ROSS ENVIRONMENTAL ASSOCIATES, INC.

Hydrogeology, Water Quality, GIS Planning, Remediation, Regulatory Compliance & Permitting, Environmental Site Assessments, and Radon Mitigation

18 June 2013

Mike and Carol Hamilton
Green Top Market
639 Morristown Corners Road
Morristown, VT 05661

RE: Ground Water Quality Monitoring Report – May 2013
Former Morristown Corners Store (SMS Site # 93-1496)

Dear Mr. and Mrs. Hamilton:

Ross Environmental Associates, Inc. (***R.E.A.***) completed additional monitoring at the Green Top Market (Former Morristown Corner Store) in Morristown, Vermont (**Figure 1 & 2**, Attachment A). This work was completed as part of the quarterly sampling program approved by Mr. Gerold Noyes of the Vermont Department of Environmental Conservation (VT DEC) in a letter dated 2 August 2012.

Contaminant concentrations as compared to the previous sampling events have decreased in monitoring wells MW-5 and AS-1. Review of available data suggests that seasonal fluctuations in groundwater elevations are influencing contaminant concentrations. In general, the SVE system continues to remove contaminant mass from the subsurface and is effectively reducing contaminant concentrations site wide.

The significant findings observed during this monitoring period are summarized below:

- The depth to groundwater ranged from 32.14(MW-5) to 33.34 (AS-1) feet below the top of casing during the May 2013 sampling event. MW-1, MW-2 and MW-4 were dry.
- No volatile petroleum compounds were detected above laboratory detection limits in the groundwater sample collected from AS-1.
- Low concentrations of benzene, ethyl benzene, and 1,2,4 trimethylbenzene, below the VGES, were detected in the sample collected from MW-5.
- Photo-ionization detector (PID) readings on well headspace at MW-1, MW-2, MW-4, MW-5, VE-1, VE-2, VE-3, VE-4, VE-5, and VE-6 ranged between 0.1 and 3.6 parts per million per volume (ppmv) on 21 May 2013.
- The CATOX SVE system has removed an estimated 214.7 gallons (equivalent) of gasoline during its operation since being installed in January 2011, bringing the total volume of gasoline removed since remediation began in August 2009 to approximately 335.7 gallons.

Conclusion/Recommendations:

The SVE system coupled with the FALCO CATOX is effectively reducing contaminant mass on-site. Since its start-up in January 2011, the CATOX system has removed approximately 214.7 gallons of gasoline. Prior to January 2011 the Granular Activated Carbon (GAC) SVE system removed approximately 116 gallons over a 24 month duration. These two systems have effectively removed an equivalent of 335.7 gallons of gasoline from the site.

Based on the most recent groundwater analytical results, ***R.E.A.*** recommends the following:

1. Bi-weekly inspection, operation and maintenance of the existing CATOX SVE remediation system should continue. PID readings of individual vapor points should be screened, flow rates and pressure readings should be recorded, and vapor points should be opened or closed to target the regions of highest contamination on-site.
2. Quarterly sampling should also continue at the site with the next sampling event occurring in July 2013. Where possible, groundwater samples should be collected from monitoring wells MW-1, MW-2, MW-4, MW-5, and AS-1 and analyzed for the possible presence of volatile petroleum compounds in accordance with EPA method 8021b. Additionally, well headspace should be screened prior to sampling to gain a perspective of VOC concentrations in each well column.
3. VE-5 is located beneath the roadbox. During the July 2013 sampling event, the roadbox should be reset to allow access to VE-5.
4. Basement screening, using a PID to monitor for the possible presence of VOCs, should continue on a quarterly basis to assess possible vapor intrusion. Concurrently, the on-site sump should be screened with a PID and any sheening or odors within the sump should be noted. If significant sheening or PID readings indicate that the sump may have been impacted, a water sample should be collected for laboratory analysis.

Copies of site maps showing approximate monitoring well locations (**Figure 3**), ground water flow directions (**Figures 4**), and contaminant distribution (**Figures 5**) are included in Attachment A. Tables summarizing ground-water elevation data (**Table 1**), ground water analytical results (**Table 2**), field measurement data (**Table 3**), routine SVE system site activity and operation and maintenance log (**Table 4**), SVE system product recovery rates (**Table 5**), vapor-phase VOC destruction efficiency (**Table 6**), and individual SVE system influent readings (**Table 7**) are included in Attachment B. Time-series graphs for water quality data are included in Attachment C, and laboratory analytical reports are included in Attachment D.

Groundwater Elevations and Flow Direction

On 21 May 2013, monitoring wells MW-1, MW-2 and MW-4 were dry, and although MW-5, and AS-1 contained water, an accurate assessment of groundwater flow direction could not be determined. Based on the limited data, groundwater flow direction appears to be toward the east-northeast, with an estimated hydraulic gradient of 7.2 percent (AS-1 to MW-5). Water-level measurements and elevation calculations for 21 May 2013 are presented in **Table 1**, Attachment B and groundwater flow direction is shown on **Figure 4** in Attachment A.

On 21 May 2013, the depth to groundwater ranged from 32.14 (MW-5) feet to 33.34 feet (AS-1) below the top of casing (TOC). Static water-table elevations were computed for each monitoring

well by subtracting the corrected or measured depth-to-water readings from the surveyed TOC elevations, which are relative to an arbitrary site datum of 100.00 feet.

Groundwater Sampling and Analysis

Between the 21 September 2012 and 21 May 2013 sampling events, contaminant concentrations increased slightly in the samples collected from monitoring well MW-5 and remained the same in the sample collected from AS-1. In review of the May 2013 groundwater monitoring data, no volatile petroleum compounds above laboratory detection limits were detected in the sample collected from AS-1. Benzene, ethyl benzene, and 1,2,4 trimethylbenzene were detected in the sample collected from MW-5 at concentrations of 1.2, 1.3, and 1.1 μg/L, respectively, which is below the VGES.

No volatile petroleum compounds were detected above laboratory detection limits in the trip-blank sample. The analytical results are summarized on **Table 2**, Attachment B, time-series graphs summarizing historical water quality data are included as Attachment C and the laboratory analytical reports are included as Attachment D. Contaminant distribution, based on samples collected on 21 May 2013, is shown on **Figure 5**, Attachment B.

Prior to sample collection, ***R.E.A*** field personnel measured the product thickness/water level and purged approximately three to five standing volumes of water from each well where possible. Samples were collected by pouring groundwater from a dedicated bailer directly into 40-milliliter glass vials with Teflon-lined septum lids. Sample vials were preserved with hydrochloric acid to reduce the pH to less than two standard units (su). Immediately after sample collection, field measurements were obtained for pH, specific conductivity, temperature, total dissolved solids (TDS), and oxygen reduction potential (ORP). A summary of the field measurement data is included on **Table 3**, Attachment B.

On 21 May 2013, groundwater samples were collected from two monitoring wells (MW-5 and AS-1). MW-1, MW-2, and MW-4 were dry on 21 May 2013; therefore, no samples were collected. The ground-water samples were analyzed for the possible presence of volatile petroleum compounds in accordance with U.S. EPA Method 8021B. All samples were shipped under chain-of-custody in an ice-filled cooler to AMRO Environmental Laboratories Corp. in Merrimack, New Hampshire for laboratory analysis.

Headspace Screening

Due to fluctuating groundwater elevations and the inability to consistently collect groundwater samples from all of the on-site monitoring wells, PID headspace readings have been collected to assess vapor concentrations in each well and vapor extraction point on a periodic basis. These data have been used to effectively alter the SVE system as needed to target the mass of contamination onsite. Headspace PID readings in the monitoring wells and air sparge well (MW-1, MW-2, MW-4, MW-5, and AS-1) and five of the vapor extraction wells (VE-1, VE-2, VE-3, VE-4, and VE-6) were screened on 21 May 2013. VE-5 was not screened because the well cap is located beneath its road box.

On 21 May 2013, PID readings on headspace at wells MW-1, MW-2, MW-4, MW-5, VE-1, VE-2 VE-3, VE-4, and VE-6 were ranged from 0.1 to 3.6 parts per million per volume (ppmv). The SVE system was running on arrival. These PID readings are summarized in **Table 3**, Attachment B.

The PID was calibrated on the day of each site visit with isobutylene gas to a benzene reference. Headspace in each well was screened by opening the well cap and immediately inserting the PID probe into the PVC riser.

CATOX SVE System Operation and Performance

Monitoring data suggest the CATOX SVE system is effectively removing contaminant mass at the site. While the average daily removal of petroleum vapors from the CATOX SVE is similar to the previous granular activated carbon (GAC) SVE system the CATOX SVE is effectively treating 96.9% of the extracted vapors, compared to an average treatment efficiency of 90% from the GAC SVE system. Additionally, the CATOX SVE system has also increased the extraction flow rate by approximately 173%. Although the average daily removal of contamination has remained the same, the increased extraction rate and treatment efficiency offer the capability to more effectively target residual contamination on-site. Additionally, the labor involved with changing carbon drums has been eliminated reducing the amount of time required during routine operation and maintenance.

Since the initial system start-up of the CATOX on 17 January 2011, the system has removed an estimated 908.3 pounds of gasoline which is equivalent to approximately 139.7 gallons, based on gasoline weighing 6.5 pounds per gallon (assuming the specific gravity of gasoline ranges between 0.73 and 0.83 yielding an average of 0.78 [1]). As of 3 June 2013, an estimated total of 1273.6 pounds of gasoline, equivalent to 195.9 gallons, has been removed by both the GAC SVE and CATOX SVE systems.

Highlights of the CATOX SVE system's performance throughout the period between 5 October 2012 and 21 May 2013 are provided below:

- Total estimated mass of gasoline removed – 1,273.6 pounds;
- Estimated mass of gasoline removed per day (Oct 12 – May 13) – 0.5 to 2.1 pounds per day;
- Total influent SVE vapor-phase gasoline conc. (Oct 12 – May 13) – 0.0 to 17.1 ppmv;
- Total SVE air flow rate (Oct 12 – May 13) – 105 to 130.2 standard cubic feet per minute (SCFM);
- PID readings at post-blower influent (July 12 – Oct. 12) – 10.3 to 116 ppmv;
- PID readings at CATOX SVE effluent (July 12 - Oct. 12) – 0.0 to 0.1 ppmv;
- Total vapor-phase destruction efficiency (July 12 – Oct. 12) – 99.5 to 100 percent with an overall average destruction efficiency of 96.1 percent since January 2011;

The SVE system has operated continuously since 7 July 2011, except when high groundwater elevations caused the knock-out drum to fill with water in late July 2011 and early November 2011 and due to loose electrical connections related to the T3 Falco-300 controller which caused inaccurate temperature fluctuations. With aid from Falmouth Products this issue was remedied on-site. A log of Site visits is included as **Table 4,** Attachment B.

During routine O&M, volatile organic compounds are measured using a portable PID. Readings are collected from the six vapor extraction influent ports and two additional influent ports (influent pre-blower and influent post-blower). The influent post-blower is used for total VOC influent analysis because it is on the pressure side of the blower allowing for more accurate PID concentrations to be

[1] MSDS Reported from Cornell University. (Taking the average specific gravity for gasoline 0.78 and multiplying by 8.34 lbs/gal water yields the conversion factor 6.5 lbs/gal for gasoline)

recorded. PID readings are also taken at the FALCO effluent. Obtaining this data during each site visit allows ***R.E.A.*** field personnel to properly adjust the system in order achieve maximum efficiency for VOC removal. Furthermore, SVE system product recovery rates are calculated in **Table 5**, Attachment B. The influent and effluent vapor concentrations, as well as the vapor-phase removal efficiency of the FALCO is documented on **Table 6**, Attachment B, and individual influent SVE readings are documented in **Table 7,** Attachment B.

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Please call me if you have any questions or concerns regarding the enclosed results or recommendations.

Sincerely,

Ross Environmental Associates, Inc.

Stephanie Feuer
Environmental Scientist

Robert J. Ross, CGWP
Principal Hydrogeologist

Attachments

Cc. Mr. Gerold Noyes – VTDEC
Ms. Jeannette Lepine

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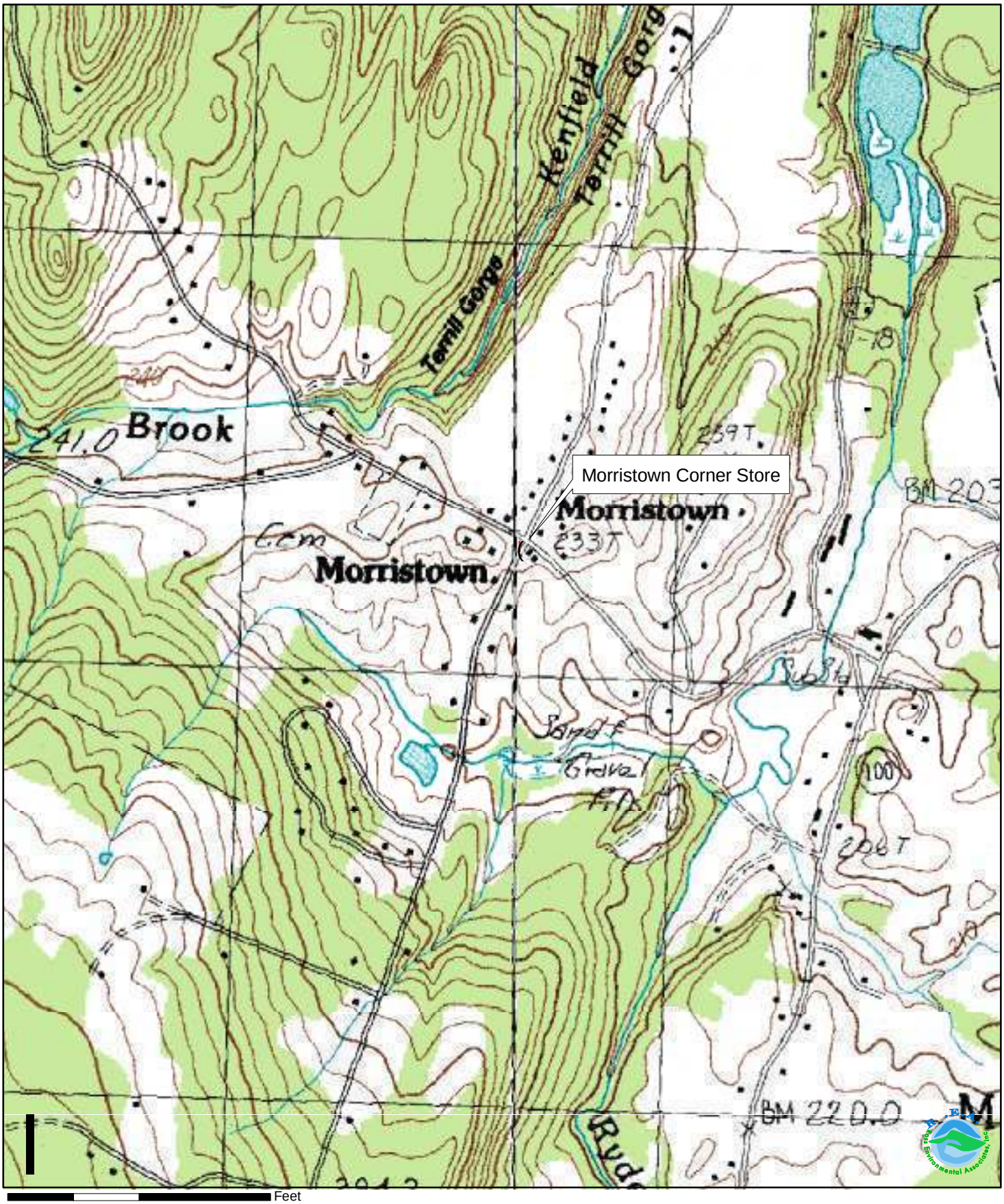
ATTACHMENT A



Site Coordinates:44º 56' 59.32" N, 72º 12' 03.60'' W

USGS: Sterling Mountain Vermont Quadrangle 1:24000, 1998
Morrisville Quadrangle 1:24000, 1999

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E:\PROJECTS_JS\MorristownCorner\Site_Maps.mxd

Figure 1
Site Map
Morristown Corner Store
Morristown, Vermont

0 500 1,000 2,000 Feet

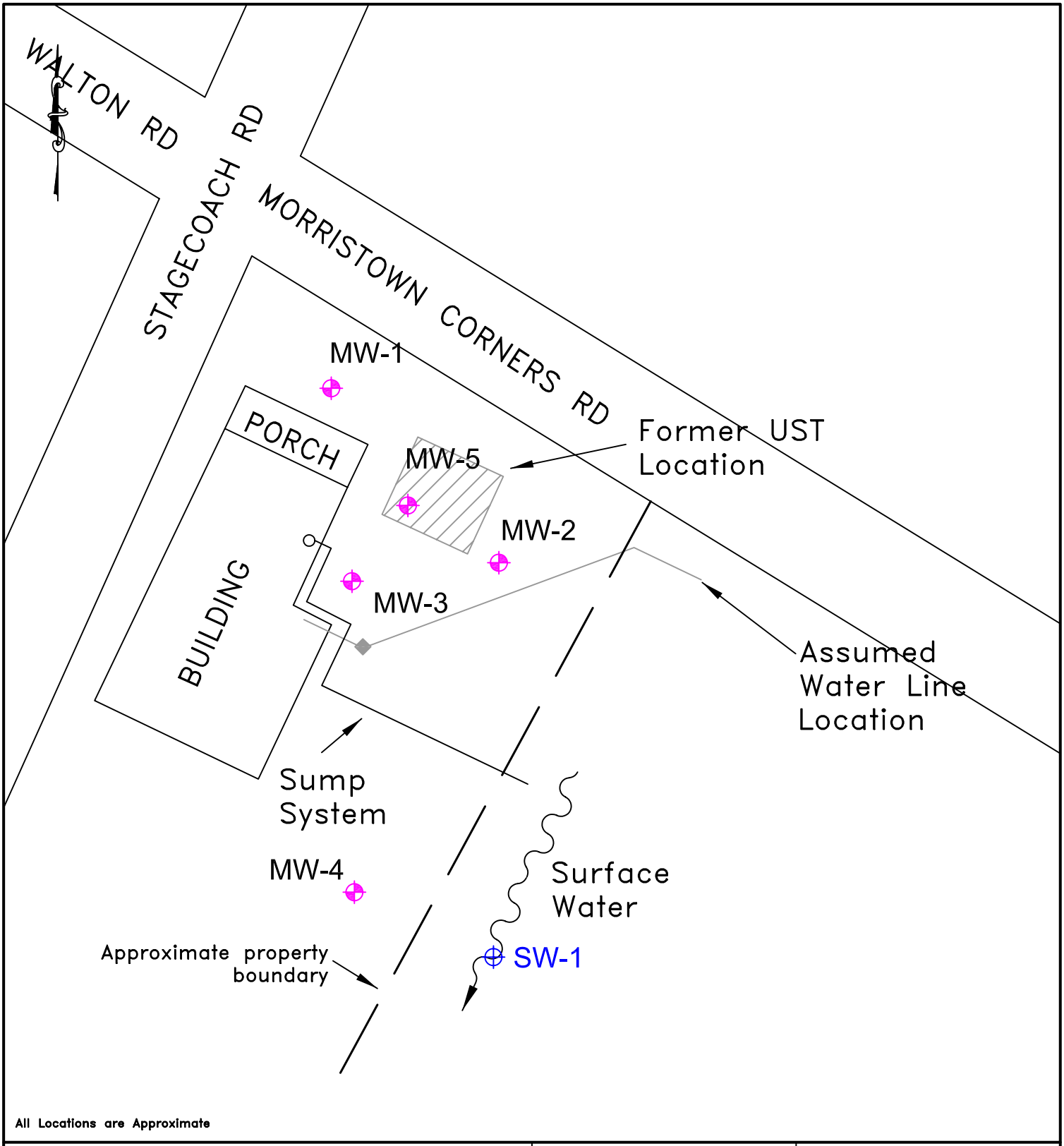
1 inch equals 500 feet

Site Coordinates:44º 56' 59.32" N, 72º 12' 03.60'' W

Aerial Photo: NAIP 2003

F:\Projects\28010\2810Fig2.pdf
E:\PROJECTS_JS\MorristownCorner\Site_Maps.mxd

Figure 2
Aerial Photo
Morristown Corner Store
Morristown, Vermont



All Locations are Approximate

Legend:
- Monitoring Well Location
- Soil Boring Location
- Curb Stop
- Surface Water Sample Location
- Sump
- Soil Screening Location

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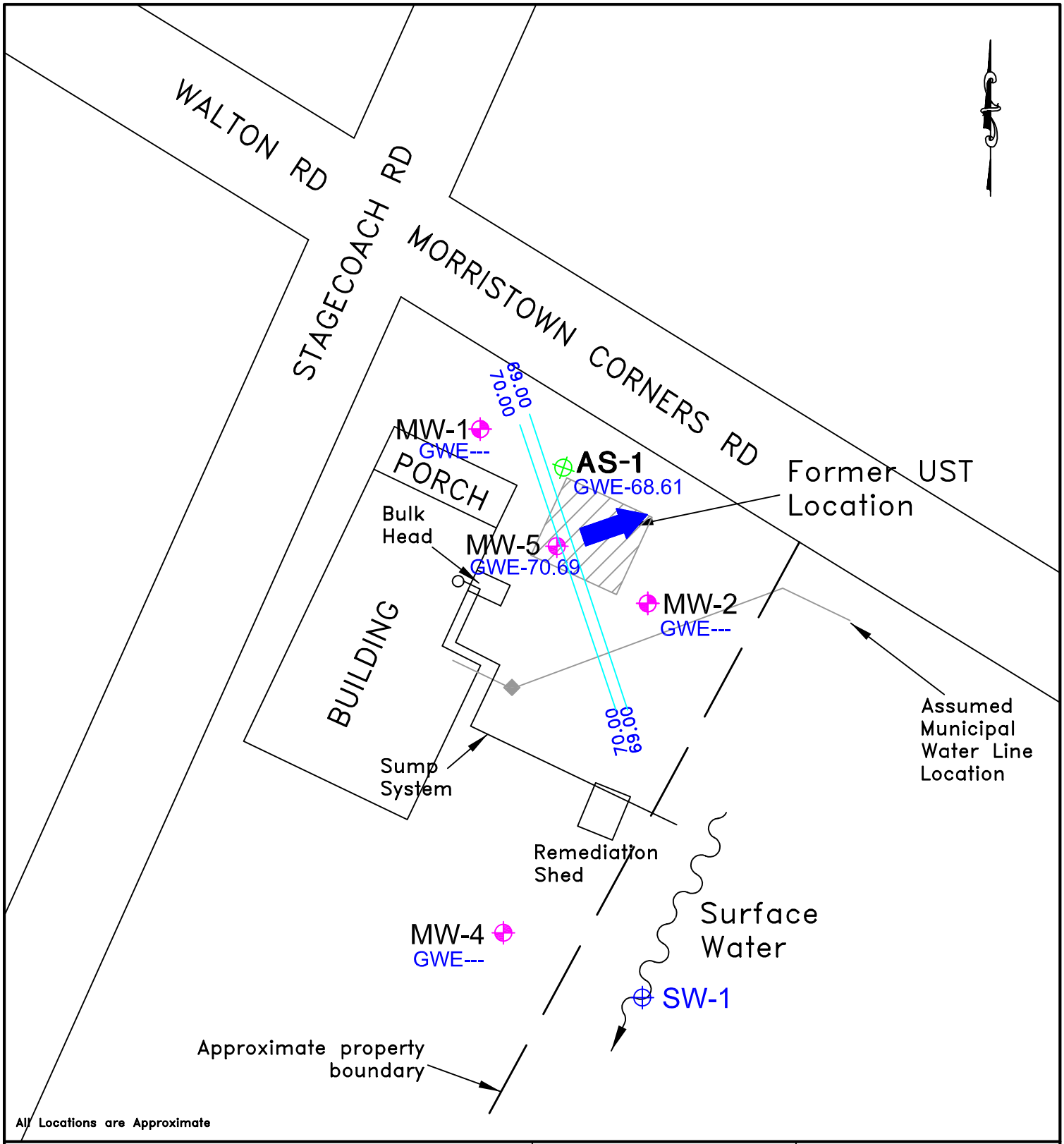
Scale:	1" = 30'	**Date:**	30 May 2008
File Name:	28-010	**Drawn By:**	JS

FIGURE 3.

SITE PLAN

(with monitoring well locations)

Former Morristown Corner Store
Morristown, VT



Legend:
- Monitoring Well Location
- Curb Stop
- Surface Water Sample Location
- Sump
- Former Monitoring Well Location

Scale:	1" = 30'	**Date:**	30 May 2008
File Name:	28-010	**Drawn By:**	JS

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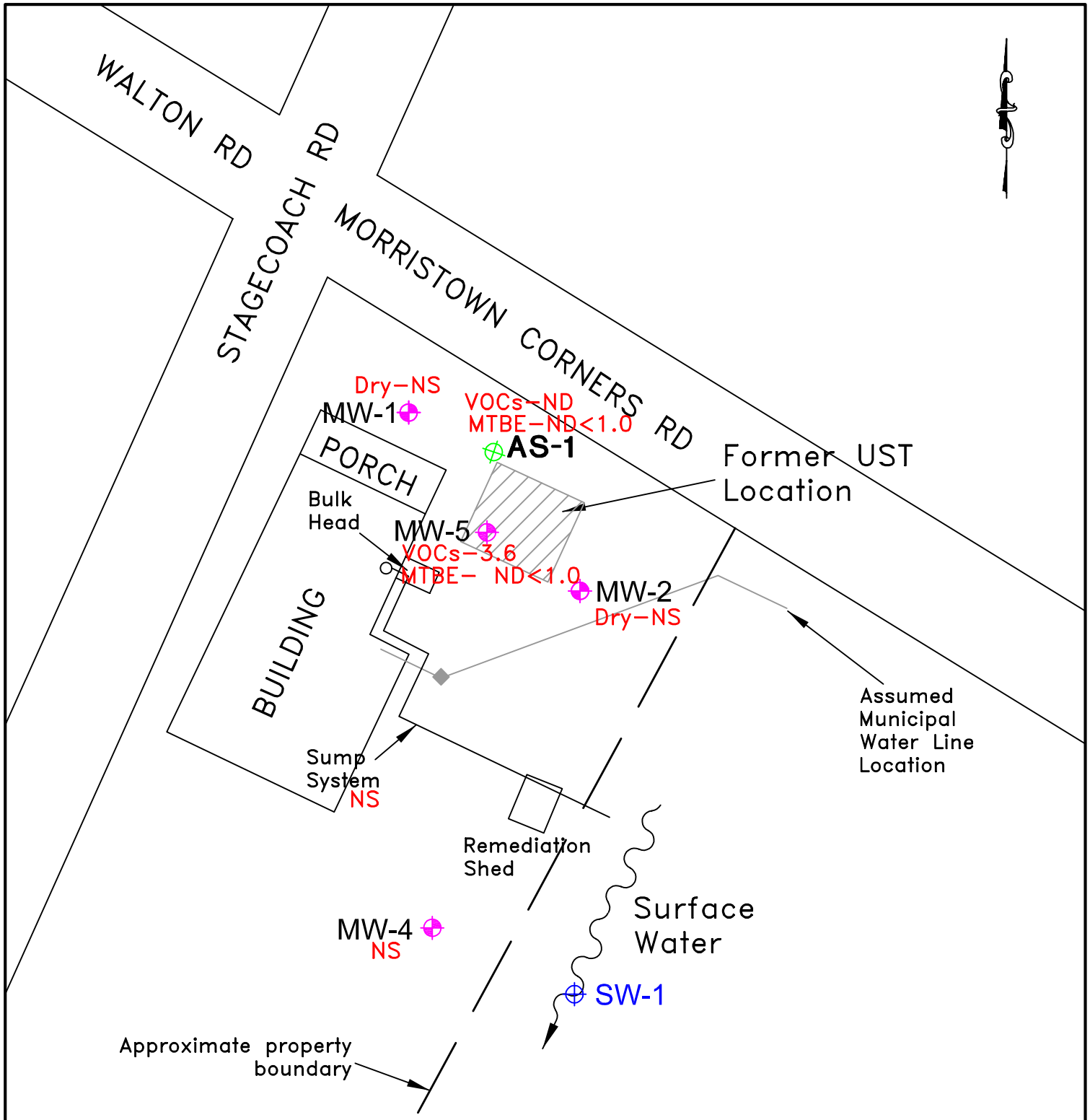
FIGURE 4

GROUNDWATER CONTOUR MAP

(Monitoring Date: 21 May 2013)

Former Morristown Corner Store
Morristown, VT



All Locations are Approximate
Onsite sump sample collected: 24 July 2008

Legend:
- Monitoring Well Location
- Curb Stop
- Surface Water Sample Location
- Sump
- Former Monitoring Well Location

Scale:	1" = 30'	**Date:**	30 May 2008
File Name:	28–010	**Drawn By:**	JS

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FIGURE 5

CONTAMINANT DISTRIBUTION
(Monitoring Date: 21 May 2013)
Former Morristown Corner Store
Morristown, VT

ATTACHMENT B

TABLE 1
GROUND WATER ELEVATION CALCULATIONS

Morristown Corner Store
Morrisville, Vermont

Monitoring Date : 21 May 2013

Well I.D.	Top of Casing Elevation (ft)	Depth to Water (feet, TOC)	Water Table Elevation (ft)
MW-1	102.21	Dry	
MW-2	100.63	Dry	
MW-4	103.80	Dry	
MW-5	102.83	32.14	70.69
AS-1	101.95	33.34	68.61

All values reported in feet relative to arbitrary site datum of 100.00 feet
Site re-surveyed on 16 June 2009

TABLE 2
GROUND-WATER ANALYTICAL RESULTS

Morristown Corner Store
Morrisville, Vermont

Monitoring Date: 21 May 2013

Parameter	MtBE	Benzene	Toluene	Ethyl benzene	Total Xylenes	1,3,5-TMB	1,2,4-TMB	Naphthalene	Total VOCs
MW-5	ND<1.0	**1.2**	ND<1.0	**1.3**	ND<2.0	ND<1.0	**1.1**	ND<2.0	**3.6**
AS-1	ND<1.0	ND<1.0	ND<1.0	ND<1.0	ND<2.0	ND<1.0	ND<1.0	ND<2.0	**ND**
VGES	***40***	***5.0***	***1,000***	***700***	***10,000***	***350***		***20***	***---***
Trip Blank	ND<1.0	ND<1.0	ND<1.0	ND<1.0	ND<2.0	ND<1.0	ND<1.0	ND<1.0	**ND**

Notes:
All results reported as micrograms per liter (µg/L), unless indicated otherwise.
ND: None detected at indicated detection limit.
Shaded values indicate exceedance of Vermont Groundwater Enforcement Standards (VGESs).

TABLE 3
FIELD MEASUREMENT DATA

Former Morristown Corners Store
Morrisville, Vermont

Monitoring Date: 21 May 2013

Well ID	PID (ppmv)	pH (su)	temperature (°C)	Specific conductivity (µS/cm)	ORP (mV)	TDS (ppm)	Comments
MW-5	**0.2**	no water quality sample collected, poor recharge					petroleum odor present, no sheen, poor recharge
AS-1	**0.2**	no water quality sample collected, poor recharge					silty, no odor, poor recharge
MW-1	**0.2**	well dry, no sample collected					
MW-2	**0.1**	well dry, no sample collected					
MW-4	**0.2**	well dry, no sample collected					
VE-1	**0.6**	not sampled					
VE-2	**1.8**	not sampled					
VE-3	**3.6**	not sampled					
VE-4	**0.1**	not sampled					
VE-5	**0.1**	not sampled					
VE-6	**0.1**	not sampled					

pH reported in standard units (s.u.).
Temperature reported in degrees celcius (ºC)
Specific conductivity reported in microsiemens per centimeter (µS/cm) or millisiemens per centimeter (mS/cm).
Oxidation-reduction potential (ORP) reported in millivolts (mV).
Total dissolved solids (TDS) reported in parts per million (ppm) or parts per (ppt) thousand.
Photoionization detector (PID) readings indicating the possible presence of volatile organic compounds (VOC) dete
by screening the headspace within each monitoring point. PID readings reported in parts per million per volume (pp
PID readings were collected on 17 September 2012

TABLE 4
SITE ACTIVITY O&M LOG
Former Morristown Corner Store
Morristown, Vermont
7 July 2011 - 3 June 2013

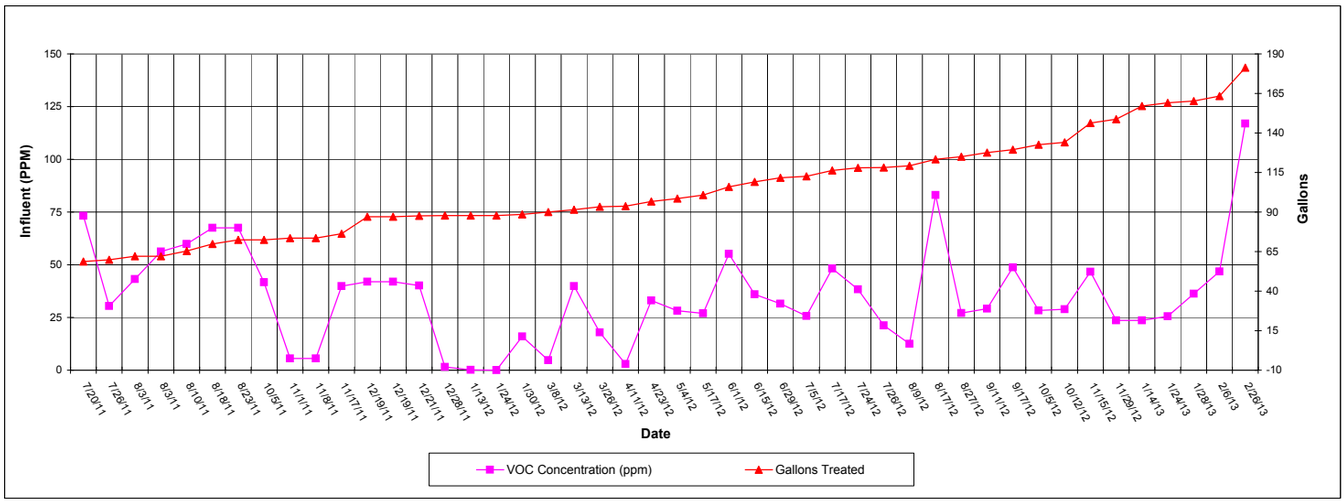
Date	Purpose of Visit	Site Activities	System Status
July 7, 2011	O and M & Quarterly Sampling	FALCO system check by M McConville and M Ingram, conducted quarterly groundwater sampling	Off on arrival, Re-started
July 20, 2011	O and M	FALCO system check by M McConville and M Ingram, emptied KO drum, air relief valve opened to reduce vacuum readings at the well heads	Off on arrival, Re-started
July 26, 2011	O and M	FALCO system check by M Ingram	Running
August 3, 2011	O and M	FALCO system check by M Ingram, closed VE-5 and VE-6	Running
August 10, 2011	O and M	FALCO system check by M Ingram, closed VE-4	Running
August 18, 2011	O and M	FALCO system check by M Ingram, opened VE-4	Running
August 26, 2011		System on, drums of waste water picked up by EP&S	
August 31, 2011		System off	System Off
September 9, 2011	O and M	J Gonyaw insulated the shed to reduce the noise impacting neighbors.	System Off
October 5, 2011	O&M	FALCO system check by J Gonyaw. T3 controler fluctuating significantly. M McConville on-site 13:00, system off on arrival	Off on arrival, Re-started
October 6, 2011	O&M	FALCO system check by M McConville. Alarm A2LO on T1 and T2.	Off on arrival, Re-started
October 7, 2011	O&M	FALCO system check by M McConville. On arrival: alarm A2LO on T1 and T2, alarm A2HI on T3. Contacted Falmouth Products who suggested that perhaps we have a loose thermocouple connection at the T3 thermocouple and suggested tightening the thermocouple wires.	Off on arrival, Re-started
October 11, 2011	O&M	FALCO system check by M McConville	Running
November 1, 2011	O and M & Quarterly Sampling	FALCO system check by M McConville and S Feuer, conducted quarterly groundwater sampling, water KO full on arrival	Off on arrival, Re-started
November 2, 2011	O and M	Large electric panel tripped, smoke noted emerging from electric panel. System turned off to await an electrician's visit.	Off on arrival, not Re-started
November 7, 2011	Electrician Visit	Tony Baraw (electrician) tightened the busses in the main control block which had either never been tightened at the factory or become loose when the motor kicks on. The busses were tightened and via e-mail exchange Tony confirmed the system was safe to re-start.	Off
November 8, 2011	O and M	FALCO system check by M McConville and System Re-Start	Off on arrival, Re-started
November 17, 2011	O and M	FALCO system check by S Feuer & M McConville	Running
December 19, 2011	O and M	FALCO system check by S Feuer. System runnning, but all temperature readings are low. System should have turned off on alarm, but for some reason was still running. System re-started.	Running
December 21, 2011	O&M	FALCO system check by M McConville. Installed a "No Smoking" sign. Applied a bead of caulk to one of the electric panels to prevent moisture from reaching the panel.	Running
December 28, 2011	O and M	FALCO system check by S Feuer	Running
Janaury 13, 2012	O and M	FALCO system check by S Feuer	Running
Janaury 24, 2012	O and M	FALCO system check by S Feuer	Running
January 30, 2012	O and M	FALCO system check by M McConville	Running
February 26, 2012	O and M & Quarterly Sampling	SF restart system and attemped to GW sample. Wells were too frozen within boxes. Emailed GN about no winter samples	Off on arrival, Re-started
March 8, 2012	O and M	FALCO system check by S Feuer	Running
March 13, 2012	O and M	FALCO system check by S Feuer	Running
March 26, 2012	O and M	FALCO system check by S Feuer and Sophie	Running
April 11, 2012	O and M	FALCO system check by S Feuer and C Koenig	Off on arrival, Re-started
April 23, 2012	O and M	FALCO system check by S Feuer	Running
May 4, 2012	O and M	FALCO system check by C Koenig	Running
May 17, 2012	O and M	FALCO system check by C Koenig	Running
June 1, 2012	O and M	FALCO system check by C Koenig and L Wroblewski	Running
June 15, 2012	O and M	FALCO system check by L Wroblewski	Running
June 29, 2012	O and M	FALCO system check byL Wroblewski	Running
July 5, 2012	O and M	FALCO system check by S Feuer and L Wroblewski	Running
July 17, 2012	O and M	FALCO system check by L Wroblewski	Running
July 24, 2012	O and M	FALCO system check by L Wroblewski	Running
July 26, 2012	O and M	FALCO system check by S Feuer and L Wroblewski	Running

TABLE 4
SITE ACTIVITY O&M LOG
Former Morristown Corner Store
Morristown, Vermont
7 July 2011 - 3 June 2013

Date	Purpose of Visit	Site Activities	System Status
July 27, 2012	Muffler Installation	JG installed Muffler to system	Running
August 9, 2012	O and M	FALCO system check by S Feuer	Running
August 17, 2012	O and M	FALCO system check by L Wroblewski	Running
August 27, 2012	O and M	FALCO system check by S Feuer	Running
September 11, 2012	O and M	FALCO system check by S Feuer	Running
September 17, 2012	O and M	FALCO system check by S Feuer	Running
September 21, 2012	Groundwater sampling	Groundwater sampling by C Koenig	Running
October 5, 2012	O and M	FALCO system check by S Feuer	Running
October 12, 2012	O and M	FALCO system check by S Feuer	Running
November 15, 2012	O and M	FALCO system check by S Feuer	Off on arrival, Re-started
November 27, 2012	O and M	FALCO system check by S Feuer, issues with T2, called Falco	Off on arrival, Re-started
November 28, 2012	O and M	FALCO system check by S Feuer and J Gonyaw, issues with T2, called Falco and fixed T2	Off on arrival, Re-started
November 29, 2012	O and M	FALCO system check by S Feuer and J Gonyaw, replaced broken vent and bent piping	Off on arrival, Re-started
December 12, 2012	O and M and GW sample	restart system and attemped to GW sample. Wells were dry.	Off on arrival, Re-started
December 19, 2012	O and M	Restart System with J. Gonyaw and S. Feuer and phone call onsite with Falco. Check all connection and wiring and determine that a clogged filter was the issue. Ordered new filter	Off on arrival, Re-started
December 28, 2012	O and M	FALCO system check and filter replacement by S Feuer	Off on arrival, Re-started
January 4, 2013	O and M	Restart System with J. Gonyaw and S. Feuer and phone call onsite with Falco. Check all connection and wiring and determine that a clogged filter was the issue. Ordered new filter	Off on arrival, Re-started
January 7, 2013	O and M	FALCO system check and filter replacement by S Feuer	Off on arrival, Re-started
January 9, 2013	O and M	Restart System with J. Gonyaw and S. Feuer. System started smoking. Determined the VE points were frozen. Going to Replace parts of Blower next.	Off on arrival, Re-started
January 11, 2013	O and M	Restart System with J. Gonyaw and S. Feuer and phone call onsite with Falco. Installed Light and Heater for VE points(currently frozen), Control box connection was bent. Jay corrected the broken connection.	Off on arrival, Re-started
January 14, 2013	O and M	FALCO system check by S Feuer	Running
January 24, 2013	O and M	FALCO system check by M. Pinard	Off on arrival, Re-started
January 28, 2013	O and M	FALCO system check by S Feuer	Running
February 6, 2013	O and M	FALCO system check by S Feuer	Running
February 26, 2013	O and M	FALCO system check by M Pinard	Running
March 8, 2013	O and M	FALCO system check by S Feuer	Running
March 22, 2013	O and M	FALCO system check by S Feuer	Running
April 5, 2013	O and M	FALCO system check by S Feuer	Running
May 9, 2013	O and M	FALCO system check by S Feuer	Running
May 17, 2013	O and M	FALCO system check by S Feuer	Running
May 21, 2013	O and M	Spring 2013 GW sampling and FALCO system check by S Feuer	Running
June 3, 2013	O and M	Spring 2013 GW sampling and FALCO system check by SF & LW	Running

TABLE 5
SVE SYSTEM PRODUCT RECOVERY
FALCO Thermo Catalytic Oxidizer (CATOX)

Morristown Corner Store
Morristown, Vermont

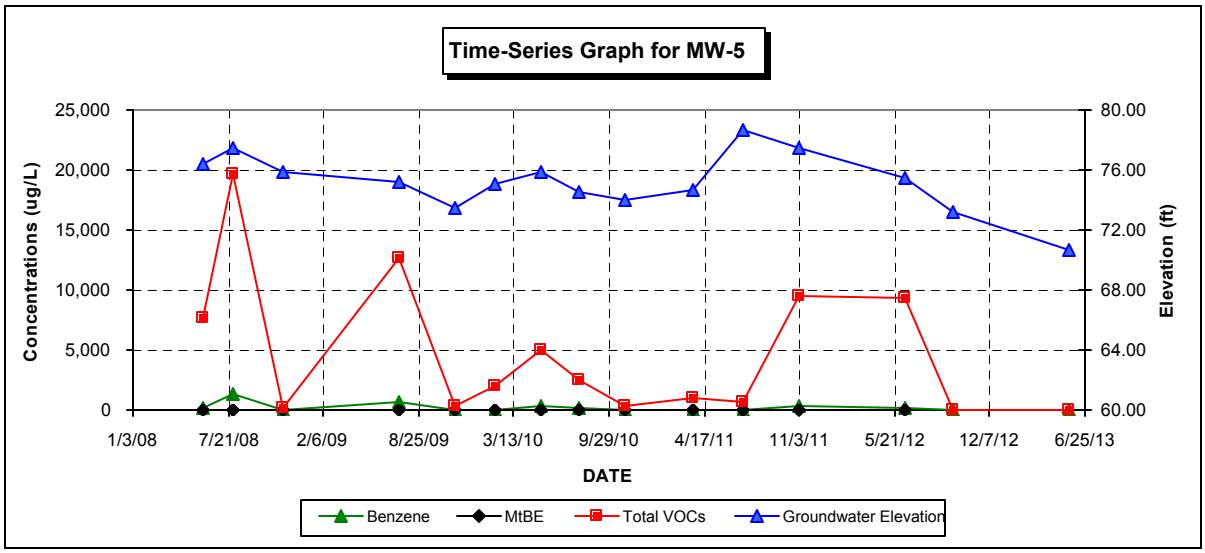


Date	Influent (ppmv)	Influent (mg/m3)	T1 (ºC)	T2 (ºC)	Flow Rate (cfm)	lbs/hr	lbs/day	gal/day	Operational Time between Monitoring Events (hours)	Recovered Gasoline (lbs)	Cumulative Recovery (lbs)	Cumulative Recovery (Gal)	Electric Meter Reading (kwh)
7/20/11 3:30 PM	73.2	323.3	324	314	114.0	0.1	3.3	0.5	314.0	43.3	381.1	58.6	15046
7/26/11 3:30 PM	30.4	134.3	330	335	114.0	0.1	1.4	0.2	144.0	8.3	389.3	59.9	16230
8/3/11 1:15 PM	43.2	190.8	329	339	105.2	0.1	1.8	0.3	189.8	14.3	403.6	62.1	17883
8/3/11 1:30 PM	56.2	248.2	329	339	113.6	0.1	2.5	0.4	0.2	0.0	403.6	62.1	17883
8/10/11 12:00 PM	59.9	264.6	329	341	130.2	0.1	3.1	0.5	166.5	21.5	425.1	65.4	19251
8/18/11 2:00 PM	67.5	298.2	330	343	130.2	0.1	3.5	0.5	194.0	28.2	453.3	69.7	20746
8/23/11 2:00 PM	67.5	298.2	330	343	130.2	0.1	3.5	0.5	120.0	17.4	470.7	72.4	21546
10/5/11 1:00 PM	41.6	183.8	329	301	130.2	0.1	2.1	0.3	4.0	0.4	471.1	72.5	21572
11/1/11 12:00 PM	5.6	24.7	301	321	130.2	0.0	0.3	0.0	598.2	7.2	478.3	73.6	25216
11/8/11 3:30 PM	5.6	24.7	301	321	130.2	0.0	0.3	0.0	1.5	0.0	478.3	73.6	25259
11/17/11 12:00 PM	39.8	175.8	332	336	130.2	0.1	2.1	0.3	212.5	18.2	496.5	76.4	
12/19/11 2:00 PM	42.0	185.5	42	43	130.2	0.1	2.2	0.3	770.0	69.6	566.1	87.1	26945
12/19/11 3:45 PM	42.0	185.5	299	317	130.2	0.1	2.2	0.3	1.7	0.2	566.3	87.1	26945
12/21/11 9:00 AM	40.1	177.1	330	336	130.2	0.1	2.1	0.3	41.3	3.6	569.9	87.7	34070
12/28/11 1:30 PM	1.5	6.6	331	328	130.2	0.0	0.1	0.0	172.5	0.6	570.4	87.8	
1/13/12 1:30 PM	0.2	0.9	331	327	138.0	0.0	0.0	0.0	384.0	0.2	570.6	87.8	27698
1/24/12 1:30 PM	0.0	0.0	330	326	130.2	0.0	0.0	0.0	264.0	0.0	570.6	87.8	
1/30/12 10:00 AM	16.0	70.7	330	331	130.2	0.0	0.8	0.1	140.5	4.8	575.4	88.5	44744
3/8/12 10:00 AM	4.7	20.8	330	333	135.0	0.0	0.3	0.0	912.0	9.6	585.0	90.0	47916
3/13/12 10:00 AM	39.8	175.8	330	333	125.0	0.1	2.0	0.3	120.0	9.9	594.9	91.5	48926
3/26/12 10:00 AM	17.9	79.1	331	333	125.0	0.0	0.9	0.1	312.0	11.5	606.4	93.3	51432
4/11/12 2:00 PM	2.9	12.8			125.0	0.0	0.1	0.0	388.0	2.3	608.8	93.7	51747
4/23/12 12:30 PM	33.1	146.2	330	333	125.0	0.1	1.6	0.3	286.5	19.6	628.4	96.7	30274
5/4/12 2:45 PM	28.2	124.6	331	332	101.25	0.0	1.1	0.2	266.3	12.6	640.9	98.6	56356
5/17/12 2:45 PM	26.9	118.8	330	333	101.25	0.0	1.1	0.2	312.0	14.1	655.0	100.8	58924
6/1/12 3:10 PM	55.1	243.4	330	333	101.25	0.1	2.2	0.3	360.4	33.3	688.3	105.9	
6/15/12 2:30 PM	36.0	159.0	330	334	101.25	0.1	1.4	0.2	335.3	20.2	708.5	109.0	64534
6/29/12 1:00 PM	31.5	139.1	330	334	101.25	0.1	1.3	0.2	334.5	17.6	726.1	111.7	67155
7/5/12 1:30 PM	25.7	113.5	330	335	101.25	0.0	1.0	0.2	144.5	6.2	732.3	112.7	68275
7/17/12 1:30 PM	48.2	212.9	332	336	101.25	0.1	1.9	0.3	288.0	23.3	755.6	116.2	70501
7/24/12 12:50 PM	38.3	169.2	329	336	101.25	0.1	1.5	0.2	167.3	10.7	766.3	117.9	71798
7/26/12 1:15 PM	21.3	94.1	329	336	101.25	0.0	0.9	0.1	48.4	1.7	768.1	118.2	72168
8/9/12 12:00 PM	12.5	55.2	330	338	101.25	0.0	0.5	0.1	334.7	7.0	775.1	119.2	74701
8/17/12 12:00 PM	83.0	366.6	329	339	101.25	0.1	3.3	0.5	192.0	26.7	801.8	123.3	76171
8/27/12 12:00 AM	27.1	119.7	331	339	101.25	0.0	1.1	0.2	228.0	10.3	812.1	124.9	
9/11/12 12:00 AM	29.1	128.5	331	340	101.25	0.0	1.2	0.2	360.0	17.5	829.7	127.6	80693
9/17/12 12:00 AM	48.8	215.6	330	340	101.25	0.1	2.0	0.3	144.0	11.8	841.4	129.5	81769
10/5/12 12:00 AM	28.3	125.0	330	339	101.25	0.0	1.1	0.2	432.0	20.5	861.9	132.6	85078
10/12/12 12:00 AM	28.9	127.7	331	340	125	0.1	1.4	0.2	168.0	10.0	871.9	134.1	86389
11/15/12 12:00 AM	46.7	206.3	331	299	125	0.1	2.3	0.4	816.0	78.8	950.7	146.3	
11/29/12 12:00 AM	23.6	104.2	330	332	125	0.0	1.2	0.2	336.0	16.4	967.1	148.8	91827
1/14/13 12:00 AM	23.6	104.2	330	340	125	0.0	1.2	0.2	1104.0	53.9	1021.0	157.1	93499
1/24/13 12:00 AM	25.5	112.6	330	330	125	0.1	1.3	0.2	240.0	12.7	1033.7	159.0	
1/28/13 12:00 AM	36.2	159.9	330	335	125	0.1	1.8	0.3	96.0	7.2	1040.9	160.1	95832
2/6/13 12:00 AM	46.8	206.7	331	334	125	0.1	2.3	0.4	216.0	20.9	1061.8	163.3	97876
2/26/13 12:00 AM	117.0	516.8	327	334	125	0.2	5.8	0.9	480.0	116.1	1177.9	181.2	
3/8/13 12:00 AM	22.1	97.6	330	335	125	0.0	1.1	0.2	240.0	11.0	1188.9	182.9	
3/22/13 12:00 AM	10.3	45.5	330	334	125	0.0	0.5	0.1	336.0	7.2	1196.0	184.0	
4/5/13 1:00 PM	24.0	106.0	329	337	125	0.0	1.2	0.2	349.0	17.3	1213.3	186.7	10664
5/9/13 1:00 PM	19.7	87.0	330	337	125	0.0	1.0	0.2	816.0	33.2	1246.6	191.8	17802
5/17/13 1:00 PM	42.3	186.8	330	337	125	0.1	2.1	0.3	192.0	16.8	1263.4	194.4	19460
5/21/13 1:00 PM	41.2	182.0	329	333	125	0.1	2.0	0.3	96.0	8.2	1271.5	195.6	
6/3/13 1:00 PM	0.0	14.3	332	334	125	0.0	0.2	0.0	312.0	2.1	1273.6	195.9	41914
Average Influent (ppmv) =	49.8		Avg. flow rate =		117.2	Avg. gal/day =		0.3		Recovery Pre - FALCO =		139.7	
										TOTAL SITE WIDE RECOVERY=		**335.7**	

Notes:

-Values in red were not recorded in the field and are therefore assumed to be equivalent to the previous Flow Rate
- converting between lbs of gasoline and gallons of gasoline is based on the ration: 6.5 pounds of gasoline = 1 gallon of gasoline
this conversion uses 0.78 as the average specific gravity of gasoline (From the MSDS Reported by Cornell University)
- ppmv = parts per million per volume cfm = cubic feet per minute kwh - kilo-watt hours
'- In some cases the system was off on arrival. To most accurately reflect the correct hours of operation, the kwh were interpolated to more accurately reflect the hours of use. These interpolations were made on 16 March 2011, 6 April 2011, and 22 April 2011 following site visits on 17 March 2011, 15 April 2011, and 27 April 2011; respectively. System parameters on those days are based upon the previously recorded data.

ATTACHMENT C

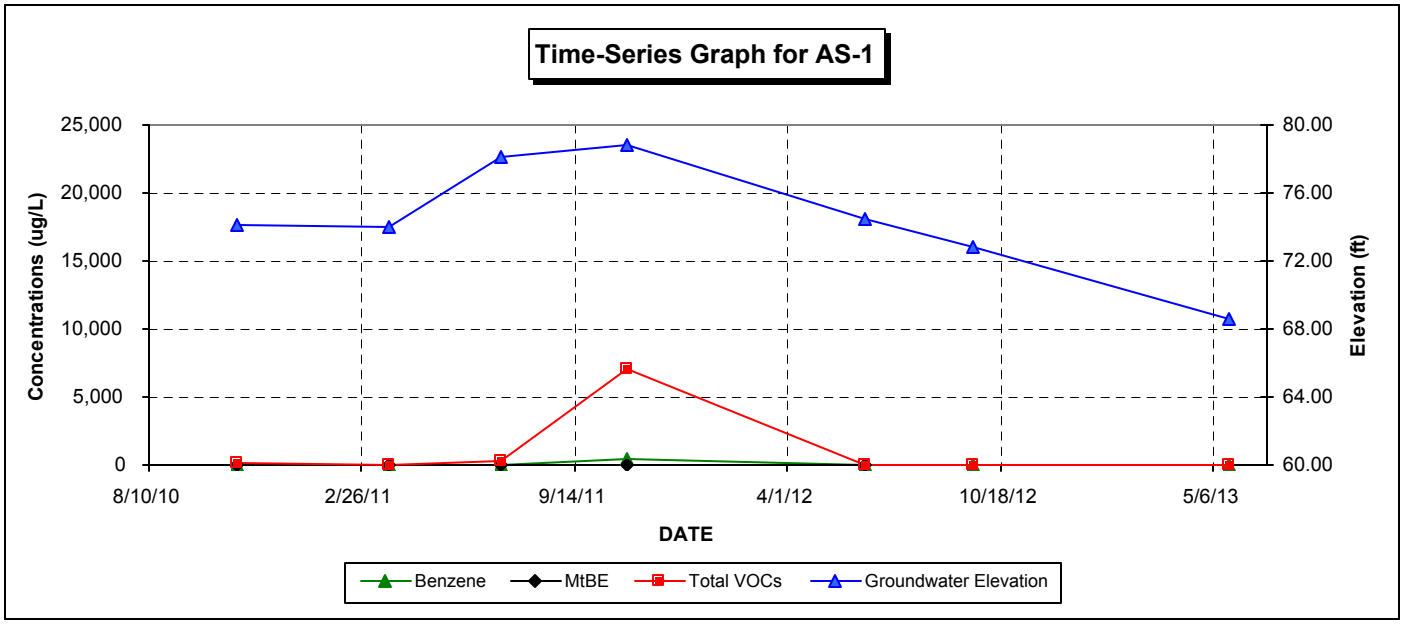


Summary of Ground Water Analytical Results for MW-5

Former Morristown Corner Store
Morrisville, Vermont

Date	MTBE	benzene	toluene	ethyl benzene	total xylenes	1,3,5-TMB	1,2,4-TMB	naphtha-lene	Total VOCs	Ground Water Elevation
5/28/2008	15	170	1,200	270	2,160	160	410	99	7,600	76.39
8/1/2008	ND	1,380	6,410	1,850	7,920	437	1,320	343	19,660	77.40
11/13/2008	7.3	1.8	23	2.3	66	6.3	3.1	ND	109.8	75.92
7/15/2009	15	670	4,600	910	5,000	260	950	190	12,595	75.18
11/10/2009	2.2	12	72	16	147	4.7	14	1.9	270	73.51
2/2/2010	32	53	490	35	1,240	100	77	3.6	2,031	75.08
5/10/2010	14	340	390	740	1,960	370	1,000	150	4,964	75.88
7/30/2010	ND<10	180	95	110	1,080	300	590	65	2,420	74.47
11/1/2010	13	23	28	11	197	38	38	6.7	355	74.06
3/24/2011	4.6	71	120	85	430	67	140	17	935	74.71
7/7/2011	7.2	82	58	110	201	82	120	28	688	78.64
11/1/2011	6.8	330	1,300	1,500	4,300	370	1,400	280	9,487	77.51
6/12/2012	ND<10	170	490	1,700	4,370	520	1,800	320	9,370	75.53
9/21/2012	ND<1.0	ND<1.0	ND<1.0	ND<1.0	ND<2.0	ND<1.0	ND<1.0	ND<2.0	ND	73.26
5/21/2013	ND<1.0	1.2	ND<1.0	1.3	ND<2.0	ND<1.0	1.1	ND<2.0	3.6	70.69
VGES	*40*	*5.0*	*1,000*	*700*	*10,000*	*350*		*20*	*---*	*---*
							% reduction		99.98	

Notes: Results given in micrograms per liter (ug/L), unless indicated otherwise.
ND- None detected at indicated detection limit.
VGES - Vermont Groundwater Enforcement Standards



Summary of Ground Water Analytical Results for AS-1

Former Morristown Corner Store
Morrisville, Vermont

Date	MTBE	benzene	toluene	ethyl benzene	total xylenes	1,3,5-TMB	1,2,4-TMB	naphtha-lene	Total VOCs	Ground Water Elevation
11/1/2010	ND<1.0	**2.0**	**3.7**	**1.1**	**74**	**29**	**27**	**1.0**	**138**	**74.17**
3/24/2011	ND<1.0	ND<1.0	ND<1.0	ND<1.0	ND<1.0	**7.9**	**8.3**	ND<1.0	**16.2**	**74.05**
7/7/2011	**3.3**	**48**	**31**	**18**	**116**	**34**	**80**	**6.2**	**337**	**78.10**
11/1/2011	**15**	**390**	**2,400**	**700**	**2,400**	**300**	**780**	**78**	**7,063**	**78.80**
6/12/2012	ND<1.0	ND<1.0	ND<1.0	ND<1.0	ND<2.0	ND<1.0	ND<1.0	ND<2.0	**ND**	**74.50**
9/21/2012	ND<1.0	ND<1.0	ND<1.0	ND<1.0	ND<2.0	ND<1.0	ND<1.0	ND<2.0	**ND**	**72.87**
5/21/2013	ND<1.0	ND<1.0	ND<1.0	ND<1.0	ND<2.0	ND<1.0	ND<1.0	ND<2.0	**ND**	**68.61**
VGES	***40***	***5.0***	***1,000***	***700***	***10,000***	***350***		***20***	***---***	***---***
							% reduction		**100**	

Notes: Results given in micrograms per liter (ug/L), unless indicated otherwise.
ND- None detected at indicated detection limit.
VGES - Vermont Groundwater Enforcement Standards

ATTACHMENT D

AMRO Environmental Laboratories Corp.

Date: *30-May-13*

CLIENT: Ross Environmental Associates
Project: 28010 Morristown Corner Store
Lab Order: 1305049
Date Received: 5/22/2013

Work Order Sample Summary

Lab Sample ID	Client Sample ID	Collection Date	Collection Time
1305049-01A	AS 1	5/21/2013	12:00 PM
1305049-02A	MW 5	5/21/2013	12:10 PM

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DATA COMMENT PAGE

Organic Data Qualifiers

ND	Indicates compound was analyzed for, but not detected at or above the reporting limit.
J	Indicates an estimated value. This flag is used either when estimating a concentration for tentatively identified compounds where a 1:1 response is assumed, or when the data indicates the presence of a compound that meets the identification criteria but the result is less than the sample quantitation limit but greater than the method detection limit.
H	Method prescribed holding time exceeded.
E	This flag identifies compounds whose concentrations exceed the calibration range of the instrument for that specific analysis.
B	This flag is used when the analyte is found in the associated blank as well as in the sample.
R	RPD outside accepted recovery limits
RL	Reporting limit; defined as the lowest concentration the laboratory can accurately quantitate.
S	Spike Recovery outside accepted recovery limits.
#	See Case Narrative

Micro Data Qualifiers

TNTC	Too numerous to count

Inorganic Data Qualifiers

ND or U	Indicates element was analyzed for, but not detected at or above the reporting limit.
J	Indicates a value greater than or equal to the method detection limit, but less than the quantitation limit.
H	Indicates analytical holding time exceedance.
B	Indicates that the analyte is found in the associated blank, as well as in the sample.
MSA	Indicates value determined by the Method of Standard Addition
+	Indicates the correlation coefficient for the Method of Standard Addition is less than 0.995
E	This flag identifies compounds whose concentrations exceed the calibration range of the instrument for that specific analysis.
R	RPD outside accepted recovery limits
RL	Reporting limit; defined as the lowest concentration the laboratory can accurately quantitate.
S	Spike Recovery outside accepted recovery limits.
PS	The analyte was below the Reporting Limit but has significant matrix interference as noted by the poor recovery of the Post Digestion Spike.
#	See Case Narrative
*	MCL Exceeded

Report Comments:

1. Soil, sediment and sludge sample results are reported on a "dry weight" basis.
2. Reporting limits are adjusted for sample size used, dilutions and moisture content, if applicable.

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AMRO Environmental Laboratories Corp.

Date: *30-May-13*

CLIENT: Ross Environmental Associates
Project: 28010 Morristown Corner Store

Lab Order: 1305049

Lab ID: 1305049-01
Collection Date: 5/21/2013 12:00:00 PM
Collection Time:
Client Sample ID: AS 1
Matrix: GROUNDWATER

Analyses	Result	RL	Qual	Units	DF	Date Analyzed
EPA 8260B AROMATIC VOLATILES BY GC/MS		**SW8260B**				Analyst: **DH**
Methyl tert-butyl ether	ND	1.0		µg/L	1	5/28/2013 12:49:00 PM
Benzene	ND	1.0		µg/L	1	5/28/2013 12:49:00 PM
Toluene	ND	1.0		µg/L	1	5/28/2013 12:49:00 PM
Ethylbenzene	ND	1.0		µg/L	1	5/28/2013 12:49:00 PM
m,p-Xylene	ND	2.0		µg/L	1	5/28/2013 12:49:00 PM
o-Xylene	ND	2.0		µg/L	1	5/28/2013 12:49:00 PM
1,3,5-Trimethylbenzene	ND	1.0		µg/L	1	5/28/2013 12:49:00 PM
1,2,4-Trimethylbenzene	ND	1.0		µg/L	1	5/28/2013 12:49:00 PM
Naphthalene	ND	2.0		µg/L	1	5/28/2013 12:49:00 PM
Surr: Dibromofluoromethane	107	68-122		%REC	1	5/28/2013 12:49:00 PM
Surr: 1,2-Dichloroethane-d4	106	74-124		%REC	1	5/28/2013 12:49:00 PM
Surr: Toluene-d8	96.3	69-121		%REC	1	5/28/2013 12:49:00 PM
Surr: 4-Bromofluorobenzene	101	62-129		%REC	1	5/28/2013 12:49:00 PM

Lab ID: 1305049-02
Collection Date: 5/21/2013 12:10:00 PM
Collection Time:
Client Sample ID: MW 5
Matrix: GROUNDWATER

Analyses	Result	RL	Qual	Units	DF	Date Analyzed
EPA 8260B AROMATIC VOLATILES BY GC/MS		**SW8260B**				Analyst: **DH**
Methyl tert-butyl ether	ND	1.0		µg/L	1	5/29/2013 1:48:00 PM
Benzene	1.2	1.0		µg/L	1	5/29/2013 1:48:00 PM
Toluene	ND	1.0		µg/L	1	5/29/2013 1:48:00 PM
Ethylbenzene	1.3	1.0		µg/L	1	5/29/2013 1:48:00 PM
m,p-Xylene	ND	2.0		µg/L	1	5/29/2013 1:48:00 PM
o-Xylene	ND	2.0		µg/L	1	5/29/2013 1:48:00 PM
1,3,5-Trimethylbenzene	ND	1.0		µg/L	1	5/29/2013 1:48:00 PM
1,2,4-Trimethylbenzene	1.1	1.0		µg/L	1	5/29/2013 1:48:00 PM
Naphthalene	ND	2.0		µg/L	1	5/29/2013 1:48:00 PM
Surr: Dibromofluoromethane	106	68-122		%REC	1	5/29/2013 1:48:00 PM
Surr: 1,2-Dichloroethane-d4	107	74-124		%REC	1	5/29/2013 1:48:00 PM
Surr: Toluene-d8	102	69-121		%REC	1	5/29/2013 1:48:00 PM
Surr: 4-Bromofluorobenzene	98.4	62-129		%REC	1	5/29/2013 1:48:00 PM

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