	U	U	0.5
Trichloroethene	U	U	U	U	0.5
Tetrachloroethene	U	**16.0**	0.4	**38.0**	0.7
Chlorobenzene	U	U	U	U	100.0
1,4-Dichlorobenzene	U	U	U	U	7.5

U = None Detected

Bolded Intervals Exceed Hazardous Limits

Area 1 - AST Area: In this area, the data indicates that toluene, in particular, as well as other VOCs have spilled at the ground surface and migrated vertically downward. In most cases the contaminants have reached the shallow groundwater. However, in all the borings analyzed, the VOC concentrations decreased with depth. This would tend to indicate that the VOC contaminants are primarily contained in the soils and that groundwater in the vicinity of the AST may not have been severely impacted. The impacted soils are confined to an approximately 30' X 30' area defined by borings EP-1, -2, -4, -6, -10 and –11 as shown on Figure A3-2. The impacted soils extend to a depth of 8 – 10'. Assuming excavation to a depth of 8 feet, this equates to approximately 270 cubic yards (cy) of soil to be excavated.

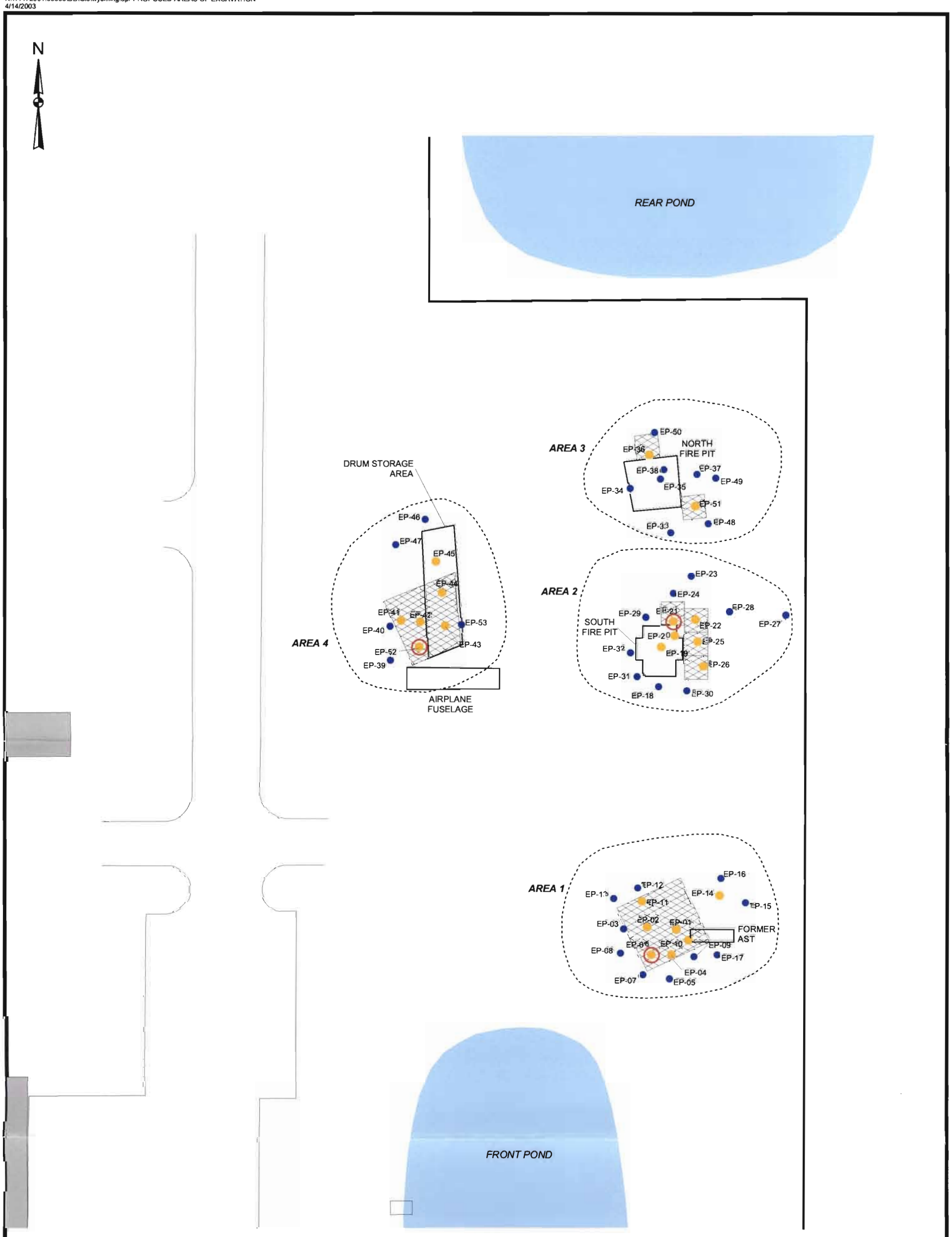
Area 4 – Drum Storage Area: Data indicates that PCE, in particular, as well as other VOCs have spilled at the ground surface and have migrated vertically downward. The VOC contamination is most apparent in EP-52. In general, the VOC concentrations increase with depth, being the highest at, or just, above the shallow groundwater surface. This would tend to indicate that the VOCs have migrated vertically downward through the soils and into the groundwater and have been transported laterally with the groundwater flow across the site (to the east and northeast). The impacted soils are confined to an approximately 30' X 30' area defined by borings EP-41, -42, -43, -44 and –52 as shown on Figure A3-2. The impacted soils extend to a depth of 8 – 10'. Assuming excavation to a depth of 8 feet, this equates to approximately 270 cy of soil to be excavated.

Area 2 – South Fire Pit: In general, the data indicates that the soils within the Fire Pit have been impacted by VOCs, as would be expected. The concrete containments appear to be intact, although no borings were extended through the bottom of the pit. There is evidence of possible minor spills of VOCs at the ground surface with vertical migration downward in EP-21, -22 and –25. However, the VOC concentrations are the highest in the 8 – 12' interval which is coincident with the shallow water-bearing zone. Elevated concentrations of toluene, ethylbenzene, xylene and PCE were observed in this interval. Based on the available data, the impacted soils are confined to three approximately 10' X 10' areas associated with borings EP-21, -22 and –25, respectively as shown on Figure

A3-2. The impacted soils extend to a depth of 8 – 10'. Assuming excavation to a depth of 8 feet, this equates to approximately 90 cy of soil to be excavated.

Area 3 – North Fire Pit: In general, the data indicates that the soils within and below the Fire Pit have not been impacted by VOCs. However, only one near surface sample was collected. The concrete containment appears to be intact. There is evidence of possible minor spills of VOCs at the ground surface with vertical migration downward in EP-36, -50 and –51. However, the VOC concentrations from OVA readings are the highest in the 8 – 12' interval which is coincident with the shallow water-bearing zone. No detectable levels of VOCs were noted in the analytical results for a sample from this interval. This may be indicative that the OVA readings recorded in these locations are associated with volatilization of VOCs migrating in the groundwater from spills in the Drum Storage Area located to the west and upgradient of the North Fire Pit. It does not appear to be indicative of leakage of VOCs out of the fire pit and downward migration to the groundwater. Based on the available data, slightly impacted soils are confined to approximately 10' X 10' areas associated with borings EP-36 and –51, as shown on Figure A3-2. The impacted soils extend to a depth of 8 – 10'. Assuming excavation to a depth of 8 feet, this equates to approximately 60 cy of soil to be excavated.

N:\11172991.00000\DB\Gis\wyoming.apr PROPOSED AREAS OF EXCAVATION
4/14/2003



URS	WYOMING COUNTY FIRE TRAINING CENTER PROPOSED SOIL EXCAVATION LIMITS	FIGURE A3-2

A4.0 PROPOSED INTERIM REMEDIAL MEASURE

A4.1 Objectives

The primary objectives of the interim remedial action at the site are as follows:

- To excavate contaminated soils to reduce and/or eliminate the potential for contaminants in the soils to be leached into the shallow groundwater.
- To treat the soils onsite such that contaminant levels are at or below the SCGs so that the soils can be re-used onsite, or, to levels such that the soils can be disposed off-site as non-hazardous.

A4.2 Scope of Work

The Scope of Work, as defined by previous discussion with representatives of [illegible] County and NYSDEC, will include excavation and on-site treatment of VOC contaminated soils from the four Areas of Concern identified above. Treatment of excavated soils will be accomplished via closed cell aboveground soil vapor extraction (SVE), the goal of which is removal of contaminants to the level of regulatory compliance (i.e., SCGs), with the potential for contaminant reduction to levels allowing for off-site disposal as non-hazardous, non-regulated soil. The IRM also will involve confirmatory sampling and analytical testing of excavated soils and various support operations involving safety, security, monitoring and decontamination.

The Scope of Work for the IRM includes the following major tasks:

- Mobilization;
- Site Preparation;
- Contaminated Soils Excavation;
- Excavation Dewatering
- Backfill and Site Restoration;
- SVE Treatment Cell Construction;
- Contaminated Soils Handling;

- SVE Treatment Cell Operation;
- Confirmatory Testing of Treated Soils;
- Decommissioning of SVE Treatment Cell;
- Final Disposition of Treated Soils.

A4.3 Design Basis

Ex-Situ remediation of impacted soils will employ SVE technology as the contaminant removal/reduction mechanism for excavated impacted soils. This technology has been employed at numerous USEPA remediation Sites for VOC remediation. SVE technology involves the use of vacuum blower(s) to produce a negative pressure gradient within the pore spaces surrounding the soil particles, which induces airflow through the waste matrix. The induced airflow causes movement (partitioning) of volatile organic contaminants, in vapor form, into the air stream. The VOC-laden air stream is transported to a treatment device (i.e., Granular Activated Carbon filter, catalytic thermal oxidizer) wherein the contaminants are removed and are contained for recycling, and/or reduced volume destruction, or destroyed outright. The treated air is discharged to the atmosphere. While SVE technology is most often utilized as an In-Situ treatment technique, Ex-Situ application of this technology, where practical, results in advantages over In-Situ applications, including efficacy and process control. This is the Ex-Situ SVE methodology.

This Site's characteristics are well suited to an Ex-Situ application of the SVE technology to achieve the IRM goals. Factors which influence the suitability of SVE to a remediation site include:

- Contaminant Type and Volatility
- Soil Type/Soil Permeability
- Ability To Produce Advective Flow Throughout The Contaminated Zone (Soils)
- Ability To Control Fugitive Emissions

Contaminants of concern in the soils to be remediated at the WCFTC Site are PCE, Toluene, Ethylbenzene and Xylenes, all of which are volatile organic compounds with relatively high vapor pressures (0.018, 0.029, 0.0092, and 0.008, respectively), relatively low boiling points, and relatively high equilibrium vapor concentrations. These characteristics make these VOCs highly amenable to removal through vapor extraction. Impacted soils to be remediated at the WCFTC Site can be generally characterized as typically weakly stratified sandy/silt/clay glacial drift material, with varying percentages of gravel (typically 15 - 25%). These soils types would be considered to be of low to moderate permeability, and would therefore be less than ideal candidates for (In-Situ) Soil Vapor Extraction. This factor is mitigated by an Ex-Situ application of SVE methodology, in which physical handling (excavation/setup) will loosen and fluff the soils, greatly increasing permeability, and is the primary justification for performing Ex-Situ remediation. In addition, Ex-Situ application of SVE methodology results in the ability to ensure advective flow throughout the soils under remediation through the ability to utilize extraction piping spacing that would be impractical in an In-Situ application. The ability to control fugitive emissions is also assured in a closed system Ex-Situ application of SVE technology.

The Ex-Situ SVE soils remediation to be performed at this Site is based upon the treatment of a soil volume estimated at approximately 700 cubic yards. A general description of the proposed soils remediation is as follows:

Contaminated soils will be excavated from four areas at the Site, previously identified through subsurface investigation. Excavated contaminated soils will be placed in an aboveground treatment cell to be constructed on-site, along the northern boundary of the "Site". The Treatment cell will be a closed cell, constructed with a 20 mil solvent welded liner/enclosure, having perforated PVC piping placed within the soils to allow air flow to be induced throughout the soils under remediation. Upon completion of Treatment Cell construction, the cell will be closed by wrapping and sealing the liner/enclosure over all surfaces, and the PVC piping will be connected to a suitably sized regenerative blower, located in an adjacent equipment shed, which will be used to induce the air flow necessary to accomplish contaminant removal from the soils. Ambient air will be drawn into the Treatment Cell by the blower through a pair of air vents located at the top of the soil treatment cell, at either end, and equipped with pressure activated valves to allow air

flow into the Treatment Cell. These valves will allow airflow only when the interior of the cell is under negative air pressure, to prevent emissions of contaminants to the atmosphere. Extracted, contaminant laden air flow from the Treatment Cell will flow through the blower, and be forced under positive pressure through two large (1000 lb. Capacity/each) activated carbon filters, piped in series, which will remove the contaminants from the air stream. The filtered air stream will be discharged to the atmosphere through an exhaust stack after carbon filtration.

A4.4 Proposed Interim Remedial Measure

In order to accomplish the objectives, URS will utilize Nature's Way Environmental Consultants & Contractors, Inc. (NWEC&C) of Crittenden, New York to provide the services described in this document. URS will provide oversight of the IRM activities to ensure compliance with this IRM Work Plan as well as the applicable federal, state and local regulations and ordinances. Upon completion of the IRM, URS will compile all the relevant data to be included in the Final Construction Monitoring Report (CMR) that will be prepared once the overall site investigation and remediation is completed.

A4.4.1 Mobilization

NWEC&C will mobilize the necessary equipment and personnel to the site. Preparation of the site prior to initiation of remedial operations will include construction of a temporary fence to control access to the work area. The fence will be constructed of 5.0' high orange plastic construction safety fencing mounted on driven steel fence posts at 10' spacing. Temporary fencing will be installed on the south and west sides of the work area and connected to the permanent chain link fence that defines the WCFTC property boundary and the north and east boundaries of the work area. Signs designating the site as a Hazardous Waste Site and warning against trespass will be affixed to all sides of the fence. Vegetation in the work area also will be cut prior to work start.

Necessary earthmoving equipment and materials will be mobilized to the Site, and exclusion zones, and a decontamination pad/area will be established within the work (fenced) area.

A centralized decontamination area with a decontamination pad will be constructed at the site to decontaminate equipment used during remedial activities. The decontamination area must be large enough to allow equipment and material to be cleaned.

The proposed excavation areas will be staked and flagged prior to excavation. Utilities on the site will be marked through the Underground Facilities Protective Organization (UFPO). All utilities to the site have been de-energized and/or shut off, but they will be marked as they are slated for removal.

A4.4.1.1 Support Facilities

For logistical support of site remediation activities, temporary office space will be made available in the existing office building for use by management and NYSDEC personnel.. This space will be used for office type work in support of the remedial action at the site and will not be used for storage or decontamination of equipment or personnel. Some space within the office will be designated for breaks and dining. Additionally, bathrooms and potable water will be made available to site workers. Prior to entering the office, site personnel will be required to doff any personal protective equipment (PPE) and remove their overboots in the contamination reduction zone. The contractor will be required to maintain a supply trailer on site to be used for the storage of equipment and PPE necessary to support the remedial action.

The contractor will be responsible for supplying and maintaining safety barriers around active work areas during excavation and soil handling activities. Also, the existing chain-link fence around the facility will be maintained and repaired as necessary by the contractor.

A4.4.1.2 Air Monitoring Program

Based on the Site's size, location, and setting, no impact to nearby residents is expected as a result of the planned IRM. There are only two occupied residences with ½ mile of the work area, one of which is seasonal. Both are at least 150' from the boundary of the work area at the WCFTC Site.

However, as a precautionary measure, residences within one-half mile will be notified, in writing, at least one week prior to the performance of any intrusive site work. Notification, continuous downwind air monitoring for VOC's during Site work, and fugitive emissions control measures described below will assure no impact to these nearby residents.

Real-time air monitoring for volatile organic vapors will be conducted at the perimeter of active excavation areas. Volatile organic vapors will be monitored at the downwind perimeter of active excavation areas with an OVA on a routine basis. If total volatile organic vapors exceed 5 ppm above background levels, work activities will be halted and monitoring will be continued under the provisions of a Vapor Emission Response Plan. The Vapor Emission Response Plan includes an intensification of perimeter monitoring and a temporary shut down of excavation activities. When the organic vapor levels drop below 5 ppm above background, work activities can resume. If organic vapor levels are greater than 5 ppm above background, but are less than 25 ppm above background at the perimeter of the excavation, activities can resume provided the organic vapor levels 200 feet downwind of the exclusion zone or half the distance to the nearest residential or commercial structure, whichever is less, is below 5 ppm above background.

Respirable dust (particulate) must be monitored at one upwind and one downwind location during all demolition and excavation activities. Temporary particulate monitoring stations will be set up and moved to the appropriate locations on a daily basis based on wind direction. If downwind particulate levels exceed the upwind particulate levels by 100 micrograms per cubic meter (μg/m3), then dust suppression measures must be employed.

Any air monitoring that results in a work stoppage will be reported to the NYSDEC, the New York State Department of Health (NYSDOH) and Wyoming County within 24-hours.

A4.4.1.3 Health and Safety Plan

URS and NWEC&C personnel will conduct all remedial activities in accordance with the requirements of the Site Specific Health and Safety Plan (SSHASP) contained in Part C, that is both protective of the site workers and the surrounding community. The SSHASP sets out personnel protection and action levels and establishes procedures and specifies H&S controls

such as exclusion and decontamination zones. Compliance with the SSHASP will be [illegible] throughout the planned Interim Remedial Action. It is expected that all intrusive Site [illegible] contaminated soils excavation and handling operations) will be conducted under Level [illegible] PPE levels will be adjusted as per the SSHASP, based on air monitoring results.

A4.4.1.4 Surveying and Mapping

Field surveys will be conducted by URS on an as-needed basis to document the horizontal and vertical extent of soil contamination removed during the IRM activities. A New York State-licensed surveyor will perform all land surveying.

A4.4.2 Site Preparation

The site will not require any clearing or grubbing prior to the commencement of remedial action activities. There are no trees on the site that will interfere with the work/excavation/staging areas and most of the site is covered with gravelly soil to promote vegetative growth.

The UFPO will be contacted prior to the start of any excavation activities to locations of the utility and service lines that are present on the site.

A4.4.3 Contaminated Soil Excavation

Contaminated soil will be excavated from four areas of the site and replaced with backfill material. The four areas include:

- Area 1 – AST Area
- Area 2 – North Fire Pit
- Area 3 – South Fire Pit
- Area 4 – Drum Storage Area

Soils in these areas have been impacted with petroleum products and/or organic/chlorinated organic solvents at concentrations that exceed the SCGs

NWEC&C will supply the necessary equipment and personnel to complete the soil excavation as well as construction and operation of the SVE Treatment Cell. Excavated soil will be screened with a PID. Any soil with PID readings that exceed 10 ppm above background levels will be considered to be contaminated and will be transported and placed in the treatment cell. Excavation activities will be discontinued when each of the walls and the bottom of the excavation exhibit PID readings that are less than 10 ppm above background levels. A minimum of one soil sample will be collected from each wall and the bottom of the excavation for VOC analysis at a local laboratory. The actual number of confirmatory samples to be collected will be determined in the field in conjunction with the onsite NYSDEC representative. The laboratory will be requested to perform a 24-hour turnaround on the analysis so the excavation can continue or be backfilled within a two-day period.

If total VOC results exceed 10 ppm, the excavation will continue in the direction from where the sample was collected. If total VOC results are less than 10 ppm, the excavation will be backfilled to grade with clean fill.

A4.4.4 Excavation Dewatering

It is anticipated that the depth of excavation (i.e., 8–10 feet) will not extend to the groundwater surface. Consequently, it is not expected that any water will be encountered during the excavation. However, should any perched water be encountered, the excavation will be dewatered as necessary by pumping from the excavation to temporary on site storage tanks. The stored water will be treated on site by pumping through carbon and the treated water will be stored in a designated clean storage tank. The treated water will be tested for VOCs prior to disposal via discharge to the local surface water drainage system. The analytical results will be compared with the NYSDEC Division of Water Technical and Operational Guidance Series (1.1.1) "Ambient Water Quality Standards and Guidance Values and Groundwater Effluent Limitations" for surface waters based on the classification of the water bodies and streams that the treated water would most likely be discharged to.

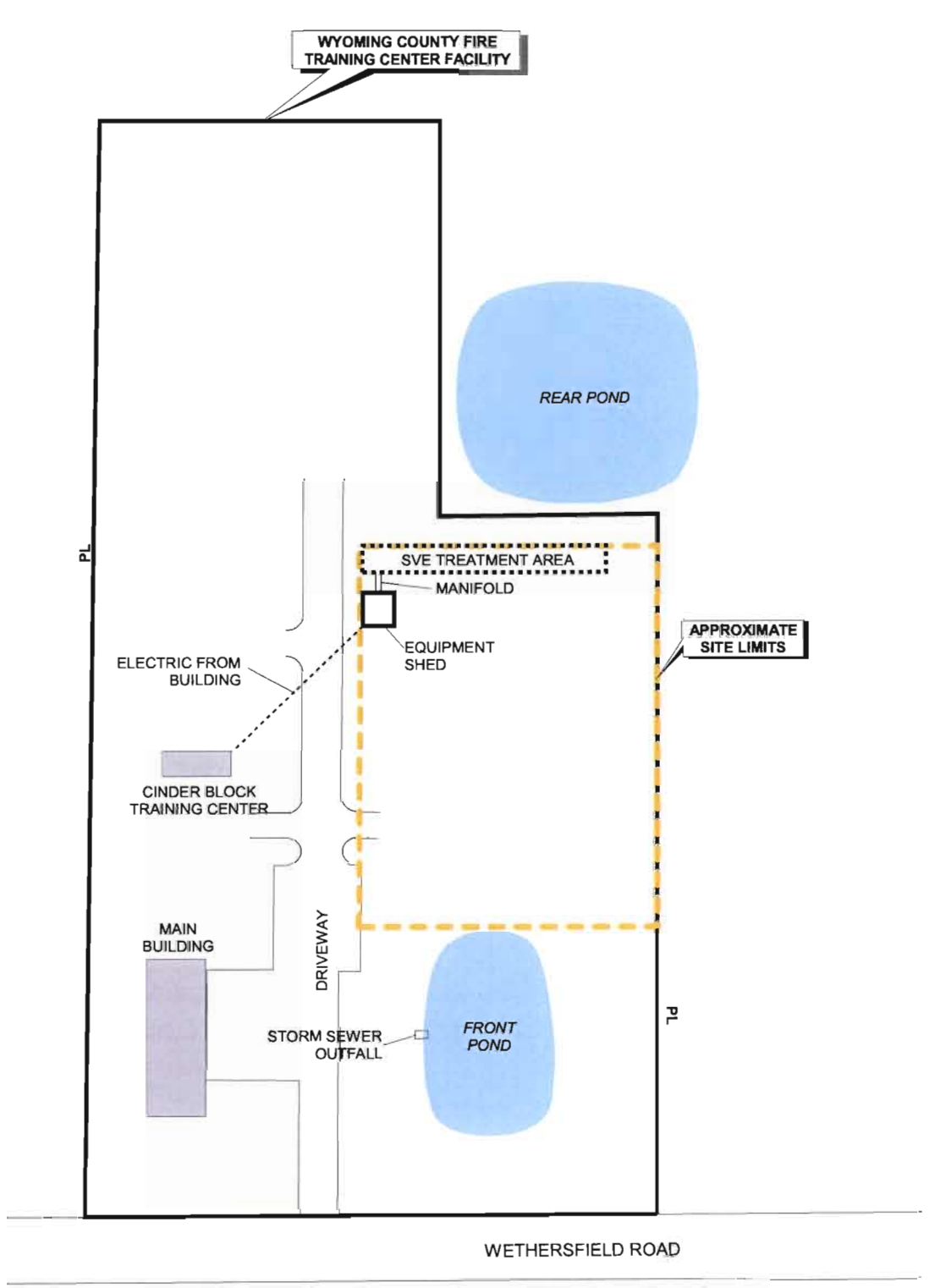
A4.4.5 Backfill and Site Restoration

Following receipt of confirmatory samples showing that the cleanup objective has been achieved, certified clean fill will be used to backfill the excavated areas. All the excavations will be backfilled and compacted to grade. Areas that originally had been paved or covered with concrete will not be repaved. Backfilled areas will be reseeded with native grasses, as appropriate.

A4.4.6 SVE Treatment Cell Construction

The proposed SVE Treatment Cell will measure approx. 180.0' L x 20.0' W x 7.0' H, and be located along the Northern boundary of the Site (Figure A4-1). The Treatment cell will be constructed of 20 mil thick, solvent welded PVC geomembrane, as manufactured by EPI. This material has been selected based on compatibility with site contaminants, liner structural requirements, and demonstrated performance in similar applications. Geomembrane material specifications are provided as Appendix A. Prior to installation of the geomembrane, topsoil will be stripped from the treatment cell area, and the subsoils graded to provide a 0.5 % drainage grade over its' length, to the east end. The base of the SVE Treatment Cell area will be compacted (rolled) smooth with all stones, rocks, roots, and debris greater than 1" dia. removed, prior to installation of the geomembrane, to prevent puncturing. The stripped topsoil will be graded to form an approximately 1.5' high perimeter berm, to assist in establishing and retaining the shape of the base of the Treatment Cell. After the Treatment Cell area has been prepared in the manner described, the geomembrane will be laid out within the base of the cell. Excess material will be retained along the North and South sides and both ends to allow closure seaming.

Washed round #1 pea gravel will then be placed to a depth of approx. 4" over the geomembrane, covering the entire bottom of the Treatment Cell. A single 4" dia. perforated PVC pipe will be set along the center (longitudinally) of the cell, buried within the pea gravel, to facilitate leachate collection and drainage to the low end of the Treatment Cell, where it will be connected to a short (2.0' h) riser, providing access for leachate removal, as necessary. A water permeable synthetic geotextile filter cloth will then be placed over the pea gravel to prevent infiltration of soils fines into the gravel base, to prevent clogging of the drainage base.



URS	WYOMING COUNTY FIRE TRAINING CENTER PROPOSED SVE TREATMENT CELL LOCATION PLAN	FIGURE A4-1

N:\11172991.00000\DB\Gis\wyoming.apr SVE TREATMENT CELL LOCATION
4/15/2003

Specifications for the synthetic geotextile filter cloth are included as Appendix A. Th[illegible] will complete preparation of the Treatment Cell for placement of contaminated soils.

A4.4.7 Contaminated Soils Handling

Excavation of contaminated soils will commence after the Treatment Ce[illegible] prepared to accept contaminated soils as detailed above. Excavation will begin at th[illegible] farthest from the Treatment Cell, the AST area. Prior to initiation of excavation, the ex[illegible] areas of excavation in each AOC will be demarcated with white paint, and air monitor[illegible] ambient air VOC concentrations will be established both within and downwind of the [illegible] control fugitive emissions during soils excavation, dumping at the Temporary Dump P[illegible] Treatment Cell construction, a volatilization inhibitor (concentrated biodegradable su[illegible] solution) will be sprayed on the exposed surfaces of the excavation and excavated soils de[illegible] soils handling operations.

Soils will be screened by OVA as excavation is being performed in an AOC[illegible] impacted from un-impacted soils. Any un-impacted (i.e., no OVA readings above [illegible] overburden soils generated during excavation will be temporarily staged adj[illegible] excavation for subsequent placement back in the excavation following confirma[illegible] Actual field excavation limits in each AOC will be established based on VOC head[illegible] of excavation sidewalls. Final excavation limits will be confirmed through [illegible] Laboratory analysis. Prior to backfilling the excavation will be measured and mapped

Soils from the four excavation areas will be excavated and placed direc[illegible] trucks that will transport the soils to a Temporary Dump Pad that will be established [illegible] to the South, and parallel to, the Treatment Cell, along its' entire length. The Tem[illegible] Pad will measure approx. 20' wide x 170' long, and consist of two layers of 10 mil [illegible] sheeting placed on the ground surface. Excavated contaminated soils will be placed [illegible] Treatment Cell area by means of an excavator fitted with a grading bucket. The ex[illegible] travel along the length of the South edge of the Treatment Cell, transferring excavat[illegible] the temporary dump pad to the Treatment Cell.

The first lift of contaminated soils will be placed into the Treatment Cell by the excavator, and graded level, without compacting the soils, over the entire base of the cell, to a thickness of approx. 1.5'. A series of five, four-inch diameter perforated PVC piping laterals will then be installed on top of the contaminated soils. These pipes will be spaced 3.0' on center, running longitudinally within the Treatment Cell as depicted in Figures A4-2 and A4-3. These laterals are designated the "Lower SVE Laterals". Each perforated PVC lateral will be surrounded by 6" of washed round #1 pea gravel, wrapped by synthetic geotextile filter cloth to prevent infiltration of fines to the SVE laterals. The Lower SVE Laterals will be manifolded together at the West end of the Treatment Cell with solid PVC piping, which will extend through the geomembrane at ground surface for later connection to the SVE blower.

A second, 3.0' thick lift of contaminated soil will then be placed into the Treatment Cell by the excavator and graded level, without compacting the soils, to a width of approx. 17.0' (to produce a soil side slope of 1V:2H). A series of four, four-inch diameter perforated PVC piping laterals will then be installed on top of the second lift of contaminated soil. These laterals will be spaced 3.0' on center, running longitudinally within the Treatment Cell as depicted in Figures A4-2 and A4-3. These laterals are designated the "Upper SVE Laterals". Each perforated PVC lateral will be surrounded by 6" of washed round #1 pea gravel, wrapped by synthetic geotextile filter cloth, to prevent infiltration of fines to the SVE laterals. The Upper SVE Laterals will be manifolded together at the west end of the Treatment Cell with solid PVC piping. The piping will extend through the geomembrane at ground surface to allow for later connection to the SVE blower.

After installation of the Upper SVE Laterals, a third, 1.5' thick lift of contaminated soil will be placed into the Treatment Cell by the excavator. The soil will be graded level, without compacting the soil, to a width of approx. 14.0' (to produce a soil side slope of 1V:2H). This lift will complete the placement of contaminated soils in the Treatment Cell. Two, four-inch diameter perforated PVC piping laterals will then be installed on top of the third contaminated soil lift. These pipes will be spaced 3.0' on center, located equidistant from the center and running longitudinally within the Treatment Cell as depicted in Figures A4-2 and A4-3. These laterals are designated the "Air Inlet Laterals", and are designed to allow ambient air to be drawn into the Treatment Cell by the negative pressure created by the SVE system. The Air Inlet Laterals will

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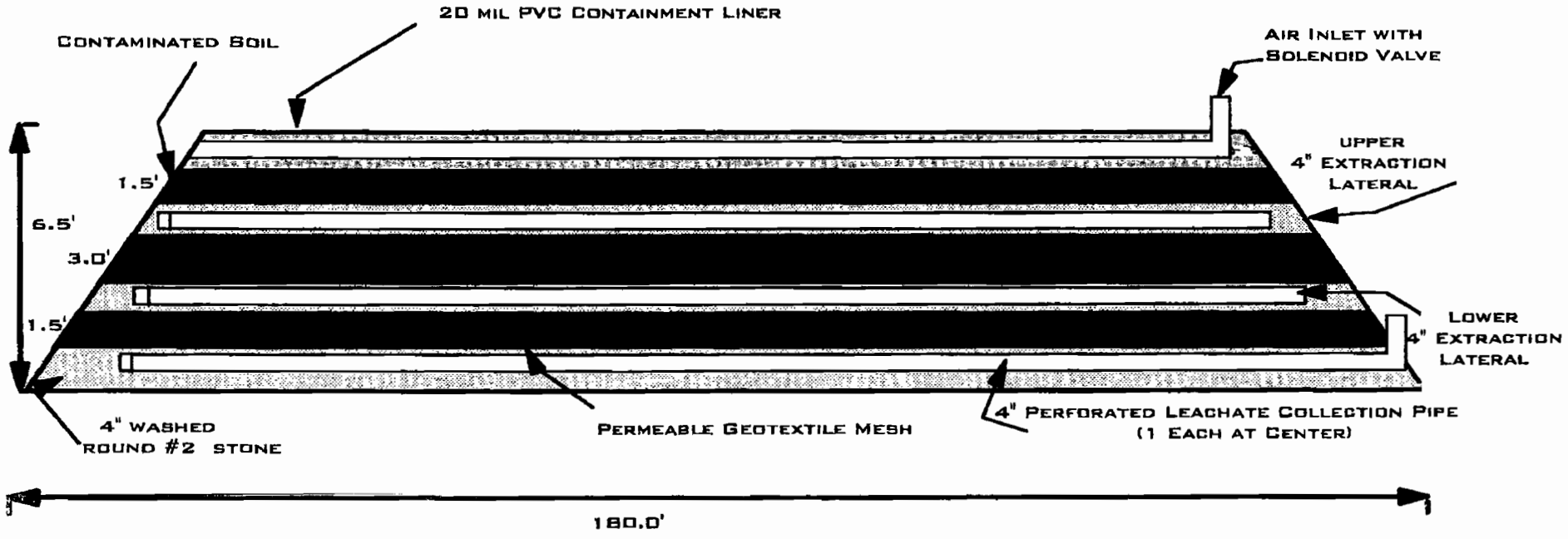

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SVE TREATMENT CELL
TYPICAL SECTION SIDE VIEW

FIGURE A4-2

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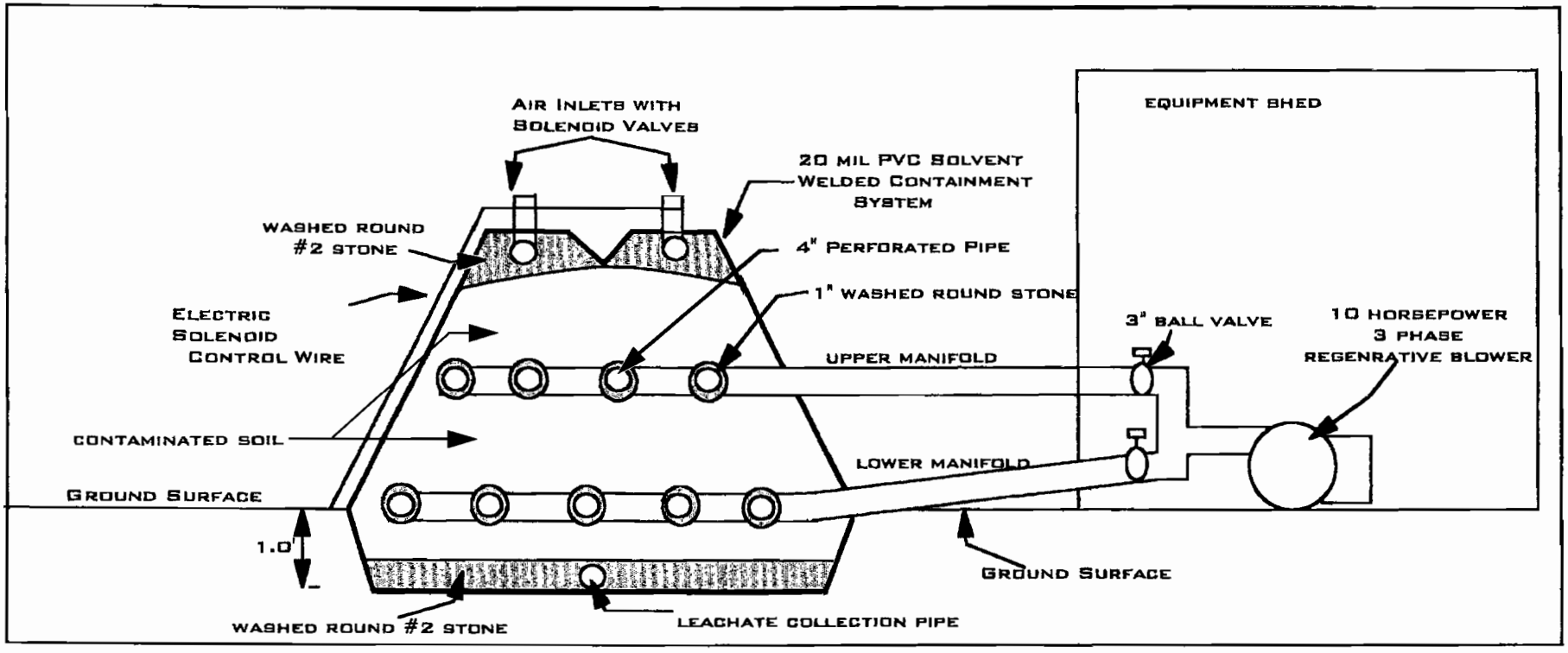
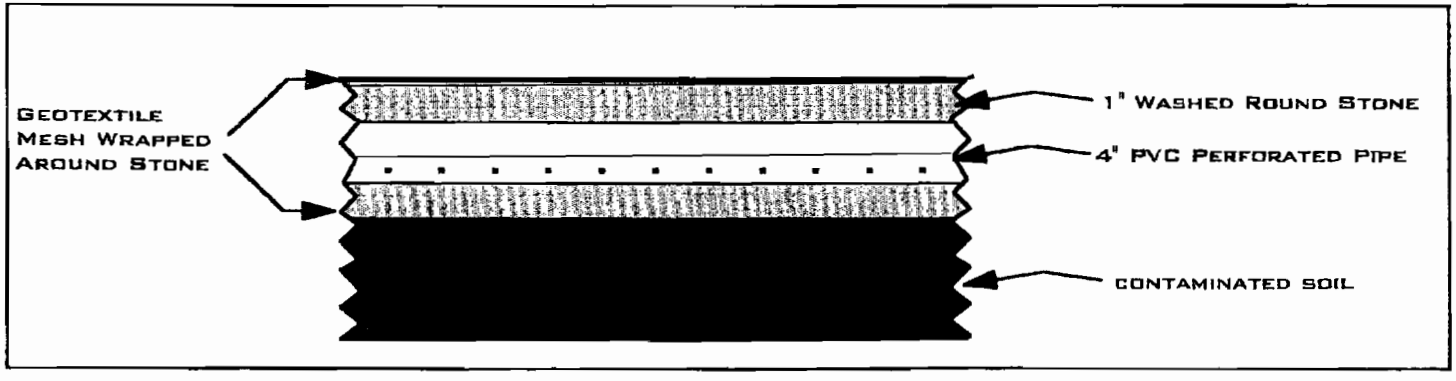


DETAIL OF PIPING LATERALS



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SVE TREATMENT CELL
TYPICAL SECTION END VIEW

FIGURE A4-3

elbow up at opposite ends of the Treatment Cell, with a solid 4" PVC riser pipe extending through the geomembrane cover. Each Air Inlet riser will be fitted with a solenoid controlled valve which will only open when negative air pressure is sensed at the SVE Lateral(s) manifold, closing if no negative pressure is present, and preventing emissions of contaminants to the atmosphere through the Treatment Cell vents.

After completion of installation of the Air Inlet Laterals, the Treatment Cell will be closed by wrapping the excess geomembrane from the baseliner over all surfaces of the Treatment Cell and solvent welding the seams (one along the length of the Treatment Cell, and one at each end). All SVE and Air Inlet Piping penetrations of the geomembrane cover will be through specially designed sealing pipe boots installed (solvent welded) into the geomembrane cover at the appropriate location(s). Specifications for the piping entry boots are provided in Appendix A.

Since Treatment Cell construction will take place over a period of several days, temporary controls to prevent fugitive emissions from the Treatment Cell will be implemented on a daily basis. While under construction, the Treatment Cell will be covered with 6 mil polyethylene sheeting at the end of each workday to prevent (rainwater) runoff and VOC emissions to the atmosphere. The temporary polyethylene cover will be left in place over the inactive portion of the Treatment Cell during cell construction operations, to the extent practicable. No excavation and/or Treatment Cell construction will be conducted during periods of rain. In addition, the Temporary Dump Pad will be either emptied of all contaminated soils prior to the finish of work on each day, or covered by a temporary 6 mil poly cover at the end of the work day, to prevent (rainwater) runoff and volatiles emissions to the atmosphere.

The SVE lateral manifold pipes exiting the completed Treatment Cell will be connected to SVE equipment housed in an equipment shed (Figure A4-4) to be located at the Southwest end of the Treatment Cell (Figure A4-1). SVE piping will be of 4" dia. solid Schedule 80 PVC. The Upper and Lower SVE piping laterals will be run separately into the equipment shed, each equipped with a 4" PVC, Tru-Union, viton seal ball valve to regulate air flow. All piping joints will be either solvent welded or unions with viton o-rings/seals. Piping from the SVE manifold ball valves to the SVE blower suction inlet will be of 3" diameter schedule 40 black steel

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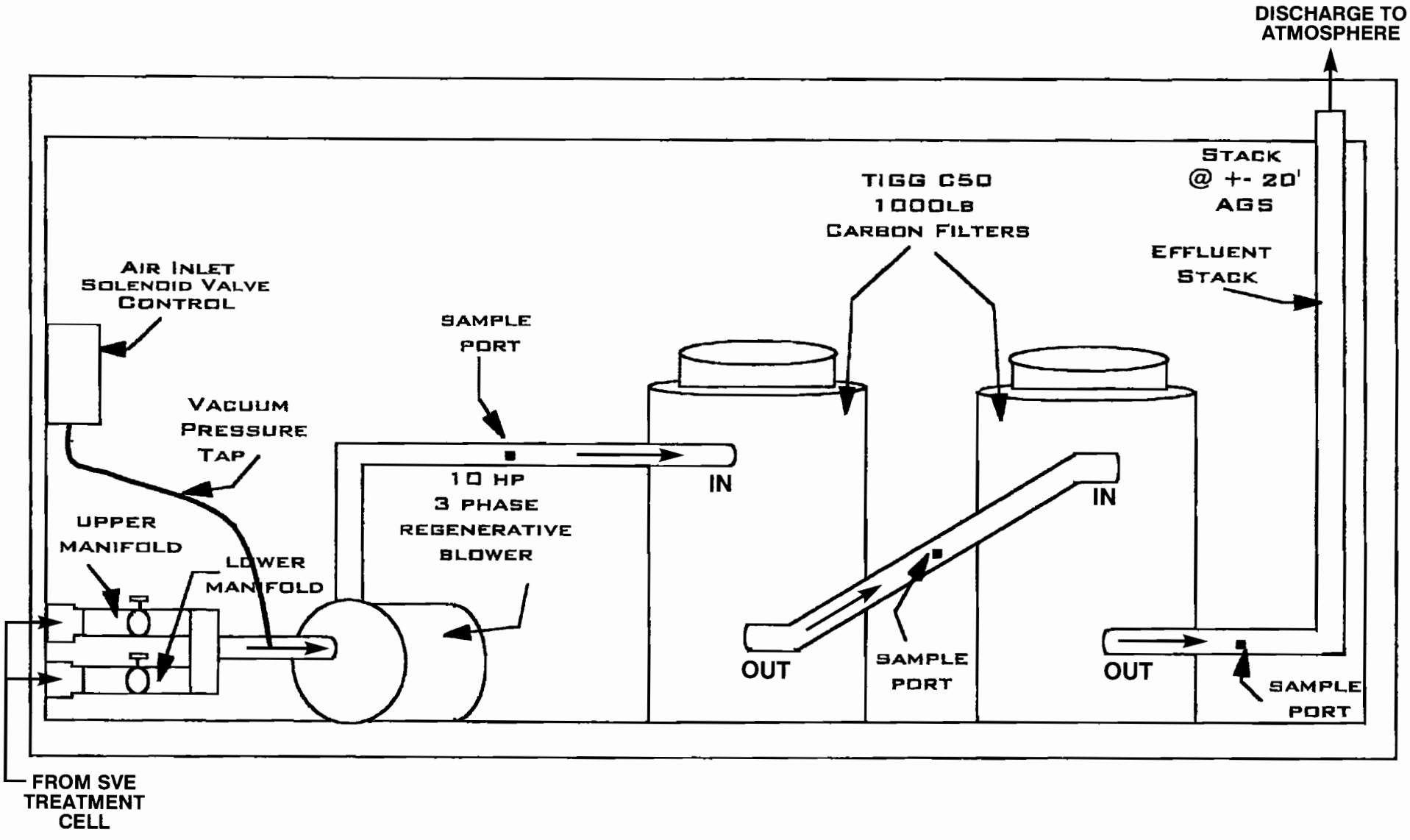

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SVE TREATMENT CELL
EQUIPMENT SHED SCHEMATIC

FIGURE A4-4

construction to prevent damage to piping from heat generated by the SVE blower. Each SVE manifold pipe (Upper & Lower) will be fitted with a vacuum gauge (0-120" H_2O) and calibrated air flow meter to allow separate observation, recording, and adjustment of air flow and pressure.

The SVE piping will be connected to a Rotron sealed regenerative blower, Model EN858, to supply the vacuum source and airflow for Soil Vapor Extraction of volatile contaminants. This blower is powered by a 10 hp, 3ph, 230v, 60 hz, explosion-proof motor, and is capable of developing a maximum of 400 scfm air flow (1.0" H2O column vacuum) and 100" H_2O column vacuum (150 scfm). Specifications for the SVE blower are provided as Appendix A.

A Best Case analysis, assuming negligible resistance to air flow through the contaminated soils (vacuum = 5.0" H_2O), and an approximate pore space volume of 20% in the soils under remediation, results in 375 scfm, and complete replacement of soil pore volume every 10 minutes. A Worst Case analysis, assuming extremely high resistance to air flow through the contaminated soils (vacuum = 95.0" H_2O), and an approximate pore space volume of 20% in the soils under remediation, results in 140 scfm, and complete replacement of soil pore volume every 27 minutes. Based on experience with similar soil treatment unit operations and soils, we expect low to moderate resistance to air flow, ranging from 15" to 55" H_2O, resulting in an estimated air flow of 260 scfm to 360 scfm, and soil pore space volume replacement every 11-15 minutes.

Electric power for the SVE blower and controls will be provided by an electric sub-service derived through underground electrical connection to the existing WCFTC building electric service panel. The electric sub-service and breaker panel will be a pedestal mounted, NEMA 3R rated watertight construction for outdoor use, and will be located at least 15.0' from the SVE equipment shed. All electrical equipment within 15.0' of the SVE equipment shed, or any piping component of the SVE system, or the Treatment Cell, will be explosion-proof (Class I, Group D), and be installed in compliance with applicable NEC requirements. All electrical service outside the hazard zone will be installed as per applicable NEC code for non-hazardous locations (non-explosion proof).

The extracted contaminant laden air stream will forced by the blower through two TIGG C-50, activated carbon filters, piped in series, to achieve contaminant removal from the air

stream. Each C-50 filter is charged with 1000 lb. activated carbon. Specifications for the TIGG C-50 filters are provided as Appendix A. Schedule 40, 3" dia., black steel piping will be utilized to and between the carbon filters. The scrubbed effluent will discharge to atmosphere at a height of approx. 20.0' above ground surface through a schedule 40, 3" dia. PVC stack, fitted with a grounding wire to earth ground. Sample ports will be provided at locations in the piping, before, between, and after the carbon filters to allow sampling and analysis of the air effluent.

Carbon loading, based on worst case analysis is as follows:

Worst Case Total 8260 volatiles Concentration in Soil (EP-21) To Be Treated = 189.4 ppm.

Allowing a safety factor of 1.5X, we calculate loading based on a total of 284.1 ppm:

0.0002841 (284.1 ppm) x 111 lb/ ft3 x 27 cu.ft/yd3 x 700 yd3. = Total VOCs = 596 lbs

Carbon adsorption capacity for VOCs is approx. 15.0% by weight, so total maximum carbon usage will be 6.66 x 596 = 3973 lbs.

Based on the worst case calculations presented above, activated carbon usage over the duration of the project should be 4000 lbs or less, requiring one change-out of activated carbon for each filter, as dictated by effluent air VOC monitoring results.

A4.4.8 SVE Treatment Cell Operation

After closure of the Treatment Cell is complete, installation of the SVE system electrical service, SVE equipment trailer, and SVE equipment will commence. The SVE equipment trailer will be a 28' long aluminum semi-trailer with rear overhead door, to allow ease of placement, adequate space for installation of the necessary SVE equipment, and easy access for activated carbon filter maintenance/recharge.

Startup of the SVE system will consist of a one day pilot test to evaluate air emissions at the stack outfall, between and before activated carbon filtration. During system startup, an OVA will be used to monitor and record system air effluent VOC concentrations every 15 minutes for a minimum 8 hours. If VOCs are detected at the exhaust stack at levels of 5.0 ppm or more above background by OVA, system air flow will be reduced until continuous measurements indicate no VOCs in effluent air above background readings. After acceptable (effluent air OVA readings at or below background) system operation has been achieved for a minimum of 2 hours, a sample of the system air effluent will be secured. The effluent air sample will be analyzed for VOCs by DOH Method 311.2, with a 24 hour turnaround time. The Pilot Test of the SVE system will be considered complete and the system will be shut down until air effluent analytical results have been evaluated for compliance with applicable discharge limits. Air effluent analytical results will be compared to NYSDEC Air Quality Standards in order to determine compliance. If initial effluent air contaminant concentrations are found to be non-compliant with discharge limits, another pilot test will be conducted, at reduced system air flow, with effluent air analysis repeated, to confirm compliance with discharge limits. The system will not be placed into continuous operation until compliance with applicable air discharge limits has been confirmed by analytical testing.

Upon confirmation of compliance with air discharge limits, the SVE system will be put into continuous operation, with air effluent sampling and analysis performed at weekly intervals for a period of one month. Thereafter the frequency of air effluent analysis will be monthly until emission controls are no longer required. In addition, laboratory analysis of SVE system influent (Before Carbon) air will be conducted on a monthly basis to evaluate contaminant removal rates and quantities, as well as to gauge remedial progress.

OVA monitoring of system air influent (Before Carbon) and Between Carbon filter air flow will be performed on a weekly basis as a component of standard Operation and Maintenance visits. All OVM readings will be recorded on two copies of O&M data sheets, one of which will be added to a field log book left on site so that a continuous data record is readily available On-Site. If, at any monitoring event, OVA readings between the carbon filters exceeds 50 ppm, the primary carbon filter will be changed out, with the (former) secondary carbon unit rotated to the primary position, and the newly charged carbon filter placed into the secondary position. In

addition, air flow rates will be recorded individually at the Upper and Lower SVE manifolds, and system exhaust stack, to assist in system performance evaluation and calculation of contaminant removal rates and quantities, during weekly Site monitoring events

Reporting of system operation parameters to Wyoming County and the NYSDEC will be monthly, and shall include copies of all O&M data sheets, a record of any actions or system adjustments performed during the reporting period, and calculations of system removal rates and quantities.

A4.4.9 Confirmatory Testing of Treated Soils

At such time that influent air OVA readings and laboratory analysis indicate that remediation of the soils under treatment may be complete (OVA readings less than 5.0 ppm above background; analytical results below detection limits for COC's; two consecutive monitoring events), the soils will be sampled for confirmatory laboratory analysis. Sampling will be performed using a Special Access Sampling Unit (SASU) to perform direct push soil sampling at Ten (10) locations, evenly distributed throughout the Treatment Cell. Soil borings will be advanced through the geomembrane cover, and will terminate before penetration of the bottom geomembrane, with continuous split spoon sampling. Headspace analysis by OVA will be performed on soils samples for each boring, and the worst case (highest OVA reading) sample from each boring will be submitted for laboratory analysis by EPA Method 8260. Duplicates and trip blanks will also be analyzed as necessary. Analytical results for confirmation samples will be compared to NYSDEC TAGM 4046 guidance values to determine whether soils remediation is complete. Soils remediation will be deemed complete when the total VOC concentration is less than 10 ppm.

A4.4.10 Decommissioning of SVE Treatment Cell

When confirmatory sampling analytical results have determined that soils remediation is complete, the Treatment Cell and SVE system will be decommissioned. The SVE system equipment trailer will be disconnected and de-mobilized from the Site. All activated carbon will be removed from the activated carbon filters, properly packaged, analyzed for disposal approval,

approved, transported, and disposed, at an approved facility. All disposal documentation will be provided to NYSDEC and Owner.

A4.4.11 Final Disposition of Treated Soils

The Treatment Cell will be dismantled, with removal and disposal of all exposed geomembrane material, and the remediated soils graded for reuse as surficial fill On-Site.

A4.5 Interim Remedial Measures Report

Following completion of the remedial action at the site, an engineering and remedial certification report will be prepared that will discuss the specifics of the interim and final remedial action activities at the site. Field and laboratory test results along with supportive graphical illustrations and work sheets will be included in the report as part of the record documentation. Additional information such as daily inspection/field reports, waste manifests, photographs and monitoring data will be appended as appropriate.

The recorded conditions will be certified by a professional engineer licensed to practice in New York State. The report will be a submitted to Wyoming County and subsequently to NYSDEC certifying that the remedial activities have been performed in compliance with the remedial action work plan, and the VCA.

A5.0 INTERIM REMEDIAL MEASURES SCHEDULE

Following approval of the Interim Remedial Measure Work Plan by the County and NYSDEC, the interim remedial measure will be initiated. This will consist of the implementation and monitoring of the approved IRM. As outlined above, the anticipated scope of work will include interim remedial action activities including contaminated soil excavation, ex-situ onsite treatment and site restoration.

APPENDIX A

SVE TREATMENT CELL

EQUIPMENT AND MATERIAL SPECIFICATIONS

ProPex® Nonwoven Geotextiles

PROPERTIES[1]	TEST METHOD	UNITS	4535	4545	4546	4547	4550	4551	4552	4553	4506	4508	4510	4512	4516
PHYSICAL															
Unit Weight	ASTM D 5261	oz/yd^2	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	6	8	10	12	16
Grab Tensile Strength	ASTM D 4632	lb	80	90	100	120	135	160	180	203	160	203	250	300	400
Grab Tensile Elongation	ASTM D 4632	%	50	50	50	50	50	50	50	50	50	50	50	50	50
Mullen Burst	ASTM D 3786	psi	150	185	210	230	270	310	330	380	310	380	520	600	750
Puncture	ASTM D 4833	lb	45	55	65	70	80	90	105	130	90	130	165	190	240
Trapezoid Tear	ASTM D 4533	lb	35	40	45	50	56	65	75	80	65	80	100	115	145
UV Resistance[2]	ASTM D 4355	% @ hr	70@500	70@500	70@500	70@500	70@500	70@500	70@500	70@500	70@500	70@500	70@500	70@500	70@500
HYDRAULIC															
Apparent Opening Size (AOS)[4]	ASTM D 4751	US Sieve	70	70	70	70	70	70	70	100	70	100	100	100	100
Permittivity	ASTM D 4491	sec^{-1}	2.2	2.1	2.0	1.8	1.7	1.5	1.5	1.5	1.5	1.5	1.2	0.9	0.7
Permeability	ASTM D 4491	cm/sec	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.30	0.30	0.20	0.20	0.20
Flow Rate	ASTM D 4491	$gal/min/ft^2$	160	155	145	130	120	110	110	110	110	110	85	65	50
PACKAGING															
Roll Width		ft	15	15	15	15	15	15	15	15	15	15	15	15	15
Roll Length		ft	360	360	360	360	360	300	300	300	900	600	180 / 600	180 / 450	180 / 300
Gross Weight[3]		lb	160	180	198	220	240	250	260	295	680	590	235 / 700	270 / 630	345 / 560
Area		yd^2	600	600	600	600	600	500	500	500	1500	1000	300 / 1000	300 / 750	300 / 500
SUGGESTED APPLICATIONS															
Separation			X	X	X	X	X	X	X	X	X	X	X	X	X
Stabilization						X	X	X	X	X			X	X	X
Erosion Control/Drainage			X	X	X	X	X	X	X	X			X	X	X
Railroad Stabilization													X	X	X
Environmental/Waste											X	X	X	X	X
MINIMUM AVERAGE ROLL VALUES															

N/A - Not Applicable

1. Physical and hydraulic properties reported as minimum average roll values (MARV
2. Percent grab tensile strength retained per hours of UV exposure following conditioning in accordance with ASTM D 43:
3. Gross weights are approximate
4. AOS reported as maimum average valu

DATE ISSUED:03/28/03
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subsurface drainage

Geotextile Applications
Overview
Subgrade-Roadbase Improvement
Pavement Enhancement
Subsurface Drainage
Erosion Control
Walls & Slopes
Containments
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Austell, Georgia 30168
PH:800/445-7732(SPEC)
Fax:770/944-4584
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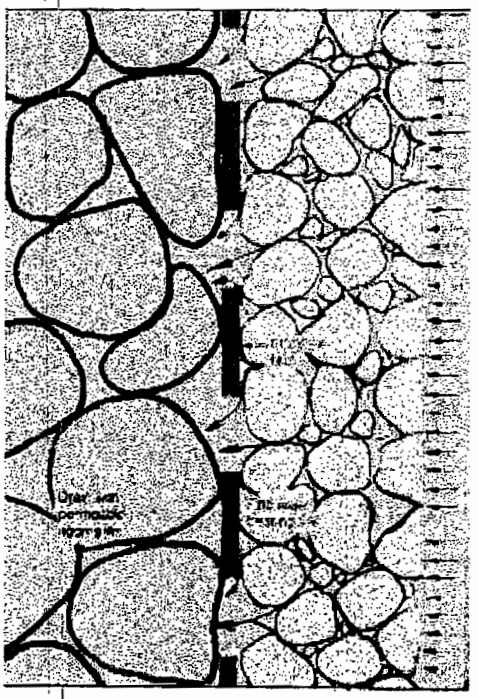
- **Areas of Application**
- **Design Challenges**
- **Benefits**
- **Recommended Products-AASHTO M 288 00**
- **Construction Procedure-trench drain**

Areas of Application

Geotextiles have replaced graded soil filters for drainage of virtually all structures, including dewatering trenches, intercept drains, pavement edge drains, walls and dams drains, leachat collection/detection removal drains, sport field drain, etc.



Design Challenges

To perform, the filter fabric must allow liquids to through the geotextile and into the drainage me soil and/or perforated pipe) throughout the desi drainage system. At the same time, the filter fa retain the upstream soil fine particles and preve migrating, or "piping" into the drainage system. selection of a particular filter fabric can be acco following four basic criteria:

Retention criteria - The filter fabric openings small enough to prevent excessive migration of
Permeability criteria - The filter fabric must b enough to allow liquids to pass through it witho significant reduction in flow.
Clogging criteria - The filter fabric must have number of pore openings, such that if soil partic clog a few openings path the flow of the filter fa greater than the required system permeability.
Survivability criteria - The filter fabric must e adequate strength, chemical resistance, and en resistance to prevent it from becoming damage installation and throughout the design life of the system.

back to top

Benefits

Compared to conventional granular soil filters,

PVC: Polyvinyl Chloride Flexible Membrane Liners

GEOMEMBRANE MENU

PVC liners fabricated by EPI are single-ply construction with Polyvinyl Chloride as the principle polymer. Only first quality virgin resins are used and all materials meet or exceed the PVC Geomembrane Institute PGI-1197 minimum specifications, which replaced the National Sanitation Foundation Standard 54 for flexible membrane liners.

PVC Liners are fabricated by EPI in panel sizes up to 40,000 square feet, accordion-folded in both directions, and packaged for shipment to your site for quick, easy installation to save you time and money.

EPI utilizes statistical process control (SPC) to ensure the quality and integrity of each panel we produce. EPI is the only fabricator to remove samples from actual factory seams during the welding process for a rigorous, proven testing procedure that assures you of the highest quality factory-fabricated PVC geomembranes available.

Treetops Sylvan Resort, Gaylord, MI.

Benefits of EPI PVC Geomembranes

- **Flexibility for three dimensional performance.**
- **Larger Panels: Up to 80% less field seams.**
- **Long term survivability.**
- **Custom size and shaped panels.**
- **Most orders ship within 72 hours.**

MINIMUM PHYSICAL PROPERTIES:

10 Mil PVC Specification
20 Mil PVC Specification 20 mil Stock Inventory Sizes

003

20 Mil PVC Specification

GEOMEMBRANE MENU

Property	Test Method	Requirement
Thickness ±5%	ASTM-D1593	.020"
Specific Gravity (min.)	ASTM-D792	1.20
100% Modulus (psi, min.)	ASTM-D882	1000
- lb. force/in. width, min.		23
Tensile (psi, min.)	ASTM-D882	2400
- lb. force/in. width, min.		48
Elongation at Break (%, min.)	ASTM-D882	350
Graves Tear (lb./in., min.)	ASTM-D1004	6.5
Resistance to Soil Burial	ASTM-D3083	
(% change max.)	(NSF Modified)	
1. Breaking Factor		5
2. Elongation at Break		20
3. Modulus at 100% Elongation		20
Impact Cold Crack (°C)	ASTM-D1790	-26
Dimensional Stability (% change max.)	ASTM-D1204 (212°F/15 min.)	4
Water Extraction (%, max.)	ASTM-D3083	0.15
Volatile Loss (%, max.)	ASTM-D1203(A)	0.90
Hydrostatic Resistance (psi, min.)	ASTM-D751(A)	68
Minimum Specifications for EPI Factory Fabricated Seams:		
Peel Strength, lbs/in. width	ASTM-D882	12.5
Shear Strength, lbs/in. width	ASTM-D882	38.4

20 mil PVC Inventory Stock Sizes - **Ready for immediate shipment**

03/20/2003 16:42 FAX

225 Newmark Civil Engineering Lab, MC-250
205 N. Mathews Ave.
Phone: 217-333-3929
Fax: 217-244-2839
Email: pgi-tp@uiuc.edu
Website: www.pvcgeomembrane.com

PVC GEOMEMBRANE INSTITUTE SPECIFICATION 1103 FOR PVC GEOMEMBRANES

This specification document is being developed by the PVC Geomembrane Institute (PGI) to help designers, engineers and regulators properly specify PVC liners. This document outlines the current industry methods for manufacturing, fabricating and installing PVC geomembranes. The following guidelines are in accordance with the best practices used at this time but are by no means the only way to fabricate and install PVC. Any deviations should be agreed upon in advance by all parties.

The PVC Geomembrane Institute is dedicated to conducting research and educating engineers and specifiers about the properties and use of PVC geomembranes. PGI conducts ongoing research in order to further the knowledge base of PVC geomembranes.

PGI 1103 Appendix A
Testing Frequencies

In most cases test methods do not specify testing frequencies. This appendix outlines the frequency of tests required to fulfill this specification for manufacture, fabrication, and installation frequencies.

MANUFACTURING TESTING FREQUENCIES

Certified Properties

Certified properties are tested based on a quantity of material produced. Certified properties are tested once per lot, or once every 40,000 lbs of material (18,000 kg), whichever is more frequent. The certification properties include thickness, tensile break strength, elongation at break, modulus at 100% strain, tear resistance, dimensional stability, and low temperature impact. Thickness is to be tested once per roll unless automatic thickness measuring equipment is installed on the production equipment. Certified test reports (Mill Certificates) for the tested properties are to be provided with every order on request.

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Index Properties
Index tests are performed when preparing and approving a geomembrane formulation. The tests are performed on the final production formulation of a geomembrane. The index properties include specific gravity, water extraction, volatile loss, hydrostatic resistance, and soil burial resistance. A certified statement of the test results for the formulation is to be made available to the customer on request.

PGI 1103 Appendix B
Testing Clarifications and Details

This appendix lists the clarifications and details of the testing methods used in the PGI specification. In some cases multiple test procedures exist within test methods and testing choices are required. This appendix makes note of the test criteria that was used to compile these specifications.

General
When both US and metric values are shown the value for acceptance is the US value.
Metric values are conversions and may contain rounding errors.

Test Method Clarification and Details

ASTM D751 Test Methods for Coated Fabrics

For Hydrostatic Burst use Section 33, Procedure A, "Pressure Application by Mullen Type Hydrostatic Tester"
Units of pressure in pounds per square inch (psi) or kiloPascals (kPa)

ASTM D882 Tensile Properties of Thin Plastic Sheeting

Use Method A
D882 method may be used for PVC film up to 60 mil (1.5mm) thick
Units are in pounds of force per inch of width (lbs/in)
Metric units are in kiloNewtons per meter of width (kN/m), or Newtons per millimeter of width (N/mm) which are equivalent units

Factory Seam Shear Testing
Use ASTM D882 Method A
ASTM D882 may be used for thicknesses greater than 1.0 mm (40 mil) for seam testing
Use 25.4 mm wide (1") specimens
Use grip separation of 51 mm (2 in) plus the seam width
Crosshead speed of 510 mm/min (20 in/min)

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Factory Seam Peel Testing
Use ASTM D882 Method A
Use 25.4 mm wide (1") specimens
Position grips 13 mm (1/2") on either side of seam
Crosshead speed of 51 mm/min (2 in/min)

ASTM D1004 Initial Tear Resistance of Plastic Film and Sheeting

Units are in pounds of force to initiate tear in the specially die-cut specimen (lbs) or in Newtons of force (N)

ASTM D1203 Volatile Loss from Plastics Using Activated Carbon Methods

Use method A

ASTM D1204 Linear Dimensional Changes of Thermoplastic Film at Elevated Temp.

Test specimens at 100C for 15 minutes
Measure percent change in lineal dimensions

ASTM D1239 Resistance of Plastic Films to Extraction by Chemicals

Test specimens in 50° C (122° F) water for twenty-four hours
Measure percent change in weight

ASTM D1790 Brittleness Temperature of Plastic Sheeting by Impact

50% of specimens must pass at specified temperature

ASTM D5199 Measuring the Nominal Thickness of Geosynthetics

US units of thousandths of an inch (0.001 inches = 1 mil)
Metric unit of millimeters of thickness (mm)

ASTM G160 Evaluating Microbial Susceptibility of Nonmetallic Materials by Soil Burial

Bury sample in prepared soil for 30 days
Perform test on actual liner sheet samples
Measure maximum change in properties as shown in specification

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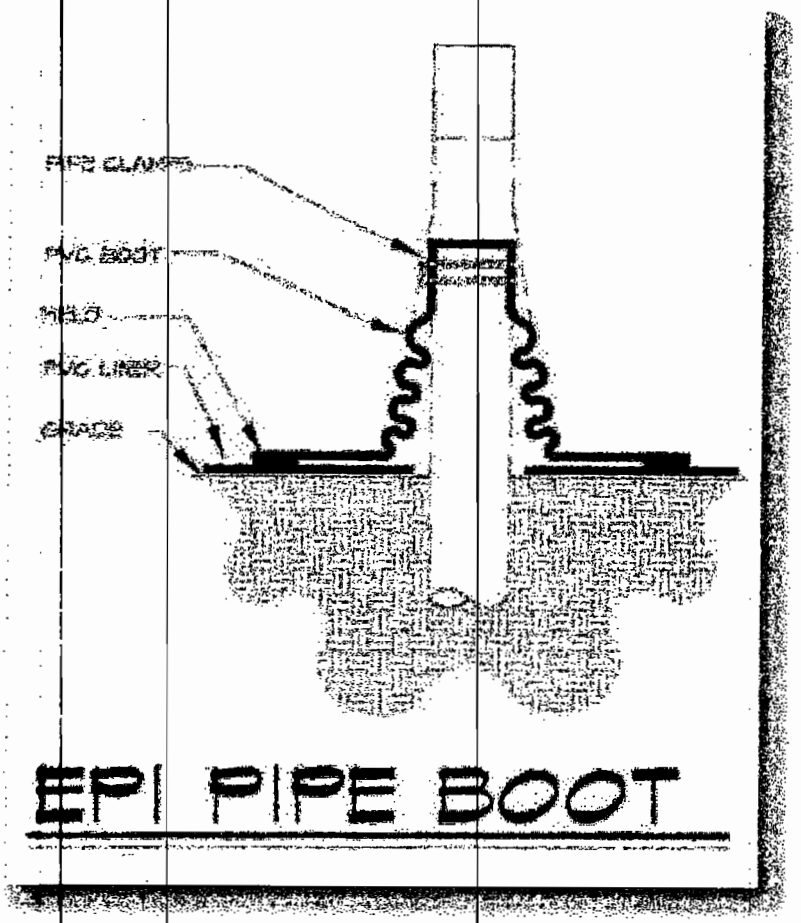

http://www.geomembrane.com/images/straightboot.jpg

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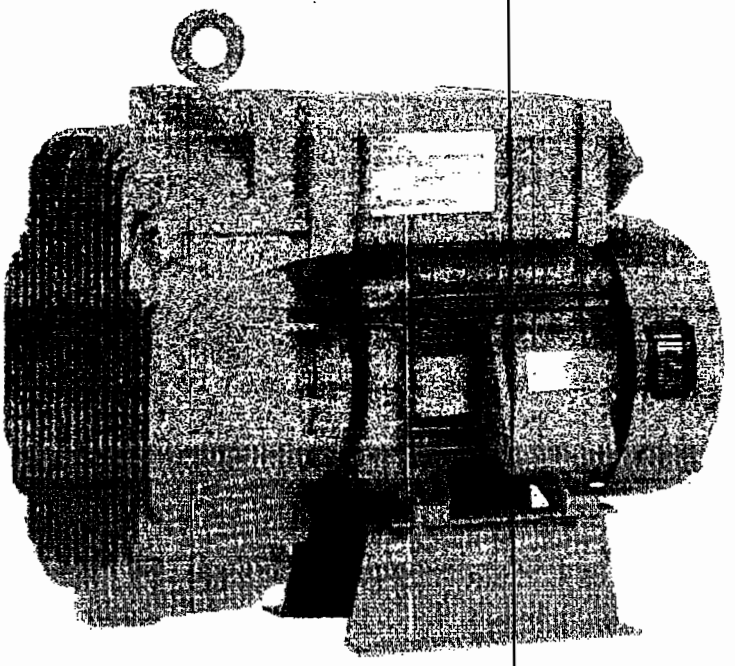
EN 858 & CP 858
Sealed Regenerative Blower w/Explosion-Proof Motor

FEATURES
- Manufactured in the USA – ISO 9001 compliant
- Maximum flow: 400 SCFM
- Maximum pressure: 120 IWG
- Maximum vacuum: 98 IWG
- Standard motor: 10 HP, explosion-proof
- Cast aluminum blower housing, cover, impeller & manifold; cast iron flanges (threaded); teflon lip seal
- UL & CSA approved motor with permanently sealed ball bearings for explosive gas atmospheres Class I Group D minimum
- Sealed blower assembly
- Quiet operation within OSHA standards

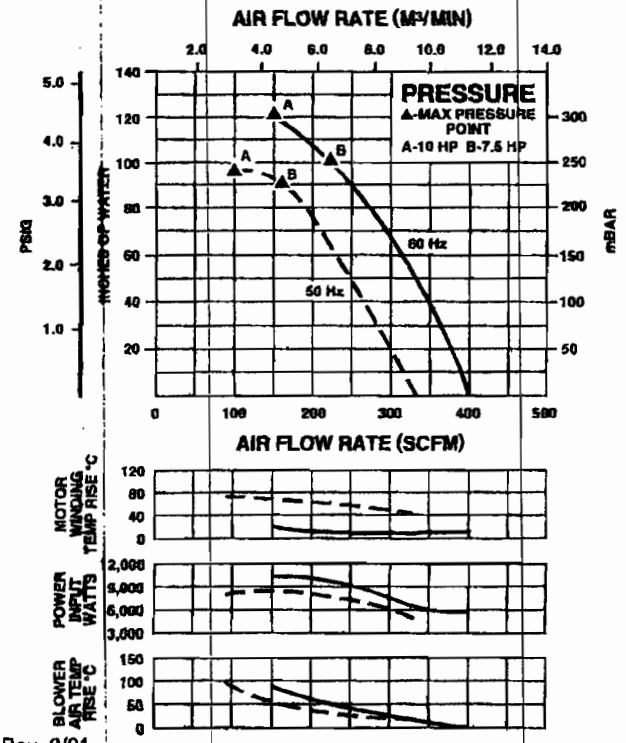
MOTOR OPTIONS
- International voltage & frequency (Hz)
- Chemical duty, high efficiency, inverter duty or industry-specific designs
- Various horsepowers for application-specific needs

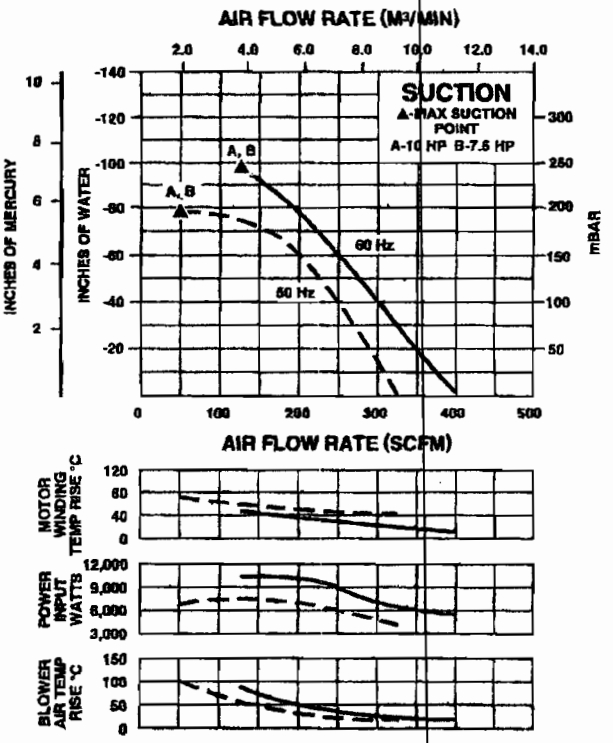
BLOWER OPTIONS
- Corrosion resistant surface treatments & sealing options
- Remote drive (motorless) models
- Slip-on or face flanges for application-specific needs

ACCESSORIES (See Catalog Accessory Section)
- Flowmeters reading in SCFM
- Filters & moisture separators
- Pressure gauges, vacuum gauges & relief valves
- Switches – air flow, pressure, vacuum or temperature
- External mufflers for additional silencing
- Air knives (used on blow-off applications)
- Variable frequency drive package



BLOWER PERFORMANCE AT STANDARD CONDITIONS





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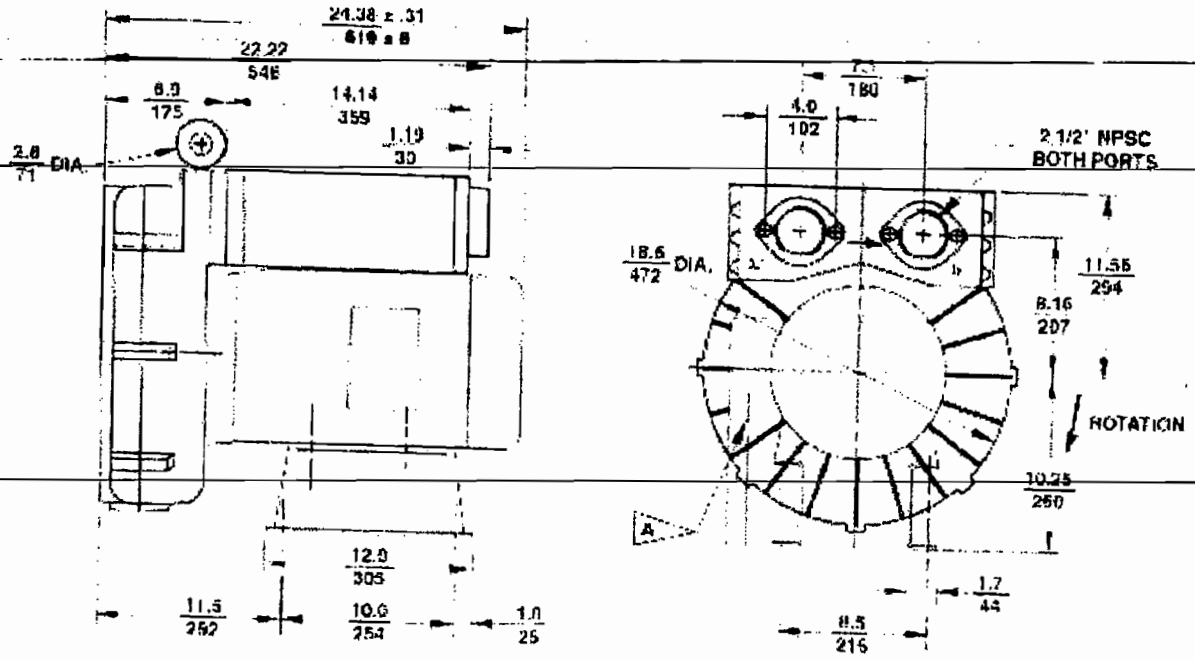

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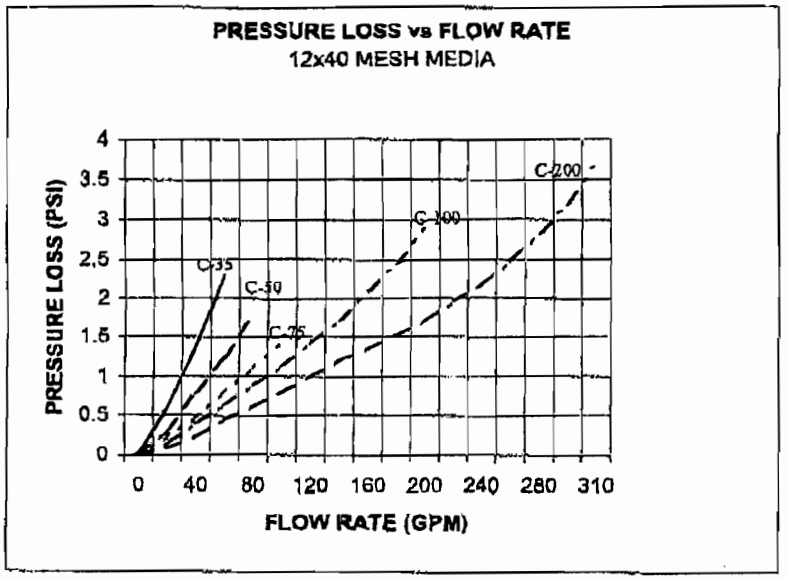
CANSORB®

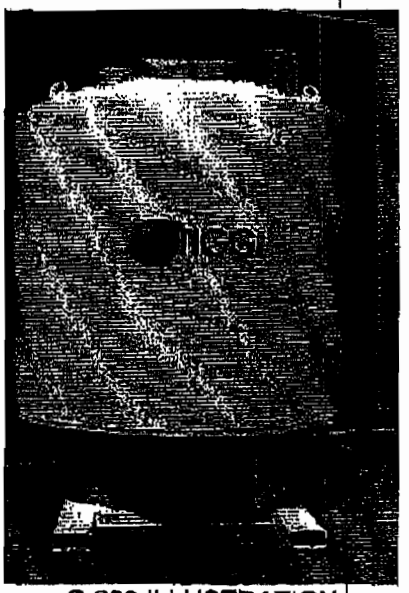
STEEL VESSELS

MODEL	MAXIMUM FLOW (GPM)	MAX PRESS (PSIG)	MAX TEMP (deg F)	FLG. INLET / OUTLET (IN)	DIAMETER / HEIGHT (IN)	STANDARD ADSORBENT FILL (LBS)	MAXIMUM ADSORBENT FILL (LBS)	SHIPPING WEIGHT - STANDARD FILL (LBS)
C-35	60	30	115	2 / 2	38 / 83	660	875	1380
C-50	90	30	115	3 / 3	46 / 98	1000	1600	2040
C-75	140	30	115	3 / 4	57 / 98	2000	2500	3420
C-100	200	30	115	3 / 4	68 / 102	3000	3600	4790
C-200	310	30	115	4 / 6	85 / 118	6000	6725	8410

NOTES:
1) Nominal design flow may be conservative. Desired contact time may allow higher or lower flow rates.
2) Dry virgin activated or reactivated carbon provided as standard adsorbent.
3) Maximum adsorbent fill is based on a bed density of 29 lb/ft^3.
4) Maximum adsorbent fill can differ based on variable bed density and alternate adsorbents.
5) Vessels are available in higher-pressure ratings in accordance with ASME Section VIII.

The CANSORB Series Modular Adsorbers are fabricated of carbon steel and provided with a high solids epoxy lining. Where process conditions dictate, the vessels can be fabricated from other materials such as stainless steel. In addition, a different lining can be substituted for the high solids epoxy. Media discharge and drain lines are provided with ball valves. The liquid collection system is designed to promote even flow distribution and thus, efficient adsorbent utilization. The liquid outlet is designed to maintain a liquid level above the carbon bed. Manways are 18 inches in diameter for easy access. The vessels are provided with lifting lugs and fork channels. *Specifications and properties are subject to change without notice.*

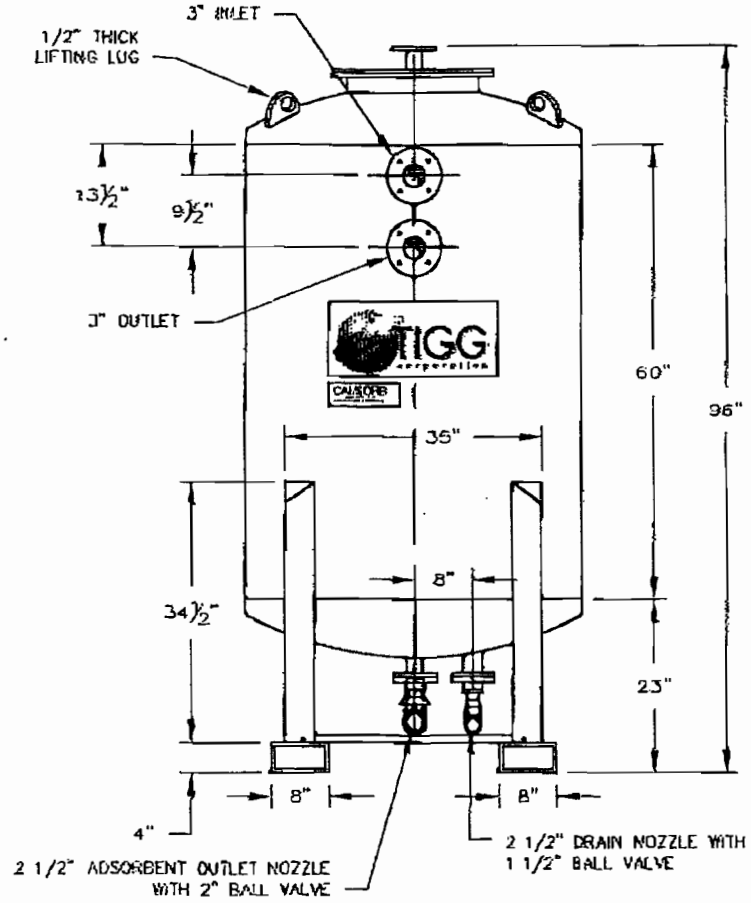




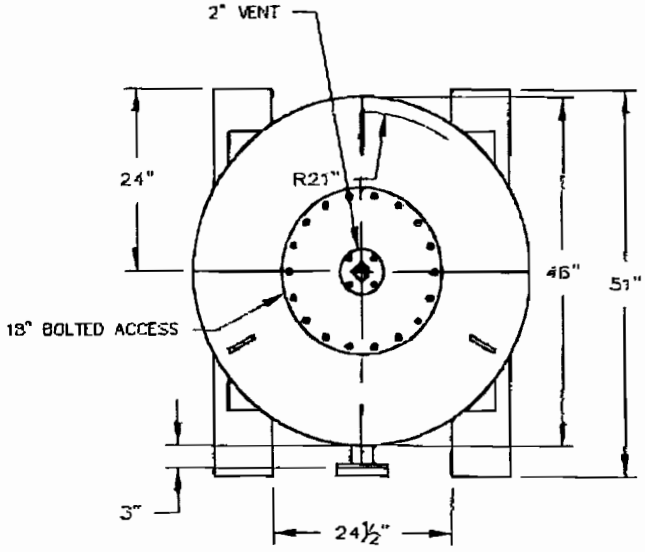
C-200 ILLUSTRATION

TIGG corporation

500 Old Pond Rd., Suite 706
Bridgeville, PA 15017
(412) 257-9580 phone
(412) 257-8520 fax
www.tigg.com
info@tigg.com



ELEVATION



PLAN

NO.	REVISION	BY	DATE
3	CHANGE EXTERIOR PAINT	JB	1/21/03
2	REVISE HEIGHT	JB	12/18/02
1	REVISE TITLE BLOCK	JB	8/3/02

PROJECT

PROJ. NO.

P.O. NO.

DRAWN BY	ZS
DESIGN BY	BL
CHKD. BY	BL
DATE	7/31/00
SCALE	NTS

TIGG corporation

C-50

DWG. NO. C-50-1001 REV. 3

VESSEL STANDARDS

VESSEL MATERIALS : CARBON STEEL	LIQUID DRAIN ASSEMBLY : SCHEDULE 80 PVC
LINING : HIGH SOLIDS EPOXY	VOLUME OF VESSEL : 62 FT.³ NOT INCLUDING TOP HEAD
EXTERIOR PAINT : ACRYLIC ALKYD ENAMEL	STANDARD/MAX CARBON FILL : 1000 LBS / 1600 LBS
HEAD THICKNESS : 3/16"	SHIP WT. OPERATING WT. STD. FILL : 2040 LBS / 6800 LBS
SHELL THICKNESS : 3/16"	CARBON TYPE : TIGG 5D 1240 LIQUID PHASE
INTERNALS : SCHEDULE 40 PVC	MAX. OPERATING PRESSURE : 30 PSIG
ADSORBENT OUTLET ASSEMBLY : SCHEDULE 80 PVC	MAX. OPERATING TEMP. : 115F

PART B

QUALITY ASSURANCE PROJECT PLAN

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B1.0 INTRODUCTION

This Quality Assurance Project Plan (QAPP) is designed to provide an overview of quality assurance/quality control (QA/QC) procedures and programs which will be adhered to during the interim remedial measures (IRM) activities as described in the IRM Work Plan. It will give specific methods and QA/QC procedures for chemical testing of environmental samples obtained from the site. In addition, it will ensure the quality of the data produced during the IRM. All samples will be analyzed by a New York State Department of Health (NYSDOH) Environmental Laboratory Approval Program (ELAP) certified laboratory.

During the IRM, the URS QA/QC Officer will be responsible for verifying that corporate QA procedures are followed. The Onsite Coordinator will be responsible for verifying that QA procedures are followed in the field. This will provide for the valid collection of representative samples. The Project Chemist will be in direct contact with the analytical laboratory to monitor laboratory activities so that holding times and other QA/QC requirements are met.

In addition to overall project coordination, the Project Manager will be responsible for overseeing both the analytical and field QA/QC activities. The ultimate responsibility for maintaining quality throughout the project rests with the Project Manager.

The analytical laboratory proposed to be used for the analysis of soil samples shall be currently certified by NYSDOH ELAP for the appropriate categories (i.e., CLP). The laboratory QA Manager will be responsible for overseeing the QC data generated. Also, the laboratory QA Manager will be in daily communication with the Project Chemist.

B2.0 DATA QUALITY OBJECTIVES

B2.1 Background

Data quality objectives (DQOs) are qualitative and quantitative statements which specify the quality of data required to support the IRM for the site. DQOs focus on the identification of the end use of the data to be collected. The project DQOs will be achieved utilizing the definitive data category, as outlined in *Guidance for the Data Quality Objectives Process,* EPA QA/G-4 (August 2000). All sample analyses will provide definitive data which are generated using rigorous analytical methods, such as reference methods approved by the U.S. Environmental Protection Agency (USEPA). A summary of the analytical methods to be used are presented in Table B2-1.

The project DQOs for data collected during this IRM are:

- to further characterize the site and determine the nature and extent of contamination;
- to identify, evaluate, and select a long-term remedial action that is cost-effective and environmentally sound;
- to maintain the highest possible scientific/professional standards for each procedure; and,
- to assure the ultimate defensibility of the data produced during the IRM.

Soil analytical results will be compared to the applicable standards, criteria and guidance (SCGs) that are protective of human health and the environment. For the soil matrix, the SCG's will be the New York State Department of Environmental Conservation (NYSDEC) Technical and Administrative Guidance Memorandum (TAGM) 4046: *Determination of Soil Cleanup Objectives and Cleanup Levels* (dated January 1994, Revised).

B2.2 QA Objectives for Chemical Data Measurement

In order to achieve the definitive data category described above, the data quality indicators of precision, accuracy, representativeness, comparability, and completeness will be measured during offsite chemical analysis.

B2.2.1 Precision

Precision examines the distribution of the reported values about their mean. The distribution of reported values refers to how different the individual reported values are from the average reported value. Precision may be affected by the natural variation of the matrix or contamination within that matrix, as well as by errors made in field and/or laboratory handling procedures. Precision is evaluated using analyses of a laboratory matrix spike/matrix spike duplicate, which not only exhibit sampling and analytical precision, but indicate analytical precision through the reproducibility of the analytical results. Relative Percent Difference (RPD) is used to evaluate precision. RPD criteria must meet the method requirements identified in Table B2-1.

B2.2.2 Accuracy

Accuracy measures the analytical bias in a measurement system. Sources of error are the sampling process, field contamination, preservation, handling, sample matrix, sample preparation, and analysis techniques. Sampling accuracy may be assessed by evaluating the results of rinse blanks. This data helps to assess the potential concentration contribution from various outside sources. The laboratory objective for accuracy is to equal or exceed the accuracy demonstrated for the applied analytical methods on samples of the same matrix. The percent recovery criterion is used to estimate accuracy based on recovery in the matrix spike/matrix spike duplicate and matrix spike blank samples. The spike and spike duplicate, which will give an indication of matrix effects that may be affecting target compounds, are also a good gauge of method efficiency. For VOC analysis surrogate recovery results will also be measured. Acceptable ranges of recovery are reported in the referenced methods identified in Table B2-1.

B2.2.3 Representativeness

Representativeness expresses the degree to which the sample data accurately and precisely represent the characteristics of a population of samples, parameter variations at a sampling point, or environmental conditions. Representativeness is a qualitative parameter which is most concerned with the proper design of the sampling program or subsampling of a given sample. Objectives for representativeness are defined for sampling and analysis tasks and are a function of the investigative objectives (i.e., determination of vertical and horizontal extent of contamination). The sampling procedures have been selected with the goal of obtaining representative samples for the media of concern.

B2.2.4 Comparability

Comparability is a qualitative parameter expressing the confidence with which one data set can be compared with another. A DQO for this program is to produce data with the greatest possible degree of comparability. This goal is achieved through using standard techniques to collect and analyze representative samples and reporting analytical results in appropriate units. Complete field documentation using standardized data collection forms will support the assessment of comparability. Comparability is limited by the other parameters (e.g., precision, accuracy, representativeness, completeness) because only when precision and accuracy are known can data sets be compared with confidence. In order for data sets to be comparable, it is imperative that contract-required methods and procedures be explicitly followed.

B2.2.5 Completeness

Completeness is defined as a measure of the amount of valid data obtainable from a measurement system compared to the amount that was expected to be obtained under normal conditions. It is important that appropriate QA procedures be maintained to verify that valid data are obtained in order to meet project needs. For the data generated, a goal of 90% is required for completeness (or usability) of the analytical data. If this goal is not met, URS project personnel will determine whether the deviations might cause the data to be rejected.

B3.0 SAMPLING LOCATIONS, CUSTODY, HOLDING TIMES, AND ANALYSIS

Sampling locations and procedures are discussed in Section 4.0 of the IRM Work Plan. Table B3-1 presents sample methods and container, preservation, and holding time requirements. All analyses will be performed in accordance with the NYSDEC Analytical Services Protocol, June 2000 Edition.

Table B2-1 identifies the specific method to be performed on the soil matrix. All holding times begin with validated time of sample receipt (VTSR) at the laboratory. The laboratory must meet the method required detection limits which are referenced within the method listed in this table.

B4.0 CALIBRATION PROCEDURES AND FREQUENCY

In order to obtain a high level of precision and accuracy during sample processing procedures, laboratory instruments must be calibrated properly. Several analytical support areas must be considered so the integrity of standards and reagents is upheld prior to instrument calibration. The following sections describe the analytical support areas and laboratory instrument calibration procedures.

B4.1 Analytical Support Areas

Prior to generating quality data, several analytical support areas must be considered:

Standard/Reagent Preparation - Primary reference standards and secondary standard solutions shall be obtained from National Institute of Standards and Technology (NIST), or other reliable commercial sources to verify the highest purity possible. The preparation and maintenance of standards and reagents will be accomplished according to the method referenced in Table B2-1. All standards and standard solutions are to be formally documented (i.e., in a bound logbook) and should identify the supplier, lot number, purity/concentration, receipt/ preparation date, preparer's name, method of preparation, expiration date, and any other pertinent information. All standard solutions shall be validated prior to use. Care shall be exercised in the proper storage and handling of standard solutions (e.g., separating volatile standards from nonvolatile standards). The laboratory shall continually monitor the quality of the standards and reagents through well documented procedures.

Balances - The analytical balances shall be calibrated and maintained in accordance with manufacturer specifications. Calibration is conducted with two Class "S" weights that bracket the expected balance use range. The laboratory shall check the accuracy of the balances daily and they must be properly documented in permanently bound logbooks.

Refrigerators/Freezers – The temperature of the refrigerators and freezers within the laboratory shall be monitored and recorded daily. This will verify that the quality of the standards and reagents is not compromised and the integrity of the analytical samples is upheld.

Appropriate acceptance ranges (2 to 6° C for refrigerators) shall be clearly posted on each unit in service.

Water Supply System - The laboratory must maintain a sufficient water supply for all project needs. The grade of the water must be of the highest quality (analyte-free) in order to eliminate false-positives from the analytical results. Ultraviolet cartridges or carbon absorption treatments are recommended for organic analyses and ion-exchange treatment is recommended for inorganic tests. Appropriate documentation of the quality of the water supply system(s) will be performed on a regular basis.

B4.2 Laboratory Instruments

Calibration of instruments is required to verify that the analytical system is operating properly and at the sensitivity necessary to meet established quantitation limits. Each instrument for organic and inorganic analyses shall be calibrated with standards appropriate to the type of instrument and linear range established within the analytical method(s). Calibration of laboratory instruments will be performed according to the method specified in Table B2-1. In addition to the requirements stated within the analytical method, the contract laboratory will be required to analyze an additional low level standard at or near the detection limits. In general, standards will be used that bracket the expected concentration of the samples. This will require the use of different concentration levels, which are used to demonstrate the instrument's linear range of calibration.

Calibration of an instrument must be performed prior to the analysis of any samples and then at periodic intervals (continuing calibration) during the sample analysis to verify that the instrument is still calibrated. If the contract laboratory cannot meet the method required calibration requirements, corrective action shall be taken as discussed in Section B7.0. All corrective action procedures taken by the contract laboratory are to be documented, summarized within the case narrative, and submitted with the analytical results.

B5.0 INTERNAL QUALITY CONTROL CHECKS

Internal QC checks are used to determine if analytical operations at the laboratory are in control, as well as determining the effect sample matrix may have on data being generated. Two types of internal checks are performed and are described as batch QC and matrix-specific QC procedures. The type and frequency of specific QC samples performed by the contract laboratory will be according to the specified analytical method and project specific requirements. Acceptable criteria and/or target ranges for these QC samples are presented within the analytical method referenced in Table B2-1.

QC results which vary from acceptable ranges shall result in the implementation of appropriate corrective measures, potential application of qualifiers, and/or an assessment of the impact these corrective measures have on the established data quality objectives. Quality control samples including any project-specific QC will be analyzed are discussed below.

B5.1 Batch QC

Method Blanks - A method blank is defined as laboratory-distilled or deionized water that is carried through the entire analytical procedure. The method blank is used to determine the level of laboratory background contamination. Method blanks are analyzed at a frequency of one per analytical batch.

Matrix Spike Blank Samples - A matrix spike blank (MSB) sample is an aliquot of water spiked (fortified) with all the elements being analyzed for calculation of precision and accuracy to verify that the analysis that is being performed is in control. A MSB will be performed for each matrix.

B5.2 Matrix-Specific QC

Matrix Spike Samples - An aliquot of a matrix is spiked with known concentrations of specific compounds as stipulated by the methodology. The matrix spike (MS) and matrix spike duplicate (MSD) are subjected to the entire analytical procedure in order to assess both accuracy and precision of the method for the matrix by measuring the percent recovery and relative percent

difference of the two spiked samples. The samples are used to assess matrix interference effects on the method, as well as to evaluate instrument performance. MS/MSDs are analyzed at a frequency of one each per 20 samples per matrix. MS/MSDs will be performed for all parameters listed in Table B2-1.

B5.3 Additional QC

Rinsate (Equipment) Blanks - A rinsate blank is a sample of laboratory demonstrated analyte-free water passed through and over the cleaned sampling equipment. A rinsate blank is used to indicate potential contamination from ambient air and from sample instruments used to collect and transfer samples. This water must originate from one common source within the laboratory and must be the same water used by the laboratory performing the analysis. The rinsate blank should be collected, transported, and analyzed in the same manner as the samples acquired that day. Rinsate blanks for nonaqueous matrices should be performed at a rate of 10 percent of the total number of samples collected throughout the sampling event.

Trip Blanks - Trip blanks are not required for nonaqueous matrices. Trip blanks are required for aqueous sampling events. They consist of a set of sample bottles filled at the laboratory with laboratory-demonstrated analyte free water. These samples then accompany the bottles that are prepared at the lab into the field and back to the laboratory, along with the collected samples for analysis. These bottles are never opened in the field. Trip blanks must return to the lab with the same set of bottles they accompanied to the field, and will be analyzed for volatile organic parameters. Trip blanks must be included at a rate of one per volatile sample shipment.

B6.0 CALCULATION OF DATA QUALITY INDICATORS

B6.1 Precision

Precision is evaluated using analyses of a field duplicate and/or a laboratory MS/MSD which not only exhibit sampling and analytical precision, but indicate analytical precision through the reproducibility of the analytical results. RPD is used to evaluate precision by the following formula:

$$RPD = \frac{/(X_1 - X_2)/}{[(X_1 + X_2)/2]} \times 100\%$$

where:

X_1 = Measured value of sample or matrix spike

X_2 = Measured value of duplicate or matrix spike duplicate

Precision will be determined through the use of MS/MSD analyses. RPD criteria for this project must meet the method requirements listed in Table B2-1.

B6.2 Accuracy

Accuracy is defined as the degree of difference between the measured or calculated value and the true value. The closer the numerical value of the measurement comes to the true value or actual concentration, the more accurate the measurement is. Analytical accuracy is expressed as the percent recovery of a compound or element that has been added to the environmental sample at known concentrations before analysis. Analytical accuracy may be assessed through the use of known and unknown QC samples and spiked samples. It is presented as percent recovery. Accuracy will be determined from matrix spike, matrix spike duplicate, and matrix spike blank samples, as well as from surrogate compounds added to organic fractions (i.e., volatiles), and is calculated as follows:

$$Accuracy\ (\%R) = \frac{(X_s - X_u)}{K} \times 100\%$$

where:

X_s = Measured value of the spike sample

X_u = Measured value of the unspiked sample

K = Known amount of spike in the sample

B6.3 Completeness

Completeness is calculated on a per matrix basis for the project and is calculated as follows:

$$Completeness\ (\%C) = \frac{(X_v - X_n)}{N} \times 100\%$$

where:

X_v = Number of expected valid measurements

X_n = Number of invalid measurements

N = Number of valid measurements expected to be obtained

B7.0 CORRECTIVE ACTIONS

Laboratory corrective actions shall be implemented to resolve problems and restore proper functioning to the analytical system when errors, deficiencies, or out-of-control situations exist at the laboratory. Full documentation of the corrective action procedure needed to resolve the problem shall be filed in the project records, and the information summarized in the case narrative. A discussion of the corrective actions to be taken is presented in the following sections.

B7.1 Incoming Samples

Problems noted during sample receipt shall be documented by the laboratory. The URS Project Chemist shall be contacted immediately for problem resolution. All corrective actions shall be documented thoroughly.

B7.2 Sample Holding Times

If any sample extraction and/or analyses exceed method holding time requirements, URS Project Chemist shall be notified immediately for problem resolution. All corrective actions shall be documented thoroughly.

B7.3 Instrument Calibration

Sample analysis shall not be allowed until all initial calibrations meet the appropriate requirements. All laboratory instrumentation must be calibrated in accordance with method requirements. If any initial/continuing calibration standards exceed method QC limits, recalibration must be performed and, if necessary, reanalysis of all samples affected back to the previous acceptable calibration check.

B7.4 Reporting Limits

The laboratory must meet the method required detection limits listed in Table B2-1. If difficulties arise in achieving these limits due to a particular sample matrix, the laboratory must notify URS project personnel for problem resolution. In order to achieve those detection limits, the laboratory must utilize all appropriate cleanup procedures in an attempt to retain the project required detection limits. When any sample requires a secondary dilution due to high levels of target analytes, the laboratory must document all initial analyses and secondary dilution results. Secondary dilution will be permitted only to bring target analytes within the linear range of calibration. If samples are analyzed at a secondary dilution with no target analytes detected, URS Project Chemist will be immediately notified so that appropriate corrective actions can be initiated.

B7.5 Method QC

All QC, including blanks, matrix spikes, matrix spike duplicates, surrogate recoveries, matrix spike blank samples, and other method-specified QC samples, shall meet the method requirements referenced in Table B2-1. Failure of method-required QC will result in the review and possible qualification of all affected data. If the laboratory cannot find any errors, the affected sample(s) shall be reanalyzed and/or re-extracted/redigested, then reanalyzed within method-required holding times to verify the presence or absence of matrix effects. If matrix effect is confirmed, the corresponding data shall be flagged accordingly using the flagging symbols and criteria. If matrix effect is not confirmed, then the entire batch of samples may have to be reanalyzed and/or re-extracted/redigested, then reanalyzed at no cost to the URS. URS shall be notified as soon as possible to discuss possible corrective actions should unusually difficult sample matrices be encountered.

B7.6 Calculation Errors

All analytical results must be reviewed systematically for accuracy prior to submittal. If upon data review calculation and/or reporting errors exist, the laboratory will be required to reissue the analytical data report with the corrective actions appropriately documented in the case narrative.

B8.0 DATA REDUCTION, VALIDATION, AND USABILITY

For all analyses, NYSDEC ASP Category B deliverable requirements will be employed for documentation and reporting of all data. The standard NYSDEC data package summary forms (see Appendix B-1) will be completed by the analytical laboratory and included in the deliverable data packages.

B8.1 Data Reduction

Laboratory analytical data are first generated in raw form at the instrument. These data may be either in a graphic or printed tabular format. Specific data generation procedures and calculations are found in each of the referenced methods. Analytical results must be reported consistently. Data for water samples will be reported in concentrations of micrograms per liter (µg/L). Data for soils will be reported in concentrations of micrograms per kilogram (µg/kg) for organics and reported on a dry weight basis.

Identification of all analytes must be accomplished with an authentic standard of the analyte traceable to National Institute of Standards and Technology (NIST) or USEPA sources. Data reduction will be performed by individuals experienced with a particular analysis and knowledgeable of requirements.

B8.2 Data Validation

Data validation is a systematic procedure of reviewing a body of data against a set of established criteria to provide a specified level of assurance of validity prior to its intended use. Data validation will be performed by environmental chemists under the supervision of the QA/QC Officer. All analytical samples collected will receive a limited data review. The data validation will be limited to a review of holding times, completeness of all required deliverables, review of QC results (surrogates, spikes, spike duplicates) and a 10% check of all samples analyzed to ensure they were analyzed properly. The method referenced in Table B3-1 as well as the general guidelines presented in the following documents will be used to aide the chemist during the data review USEPA Region II *Contract Laboratory Program (CLP) Organic Data*

Review, SOP No. HW-6, Revision #12, March 2001. This document will be used with the following exceptions:

- Technical holding times will be in accordance with NYSDEC ASP, June 2000 edition, and
- Tentatively identified compounds (TICs) will be qualified by the analytical laboratory only

Where possible, discrepancies will be resolved by URS chemists (i.e., no letters will be written to laboratories). A complete analytical data validation is not anticipated. However, if the initial limited data audit reveals significant deviations and problems with the analytical data. URS may recommend complete validation of the data.

B8.3 Data Usability

Two sets of data usability tables will be submitted. One set of tables will be only detected values reported, which will be incorporated into the text of the IRM report. The second set of tables will be a complete listing of the validated analytical results. These validation summary tables will be included in the Data Usability Summary Report (DUSR). The DUSR will obtain information regarding deviations, discrepancies and unusable data along with the validation summary tables.

B9.0 PREVENTIVE MAINTENANCE AND PERFORMANCE/SYSTEM AUDITS

B9.1 Preventative Maintenance

The laboratory is responsible for the maintenance of its analytical equipment. Preventive maintenance is provided on a regular basis to minimize down-time and the potential interruption of analytical work. Instruments are maintained in accordance with the manufacturer's recommendations. If instruments require maintenance, only trained laboratory personnel or manufacturer-authorized service specialists are permitted to do the work. Maintenance activities will be documented and kept in permanent logs. These logs will be available for inspection by auditing personnel.

B9.2 Performance/System Audits

Audits will include a careful evaluation of both field and laboratory quality control procedures and will be performed before or shortly after systems are operational. The audits will be conducted by an individual who is technically knowledgeable about the operation(s) under review. Performance audits are conducted by introducing control samples into the data production process. These control samples may include performance evaluation samples, field samples spiked with known amounts of analyte, and split field samples that are analyzed by two or more analysts within or outside the organization.

Systems audits are onsite qualitative inspections and reviews of the quality assurance system used by some part of or the entire measurement system. They provide a quantitative measure of the quality of the data produced by one section or the entire measurement process. The audits are performed against a set of requirements, which may be a quality assurance project plan or work plan, a standard method, or a project statement of work. The primary objective of the systems audits is to verify that the QA/QC procedures are being followed.

B9.2.1 Performance and External Audits

In addition to conducting internal reviews and audits, as part of its established quality assurance program, the laboratory is required to take part in regularly-scheduled performance evaluations and laboratory audits from state and federal agencies. They are conducted as part of the certification process and to monitor the laboratory performance. The audits also provide an external quality assurance check of the laboratory and provide reviews and information on the management systems, personnel, standard operating procedures, and analytical measurement systems. Acceptable performance on evaluation samples and audits is required for certification and accreditation. The laboratory shall use the information provided from these audits to monitor and assess the quality of its performance. Problems detected in these audits shall be reviewed by the QA Manager and Laboratory Management, and corrective action shall be instituted as necessary.

B9.2.2 Systems/Internal Audits

As part of its quality assurance program, the Laboratory QA Manager shall conduct periodic checks and audits of the analytical systems. The purpose of these is to verify that the analytical systems are working properly, and that personnel are adhering to established procedures and documenting the required information. These checks and audits also assist in determining or detecting where problems are occurring.

The QA Manager periodically will submit laboratory control samples. These samples will serve to check the entire analytical method, the efficiency of the preparation method, and the analytical instrument performance. The results of the control samples are reviewed by the QA Manager who reports the results to the analyst and the Laboratory Director. When a problem is indicated, the QA Manager will assist the analyst and laboratory management in determining the reason and in developing solutions. The QA Manager will also recheck the systems as required.

REFERENCES

Comprehensive Environmental Response Compensation and Liability Act (CERCLA) Quality Assurance Manual, Final Copy, Revision 1, October 1989.

National Enforcement Investigations Center of USEPA Office of Enforcement. *NEIC Policies and Procedures.* Washington: USEPA.

New York State Department of Environmental Conservation (NYSDEC). 2000. *Analytical Services Protocol* (ASP), June Edition. Albany: NYSDEC.

USEPA. 1987. *A Compendium of Superfund Field Operations Methods,* EPA/540/P-87-001, (OSWER Directive 9355.0-14). December. Cincinnati, OH: USEPA.

USEPA. 2000. *Guidance for the Data Quality Objective Process,* EPA QA/G-4. August. Washington: USEPA.

TABLE B3-1
ANALYTICAL METHODS, CONTAINER, PRESERVATION, AND HOLDING TIME REQUIREMENTS
WYOMING COUNTY FIRE TRAINING CENTER

PARAMETER	ANALYTICAL METHOD*	VOLUME REQUIREMENT	PRESERVATION	HOLDING TIME*
Soil/Sediment				
TCL Volatiles	OLMØ4.2	2 x 4 oz. wide mouth glass, teflon septa	Cool 4° C	10 days

NOTES:

* - NYSDEC Analytical Services Protocol (ASP), June 2000 Edition.

** - All holding times begin with the Validated Time of Sample Receipt (VTSR) at the laboratory.

TABLE B2-1
SUMMARY OF ANALYTICAL PARAMETERS
WYOMING COUNTY FIRE TRAINING CENTER

Parameter	Method Number / Reference[1]	Estimated Number of Samples	QA/QC Samples		
			MS/MSD/MSB	Rinse Blanks	Trip Blanks
Subsurface Soil					
Volatiles + TICs	OLM04.2	40	2/2/2	4	0

NOTES:

[1]NYSDEC Analytical Services Protocol (ASP), June 2000 Edition.

TIC – Tentatively Identified Compounds

APPENDIX B-1

STANDARD NYSDEC DATA PACKAGE REPORTING FORMS

NEW YORK STATE DEPARTMENT OF ENVIRONMENTAL CONSERVATION

SAMPLE IDENTIFICATION AND ANALYTICAL REQUIREMENT SUMMARY

Customer Sample Code	Laboratory Sample Code	Analytical Requirements					
		*VOA GC/MS Method #	*BNA GC/MS Method #	*VOA GC Method #	*Pest PCBs Method #	*Metals	*Other

NEW YORK STATE DEPARTMENT OF ENVIRONMENTAL CONSERVATION

SAMPLE PREPARATION AND ANALYSIS SUMMARY
VOLATILE (VOA)
ANALYSES

Laboratory Sample ID	Matrix	Date Collected	Date Rec'd at Lab	Date Extracted	Date Analyzed

PART C

HEALTH AND SAFETY PLAN

HEALTH AND SAFETY PLAN
FOR
CONTAMINATED SOIL REMOVAL
AT THE
WYOMING COUNTY FIRE TRAINING AREA
WETHERSFIELD, NEW YORK

Prepared For:

WYOMING COUNTY
143 NORTH MAIN STREET
WARSAW, NEW YORK 14569

Prepared By:

URS CORPORATION – NEW YORK
282 DELAWARE AVENUE
BUFFALO, NEW YORK 14202

August 2003

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C1.0 INTRODUCTION

Wyoming County has operated a fire training center located at 3651 Wethersfield Road in the Town of Wethersfield, New York (Figure C1-1). Remedial activities consisting of drum removal, aboveground storage tank (AST) removal, and contaminated soil excavation were conducted at the site in July/August of 2001. A limited site investigation program, conducted in September/October of 2001, has shown that VOCs consisting primarily of toluene and tetrachloroethene (PCE) have contaminated the soils and/or groundwater in various areas at the site. Additionally, VOCs have been detected in groundwater in the two adjacent residential parcels located immediately east of the site.

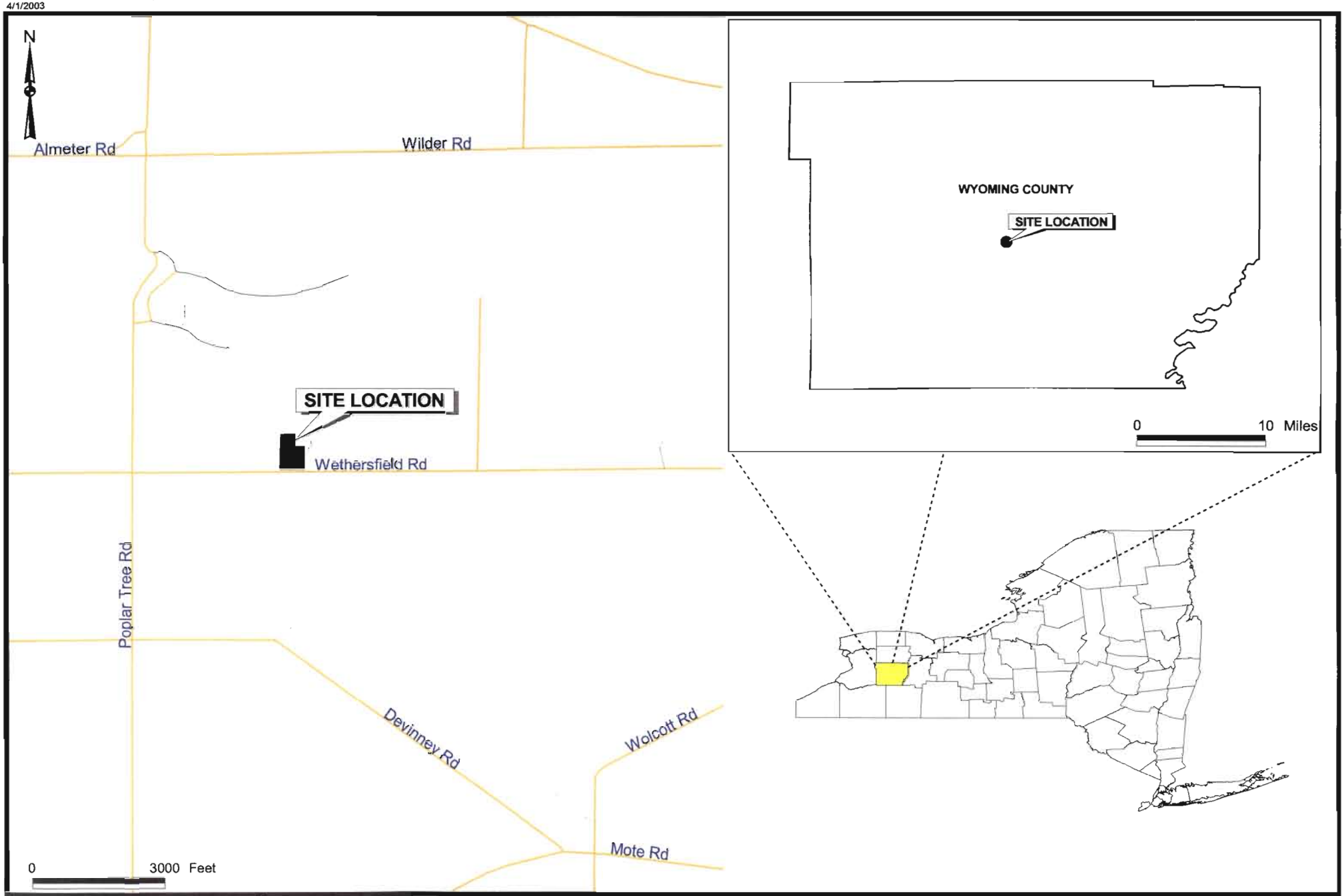
URS Corporation – New York (URS) has been retained by Wyoming County to develop and implement an Interim Remedial Measure (IRM) Work Plan for removal of contaminated soils at the site. The scope of the IRM includes the excavation of VOC-contaminated soils from selected areas of the site with on-site treatment of the soils utilizing soil vapor extraction methods.

C1.1 Site Description and History

The Wyoming County Fire Training Center (WCFTC) facility is located on the north side of Wethersfield Road approximately one-half mile east of the intersection of Poplar Hill Road in the Town of Wethersfield, Wyoming County (Figure C1-1).

The overall WCFTC facility occupies approximately 6.8 acres and includes several permanent structures/installations and is completely enclosed by a chain link fence about its perimeter. The main features of the WCFTC facility are the Training Center building and attached garage in the southwest section of the property, two smaller support buildings, a storm water retention pond and several fire training structures across the remaining portions of the property. The site, which was previously investigated and is the subject of this IRM, includes a former steel AST used for storage of flammable liquids, two former subgrade concrete fire pits connected to the AST via underground piping and, a former drum storage area that was utilized for storage of drums containing flammable liquids. These features are all located on about one acre in the eastern portion of the WCFTC facility (Figure C1-2), the site.

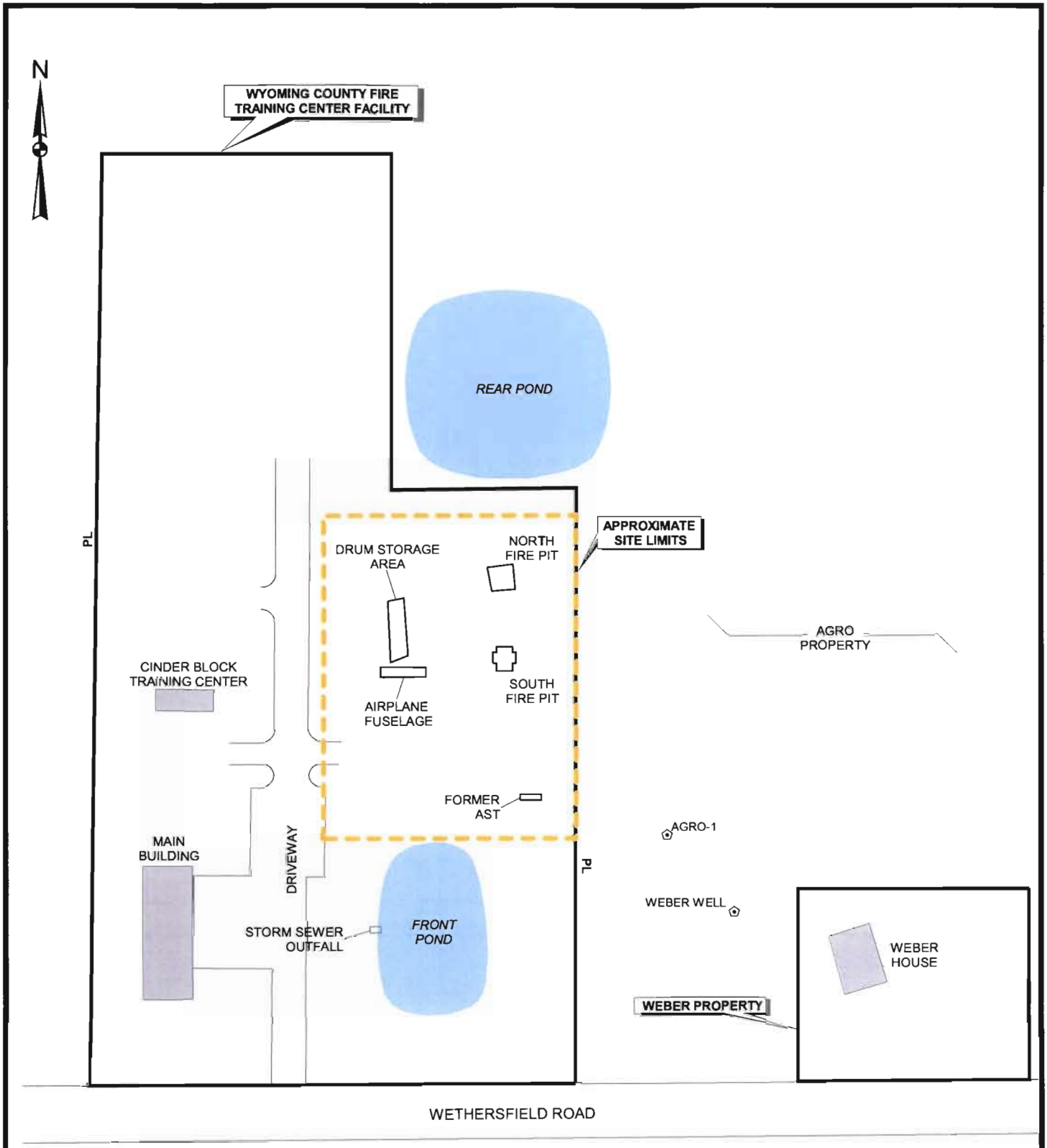
N:\11172991.00000\DB\Gis\site.apr SITE LOCATION
4/1/2003



URS

WYOMING COUNTY FIRE TRAINING CENTER
SITE LOCATION MAP

FIGURE C1-1



Legend

⬠ Residential Pumping Well

120 0 120 Feet

URS

WYOMING COUNTY FIRE TRAINING CENTER
SITE PLAN

FIGURE C1-2

N:\11172991.00000\DB\Gis\wyoming.apr SITE FEATURES
4/14/2003

The site topography is generally flat, with a graded bank along the eastern boundary. Vegetative cover consists primarily of turf grass. The property to the east and northeast slopes more steeply to the northeast.

Surrounding land uses are generally agricultural and recreational with low-density residential housing along Wethersfield Road. The two neighboring parcels to the east are occupied by a seasonal home and a permanent residence. The Agro property, adjacent to the eastern and northern boundaries of the WCFTC, is occupied by a seasonal residence. This property has approximately two hundred feet of frontage on Wethersfield Rd. and widens to the east and west some distance from the road. Only the southern portion of this property is included in the study area.

The Mark Weber property, 3689 Wethersfield Rd., is the closest permanent residence to the WCFTC. The Weber property is situated immediately to the east of the Agro property and occupies similar frontage.

A mixture of vegetation is present on nearby parcels, ranging from mature trees to brush and lawn areas. There are two ponds present on the Agro property, the closest being located immediately northeast of the subject property.

The site and immediately surrounding properties are depicted on Figure C1-2.

The WCFTC was operated by the County commencing in the 1970's. Flammable liquids consisting of solvents, petroleum products, paint thinners, degreasers, etc. were brought to the site and stored in the AST and/or in drums of various sizes in the unlined drum storage area. Liquids from the AST were conveyed to two subgrade concrete-lined fire pits via an underground steel piping/valve system. Liquids from the drums were dumped directly into the fire pits, ignited and subsequently extinguished during fire training exercises.

In 2002, the County executed a Voluntary Cleanup Agreement (VCA) for the site with the state of New York.

C1.2 Purpose

Based on the data from the previous investigations, the probable extent of soil contamination at the site has been adequately delineated. The purpose of this IRM is to remove contaminated soils that may be providing an ongoing "source" of contaminants to the shallow groundwater.

C1.3 Anticipated Field Activities

This Health and Safety Plan (HASP) includes appropriate health and safety procedures to be followed by all URS Corporation (URS) personnel during interim remedial measure activities at and in the vicinity of the former fire training center located at 3651 Wethersfield Road, Town of Weathersfield, Wyoming County, New York. Anticipated field activities at the site will include:

- Setting up of support facilities/mobilization/demobilization
- Excavation of contaminated soil (approximately 700 yd^3)
- Direct loading of contaminated soil into dump trucks
- Excavation dewatering
- Unloading of contaminated soil at onsite constructed soil vapor extraction (SVE) treatment cell
- SVE treatment
- Collection of samples of treated soil
- Excavation backfilling
- Decommissioning of SVE treatment cell
- Stockpiling of treated soil for onsite reuse and/or offsite disposal
- Real-time air monitoring

The procedures presented in this plan comply with the following regulatory or guidance documents:

AMERICAN CONFERENCE OF GOVERNMENTAL INDUSTRIAL HYGIENISTS (ACGIH)

ACGIH-0028	2002 TLVs and BEIs – Threshold Limit Values for Chemical Substances and Physical Agents and Biological Exposure Indices.
ACGIH-0376	Guide to Occupational Exposure Values – 2002.
ACGIH-0460	Guidelines for the Selection of Chemical Protective Clothing, 3rd Edition.

CODE OF FEDERAL REGULATIONS (CFR)

29 CFR Part 1904	Recording and Reporting Occupational Injuries and Illnesses.
29 CFR Part 1910	Occupational Safety and Health Standards, especially Part 1910.120-Hazardous Waste Site Operations and Emergency Response.
29 CFR Part 1926	Safety and Health Regulations for Construction, especially Part 1926.65-Hazardous Waste Site Operations and Emergency Response.
49 CFR Part 171	General Information, Regulations, and Definitions.
49 CFR Part 172	Hazardous Materials Table, Special Provisions, Hazardous Materials Communications, Emergency Response Information, and Training Requirements.

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY (USEPA)

No Publication No.	(1984) Standard Operating Safety Guides, Office of Emergency and Remedial Response.
USEPA Order 1440.2	(1981) Health and Safety Requirements for Employees Engaged in Field Activities.

NATIONAL INSTITUTE FOR OCCUPATIONAL SAFETY AND HEALTH (NIOSH)

NIOSH Pub. No. 85 115	(October 1985) NIOSH/OSHA/USCG/USEPA, Occupational Safety and Health Guidance Manual for Hazardous Waste Site Activities.
NIOSH Pub. No. 97-140	(June 1997) NIOSH Pocket Guide to Chemical Hazards.

URS personnel who will be involved in intrusive activities on site have completed the appropriate waste site worker training as required by OSHA 1910.120(e)(2), 1910.120(e)(3), and 1910.120(e)(8), as applicable, and the required medical surveillance as required by OSHA 1910.120(f).

C2.0 RESPONSIBILITIES

The following is a summary of the health and safety responsibilities of various project personnel.

C2.1 Project Health and Safety Officer

The responsibilities of the Project Health and Safety Officer (HSO) are to develop and coordinate the Site Health and Safety Program, and to provide necessary direction and supervision to the Site HSO. The Project HSO will conduct the initial site-specific training session (Onsite Health and Safety Briefing), and will review and confirm changes in personal protection requirements when site conditions are found to be different from those originally anticipated.

C2.2 Site Health and Safety Officer

The responsibilities of the Site HSO are as follows:

- Implement this HASP
- Enforce day-to-day health and safety protocols in effect on the site
- Require that all URS workers who will be involved in intrusive activities on the site have had appropriate waste site worker training and medical examinations, and review and maintain training and medical certifications on site
- Require that all personnel entering the site understand the provisions of this HASP
- Conduct periodic training sessions in proper use and maintenance of personal protective equipment and safety practices
- Conduct periodic emergency response drills
- Conduct daily health and safety meetings each morning
- Direct and advise onsite URS personnel, visitors, and subcontractor HSO on all aspects, especially changes, related to health and safety requirements at the site
- Conduct necessary health and safety monitoring
- Administer the air monitoring program

- Monitor site conditions and determine all necessary changes in levels of personal protection and, if warranted, execute work stoppages
- Report changes in site conditions and changes in personal protection requirements to the Project HSO
- Prepare accident/incident reports

The Site HSO reports directly to the Project HSO. URS will designate a qualified backup for the Site HSO prior to the initiation of onsite activities.

C2.3 Field Team Personnel

Field team personnel will be responsible for understanding and complying with site health and safety requirements. Field team personnel on site will be trained in first aid and CPR, and will be certified by the American Red Cross. Field team personnel will have completed the required waste site worker training to comply with 29 CFR, Part 1910.120.

C3.0 TRAINING REQUIREMENTS

All personnel conducting field activities on site are required to be certified in health and safety practices for hazardous waste operations as specified in the Federal OSHA Regulations (29 CFR 1910.120) (revised March 6, 1990). Paragraph (e) (2) of the above-referenced regulations requires that each employee, at the time of job assignment, receive a minimum of 40 hours of initial instruction off the site, and a minimum of three days of supervised field experience.

Paragraph (e) (3) of the above-referenced regulations requires that all onsite management and supervisory personnel directly responsible for, or who supervise employees engaged in hazardous waste operations, must initially receive eight hours of additional specialized training. Management and supervisory training must emphasize health and safety practices related to managing hazardous waste work.

Paragraph (e)(8) of the above-referenced regulations requires that workers and supervisors receive eight hours of refresher training annually on the items specified in Paragraph (e)(1) and/or (e)(3).

Additionally, all personnel must receive adequate site-specific training, in the form of an Onsite Health and Safety Briefing given by the Project HSO prior to participating in onsite field work. This will involve a review of this Health and Safety Plan with emphasis on the following:

- Protection of the adjacent community from hazardous substances which may be released during intrusive activities
- Attention to health effects and hazards of substances known to be present on site
- Attention to physical hazards on site, and the importance of knowing proper means of avoiding these hazards
- Health hazards, protective measures, emergency and first aid measures, fire and explosion information, reactivity, incompatible materials, and emergency procedures

for spills of hazardous chemicals brought onto the site for use during normal field operations

- Hazards and protection against heat/cold
- The need for vigilance in personal protection, and the importance of attention to proper use, fit, and care of personal protective equipment
- The effectiveness and limitations of personal protective equipment
- Prescribed decontamination procedures
- Site control, including work zones, access, and security
- The proper observance of daily health and safety practices, such as the entry and exit of work zones and site, proper hygiene during lunch, break, etc.
- Recognition in oneself or in others of physical conditions requiring immediate medical attention, and application of simple first aid measures
- Emergency procedures to be followed (with rehearsals) in cases of fire, explosion, or sudden release of hazardous gases

Health and Safety Meetings will be conducted daily by the Site HSO and will cover protective clothing and other equipment to be used that day, potential chemical and physical hazards, emergency procedures, and conditions and activities from the previous day.

All visitors entering the Exclusion Zone or Contamination Reduction Zone will be required to receive the necessary site-specific training from the Site HSO and must be equipped with the proper personal protective equipment.

A4.0 MEDICAL SURVEILLANCE REQUIREMENTS

All URS personnel who engage in onsite activities for 30 days or more per year participate in the Medical Surveillance Program, which involves undergoing a medical examination once every year. The examination must be conducted by a physician who is board-certified in occupational medicine. The physician will have been made familiar with the job-related duties of each worker examined. All URS project personnel involved in onsite activities at the site will participate in the Medical Surveillance Program as required by 29 CFR 1910.120(f) and 10 CFR 20.

Components of the Medical Surveillance Program are shown in Table C4-1. The physician must state whether the individual is fit to conduct work on hazardous waste sites using personal protection, or whether he or she must work within certain restrictions; personnel may be excluded from this site for medical reasons. Copies of the medical examination reports will be given to each employee who will be encouraged to forward copies to their personal physician.

Any person exposed to high levels of hazardous substances will be required to undergo a repeat medical exam at or before the conclusion of the project to determine possible health impacts. Any person suffering a lost-time injury or illness must have medical approval prior to returning to work on site. When employment is terminated for any reason, the employee must receive an exit medical examination.

All medical records will be held by the employer for the period of employment plus at least 30 years, in accordance with OSHA regulations on confidentiality and any other applicable regulations and will be made available to OSHA upon request.

TABLE C4-1

COMPONENTS OF MEDICAL SURVEILLANCE PROGRAM

- Medical and occupational history
- Physical examination, with particular attention to the cardiopulmonary system, general physical fitness, skin, blood-forming, hepatic, renal, and nervous systems
- Urinalysis, to include:
    - radiological bioassay
    - color
    - appearance
    - specific gravity
    - pH
    - ketones
    - protein
    - glucose
    - blood
    - bilirubin
    - leukocyte esterase
    - nitrite
    - white blood cell (WBC) count
    - red blood cell (RBC) count
    - casts
    - bacteria
    - epithelial cells
    - crystals
    - yeasts
- Blood analysis, to include:
    - complete blood count
    - hemoglobin
    - albumin, globulin, total protein
    - bilirubin - direct and total
    - g-glutamyl transpeptidase
    - serum glutamic oxalacetic transaminase
    - lactic dehydrogenase
    - alkaline phosphatase
    - sodium
    - potassium
    - chloride
    - magnesium
    - calcium
    - phosphorus
    - uric acid
    - blood urea nitrogen (BUN)
    - creatinine

TABLE C4-1 (continued)

- cholesterol
- triglycerides
- glucose
- iron
- heavy metals - arsenic, lead, mercury, and zinc protoporphyrin

- Pulmonary function test

- Additional tests as appropriate, including:
  - chest X-ray
  - electrocardiogram
  - stress test

C5.0 SITE HAZARD EVALUATION

C5.1 Chemical Hazards

The primary chemicals of concern on site are volatile organic compounds (VOCs), based on detections of these compounds in soil samples from previous investigations. The health and safety characteristics and occupational exposure values of these compounds are summarized in Table C5-1. The risk of exposure to these contaminants can be by the dermal or respiratory route, depending on the type of contaminant and activity being conducted.

C5.2 Physical Hazards

Physical hazards range from the dangers of tripping and falling on uneven ground to those associated with the operation of heavy equipment such as excavators. Physical hazards also include scattered debris, scrap metal, and concrete.

Field activities that involve soil excavation and handling usually involve contact with various types of machinery. At least two people on site must be currently American Red Cross-certified in first aid and CPR. Personnel trained and certified in first aid should be prepared to take care of cuts and bruises as well as other minor injuries. A first aid kit approved by the American Red Cross will be present and available during all field activities.

Animals and some insects may bite and thereby pose a health hazard in the form of irritation, illness, or poisoning. Anyone bitten should be given immediate first aid as necessary, and shall be transported to the nearest medical facility (if necessary). Members of the field investigation team will be properly briefed regarding the potential for encountering insects and animals. The potential threat of the deer tick and the possibility of contracting Lyme disease is a serious matter. The likelihood of contracting Lyme disease will be greatly decreased by field personnel wearing long pants, long sleeved shirts, and hard hats. All field personnel will be instructed to take a shower daily upon returning to the hotel or place of residence to further decrease the likelihood of contracting Lyme disease.

TABLE C5-1

HAZARD CHARACTERISTICS OF CHEMICAL CONTAMINANTS ON SITE

Substance	Toxicity/Carcinogenicity	Occupational Exposure Values*
Ethylbenzene	Moderately toxic by ingestion, inhalation, and skin contact. Irritant and narcotic in high concentrations. Confirmed animal carcinogen.	100 ppm (TLV-TWA and PEL) 125 ppm (STEL) (1) (TLV)
Tetrachloroethylene (Perchloroethylene)	Moderately toxic. Irritating to skin and eyes. Confirmed animal carcinogen.	25 ppm (TLV-TWA) 100 ppm (PEL and STEL (1) (TLV)) 200 ppm (Ceiling) (2) (PEL)
Toluene	Moderate toxicity via the oral, inhalation, and intraperitoneal routes, low toxicity via the dermal route.	50 ppm (Skin) (3) (TLV-TWA) 200 ppm (PEL) 300 ppm (Ceiling) (2) (PEL)
Xylenes	Moderate toxicity via the oral, inhalation, intraperitoneal, and subcutaneous routes.	100 ppm (TLV-TWA and PEL) 150 ppm (STEL) (1) (TLV)

* Occupational Exposure Values (TLVs and PELs) are 8-hour Time-Weighted Averages (TWAs) unless otherwise noted.

NOTES:

(1) STEL – 15 minute TWA exposure which should not be exceeded at any time during a work day.
(2) Ceiling – The concentration that should not be exceeded during any part of the working exposure.
(3) Skin-Listed substances followed by the designation "skin" refer to the potential significant contribution to the overall exposure by the cutaneous route, including mucous membranes and the eyes, either by contact with vapors or, or probable greater significance, by direct contact with the substance.

Definitions

Permissible Exposure Limits (PELs) – Measure of toxicity of a substance, exposure limits that are published and enforceable by the Occupational Safety and Health Administration (OSHA) as legal standards, cannot be exceeded, 8 hour exposure is assumed, expressed as concentration of a substance per unit air volume, mg/m^3, ppm.

Threshold Limit Values (TLVs) – Refers to airborne concentrations of substances as issued by the American Conference of Governmental Industrial Hygienists (ACGIH) and represents conditions under which it is believed that nearly all workers may be repeatedly exposed, day after day, without adverse effect.

Threshold Limit Value – Time Weighted Average (TLV-TWA) – The Time-Weighted Average concentration for a conventional 8-hour work day and a 40-hour workweek, to which it is believed nearly all workers may be repeatedly exposed, day after day, without adverse effect.

TABLE C5-1 (Continued)

References

- American Conference of Governmental Industrial Hygienists. *Guide to Occupational Exposure Values-2002*. Cincinnati, Ohio.
- American Conference of Governmental Industrial Hygienists. *2002 TLVs and BEIs - Threshold Limit Values for Chemical Substances and Physical Agents,* Cincinnati, Ohio.
- 29 CFR, Part 1910.1000, Tables Z-1 and Z-2, Limits for Air Contaminants, July 1, 1995.
- National Institute for Occupational Safety and Health. *NIOSH Pocket Guide to Chemical Hazards*. Publication No. 97-140, June 1997. Cincinnati, Ohio.
- Hawley, Gessner G. *The Condensed Chemical Dictionary*, Tenth Edition, New York: Van Nostrand Reinhold, 1981.
- Sax, R. Irving. *Dangerous Properties of Industrial Materials*, Sixth Edition, New York: Van Nostrand Reinhold, 1984.

Improper lifting by workers is one of the leading causes of industrial injuries. Therefore, all members of the field crew should be trained in the proper methods of lifting heavy objects. All workers should be cautioned against lifting objects too heavy for one person.

C6.0 TEMPERATURE STRESS

CA6.1 Heat Stress

The combination of high ambient temperature, high humidity, physical exertion, and personal protective apparel which limits the dissipation of body heat and moisture can cause heat stress. The Site HSO is responsible for monitoring heat stress in the field team personnel.

The following prevention, recognition, and treatment strategies will be implemented to protect personnel from heat stress. Personnel will be trained to recognize the symptoms of heat stress, implement proper preventative measures, and apply the appropriate treatment.

A. Prevention

1. Provide plenty of liquids. Available in the Support Zone will be a 50% solution of fruit punch in water, or the like, or plain water.

2. Provide cooling devices. A portable, pump-activated [illegible] and containers of tap water will be available in the Contamination Reduction Zone to reduce body temperature, cool protective clothing and/or act as a quick-drench shower in case of an exposure incident.

3. Adjust the work schedule. During hot summer days, labor-intensive tasks which pose a high potential risk of heat stress can be performed during the coolest part of the day.

B. Recognition and Treatment

Any person who observes any of the following forms of heat stress, either in themselves or in another worker, will report this information to the Site HSO immediately after implementing treatment, if possible.

1. Heat Rash (prickly heat):

Cause: Continuous exposure to hot and humid air, aggravated by chafing clothing.

Symptoms: Eruption of red pimples around sweat ducts, accompanied by intense itching and tingling.

Treatment: Remove source of irritation and cool the skin with water or wet cloths.

2. Heat Syncope (fainting):

Cause: Sun rays beating down on victim's head and prolonged upright position can lead to mild dehydration and contraction of the blood vessels resulting in a temporary deficiency in flow of blood to the brain.

Symptoms: Brief loss of consciousness.

Treatment: Have the worker assume a horizontal position and drink one to two liters of fluid (not alcohol). Elevate the legs and cover the head.

3. Heat Cramps (heat prostration):

Cause: Profuse perspiration accompanied by inadequate replenishment of body water and electrolytes.

Symptoms: Sudden development of pain and/or muscle spasms in the abdominal region.

Treatment: Move the worker to the Contamination Reduction Zone. Remove protective clothing. Provide fluids orally. Decrease body temperature and allow a period of rest in a cool location.

4. Heat Exhaustion (heat toxemia, sunstroke):

Cause: Overexertion in a hot environment and profuse perspiration accompanied by inadequate replenishment of body water and electrolytes. Warning – this is a serious condition.

Symptoms: Muscular weakness, fatigue, staggering gait, nausea, dizziness, shallow breathing, pale and clammy skin, and approximately normal body temperature.

Treatment: Perform the following while simultaneously making arrangements for transport to a medical facility: Move the worker to the Contamination Reduction Zone. Remove protective clothing. Lie the worker down on his or her back, in a cool place, and raise the feet 6 to 12 inches. Keep warm, but loosen all clothing. If conscious, provide sips of a salt water solution using one teaspoon of salt in 12 ounces of water. Transport the worker to a medical facility.

5. Heat Stroke:

Cause: Same as heat exhaustion. This is an extremely serious condition.

Symptoms: Dry, red, hot skin, dry mouth, dizziness, nausea, headache, rapid pulse high temperature. Temperature continues to rise unless treatment is implemented.

Treatment: The basic principle is to lower the body temperature rapidly.

1. Move the victim out of the sun.
2. Remove clothes.
3. Soak victim completely with water; wet hair as well.

4. Place victim in front of a fan or in a breeze, if possible.
5. If ice is available, apply directly to the victim, especially under the arms and on the head.
6. Monitor body temperature with available thermometers. Temperature should start to decrease within minutes.
7. As temperature approaches 101°F, stop cooling measures and initiate transport to a hospital or declare an emergency response. The temperature should continue to fall, often to subnormal, during this period.

Other considerations in treating heat stroke are:

1. Rub skin briskly during cooling process.
2. If cardiac arrest occurs, perform CPR (ONLY IF CERTIFIED) and continue cooling.
3. If a seizure occurs, continue cooling; the seizure will stop.
4. No drugs of any kind are to be given to the victim.

C. Heat Stress - Predisposing Factors

Preventing heat stress is clearly preferred to treatment. The following factors increase the individual's risk of heat stress:

- Physically unfit
- Age
- Not accustomed to heat
- Sunburn

- Alcohol and drugs
- Dehydration
- Heavy or non-breathable clothing
- Not covering one's head

C6.2 Cold Stress

Personnel can be susceptible to cold stress while conducting field work during cold weather months. To guard against cold stress and to prevent cold injuries, appropriate warm clothing should be worn, warm shelter must be previously identified and readily available, rest periods should be adjusted as needed, and the physical conditions of onsite field personnel should be closely monitored. All personnel working on site must be able to recognize the signs and symptoms of cold stress and apply first aid as needed. The Site HSO is responsible for monitoring the signs and symptoms of cold stress among field personnel.

The development of cold stress and cold injuries is influenced by three factors: the ambient temperature, the velocity of the wind, and the amount of sunshine. Fingers, toes, and ears are the most susceptible parts of the body affected by cold.

A. Frost Nip:

Cause: Frost nip is the first sign of frostbite and is the only form of local cold injury that can be definitively treated in the field.

Symptoms: A whitened area of the skin which is slightly burning or painful.

Treatment: Rewarming the affected part.

B. Frost Bite:

Cause: Local damage is caused by exposure to low temperature environmental conditions. It results at temperatures when ice crystals form, either superficially or deeply, in the fluids and

underlying soft tissues of the skin. The nose, cheeks, ears, fingers, and toes are most commonly affected.

Symptoms: Skin is cold, hard, white, and numb. There may also be blisters. The affected parts will feel intensely cold; however, there may not be any pain. The victim may not know that he or she is frost-bitten.

As time goes on, the victim may experience mental confusion and impairment of judgment. The victim may stagger and eyesight may fail. The victim may fall and become unconscious. Shock is evident and breathing may cease. If death occurs, it is usually due to heart failure.

Treatment: Generally, definitive thawing should not be performed in the field, because if re-freezing occurs, it could result in severe damage. The victim should be transported to a medical facility after the following measures are instituted:

Do Not:

- Do not walk on a thawed foot or toes or use thawed hands.
- Do not allow victim to smoke or drink alcohol.
- Do not rub affected area with anything.
- Do not break any blisters.
- Do not apply heat of any kind.

Do:

- Do place victim in protected environment.
- Do prevent further heat loss (warmer clothes).
- Do protect from further damage (warm covering).

C. Mild Hypothermia:

Symptoms: The single most important sign of mild hypothermia is a change in behavior. Some signs that can be observed are:

- Decrease in work efficiency
- Decreased level of communication
- Forgetfulness
- Poor judgment
- Poor motor skills (difficulty in handling objects, dropping tools)

The target organ of mild hypothermia is the brain. During mild hypothermia, most of the body's protective mechanisms for temperature control are intact. Shivering is usually present and "goose flesh" and pale skin persist. When asked directly, the victim will usually say that he feels cold. A worker impaired by mild hypothermia can be a danger to himself and co-workers.

Treatment:

- The victim should be moved indoors or into a heated vehicle.
- Remove all wet or damp clothing, dry skin, and apply dry clothing.
- The head should be covered with a hat or blanket
- Blankets should be put on the victim.
- The victim should be given hot fluids (no alcohol)
- If possible, monitor the victim's temperature at 15 minute intervals.

D. Moderate Hypothermia: For field purposes, this may be defined as the stage at which the patient is clearly incapable of functioning effectively, but is conscious.

Symptoms: The victim's body temperature is well below normal and some mental changes may occur which include:

- Disorientation to people, place, and time

- Hallucinations
- Inappropriate laughing or crying
- Bizarre behavior for that individual

During moderate hypothermia, shivering is absent, "goose flesh" disappears, and the heart rate may slow down. The victim does not "feel" cold.

Treatment:

- First, treat the patient for mild hypothermia.
- Provide warming with hot blowers or heaters.
- Use human body heat.
- Watch for signs of returning to normal (e.g., shivering, goose flesh, teeth chattering).
- Monitor mental status.

After these steps are initiated, the victim should be taken to a medical facility. The patient should not return to work for at least 48 hours.

E. Severe Hypothermia:

Symptoms: Characterized by a decrease in the body temperature which results in a deep coma in which even vital signs become very weak and finally undetectable. Most occupational cases occur when the victim is alone or lost. These victims, for all practical purpose, appear to be dead, but the saying "not dead until warm and dead" applies to severe hypothermia. Many of these victims can survive.

Treatment:

1. The patient is not to be considered dead.
2. Remove wet clothes, dry skin, and apply dry clothes.
3. Activate rewarming.
4. Prepare to transfer the victim to a medical facility.

5. If the patient is pulse-less and is not breathing, perform CPR (ONLY IF CERTIFIED), while enroute to the medical facility.

6. Very cold victims often tolerate long periods of arrest, even without CPR. The victim must be handled very carefully because of extreme susceptibility to even minor trauma.

C7.0 SITE CONTROL

In order to keep unauthorized personnel from entering the work area during excavation, treatment, or environmental sampling activities, and for good control of overall site safety, three work zones will be established. The three work zones are the Support Zone, the Contamination Reduction Zone, and the Exclusion Zone. Actual Exclusion Zone size will be determined by optimal size of work area and by local obstructions.

C7.1 Support Zone

The Support Zone for the project will be established in a URS cargo van. The support facilities will contain personal protective equipment (disposable suits, gloves, boots, etc.), a first aid kit, a fire extinguisher, a stretcher, an eyewash station, sampling equipment, sample containers, and 50% solution of fruit punch or the like in water (or plain drinking water).

C7.2 Contamination Reduction Zones

A Mobile Contamination Reduction Zone will lie adjacent to the Exclusion Zone. During excavation operations, materials brought to the surface may come in contact with workers' boots or protective clothing and equipment. A mobile decontamination area will be set up adjacent to any soil handling areas. All personnel will be required to decontaminate themselves and light equipment prior to leaving the Exclusion Zone.

C7.3 Exclusion Zone

The Exclusion Zone is the area around soil handling activities. The exact size of any Exclusion Zone will be determined by optimal size of work area and by local obstructions. All personnel leaving the Exclusion Zone will be required to do so via the Mobile Contamination Reduction Zone, and to carry out proper decontamination procedures.

C7.4 Site Visitation

It is possible that officials from NYSDEC and other regulating bodies and jurisdictions will visit the site during operations. It is also possible that an OSHA representative will wish to inspect the operations. All such officials must meet the requirements of OSHA-approved training and site-specific training before going into any Exclusion Zone. All visitors must read this HASP prior to entering an Exclusion Zone. Visitors other than NYSDEC, OSHA, New York State Department of Health (NYSDOH), or Town or County government representatives will be subject to the additional requirement of having to receive written permission from Wyoming County to enter an Exclusion Zone. A Daily Site Visitors Log will be kept and all visitors to the site will sign in and provide their affiliation, the date of visit, affirmation that they have read and understood the HASP, arrival time, departure time, and purpose of visit.

C8.0 PERSONAL PROTECTION

Since personnel working on site may be exposed to chemical contaminants released during soil handling activities, or may come in contact with contaminants in soils, various levels of protection must be available. Components of all levels of personal protection that will be available are listed in Table C8-1. The anticipated levels of protection for various field activities are given in Table C8-2.

In the event that unexpected levels of organic vapors are encountered, any personnel working at Level D or D+ protection will don their respirators (change to Level C). The Site HSO will consult with the Project HSO to decide if and when Level D or D+ protection may be resumed, or if a higher level of personal protection is required.

Some modification in safety equipment (e.g., switching from poly-coated disposable coveralls to standard disposable coveralls) may be implemented in order to balance concerns for full contaminant protection against concerns for the possibility of heat stress resulting from the need to wear more restrictive protective equipment. Such modifications may be implemented only if approved in advance by the Site HSO, following consultation with the Project HSO. Protective equipment which fully complies with the requirements of all required levels of protection will be immediately available at all times on the site.

Level C respiratory protection will normally be provided using NIOSH-approved full-face respirators, with Type GMC-H combination filter cartridges approved for removal of organic vapors, particulates, gases, and fumes. The filter cartridges will be changed at the end of each work day or when breakthrough occurs, whichever comes first. All URS field team members will have been fit-tested for respirators using irritant smoke prior to project assignment. Due to difficulties in achieving a proper seal between face and mask, persons with facial hair will not be allowed to work in areas requiring respiratory protection.

TABLE C8-1

COMPONENTS OF PERSONAL PROTECTION LEVELS

Level D Protection	Level D+ Protection	Level C Protection
• **ANSI-Approved Safety glasses with shields (or goggles)**	• ANSI-Approved Safety glasses with side shields (or goggles)	• Level D+ items, adding:
• ANSI-Approved Hard hat	• ANSI-Approved Hard hat	• Full-face air-purifying respirator (to be worn)
• Ordinary coveralls	• Face shield (optional)	• Duct-taping of gloves and boots to disposable coveralls
• **Ordinary work gloves**	• Disposable poly-coated coveralls (Tyvek or equivalent)	
• **ANSI-Approved Steel-toe, steel-shank work shoes or boots (chemical resistant)**	• Inner gloves of snug-fitting latex or vinyl	
• Outer boots or neoprene or butyl rubber (optional)	• Outer gloves of neoprene or nitril	
	• Outer boots of neoprene or butyl rubber	
	• ANSI-Approved Steel-toe, steel-shank work shoes or boots (chemical resistant)	
	• **Full-face air-purifying respirator (immediately available)**	

2. Respirator to be NIOSH-approved [illegible]C-H combination respirator cartridges approved for organic vapors, particulates, gasses, and fumes.

TABLE C8-2

PLANNED LEVELS OF PERSONAL PROTECTION FOR EACH MAJOR ACTIVITY

Field Activity	Level of Protection*
A. Non-Intrusive Activities	
1. Setting up Support Facilities/Mobilization/Demobilization	D
2. Land Surveying	D
3. Support Zone Activities	D
B. Intrusive Activities	
1. Handling of Contaminated Soils	D/D+
2. Excavation Dewatering	D/D+
3. Soil Vapor Extraction Treatment	D/D+
4. Environmental Sampling	D/D+
5. Soil Vapor Extraction Cell Construction/Decommissioning	D
6. Excavation Backfilling	D
7. Equipment Decontamination	D/D+

* These are the levels of protection at which work will commence during the various activities on the site. Due to onsite conditions, and as directed by the Site Health and Safety Officer, it may become necessary to upgrade, or it may be possible to downgrade, the level of personal protection.

C9.0 AIR MONITORING

Real-time air monitoring will be performed during all soil handling activities by trained URS personnel. While sampling activities are in progress, monitoring frequencies will be as summarized in Table C9-1. Air monitoring equipment will be calibrated daily and all data will be recorded in the field notebook and transferred to Instrument Reading Logs. Each day, soil handling activities will not begin until the instruments are calibrated and background levels are taken and recorded. Air will be monitored for total volatiles with a photoionization detector (PID) (HNu Model PI 101, or equivalent). Explosive atmosphere, oxygen content, and hydrogen sulfide will be monitored with an explosimeter (Bacharach Sentinel 44, or equivalent). Particulates will be monitored using a MIE PDM-2 Miniram dust/aerosol monitor, or equivalent. All real-time air monitoring results and meteorological data (e.g., temperature range, wind speed, wind direction, etc. obtained from onsite measurements and/or national weather service, radio, or airport) will be recorded in the field notebook and will be transferred to Instrument Reading Logs.

C9.1 Total Volatiles

Air monitoring for total volatiles (organic vapors) will be performed during all soil handling activities using a PID (HNu Model PI 101, or equivalent) equipped with the standard probe which contains a 10.2 eV lamp. When readings less than 1 part per million (ppm) above background in the breathing zone are observed consistently, monitoring will take place at least every 10 minutes or for every sample retrieved and Level D protection will be utilized. When readings between 1 ppm and 5 ppm above background in the breathing zone are observed consistently, monitoring will be continuous and Level D+ protection will be utilized. If readings from 5 to 10 ppm above background in the breathing zone are observed, and all other action levels indicate that intrusive activities can proceed, monitoring will be continuous and Level C protection will be utilized. If organic vapor readings exceed 10 ppm above background in the breathing zone, or other instrument readings necessitate work suspension, soil handling activities will be halted and the level of protection used by onsite personnel will be reassessed. Monitoring frequencies during soil handling activities will be as summarized in Table C9-1.

TABLE C9-1
ACTION LEVELS DURING SOIL HANDLING ACTIVITIES

Organic Vapors (PID)	Combustibles	Oxygen	Hydrogen Sulfide	Particulates	Responses
0-1 ppm Above Background, Sustained Reading	0-10% LEL	19.5-23.5%	0-5 ppm	<0.10 mg/m³	• Continue soil handling activities. • Level D protection. • Continue monitoring every 10 minutes or whenever an odor is detected.
1-5 ppm Above Background, Sustained Reading	0-10% LEL	19.5-23.5%	5-10 ppm	0.10–0.25 mg/m³	• Continue soil handling activities. • Level D+ protection. • Continuous monitoring for organic vapors in the work area and at the Exclusion Zone perimeter. • Continuous monitoring for LEL, O_2, and H_2S in the work area.
5-10 ppm Above Background Sustained Reading	0-10% LEL	19.5 – 23.5%	5-10 ppm	0.25-1.0 mg/m³	• Continue soil handling activities. • Level C protection. • Continuous monitoring for organic vapors in the work area and at the Exclusion Zone perimeter. • Continuous monitoring for LEL, 0_2, and H_2S in the work area. • Employ dust suppression measures if particulate readings >0.25 mg/m³ above background are sustained over 15 minute period.
>10 ppm Above Background, Sustained Reading	>10% LEL	<19.5% or >23.5%	>10 ppm	>1.0 mg/m³	• Temporarily suspend soil handling activities. • Withdraw from area; shut off all engine ignition sources. • Continuous monitoring for organic vapors at Exclusion Zone perimeter if organic vapor readings >10 ppm. • Continuous LEL monitoring in breathing zone if LEL reading >10%. • Employ dust suppression measures if particulate readings >0.25 mg/m³ above background are sustained over 15 minute period. • Consult with Project HSO.

Notes:

Air monitoring for action levels will occur in the breathing zone.
If action levels for any one of the monitoring parameters is exceeded, the appropriate responses listed in the right hand column should be taken.

C9.2 Explosive Atmosphere/Oxygen Content/Hydrogen Sulfide Gas

A Bacharach Sentinel 44 combustible gas indicator (CGI), or equivalent, will be used to monitor for explosive atmosphere, percent oxygen, and hydrogen sulfide content. Readings greater than 10% LEL, less than 19.5% oxygen, greater than 23.5% oxygen, or greater than 10 ppm hydrogen sulfide will require temporary suspension of intrusive activities until the Project HSO determines a safe re-entry level.

C9.3 Particulates

Particulate monitoring will be conducted during all soil handling activities. Particulates will be monitored in the active work area upwind and downwind from the trench. If particulate levels, integrated over a period not to exceed two minutes under windy conditions or 10 minutes under calm conditions, at the downwind location are in excess of 0.25 mg/m^3, the upwind station will be monitored immediately using the same monitor. If the downwind measurement exceeds the background measurement by more than 0.25 mg/m^3, operations will be temporarily suspended and water may be used to suppress the dust. Operations will be continued once ambient conditions improve, as determined by the Site HSO.

C9.4 Work Stoppage Responses

The following responses will be initiated whenever one or more of the action levels necessitating a work stoppage is exceeded:

- The Site HSO will be consulted immediately.
- All personnel (except as necessary for continued monitoring and contaminant mitigation, if applicable) will be cleared from the work area (e.g., from within the Exclusion Zone).

Any chemical release to air, water, or soil must be reported to the Site HSO at once. Any exposure resulting from protective equipment failure must be immediately reported to the Site HSO and to the Project HSO in writing within 24 hours.

C9.5 Calibration of Air Monitoring Instruments

Photoionization Detector: The photoionization detector will be calibrated to a benzene surrogate daily (prior to field activities) and the results will be recorded in the field notebook and transferred to Instrument Reading Logs.

Explosimeter: Once a day, the explosimeter will be calibrated to a methane gas and hydrogen sulfide gas standard. Prior to each use, the oxygen sensor will be air-calibrated at an upwind location. This calibration involves adjusting the meter to read 20.9%, the concentration of oxygen in ambient air.

Particulate Monitor: All instrument operation checks will be performed prior to use each day according to manufacturer specifications.

C9.6 Community Air Monitoring Plan

Real-time air monitoring for volatile organic compounds and particulates will be conducted at the perimeter of the Exclusion Zone during soil handling activities as

- Volatile organic compounds and dust particulates will be monitored at the upwind perimeter of the exclusion zone on a periodic basis. If total organic vapors exceed 5 ppm above background, work activities will be halted and continued under the provisions of a Vapor Emission Response Plan (See Section C10). All readings will be recorded and be available for NYSDEC and NYSDOH personnel to review if requested.

- If particulate levels at the downwind station exceed particulate levels at the upwind station by more than 0.25 mg/m^3, work activities will be halted and additional dust suppression measures will be employed.

C9.6.1 Vapor Emission Response Plan

If the ambient air concentration of organic vapors exceeds 5 ppm above background at the perimeter of the Exclusion Zone, activities will be halted and monitoring continued. If the organic vapor level decreases below 5 ppm above background, work activities can resume. If the organic vapor levels are greater than 5 ppm over background but less than 10 ppm over background at the perimeter of the Exclusion Zone, activities can resume provided the organic vapor level 200 feet downwind of the Exclusion Zone or half the distance to the nearest residential or commercial structure, whichever is less, is below 5 ppm over background.

If the organic vapor level is above 10 ppm at the perimeter of the Exclusion Zone, activities must be shut down. When work shutdown occurs, downwind air monitoring as directed by the Site HSO will be implemented to ensure that vapor emission does not impact the nearest residential or commercial structure at levels exceeding those specified in the Major Vapor Emission Response Plan (Section C9.6.2).

C9.6.2 Major Vapor Emission Response Plan

If any organic vapor levels greater than 5 ppm over background are identified 200 feet downwind from the Exclusion Zone or half the distance to the nearest residential or commercial property, whichever is less, all work activities will be halted.

If, following the cessation of work activities, or as the result of an emergency, organic vapor levels persist above 5 ppm above background 200 feet downwind from the Exclusion Zone or half the distance to the nearest residential or commercial property, then the air quality will be monitored within 20 feet of the perimeter of the nearest residential or commercial [illegible]20-foot zone).

If efforts to abate the emission source are unsuccessful and organic vapor levels approaching 5 ppm persist for more than 30 minutes in the 20-foot zone, then the Major Vapor Emission Response Plan shall automatically be placed into effect. Also, the Major Vapor Emission Response Plan shall be immediately placed into effect if 20-foot zone [illegible] vapor levels are greater than 10 ppm above background.

Upon activation of the Major Vapor Emission Response Plan, the following activities will be undertaken:

- All Emergency Response authorities will immediately be contacted by the Site HSO and advised of the situation.

- Air monitoring will be conducted at 30 minute intervals within the 20-foot zone. If two successive readings below action levels are measured, air monitoring may be halted or modified by the Site HSO.

C10.0 DECONTAMINATION PROCEDURES

C10.1 Decontamination of Personnel

Non-disposable protective clothing, boots, and gloves, will be decontaminated in the Contamination Reduction Zone before entering the Support Zone by a thorough soap-and-water wash. Personnel performing intrusive tasks involving handling of contaminated soils will be advised that all clothing worn under protective clothing (i.e., underwear, shirts, socks, trousers) should be laundered separately from street clothing before re-wearing. If protective clothing is breached and personal clothing becomes contaminated, the personal clothing will be disposed.

C.10.2 Decontamination of Equipment

Decontamination of sampling equipment by soap-and-water wash will take place in the Contamination Reduction Zone. Other light equipment (such as tools, containers, monitoring instruments, radios, clipboards, etc.) will be segregated and deposited on plastic drop cloths or in plastic-lined containers placed in the Contamination Reduction Zone and will be wiped off with damp cloths.

Decontamination of heavy equipment and vehicles, will be carried out on a decontamination pad by high-pressure water in the Contamination Reduction Zone. Appropriate personal protection equipment (PPE) must be used during all decontamination activities.

C11.0 STANDARD OPERATING PROCEDURES, ENGINEERING CONTROLS, AND WORK PRACTICES

C11.1 Project Safety Goal

Safety is URS's highest priority. The firm has established a goal of zero accidents for this project. The process of planning the project work will be done in a manner that will identify, evaluate, and control the site hazards and help realize the goal of zero accidents.

C11.2 Safety Equipment

Activities performed at the site will require, at the minimum, the use of personal protective safety equipment or Level D PPE.

C11.2.1 Hard Hats

Hard hats complying with ANSI Code Z89.1 must be worn properly, with the brim facing forward, at all times in the work zones at the site; they may be removed only inside designated office or break areas. Hard hats will be stored outside the work area to decrease the chance of contamination when not in use.

C11.2.2 Hearing Protection

Hearing protection will be provided and worn if noise levels reach or exceed 85 dB(A). Hearing protection must be able to lower noise levels to below 85 dB(A). Ear plugs will be discarded after each use unless they are fitted to an individual or are designed for reuse, in which case an individual may reuse his or her own ear plugs. Earmuffs may be reused after proper cleaning and decontamination. Earmuffs will be stored outside the work area to decrease the chance of contamination when not in use.

C11.2.3 Work Gloves

Work gloves must be worn when handling soil or materials in the work area. The gloves must be puncture-resistant to glass, sharps, or other objects that may be encountered during removal. The gloves cannot interfere with a worker's dexterity. Work gloves may be reused.

C11.2.4 Steel-Toed Safety Shoes

All personnel involved in onsite work activities must wear steel-toed safety shoes.

C11.2.5 Safety Glasses

Safety glasses will be worn at all times in the work zones; safety glasses may be removed only inside designated break areas or when wearing respiratory protection. Safety glasses must be cleaned and decontaminated periodically. Safety glasses must be stored outside the work area to decrease the chance of contamination when not in use.

C11.3 Fire Prevention and Protection

This section details fire prevention and protection procedures/resources at the project:

- The Fire Department is the available fire-fighting services.
- There will be fire extinguishers mounted on all excavation equipment, as well as in vehicles.
- There will be no smoking in work areas. Smoking will only be permitted in designated areas.
- At a minimum, one fire extinguisher rated at least I0- A:B:C will be located in each work area.

- All fire extinguishers will be inspected monthly by site personnel and annually by licensed personnel.

Project personnel are only permitted to extinguish fires in their incipient stages and only if they have received fire extinguisher training within the last year. Fighting fires is prohibited by project personnel and will only be performed by the local fire department.

C11.4 Housekeeping

Housekeeping will be a priority at the project site. The following provisions will be in place to ensure that housekeeping is maintained at a high standard:

- The importance of housekeeping and the expectation that good housekeeping will be maintained will be a regular topic of the morning safety meetings.
- Job sites will be cleaned up on a daily basis.
- Subcontractors will be informed of their responsibilities to maintain their housekeeping.
- Adequate trash receptacles will be positioned at several locations and regularly emptied. Contaminated trash must be segregated from sanitary trash for proper disposal. Hazardous waste containers will be labeled according to Resource Conservation and Recovery Act (RCRA) regulations.
- Housekeeping is an operational/safety item that will be regularly considered during routine inspections.

C11.5 Operation of Motor Vehicles

All URS personnel and subcontractors operating motor vehicles in the investigation area site will hold a valid driver's license and comply with the requirements of all federal, state, and local traffic regulations. Only vehicles that are in good condition and safe to operate will be used.

All personnel will drive defensively and wear seat belts while vehicles are in motion. Since backing accidents are the type of accident most frequently associated with this type of project, the following guidelines will be observed:

- Backing of vehicles will be avoided when possible. If this type of maneuver is unavoidable, extra care will be taken while backing vehicles.
- When parking vehicles, vehicles will be backed into the space whenever possible.
- If a parked vehicle must be backed out, the driver will physically walk to the back of the vehicle to observe the area before entering the vehicle.
- Spotters will be used to back vehicles whenever possible.

C11.6 First Aid and Medical Facilities

A first aid kit will be provided and maintained in the URS vehicle. Emergency phone numbers will be posted in the vehicle. A map showing the route to the nearest hospital is presented in Figure C11-1. The name, address, and telephone number of the hospital is:

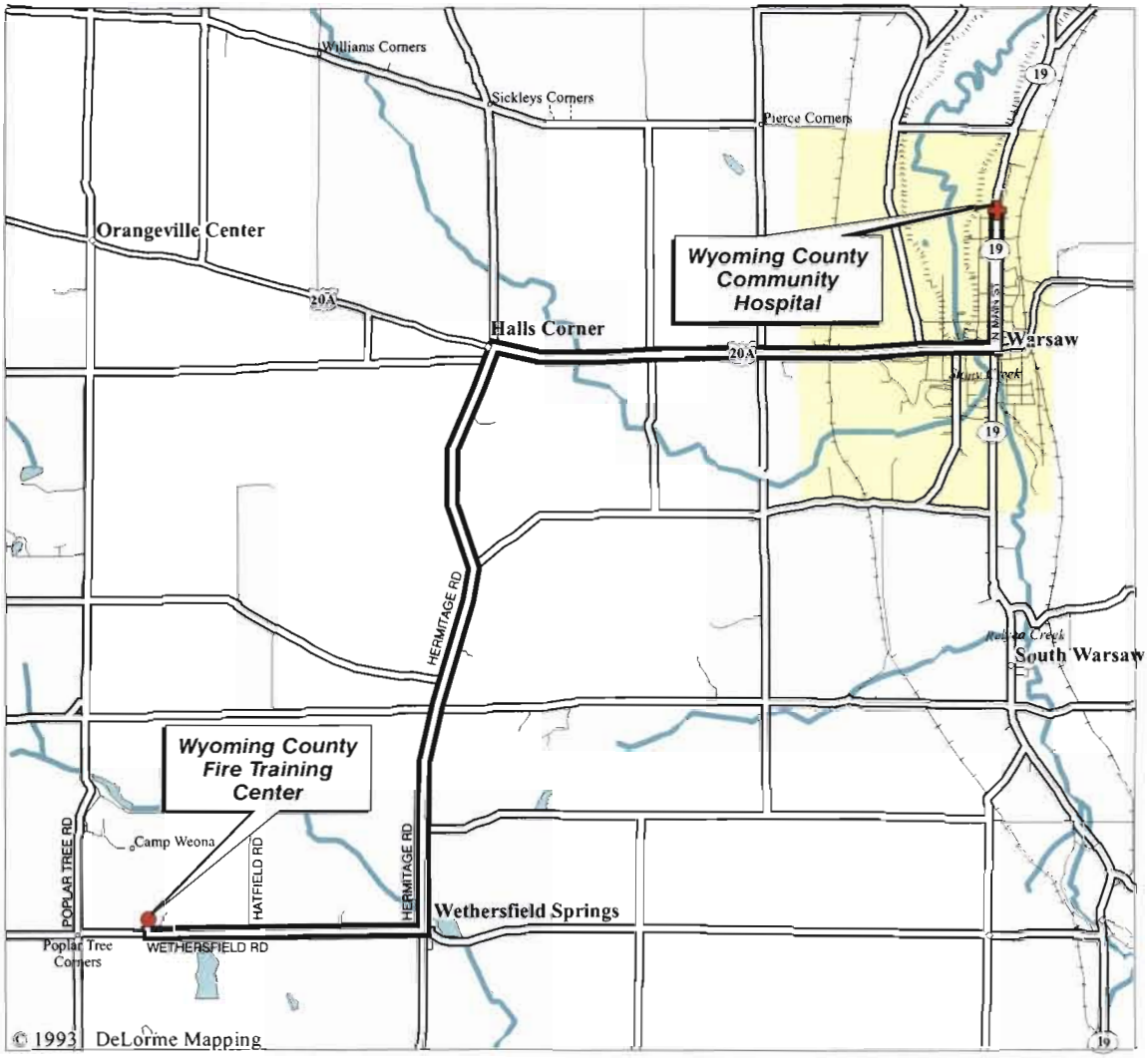
Wyoming County Community Hospital
400 N. Main Street
Warsaw, New York
(585) 786-2233

C11.7 General Work Practices

The following list presents general work rules that will be enforced by the Project Manager (PM) and Site HSO. Personnel will comply with the applicable requirements stated below.

- Employees will not be allowed on site without the prior knowledge and consent of the PM.

- Onsite personnel must use the buddy system when wearing respiratory protective equipment.



APPROXIMATE SCALE IN FEET

1000 0 1000

Start out going East on Wethersfield Rd toward Hatfield Rd for approximately 1.74 miles. Then turn left onto Hermitage Rd. approximately 3.92 miles. Then turn right onto US-20A for approximately 3.62 miles. Then turn left onto NY-19/ N. Main St. for approximately 1.07 miles and the Hospital will be on the right hand side.

Wyoming County
Community Hospital
400 N. Main St.
Warsaw, NY 14569

Main: (585) 786-2233
Fax: (585) 786-1226

AG18068-11172991-041603-CYI

URS

WYOMING COUNTY FIRE TRAINING CENTER ROUTE TO THE HOSPITAL

FIGURE C11-1

- Only those vehicles and equipment required to complete work tasks should be permitted within the Exclusion Zone (backhoes, dump trucks, and similar heavy equipment). All non-essential vehicles should remain within the Support Zone.

- Loose jewelry, clothing, or long hair is not permitted on or near equipment with moving parts.

- Wind indicators will be set up so as to be visible from the Exclusion Zone.

- Personnel will not enter a restricted area unless authorized and all personnel will enter work areas only through the Contamination Reduction Zone. All personnel leaving an Exclusion Zone must exit through the CRZ.

- All personnel going on site must be thoroughly briefed on anticipated hazards, and trained on equipment to be worn, safety procedures, emergency procedures, and communications.

- All regulated work zones, as established on the site, will be observed. All required PPE will be worn prior to entering these zones.

- Whenever possible, contact with contaminated (or potentially contaminated) surfaces will be avoided-walk around (not through) puddles and discolored surfaces, and do not kneel or set equipment on potentially contaminated ground.

- Containers, such as drums, will be moved only with the proper equipment and will be secured to prevent dropping or loss of control during transport.

- Field survey instruments, such as PIDs, should be covered with plastic or similar covering to minimize the potential for contamination.

- Legible and understandable labels will be affixed prominently to the containers of waste materials.
- Food, beverages, unapplied cosmetics, and tobacco products will not be allowed in regulated work zones. These are only allowed in designated areas.

- No matches or lighters will be permitted in the Exclusion Zone or Contamination Reduction Zone.

- Beards, facial hair, or other facial obstructions that interfere with respirator fit will not be permitted.

- Field crewmembers will be familiar with the physical characteristics of the site operations including:

  - Wind direction in relation to the contaminated area;
  - Accessibility to associates, equipment, and vehicle;
  - Areas of known or suspected contamination;
  - Work zones;
  - Communications;
  - Site access, and
  - Nearest water sources.

- The number of personnel and equipment in the Exclusion Zone should be minimized but only to the extent consistent with workforce requirements of safe site operations.

- Field personnel are to observe each other for signs and symptoms of toxic material exposures. These signs and symptoms include, but are not limited to:

  - Changes in complexion and skin discoloration.
  - Changes in coordination.
  - Changes in demeanor.
  - Excessive salivation and papillary response.

- Changes in speech pattern.

- Field personnel are to advise each other of nonvisible effects of toxic material exposures such as:

  - Headaches.
  - Dizziness.
  - Nausea.
  - Blurred vision.
  - Cramps.
  - Irritation of eyes, skin, or respiratory tract.

- Any detected effects of toxic exposure will be reported to the Site HSO immediately.

- If onsite activities, including decontamination, continue later than dusk, adequate lighting must be provided.

- Field activities will be suspended during severe weather such as high winds, thunderstorms, lightning, tornado warnings, and winter storm warnings.

- Damaged PPE or clothing will be immediately repaired or replaced, as appropriate.

- Personnel must thoroughly wash their hands and face before eating, smoking, drinking, or applying cosmetics.

- Unauthorized removal of materials from the site is prohibited.

- Spills will be prevented to the extent possible. In the event that a spill occurs, contain liquid if possible.

- Splashing of contaminated materials will be prevented.

- Possession of controlled substances and prohibited items, such as alcohol, firearms, or weapons, while working on site is strictly prohibited.

- Operations involving the potential for fire hazards will be conducted in a manner that will minimize the risk of fire.

- Overhead and underground utility hazards will be identified or located prior to conducting operations.

C12.0 EMERGENCY PROCEDURES

The most likely incidents for which emergency measures might be required are:

- an exposure-related worker illness
- a sudden release of hazardous gases/vapors during excavation
- an explosion or fire occurring during excavation
- slipping, tripping, or falling resulting in personal injury
- spill of contaminated liquid or solid

Emergency procedures established to respond to these incidents are covered under the sections that follow.

C12.1 Communications

Communications will be centered in the field vehicle, which will contain cellular telephones for direct outside communications with emergency response organizations.

C12.2 Escape Routes

Flags will be positioned around the site to indicate wind direction. In the event of a sudden release of hazardous gases, or a fire, all personnel will be required to move at 90 degrees away from the location of the release or fire, toward the site exit point. This may require personnel to move from the Exclusion Zone directly into an offsite area without proper decontamination. At the conclusion of the emergency, they should proceed to proper decontamination.

C12.3 Evacuation Signal

In the event of a sudden release or fire requiring immediate evacuation of the site, three quick blasts will be sounded on an air horn. The horns will be kept in a conspicuous place for quick access by personnel. An air horn will also be kept in the Contamination Reduction Zone.

Wyoming County and the Project HSO will be notified by telephone, and later by written report, whenever a site evacuation is executed.

C12.4 Other Signals

Emergency hand signals for use by personnel wearing air-purifying respirators are summarized in Table C12-1.

C12.5 Fire

In the event of a fire that cannot be controlled with available equipment, the local fire department (Warsaw Village Town Hall Fire) will be summoned immediately by the Site HSO or his designee, who shall apprise them of the situation upon their arrival. Wyoming County will also be notified. (See Table C12-2 for telephone numbers of emergency response agencies.)

C12.6 First Aid

At the startup of field activities, the Project HSO will contact hospital personnel regarding the potential hazards at the site. First aid for personal injuries will be administered, if possible, at the site by the Site HSO or his designee. If a site worker should require further treatment, he or she will be transported to the hospital in the URS vehicle located on site or an ambulance will be summoned.

All accidents, however insignificant, will be reported to the Site HSO, who will report the accident to the Project HSO. All personnel designated to administer first aid will have received a minimum of eight hours training in first aid and CPR, and be certified by the American Red Cross.

In the event of a serious personal injury requiring offsite medical attention, the injured person will first be moved to the Contamination Reduction Zone, where an attempt will be made to go through the decontamination procedures, including removal of protective clothing. If the injury is life-threatening, decontamination will be of secondary importance, and the injured party will be taken directly to the hospital. If a head, neck, back or spinal injury is suspected, the injured person will not be moved and an ambulance will be summoned to the site.

TABLE C12-1

EMERGENCY HAND SIGNALS

• Hand gripping throat	- Can't breathe.
• Grip partner's wrist, or place both hands around wrist	- Leave area immediately, no debate!
• Hands on top of head	- Need assistance.
• Thumbs up	- I am all right, OK, I understand.
• Thumbs down	- No, negative.

TABLE C12-2

EMERGENCY TELEPHONE NUMBERS

Emergency Response Agencies	
Fire-Warsaw Village Town Hall Fire	585-786-2468
Police-Wyoming County Sheriff	585-786-8989
New York State Police (Nunda)	585-468-3800
Medical Facilities	
Wyoming County Community Hospital 400 N. Main Street Warsaw, New York	585-786-2233
Environmental and Health Agencies	
New York State Department of Environmental Conservation Regional Headquarters	716-851-7200
New York State Department of Health Toxic Substances	716-847-4385
URS Corporation	
Robert Henschel, Project Manager	716-856-5636
Richard Fudeman, Project Health and Safety Officer	716-856-5636
Tim Burmeier, Site Health and Safety Officer	716-856-5636
(Cellular telephone numbers for field personnel will be provided at startup of field activities.)	
Client Representatives	
Jim Reger, Wyoming County Emergency Services	585-786-8867
Doug Berwanger, Wyoming County, Board of Supervisors Chairman	585-786-8800

In the event of a serious personal injury requiring offsite medical attention, the injured person will first be moved to the Contamination Reduction Zone, where an attempt will be made to go through the decontamination procedures, including removal of protective clothing. If the injury is life-threatening, decontamination will be of secondary importance, and the injured party will be taken directly to the hospital. If a head, neck, back, or spinal injury is suspected, the injured person will not be moved and an ambulance will be summoned to the site.

C12.7 Emergency Assistance

The name, telephone number, and location of police, fire, hospital, and other agencies whose services might be required, or from whom information might be needed, will be kept in the support zone. The list is presented in Table C12-2. A map showing the route to the nearest hospital is presented in Figure C11-1.

If an ambulance should have to be called to the site, the injured person should meet the ambulance outside the Exclusion Zone if possible. If a head or spinal injury is suspected or the person is unconscious for any reason, medical personnel may have to come into the Exclusion Zone.

C12.8 Spills

The potential for spills to occur during onsite work at the site is minimal, since the direct handling of hazardous waste containers (drums, tanks, etc.) is not expected to be part of the scope of work. In the event that residual materials are spilled on site, the following procedures will be implemented:

C12.8.1 Liquid Spills

If a liquid (decontamination water, well development water, etc.) is spilled on a permeable surface, 2 inches of surface soil will be removed where the spill occurred and drummed. The area will later be either backfilled with clean soil or regraded. If liquid is spilled on an impermeable surface, a sorbent material will be applied to the spill area. The sorbent material will be swept up and drummed, and the spill area washed down with clean water.

C12.8.2 Soil Spills

Contaminated soil spilled on a permeable surface will be shoveled into a drum, and the top 2 inches of soil where the spill occurred will also be removed and drummed. The area will then be either backfilled with clean topsoil or regraded. If soil is spilled on an impermeable

surface, the material will be shoveled (or swept) back into a drum, and the area washed with clean water.

C12.9 Accident Investigation and Reporting

C12.9.1 Accident Investigation

All accidents requiring first aid which occur incidental to activities on site will be investigated. Standard OSHA formats will be used for reporting any accidents/injuries/illness that occur on the site. The investigation format will be as follows:

- interviews with witnesses,
- pictures, if applicable, and
- necessary actions to alleviate the problem.

C12.9.2 Accident Reports

In the event that an accident or some other incident such as an explosion or exposure to toxic chemicals occurs during the course of the project, the Project HSO and Wyoming County will be telephoned within one hour and receive a written notification within 24 hours. The report shall include the following items:

- Name, telephone number, and location of the contractor, if not URS personnel.
- Name and title of person(s) reporting.
- Date and time of accident/incident.
- Location of accident/incident, (i.e., building number, facility name).
- Brief summary of accident/incident giving pertinent details including type of operation ongoing at the time of the accident/incident.
- Cause of accident/incident.
- Casualties (fatalities, disabling injuries).
- Details of any existing chemical hazard or contamination.
- Estimated property damage, if applicable.

- Nature of damage; effect on contract schedule.
- Action taken by contractor/URS to ensure safety and security.
- Other damage or injuries sustained (public or private).

C13.0 SAFETY CONCERNS AND CONTINGENCY MEASURES DURING EXCAVATION OPERATIONS

During the excavation of contaminated soil, several health and safety concerns usually arise and control the method of excavation. All excavations must be sloped for stabilization. Personnel near the excavation may be exposed to toxic or explosive gases and oxygen-deficient environments. Due to these potential hazards, real-time air monitoring will be conducted. No person will enter an excavation for any reason except if absolutely necessary for a rescue. URS personnel will maintain a safe distance at all times to avoid interference with the operation of heavy equipment.

Excavation at this site will be conducted under the safety regulations specified herein, which are based upon OSHA Health and Safety Standards (29 CFR 1926 - Subpart P, 1910.120, and 1910.134). The following sections describe site-specific safety measures to be implemented during excavation activities.

C13.1 Excavation Operations

A temporary barrier will be established prior to test pit excavation. Access to the test pit site, via a single entrance in the barrier, will be closely controlled. The temporary barrier will be erected about 20 feet away from the working area. Excavation will be timed so as to not permit any test pits to remain open overnight. URS personnel will regularly police the outside of the temporary barrier during the excavation of test pits. Applicable USDOL-OSHA rules covering sloping, trenching, etc. will be strictly adhered to.

Excavated materials will typically be loaded directly into dump trucks, but may be stored and retained at least two feet from the anticipated edge of the excavation to prevent excessive loading on the face of the excavation and possible cave-in. If at any time during the excavation program, buried metal or concrete objects are encountered, excavation activities will cease immediately. After obtaining instrument readings, the supervising field geologist and Site HSO will decide whether to continue or discontinue excavation at that location.

If a drum containing waste materials is accidentally ruptured during excavation, the following equipment will be readily available to control the situation if necessary:

Class ABC fire extinguishers
Canvas tarps
Sorbent materials

C13.2 Inspection Methodologies

Excavation will proceed in 12-inch lifts using a backhoe. Between each lift, a visual inspection will be made for solids objects such as drums. If an intact drum is found, it will be inspected for the following:

- Symbols, words, or other marks on the drum indicating that its contents are hazardous
- Symbols, words, or other marks on the drum indicating that it contains discarded laboratory chemicals, reagents, or other potentially dangerous materials in small-volume individual containers
- Signs of deterioration, such as corrosion, rust, and leaks
- Signs that the drum is under pressure, such as swelling and bulging
- Drum type such as polyethylene or PVC-lined drums, exotic metal drums, single-walled drums used as a pressure vessel, and laboratory packs
- Configuration of the drum head (e.g., whole lid removable, has a bung, or contains a liner)

Monitoring around the drums will be conducted using a PID for organic vapors and an explosimeter.

While excavating, the excavation will be visually inspected after each 12-inch lift, and instrument readings will be taken. If waste materials, discoloration, or elevated instrument readings are detected, the material will be brought to the surface and a sample may be collected from the backhoe bucket. The material, exclusive of drums or other materials with obvious potential to contain hazardous wastes, will then be returned to the excavation

C14.0 CONFINED SPACE ENTRY

Because it is not presently part of the scope of work, confined space entry requirements will not be necessary. If it does become necessary, the Wyoming County will be notified prior to any confined space entry and all confined space entry will be performed in accordance with 29 CFR 1910.146.