McMahon & Mann
Consulting Engineers, P.C.

CHEM-TROL SITE

Site Code: 915015

SOIL VAPOR INTRUSION STUDY REPORT

HAMBURG, NEW YORK

***Prepared for*:**

SC Holdings, Inc.

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EXECUTIVE SUMMARY

McMahon & Mann Consulting Engineers, P.C. (MMCE) prepared this report documenting the soil vapor intrusion (SVI) assessment completed at the Chem-Trol site on behalf of S.C. Holdings, Inc. The SVI investigation was requested by the New York State Department of Environmental Conservation (NYSDEC) as volatile organics were detected in MW-13R on the west side of the South Branch of Smokes Creek. The site remedy includes a groundwater collection and treatment system that was installed at the site to limit future migration of VOC's in the groundwater. The objective of the SVI study is to assess whether VOC's, in excess of their appropriate standard, criteria or guidance concentration, are migrating in the soil vapor between MW-13R and the western property boundary of the Chem-Trol site.

Work was completed in accordance with the Soil Vapor Intrusion Study Work Plan prepared by MMCE dated July 2006. The work plan was developed based on New York State Department of Health (NYSDOH) draft *Guidance for Evaluating Soil Vapor Intrusion in the State of New York* (February 2005) and was reviewed by the NYSDOH and the NYSDEC and accepted in a letter dated August 25, 2006.

The work included assessing the likely migration pattern for VOC's (i.e., through bedrock fractures), installing probes in the potential migration area and sampling and analyzing the soil vapor through the probes. MMCE completed the field investigation on September 25 and 26, 2006. NYSDEC personnel were on-site throughout the field investigations.

The field investigation included documenting the observed bedrock fracture pattern in the South Branch of Smokes Creek, completion of hand auger borings to observe and document subsurface soil conditions, installation of soil vapor probes and sample collection. Additionally, a groundwater sample from monitoring well MW-13R was collected for analytical testing.

The NYSDOH guidance document recommends that soil vapor sample analytical test results be compared to background outdoor ambient air concentrations and site related outdoor ambient air concentrations. In addition to the comparisons recommended by the NYSDOH, MMCE compared the results with the USEPA Region 3 Risk Based Concentration (RBC) table for VOCs in ambient air, the USEPA Region 9 Preliminary Remediation Goals (PRG) table for VOCs in ambient air, and the NYSDEC Toxic Air Monitoring System (TAMS) results for Whiteface Mountain and Lackawanna.

The results of this SVI assessment conclude that the low levels of VOCs detected in the soils of South Branch of Smokes Creek do not pose a risk at the site.

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1. INTRODUCTION

McMahon & Mann Consulting Engineers, P.C. (MMCE) prepared this report documenting the Soil Vapor Intrusion (SVI) investigation completed at the Chem-Trol site for S.C. Holdings, Inc. Work was completed in accordance with the Soil Vapor Intrusion Study Work Plan prepared by MMCE dated July 2006. The work plan was reviewed by the New York State Department of Health (NYSDOH) and the New York State Department of Environmental Conservation (NYSDEC) and accepted in a letter dated August 25, 2006. A copy of the work plan and acceptance letter is included in Appendix A.

Volatile organic compounds (VOCs) have historically been detected in monitoring well MW-13R located adjacent to the South Branch of Smokes Creek approximately 67 feet from the western property line of the site (see Figure 1). As part of the NYSDEC approved site remedy, a groundwater collection and treatment system has been installed between the site and the South Branch of Smokes Creek to limit future migration of VOC's in the groundwater.

The NYSDEC and NYSDOH requested S.C. Holdings, Inc. assess whether VOC's, are migrating in the soil vapor between MW-13R and the western property boundary of the Chem-Trol site in excess of their appropriate standard, criteria or guidance concentration.

The field investigation included assessing the likely migration pattern for VOC's (i.e., through bedrock fractures), installing probes in the potential migration area and sampling and analyzing the soil vapor through the probes. The analytical results are compared with risk based guidance concentrations as recommended by the NYSDOH final *Guidance for Evaluating Soil Vapor Intrusion in the State of New York* (October 2006) and ambient air VOC data.

2. HYDROGEOLOGIC SITE CONDITIONS

Figure 1 provides a site plan view and cross section of the Chem-Trol site and residential properties to the west of the site. The South Branch of Smokes Creek (creek) flows along the west side of the site between the residential properties and the area of remedial activity on the Chem-Trol site.

The cross section extends between the approximate locations of groundwater monitoring wells MW-2S on the Chem-Trol site and MW-16R located on residential property off South Alfred Road. As depicted in the cross section, the ground surface and the bedrock surface rise approximately 30 feet on either side of the creek.

The stratigraphic cross section at the site includes surficial soils consisting of topsoil and/or miscellaneous fill; glacial till soils; and weathered shale with more competent shale below.

Groundwater recharge occurs as surface water infiltrates vertically through the surficial soils and glacial till. The amount of surface water infiltration is limited due to the low hydraulic conductivity of the upper portion of the glacial till and the soil cover overlying the site. In 1994, a remedial investigation (RI) was completed to assess the effect of the site on groundwater, surface water, surface water sediments, floodplain sediments adjacent to the creek and site soils. The hydraulic properties of these materials based on data provided in the RI (1994) are summarized below.

Material	Thickness (feet)	Hydraulic Conductivity (cm/sec)
Lower Glacial Till (coarser grained portion)	0.5 to 4.7	$9x10^{-5}$
Weathered Shale	25 to 30	$3x10^{-3}$
Competent Shale	65 to 130	$3x10^{-5}$

As the infiltrating water reaches the lower glacial till, it flows downward through the glacial till into the more permeable weathered shale. Flow in the weathered shale is believed to be the primary flow path across the site due to its relatively high permeability. Groundwater from the Chem-Trol site flows within the weathered shale in a westerly direction, along fractures and bedding planes, towards the creek (see Figure 1) where the creek bottom is in bedrock.

During the RI, fractures were noted within the bed of the creek. The strike of the observed fractures as reported in the RI (1994) was typically about N 70^{o} E and N 30^{o} W and the fracture spacing varied between 0.2 and 17 feet.

Water level measurements made in the South Branch of Smokes Creek and the adjacent wells (MW-8R and MW-13R) indicate that groundwater at the site discharges from the weathered shale to the South Branch of Smokes Creek.

The groundwater elevation to the west of the site is above the creek elevation and therefore groundwater flow is easterly toward the creek. Therefore, groundwater flows from the east and west towards the creek and then along the creek alignment.

As discussed in the work plan, groundwater sample test results indicate that the groundwater in the overburden and upper weathered shale have been impacted primarily by VOCs.

Compounds detected at the site included 1,1-dichloroethene, 1,1-dichloroethane, 1,1,1-trichloroethane, trichloroethene, toluene, benzene and o-chlorotoluene.

A groundwater collection and treatment system was installed at the site to collect and treat the groundwater in the bedrock. The treatment system is shown on Figure 1 and includes a collection trench extending into bedrock, collection wells and a treatment building. The system is designed to limit the future off site migration of VOCs in the groundwater.

3. FIELD INVESTIGATION

MMCE completed the field investigation on September 25 and 26, 2006. NYSDEC personnel were on-site throughout the field investigations. The location of the soil vapor study area is shown on Figures 1 and 2. The field investigation included documenting the observed bedrock fracture pattern in the creek, completion of hand auger borings to observe and document subsurface soil conditions, installation of soil vapor probes and sample collection. Additionally, a sample from groundwater monitoring well MW-13 R was collected for analytical testing. Each is discussed below.

3.1 Bedrock Fracture Pattern Observation

Because groundwater from the site flows along fractures and bedding planes within the weathered shale, migration of VOCs in the soil vapor would also follow bedrock fractures. As described in the work plan, MMCE located bedrock fractures in the bed of the South Branch of Smokes Creek in the vicinity of MW-13R. MMCE then projected the orientation of the observed fractures westward towards the residential properties east of South Alfred Road. The soil vapor probes were located in the area of the projected fractures as the most likely locations to detect VOC migration.

MMCE observed two bedrock joints in the bed of the creek in the vicinity of MW-13R. MMCE recorded the strike of the observed fractures to be approximately N 66° W and the fracture spacing between the two joints to be approximately 5 feet. Figure 2 shows the location of the observed bedrock fractures. The observed bedrock fractures were projected toward the west property line as shown on Figure 2. A photo of the northern bedrock fracture is included in Appendix B.

3.2 Hand Auger Observations

MMCE used a 3 ½ -inch hand bucket auger to complete two hand auger holes (denoted HA-1 and HA-2) to visually observe the subsurface soil conditions and determine the approximate depth to bedrock. The location of the hand auger holes is shown on Figure 2. The following table summarizes soil conditions observed during the hand augering.

Hand Auger Designation	Depth (ft)	Observation / Description
HA-1	0 to 3.5	Moist Brown Sandy Silt
	3.5 to 3.75 (refusal)	Black Sand & Shale Chips
HA-2	0 to 4.25	Moist Brown Sandy Silt
	4.25 to 4.45 (refusal)	Gray Sand & Shale Chips

3.3 Soil Vapor Probe Installation and Sampling

Soil vapor probes (denoted GP-1 and GP-2) were installed along the projected bedrock fractures observed in the South Branch of Smokes Creek (see Figure 2). GP-1 and GP-2 were located approximately 34 feet and 66 feet away from MW-13R, respectively. Each probe consisted of ½ inch diameter galvanized steel pipe fitted with a removable tip. The probes were driven to the top of rock using a post slide hammer and then retracted about 2 to 3 inches to remove the tip. A length of new ¼-inch polyethylene tubing (sample tube) was inserted approximately 1-inch below the bottom of the pipe. A fitting installed on top of each pipe prevented ambient air from entering the system. The steel probe was sealed at the ground surface with bentonite paste to prevent preferential flow along the interface of the probe annulus and surrounding soils. An inverted 5 gallon plastic bucket was placed over the top of the soil vapor probe and the sample tube was inserted through the side of the bucket and connected to the top of the soil vapor probe.

3.3.1 Tracer Gas Sampling

Prior to collecting a soil vapor sample, a tracer gas (helium) was introduced into the inverted 5 gallon bucket at approximately 14 pounds per square inch (psi) to check for infiltration of air into the soil vapor probe (see Figure 3). Helium tracer gas was introduced into the bucket while the polyethylene tubing was purged a minimum of three volumes of the probe using a MITYVAC hand held vacuum pump. A soil vapor sample was obtained after purging and checked for helium using a Mark 9822 helium detector. Appendix C includes a copy of the Mark 9822 helium detector specification sheet. The tracer gas results are summarized in Appendix C.

Once it was determined that the tubing and probe were sealed, a soil vapor sample was obtained as described below.

3.3.2 Soil Vapor Sampling

A soil vapor sample was collected from each soil vapor probe after tracer gas sampling demonstrated each probe was sealed from ambient air and a minimum three probe volumes of air had been purged. The sample tube was removed from the helium detector and connected to the Summa Canister provided by Severn Trent Laboratories (STL). The Summa

canister was under a negative pressure to create a vacuum in the soil vapor probe. Each Summa canister was fitted with a flow regulator to control soil vapor flow into the Summa canister over a four hour time period. Appendix B contains photographs of the equipment setup. The data collected during the soil vapor sampling is summarized in Appendix D.

Following collection of the soil vapor samples, the Summa canisters were shipped to STL for analytical testing. The samples were analyzed for the TO-15 list plus cyclohexane and o-chlorotoluene (2-Chlorotoluene).

3.4 Monitoring Well MW-13R Sampling

STL collected a groundwater sample from MW-13R on September 27, 2007 as part of the annual sampling completed at the site. The sample was collected for analytical testing according to the New York State Department of Environmental Conservation (NYSDEC) target compound list (TCL) plus orthochlorotoluene.

4. ANALYTICAL TEST RESULTS

The laboratory analytical test results for soil vapor probes GP-1 and GP-2 and monitoring well MW-13R are included in Appendix D and summarized on Table 1. For parameters detected, the value is bolded and shaded in Table 1.

As shown on Table 1[1], seven VOCs were detected in monitoring well MW-13R, 13 VOCs were detected in GP-1 and 10 VOCs were detected in GP-2. Only three VOCs (1-1 dichloroethane, benzene and chloroethane) detected in MW-13R were detected in either of the soil vapor probes GP-1 and GP-2. Benzene was the only parameter detected at all three sampling locations.

5. DISCUSSION OF RESULTS

The NYSDOH document titled *Guidance for Evaluating Soil Vapor Intrusion in the State of New York*[2] provides guidance for evaluating sampling results. In Section 3.3 of the NYSDOH guidance document, it is recommended that soil vapor sample analytical test results be compared to background outdoor ambient air concentrations, site related outdoor ambient air concentrations, and the NYSDOH's guidelines for VOCs in ambient air.

In addition to the comparisons recommended by the NYSDOH, MMCE compared the results with risk based values from the USEPA Region 3 Risk Based Concentration (RBC) table for VOCs in ambient air, the USEPA Region 9 Preliminary Remediation Goals (PRG) table for

[1] The value for total xylene is the sum of the m&p-xylene and o-xylene values shown in Table 2
[2] New York State Department of Health, Final Guidance for Evaluating Soil Vapor Intrusion in the State of New York, dated October 2006

VOCs in ambient air, and the NYSDEC Toxic Air Monitoring System (TAMS) results for Whiteface Mountain and Lackawanna. The analytical testing results for soil vapor samples from GP-1 and GP-2 compared with the NYSDOH, USEPA and TAMS data are included in Table 2.

5.1 Risk Based Guidance Values

NYSDOH has published guidance values for the VOC's methylene chloride, tetrachloroethane and trichloroethene in ambient air. Table 2 lists monitoring results for GP-1 and GP-2 along with the three NYSDOH risk based guidance VOC values in ambient air.

In addition to the NYSDOH risk based guidance values, guidance values (RBC and PRG values) developed by the USEPA are also included for comparison in Table 2. The RBC values (see Appendix E) developed by USEPA Region 3 contain a listing of toxicity factors for approximately 400 chemicals. USEPA combined the toxicity factors with "standard" exposure scenarios to calculate RBCs for each chemical corresponding to fixed levels of risk in water, air, fish tissue, and soil[3]. The PRG values (see Appendix E) prepared by USEPA Region 9 combine current USEPA toxicity values with "standard" exposure factors to estimate contaminant concentrations in environmental media (soil, air, and water) considered protective of humans health over a lifetime[4]. The USEPA describes the PRGs as tools for evaluating and cleaning up contaminated sites. They are risk-based concentrations that are intended to assist risk assessors and others in initial screening-level evaluations of environmental measurements.

5.2 Ambient Air VOC Concentrations

The NYSDOH guidance document includes as Appendix C Table C4 which includes a limited number of VOCs compiled from available air data published for the USEPA in 1988. The database covers the concentrations of more than 300 VOCs in outdoor (urban, rural, remote, source-dominated) and indoor settings. Indoor air data are limited to residential and office space, and exclude studies of emissions or sources, solely health-related studies, laboratory or modeling studies, and industrial workplace studies.

In order to compare the soil vapor sample analytical test results with background outdoor air VOC levels in New York, MMCE obtained ambient air quality analytical data from the NYSDEC TAMS. TAMS is a statewide air quality monitoring network developed to monitor air quality related to toxics in the State's urban, industrial, residential, and rural areas. This monitoring network measures VOCs in the air.

[3] The equations and the exposure factors are shown in the RBC Table companion memo, the Technical Background Document on the USEPA web site http://www.epa.gov/reg3hwmd/risk/human/index.htm.
[4] See the USEPA web site for additional information http://www.epa.gov/region09/waste/sfund/prg/index.html

MMCE compared the results of the soil vapor probes with the background outdoor air levels established at two TAMS sites, Lackawanna (site #1402-14) and Whiteface Mountain Base (site #1567-04). The Lackawanna site was selected for comparison with the Chem-Trol soil vapor probe data due to the proximity of the Lackawanna site to the Chem-Trol site. The Lackawanna site is characterized as an industrial site. The Whiteface Mountain Base site was selected to represent background air quality characteristics of a rural site not associated with industrial activities.

5.3 GP-1 and GP-2 Data Assessment

Comparison of the VOC concentrations in the soil vapor samples obtained from GP-1 and GP-2 are presented in Table 2. Of the VOC parameters analyzed, only 1,4 dichlorobenzene was outside the range of risk based or background values listed in Table 2. However, in USEPA's Soil Vapor Intrusion Guidance[5], the USEPA includes a soil gas-to-indoor air attenuation factor when assessing soil vapor intrusion. The USEPA defines the soil gas-to-indoor air attenuation factor as the ratio of the indoor air concentration to the soil gas concentration either from directly below the foundation or from depths less than 5 feet below foundation level. Considering a soil gas-to-indoor air attenuation factor 0.1, as suggested by the USEPA, the calculated 1,4 dichlorobenzene concentration from soil vapor in GP-2 would be less than the RBC or PRG values listed in Table 2.

6. CONCLUSION AND RECOMMENDATION

Groundwater flow beneath the residential properties is generally easterly towards the South Branch of Smokes Creek and the site (see discussion in Section 2). The presence of a groundwater extraction trench constructed between the former Chem-Trol facility and the South Branch of Smokes Creek further controls migration of VOCs in shallow groundwater.

The results of the SVI study conducted at the western property line of the Chem-Trol site conclude that the VOCs detected are less than the risk based values or the background ambient air VOC concentrations listed in Table 2, with the exception of 1,4 dichlorobenzene in GP-1 and GP-2. However, the concentration of 1,4 dichlorobenzene at GP-2 is below the USEPA RBC and PRG values when the soil gas-to-indoor air attenuation factor of 0.1 is applied.

Consequently, the results of this SVI assessment conclude that the concentration of VOCs detected in soil vapor samples taken at the western property boundary of the Chem-Trol site generally decrease in concentration with distance from the South Branch of Smokes Creek and are at concentrations that do not pose a risk at the western property boundary to the site.

[5] *Draft Guidance for Evaluating the Vapor Intrusion to Indoor Air Pathway From Groundwater and Soil (Subsurface Vapor Intrusion Guidance),* November 2002, EPA530-D-02-004, Appendix F Empirical Attenuation Factors and Reliability Assessment

TABLES

TABLE 1

Sampling Summary Table (GP-1, GP-2 and MW-13R)

Parameter	MW-13R [1] (Results in ug/L) 10/18/2006	Qualifier	10/18/2006 DILUTED	Qualifier	GP-1 [2] ppb (v/v)	Qualifier	GP-1 [2] ug/m3	Qualifier	GP-2 [2] ppb (v/v)	Qualifier	GP-2 [2] ug/m3	Qualifier
1,1,1-Trichloroethane	5	ND	100	ND	**13**		**68**		0.2	ND	1.1	ND
1,1,2,2-Tetrachloroethane	5	ND	100	ND	0.20	ND	1.4	ND	0.2	ND	1.4	ND
1,1,2-Trichloro-1,2,2-trifluororethane	5	ND	100	ND	**0.91**		**7.0**		0.2	ND	1.5	ND
1,1,2-Trichloroethane	5	ND	100	ND	0.20	ND	1.1	ND	0.2	ND	1.1	ND
1,1-Dichloroethane	**8.6**		100	ND	**17**		**69**		0.2	ND	0.81	ND
1,1-Dichloroethene	5	ND	100	ND	0.2	ND	0.79	ND	0.2	ND	0.79	ND
1,2,4-Trichlorobenzene	5	ND	100	ND	1.0	ND	7.4	ND	1.0	ND	7.4	ND
1,2-Dibromo-3-Chloropropane DBCP	5	ND	100	ND								
1,2-Dibromoethane (EDB)	5	ND	100	ND	0.2	ND	1.5	ND	0.2	ND	1.5	ND
1,2-Dichlorobenzene	5	ND	100	ND	0.2	ND	1.2	ND	0.2	ND	1.2	ND
1,2-Dichloroethane	5	ND	100	ND	0.2	ND	0.81	ND	0.2	ND	0.81	ND
1,2-Dichloropropane	5	ND	100	ND	0.2	ND	0.92	ND	0.2	ND	0.92	ND
1,3-Dichlorobenzene	5	ND	100	ND	0.2	ND	1.2	ND	0.2	ND	1.2	ND
1,4-Dichlorobenzene	5	ND	100	ND	**1.0**		**6.1**		**0.4**		**2.4**	
2-Hexanone	25	ND	500	ND								
Acetone	25	ND	500	ND								
Benzene	**0.61**	J	100	ND	**0.29**		**0.94**		**0.36**		**1.2**	
Bromoform	5	ND	100	ND								
Bromomethane	5	ND	100	ND	0.2	ND	0.78	ND	0.2	ND	0.78	ND
Carbon Disulfide	5	ND	100	ND								
Carbon Tetrachloride	5	ND	100	ND	0.2	ND	1.3	ND	0.2	ND	1.3	ND
Chlorobenzene	5	ND	100	ND	0.2	ND	0.92	ND	0.2	ND	0.92	ND
Chloroethane	**12**		100	ND	0.2	ND	0.53	ND	**0.23**		**0.60**	
Chloroform	5	ND	100	ND	0.2	ND	0.98	ND	0.2	ND	0.98	ND
Chloromethane	5	ND	100	ND	0.5	ND	1.0	ND	**0.50**		**1.0**	
cis-1,2-Dichloroethene	**1**	J	100	ND	0.2	ND	0.79	ND	0.2	ND	0.79	ND
cis-1,3-Dichloropropene	5	ND	100	ND	0.2	ND	0.91	ND	0.2	ND	0.91	ND
Cyclohexane	**1.2**	J	100	ND	0.5	ND	1.7	ND	0.5	ND	1.7	ND
Dibromochloromethane	5	ND	100	ND								
Dichlorobromomethane (Bromodichloromethane)	5	ND	100	ND								
Dichlorodifluoromethane					0.2	ND	0.99	ND	**0.34**		**1.70**	
Dichlorofluoromethane	5	ND	100	ND								
Ethylbenzene	5	ND	100	ND	**0.52**		**2.3**		**0.57**		**2.5**	
Isopropylbenzene	5	ND	100	ND								
Methyl Acetate	5	ND	100	ND								
Methyl Ethyl ketone	25	ND	500	ND								
Methyl Isobutyl Ketone	25	ND	500	ND								
Methyl tert butyl ether (MTBE)	5	ND	100	ND								
Methylcyclohexane	5	ND	100	ND								
Methylene chloride (Dichloromethane)	5	ND	**18**	DJ	0.5	ND	1.7	ND	0.5	ND	1.7	ND
o-Chlorotoluene	**600**	BE	**680**	BD	0.4	ND	2.1	ND	0.4	ND	2.1	ND
Styrene	5	ND	100	ND	**0.3**		**1.3**		**0.22**		**0.94**	
Tetrachloroethene	5	ND	100	ND	**0.75**		**5.1**		0.2	ND	1.4	ND
Toluene	5	ND	100	ND	**1.9**		**7.0**		**1.8**		**6.6**	
Total Xylenes [3]	15	ND	300	ND	**2.58**		**11.00**		**2.8**		**12.0**	
trans-1,2-Dichloroethene	5	ND	100	ND								
trans-1,3-Dichloropropene	5	ND	100	ND	0.2	ND	0.91	ND	0.2	ND	0.91	ND
Trichloroethene	5	ND	100	ND	**0.84**		**4.5**		0.18	ND	0.97	ND
Trichlorofluoromethane	5	ND	100	ND	0.2	ND	1.1	ND	0.2	ND	1.1	ND
Vinyl Chloride	**0.71**	J	100	ND	0.2	ND	0.51		0.2	ND	0.51	ND
Benzyl Chloride					0.4	ND	2.1	ND	0.4	ND	2.1	ND
1,2-Dichloro-1,1,2,2-tetrafluoroeth					0.2	ND	1.4	ND	0.2	ND	1.4	ND
Hexachlorobutadiene					1.0	ND	11.0	ND	1.0	ND	11.0	ND
1,2,4-Trimethylbenzene					**0.52**		**2.6**		**0.23**		**1.1**	
1,3,5-Trimethylbenzene					**0.28**		**1.4**		0.2	ND	0.98	ND

QUALIFIER LEGEND

ND - Not Detected

J - Estimated Value

B - Analyte found in associated blank sample

E - Concentration exceeded the calibration range of the instrument

NOTES:

1. MW-13R data obtained from laboratory testing completed Severn Trent Laboratories, Inc dated October 18, 2006.
2. GP-1 and GP-2 results based on Analytical Report prepared by Severn Trent Laboratories, Inc. dated October 13, 2006.
3. The value presented for the samples collected from GP-1 and GP-2 are the sum of m, p and o xylene.

TABLE 2

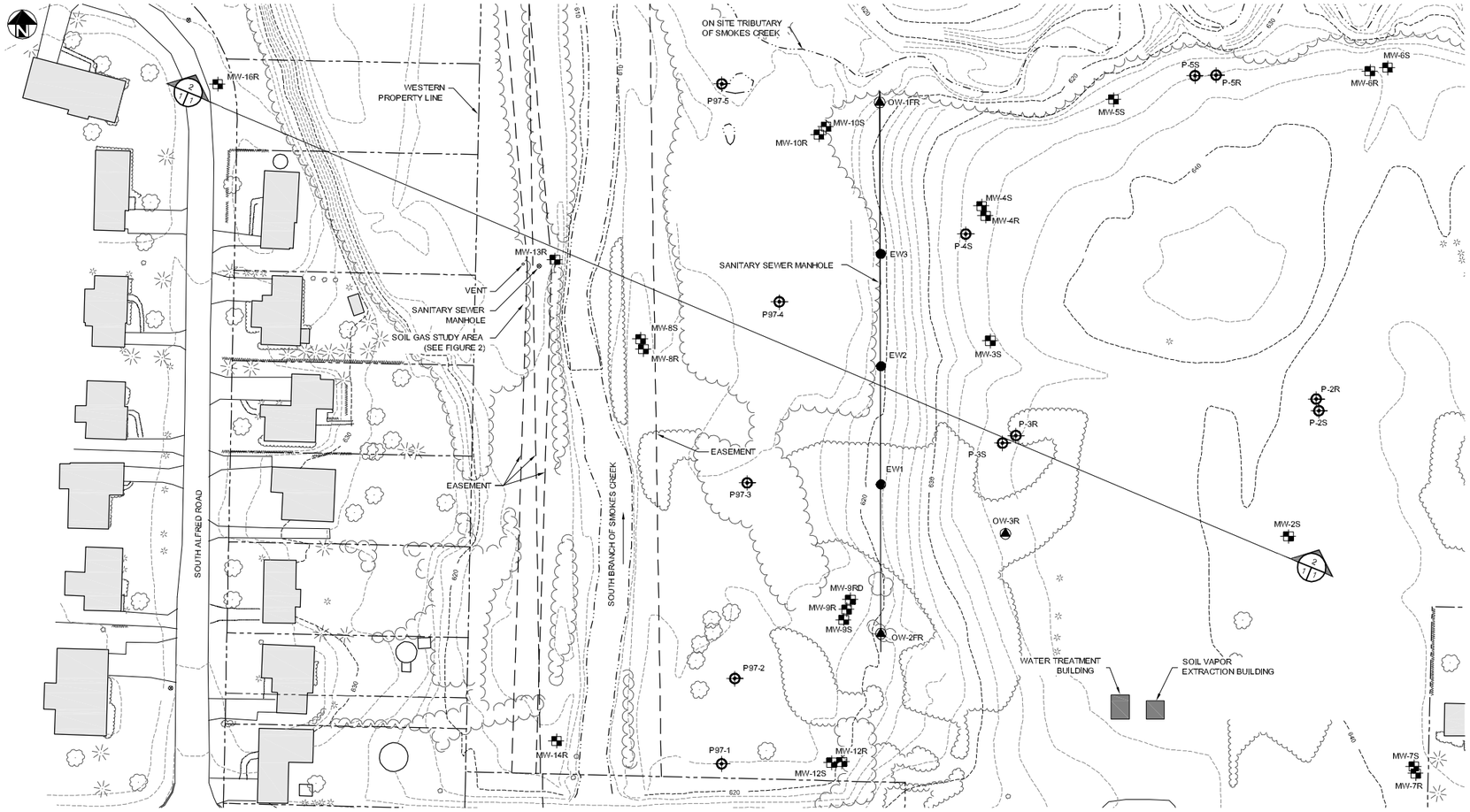
Sampling Comparison to Guidance, Background and Risk Based Values

	Gas Probe Results								Risk Bases Values			Background Values					
	GP-1 [1]				GP-2 [1]				NYSDOH Ambient Air Guidance (ug/m^3) [2]	USEPA Region 3 RBC Ambient Air (ug/m^3) [6]	USEPA Region 9 PRG Ambient Air (ug/m^3) [7]	Whiteface Mountain Base (site #1567-04) [3] 2003 Average Annual Data (ppb v/v)		Lackawanna (site #1402-14) [4] 2003 Average Annual Data (ppb v/v)		NYSDOH Indoor Air 75th percentile (ug/m^3) [5]	NYSDOH Outdoor Air 75th percentile (ug/m^3) [5]
Parameter	ppb (v/v)	Qualifier	ug/m3	Qualifier	ppb (v/v)	Qualifier	ug/m3	Qualifier				Min.	Max.	Min.	Max.		
1,1,1-Trichloroethane	**13**		**72**		0.2	ND	1.1	ND	NV	1000	2300	0.029	0.07	0.028	0.228	30	3.3
1,1,2,2-Tetrachloroethane	0.20	ND	1.4	ND	0.2	ND	1.4	ND	NV	0.031	0.033	0.000	0.033	0	0.04	0	0.06
1,1,2-Trichloro-1,2,2-trifluororethane	**0.91**		**7.0**		0.2	ND	1.6	ND	NV	31000	NV	NV	NV	NV	NV	NV	NV
1,1,2-Trichloroethane	0.20	ND	1.1	ND	0.2	ND	1.1	ND	NV	0.11	0.12	0.000	0.026	0	0.03	NV	0.14
1,1-Dichloroethane	**17**		**70**		0.2	ND	0.82	ND	NV	510	520	0.000	0.03	0	0.035	NV	0.2
1,1-Dichloroethene	0.2	ND	0.80	ND	0.2	ND	0.80	ND	NV	220	NV	0.000	0.026	0	0.034	0	0
1,2,4-Trichlorobenzene	1.0	ND	7.5	ND	1.0	ND	7.5	ND	NV	37	3.7	NV	NV	NV	NV	NV	1.5
1,2-Dibromoethane (EDB)	0.2	ND	1.4	ND	0.2	ND	1.4	ND	NV	0.0031	0.0034	0.000	0.028	0	0.04	0	0.08
1,2-Dichlorobenzene	0.2	ND	1.2	ND	0.2	ND	1.2	ND	NV	150	210	NV	NV	NV	NV	0	0.23
1,2-Dichloroethane	0.2	ND	0.82	ND	0.2	ND	0.82	ND	NV	0.069	0.074	0.000	0.037	0	0.046	0	0.22
1,2-Dichloropropane	0.2	ND	0.94	ND	0.2	ND	0.94	ND	NV	0.092	0.099	0.000	0.033	0	0.038	NV	0.3
1,3-Dichlorobenzene	0.2	ND	1.2	ND	0.2	ND	1.2	ND	NV	11	110	NV	NV	NV	NV	5.6	1.2
1,4-Dichlorobenzene	**1.0**		**6.1**		**0.4**		**2.4**		NV	0.28	0.31	NV	NV	NV	NV	5.6	1.2
Benzene	**0.29**		**0.94**		**0.36**		**1.2**		NV	0.23	0.25	0.043	0.851	0.179	2.424	21	11
Bromomethane	0.2	ND	0.79	ND	0.2	ND	0.79	ND	NV	5.1	5.2	0.000	0.036	0	0.036	NV	12
Carbon Tetrachloride	0.2	ND	1.3	ND	0.2	ND	1.3	ND	NV	0.12	0.13	0.013	0.157	0.04	0.157	0.83	0.81
Chlorobenzene	0.2	ND	0.93	ND	0.2	ND	0.93	ND	NV	51	62	0.003	0.026	0.004	0.037	0	1.4
Chloroethane	0.2	ND	0.53	ND	**0.23**		**0.62**		NV	2.2	2.3	0.000	0.000	0	0	NV	1.7
Chloroform	0.2	ND	1.6	ND	0.2	ND	1.6	ND	NV	0.077	0.083	0.013	0.045	0.013	0.081	3.4	0.88
Chloromethane	0.5	ND	1.0	ND	**0.50**		**1.0**		NV	95	95	0.365	0.934	0.407	0.714	NV	1.5
cis-1,2-Dichloroethene	0.2	ND	0.80	ND	0.2	ND	0.80	ND	NV	37	NV	0.000	0.025	0	0.029	NV	0.45
cis-1,3-Dichloropropene	0.2	ND	0.92	ND	0.2	ND	0.92	ND	NV	0.63	NV	0.000	0.024	0	0.032	NV	160
Cyclohexane	0.5	ND	1.8	ND	0.5	ND	1.8	ND	NV	6200	6200	NV	NV	NV	NV	NV	NV
Dichlorofluoromethane	0.2	ND	0.86	ND	**0.34**		**1.5**		NV	180	210	0.412	5.003	0.439	0.805	NV	NV
Ethylbenzene	**0.52**		**2.3**		**0.57**		**2.5**		NV	1100	1100	0.007	1.594	0.023	0.818	9.6	5.4
Methylene chloride (Dichloromethane)[8]	0.5	ND	1.8	ND	0.5	ND	1.8	ND	60.0	3.8	4.1	0.015	0.131	0.023	0.456	NV	6.3
o-Chlorotoluene	0.4	ND	2.1	ND	0.4	ND	2.1	ND	NV	73	73	NV	NV	NV	NV	NV	0.67
Styrene	**0.3**		**1.3**		**0.22**		**0.95**		NV	1000	1100	0.000	0.077	0.008	0.19	2.8	1.4
Tetrachloroethene	**0.75**		**5.1**		0.2	ND	1.4	ND	100.0	0.31	NV	0.007	0.035	0.013	0.219	11	5.9
Toluene	**1.9**		**7.3**		**1.8**		**6.9**		NV	5100	400	0.024	11.23	0.15	5.451	0	20
trans-1,3-Dichloropropene	0.2	ND	0.92	ND	0.2	ND	0.92	ND	NV	NV	NV	0.000	0.026	0	0.034	NV	NV
Trichloroethene	**0.84**		**4.6**		0.18	ND	0.98	ND	5.0	0.016	NV	0.000	0.027	0	0.047	4.5	2.5
Trichlorofluoromethane	0.2	ND	1.1	ND	0.2	ND	1.1	ND	NV	730	730	NV	NV	NV	NV	NV	1.2
Vinyl Chloride	0.2	ND	0.52	ND	0.2	ND	0.52	ND	NV	0.072	0.11	0.000	0.000	0	0.016	NV	0.78
Benzyl Chloride	0.4	ND	2.1	ND	0.4	ND	2.1	ND	NV	0.037	0.04	NV	NV	NV	NV	NV	0.09
1,2-Dichloro-1,1,2,2-tetrafluoroethane	0.2	ND	1.6	ND	0.2	ND	1.6	ND	NV	NV	NV	NV	NV	NV	NV	NV	NV
Hexachlorobutadiene	1.0	ND	10.8	ND	1.0	ND	10.8	ND	NV	0.08	0.086	NV	NV	NV	NV	NV	0.06
1,2,4-Trimethylbenzene	**0.52**		**2.6**		**0.23**		**1.1**		NV	NV	6.2	NV	NV	NV	NV	4	7.4
1,3,5-Trimethylbenzene	**0.28**		**1.4**		0.2	ND	1.0	ND	NV	NV	6.2	0.003	0.836	0.009	0.36	5.4	2.5
m-Xylene & p-Xylene	**2.0**		**8.8**		**2.1**		**9.3**		NV	110	110	0.013	6.617	0.06	2.904	18	11
o-Xylene	**0.58**		**2.6**		**0.7**		**3.1**		NV			0.006	2.195	0.023	0.965	9.3	6.5

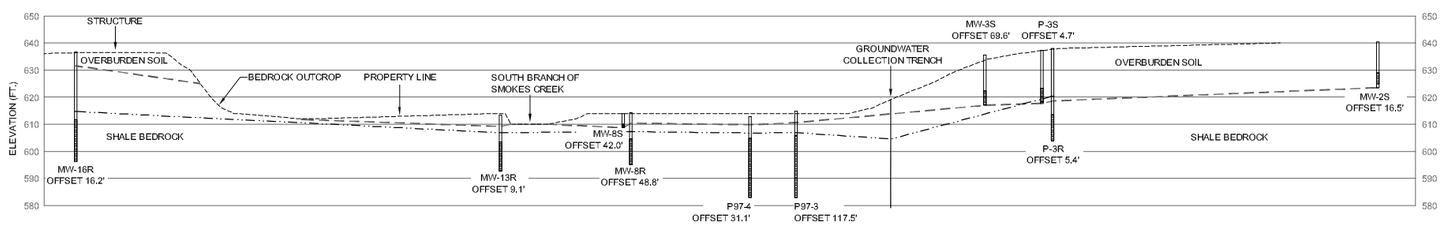
NOTES:

1. GP-1 and GP-2 results based on Analytical Report prepared by Severn Trent Laboratories, Inc. dated October 13, 2006.
2. The air guideline value based on the New York State Department of Health Guidance for Evaluating Soil Vapor Intrusion in the State of New York.
3. Whiteface Mountain Base(Site #1567-04) Annual VOC Data (1999-2003) obtained from New York State Department of Environmental Conservation web site. The site notes that the 2003 data completeness is approximatley 98 percent.
4. Lackawanna site (Site #1402-14) Annual VOC Data (1999-2003) obtained from New York State Department of Environmental Conservation web site. The site notes that the 2003 data completeness is approximatley 89 percent.
5. New York State Department of Health, Final Guidance for Evaluating Soil Vapor Intrusion in the State of New York, dated October 2006 , Appendix C, Table C4.
6. The table of values RBC values can be found on the USEPA web site at http://www.epa.gov/reg3hwmd/risk/human/index.htm.
7. The table of PRG values can be found on the USEPA web site at http://www.epa.gov/region09/waste/sfund/prg/index.html
8. Methylene chloride was detected in a diluted sample from MW-13R but was not detected in the undiluted sample and is therefore likely to be a false positive detection. It was not detected in soil vapor samples from GP-1 and GP-2.

FIGURES



1 / 1 SITE PLAN
SCALE: 1" = 50'



2 / 1 / 1 CROSS SECTION
HORIZONTAL SCALE: 1" =50'
VERTICAL SCALE: 1" = 25'

LEGEND

- EXISTING GROUND CONTOURS
- TREE / TREELINE
- STREAM
- PROPERTY LINE
- EASEMENT
- MW-16R / P97-3 / OW-3R — MONITORING WELL DESIGNATION AND LOCATION
- EW2 — EXTRACTION WELL DESIGNATION AND LOCATION
- GROUNDWATER COLLECTION TRENCH
- BUILDING

NOTES:

1. This map compiled by McIntosh and McIntosh, P.C. using photogrammetric methods from aerial photography dated December 9, 1989.

2. Groundwater elevation data based on field measurements made in March 2006 except for monitoring well MW-16R. The groundwater elevation for MW-16R was taken from "Groundwater Monitoring Chem-Trol Site," prepared by McMahon & Mann Consulting Engineers, P.C. and dated May 1999.

3. The groundwater elevation shown in the groundwater collection trench was measure in extraction well EW-2 in March 2006.

50' 0 25' 50'
SCALE: 1" = 50'

LEGEND

- EXISTING GROUND SURFACE
- BEDROCK
- GROUNDWATER
- MONITORING WELL INTAKE ZONE

50' 0 25' 50'
HORIZONTAL SCALE:1" = 50'

50' 0 25' 50'
VERTICAL SCALE:1" = 25'

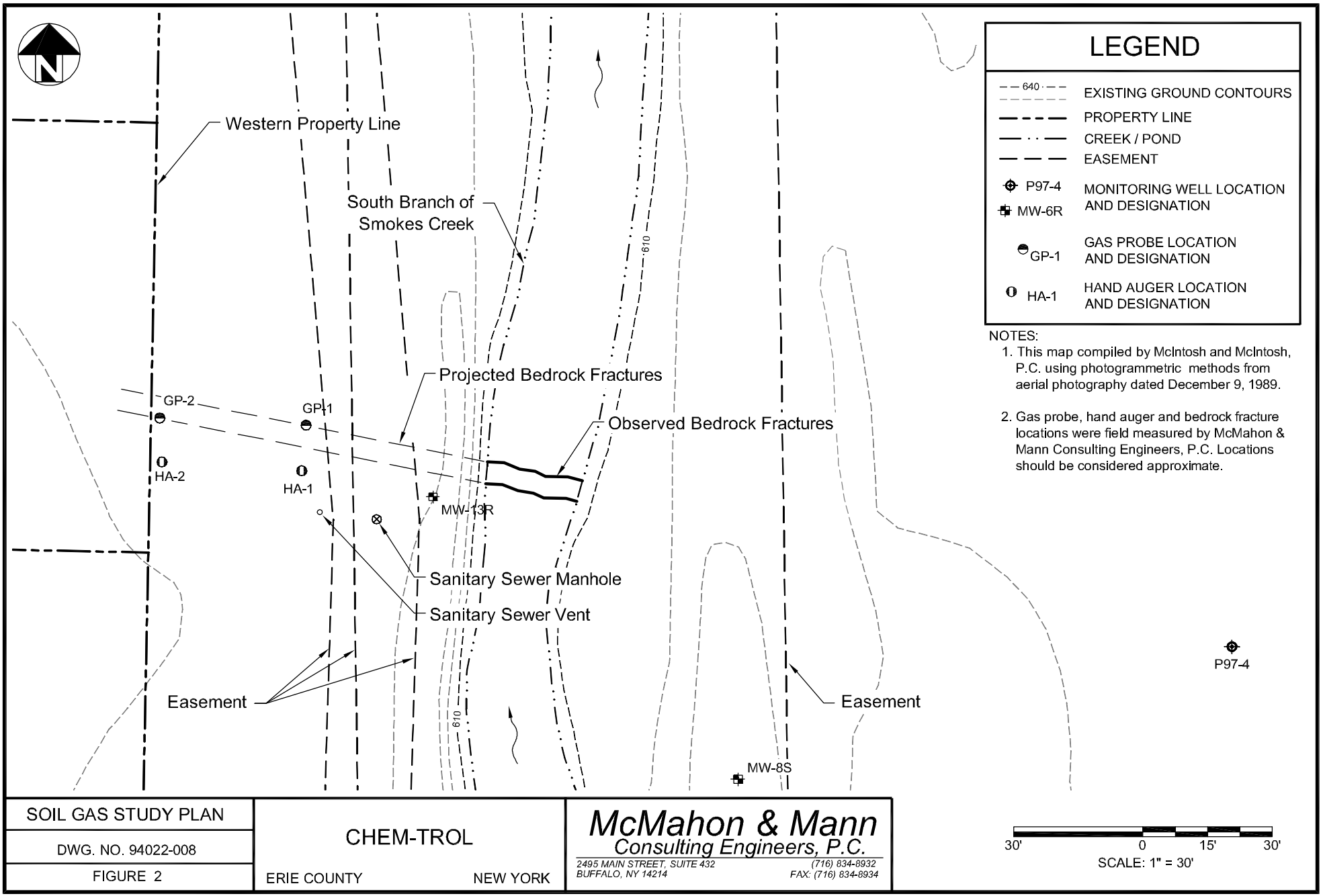
McMahon & Mann
Consulting Engineers, P.C.
2495 MAIN STREET, SUITE 432
BUFFALO, NY 14214
FAX: (716) 8344804

REDUCED

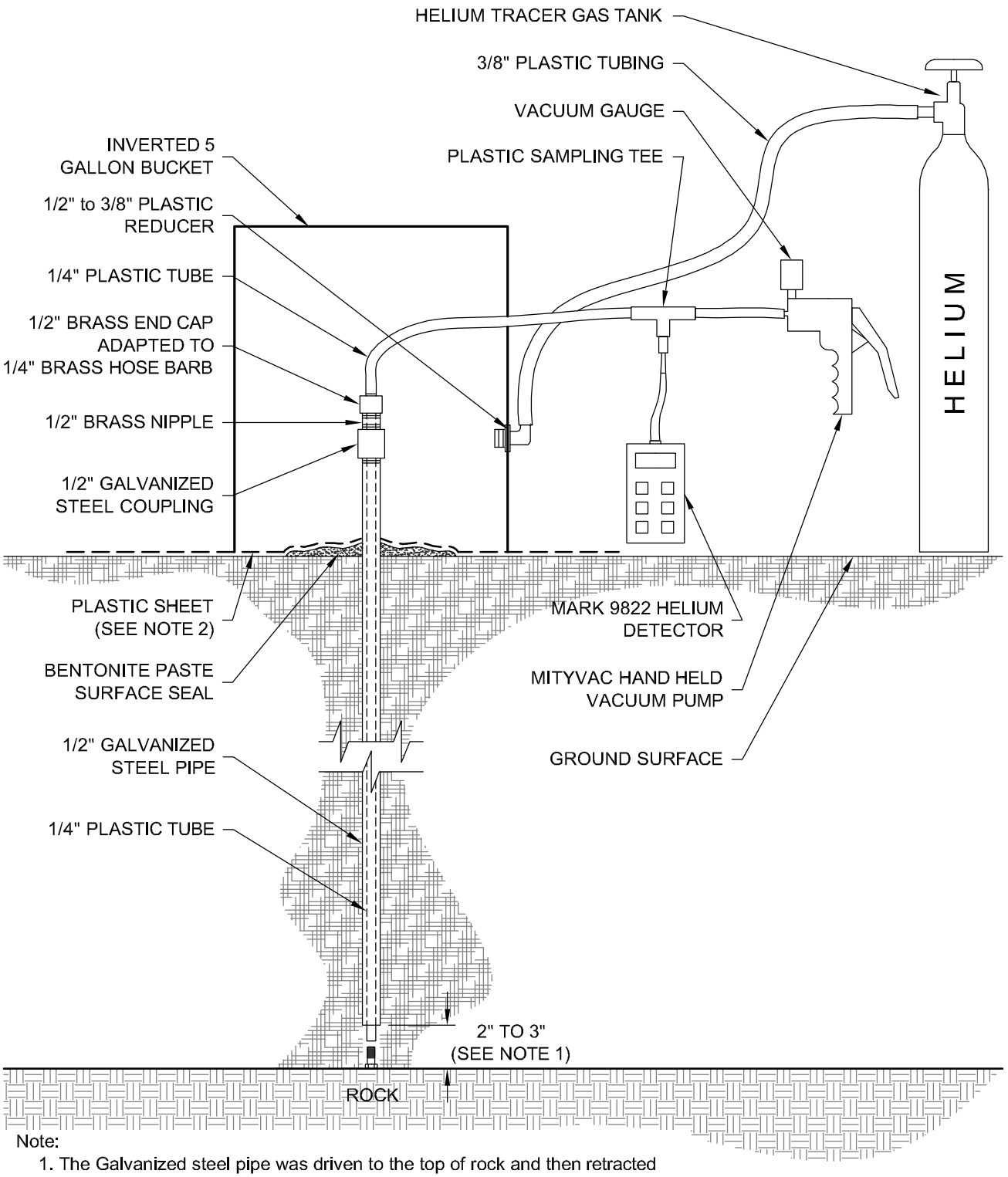
REV 1	
REV 2	
REV 3	
REV 4	
REV 5	
REV 6	

CHEM-TROL
SITE PLAN AND CROSS-SECTION
ERIE COUNTY NEW YORK

DRAWN BY:	C.R.G.
CHECKED BY:	S.W.L.
SCALE:	AS SHOWN
DATE:	NOVEMBER 2006
JOB NO.	94-022
FIGURE	1
DWG. NO.	94022-007
REVISION NUMBER -	0



SOIL GAS STUDY PLAN	CHEM-TROL	McMahon & Mann Consulting Engineers, P.C.
DWG. NO. 94022-008		2495 MAIN STREET, SUITE 432 (716) 834-8932
FIGURE 2	ERIE COUNTY NEW YORK	BUFFALO, NY 14214 FAX: (716) 834-8934



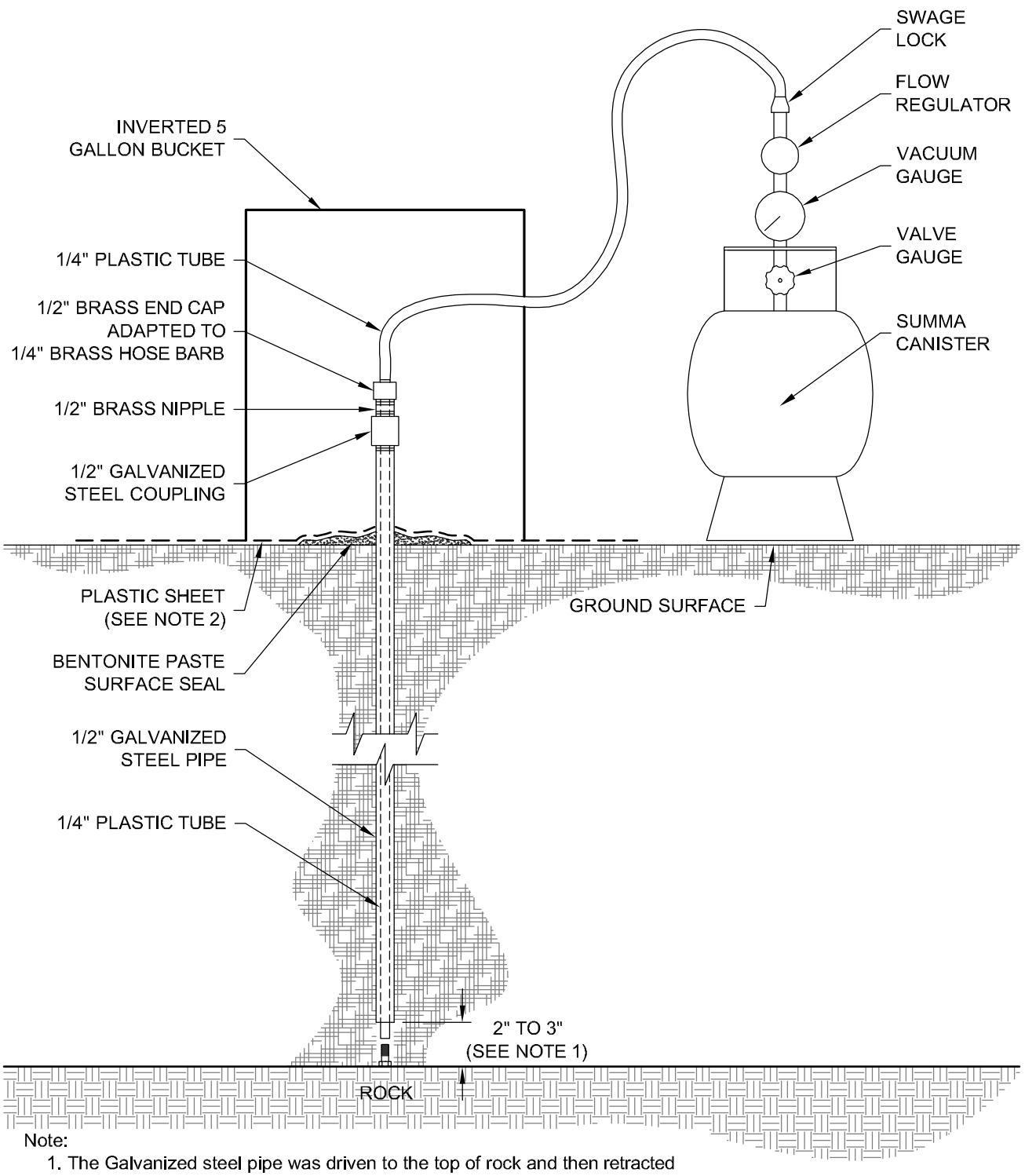
Note:

1. The Galvanized steel pipe was driven to the top of rock and then retracted approximately 2 to 3 inches to drop the bolt out of the pipe.

2. Plastic sheet was only used at gas probe location GP-2.

SCALE: N.T.S.

TRACER GAS SETUP	CHEM-TROL	*McMahon & Mann Consulting Engineers, P.C.*
DWG. NO. 94022-009a		2495 MAIN STREET, SUITE 432 (716) 834-8932
FIGURE 3	ERIE COUNTY NEW YORK	BUFFALO, NY 14214 FAX: (716) 834-8934



Note:

1. The Galvanized steel pipe was driven to the top of rock and then retracted approximately 2 to 3 inches to drop the bolt out of the pipe.

2. Plastic sheet was only used at gas probe location GP-2.

SCALE: N.T.S.

SAMPLING SETUP	CHEM-TROL	McMahon & Mann Consulting Engineers, P.C.
DWG. NO. 94022-009b		2495 MAIN STREET, SUITE 432 (716) 834-8932
FIGURE 4	ERIE COUNTY NEW YORK	BUFFALO, NY 14214 FAX: (716) 834-8934

APPENDIX A

Soil Vapor Intrusion Study Work Plan and Acceptance Letter

APPENDIX B

Photographs

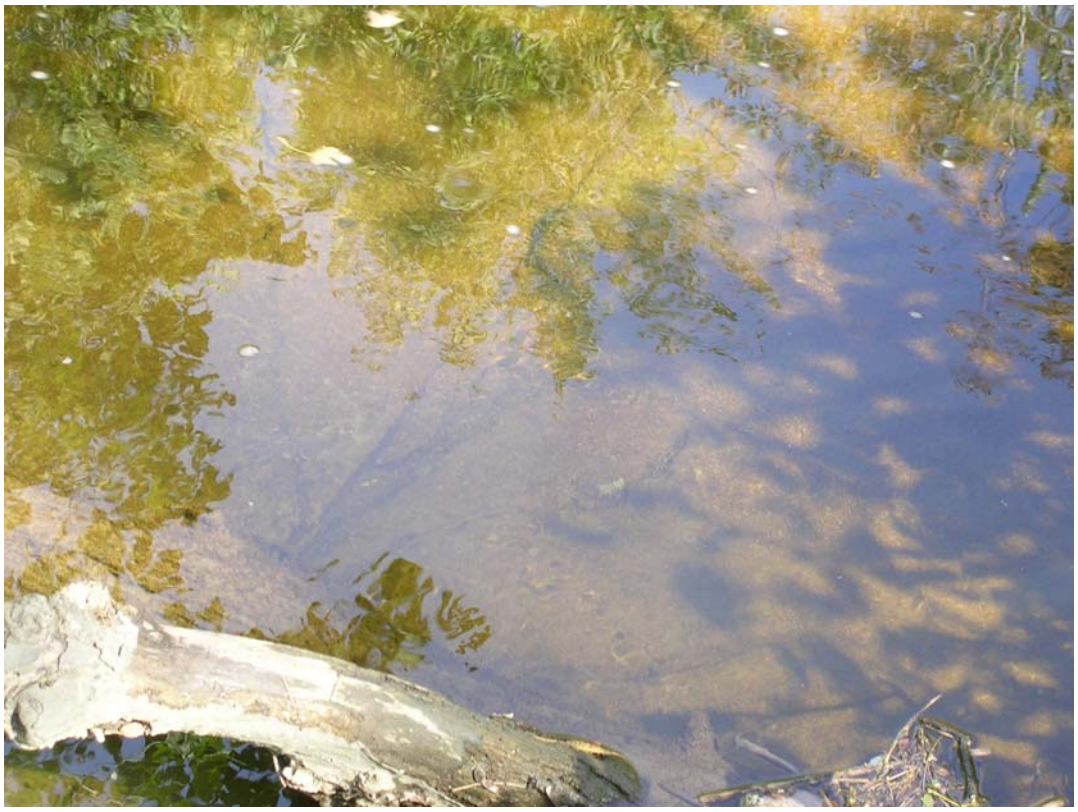


Photo 1: Observed Bedrock Fracture

Photo 2: Top of Gas Probe Setup

Photo 3: Gas Probe Setup

Photo 4: Gas Sample Collection

APPENDIX C

Mark 9822 Helium Detector Specification Sheet
and Tracer Gas Sampling Results

APPENDIX D

Laboratory Sampling Results

Appendix D-1: GP-1 and GP-2
Appendix D-2: MW-13R
Appendix D-3: Summa Canister Sampling Information

APPENDIX D-1

Soil Vapor Probes GP-1 and GP-2

APPENDIX D-2

MW-13R Sampling Results
(Pages 1 through 9 of Analytical Report Prepared by STL dated 10/18/06)

APPENDIX D-3
Summa Canister Sampling Information

APPENDIX E
USEPA RBC & PRG Tables