

June 20, 1994

Managing the Environment through Science

Mr. Chuck Schwer, Supervisor  
Sites Management Section  
Hazardous Materials Management Division  
Agency of Natural Resources  
103 South Main Street  
Waterbury, VT 05671-0404

JUN 30 10 32 AM '94

## STONE ENVIRONMENTAL INC

58 East State Street Phone / 802. 229.4541  
Montpelier, Vermont Fax / 802. 229.5417  
05602

RE: Report on the Findings of Subsurface Investigation at Border Gas, Inc., Derby, Vermont  
(DEC Site #91-1091) (SEI Project #93-505)

Dear Mr Schwer,

On behalf of Mr. Gilles Desjarlais and Mr. Bennie Meunier, Stone Environmental, Inc. (SEI) is pleased to present the following report on the above referenced project at Border Gas in Derby, Vermont. The work was requested by the Hazardous Materials Management Division (HMMD) in response to the removal of four underground storage tanks (USTs) in 1991. Petroleum contamination above the State of Vermont guideline levels was measured in the soils during tank removal.

### 1.0 Overview / Executive Summary

SEI was retained to perform a subsurface investigation at Border Gas in Derby, Vermont. The project was conducted per the October 8, 1993 approved workplan as well as the December 15, 1993 approved addendum. Work performed per the October 8 workplan included the advancement of four soil borings, two of which were converted to groundwater monitoring wells. Work performed per the December 15 addendum included the installation of two additional monitoring wells. Sampling and analyses of the wells and a survey of the site were performed at a later date.

VOC field screening revealed concentrations above VT DEC guidelines in two of the borings. There was no groundwater contamination detected at the site. Crystal Brook, which is located approximately 1000 feet topographically downgradient of the site, is the principle potential receptor identified and does not appear to be threatened. Any contamination present as a result of the removed USTs has not been observed to migrate significantly and, based on the soil types and saturated zone, probably will not migrate much further.

### 2.0 Scope of Services

#### 2.1 Site History

The current Border Gas building was built in 1953 and has operated as a gasoline/service station since its construction. According to Mr. Desjarlais, the "Sarsaparilla Cafe" located adjacent to Border Gas

Border Gas Site Investigation, Derby, Vermont

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was in the past a service station called "Kelleys". It is not known whether or not there was gasoline sold, although Mr. Desjarlais did not think that there was. Although SEI did not inspect the interior of the building, Mr. Desjarlais informed us that there is still a "mechanics pit" where they used to service vehicles. There is not a basement in the building. There is a dry well reportedly used for wash water from the adjacent restaurant that is located in the vicinity of MW#2.

As stated above, four gasoline USTs were removed from Border Gas in July, 1991. SEI has reviewed the tank pull report submitted to the HMMD and obtained the following information:

- ▶ Soils screened with a PID from the bottom of the tank excavation ranged from 100 to 200 ppm across the entire pit.
- ▶ As the contaminated soils could not be totally removed from the excavation during UST removal, all of the soils were left in the excavated area.
- ▶ The tanks showed no signs of leaking. All were in good condition.
- ▶ No groundwater was encountered during UST removal.
- ▶ The tanks had been out of service for at least 15 years.

## 2.2 Site Information

In general, the site is situated on rural land that gradually slopes towards the southwest. There is a large dairy farm to the sites immediate east and south sides, as well as southwest of Route 5. Crystal Brook, which is located approximately 1000 feet to the southwest of Border Gas, flows southwesterly into Johns River, which feeds into Lake Memphramagog. Lake Memphramagog is located over six miles to the west. The area is served by municipal water but each residence has an on-site septic system. The parking lot at Border Gas is asphalt capped, including the area within the tank excavation.

## 2.3 Soil Borings and Monitoring Well Installation

### 2.3.1 November 10, 1993

The subsurface investigation performed by SEI on November 10 consisted of the advancement of four soil borings (two of which were converted to groundwater monitoring wells). DIGSAFE was contacted five days prior to drilling. The borings were advanced to either the water table or auger refusal and soil samples were collected at five foot intervals. Each sample was placed in a one pint mason jar and covered with aluminum foil. Volatile organic compounds (VOCs) were allowed to develop in the headspace of the sample jar for a minimum of five minutes. The sample was agitated for approximately one minute during this time. The aluminum foil was then pierced by a MicroTip photo ionization detector (PID) equipped with a 10.6 eV lamp, and the sample headspace was measured. The maximum "peak" reading was recorded from the PID. The PID had been calibrated to 97 ppm isobutylene in the lobby of Border Gas, and all headspace readings were performed in the lobby as the temperature outside was well below freezing. As the PID was calibrated to isobutylene, the VOC measurements obtained during drilling should be multiplied by 0.60 to accurately measure benzene found in gasoline contaminated soils.

Border Gas Site Investigation, Derby, Vermont

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As mentioned above, two of the soil borings were completed as monitoring wells (see Figure 2, Site Map), one in the approximate center of the tank removal area (MW#2), and the other within the assumed up-gradient end of the tank excavation area (MW#1). SB#2 was advanced in an assumed upgradient position from the tank pull area, and SB#4 was advanced in a topographically downgradient position from the tank pull area between MW#2 and Route 5.

Immediately east of Route 5 and west of the tank excavation area pit is a storm drain that runs parallel with the road. It is not known where it drains into but it is assumed that it drains into Crystal Brook, which is located approximately 1,000 feet downhill of the site.

### 2.3.2 January 21, 1994

On January 21, two monitoring wells were installed (MW#3 and MW#4) in assumed downgradient locations of the tank pull area. Soil samples were collected and field analyzed with the same PID in the same fashion as the November 10 investigation. Soil boring and well logs for both days are included as Attachment 1. Prior to drilling, SEI personnel met on-site with Mr. Gil Blais of the International Water Company in Derby Line. Mr. Blais marked all buried water lines in the proposed drilling area. DIGSAFE had already been contacted.

### 2.4 Groundwater Sampling

All groundwater monitoring wells were sampled per standard operating procedure (SOP) SEI-6.7.1, and water levels were measured per SOP SEI-6.2.1. MW#1 was sampled on February 4, 1994. That same day, MW#2 could not be located due to approximately eight inches of ice and snow that had accumulated in the vicinity of MW#2. It was also discovered that MW#4 had apparently been hit by a snowplow as the protective casing was damaged. The top of casing slip cap was still intact, however. Both MW#3 and MW#4 were dry. The sample collected from MW#1 was transported in ice to MicroAssays of Vermont in Middlesex where it was analyzed using EPA Method 8020.

SEI returned to the site on May 4, 1994 to sample MW#2, MW#3, and MW#4. MW#2 was visible as the snow and ice had melted in the parking lot. A sample was collected from MW#2 and transported on ice to MicroAssays of Vermont for EPA Method 8020 analysis. MW#3 and MW#4 were both dry. SEI again returned to the site on May 26, 1994 to check MW#3 and MW#4 and both were again dry.

### 2.5 Site Survey

A survey of the site was performed by SEI and Todd Hill of Montpelier, Vermont. All soil boring and monitoring well locations were surveyed relative to an arbitrary datum. Other pertinent structures were also surveyed. Combining the well locations with their corresponding depth to water measurements, SEI developed a groundwater contour map included as Attachment 3.

Border Gas Site Investigation, Derby, Vermont

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### 3.0 Findings

VOC field screening results for all borings and wells are as follows:

Sample Depth	MW#1 (SB#1)	MW#2 (SB#3)	MW#3	MW#4	SB#2	SB#4
4'-6'	1 ppm	0 ppm	3.6 ppm	0 ppm	0 ppm	259 ppm
9'-11'	0 ppm	51 ppm	7.6 ppm	0 ppm	0 ppm	2188 ppm
14'-16'	0 ppm	not sampled	2.6 ppm	not sampled	0 ppm	2500 ppm
18'-20'	0 ppm	not sampled	5.7 ppm	not sampled	not sampled	not sampled

Laboratory analyses of groundwater samples from MW#1 and MW#2 using EPA Method 8020 were below practical quantitation limit (BPQL) for all parameters (see Attachment 1). As stated above, MW#3 and MW#4 were both dry during the sampling events.

In general, the soil below the site consists of dense, tight soils as evidenced by slow drilling and high blow counts (see well logs). There is a layer of dense, clayey loam at approximately 88 feet relative elevation to 95 feet (approximately 5 to 13 feet below surface grade) that was found consistently in each boring and well except for MW#2 (SB#3). Bedrock was encountered in MW#2, MW#3, MW#4, and SB-2. As groundwater was present in only two of the monitoring wells (MW#1 and MW#2), the exact groundwater flow direction cannot be accurately determined.

### 4.0 Discussion / Conclusions / Recommendations

Elevated VOC concentrations were detected in SB#4. VOCs at such high levels do not appear to be consistent with soils uncovered during the excavation of the tanks. The contamination appears to be isolated, and will probably not migrate any great distance due to the tight soils and lack of saturated zone in the vicinity.

It is apparent that there are contaminated soils in the tank excavation area beneath Border Gas. This was determined through soil screening during the investigation as well as from the tank pull report referenced above. However, based on the VOC screening results as well as the groundwater sampling results, the contamination has not seen extensive migration and is limited in extent to an area around SB#4. This is consistent with the fact that tight soils in the subsurface encountered during drilling, the presence of little to no saturated zone in the area, as well as the presence of an asphalt cap at the site would deter migration.

The groundwater samples collected from MW#1 and MW#2 revealed no contamination above the laboratory's practical quantitation limits is present. It appears that any contamination present at the site

Border Gas Site Investigation, Derby, Vermont

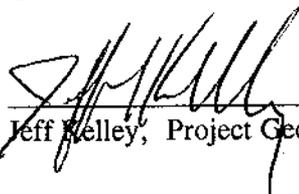
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has not affected the groundwater.

Based on the findings of this investigation coupled with information obtained from the tank pull report, we feel that any contamination present in the subsurface at Border Gas is not posing a threat to health or the environment. Specifically, Crystal Brook, which appears to be the principle potential receptor in the area, is not threatened by contamination caused by the removed USTs at the site. It is our recommendation that further investigation is not warranted at Border Gas.

Sincerely,

STONE ENVIRONMENTAL INC



Jeff Kelley, Project Geoscientist

Figure 1: Area Map  
Figure 2: Site Map  
Attachment 1: Well and Soil Boring Logs  
Attachment 2: Laboratory Results

cc: Mr. Gilles Desjarlais  
Mr. Benny Meunier

Reviewed By:   
g:\proj\93-505\report.doc June 20, 1994



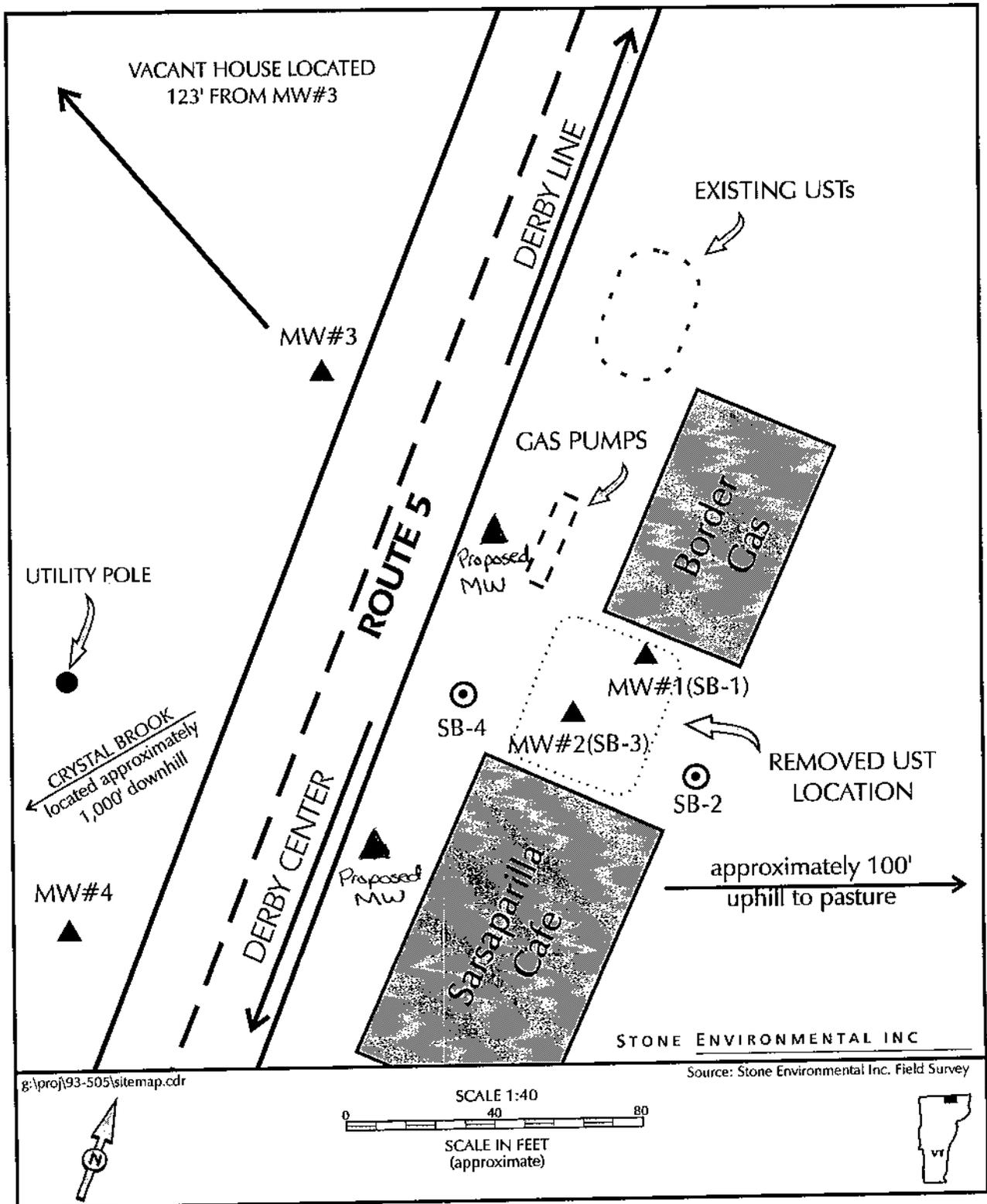


FIGURE 2  
SITE MAP  
Border Gas, Derby, Vermont

# **ATTACHMENT 1**

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## **WELL & SOIL BORING LOGS**

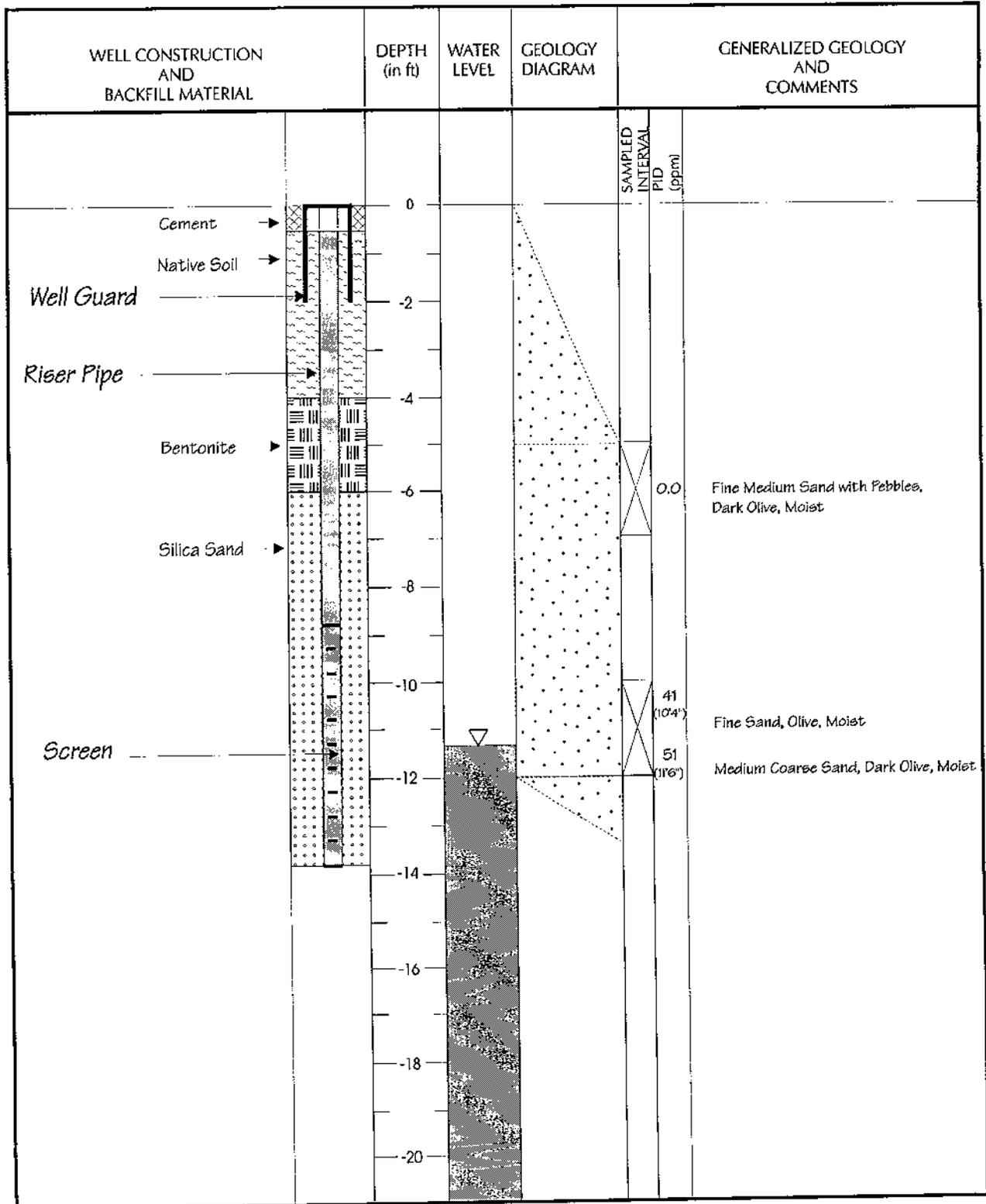


# BORDER GAS

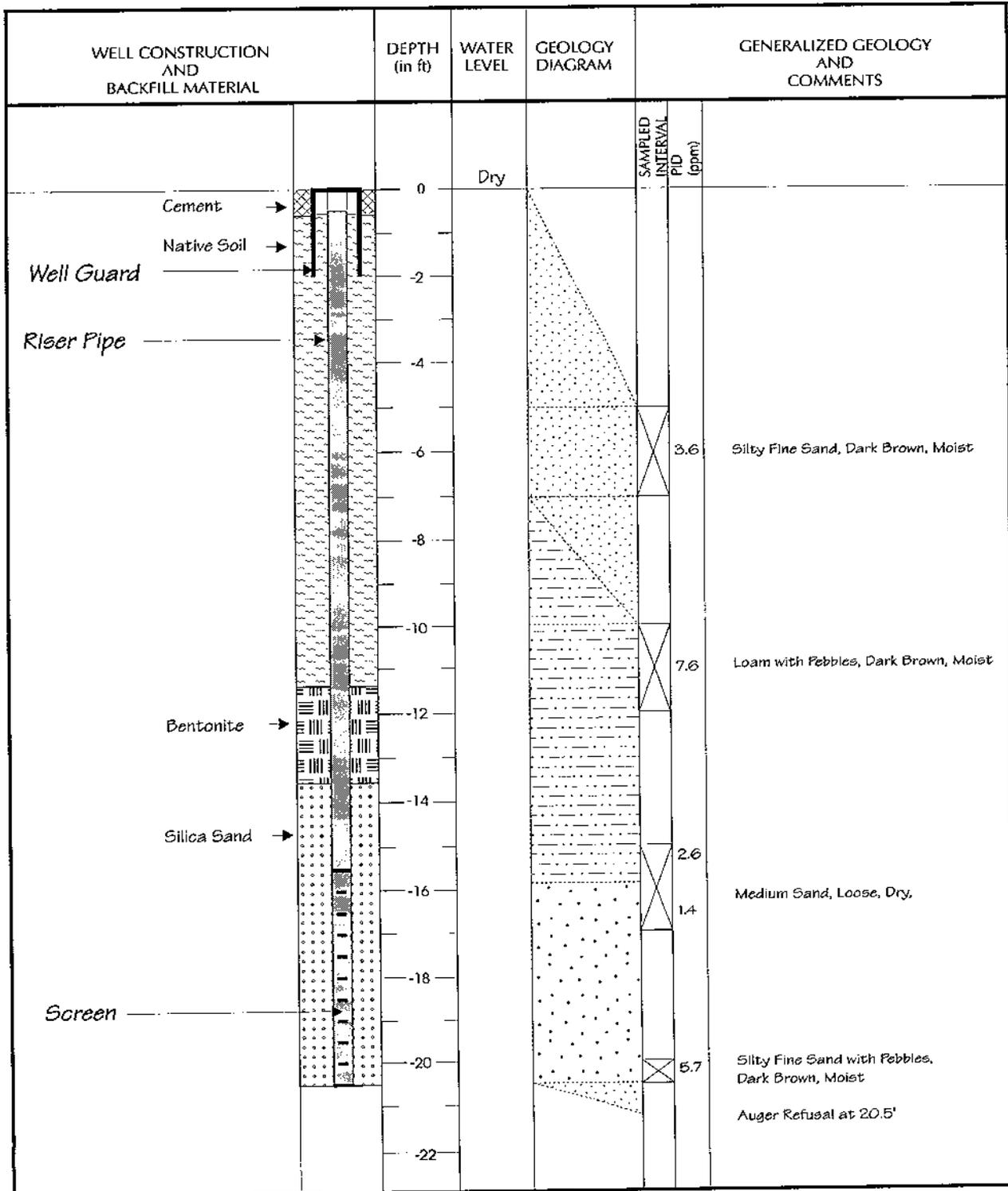
## Derby, Vermont

### WELL CONSTRUCTION DIAGRAM - MW#2/SB#3

### PROJECT# 93505



# BORDER GAS Derby, Vermont WELL CONSTRUCTION DIAGRAM - MW#3 PROJECT# 93505



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STONE ENVIRONMENTAL INC





**BORDER GAS**  
**Derby, Vermont**  
**WELL CONSTRUCTION LOGS**

MW#3																
<p><b>GENERAL</b></p> <p>Date of Installation: January 21, 1994            Geoscientist: Jeff Kelley            Drilling Contractor: Green Mtn Boring            Drilling Method: hollow stemmed auger            Inside diameter: 4.25"            Outside diameter: 8"            Boring depth: 20.5'</p> <p><b>WELL MATERIALS</b></p> <p>Casing diameter: 2"            Riser pipe material: PVC            Length of riser pipe: 15'            Screened Interval: 15.5'-20.5'            Length of screen: 5'            Slot size: 0.02"            Well guard: road box</p>	<p><b>BACKFILL DETAIL</b>      <b>DEPTH INTERVAL (feet bgs)</b></p> <p>Native soil: sg - 11.5'            Bentonite: 11.5'-13.5'            Silica sand: 13.5'-20.5'</p> <p><b>SURVEY AND WATER LEVEL INFORMATION</b></p> <p>Ground surface elevation: 99.2'            Water table elevation: Dry            Date of water level measurement: May 4, 1994</p> <p><b>SAMPLING \ SPLITSPOON RESULTS</b></p> <table style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="text-align: left; border-bottom: 1px solid black;">Sample Interval</th> <th style="text-align: left; border-bottom: 1px solid black;">Blow Counts</th> <th style="text-align: left; border-bottom: 1px solid black;">Recovery</th> </tr> </thead> <tbody> <tr> <td>5' - 7'</td> <td>38-12-5-9</td> <td>3"</td> </tr> <tr> <td>10' - 12'</td> <td>28-15-13-10</td> <td>8"</td> </tr> <tr> <td>15' - 17'</td> <td>16-7-8-12</td> <td>18"</td> </tr> <tr> <td>20' - 22'</td> <td>100/3"</td> <td>3"</td> </tr> </tbody> </table>	Sample Interval	Blow Counts	Recovery	5' - 7'	38-12-5-9	3"	10' - 12'	28-15-13-10	8"	15' - 17'	16-7-8-12	18"	20' - 22'	100/3"	3"
Sample Interval	Blow Counts	Recovery														
5' - 7'	38-12-5-9	3"														
10' - 12'	28-15-13-10	8"														
15' - 17'	16-7-8-12	18"														
20' - 22'	100/3"	3"														

MW#4													
<p><b>GENERAL</b></p> <p>Date of Installation: January 21, 1994            Geoscientist: Jeff Kelley            Drilling Contractor: Green Mtn Boring            Drilling Method: hollow stemmed auger            Inside diameter: 4.25"            Outside diameter: 8"            Boring depth: 12.5'</p> <p><b>WELL MATERIALS</b></p> <p>Casing diameter: 2"            Riser pipe material: PVC            Length of riser pipe: 15'            Screened Interval: 7.5'-12.5'            Length of screen: 5'            Slot size: 0.02"            Well guard: road box</p>	<p><b>BACKFILL DETAIL</b>      <b>DEPTH INTERVAL (feet bgs)</b></p> <p>Native soil: sg - 3.5'            Bentonite: 3.5'-5.5'            Silica sand: 5.5'-12.5'</p> <p><b>SURVEY AND WATER LEVEL INFORMATION</b></p> <p>Ground surface elevation: 97.5'            Water table elevation: Dry            Date of water level measurement: May 4, 1994</p> <p><b>SAMPLING \ SPLITSPOON RESULTS</b></p> <table style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="text-align: left; border-bottom: 1px solid black;">Sample Interval</th> <th style="text-align: left; border-bottom: 1px solid black;">Blow Counts</th> <th style="text-align: left; border-bottom: 1px solid black;">Recovery</th> </tr> </thead> <tbody> <tr> <td>5' - 7'</td> <td>15-7-8-7</td> <td>10"</td> </tr> <tr> <td>10' - 12'</td> <td>9-6-5-24</td> <td>15"</td> </tr> <tr> <td>12.5'</td> <td>50/0"</td> <td>0"</td> </tr> </tbody> </table>	Sample Interval	Blow Counts	Recovery	5' - 7'	15-7-8-7	10"	10' - 12'	9-6-5-24	15"	12.5'	50/0"	0"
Sample Interval	Blow Counts	Recovery											
5' - 7'	15-7-8-7	10"											
10' - 12'	9-6-5-24	15"											
12.5'	50/0"	0"											

## Soil Boring Logs

### SB#2

<u>SAMPLING / SPLIT SPOON RESULTS</u>			
<u>Sampling Interval</u>	<u>Blow Counts</u>	<u>Recovery</u>	<u>General Sample Description</u>
5' - 7'	6-5-14-9	19"	0-2" Fine medium sand 2"-19" Loamy fine sand
10' - 12'	8-32-30-23	10"	Loamy fine sand
15' - 17'	37-31-18-11	7"	Fine medium sand, wet throughout

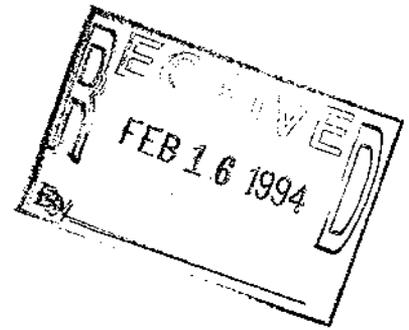
### SB#4

<u>SAMPLING / SPLIT SPOON RESULTS</u>			
<u>Sampling Interval</u>	<u>Blow Counts</u>	<u>Recovery</u>	<u>General Sample Description</u>
4' - 67'	7-6-6-5	14"	Medium coarse sand with pebbles, dry
9' - 11'	7-19-21-37	22"	Loam, dense, olive gray, dry
14' - 16'	39-64-100/4"	15"	Loam, dense, gray, dry

# **ATTACHMENT 1**

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## **LABORATORY RESULTS**



## LABORATORY ANALYSIS

CLIENT NAME:	Stone Environmental	REF #:	8219
ADDRESS:	58 East State Street Montpelier, VT 05602	PROJECT NO.:	not given
SAMPLE LOCATION:	Border Gas	DATE OF SAMPLE:	2/1/94
SAMPLER:	Jeff Kelley	DATE OF RECEIPT:	2/1/94
		DATE OF ANALYSIS:	2/9/94
ATTENTION:	Jeff Kelley	DATE OF REPORT:	2/14/94

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.
- Matrix spikes, matrix spike duplicates, and 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 inferred efficiency of analyte recovery for individual samples was monitored by the addition of surrogate analytes to all samples, standards, and blanks. Surrogate recoveries were found to be within laboratory QA/QC acceptance limits, unless noted otherwise.

Reviewed by:

Brendan McMahon, Ph.D.  
Director, Chemical Services



## LABORATORY REPORT

### EPA METHOD 8020 ANALYTES + MTBE with GC/MS Confirmation

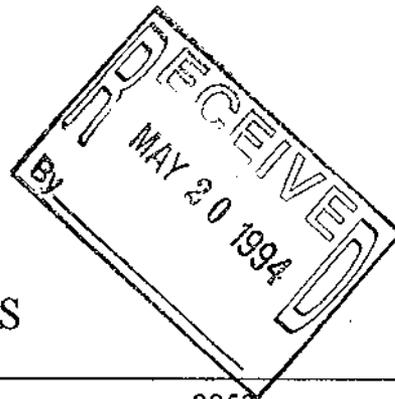
CLIENT NAME:	Stone Environmental	PROJECT CODE:	93,505
PROJECT NAME:	Border Gas	REF.#:	8,219
REPORT DATE:	February 14, 1994	STATION:	MW#1
DATE SAMPLED:	February 1, 1994	TIME SAMPLED:	13:15
DATE RECEIVED:	February 1, 1994	SAMPLER:	Jeff Kelley
ANALYSIS DATE:	February 9, 1994	SAMPLE TYPE:	Water

PARAMETER	PQL ( $\mu\text{g/L}$ )	Concentration ( $\mu\text{g/L}$ )
Benzene	1	BPQL
Toluene	1	BPQL
Ethylbenzene	1	BPQL
m+p-Xylene	2	BPQL
o-Xylene	1	BPQL
Chlorobenzene	1	BPQL
1,2-Dichlorobenzene	1	BPQL
1,3-Dichlorobenzene	1	BPQL
1,4-Dichlorobenzene	1	BPQL
MTBE	1	BPQL

Surrogate % Recovery: 99%

BPQL = Below Practical Quantitation Limit (PQL).





## LABORATORY ANALYSIS

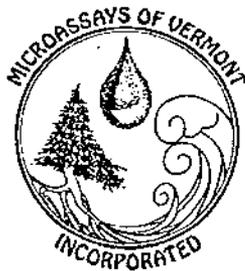
CLIENT NAME:	Stone Environmental, Inc.	REF #:	8853
ADDRESS:	58 East State Street Montpelier, VT 05602	PROJECT NO.:	93505
SAMPLE LOCATION:	Border Gas	DATE OF SAMPLE:	5/4/94
SAMPLER:	Jeff Kelley	DATE OF RECEIPT:	5/5/94
		DATE OF ANALYSIS:	5/16/94
ATTENTION:	Jeff Kelley	DATE OF REPORT:	5/18/94

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 analytes to all samples, standards, and blanks. Surrogate recoveries were found to be within laboratory QA/QC acceptance limits, unless noted otherwise.

Reviewed by:

Brendan McMahon, Ph.D.  
Director, Chemical Services



## LABORATORY REPORT

### EPA METHOD 8020 ANALYTES + MTBE with GC/MS Confirmation

CLIENT NAME:	Stone Environmental, Inc.	PROJECT CODE:	93,505
PROJECT NAME:	Border Gas	REF.#:	8,853
REPORT DATE:	May 18, 1994	STATION:	MW-2
DATE SAMPLED:	May 4, 1994	TIME SAMPLED:	not given
DATE RECEIVED:	May 5, 1994	SAMPLER:	Jeff Kelley
ANALYSIS DATE:	May 16, 1994	SAMPLE TYPE:	Water

PARAMETER	PQL ( $\mu\text{g/L}$ )	Conc. ( $\mu\text{g/L}$ )
Benzene	1	BPQL
Toluene	1	BPQL
Ethylbenzene	1	BPQL
m+p-Xylene	2	BPQL
o-Xylene	1	BPQL
Chlorobenzene	1	BPQL
1,2-Dichlorobenzene	1	BPQL
1,3-Dichlorobenzene	1	BPQL
1,4-Dichlorobenzene	1	BPQL
MTBE	1	BPQL

Surrogate % Recovery: 99%

BPQL = Below Practical Quantitation Limit (PQL).

