Sterling Environmental Engineering, P.C.

APPLE VALLEY SHOPPING CENTER
TOWN OF LAGRANGE, NEW YORK

DESIGN ENGINEERING REPORT FOR
AIR STRIPPER EXHAUST TREATMENT SYSTEM

Prepared for:

Apple Valley Corp
300 Westage Business Center
Suite 260
Fishkill, New York 12524

Prepared by:

Sterling Environmental Engineering, P.C.
24 Wade Road
Latham, New York 12110

April 12, 2011

"Serving our clients and the environment since 1993"

APPLE VALLEY SHOPPING CENTER
TOWN OF LAGRANGE, NEW YORK

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1.0 INTRODUCTION

The Apple Valley Shopping Center Site (the Site) is located in the Town of LaGrange, Dutchess County, New York, approximately seven (7) miles east of the City of Poughkeepsie (see Figure 1, "Site Location Map"). The Site consists of the Apple Valley Shopping Center (AVSC), located at the southwest corner of the junction of State Route 55 and Titusville Road. The Site has been the subject of active groundwater remediation since 1992 subject to the approval and oversight by the United States Environmental Protection Agency (USEPA) and/or the New York State Department of Environmental Conservation (NYSDEC).

The original onsite groundwater pump and treatment air stripper was installed in the fall of 1992 at the location currently referred to as AV-2. At the same time, a similar system was installed at Lots 9 & 10 of Locust Crest Court located southwest of the Site. In 2001, the air stripper located at AV-2 was replaced and the air stripper at Lots 9 & 10 of Locust Crest Court was decommissioned.

Commencing on October 27, 2005, the onsite system was expanded to include treatment of water from recovery wells RW-1, RW-2, and RW-3, and the continuation of treatment of water from AV-2. The enhanced system was brought online on February 9, 2006 as described in the November 15, 2006 Interim Remedial Measures Report prepared by Conrad Geoscience Corp.

At this time, the NYSDEC seeks to supplement the existing treatment system by including Granulated Activated Carbon (GAC) treatment on the air emissions from the stripper. This Design Engineering Report provides the basis for design of the treatment system.

2.0 EXISTING AIR STRIPPER TREATMENT SYSTEM

The existing air stripper treatment system is described in detail in Section 5.0 of the November 15, 2006 Interim Remedial Measures Report prepared by Conrad Geoscience Corp.

In short, the existing upgraded system consists of a HDPE EZ-Stacker Stackable Tray Air Stripper Model #EZ-4.xP manufactured by QED Environmental Systems, Inc. The EZ-4.xP is rated to operate at a flow range of 1 to 40 gallons per minute (gpm). The air stripper configuration consists of a series of four (4) shell/tray modules. This system was brought online on February 9, 2006. This system is treating a combined flow of groundwater that is pumped from Recovery Wells RW-1, RW-2, RW-3 and AV-2.

The system will continue to be operated as set forth in the Site Operation and Maintenance (O&M) Manual.

Ongoing monitoring of groundwater quality is performed quarterly. Groundwater samples are collected from Recovery Wells RW-1, RW-2, RW-3, and AV-2; Monitoring Wells MW-1, MW-2, MW-3, MW-5, MW-6, MW-7, and AV-1; and residential systems located in the Woodbridge Estates Subdivision. A groundwater remediation system effluent sample is also collected (AVS-EFF).

This system has been effective at removing contaminants of concern (COCs) from the water phase. Based upon the evaluation of operational data, the treatment system at the Site is estimated to have removed approximately 473 pounds of Tetrachloroethene (PCE) from the bedrock aquifer. This equates to approximately 35 gallons of PCE. The Record of Decision (ROD) states two (2) documented spills totaling approximately 70 gallons of the commercial grade product. Given the volatile characteristic of PCE and the paved surface on which the spills occurred, it is likely a portion of the spilled quantities

volatilized to the atmosphere. Accordingly, the pump and treat system is estimated to have removed more than one-half (1/2) of the original mass of PCE.

Operation and maintenance of the existing low profile air stripper, and sampling of the monitoring wells and effluent, will continue under the approved program. As outlined in Section 3.0, an exhaust treatment system will be added to the current air stripper to remove the COCs from the emissions stream.

3.0 AIR STRIPPER EXHAUST TREATMENT SYSTEM

The air stripper exhaust treatment system will consist of two (2) Model VF-500 Vapor Filter Vessels manufactured by Tetrasolv or approved equal. The first filter will be filled with GAC, and the second filter will be filled with HS-600 VC (Vinyl Chloride) Removal Media (refer to Figure 2). The vessels will be connected in series using eight (8) inch diameter PVC piping, PVC fittings, flexible couplings and clamps. Permanent sampling ports will be installed on the outlet of piping from the primary unit. The air stripper exhaust treatment system will placed in an enclosure on the northwest side of the existing treatment unit housing the air stripper. The new enclosure will be insulated and heated and will have a footprint of one hundred (100) square feet.

The volatile organic compounds (VOCs) will adsorb on GAC in the first filter (see sheet entitled "Reactivated Carbon" provided in Appendix A). Adsorption is highly effective on PCE, Trichloroethene (TCE), and cis-1,2-Dichloroethene (DCE). Vinyl Chloride is not as effectively adsorbed. An approximate 25% reduction for the Vinyl Chloride concentration is anticipated after the air flow passes through the initial filter. Therefore, the second filter will contain the HS-600 VC Removal Media made by Hydrosol (see the sheet entitled "HS-600" provided in Appendix A), consisting of 6% Potassium Permanganate in a molecular sieve substrate. The Potassium Permanganate will oxidize the Vinyl Chloride and remaining DCE effectively, and will cause significant decreases in any remaining TCE and PCE.

The influent to the second filter will be monitored to determine when media requires replacement. If breakthrough occurs from the first filter, the second filter will remove COCs.

3.1 Design Calculations

Currently, the EZ-4.xP operates at a rate of 280 cubic feet per minute (cfm). The air stripper exhaust treatment system is designed to handle this flow rate and PCE, TCE, DCE and Vinyl Chloride concentrations of 1,966 ug/m^3, 110 ug/m^3 and 142 ug/m^3 and 35 ug/m^3, respectively (see Calculations provided as Appendix B). Assuming these influent concentrations, the lifespan of the GAC is expected to be 180 days. The lifespan of the HS-600 VC Removal Media is expected to be 360 days. The combined air stripper and exhaust treatment system results in a friction pressure loss of 31.67 inches of H_20. This is within the capability of the existing blower.

4.0 OPERATION AND MAINTENANCE OF AIR STRIPPER EXHAUST TREATMENT SYSTEM

Two (2) Tetrasolv Filtration Vapor Filters will be installed in series to treat the exhaust flow from the existing air stripper. The filters require periodic monitoring with regards to inlet and outlet pressure and sampling from inlet and outlet points to verify system performance. The GAC must be periodically replaced in order to meet discharge limits and conserve the use of the HS-600 VC Removal Media.

Similarly, the HS-600 VC Removal Media must be replaced in the second filter periodically.

A sample port between the filters will be used to monitor the effectiveness of the GAC in the initial filter. When sample results for PCE, TCE, and DCE exceed the standards outlined in Section 5.1, the initial filter media will require replacement.

The concentrations of VOCs influent to the second filter as determined by the monitoring will be used to calculate the mass of COCs adsorbed by the HS-600 VC Filter Media. When the filter media reaches 90% of its capacity, the HS-600 VC Filter Media will be replaced. The emissions from the treatment system will continue to be monitored on a quarterly basis.

Engineering Specifications and Operation & Maintenance Manuals for the Tetrasolv Filtration Vapor filters are provided in Appendix A.

5.0 FIELD SAMPLING SCHEDULE

5.1 Air Quality

Monitoring of the treated exhaust air will continue to be performed using the existing approval protocol. Samples will also be collected from the outlet of the primary filter. All samples will be collected in laboratory-supplied summa canisters, labeled appropriately and transported under appropriate Chain of Custody procedures by overnight courier to the analytical laboratory.

Samples will be collected from the effluent of both filters on a quarterly basis throughout the first year of operation. After a year, the sampling schedule will be reviewed and adjusted if appropriate.

The following action levels are proposed to determine frequency for media replacement.

Parameter	Primary Filter Effluent	Secondary Filter Effluent**
Tetrachloroethene (PCE)	1.0 ug/m^3	1.0 ug/m^3
Trichloroethene (TCE)	0.50 ug/m^3	0.50 ug/m^3
cis-1,2-Dichloroethene (DCE)	63.0 ug/m^3	63.0 ug/m^3
Vinyl Chloride*		0.11 ug/m^3
* The concentration of Vinyl Chloride may exceed this value, depending on the influent concentration. The GAC may not be replaced when this value is exceeded, provided the second filter can adequately treat the Vinyl Chloride. ** Based on Annual Guideline Concentrations according to the NYSDEC DAR-1 AGC/SGC Table which is used to ensure compliance with 6 NYCRR 212.9(a).		

All personnel involved with vapor sampling will follow procedures described in the site's Health and Safety Plan (HASP) presented in Appendix C.

6.0 QUALITY ASSURANCE PROJECT PLAN

Proposed construction activities described herein will be performed largely by a contractor and various equipment vendors. Sterling Environmental Engineering, P.C. (STERLING) will obtain quotations and will assist Apple Valley Corp. in selecting qualified, capable contractors and vendors.

Once this Design Engineering Report is accepted by the NYSDEC, qualified contractors and vendors will be selected.

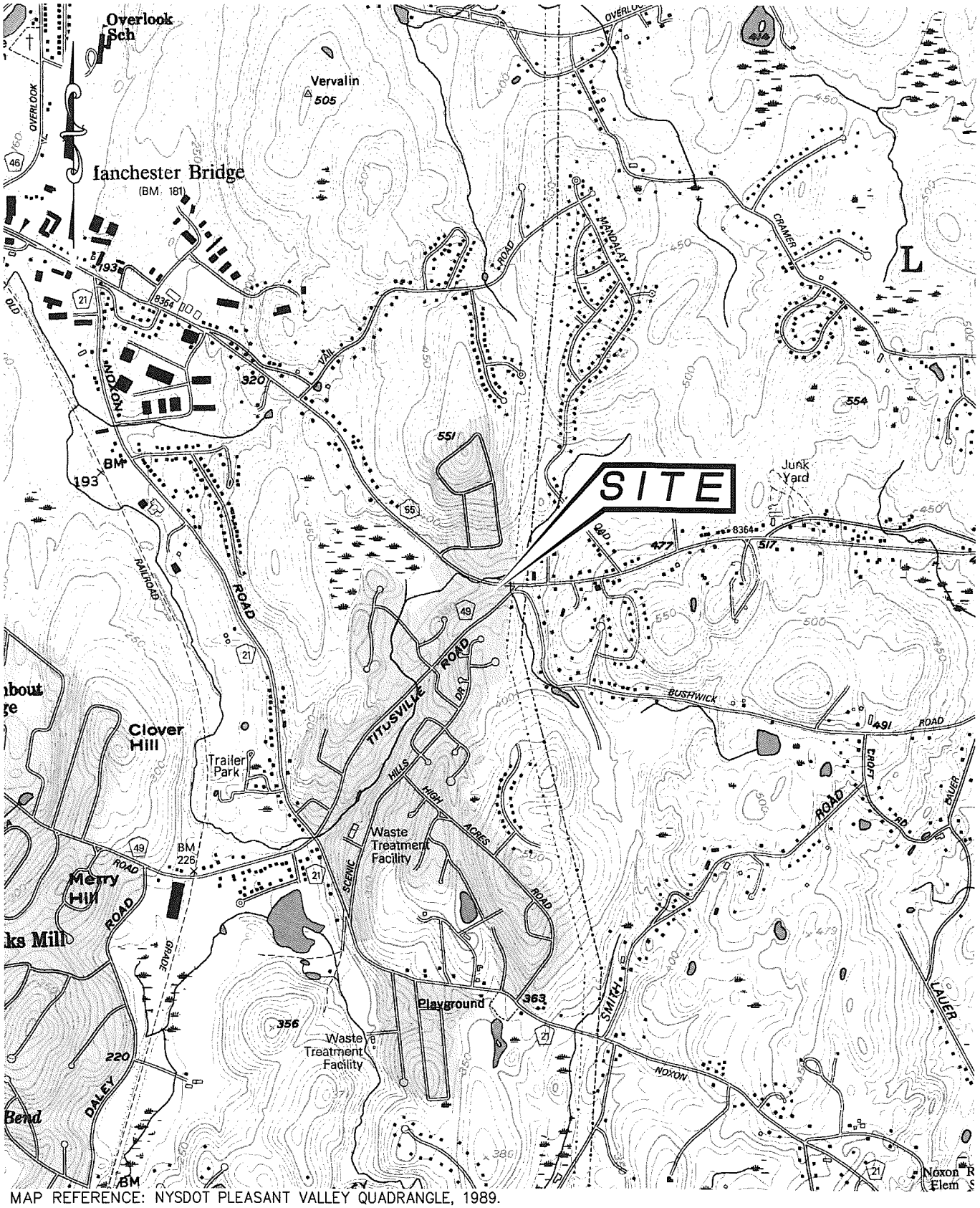
7.0 PROPOSED SCHEDULE

The additional treatment components outlined herein will be installed following NYSDEC's approval of this Design Engineering Report. Delivery and installation is expected to require 60 to 90 days. Once installation is complete, a thirty (30) day shakedown period is expected.

Provided NYSDEC approval is obtained by June 1, 2011, the operation of the additional components may be completed this construction season.

23008 Design Engineering Report\Design Engineering Report_Air Treatment_txt.doc

FIGURES



MAP REFERENCE: NYSDOT PLEASANT VALLEY QUADRANGLE, 1989.

STERLING

Sterling Environmental Engineering, P.C.

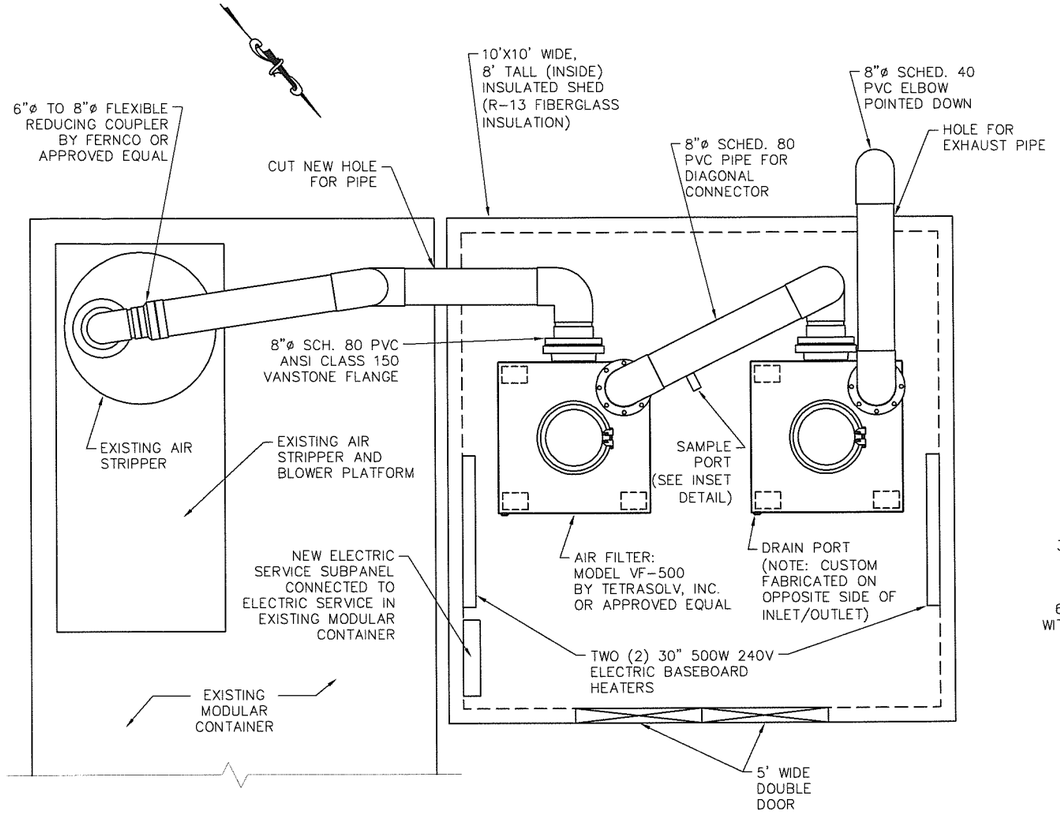
24 Wade Road • Latham, New York 12110

SITE LOCATION MAP

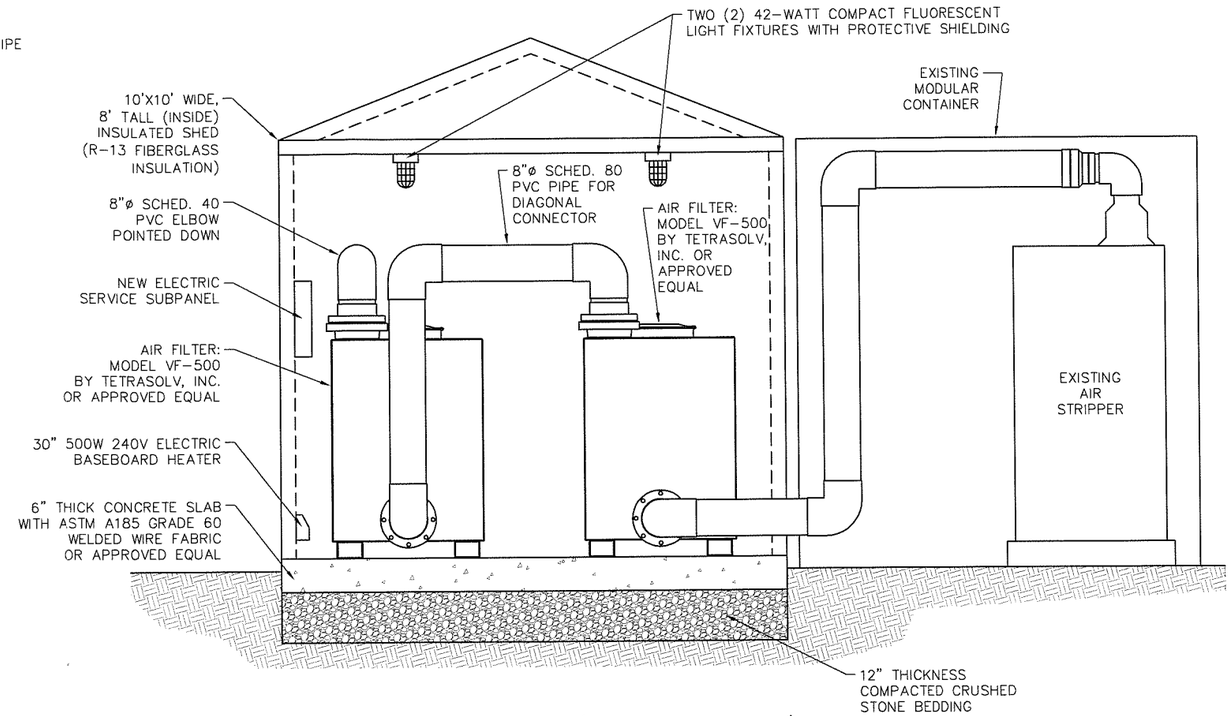
APPLE VALLEY SHOPPING CENTER

TOWN OF LAGRANGE DUTCHESS CO., N.Y.

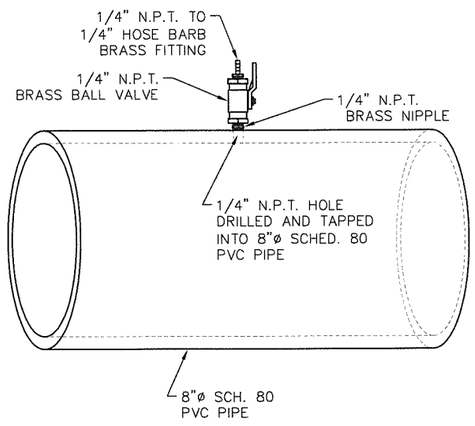
PROJ. No.:	23008	DATE:	4–1–11	SCALE:	1" = 2000'	DWG. NO.	23008001	FIGURE	1



PLAN VIEW
(N.T.S.)



ELEVATION VIEW (FROM REAR)
(N.T.S.)



INSET DETAIL - ELBOW AND SAMPLE PORT
(N.T.S.)

NOTE: 1) SOLID PIPE TO BE SUPPORTED AS SPECIFIED BY THE ENGINEER.
2) SAMPLE PORT TO BE LOCATED AS DIRECTED BY THE ENGINEER.

STERLING
Sterling Environmental Engineering, P.C.
24 Wade Road • Latham, New York 12110

EMISSIONS CONTROLS

APPLE VALLEY SHOPPING CENTER
702 N.Y.S. ROUTE 55
TOWN OF LAGRANGE DUTCHESS CO., N.Y.

PROJ. No.:	23008	DATE:	3-29-11	SCALE:	AS SHOWN	DWG. NO.	23008010	FIGURE	2

APPENDIX A

ENGINEERING SPECIFICATIONS AND OPERATION & MAINTENANCE MANUAL

Tetrasolv Filtration

Operation & Maintenance Manual

VFD • VFV • VF • VR SERIES

Tetrasolv Filtration Vapor Filters

Liquid & Vapor Filtration
Remedial • Industrial • Municipal

CONTENTS

1.0 GENERAL DESCRIPTION

The liquid series filters utilize fixed bed filtration to treat vapor. The filters employ a variety of medias to remove or catalyze contaminants. Flow through the filter may be either up flow or down flow depending upon the media supplied and the operation parameters. Generally inlet and outlet locations are indicated on the filter and or the filter drawings.

The most common application utilizes activated carbon as the adsorption media. Typically vapor which contains low levels of organic contaminants flows upward through the column of activated carbon where the larger organic molecules adhere to the porous structure of the activated carbon granules. This adsorption begins at the bottom of the "bed" and continues upward as the original adsorptive area becomes saturated.

Complete saturation of the carbon is dependent upon many factors such as contaminant levels, temperature, compounds being adsorbed, humidity, etc. Typically a carbon isotherm has been run on the influent stream to determine the expected rate of consumption of the activated carbon media. When monitoring has determined discharge air no longer meets discharge requirements the carbon will have to be removed and replaced ***(refer to section 5.0)***.

2.0 SAFETY CONSIDERATIONS

It is important that the entire O&M manual be read prior to set up and operation of the carbon system. If you have any questions please contact Tetrasolv Filtration at the number listed below or support@tetrasolv.com.

- ***WARNING: Where system pressure may exceed design pressure we strongly recommend the use of a relief device. Exceeding the maximum pressure of the filter could result in catastrophic failure***

of the vessel.

- Always adhere to "lockout/tagout" procedures when servicing the system.

- Wear appropriate safety equipment when operating system.

- ***WARNING: Wet or dry activated carbon preferentially removes oxygen from air. In closed or partially closed containers, oxygen depletion may reach hazardous levels. If workers must enter a container containing carbon, appropriate sampling and work procedures should be followed for potentially low-oxygen spaces - including all applicable federal and state requirements.***

- ***WARNING: High concentrations of certain compounds such as BETX and low concentrations such as ketones, aldehydes, organic acids and sulphur may cause severe temperature rises.***

- Understand the potential hazards of the stream being treated by the system. The activated carbon may contain higher concentrations of the contaminants being adsorbed than is in the influent stream. In addition the carbon may be considered hazardous material and therefore may require specific handling precautions unknown to Tetrasolv Filtration.

3.0 INSTALLATION

3.1 Shipment

Typically filters are shipped with media installed. However, in certain instances media is shipped to the site to be installed after installation. In very large systems it may be advisable to not install the media until adsorbers have been placed into final position and secured.

3.2 Unloading

Refer to the product data sheet for weight information for appropriate sizing information for the equipment to be used.

All components should be lifted either by crane or forklift as designated by the model.

- ***WARNING: Failure to follow the procedures outlined below can result in catastrophic damage to the system.***

Crane Lift - If a crane lift is to be used we recommend the following method. A "spreader" equaling 75% of the distance between the opposing lifting eyes on each adsorber should be used to insure proper lifting force direction. Attach an appropriately sized spreader beam and lifting cables to each lift eye of the component. The use of an experienced crane operator and quality equipment is highly recommended.

Fork-Lift - When using a forklift we recommend that the fork tubes on the filter be used or a pallet if the unit was shipped on a pallet.

3.3 Inspection

Perform the following inspections after un-loading the system. Note any discrepancies and contact TetraSolv immediately.

- Check the vessel exterior for damage which may have occurred during shipment. Inspect the support structures and piping support for damage.

- Inspect the piping system for damage. Insure the valves operate properly. Check installed instruments and instrument installation points for damage.

- If the filters are shipped without carbon visually inspect the interior of the vessel for damaged internals.

- Inspect the carbon discharge, drain and vent valves for damage

3.4 Set Up

The filter should be placed on a level concrete pad of appropriate thickness to support the system at it's maximum operational weight. The filter should be secured to the pad using appropriately sized anchor bolts.

Connect the site piping to the filter inlet and outlet connection points. It is important that all piping connected to the filter should be self supported. We also recommend in hard pipe installation that a flexible joint be used to further insulate the filter from vibration and stress.

Connect any gauges and instrumentation shipped

loose with the system.

The outlet piping if connected to a stack or vent should be designed to prevent the introduction of water or debris into the adsorber piping. Discharge piping should be sized equal to or greater than the diameter of the system piping or back pressure could occur creating excess pressure drop on the system.

Flowrates greater than 60 cfm / sq ft can produce bed fluidization in vapor phase filters. When this occurs carbon granules can be lifted and propelled out of the carbon bed in up-flow applications. In extreme cases large amounts of carbon can be expelled. If the system will be operating near or greater than the amount stated above please contact Tetrasolv for recommendations.

Carbon filters can be manifold in parallel operation for higher flowrates. Series operation is the preferred method of operation as it provides for the greatest degree of bed utilization.

Vapor conditions such as high humidity and high temperature (> 125° F) can cause inefficient adsorbtion to occur. If these conditions exist contact Tetrasolv for support. Also, any free water or product and debris should be eliminated with a knockout filter prior to the vapor stream entering the system. Many other vapor issues may effect Adsorber operation and we therefore recommend you discuss your specific installation with a representative.

4.0 OPERATION

4.1 Modes of Operation

With certain applications (2) filters in series flow are utilized. Listed below are typical operational modes.

- Shutdown - Both filters completely off-line and isolated.
- Series Flow - Influent enters primary filter and exits through secondary adsorber (this is the preferred method of operation)
- Isolation Flow - Only one filter is receiving influent. This mode is typically used when the operator is maintaining the off-line filter.
- Parallel Flow - Both filters are receiving the influent as the primary. Flow is split equally between the filters. This mode is used when higher flow rates need to be achieved and contact times are not critical.

4.3 Monitoring

Adsorber units only require periodic monitoring if properly installed. The following items may be monitored:

Pressure: Check inlet and outlet pressure. Increase in pressure differential may indicate media breakdown or presence of high moisture. Rapid increase in pressure drop could indicate adsorber failure.

Samples: Inlet and outlet sample points if provided for vapor analysis to determine system performance.

5.0 ADSORBER SERVICING

The Adsorber may be serviced on-site using a vacuum removal method. Prior to servicing the unit should be closed off from influent and effluent lines and any electrical devices or connections should be tagged off.

After removal of the spent carbon is complete, it is recommended that the inside of the Adsorber be checked thoroughly and any minor maintenance conducted.

5.1 Carbon Loading - Bulk Bag

- ***WARNING - Dry activated carbon generates considerable dust. While activated carbon poses no health risk the dust can cause respiratory irritation and occasional skin rash. Therefore we recommended the use of proper clothing and dust mask during filling operation.***

Hoist the bag over the manway and untie the outer bag exposing the inner chute. Untie the inner chute while clasping it shut. Remain holding the chute and carefully lower the chute into the manway. Un-clasp the chute and allow the carbon to discharge from the sack. The carbon should flow out very quickly and completely. When finished shake the bag and invert the chute into the bag.

If at any time you wish to stop the flow of carbon simply re-grasp the chute up high and cinch. Re-tie the bag.

5.2 Carbon Loading - Vacuum Method

In this method dry-activated carbon will be loaded into to the adsorbers using a vacuum rig. To add the carbon to the filters use the following method:

WARNING: Due to the low vacuum rating of the VF series adsorbers (< 60" H_20) only experienced change-out personnel should attempt this method of re-filling. Exceeding the recommend vacuum rating could lead to failure of the superstructure of the vessel.

1. Connect a 3" vacuum source to the auxiliary connection of the adsorber to be filled.

2. Install a 16" bolted transfer lid onto the manway opening of the adsorber to be filled.

3. Turn on the vacuum and check for good flow of air through the adsorber. Connect the fill line to the transfer lid and lead enough hose to reach the fresh carbon source (Note: This should be as short of a distance as possible).

4. Begin vacuuming carbon into the adsorber. It is important to note that the loading method is actually conveying and not true vacuum. The hose should contain 1/3 air with the carbon. Closely view the adsorber being filled. If the adsorber is collasping in excessively take less carbon and more air. This is something from experience and cannot be adequately explained here.

5. When transfer is complete the transfer lid should be removed and the carbon in the adsorber should be leveled out to insure even pressure drop across the bed.

6. Close the manway and turn the adsorber back on.

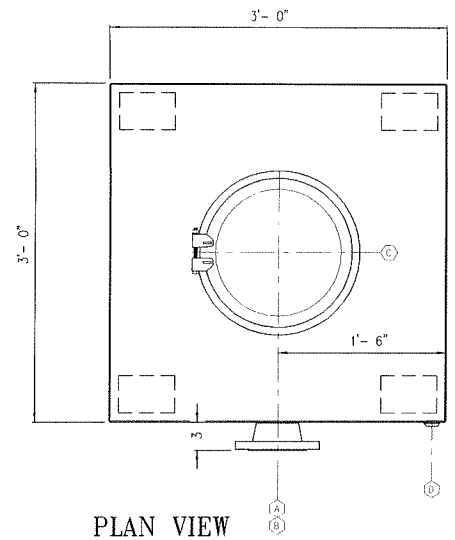
> ***Note: When the system if first started up small amounts of fines may be present in the discharge stream. This is normal and should discontinue within a short period of time.***

6.0 MAINTENANCE

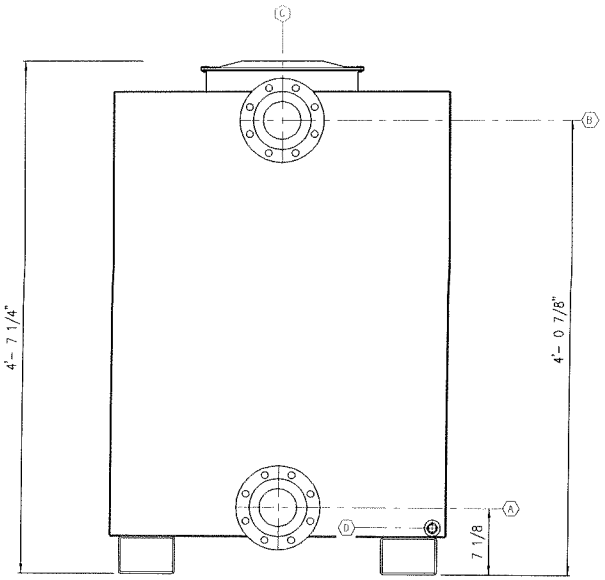
6.1 Extended Shutdown

If the system is to be shutdown for extended period of time it is recommended that the valve be placed in shutdown mode and the system water drain valve be left open.

Monitor the system closely after extended shutdown for signs of potential problems such as interior manifold failure or leaking valves and gaskets.



PLAN VIEW



ELEVATION VIEW

SCHEDULE OF OPENINGS

MARK	SIZE	QTY	RATING	TYPE	DESCRIPTION
A	4"	1	150#	RFWN	INLET
B	4"	1	150#	RFWN	OUTLET
C	16"	1	N/A	FF CMPRG	MANWAY c/w BLIND
D	1/2"	1	FNPT	WLD FLG	DRAIN
E					
F					
G					
H					

DESIGN DATA

Registration	NOT APPLICABLE	Year Built	2001
Construction	NOT APPLICABLE	Serial No	00-____
Design Pressure	3 PSIG	Capacity (Vol.)	36 cu. ft.
Design Temperature	350 Deg F	Shipping Wt. (Empty)	470 POUNDS
External Pressure	NOT APPLICABLE	Wt. full of water	_____ POUNDS
Min. Des. Metal Temp.	-20 Deg F AT 3 PSIG	Gaskets	NEOPRENE
MAWP (New & Cold)	3 PSIG	Studs & Nuts	MILD STEEL (ZINC PLATED)
MAWP (Hot & Corr'd)	3 PSIG	Internal Surface Prep	INTERNAL POWER CLEAN
Hydro Test Pressure	N / A	External Surface Prep	EXTERNAL POWER CLEAN
Corrosion Allowance	NONE	Internal Coating	SERIES 120 POTAPOX PLUS 5-8 mils DFT
Radiography	NONE	External Coating	MAB PLYMASTIC (Lt GRAY) 5-7 mils DFT

Tetrasolv Filtration
WWW.TETRASOLV.COM
1200 EAST 26th STREET
ANDERSON, INDIANA 46016
Ph: (765) 643-3941
Fx: (765) 643-3949

REV	DESCRIPTION OF REVISIONS	BY	DATE

REV	DRAWING ISSUE RECORD	BY	DATE

CUSTOMER: UNKNOWN

PROJECT: UNKNOWN

GENERAL ASSEMBLY LAYOUT - ELEVATION AND ORIENTATION

FOR

MODEL VF-500 FILTER

DWN BY	CHK'D BY	APP'D BY	DATE	SCALE	JOB No.	DRAWING No.	REV
DB (TF)	TB (TF)	EP (TF)	FEB 19/01		UNKNOWN	VF500-CD	0

FILTRATION MEDIA : 8x30 RE-ACTIVATED CARBON 4x10 RE-ACTIVATED CARBON

GENERAL DESCRIPTION

Select Re-Activated carbon from domestic sources is quality screened during our purchasing process for activity, density and fines. The use of re-activated carbon is recommended as a lower cost alternative for most sites where drinking water quality is not necessary. In many cases our re-activated carbon meets and exceeds imported virgin carbon. In addition all carbon either sold by itself or installed in our filtration units is traced by lot number to the installation or sale.

8x30 (Liquid Phase) Standard Specifications:	**Standard**	**Value**
Iodine Number	ASTM D-4607	800 Minimum
Moisture Content	ASTM D-2867	5% Maximum (as packed)
Particle Size	ASTM D-2862	8x30 US Mesh
Ash		10% Maximum
Total Surface Area (N2BET)		1050 Minimum
Pore Volume (cc/g)		0.75

4*10 (Vapor Phase) Standard Specifications:	**Standard**	**Value**
Carbon Tetrachloride Activity Level	ASTM D-3467	40 Minimum
Moisture Content	ASTM D-2867	5% Maximum (as packed)
Particle Size	ASTM D-2862	4x10 US Mesh
Ash		10% Maximum
Total Surface Area (N2BET)		1050 Minimum
Pore Volume (cc/g)		0.75

Packaging:		
50 Pound Bags	50 Pound Drums	Bulk Tanker
1,000 Pound Bulk Sacks	200 Pound Drums	

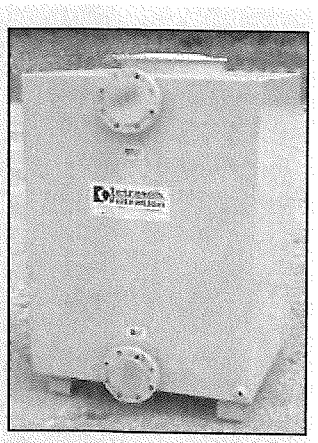
Tetrasolv Filtration, Inc. • 1200 East 26th Street • Anderson, Indiana 46016 • USA
Toll Free: 800-441-4034 Telephone: 765-643-3941 • Fax: 765-643-3949
www.tetrasolv.com • info@tetrasolv.com

tetraSOLV
FILTRATION

HOME OFFICE
1424 Abraham Drive
Anderson, IN 46013
508-631-3203 Phone
www.tetrasolv.com

REGIONAL OFFICE
POB 1034
Truth or Consequences, NM 87901
508-448-0256 Fax
jbarbour@tetrasolv.com

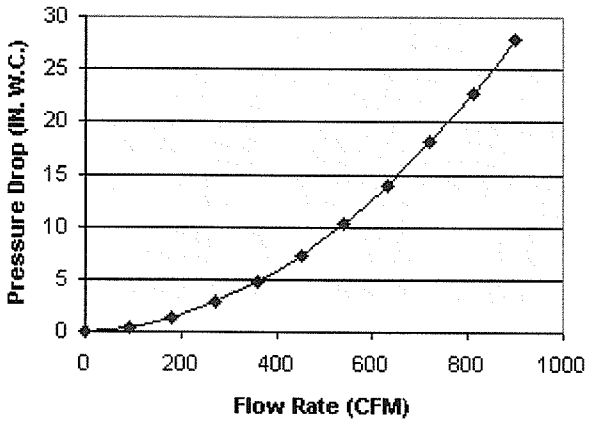
VF SERIES FILTERS
MODEL VF-500

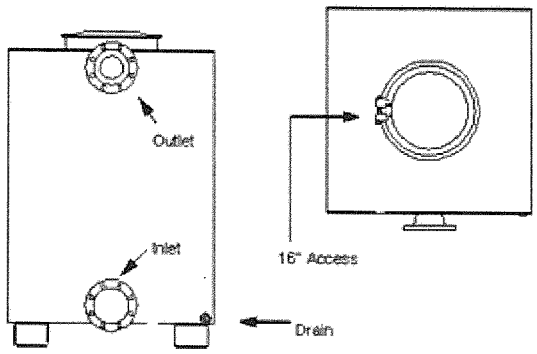


The VF-500 filter is a media filter vessel designed to treat vapor streams where pressure drop is a strong concern. While the typical design application is a activated carbon adsorbtion unit, the filter can easily accommodate many medias. The sturdy construction makes these filter vessels ideal for long term treatment units. Some applications include:

- Soil Vapor Extraction Treatment
- Air Stripper Off Gas Treatment
- Odor Removal System
- Storage Tank Purge Vapor Treatment
- Pilot Study
- Industrial Process Treatment

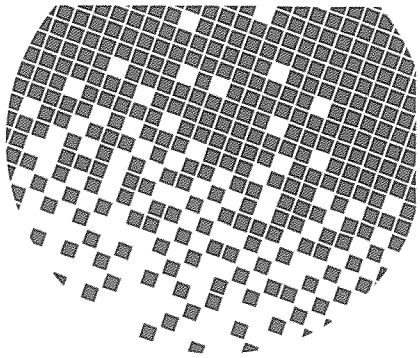
PRESSURE DROP GRAPH
*(As Filled 4*10 GAC)*





VF-500 SPECIFICATIONS			
Overall Height	4'8"	Vessel/Internal Piping Materials	CS/ CS (False Floor)
Footprint	3' X 3'	Internal Coating	Polyamide Epoxy Resin
Inlet / Outlet (150# FLNG)	4"	External Coating	Epoxy Mastic (Light Grey)
Drain / Vent (FNPT)	1/2"	Maximum Pressure / Temp	3 PSIG / 250° F
GAC Fill (lbs)	500	Cross Sectional Bed Area	9 FT^2
Shipping / Operational Weight (lbs)	900/1,025	Bed Depth/Volume	2 FT / 18 FT^3

tetraSOLV
FILTRATION



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1200 E. 26th ST
Anderson, IN 46016
508-631-3203 Phone
www.tetrasolv.com

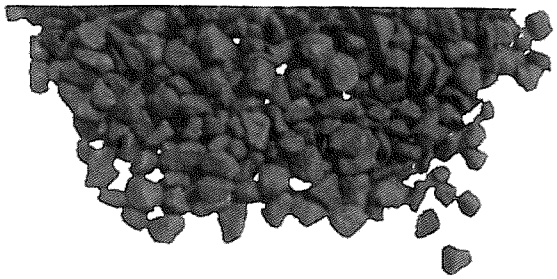
REGIONAL OFFICE
POB 1034
Truth or Consequences, NM 87901
508-448-0256 Fax
jbarbour@tetrasolv.com

- **HS-600 Specifications**

The potassium permanganate impregnated media shall have no less than 3.6 pounds of potassium permanganate per cubic foot, a bulk density of no less than 60 pounds per cubic foot, a moisture content of 12-15% by weight and shall not dust. The media shall have an irregular particle size of 4 x 8 mesh.

The performance characteristics of the air filtration media shall meet or exceed a service life of no less than 72 hours for breakthrough of hydrogen sulfide at the following test conditions:

Media Bed Volume: 76.00 cubic centimeters
Bed Configuration: 2.54 cm (id) x 15.00 cm
Flow Rate: 3000 (+/- 100) ml/minute
Relative Humidity: 70%
Challenge Gas: hydrogen sulfide
Challenge Gas Concentration: 10 (+/- 0.25) PPM



HS-600

6% potassium permanganate impregnated media. The number one method for removing acid gasses and other airborn pollutants.

The Environmental Remediation Heavyweight

Hydrosil International Ltd. introduces a major breakthrough in oxidation of acid gases, fumes and odors. HS-600, a unique molecular sieve impregnated with potassium permanganate, was created in our laboratories to oxidize gaseous pollutants such as hydrogen sulfide, sulfur dioxide, formaldehyde, ethylene, mercaptans, and various aldehydes and alcohols.

Removes

- Vinyl Chloride
- DCE
- TCE
- PCE
- Ethyl Mercaptan
- Methyl Mercaptan
- Penta Mercaptan
- Propylene Glycol
- Chlorethene

Constituents have had a 95%+ Reductions when treated with these media

HS-600

HS-600 MSDS

Removal of Vinyl Chloride using Potassium Permanganate

Reaction Mechanism of Permanganate Ion with VCM [Figure 1]

Welcome
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- HS-AC-HG

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Your name *

Your email *

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INTERNATIONAL LTD.
1180 St. Charles Street
Elgin, IL 60120

REACTION FOR THE REMOVAL OF VINYL CHLORIDE USING POTASSIUM PERMANGANATE

The reaction of permanganate ion with vinyl chloride monomer is outlined in Figure 1. The reaction produces 1,2 dihydroxy, chloroethane, an addition product, and a precipitate of manganese dioxide. A short description of the reaction is also included below. The typical oxidation reaction for an alkene by permanganate ion may be found in any general organic chemistry text.

The oxidation of an alkene leads to the formation of a compound with hydroxyl groups on the carbon atoms that were involved in the double bond, a 1,2 diol. Manganese (VII) in permanganate ion is ultimately reduced to manganese (IV) in manganaese dioxide. The carbon atoms of the double bond are oxidized. Even if no base is added at first, the solution becomes progressively more basic as the reaction proceeds.

In this oxidation reaction, the two hydroxyl groups become attached to the same face of the double bonds. The permanganate ion is believed to add to the double bond to give a cyclic intermediate, a manganate ester. The first step of this reaction is the syn (same side) addition of permanganate ion to the double bond. This intermediate breaks down in the presence of water to give the cis-1,2 diol. Thus, there are no appreciable quantities of chlorine gas or formaldehyde formed in the reaction.

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Reaction Mechanism of Permanganate Ion with VCM (Vinyl Chloride Monomer)

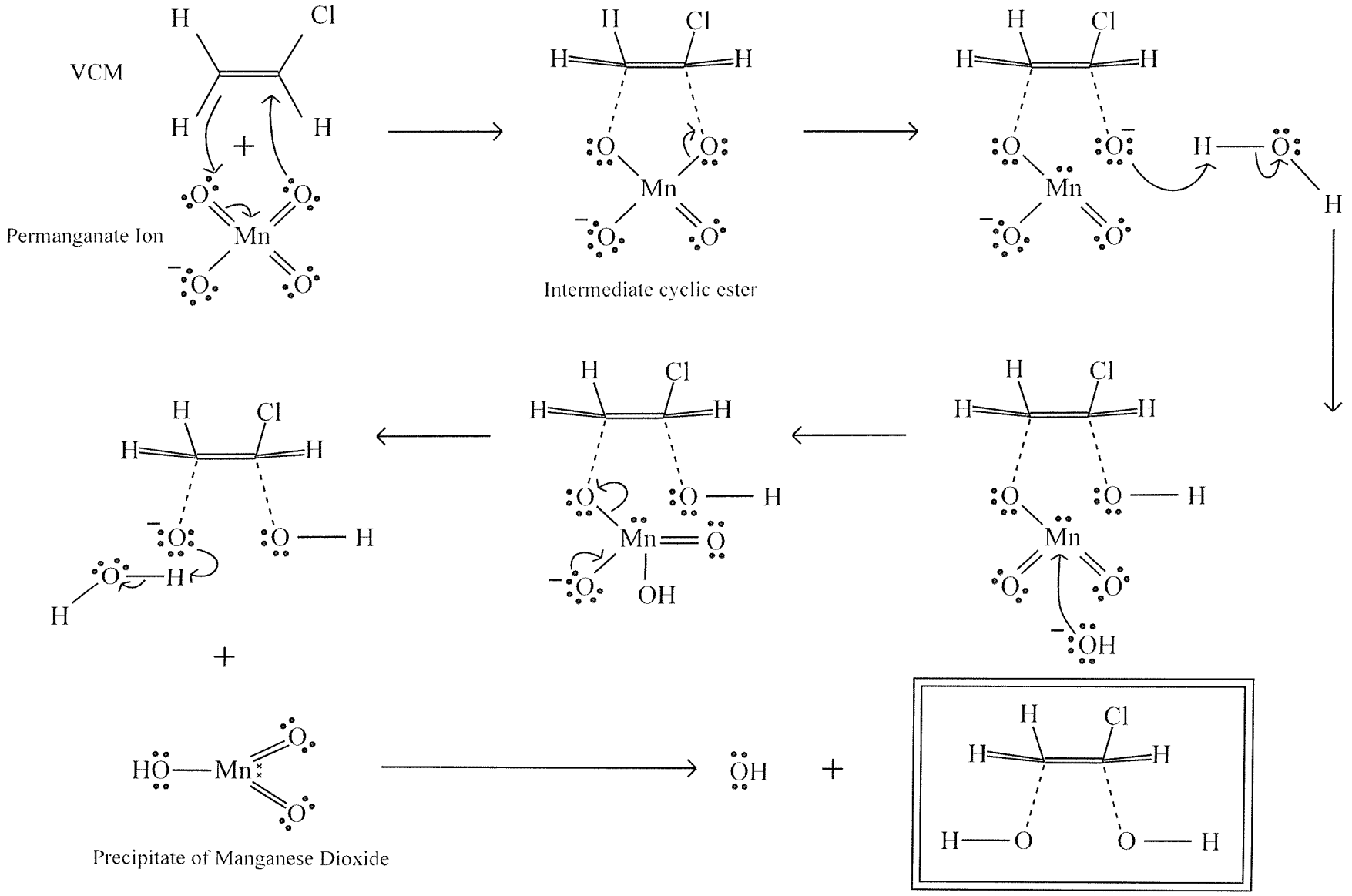


FIGURE 1

APPENDIX B

CALCULATIONS

Calculations for Air Stripper Exhaust Treatment System

Influent Concentrations of Contaminants of Concern (COCs):

Tetrachloroethylene (PCE):	1966 ug/m^3
Trichloroethylene (TCE):	110 ug/m^3
Cis-1,2-Dichloroethylene (DCE):	142 ug/m^3
Vinyl Chloride:	35 ug/m^3

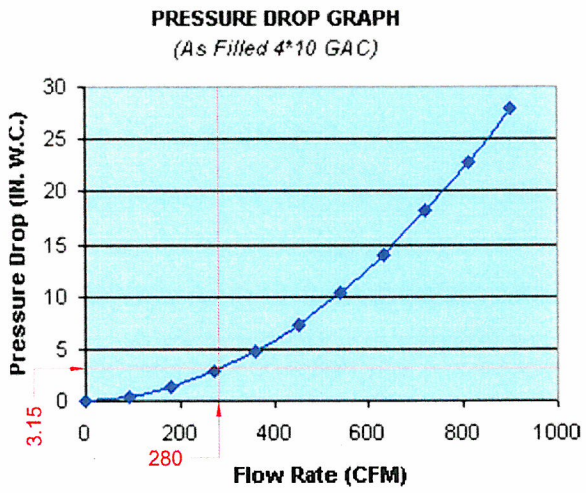
The influent concentration of COCs were based on the average removal rates of the current air stripper over the previous three (3) years. Removal rates from earlier years are available, however do not appear representative of the likely influent concentrations.

Flow Rate:

The existing air stripper operates at 280 cubic feet per minute (cfm), which is necessary to effectively remove the contaminants in the water phase prior to discharge.

Selection of the VF-500:

Utilizing the known air emission rate of 280 cfm occurring at the present air stripper and utilizing the Pressure Drop Graph for the Granulated Activated Carbon (GAC) Filter manufactured by Tetrasolve Filtration as shown below, it was determined the pressure drop was acceptable.



Pressure Drop Due to Friction in the Air Stripper Exhaust Treatment System:

Air Filter Units:

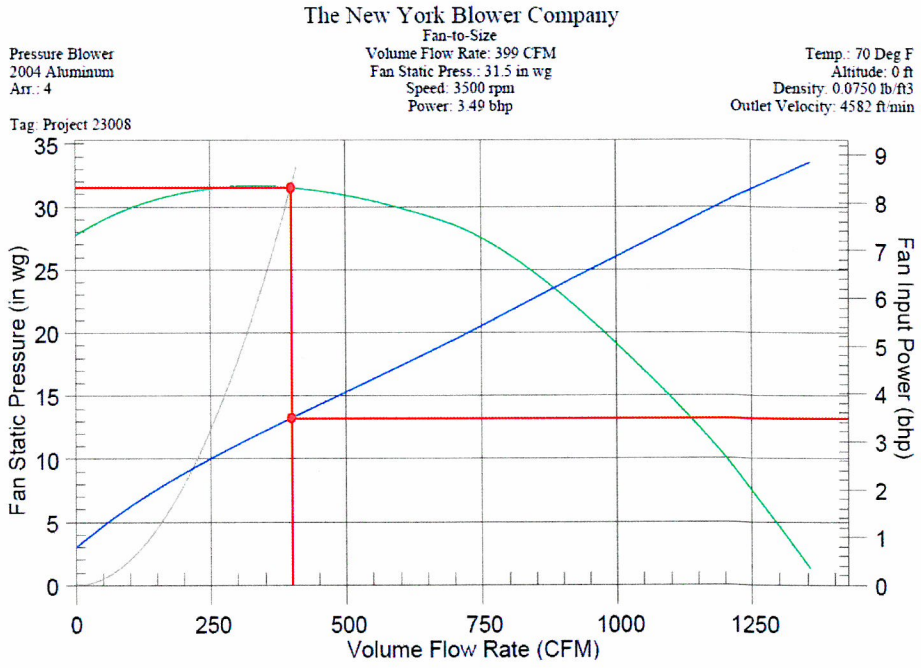
VF-500 with GAC as Filter Media:	3.15 in H_2O
VF-500 with HS-600 Vinyl Chloride as Filter Media:	3.15 in H_2O

Piping:

36 feet of eight (8) inch diameter PVC at 0.4 in H_2O per 100 feet:	0.14 in H_2O
11 - (8) eight inch diameter 90° PVC Elbows at 0.088 in H_2O per 90° Elbows:	0.97 in H_2O
Total Pressure Drop:	7.41 in H_2O

Blower Selection:

Current Blower:



Assuming a flow rate of 280 cfm, the fan static pressure is 31.5 inches H_2O.

The EZ-4.4P requires a maximum pressure of 24 inches H_2O according to the manufacturer.

The remaining pressure of 7.5 inches H_2O meets the requirement of the Air Stripper Exhaust Treatment System.

Use of Filter Media:

Assuming the concentrations of COCs PCE, TCE, and DCE in the influent shown above; the GAC supplier calculated the following rates of usage of GAC.

Tetrachloroethylene (PCE):	2.04 lbs. GAC/day
Trichloroethylene (TCE):	0.13 lbs. GAC/day
Cis-1,2-Dichloroethylene (DCE):	0.15 lbs. GAC/day
Total GAC Used per day:	2.32 lbs. GAC/day

Assuming a 20% Safety Factor and utilizing the mass of 500 pounds of GAC loaded into the filter, the calculations indicate the GAC will need to be replaced every 180 days.

Assuming the initial concentration of 35 ug/m^3 of Vinyl Chloride (VC), the supplier of the HS-600 VC Media calculated the following rates of usage of HS-600 VC Media.

Vinyl Chloride (VC):	2.28 lbs Media/day

Assuming a 20% Safety Factor and utilizing the mass of 1,000 pounds of HS-600 VC Media loaded into the filter, the calculations indicate the HS-600 VC Media will need to be replaced every 365 days.

APPENDIX C

HEALTH AND SAFETY PLAN

HEALTH AND SAFETY PLAN

Interim Remedial Action
Apple Valley Shopping Center Superfund Site
Town of LaGrange, New York
NYSDEC Site No. 3-14-084

Prepared by: _____ Date: _____

Approved by: _____ Date: _____
Health and Safety Manager

Approved by: _____ Date: _____
Project Manager

Table of Contents

1. Introduction

1.1 HASP Applicability

This site-specific Health and Safety Plan (HASP) has been developed by Upstate HydroTech Consulting, LLC (UHTC) and Sterling Environmental Engineering, P.C. (STERLING). It establishes the health and safety procedures to minimize potential risks to personnel involved with the subsurface exploration activities, sampling and interim remedial action at the Apple Valley Shopping Center Superfund Site (the Site) located in the Town of LaGrange, Dutchess County, New York. This HASP applies to all personnel potentially exposed to safety and/or health hazards related to the activities described in Section 3.0 of this document.

This HASP has been prepared to comply with the applicable requirements of the Occupational Safety and Health Administration (OSHA) Hazardous Waste Operations and Emergency Response Standard (29 CFR 1910.120). Activities covered by this HASP must be conducted in complete compliance with this HASP and with all applicable Federal, State, and local health and safety regulations. Personnel covered by this HASP who cannot or will not comply will be excluded from site activities.

This HASP will be distributed to each person involved with investigative activities at the site. Each person must sign a copy of the attached HASP Receipt and Acceptance Form (see Attachment A).

1.2 Organization/Responsibilities

The implementation of health and safety at this project location will be the shared responsibility of the Project Manager (PM), the Health and Safety Manager (HSM), the Project Site Safety Officer (SSO) and all other personnel who conduct activities at the site.

1.2.1 Project Manager (PM)

The Project Manager (PM) has the primary responsibility for ensuring the overall health and safety of this project. As such, the PM is responsible for ensuring that the requirements of this HASP are implemented. Some of the PM's specific responsibilities include:

- Ensuring that all personnel to whom this HASP applies have received a copy of it;
- Providing the SSO with updated information regarding environmental conditions at the site and the scope of site work;
- Providing adequate authority and resources to the on-site SSO to allow for the successful implementation of all necessary safety procedures;
- Supporting the decisions made by the SSO;
- Maintaining regular communications with the SSO; and
- Coordinating the activities of all subcontractors and ensuring that they are aware of the pertinent health and safety requirements for this project.

1.2.2 Health and Safety Manager (HSM)

The Health and Safety Manager (HSM) is responsible for the preparation, interpretation and modification of this HASP. Modifications to this HASP which may result in less stringent precautions cannot be undertaken by the SSO without the approval of the HSM. Specific duties of the HSM include:

- Writing, approving and amending the HASP for this project;
- Advising the SSO on matters relating to health and safety on this site;
- Recommending appropriate personal protective equipment (PPE) and air monitoring instrumentation to protect personnel from potential site hazards;
- Conducting accident investigations; and,
- Maintaining regular contact with the SSO to evaluate site conditions and new information which might require modifications to the HASP.

1.2.3 Site Safety Officer (SSO)

All field technicians are responsible for implementing the safety requirements specified in this HASP. One (1) technician will be designated to serve as the Site Safety Officer (SSO). The SSO will be appointed by the PM. The SSO will be on-site during all activities covered by this HASP. The SSO is responsible for enforcing the requirements of this HASP once work begins. The SSO has the authority to immediately correct all situations where non-compliance with this HASP is noted and to immediately stop work in cases where an immediate danger is perceived. Some of the SSO's specific responsibilities include:

- Ensuring that all personnel to whom this HASP applies have submitted a completed copy of the HASP Receipt and Acceptance Form (see Attachment A);
- Ensuring that all personnel to whom this HASP applies have attended a pre-entry briefing prior to entering an exclusion zone;
- Maintaining a high level of health and safety consciousness among employees at the work site;
- Procuring and distributing the PPE needed for personnel involved with this project;
- Procuring the air monitoring instrumentation required and performing air monitoring for field activities;
- Verifying that all PPE and health and safety equipment is in good working order;
- Setting up and maintaining the work zones and ensuring proper cleanup of all site personnel;
- Notifying the PM of all non-compliance situations and stopping work in the event that an immediate danger situation is perceived;
- Monitoring and controlling the safety performance of all personnel within the established restricted areas to ensure that required safety and health procedures are being followed;
- Conducting accident/incident investigations and preparing accident/incident investigation reports;
- Conducting the pre-entry briefing as required by Section 10.3 of this HASP; and
- Initiating emergency response procedures in accordance with Section 11.0 of this HASP.

1.2.4 Field Personnel and Covered Subcontractor Personnel

All field personnel covered by this HASP are responsible for following the health and safety procedures specified in this HASP and for performing their work in a safe and responsible manner. Some of the specific responsibilities of the field personnel are as follows:

- Reading this HASP in its entirety prior to the start of on-site work;
- Submitting a completed HASP Receipt and Acceptance Form (see Attachment A) and documentation of medical surveillance and training to the PM prior to the start of work;
- Attending the required pre-entry briefing prior to beginning on-site work;
- Bringing forth any questions or concerns regarding the content of this HASP to the PM or the SSO prior to the start of work;
- Reporting all accidents, injuries and illnesses, regardless of their severity, to the SSO; and
- Complying with the requirements of this HASP and the requests of the SSO.

1.2.5 Contractors

In addition to other requirements referenced in this HASP, all contractors are required to:

- Provide appropriate PPE for their employees;
- Ensure, via daily inspections, that their equipment is maintained in good working condition;
- Operate their equipment in a safe manner; and
- Appoint an on-site safety coordinator to interface with the SSO.

1.3 Modification of this HASP

The procedures in this HASP have been developed based on information from previous investigations at the site. Should additional information become available regarding potential on-site hazards, it may be necessary to modify this HASP. All proposed modifications to this HASP must be reviewed and approved by the HSM before such modifications are implemented.

Any significant modifications must be incorporated into the written document as addenda and the HASP must be re-issued. The PM will ensure that all personnel covered by this HASP receive copies of all issued addenda. Sign-off forms will accompany each addendum and must be signed by all personnel covered by the addendum. Sign-off forms will be submitted to the PM. The HASP addenda will be distributed during the regularly scheduled meetings so that they can be reviewed and discussed. Attendance forms will be collected during the meeting.

2. Site Description and History

2.1 Site Description

The Apple Valley Shopping Center Superfund Site is located in the Town of LaGrange, Dutchess County, New York, approximately seven (7) miles east of the City of Poughkeepsie (see Figure 1, Site Location). The Site consists of the Apple Valley Shopping Center (AVSC), located at the southwest corner of the junction of State Route 55 and Titusville Road. The AVSC was constructed in 1967 – 1968, and contains a number of businesses including the former Apple Valley Dry Cleaners (AVDC) currently Absolute Pizza, the Norgetown Laundromat (NL) currently Apple Valley Laundromat, and a Grand Union supermarket (GU) currently Foodtown.

The Site is owned by Apple Valley Corporation; the previous owner was James A. Klein Enterprises (JAK). JAK is subject to Administrative Order On Consent (Order) No. II-CERCLA-10224 entered on October 4, 1991 between JAK and the United States Environmental Protection Agency (USEPA) with respect to the Site. The Order requires JAK to undertake an Emergency Removal Action at the Site. Such Emergency Removal Action has been ongoing since 1992. The principal contaminant at the Site as demonstrated by groundwater sampling, soil gas sampling and soil testing is tetrachloroethene (also perchloroethene or PCE); lesser quantities of trichloroethene (TCE) and other chlorinated solvents have also been detected.

Southwest of the AVSC are the residences of the Woodbridge Estates Subdivision, several of which are impacted by the terms of the Order.

2.2 Site History

In 1988, prompted by a homeowner's complaint regarding odor and septic discharge from the Grand Union trash compactor, the Dutchess County Department of Health (DCDOH) collected and analyzed samples of groundwater from several residential supply wells located in the Woodbridge Estates Subdivision[1]. The samples were found to contain PCE and its breakdown products including TCE and isomers of dichloroethene (DCE). The DCDOH also sampled the AVSC's supply wells, well AV-1 (abandoned due to poor yield) and its replacement, well AV-2. Concentrations of the same chlorinated compounds were detected, with greater than 5,000 parts per billion (ppb) of PCE in well AV-1. Chlorinated hydrocarbons were also found in the discharge from the sump at the base of the Grand Union loading dock. A point-of-entry (POE) granular activated carbon (GAC) filter system was installed by JAK to treat the AVSC's well water and, in 1989, a third supply well (AV-3) was installed in a presumed upgradient location on the AVSC property.

In 1989, the New York State Department of Environmental Conservation (NYSDEC) prepared a preliminary justification report for listing the AVSC as a potential Hazardous Waste Site.

In 1990, the DCDOH conducted more extensive sampling of the water supply wells in the Subdivision, and found that a number of wells were contaminated with chlorinated compounds at levels above the NYS standards for public drinking water supplies. In September 1990, the NYSDEC requested the

[1] See tabulated analytical results and analytical reports included in *Work Plan, Apple Valley Shopping Center Superfund Site, LaGrange, New York, Superfund Emergency Removal Action* prepared by TRC Environmental Consultants, Inc.

intervention of the USEPA to initiate actions under CERCLA's emergency removal authorities to provide potable water supplies to the affected residents.

2.2.1 Regulatory and Legal Framework

In December 1990, the NYSDEC first notified JAK that the AVSC had been included in the State Register of Potential Hazardous Waste Sites, and that JAK was considered a potentially responsible party (PRP) by reason of ownership of the Site. Immediately thereafter, JAK began the provision of bottled water to the affected residences in the Woodbridge Estates Subdivision pending further negotiations with the NYSDEC. On December 21, 1990, the USEPA notified counsel for JAK that it would assume primacy for the Site and would be initiating actions under the emergency removal authorities, and that the USEPA viewed JAK as a PRP.

An agreement was reached between the USEPA and JAK in late September 1991, and the Order was issued with an effective date of October 4, 1991. The Order focuses on the primary objectives of providing users of groundwater at the Site a potable source of drinking water and protecting other currently unaffected users of groundwater in the area.

2.2.2 Emergency Removal Action

In 1992, JAK installed point-of-entry (POE) granular activated carbon (GAC) filters on the wells of eight (8) residences in the Woodbridge Estates Subdivision. A groundwater withdrawal and treatment program was also initiated to control migration of contaminated groundwater from the Site and to effect a collapse of the off-site contaminant plume. This program involved the installation of two (2) low-profile air strippers. The first air stripper (AVS) serviced AVSC well AV-2. This well was pumped continuously at 20 gallons per minute (gpm). Treated water from AV-2 was distributed for use by AVSC tenants and excess water was discharged to an adjacent wetland. In early 1999, the AVSC was placed on municipal water. Now the entire treated discharge of the AVS is discharged to the wetland.

The second air stripper (LRS) serviced two (2) wells on Locust Crest Court (Lot Nos. 10 and 11). These wells were pumped intermittently for a combined continuous discharge of 10 gpm. Treated water from these wells was distributed for use by the residents of Lots 10 and 11, and excess water was discharged to an adjacent wetland. JAK also retained responsibility for operation and maintenance of the GAC filters and air strippers.

In 1996, five (5) of the original eight (8) POE GAC filters were decommissioned as the water at these locations had been cleaned to levels below the standards for treatment cessation. In 1999, a sixth residence was removed from the program. The two (2) remaining GAC systems service Lots 10 and 11.

In 2001, the air stripper servicing Lots 10 and 11 of the Woodbridge Estates Subdivision was permanently decommissioned. The same year, the AVSC air stripper, AVS, was replaced with an off-the-shelf unit manufactured by QED Environmental.

3. Scope of Work

3.1 Purpose of IRM

This Interim Remedial Action (IRM) is proposed to supplement the ongoing Removal Action undertaken by JAK. This IRM targets source areas previously identified at the Site, including the primary source area, or "hot spot," located approximately 15 to 20 feet behind the former location of the AVDC. The primary goal is to accelerate the rate of contaminant removal in this area of the Site. The scope of work includes subsurface explorations to install groundwater extraction wells and monitoring wells, installation of a groundwater treatment system and subsequent periodic environmental sampling events.

3.2 Subsurface Explorations

Subsurface operations include the installation of recovery wells and the installation of boundary monitoring wells.

3.2.1 Recovery Well Installation

Specific field tasks include:

- Advancing three (3) borings using hollow stem augers through the overburden and employing continuous split-spoon sampling.
- Advancing these borings through the bedrock using smooth core boring methods.
- Screening the soil and bedrock samples for volatile organic compounds (VOCs) using a photoionization detector (PID).
- Opening the bedrock core boring to six (6) inches diameter using water rotary techniques.
- Testing intervals of the bedrock boring using packers to determine potentiometric head and yield, and to collect samples of groundwater from various zones in the bedrock.
- Analyzing groundwater samples collected during packer testing for chlorinated compounds using an on-site, portable gas chromatograph.
- Designing and installing well screens.
- Completing the well installations.
- Installing pumps in the wells and plumbing these pumps into the treatment system.

3.2.2 Boundary Well Installation

Specific field tasks include:

- Advancing four (4) borings using water rotary techniques through the overburden and bedrock.
- Completing the well installations with casing installed five (5) feet into bedrock.
- Install dedicated submersible pumps in the wells to facilitate the collection of groundwater samples.

3.3 Groundwater Treatment System

The installation of the groundwater treatment system involves the receipt on-site of off-the-shelf, low-profile air stripping technology, its installation in the existing site building, and its hookup to electricity and plumbing. The installation will be performed by various skilled subcontractors. When the system has been installed, the

groundwater extraction will be brought on-line, with samples of influent and effluent collected for analysis by an approved laboratory once operating parameters have been maximized.

3.4 Environmental Sampling

Groundwater samples will be collected on a periodic basis, initially quarterly, for analysis by an approved laboratory for VOCs. They will be collected from influent and effluent ports on the two (2) air strippers, from the boundary and other site monitoring wells using dedicated submersible pumps, and from taps in various residences in the adjoining Woodbridge Estates Subdivision.

The indoor air quality at the AVSC will also be monitored periodically to assess potential impacts.

4. Chemical Hazard Assessment and Controls

4.1 Chemical Hazards

The predominant chlorinated organic solvents detected in the groundwater include tetrachloroethene (also perchloroethene or PCE), trichloroethene (TCE), and cis-1,2-dichloroethene (cis-DCE). Overexposure to the chlorinated organic solvents likely to be present in the groundwater may result in depression of the central nervous system, symptoms of which include dizziness, headache, giddiness, intoxication and nausea. Chronic overexposures can result in liver, kidney and central nervous system damage.

The OSHA Permissible Exposure Limit (PEL) for PCE and TCE is 100 ppm as an 8-hour time-weighted average (TWA). OSHA does not regulate DCE but the American Conference of Governmental Industrial Hygienists (ACGIH) recommends a Threshold Limit Value (TLV) of 200 ppm as an 8-hour TWA.

4.2 Chemical Exposure and Control

4.2.1 Chemical Exposure Potential

Although the concentrations of chlorinated solvents in groundwater exceed NY standards, the reported concentrations are in the part per billion to low part per million range and therefore should not present a vapor hazard to site workers. As described above, the primary route of exposure during site activities in areas contaminated with chlorinated solvents is direct dermal contact.

4.2.2 Chemical Exposure Control

The following chemical exposure control measures will be implemented during the proposed investigations:

- The SSO will perform air monitoring (see Section 6.1) in the worker's breathing zone to determine exposure to VOC vapors during the subsurface explorations and sampling activities. If exposures exceed the action levels, respiratory protection as discussed in Section 7.2, will be donned.
- To avoid direct dermal contact with potentially contaminated media, chemical protective clothing, as described in Section 7.1, will be required when collecting samples and decontaminating sampling equipment.
- Although highly unlikely, exposure to all of the contaminants of concern may occur via ingestion (hand-to-mouth transfer). The decontamination procedures described in Section 9.0 address personal hygiene issues that will limit the potential for contaminant ingestion.

5. Physical Hazards and Controls

5.1 Facility Requirements

The AVSC has no particular requirements for personal protective equipment (PPE). The SSO will interface with the facility representatives as necessary to ensure that site personnel activities do not interfere with plant operations at both interior and exterior locations.

5.2 Utility Hazards

5.2.1 Underground Utilities

New York law requires that, at least 48 hours prior to initiation of any subsurface work, a utility clearance be performed at the site. The driller will contact Dig Safely New York (1-800-962-7962) to request a mark-out of underground utilities in the proposed sampling areas. Work will not begin until the required utility clearances have been performed. Public utility clearance organizations typically do not mark-out underground utility lines that are located on private property. As such, the driller must exercise due diligence and try to identify the location of any private utilities on the properties being investigated. This requirement can be fulfilled in several ways, including:

- obtaining as-built drawings for the areas being investigated from the property owner;
- visually reviewing each proposed excavation location with the property owner or knowledgeable site representative;
- performing a geophysical survey to locate utilities or hiring a private line locating firm to determine the location of utility lines that are present at the property;
- identifying a no-drilling/digging zone; or
- hand digging in the proposed drilling/excavation locations if insufficient data is available to accurately determine the location of the utility lines.

5.2.2 Overhead Utilities

Be particularly aware of overhead power lines in the work area. Any vehicle or mechanical equipment capable of having parts of its structure elevated (drill rig, crane, etc.) near energized overhead lines shall be operated so that a clearance of at least ten (10) feet is maintained. If the voltage is higher than 50kV, the clearance shall be increased four (4) inches for every 10kV over that voltage.

5.3 Traffic Concerns

Work is being performed at exterior locations where traffic is a concern (i.e. parking lot, shipping/receiving area, loading dock). The following precautions should be followed. All are designed to draw attention to the work and to warn other people of the activities.

- Notify the property owner of your work location, dates of work and the anticipated work times. Suggest the possibility of a detour around the work area.
- Wear an orange safety vest. If work is being performed at dawn, dusk or evening, the vests must have reflective tape.

- Set up traffic cones 50 feet in front of the work area. "Work Zone" signs should also be placed in a conspicuous area to warn others of your presence.

5.4 Drilling Hazards

Use of a drill rig to install monitoring wells will require all personnel in the vicinity of the operating rig to wear steel-toed boots, hardhats, hearing protection and safety eyewear. Personnel shall not remain in the vicinity of operating equipment unless it is required for their work responsibilities. Additionally, the following safety requirements must be adhered to:

- All drill rigs and other machinery with exposed moving parts must be equipped with an operational emergency stop device. Drillers and geologists must be aware of the location of this device. This device must be tested prior to job initiation and periodically thereafter. The driller and helper shall not simultaneously handle augers unless there is a standby person to activate the emergency stop.
- The driller must never leave the controls while the tools are rotating unless all personnel are kept clear of rotating equipment.
- A long-handled shovel or equivalent must be used to clear drill cuttings away from the hole and from rotating tools. Hands and/or feet are not to be used for this purpose.
- A remote sampling device must be used to sample drill cuttings if the tools are rotating or if the tools are readily capable of rotating. Samplers must not reach into or near the rotating equipment. If personnel must work near any tools that could rotate, the driller must shut down the rig prior to initiating such work.
- Drillers, helpers and geologists must secure all loose clothing when in the vicinity of drilling operations.
- Only equipment that has been approved by the manufacturer may be used in conjunction with site equipment and specifically to attach sections of drilling tools together. Pins that protrude excessively from augers shall not be allowed.
- No person shall climb the drill mast while tools are rotating.
- No person shall climb the drill mast without the use of ANSI-approved fall protection (approved belts, lanyards and a fall protection slide rail) or portable ladder which meets the requirements of OSHA standards.

5.5 Noise Exposure

Due to facility activities, hearing protection must be worn by employees. Furthermore, the use of the drilling rig will generate noise levels that will require the use of hearing protection in the immediate vicinity. Appropriate earmuffs or earplugs (i.e., with an NRR greater than 25 dB) should be worn to prevent overexposure. The general rule of thumb is that if you have to raise your voice to be understood by someone who is standing 3 to 5 feet away from you, the noise levels are likely to be above 85 dB and therefore require the use of hearing protection.

5.6 Back Safety

Using the proper techniques to lift and move heavy pieces of equipment, such as drums of investigation-derived wastes, is important to reduce the potential for back injury. The following precautions should be implemented when lifting or moving heavy objects.

- Use mechanical devices to move objects, such as drums of investigation derived wastes or generators, that are too heavy to be moved manually.

- If mechanical devices are not available, ask another person to assist you.
- Bend at the knees, not the waist. Let your legs do the lifting.
- Do not twist while lifting.
- Bring the load as close to you as possible before lifting.
- Be sure the path you are taking while carrying a heavy object is free of obstructions and slip, trip and fall hazards.

5.7 Electrical Safety

If using portable tools that are electrically powered, follow the safety precautions listed below:

- Check to see that electrical outlets used to supply power during field operations is of the three (3) wire grounding type.
- Extension cords used for field operations should be of the three (3) wire grounding type and designed for hard or extra-hard usage. This type of cord uses insulated wires within an inner insulated sleeve and will be marked S, ST, STO, SJ, SJO or SJTO.
- NEVER remove the ground plug blade to accommodate ungrounded outlets.
- Do not use extension cords as a substitute for fixed or permanent wiring. Do not run extension cords through openings in walls, ceilings or floors.
- Protect the cord from becoming damaged if the cord is run through doorways, windows or across pinch points.
- Examine extension and equipment cords and plugs prior to each use. Damaged cords with frayed insulation or exposed wiring and damaged plugs with missing ground blades must be removed from service immediately.
- All portable or temporary wiring which is used outdoors or in other potentially wet or damp locations must be connected to a circuit that is protected by a ground fault circuit interrupter (GFCI). GFCI's are available as permanently installed outlets, as plug-in adapters and as extension cord outlet boxes. Do not continue to use a piece of equipment or extension cord that causes a GFCI to trip.
- When working in flammable atmospheres, be sure that the electrical equipment being used is approved for use in Class I, Division I atmospheres.
- Do not touch a victim who is still in contact with current. Separate the victim from the source using a dry, non-metallic item such as a broom stick or cardboard box. Be sure your hands are dry and you are standing on a dry surface. Turn off the main electrical power switch and then begin rescue efforts.

5.8 Thermal Stress

Although the majority of the work is being conducted in the summer, periodic groundwater sampling will be conducted over a three (3) year period. Therefore, the hazards of both heat and cold stress are addressed in this HASP.

5.8.1 Heat Stress

Types of Heat Stress

Heat related problems include heat rash, fainting, heat cramps, heat exhaustion and heat stroke. Heat rash can occur when sweat isn't allowed to evaporate, leaving the skin wet most of the time and making it subject to irritation. Fainting may occur when blood pools to lower parts of the body and as a result, does

not return to the heart to be pumped to the brain. Heat related fainting often occurs during activities that require standing erect and immobile in the heat for long periods of time. Heat cramps are painful spasms of the muscles due to excessive salt loss associated with profuse sweating. Heat exhaustion results from the loss of large amounts of fluid and excessive loss of salt from profuse sweating. The skin will be clammy and moist and the affected individual may exhibit giddiness, nausea and headache.

Heat stroke occurs when the body's temperature regulatory system has failed. The skin is hot, dry, red and spotted. The affected person may be mentally confused and delirious. Convulsions could occur. Early recognition and treatment of heat stroke are the only means of preventing brain damage or death. A person exhibiting signs of heat stroke should be removed from the work area to a shaded area. The person should be soaked with water to promote evaporation. Fan the person's body to increase cooling. Immediate medical assistance is needed in case of heat stroke. Dial 911 to request an ambulance.

Increased body temperature and physical discomfort also promote irritability and a decreased attention to the performance of hazardous tasks.

Early Symptoms of Heat-Related Health Problems:

- decline in task performance
- incoordination
- decline in alertness
- unsteady walk
- excessive fatigue
- reduced vigilance
- muscle cramps
- dizziness

Susceptibility to Heat Stress Increases due to:

- lack of physical fitness
- lack of acclimation
- increased age
- dehydration
- obesity
- drug or alcohol use
- sunburn
- infection

People unaccustomed to heat are particularly susceptible to heat fatigue. First timers in PPE need to gradually adjust to the heat.

The Effect of Personal Protective Equipment

Sweating normally cools the body as moisture is removed from the skin by evaporation. However, the wearing of certain personal protective equipment (PPE), particularly chemical protective coveralls (e.g., Tyvek), reduces the body's ability to evaporate sweat and thereby regulate heat buildup. The body's efforts to maintain an acceptable temperature can therefore become significantly impaired by the wearing of PPE.

Measures to Avoid Heat Stress:

The following guidelines should be adhered to when working in hot environments:

- Establish work-rest cycles (short and frequent are more beneficial than long and seldom).
- Identify a shaded, cool rest area.
- Rotate personnel, alternate job functions.

- Water intake should be equal to the sweat produced. Most workers exposed to hot conditions drink less fluids than needed because of an insufficient thirst. Do not depend on thirst to signal when and how much to drink. For an 8-hour work day, 50 ounces of fluids should be consumed.
- Eat lightly salted foods or drink salted drinks such as Gatorade to replace lost salt.
- Save most strenuous tasks for non-peak heat hours such as the early morning or at night.
- Avoid alcohol during prolonged periods of heat. Alcohol will cause additional dehydration.
- Avoid double shifts and/or overtime.

The implementation and enforcement of the above-mentioned measures will be the joint responsibility of the PM and SSO. Potable water and fruit juices should be made available each day for the field team.

Heat Stress Monitoring Techniques

Site personnel should regularly monitor their heart rate as an indicator of heat strain by the following method:

Check radial pulse rates by using fore- and middle fingers and applying light pressure to the pulse in the wrist for one (1) minute at the beginning of each rest cycle. If the pulse rate exceeds 110 beats/minute, shorten the next work cycle by one-third and keep the rest period the same. If, after the next rest period, the pulse rate still exceeds 110 beats/minute, shorten the work cycle again by one-third.

5.8.2 Cold Stress

Types of Cold Stress

Cold injury is classified as either localized, as in frostbite, frostnip or chilblain; or generalized, as in hypothermia. The main factors contributing to cold injury are exposure to humidity and high winds, contact with wetness and inadequate clothing.

The likelihood of developing frostbite occurs when the face or extremities are exposed to a cold wind in addition to cold temperatures. The freezing point of the skin is about 30°F. The fluids around the cells of the body tissue freeze, causing the skin to turn white. This freezing is due to exposure to extremely low temperatures. As wind velocity increases, heat loss is greater and frostbite will occur more rapidly.

Symptoms of Cold Stress

The first symptom of frostbite is usually an uncomfortable sensation of coldness, followed by numbness. There may be a tingling, stinging or aching feeling in the effected area. The most vulnerable parts of the body are the nose, cheeks, ears, fingers and toes.

Symptoms of hypothermia, a condition of abnormally low body temperature, include uncontrollable shivering and sensations of cold. The heartbeat slows and may become irregular, the pulse weakens and the blood pressure changes. Pain in the extremities and severe shivering can be the first warning of dangerous exposure to cold.

Maximum severe shivering develops when the body temperature has fallen to 95°F. This must be taken as a sign of danger and exposure to cold must be immediately terminated. Productive physical and mental work is limited when severe shivering occurs.

Methods to Prevent Cold Stress

When the ambient temperature, or a wind chill equivalent, falls to below 40°F (American Conference of Governmental Industrial Hygienists recommendation), site personnel who must remain outdoors should wear insulated coveralls, insulated boot liners, hard hat helmet liners and insulated hand protection. Wool mittens are more efficient insulators than gloves. Keeping the head covered is very important, since 40% of body heat can be lost when the head is exposed. If it is not necessary to wear a hard hat, a wool knit cap provides the best head protection. A face mask may also be worn.

Persons should dress in several layers rather than one single heavy outer garment. The outer piece of clothing should ideally be wind and water proof. Clothing made of thin cotton fabric or synthetic fabrics such as polypropylene is ideal since it helps to evaporate sweat. Polypropylene is best at wicking away moisture while still retaining its insulating properties. Loosely fitting clothing also aids in sweat evaporation. Denim is not a good protective fabric. It is loosely woven which allows moisture to penetrate. Socks with a high wool content are best. If two pairs of socks are worn, the inner sock should be smaller and made of cotton, polypropylene or a similar type of synthetic material that wicks away moisture. If clothing becomes wet, it should be taken off immediately and a dry set of clothing put on.

If wind conditions become severe, it may become necessary to shield the work area temporarily. The SSO and the PM will determine if this type of action is necessary. Heated break trailers or a designated area that is heated should be available if work is performed continuously in the cold at temperatures, or equivalent wind chill temperatures, of 20°F.

Dehydration occurs in the cold environment and may increase the susceptibility of the worker to cold injury due to significant change in blood flow to the extremities. Drink plenty of fluids, but limit the intake of caffeine.

6. Air Monitoring

6.1 Direct Reading Instruments

Instrument 1 – RaeSystems MiniRae 2000 (PID) equipped with a 10.6 ev lamp

A photoionization detector (PID) will be used by the SSO to identify the presence of chlorinated hydrocarbon vapors in site personnel's breathing zone during subsurface investigations. If the PID indicates sustained (i.e. 15-minute) readings of total organic vapors in the site personnel's breathing zone of 50 units or more, Level C respiratory protection will be worn by all personnel working.

The PID will also be used during the subsurface investigations to collect periodic air quality readings along the boundary of the property adjacent to Woodbridge Estates Subdivision, and at the designated boundary of the work zone to protect community health.

During sampling events, the PID will be used to monitor concentrations inside the well casing and also to determine breakthrough of the first vapor-phase carbon canister at the new air stripper.

6.2 Personal Air Sampling

OSHA does not require the collection of personal air sampling during the proposed activities. As such, this type of monitoring will not be conducted by personnel during any of the proposed tasks.

6.3 Calibration and Recordkeeping

Equipment used by on-site personnel will be calibrated in accordance with the quality assurance plan and standard operating procedures. A log of PID readings will be kept in the field notebook. Daily calibration information will also be recorded in the field notebook.

7. Personal Protective Equipment

Personal protective equipment (PPE) will be worn during site activities to prevent on-site personnel from being injured by the safety hazards posed by the site and/or the activities being performed. In addition, chemical protective clothing will be worn to prevent direct dermal contact with the site's chemical contaminants. The following table describes the PPE and chemical protective clothing to be worn for general site activities and for certain specific tasks.

7.1 Chemical Protective Clothing

PPE Item	Task 1	Task 2	Task 3
Hard Hat	✓	✓	
Steel Toed Safety Shoes	✓	✓	✓
Safety Glasses with Sideshields	✓	✓	✓
Traffic Vests	*		*
Inner PVC/Outer Nitrile Gloves	✓		✓
Hearing Protection	✓	✓	✓

Task 1 – Drilling and Well Installation
* - when working in streets or parking area

Task 2 – Groundwater Treatment System Installation and Start Up

Task 3 – Environmental Sampling
* - when working in streets or parking area

7.2 Respiratory Protection

A photoionization detector (PID) will be used by the SSO to identify the presence of any volatile organic vapors in the breathing zone during site activities. If the PID indicates sustained (i.e. 15-minute) readings of total organic vapors in the employee's breathing zone of 50 units or more, Level C respiratory protection will be worn.

Level C : Half-mask, air-purifying respirator equipped with organic vapor cartridges

Respiratory protection should also be worn if odors become objectionable at any time or if respiratory tract irritation is noticed. All on-site personnel who are expected to wear respiratory protection must have successfully passed a qualitative or quantitative fit-test within the past year for the brand, model and size respirator they plan to wear during the proposed activities.

7.3 Other Safety Equipment

The field team will bring the following additional safety items to the site for use as necessary:

- Portable, hand-held eyewash bottles
- First aid kit
- Portable communications equipment
- Fire Extinguisher

8. Site Control

8.1 Work Zones

To prevent both exposure of unprotected personnel and migration of contamination due to tracking by personnel or equipment, work areas along with personal protective equipment requirements will be clearly identified. Work areas or zones will be designated as suggested in the "Occupational Safety and Health Guidance Manual for Hazardous Waste Site Activities," NIOSH/OSHA/USCG/EPA, November, 1985. They recommend the areas surrounding each of the work areas to be divided into three zones:

- Exclusion or "hot" Zone
- Contamination Reduction Zone (CRZ)
- Support Zone

8.1.1 Exclusion Zone

An exclusion zone will be established around each boring location. Zones will also be established at any groundwater sampling location that is in the path of traffic. This zone should be large enough (i.e. 20 foot radius) to protect unprotected personnel from contact with vapors or dusts that may arise from these operations as well as the physical hazards associated with the operation of heavy equipment. Traffic cones or tape will be used to demarcate the exclusion zone.

All personnel entering the exclusion zone must be trained in accordance with the requirements defined in Section 10.2 of this HASP and must wear the prescribed level of personal protective equipment.

8.1.2 Contamination Reduction Zone

The decontamination zone will be established adjacent to the exclusion zone. Personnel will remove contaminated gloves and other disposable items in this area and place them in a plastic bag until they can be properly disposed of.

8.1.3 Support Zone

At this site the support zone will include the area outside of the exclusion zone.

8.2 Safety Practices

The following measures are designed to augment the specific health and safety guidelines provided in this plan.

- The "buddy system" will be used at all times by any field personnel entering confined space. Standby team members must be intimately familiar with the procedures for initiating an emergency response.
- Eating, drinking, chewing gum or tobacco, smoking or any practice that increases the probability of hand-to-mouth transfer and ingestion of materials is prohibited in the immediate work area and the decontamination zone.
- Smoking is prohibited in all work areas. Matches and lighters are not allowed in these areas.

- Hands and face must be thoroughly washed upon leaving the work area and before eating, drinking or any other activities.
- Beards or other facial hair that interfere with respirator fit are prohibited.
- The use of alcohol or illicit drugs is prohibited during the conduct of field operations.
- All equipment must be decontaminated or properly discarded before leaving the site in accordance with the project work plan.

9. Decontamination

9.1 Personal Decontamination

Proper decontamination is required of all personnel before leaving the site. Decontamination will occur within the contamination reduction zone. Disposable PPE will be removed in the decontamination zone and placed in lined garbage bags.

If worn, respirators will be cleaned after each use with respirator wipe pads and will be stored in plastic bags after cleaning.

Regardless of the type of decontamination system required, a container of potable water and liquid soap will be made available so employees can wash their hands before leaving the site for lunch or for the day.

10. Medical Monitoring and Training Requirements

10.1 Medical Monitoring

All personnel performing activities covered by this HASP must be active participants in a medical monitoring program that complies with 29 CFR 1910.120(f). Each individual must have completed an annual surveillance physical examination and/or an initial baseline physical examination within the last year prior to performing any work on the site covered by this HASP.

10.2 Health and Safety Training

All personnel performing activities covered by this HASP must have completed the appropriate training requirements specified in 29 CFR 1910.120(e). Each individual must have completed an annual 8-hour refresher-training course and/or initial 40-hour training course within the last year prior to performing any work on the sites covered by this HASP.

10.3 Pre-Entry Briefing

The SSO will conduct a pre-entry briefing before site activities begin. HASP receipt and acceptance sheets will be collected at this meeting. Short safety refresher meetings will be conducted, as needed, throughout the duration of the project. Attendance of the pre-entry meeting is mandatory and will be documented by the SSO. An attendance form is presented in Attachment B.

11. Emergency Response

OSHA defines emergency response as any "response effort by employees from outside the immediate release area or by other designated responders (i.e., mutual-aid groups, local fire departments, etc.) to an occurrence which results, or is likely to result in an uncontrolled release of a hazardous substance." On-site personnel shall not participate in any emergency response where there are potential safety or health hazards (i.e., fire, explosion, or chemical exposure). Response actions will be limited to evacuation and medical/first aid as described within this section below. As such this section is written to comply with the requirements of 29 CFR 1910.38 (a).

The basic elements of an emergency evacuation plan include:

- employee training,
- alarm systems,
- escape routes,
- escape procedures,
- critical operations or equipment,
- rescue and medical duty assignments,
- designation of responsible parties,
- emergency reporting procedures and
- methods to account for all employees after evacuation.

11.1 Employee Training

Employees must be instructed in the site-specific aspects of emergency evacuation. On-site refresher or update training is required anytime escape routes or procedures are modified or personnel assignments are changed. The SSO must verify the specific evacuation procedures that the facility prefers contractors follow in the event of a facility-related emergency. This information will be communicated to the field team during the pre-entry briefing.

11.2 Alarm Systems/Emergency Signals

11.2.1 On-Site Personnel Emergency

An emergency communication system must be in effect at all sites. The most simple and effective emergency communication system in many situations will be direct verbal communication. Each site must be assessed at the time of initial site activity and periodically as the work progresses. Verbal communication must be supplemented anytime voices can not be clearly perceived above ambient noise levels (i.e., noise from heavy equipment; drilling rigs, backhoes, etc.) and anytime a clear line-of-sight can not be easily maintained among all personnel because of distance, terrain or other obstructions.

Verbal communication will be adequate to warn on-site personnel of hazards associated with the immediate work area. However, the two person sampling team may be split up during the day to expedite sampling. Each team member will be equipped with a cellular phone portable two-way radio to ensure immediate communication can occur between each other. These phones can also be used to contact local emergency responders. Phones are also located within the facility and can be used to call local emergency responders.

11.2.2 Facility-Related Emergency

The SSO must determine if the facility has an emergency signal system in place. If such a system is in place, the SSO will communicate this information to the field team during the pre-entry briefing.

11.3 Escape Routes and Procedures

The SSO will verify the escape routes from each work area with a facility representative. Assembly areas must also be identified. The escape routes and assembly areas will be reviewed during the pre-entry briefing. All personnel on site are responsible for knowing the escape route from the site and where to assemble after evacuation.

11.4 Rescue and Medical Duty Assignments

The phone numbers of the police and fire departments, ambulance service, local hospital, and project representatives are provided in the emergency reference sheet. This sheet will be posted in the site vehicle.

In the event an injury or illness requires more than first aid treatment, the SSO will accompany the injured person to the medical facility and will remain with the person until release or admittance is determined. The SSO will relay all appropriate medical information to the on-site project manager and the HSM.

If the injured employee can be moved from the accident area, he or she will be brought to the contamination reduction zone where their PPE will be removed. If the person is suffering from a back or neck injury the person will not be moved and the requirements for decontamination do not apply. The SSO must familiarize the responding emergency personnel about the nature of the site and the injury. If the responder feels that the PPE can be cut away from the injured person's body, this will be done on-site. If this not feasible, decontamination will be performed after the injured person has been stabilized.

11.5 Designation of Responsible Parties

The SSO is responsible for initiating emergency response. In the event the SSO can not fulfill this duty, the alternate SSO will take charge.

11.6 Employee Accounting Method

The SSO is responsible for identifying all personnel on-site at all times. On small, short duration jobs this can be done informally as long as accurate accounting is possible.

11.7 Accident Reporting and Investigation

Any incident (other than minor first aid treatment) resulting in injury, illness or property damage requires an accident investigation and report. The investigation should be conducted as soon as emergency conditions are under control. The purpose of the investigation is not to attribute blame but to determine the pertinent facts so that repeat or similar occurrences can be avoided. An accident investigation form is

presented in Attachment C of this HASP. The Supervisor of the injured personnel and the HSM should be notified immediately of the injury.

If a subcontractor personnel is injured, they are required to notify the SSO. Once the incident is under control, the subcontractor will submit a copy of their company's accident investigation report to the SSO.

EMERGENCY REFERENCES

Ambulance:	Notify 9-1-1
Fire:	Notify 9-1-1
Police:	Notify 9-1-1
Hospital - Poughkeepsie:	**845-483-5000** St. Francis Hospital 241 North Road Poughkeepsie, NY 12601
Directions to Hospital:	From site turn LEFT onto NY-55/Freedom Plains Road. Follow west for approximately 5.5 miles Stay straight to go onto Mill Street. Turn RIGHT onto Columbus Drive. Columbus Drive becomes Washington Street. Washington Street becomes North Road.

Project Representatives:

Theresa Beddoe (PM, HSM)	Office:	585-385-0609
UHTC	Cell:	585-455-9192
8 Mill Road	Home:	585-387-8996
Fairport, New York 14450		
Sterling Environmental Engineering, P.C.	Office:	518/456-4900
Mark P. Millspaugh, P.E.	Cell:	518/573-4796
Elizabeth Davis	Cell:	518/339-7964
1 Columbia Circle		
Albany, New York 12203		
Conrad Geoscience	Office:	845/454-2544
John Conrad	Cell:	914/475-2670
8 Raymond Avenue		
Poughkeepsie, New York 12603		
Craig Stiles (SSO)	Home:	585-467-9640
Independent Contractor	Cell:	585-750-9640

Apple Valley Corporation 845-897-4384

James A. Klein (Owner)
Ernie Henzler (Site Representative)

Attachment A

Health and Safety Plan Receipt and Acceptance Form

Health and Safety Plan Receipt and Acceptance Form

Interim Remedial Action
Apple Valley Shopping Center Superfund Site
Town of LaGrange, New York
NYSDEC Site No. 3-14-084

I have received a copy of the Health and Safety Plan prepared for the above-referenced site and activities. I have read and understood its contents and I agree that I will abide by its requirements.

Name (Print) _____

Signature _____

Date _____

Representing (Print) _____
Company Name

Attachment B

Health and Safety Plan Pre-Entry Briefing Attendance Form

Interim Remedial Action
Apple Valley Shopping Center Superfund Site
Town of LaGrange, New York
NYSDEC Site No. 3-14-084

Briefing Conducted By: _____

Date Performed: _____

Printed Name	Signature	Representing

Attachment C

Supervisor's Accident Investigation Report Form

SUPERVISOR'S ACCIDENT INVESTIGATION REPORT

Injured Employee _____ Job Title _____

Home Office _____ Division/Department _____

Date/Time of Accident _____

Location of Accident _____

Witnesses to the Accident _____

Injury Incurred? _____ Nature of Injury _____

_____

Engaged in What Task When Injured? _____

_____

Will Lost Time Occur? ____ How Long? _____ Date Lost Time Began _____

Were Other Persons Involved/Injured? _____

_____

How Did the Accident Occur? _____

_____

_____

_____

_____

What Could Be Done to Prevent Recurrence of the Accident? _____

_____

_____

What Actions Have You Taken Thus Far to Prevent Recurrence? _____

_____

_____

Supervisor's Signature _____ Title _____ Date _____

Reviewer's Signature _____ Title _____ Date _____

Note: If the space provided on this form is insufficient, provide additional information on a separate page and attach. The completed accident investigation report must be submitted to the Health and Safety Manager within two days of the occurrence of the accident.