

Phase (check one)	Type (check one)
<input checked="" type="checkbox"/> Initial Site Investigation <input type="checkbox"/> Corrective Action Feasibility Investigation <input type="checkbox"/> Corrective Action Plan <input type="checkbox"/> Corrective Action Summary Report <input type="checkbox"/> Operations and Monitoring Report	<input type="checkbox"/> Work Scope <input checked="" type="checkbox"/> Technical Report <input type="checkbox"/> PCF Reimbursement Request <input type="checkbox"/> General Correspondence

INITIAL SITE INVESTIGATION REPORT

Moretown Town Garage
 Route 100B
 Moretown, VT

DEC Site No.96-2118
 SEI Project No. 97670

Client:
 Moretown Select Board
 Town of Moretown
 P.O. Box 666
 Moretown, VT 05660
 Contact: John Hoogenboom
 (802) 496-4141

Prepared by:
 Stone Environmental, Inc.
 58 East State Street
 Montpelier, VT 05602
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 Contact: Jeff Kelley, Project Geoscientist

PROJECT: 96-2118
 REPORT: 97-01

JUN 19 11 11 AM '97

April 15, 1997

EXECUTIVE SUMMARY

Two underground storage tanks (USTs) were removed on December 17 and 18, 1996 at the Moretown Town Garage. Based on the tank pull report submitted by Griffin International, Inc. on December 20, 1996 the State of Vermont Waste Management Division required an initial site investigation be performed to delineate the magnitude and extent of contamination discovered during the tank removal. on March 3, 1997 we advanced six soil borings at the site, and installed four permanent monitoring wells in four of these borings. We also surveyed the site and collected groundwater samples from the wells on March 5, 1997.

Soils encountered at the site consisted of sandy loam in the upper few feet and then a siltier loam below that. Sands were present below the silt loam layer. We detected what we described as an old fuel odor in MW-1/SB-1 from about 5 to 10 feet bgs. This odor seemed to decrease in intensity with depth. We also encountered a fuel odor in MW-2/SB-3 at about 6 feet bgs. Some of this odor may possibly be attributed to decaying material as the current property was built up over a swamp.

Soil screening with the PID indicates that VOCs were present in only one of the borings above the State of Vermont guideline of 10 parts per million (ppm). This reading was 13.0 ppm in MW-1/SB-1 at the 9.5 to 10.0 foot bgs interval. MW-4/SB-5, which is hydraulically upgradient of the tank pull area, possessed the only groundwater contaminant detected above the Vermont Groundwater Enforcement Standards (VGWES). Benzene was detected at 5.2 parts per billion (ppb) in this well, which is slightly above the VGWES of 5.0 ppb. Modified 8100 results for TPHI were all below the laboratories method detection limit of 0.5 ppm.

The groundwater flow direction is to the west or southwest, which makes MW-4 an upgradient location to the tank pull area while MW-1, MW-2, MW-3, and SB-2 are all located downgradient. The locations of these wells and borings, as well as the location and PID results of SB-6, suggest that the contamination detected during the tank removal has been adequately delineated.

The presence of even low levels of petroleum compounds dictate the need for at least one more sampling event. Therefore, we recommend one more round of groundwater sampling in the summer of 1997 to establish if the contamination is increasing or decreasing. If contamination in the four wells stays the same or declines at the next sampling event, we would probably recommend the site be granted sites management activities completed (SMAC) status. If the levels are increasing, more monitoring may need to be performed.

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1.0 INTRODUCTION

Two underground storage tanks (USTs) were removed on December 17 and 18, 1996 at the Moretown Town Garage. Based on the tank pull report submitted by Griffin International, Inc. on December 20, 1996 the State of Vermont Waste Management Division required an initial site investigation be performed to delineate the magnitude and extent of contamination discovered during the tank removal. The Town of Moretown selected Stone Environmental, Inc. (SEI) to perform this investigation, and on March 3, 1997 SEI advanced six soil borings at the site, and installed four permanent monitoring wells in four of these borings. SEI also surveyed the site and collected groundwater samples from the wells on March 5, 1997. This report describes the methods used in the investigation and presents all field and laboratory results.

2.0 SITE LAYOUT

The Moretown Town Garage is located on the east side of Route 100B in Moretown, Vermont. The topography of the site is characterized by a steep western sloping hill on the eastern property line with the garage building and parking area located on a gently western sloping, non-paved area. The northern flowing Mad River is located approximately 600 feet to the west of Route 100B. According to Howard Ferris, who lives directly across Route 100B from the garage, the site was formerly a swamp before the Town of Moretown built the garage in about 1958.

3.0 MONITORING WELL INSTALLATION

On March 3, 1997 Adams Engineering of Underhill, Vermont advanced six soil borings at the site. Jeff Kelley of SEI supervised the field work, logged all soils, and installed permanent monitoring wells in four of these borings. Also present at the site on March 3 was Andrew Shively of the Waste Management Division's Sites Management Section (SMS).

3.1 Soil Sampling

Adams' advanced each boring in 5 foot increments collecting continuous soil samples. Jeff Kelley logged each 5 foot spoon and collected soil samples at either textural changes or approximate 1 foot increments. Each sample was placed in a Ziplock[®] bag, sealed, and allowed to equilibrate in the SEI vehicle for a minimum of five minutes. The sample bag was then shaken briefly and the volatile organic compounds (VOCs) were measured from the sample headspace using a MiniRae[®] photoionization detector (PID) equipped with a 10.6eV lamp. Mr. Shively also screened the samples with his HNu[®] PID for on-site comparison of the results. Locations of the borings and monitoring wells are shown in Figure 2, while well construction and boring logs with PID screening results are presented in Attachment 1. HNu[®] results are not included in the boring logs.

3.2 Well Construction

As seen in Attachment 1, all four monitoring wells were installed at about 10 feet below ground

surface (bgs) with between 7 and 8 feet of 1.5 inch diameter PVC screen (0.01") with the remaining materials being solid PVC riser. Adams' developed each well using a peristaltic pump, purging the well until the discharge was clear and relatively sediment free. Each well was completed with a flush mounted road box.

3.3 Groundwater Sampling

Jeff Kelley and Kevin Brooker, also of SEI, returned to the site on March 4, 1997 to survey the wells and collect groundwater samples. They used disposable polyethylene bailers to collect the samples, preserving each sample with 4 drops of hydrochloric acid. They placed the samples on ice and delivered them to Green Mountain Laboratories in Middlesex, Vermont for EPA Methods 8020 and Modified 8100-TPH analyses. The results are summarized in Table 1, while copies of the original lab analyses are included in Attachment 2.

On the day of drilling (March 3) Jeff Kelley also collected groundwater samples from SB-2, where we had installed a stainless steel temporary well. However, the two vials containing the volatile analyses samples (Method 8020) froze and broke before they were delivered to the lab. The Modified 8100 samples from that location also froze but did not break, as there was a headspace in the sample jar.

3.4 Groundwater Flow Direction

Based on the site survey and depth to water measurements collected on March 4, 1997 the groundwater flow direction appears to be to the southwest (see Figure 3). As seen in Figure 3, although groundwater below the site will travel in along slightly pathways depending on its location, groundwater leaving the site will be traveling in a southwesterly direction.

4.0 RESULTS AND DISCUSSION

Soils encountered at the site consisted of sandy loam in the upper few feet and then a siltier loam below that. Sands were present below the silt loam layer. We detected what we described as an old fuel odor in MW-1/SB-1 from about 5 to 10 feet bgs. This odor seemed to decrease in intensity with depth. We also encountered a fuel odor in MW-2/SB-3 at about 6 feet bgs. Some of this odor may possibly be attributed to decaying material as the current property was built up over a swamp (see Section 2.0 above).

Soil screening with the PID indicates that VOCs were present in only one of the borings above the State of Vermont guideline of 10 parts per million (ppm). This reading was 13.0 ppm in MW-1/SB-1 at the 9.5 to 10.0 foot bgs interval. MW-4/SB-5, which is hydraulically upgradient of the tank pull area, possessed the only groundwater contaminant detected above the Vermont Groundwater Enforcement Standards (VGWES). Benzene was detected at 5.2 parts per billion (ppb) in this well, which is slightly above the VGWES of 5.0 ppb. Modified 8100 results for TPH were all below the laboratories method detection limit of 0.5 ppm. Although the Method 8020 groundwater sample from SB-2 did not make it to the laboratory, the lack of PID detections (0.6 ppm maximum) suggest that volatile organic compounds were not present in this boring.

The groundwater flow direction is to the west or southwest, which makes MW-4 an upgradient location to

the tank pull area while MW-1, MW-2, MW-3, and SB-2 are all located downgradient. The locations of these wells and borings, as well as the location and PID results of SB-6, suggest that the contamination detected during the tank removal has been adequately delineated.

5.0 CONCLUSIONS / RECOMMENDATIONS

Although there are some low concentrations of VOCs in both the soil and groundwater, there are no locations with elevated concentrations that would warrant further investigation. However, the presence of even low levels of petroleum compounds dictate the need for at least one more sampling event. Therefore, SEI recommends one more round of groundwater sampling in the summer of 1997 to establish if the contamination is increasing or decreasing.

We will pay particular attention to benzene concentrations in MW-4. As this well is upgradient of the tank pull area and assumed source of contamination, the 5.2 ppb benzene detected in March 1997 may possibly be attributed to sampling error. However, as there is often heavy equipment and other vehicles on the property, some petroleum may have been spilled from time to time and found its way to the shallow water table. The next sampling event should indicate if contamination is indeed present at this location. If contamination in the four wells stays the same or declines at the next sampling event, the site would be a candidate for sites management activities completed (SMAC) status. If the levels are increasing, more monitoring may need to be performed.

TABLE 1
Groundwater Laboratory Results 03/04/97
Moretown Town Garage

EPA METHODS 8020 & MODIFIED 8100-TPH						
Sample ID	Benzene	Toluene	Ethylbenzene	Total Xylenes	MTBE	TPH
MW-1	ND (1)	ND (1)	ND (1)	ND (2)	20	<0.5 ppm
MW-2	ND (1)	ND (1)	1.4	26	ND (5)	<0.5 ppm
MW-3	ND (1)	ND (1)	ND (1)	2.8	ND (5)	<0.5 ppm
MW-4	5.2	2.4	ND (1)	3.8	9.4	<0.5 ppm
SB-2	anp	anp	anp	anp	anp	<0.5 ppm
VTGWES	5	2420	680	400	40	nps

source: Green Mountain Laboratories, Inc.

NOTES: all results in parts per billion except for TPH, which is in parts per million

(n) = practical quantification limit

ND = non-detect

VTGWES = State of Vermont Groundwater Enforcement Standard

anp = analysis not performed

nps = no published standard

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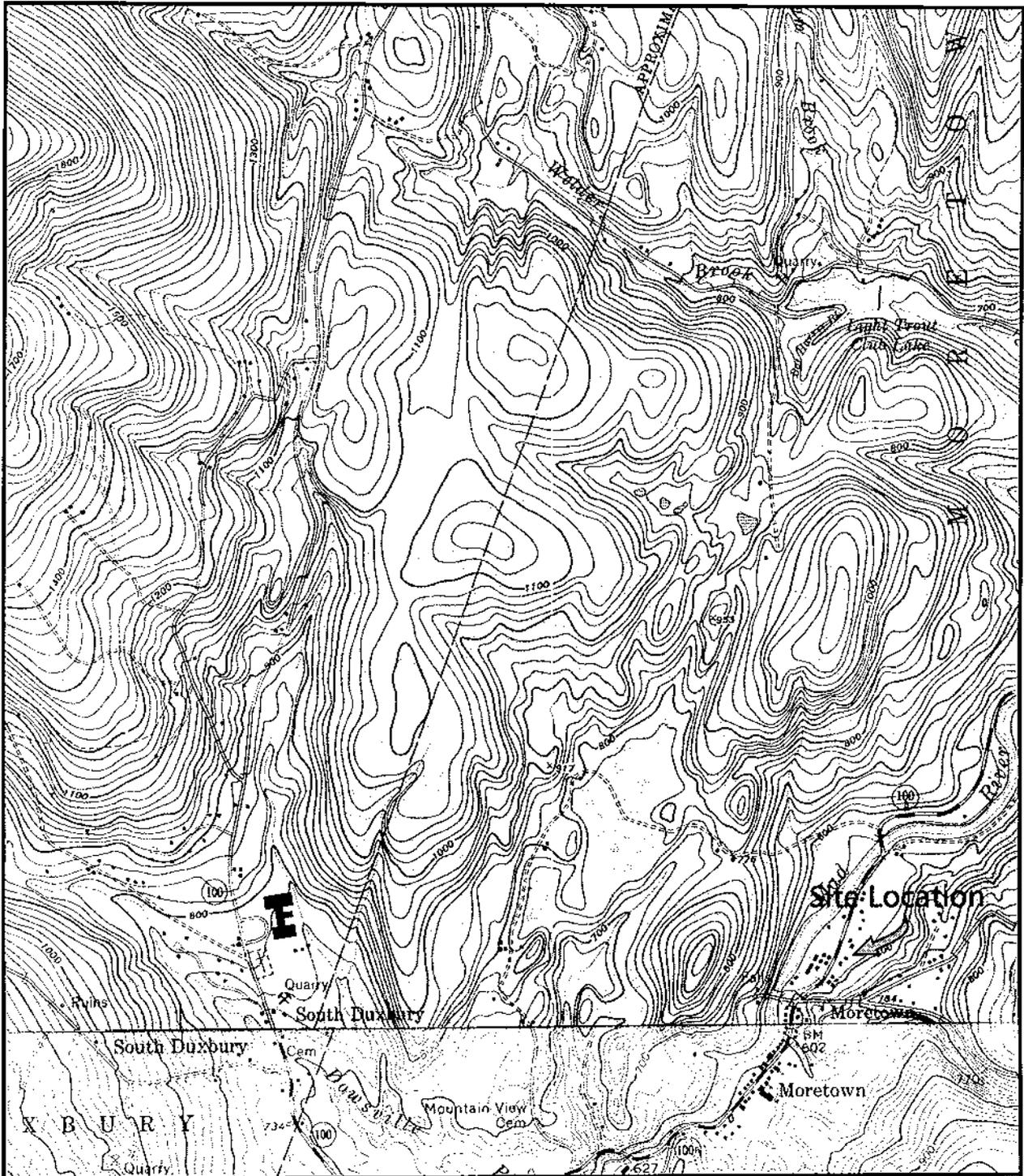
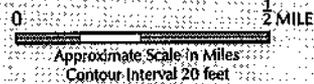


FIGURE 1: SITE LOCATION MAP
Moretown Town Garage
Moretown, Vermont



Source: Waterbury, VT Quadrangle, 7.5 Minute Series, 1:24,000 Scale, USGS 1980;
 Waitsfield, VT Quadrangle, 7.5 Minute Series, 1:24,000 Scale, USGS 1970;
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 int: 04-01-97:jmk

 **STONE ENVIRONMENTAL INC**

GROUNDWATER SAMPLING RESULTS

MW-1: 20 ppb MTBE
 MW-2: 1.4 ppb ethylbenzene
 26 ppb xylenes
 MW-3: 2.8 ppb xylenes
 MW-4: 5.2 ppb benzene
 2.4 ppb toluene
 3.8 ppb xylenes
 9.4 ppb MTBE

LEGEND

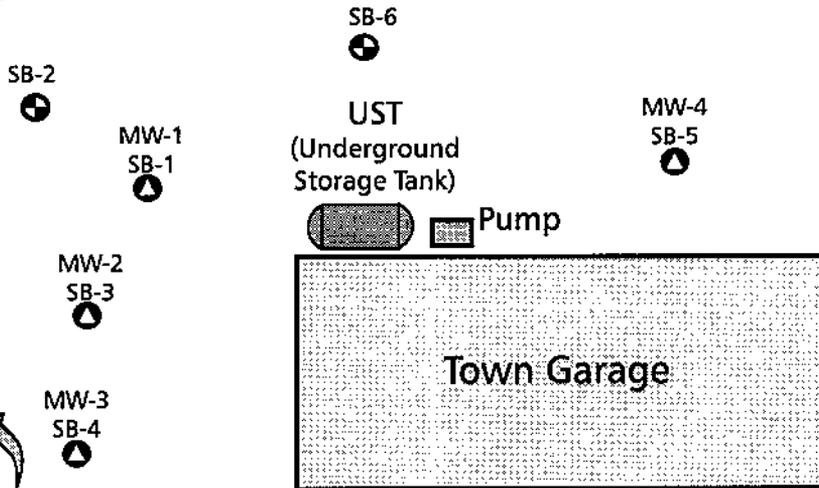
- SB-#
 Soil Boring
- MW-#
SB-#
 Monitoring Well and Soil Boring

0 30
 Approximate Scale in Feet

← Mad River
 (approximately 500' west)

Drainage Ditch
 (and approximate property line) ↘

Route 100



Drainage Pipe ↘

↙ Drainage Ditch
 (and approximate property line)

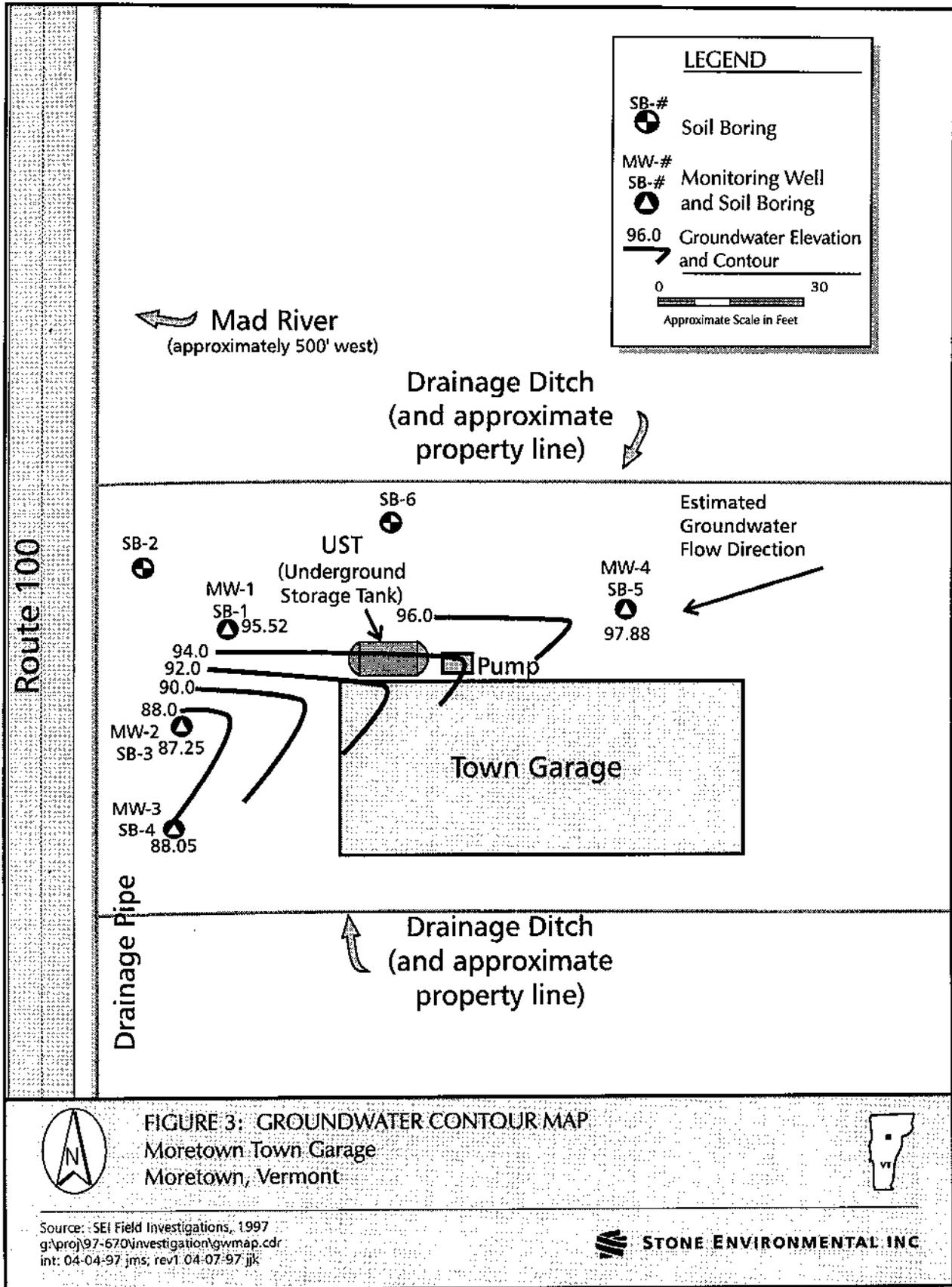


FIGURE 2: SITE MAP
 Moretown Town Garage
 Moretown, Vermont



Source: SEI Field Investigations, 1997
 g:\proj\97-670\investigation\site\map.cdr
 int: 04-04-97 jms; rev1 04-07-97 jjk

 **STONE ENVIRONMENTAL INC**



ATTACHMENT 1

Well Construction Logs

Monitoring Well MW-2/SB3
 Moretown Town Garage

Date Drilled: 03-03-97
 Logged by: Jeff Kelley
 Date of Water Level Measurement: 03-04-97

Field notes (Jeff Kelley)
 04-04-97 jjk
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WELL CONSTRUCTION AND BACKFILL MATERIAL	DEPTH (feet)	PID RECOVERY	PID (ppm)	SAMPLE INTERVAL	SAMPLE RECOVERY	GENERAL LITHOLOGY AND COMMENTS (based on field notes, and geoscientist interpretation)
	1					
Cement	0	0.4				gravelly sandy loam
Bentonite Slurry	-1	3.1				sandy clay loam silty clay loam; fuel odor at ~6'
Sand	-2	1.9				
Screened Interval	-3					
Water Level	-4					
	-5	1.8				
	-6	0.6				
	-7	3.0	2.0			sand
	-8	0.4				
	-9					
	-10	1.0				
	-11	0.5	0.6			
	-12	1.1				gravelly sand
	-13					
	-14					
	-15					

Monitoring Well MW-3/SB4
 Moretown Town Garage

Date Drilled: 03-03-97
 Logged by: Jeff Kelley
 Date of Water Level Measurement: 03-04-97

Field notes (Jeff Kelley)
 04-04-97 jjk
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WELL CONSTRUCTION AND BACKFILL MATERIAL	DEPTH (Feet)	PID RECOVERY	PID (ppm)	SAMPLE INTERVAL	SAMPLE RECOVERY	GENERAL LITHOLOGY AND COMMENTS (based on field notes, and geoscientist interpretation)
	1					
	0		0.3			sandy loam
Cement Bentonite Slurry	-1		0.4			
	-2		0.7			
Sand	-3		1.0			silty clay loam
	-4					
	-5		0.5			silt loam
<i>Screened Interval</i>	-6		0.4			
	-7		0.7			
	-8		0.6			
	-9		0.5			sand
	-10		0.7			
<i>Water Level</i>	-10		0.6			
	-11		0.6			gravelly sand
	-12		0.6			
	-13					
	-14					
	-15					

Monitoring Well MW-4/SB5
 Moretown Town Garage

Date Drilled: 03-03-97
 Logged by: Jeff Kelley
 Date of Water Level Measurement: 03-04-97

Field notes (Jeff Kelley)
 04-04-97 jjk
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WELL CONSTRUCTION AND BACKFILL MATERIAL	DEPTH (Feet)	PID RECOVERY	PID (ppm)	SAMPLE INTERVAL	SAMPLE RECOVERY	GENERAL LITHOLOGY AND COMMENTS (based on field notes, and geoscientist interpretation)
Cement Bentonite Slurry Sand Screened Interval	1 0 -1 -2 -3 -4 -5 -6 -7 -8 -9 -10		0.4 0.4 0.3 0.3 0.3 0.3 0.2 0.2			sandy loam loamy sand silt loam

SOIL BORING LOG SB-2

Moretown Town Garage

Date Drilled: 03-03-97

Logged by: Jeff Kelley

SEI Field Notes (Jeff Kelley)
 04-04-97 jjk
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DEPTH (Feet)	WATER LEVEL	PID INTERVAL	PID READING (ppm)	SAMPLE INTERVAL	RECOVERY	GENERAL LITHOLOGY AND COMMENTS (based on field notes and geoscientist interpretation)
1						
0			0.5			sandy loam
-1			0.3			
-2	▼		0.6			fine sandy loam
-3			0.3			sandy clay loam
-4						
-5						

SOIL BORING LOG SB-6

Moretown Town Garage

Date Drilled: 03-03-97

Logged by: Jeff Kelley

SEI Field Notes (Jeff Kelley)
 04-04-97 jkk
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DEPTH (Feet)	WATER LEVEL	PID INTERVAL	PID READING (ppm)	SAMPLE INTERVAL	RECOVERY	GENERAL LITHOLOGY AND COMMENTS (based on field notes and geoscientist interpretation)
1						
0			0.7			sandy loam
-1						
-2						
-3			0.3			
-4			0.4			silt loam
-5			0.2			loamy fine sand
-6	▼		0.1			
-7			0.7			loamy sand

ATTACHMENT 2

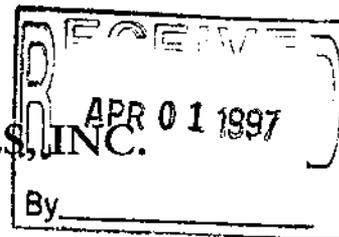
Laboratory Results

GREEN MOUNTAIN LABORATORIES, INC.

RR 3, BOX 5210
Montpelier, Vermont 05602

Phone (802) 223 - 1468

Fax (802) 223 - 8688



LABORATORY RESULTS

CLIENT NAME:	Stone Environmental, Inc.	REFERENCE NO.:	1936
ADDRESS:	58 E. State Street Montpelier, VT 05602	PROJECT NO.:	97-670
SAMPLE LOCATION:	Moretown	DATE OF SAMPLE:	03/05/97
SAMPLER:	Kevin Brooker/Jeff Kelley	DATE OF RECEIPT:	03/05/97
ATTENTION:	Jeff Kelley	DATE OF ANALYSIS:	03/11/97-03/19/97
		DATE OF REPORT:	03/28/97

Pertaining to the analyses of specimens submitted under the accompanying chain of custody form, please note the following:

- Water samples submitted for VOC analysis were preserved with HCl.
- Specimens were processed and examined according to the procedures outlined in the specified method.
- Holding times were honored.
- Instruments were appropriately tuned and calibrations were checked with the frequencies required in the specified method.
- Blank contamination was not observed at levels interfering with the analytical results.
- Continuing Calibration standards were monitored at intervals indicated in the specified method. The resulting analytical precision and accuracy were determined to be within method QA/QC acceptance limits.
- The efficiency of analyte recovery for individual samples was monitored by the addition of surrogate analyte to all samples, standards, and blanks. Surrogate recoveries were found to be within laboratory QA/QC acceptance limits, unless noted otherwise.

Reviewed by:

A handwritten signature in cursive script that reads "Althea L. Lindell".

Althea L. Lindell
Director, Chemical Services

GREEN MOUNTAIN LABORATORIES, INC.

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Montpelier, Vermont 05602

Phone (802) 223 - 1468

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LABORATORY RESULTS

GC/MS METHOD - EPA 8020

GML REF. # : 1936
STATION: MW-1
ANALYSIS DATE: 03/11/97-03/19/97
DATE SAMPLED: 03/05/97
SAMPLE TYPE: WATER

PARAMETER	PQL (µg/L)	Conc. (µg/L)
Benzene	1	ND
Toluene	1	ND
Ethylbenzene	1	ND
m+p-Xylene	2	ND
o-Xylene	1	ND
Chlorobenzene	1	ND
m-Dichlorobenzene	1	ND
p-Dichlorobenzene	1	ND
o-Dichlorobenzene	1	ND
MTBE	5	20

Surrogate % Recovery: 95.5 %

ND = Not Detected

BPQL = Below Practical Quantitation Limits

GREEN MOUNTAIN LABORATORIES, INC.

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LABORATORY RESULTS

GC/MS METHOD - EPA 8020

GML REF. # : 1936
STATION: MW-2
ANALYSIS DATE: 03/11/97-03/19/97
DATE SAMPLED: 03/05/97
SAMPLE TYPE: WATER

PARAMETER	PQL ($\mu\text{g/L}$)	Conc. ($\mu\text{g/L}$)
Benzene	1	ND
Toluene	1	ND
Ethylbenzene	1	1.4
m+p-Xylene	2	25
o-Xylene	1	1.0
Chlorobenzene	1	ND
m-Dichlorobenzene	1	ND
p-Dichlorobenzene	1	ND
o-Dichlorobenzene	1	ND
MTBE	5	ND

Surrogate % Recovery: 97.8 %

ND = Not Detected

BPQL = Below Practical Quantitation Limits

GREEN MOUNTAIN LABORATORIES, INC.

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Montpelier, Vermont 05602

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LABORATORY RESULTS

GC/MS METHOD - EPA 8020

GML REF. # : 1936
STATION: MW-3
ANALYSIS DATE: 03/11/97-03/19/97
DATE SAMPLED: 03/05/97
SAMPLE TYPE: WATER

PARAMETER	PQL (µg/L)	Conc. (µg/L)
Benzene	1	ND
Toluene	1	ND
Ethylbenzene	1	ND
m+p-Xylene	2	2.8
o-Xylene	1	ND
Chlorobenzene	1	ND
m-Dichlorobenzene	1	ND
p-Dichlorobenzene	1	ND
o-Dichlorobenzene	1	ND
MTBE	5	ND

Surrogate % Recovery: 95.2 %

ND = Not Detected

BPQL = Below Practical Quantitation Limits

GREEN MOUNTAIN LABORATORIES, INC.

RR 3, BOX 5210
Montpelier, Vermont 05602

Phone (802) 223 - 1468

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LABORATORY RESULTS

GC/MS METHOD - EPA 8020

GML REF. # : 1936
STATION: MW-4
ANALYSIS DATE: 03/11/97-03/19/97
DATE SAMPLED: 03/05/97
SAMPLE TYPE: WATER

PARAMETER	PQL (µg/L)	Conc. (µg/L)
Benzene	1	5.2
Toluene	1	2.4
Ethylbenzene	1	ND
m+p-Xylene	2	2.5
o-Xylene	1	1.3
Chlorobenzene	1	ND
m-Dichlorobenzene	1	ND
p-Dichlorobenzene	1	ND
o-Dichlorobenzene	1	ND
MTBE	5	9.4

Surrogate % Recovery: 97.0 %

ND = Not Detected

BPQL = Below Practical Quantitation Limits

Green Mountain Laboratories, Inc.

RR#3 Box 5210

Montpelier, Vermont 05602

Phone (802) 223-1468

Fax (802) 223-8688

LABORATORY RESULTS

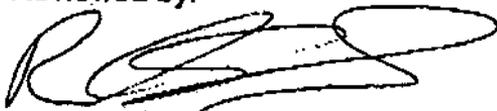
CLIENT NAME:	Stone Environmental	REF #:	1936
ADDRESS:	58 State Street	PROJECT NO.:	97-670
	Montpelier, Vt. 05602	DATE OF SAMPLE:	03/05/97
SAMPLE LOCATION:	Moretown	DATE OF RECEIPT:	03/05/97
SAMPLER:	Kevin Brooker/Jeff Kelley	DATE OF ANALYSIS:	03/14/97
ATTENTION:	Jeff Kelley	DATE OF REPORT:	03/18/97

Total Petroleum Hydrocarbons (TPH) Results by EPA Modified 8100

Sample	Result (mg/l-ppm)*
MW - 1	<0.5
MW - 2	<0.5
MW - 3	<0.5
MW - 4	<0.5
SB - 2	<0.5

* Carbon Range C9-C40 - Fuel (Diesel) and Lubricating Oil Range Organics.

Reviewed by:



Raul Sanchez
Chemical Services

