



October 12, 1999

Mr. Gerald Noyes  
Sites Management Section  
VTDEC WMD  
103 South Main St./ West Bldg.  
Waterbury, VT 05671-0404

**RE: Initial Site Investigation Report  
Lake Hortonia Country Store, Orwell, VT (VTDEC Site #99-2605)**

Dear Mr. Noyes:

Please find enclosed a copy of the *Initial Site Investigation Report* for the Lake Hortonia Country Store. Mr. Jody Gale, owner of the site, requested that a copy be forwarded to you for review. Please do not hesitate to call, if you have any questions or comments.

Please contact me as soon as you have had a chance to review this.

Sincerely,

A handwritten signature in black ink that reads "Robert Higgins". The signature is written in a cursive style with a large initial "R".

Robert Higgins  
Engineer

Enc.

cc: GI Project 69941552  
Mr. Jody Gale, Lake Hortonia Store (w/o enclosure)

**INITIAL SITE INVESTIGATION OF  
SUBSURFACE PETROLEUM CONTAMINATION AT  
THE LAKE HORTONIA COUNTRY STORE**

**OCTOBER 7, 1999**

**Site Location:**

**Lake Hortonia Country Store  
303 Route 144  
Orwell, VT 05760**

**VTDEC SITE #99-2605  
GI Project #69941552**

**Prepared For:**

**Mr. Jody Gale  
Lake Hortonia Country Store  
303 Route 144  
Orwell, VT 05760**

**Prepared By:**



**P.O. Box 943 / 20 Commerce Street Williston, VT 05495 (802) 865-4288**

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## I. INTRODUCTION

This report summarizes the initial investigation of subsurface petroleum contamination at the Lake Hortonia Country Store (LHCS) located on Route 144 in Orwell, VT (see Site Location Map in Appendix A). This investigation was conducted by Griffin International, Inc. (Griffin) for Mr. Jody Gale of the LHCS.

Investigative efforts at the site were conducted due to the detection of subsurface petroleum contamination during the removal of two 2,000-gallon gasoline underground storage tanks (USTs, UST#1 and UST#2) on April 5, 1999. These two USTs were to be replaced by one 2,000-gallon gasoline double-walled UST. One 550-gallon gasoline UST (UST#3) was also removed on this date on another portion of the site. This investigation was conducted to define the extent and degree of residual petroleum contamination remaining in the subsurface at the site in the vicinity of USTs #1 and #2. No investigative efforts are being conducted in the vicinity of UST #3.

The investigation consisted of the following tasks:

1. Groundwater sample collection from the existing monitoring wells to characterize the degree of groundwater contamination in the former source area.
3. Determination of groundwater flow direction and gradient.
4. A survey of potential sensitive receptors in the vicinity of the LHCS.
5. Preparation of a summary report (this document).

The Vermont Department of Environmental Conservation (VTDEC) requested that this work be completed in a letter to Mr. Gale from Mr. Chuck Schwer of the VTDEC, dated May 18, 1999. All work at the site was conducted in accordance with Griffin's May 25, 1999 Work Plan and Cost Estimate. Approval to proceed with this plan was given by Mr. Gerold Noyes of the VTDEC in a June 11, 1999 letter to Mr. Gale.

## II. BACKGROUND

### A. Site Description

The subject property is located along Route 144 in Orwell, Vermont. The site is approximately 2.7 acres in size and is located within a residential portion of town. The LHCS property consists of one retail store building, which is situated on a concrete slab foundation. The remainder of the site is occupied by unpaved driveway/parking areas, one gasoline pump island for motor vehicles, one gasoline pump for motorboats (located on the southern portion of the site), and grassy areas.

General topography across the site slopes to the south, towards Lake Hortonia. The subject site is located at approximately 490 feet above sea level. Based on field observations and a review of the United States Geological Survey (USGS) Sudbury and Bomoseen, VT topographic maps and topographic field observations, groundwater beneath the site is inferred to flow to the south, towards Lake Hortonia and its associated dam and spillway. The Lake Hortonia dam spillway is located adjacent to the southwestern portion of the site. The spillway drains into an unnamed stream which flows in a westerly direction.

The LHCS is abutted to the north by Route 144, across which are residential properties. To the east, the site is abutted by residential properties. The site is abutted to the south by Lake Hortonia, and to the southwest by the Lake Hortonia Dam. To the west, the site is abutted by residential properties. According to Mr. Gale, the LHCS and properties in the vicinity are serviced by private water supply wells.

Three groundwater monitoring wells currently exist at the subject site. These monitoring wells were installed in May 1989 for UST monitoring by Green Mountain Boring Company, Inc. of Barre, VT. Based on a review of the well logs, subsurface materials encountered consisted of silts and fine sands. The boring logs can be found in Appendix B.

## **B. Background Information**

### **UST #1 and UST #2**

On April 5, 1999, Griffin inspected the removal of two 2,000-gallon single-walled steel gasoline USTs. These USTs were used to store gasoline for retail sale to motor vehicles. The USTs were observed to be in good condition with no holes or seeps identified. These USTs were replaced with one new 2,000-gallon double-walled gasoline UST. The newly installed 2,000-gallon UST is located on the eastern portion of the site.

Volatile organic compound (VOC) concentrations, measured with an HNu<sup>TM</sup> photoionization detector (PID) equipped with a 10.2 eV bulb, ranged from 160 parts per million (ppm) to 200 ppm in soils.

Soils in the excavation consisted of coarse to fine gravel and some silt from grade to a depth of approximately 8 feet below surface grade (bsg). Some large cobbles were also observed in the excavation. Groundwater was encountered at approximately 8 feet bsg in this excavation. No sheens were observed on the groundwater in the tank pit. Bedrock was not encountered in the excavation. All excavated soils were backfilled.

### **UST #3**

Griffin also supervised the removal and permanent closure of one 550-gallon single-walled steel gasoline UST on April 5, 1999. This UST was formerly used to store gasoline for sale to water

craft on Lake Hortononia. Visual inspection of the UST found it to be in good condition, with some rust and pitting.

VOC concentrations in soils, as measured with a PID, ranged from 0 ppm to 10 ppm. Screened samples from the bottom of the excavation were non-detect for VOCs. Soils encountered in this excavation were similar to those encountered in the excavation for USTs #1 and #2. Groundwater was encountered at approximately 6 feet bsg in the excavation for UST#3. No sheens were observed on the groundwater. Bedrock was not encountered in the excavation.

### **C. Site Geology**

According to the Surficial Geologic Map of Vermont (Doll, 1970) surficial materials at the subject site are mapped as glacial till and well-sorted sand. According to the Bedrock Geological Map of Vermont (Doll, 1961), the subject property is underlain by the Middle Ordovician Hortonville Formation, which is characterized by black, carbonaceous and pyritic shale and phyllite (locally sandy).

## **III. INVESTIGATIVE PROCEDURES**

### **A. Determination of Groundwater Elevations, Flow Direction, and Gradient**

The existing monitoring well locations and elevations, along with other site features, were surveyed on July 29, 1999 for inclusion on the Site Map (Appendix A). The top of PVC casing in MW-2 was assigned an arbitrary elevation of 100.00 feet. Measured depths to water ranged from 6.95 feet below top of casing (btoc) (MW-1) to 7.80 feet btoc (MW-2). Liquid level measurement data can be found in Appendix C. Free-phase petroleum product was not observed on groundwater during the well gauging and sampling event; however, a slight oily sheen was observed on groundwater from monitoring well MW-3. Based on the construction of the wells as indicated by the well logs, the water table was encountered within the screened portion of the well.

Based on groundwater level measurements, groundwater at the site was determined to flow in a south-southwesterly direction. This groundwater flow direction is consistent with that inferred by topographic map review and field observations. A Groundwater Contour Map can be found in Appendix A.

## **B. Groundwater Sample Collection and Analysis**

On July 29, 1999 groundwater samples were collected from the three monitoring wells and submitted to Endyne, Inc. of Williston, Vermont. The samples were collected according to Griffin's groundwater sampling protocol, which complies with industry and state standards. The samples were analyzed for VOCs by EPA Method 8021B. In accordance with VTDEC protocols and for quality assurance/quality control (QA/QC) purposes, a duplicate sample (MW-2) and a trip blank were also collected and analyzed for VOCs by EPA Method 8021B.

VOCs were reported as detected in groundwater from each of the sampled monitoring wells. Benzene, 1,3,5-Trimethylbenzene (TMB), 1,2,4-TMB, and naphthalene were detected in the groundwater from monitoring wells MW-1 and MW-2 at concentrations which exceed the applicable Vermont Groundwater Enforcement Standards (VGESs). In addition, toluene was detected above its applicable VGES in the groundwater sample collected from monitoring well MW-2. Each of the VOCs detected in the groundwater sample from monitoring well MW-3 exceeded its applicable VGES.

Results from the analyses of the trip blank sample indicate that adequate QA/QC measures were maintained during sample collection and analysis. Groundwater analytical data are tabulated in Appendix D. The groundwater analytical laboratory report is included in Appendix E.

## **C. Visual Inspection of Lake Hortonia Shore**

On July 29, 1999, Griffin inspected the beach and shoreline of the portion of Lake Hortonia, which abuts the subject site to the south. No visual or olfactory signs of petroleum impact to the lake surface or to the beach were observed by Griffin during the inspection.

## **D. Sensitive Receptor Risk Assessment**

A visual survey of the area surrounding the LHCS was conducted in April 1999 in conjunction with the UST removal activities. Based on these observations, an estimation of the potential risk to identified receptors was made based on proximity to the source areas, groundwater flow direction, and contaminant concentration levels in subsurface soils and groundwater.

### *Water Supplies*

The subject site is serviced by one private bedrock water supply well, which is located approximately 300 feet southeast and topographically cross-gradient of former USTs #1 and #2. According to Mr. Gale, the on-site supply well is used only to furnish water to appliances and this water is not used for human consumption. Based on a visual inspection of the site and conversations with Mr. Gale, there are believed to be approximately 10 private water supply

wells within a one-half mile radius of the site. Mr. Gale indicated that most residences obtain their water from Lake Hortonia. If there are any drilled groundwater supply wells located downgradient of the site (southwest), these wells may be at risk from dissolved petroleum impacts.

#### *Buildings in the Vicinity*

A retail store/gasoline station is located on the subject property. This building is situated on a concrete slab foundation. Since this building does not contain a basement, there is likely to be little risk of petroleum vapor migration posed to the site building by the former USTs. Residences in the vicinity of the subject site (located to the north, east, and west) are inferred to contain basements.

#### *Surface Water*

Lake Hortonia abuts the site to the south. The Lake Hortonia dam spillway is also located adjacent to the southwestern portion of the site. The spillway drains into an unnamed stream, which flows in a westerly direction. Given the proximity of the site to these surface water bodies, Lake Hortonia and the unnamed stream may be at risk of petroleum impacts from the subject site.

#### *Utility Corridors*

Groundwater at the site is located at approximately six to seven feet below grade, below the elevation where underground utilities are typically found. There are no known underground utilities in the downgradient vicinity of the source area, and therefore the potential for dissolved contaminant migration through utility corridors is considered minimal.

## **IV. CONCLUSIONS**

Based on the initial site investigation at the LHCS property, the following conclusions are offered:

1. Two 2,000-gallon gasoline USTs (USTs #1 and #2) and one 550-gallon gasoline UST were removed from the site in April 1999. Petroleum impacts were detected in soils in the excavation for USTs #1 and #2. No significant petroleum impacts were detected in the excavation for UST #3. All soils were backfilled into the excavations.
2. Three groundwater monitoring wells are currently present at the site. Groundwater was measured between 6.95 feet btoc to 7.80 feet btoc in the on-site monitoring wells on July 29, 1999. Groundwater was determined to flow in a south-southwesterly direction across the site, towards Lake Hortonia and the dam spillway. Free phase product was not observed on

groundwater during the monitoring well sampling; however an oily sheen was observed on groundwater from monitoring well MW-3.

3. Select VOCs were reported as detected above the applicable VGESs in groundwater from each of the three on-site monitoring wells.
4. No visual or olfactory signs of petroleum impact were observed on the Lake Hortonia shoreline and beach on the day of the monitoring event.
5. Based on field observations and analytical results, residual petroleum impacts are present in soil and groundwater in the vicinity of the former 2,000-gallon gasoline USTs. There are currently no other known receptors affected by subsurface petroleum contamination at the site. The subject site and surrounding properties are serviced by private water supply wells or receive their water from Lake Hortonia. The site building is situated on a concrete slab foundation, however residences located to the north (upgradient), east (cross-gradient), and west (down to cross-gradient), are inferred to contain basements.
6. With the apparent source removed (i.e., the former USTs), and barring the identification of an additional or alternate source, it is expected that, over time, the natural processes of dilution, dispersion, and biodegradation will reduce dissolved contaminant concentrations present in groundwater and adsorbed contamination in soils at the LHCS.

## V. RECOMMENDATIONS

Based on the results of this site investigation, Griffin recommends the following:

1. Since petroleum compounds are present in the groundwater at levels above the applicable groundwater standards, Griffin recommends that groundwater sampling be conducted on a <sup>1/4</sup> semi-annual basis in order to assess groundwater fluctuations. The three on-site monitoring wells should be sampled and analyzed for petroleum related compounds via EPA Method 8021B in January 2000.
2. The on-site private water supply well and any cross- to downgradient water supply wells should be sampled and analyzed for VOCs by EPA Method 8021B during the next sampling round. Griffin also recommends the preparation of an area map which identifies private water supply wells in the site vicinity. 8260
3. The beach and shoreline of Lake Hortonia adjacent to the subject site should continue to be inspected for indications of petroleum contamination.
4. The basement (if present) in the residence located to the west and topographically cross- to downgradient of the subject site should be screened with a PID for the presence of VOCs during the next sampling round.

5. In order to further define the downgradient degree and extent of dissolved petroleum migration, Griffin recommends the installation of one additional monitoring well in association with the subject site.

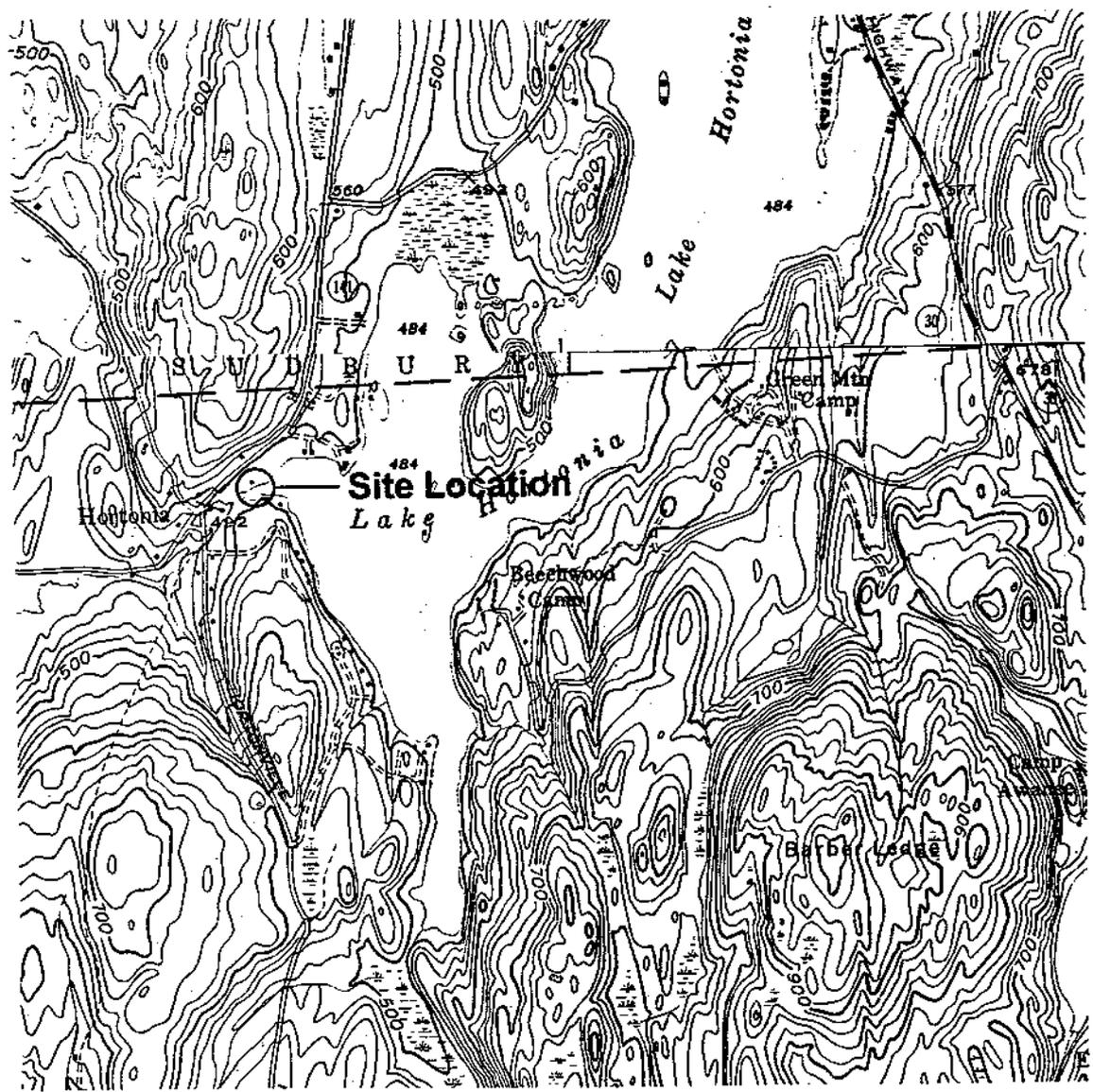
## VI. REFERENCES

- Doll, Charles G., ed., 1961, *Centennial Geologic Map of Vermont*, Vermont Geological Survey.
- Doll, Charles G., ed., 1970, *Surficial Geologic Map of Vermont*, Vermont Geological Survey.
- Gale, Mr. Jody, Lake Hortonia Country Store, 1999, tax map, boring logs, private water supply well information.
- USGS 7.5 Minute Topographic Quadrangle Map, Bomoseen, Vermont, 1946, photorevised 1972.
- USGS 7.5 Minute Topographic Quadrangle Map, Sudbury, Vermont, 1944, photoinspected 1972.

**APPENDIX A**

**MAPS**

- 1) SITE LOCATION MAP**
- 2) SITE MAP**
- 3) GROUNDWATER CONTOUR MAP**
- 4) CONTAMINANT CONCENTRATION MAP**



Griffin Job Number:

69941552

Source:

USGS Topographic Map, Sudbury, VT, 1944, Photoinspected 1972

USGS Topographic Map, Bomoseen, VT, 1946, Photorevised 1972



**Lake Hortonia Country Store**

303 Route 144, Orwell, VT

Site Location Map  
VTDEC Site No.99-2605

Date: 09/08/99	Drawing No. 1	Scale: 1:25,000	By: TLC
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RESIDENTIAL

RT. 144

RESIDENTIAL

STATE  
ACCESS  
ROAD

FORMER LOCATION OF (2)  
2,000 GALLON GASOLINE USTs  
REMOVED 4/5/99

GASOLINE PUMP

MW1

MW3

MW2

NEW DOUBLE WALL 2,000  
GALLON GASOLINE UST

RESIDENTIAL

LAKE  
HORTONIA  
STORE

UNPAVED DRIVEWAY/  
PARKING AREA

APPROXIMATE LOCATION OF  
FORMER 550 GALLON GASOLINE  
UST, REMOVED 4/99

GRASS

APPROXIMATE LOCATION OF  
GASOLINE PUMP

LAKE SHORE

LAKE HORTONIA

APPROXIMATE LOCATION OF  
DAM SPILLWAY

**LEGEND**

MW2  
92.20

SOURCE: GRIFFIN SITE SURVEY 7/29/99  
VTDEC SITE NO. 99-2605

JOB #:69941552



**LAKE HORTONIA STORE**

ORWELL, VERMONT

**SITE MAP**

DATE: 10/1/99

DWG.#: 1

SCALE:1"= 50'

DRN.:JL

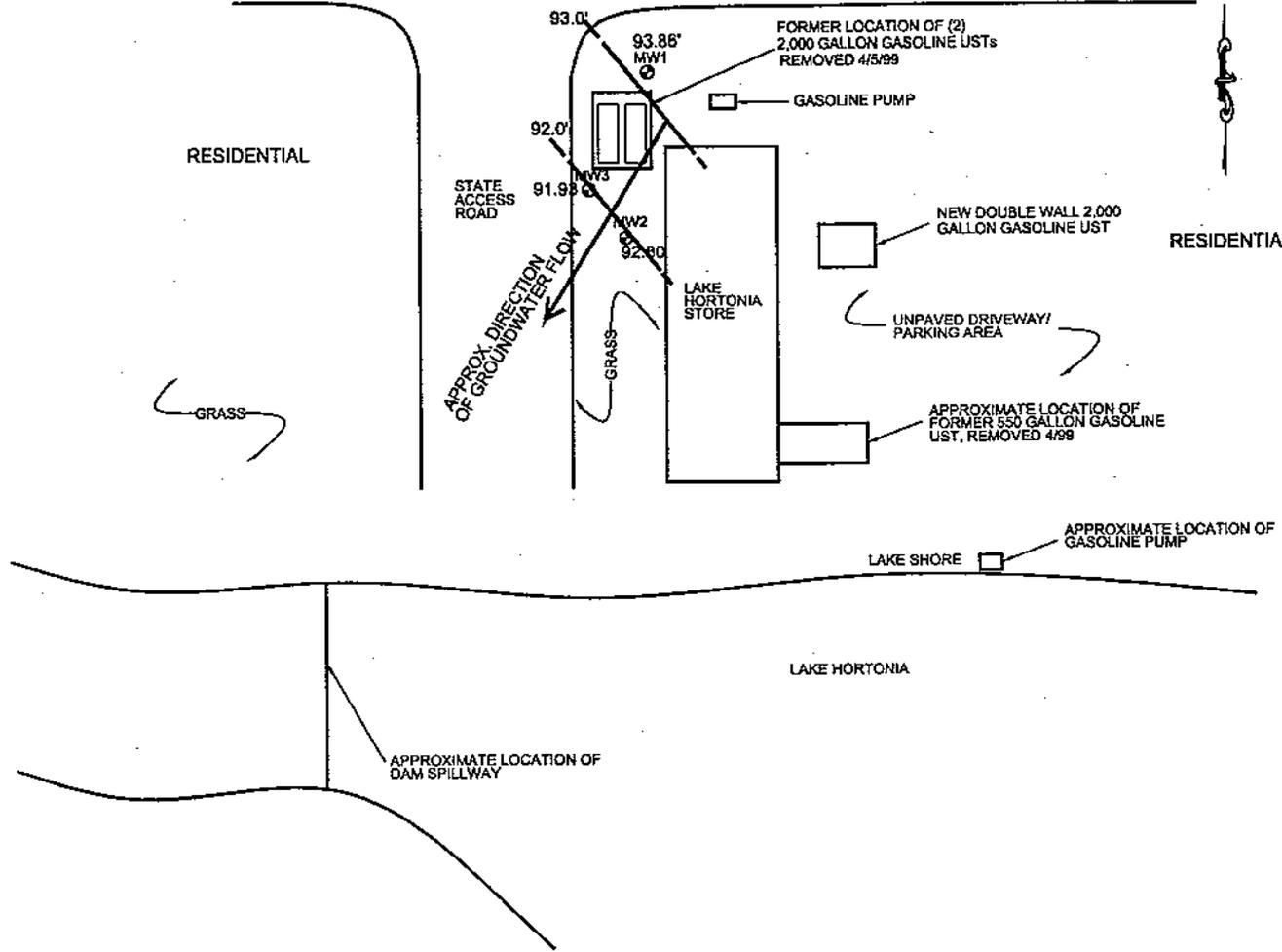
APP.:RH

RESIDENTIAL

RT. 144

RESIDENTIAL

RESIDENTIAL



**LEGEND**

MW2  
92.20  
MONITORING WELL WITH GROUNDWATER ELEV. IN FEET.

GROUNDWATER CONTOURS DASHED WHERE INFERRED.

JOB#: 69941552 MEASUREMENT DATE 7/29/89



**LAKE HORTONIA STORE**

ORWELL, VERMONT

**GROUNDWATER CONTOUR MAP**

DATE: 10/04/89

DWG.#: 2

SCALE: 1"=50'

DRN.:NM

APP.:RH

RESIDENTIAL

RT. 144

RESIDENTIAL

STATE ACCESS ROAD

2,305 MW1

FORMER LOCATION OF (2) 2,000 GALLON GASOLINE USTs REMOVED 4/5/99

GASOLINE PUMP

MW3 48,281

MW2 7,316

NEW DOUBLE WALL 2,000 GALLON GASOLINE UST

RESIDENTIAL

LAKE HORTONIA STORE

UNPAVED DRIVEWAY/ PARKING AREA

APPROXIMATE LOCATION OF FORMER 550 GALLON GASOLINE UST, REMOVED 4/99

GRASS

GRASS

APPROXIMATE LOCATION OF GASOLINE PUMP

LAKE SHORE

LAKE HORTONIA

APPROXIMATE LOCATION OF DAM SPILLWAY

### LEGEND

 MONITORING WELL WITH TOTAL VOC CONCENTRATION IN ppb.  
7,316

SAMPLED 7/29/99  
JOB #: 89941552



# LAKE HORTONIA STORE

ORWELL, VERMONT

## CONTAMINANT CONCENTRATION MAP

DATE: 10/4/99

DWG.#: 3

SCALE: 1"=50'

DRN.:NM

APP.:RH

**APPENDIX B**  
**MONITORING WELL LOGS**

# Green Mountain Boring Co., Inc.

R. D. 2 - BARRE, VERMONT 05641

SHEET 2 OF 3  
 DATE 5-4-89  
 HOLE NO. MW-2  
 LINE & STA. \_\_\_\_\_  
 OFFSET None

PROJECT NAME Lake Hortonia Country Store ADDRESS Orwell, Vermont  
 LOCATION Fuel tanks  
 REPORT SENT TO Lake Hortonia Country Store PROJ. NO. 89-134  
 SAMPLES SENT TO \_\_\_\_\_ OUR JOB NO. \_\_\_\_\_

GROUND WATER OBSERVATIONS	CASING	SAMPLER	CORE BAR.	SURFACE ELEV.
At <u>9'</u> at <u>1</u> Hours	Type <u>AUGERS</u>	SPLIT SPOON		DATE STARTED <u>5-4-89</u>
At _____ at _____ Hours	Size I. D. <u>4.25</u>	<u>1 3/8"</u>		DATE COMPL. <u>5-4-89</u>
	Hammer Wt. _____	<u>140#</u>		BORING FOREMAN <u>Lawrence</u>
	Hammer Fall _____	<u>30"</u>		INSPECTOR _____
				SOILS ENGR. _____

LOCATION OF BORING: East end of fuel tank

DEPTH	Casing Blows per foot	Sample Depths From - To	Type of Sample	Blows per 6" on Sampler			Moisture Density or Consist.	Strata Change Elev.	SOIL IDENTIFICATION Remarks include color, gradation, Type of soil etc. Rock-color, type, condition, hardness, Drilling time, seams and etc.	SAMPLE		
				From 0-6	To 6-12	To 12-18				No.	Pen	R
								Augered to 11' w/4.25" augers				
								Augered through stones w/fine sand				
								Auger refusal on stone at 11'				
								Set well at 11'				
								<u>Materials used:</u>				
								2 Bags Silica sand				
								5' PVC 2" screen				
								6' PVC 2" riser				
								1 Top wing type cap				
								1 Bottom push on cap				
								50# Bentonite (powder)				
								1 Curb box (m-60)				
								40# Cement				

GROUND SURFACE TO <u>11'</u>	USED _____	AUGERS: <u>THEN</u>	Set well	SUMMARY:
Sample Type	Proportions Used	140 lb. Wt. x 30" fall an 2" O. D. Sampler		Earth Boring <u>1</u>
D=Dry C=Cored W=Washed	trace 0 to 10%	Cohesionless Density	Cohesive Consistency	Rock Coring
UP=Undisturbed Piston	little 10 to 20%	0-10 Loose	0-4 Soft 30 + Hard	Samples _____
TP=Test Pit A=Auger V=Vane Test	some 20 to 35%	10-30 Med. Dense	4-8 M/Stiff	
UT=Undisturbed Thinwall	and 35 to 50%	30-50 Dense	8-15 Stiff	
		50+ Very Dense	15-30 V-Stiff	

HOLE NO. \_\_\_\_\_

# Green Mountain Boring Co., Inc.

R. D. 2 - BARRE, VERMONT 05641

SHEET 3 OF 3  
 DATE 5-4-89  
 HOLE NO. MW-3  
 LINE & STA. \_\_\_\_\_  
 OFFSET None

Lake Hortonia Country Store ADDRESS Orwell, Vermont  
 PROJECT NAME Fuel tanks LOCATION \_\_\_\_\_  
 REPORT SENT TO Lake Hortonia Country Store PROJ. NO. \_\_\_\_\_  
 SAMPLES SENT TO \_\_\_\_\_ OUR JOB NO. 89-134

GROUND WATER OBSERVATIONS	CASING	SAMPLER	CORE BAR.	SURFACE ELEV.
At <u>7'</u> at <u>1</u> Hours	Type <u>AUGERS</u>	<u>SPLIT SPOON</u>		DATE STARTED <u>5-4-89</u>
At _____ at _____ Hours	Size I. D. <u>4.25"</u>	<u>1 3/8"</u>		DATE COMPL. <u>5-4-89</u>
	Hammer Wt. _____	<u>140#</u>		BORING FOREMAN <u>Lawrence</u>
	Hammer Fall _____	<u>30"</u>		INSPECTOR _____
				SOILS ENGR. _____

LOCATION OF BORING: South side of tanks

DEPTH	Casing Blows per foot	Sample Depths From - To	Type of Sample	Blows per 6" on Sampler			Moisture Density or Consist.	Strata Change Elev.	SOIL IDENTIFICATION Remarks include color, gradation, Type of soil etc. Rock-color, type, condition, hardness, Drilling time, seams and etc.	SAMPLE	
				From	To					No.	Pen
				0-6	6-12	12-18					
								Augered to 10.5' w/4.25" augers			
								Augered through fine sand and silt few stones			
								Set well at 10.5'			
								Materials used:			
								2 Bags Silica sand			
								8' PVC 2" screen			
								2' PVC 2" riser			
								1 Top wing type cap			
								1 Bottom push on cap			
								50# Bentonite (powder)			
								1 Curb box (M-60)			
								40# Cement			

GROUND SURFACE TO <u>10.5'</u>	USED _____	AUGERS: _____	THEN <u>Set well</u>	SUMMARY:
Sample Type	Proportions Used	140 lb. Wt. x 30" fall an 2" O. D. Sampler	Cohesionless Density	Earth Boring ( )
D=Dry C=Cored W=Washed	trace 0 to 10%	0-10 Loose	Cohesive Consistency	Rock Coring ( )
UP=Undisturbed Piston	little 10 to 20%	10-30 Med. Dense	0-4 Soft 30 + Hard	Samples
TP=Test Pit A=Auger V=Vane Test	some 20 to 35%	30-50 Dense	4-8 M/Stiff	
UT=Undisturbed Thinwall	and 35 to 50%	50 + Very Dense	8-15 Stiff	
			15-30 V-Stiff	

HOLE NO. MW-3

# Green Mountain Boring Co., Inc.

R. D. 2 - BARRE, VERMONT 05641

SHEET 1 OF 3  
 DATE 5-4-89  
 HOLE NO. MW-1  
 LINE & STA. None  
 OFFSET

Lake Hortonia Country Store ADDRESS RD # 1 Orwell, Vermont  
 PROJECT NAME Fuel tanks LOCATION  
 REPORT SENT TO Lake Hortonia Country Store PROJ. NO.  
 SAMPLES SENT TO OUR JOB NO. 89-134

GROUND WATER OBSERVATIONS	CASING	SAMPLER	CORE BAR.	SURFACE ELEV.
At <u>4'</u> at <u>1</u> Hours	Type <u>AUGERS</u>	<u>SPLIT SPOON</u>		DATE STARTED <u>5-4-89</u>
At _____ at _____ Hours	Size I. D. <u>4.25"</u>	<u>1 1/8"</u>		DATE COMPL. <u>5-4-89</u>
	Hammer Wt. _____	<u>140#</u>		BORING FOREMAN <u>Lawrence</u>
	Hammer Fall _____	<u>30"</u>		INSPECTOR _____
				SOILS ENGR. _____

LOCATION OF BORING: Southwest end of pumps

DEPTH	Casing Blows per foot	Sample Depths From - To	Type of Sample	Blows per 6" on Sampler			Moisture Density or Consist.	Strata Change Elev.	SOIL IDENTIFICATION Remarks include color, gradation, Type of soil etc. Rock-color, type, condition, hardness, Drilling time, seams and etc.	SAMPLE		
				From	To					No.	Pen	R
				0-6	6-12	12-18						
								Augered to 10.5' w/4.25" augers				
								Augered through silt & fine sand				
								Set well at 10.5'				
								<u>Materials used:</u>				
								2 Bags Silica sand				
								8' PVC 2" screen				
								2' PVC 2" riser				
								1 Top wing type cap				
								1 Bottom push on cap				
								50# Bentonite (powder)				
								1 Curb box (m-60)				
								40# Cement				
								1 Well developer				

GROUND SURFACE TO 10.5' USED \_\_\_\_\_ AUGERS: THEN Set well

Sample Type D = Dry C = Cored W = Washed UP = Undisturbed Piston TP = Test Pit A = Auger V = Vane Test UT = Undisturbed Thinwall	Proportions Used trace 8 to 10% little 10 to 20% some 20 to 35% and 35 to 50%	Cohesionless Density 0-10 Loose 10-30 Med. Dense 30-50 Dense 50+ Very Dense
		THEN <u>Set well</u> 140 lb. Wt. x 30" fall an 2" O. D. Sampler Cohesive Consistency 0-4 Soft 30 + Hard 4-8 M/Stiff 8-15 Stiff 15-30 V-Stiff

SUMMARY:  
 Earth Boring  
 Rock Coring  
 Samples 0  
 HOLE NO. MW-

**APPENDIX C**

**LIQUID LEVEL MEASUREMENT DATA**

Liquid Level Monitoring Data  
Lake Hortonia Country Store  
Orwell/Lake Hortonia, VT  
VTDEC Site No. 99-2605

Monitoring Date: 7/29/99

Well I.D.	Top of Casing Elevation	Depth To Product	Depth To Water	Product Thickness	Specific Gravity Of Product	Hydro Equivalent	Corrected Depth To Water	Corrected Water Table Elevation
MW-1	100.81	-	6.95	-	-	-	6.95	93.86
MW-2	100.00	-	7.80	-	-	-	7.80	92.20
MW-3	99.61	-	7.68	-	-	-	7.68	91.93

**APPENDIX D**

**GROUNDWATER QUALITY DATA**

**Groundwater Quality Summary  
 Lake Hortonia Country Store  
 Orwell, VT  
 VTDEC Site No. 99-2605**

**Sampled 7/29/99**

PARAMETER	MW-1	MW-2	MW-3	VGES
Benzene	151	558	7,470	5
Toluene	368	3020	15,700	1000
Ethylbenzene	37.8	380	1,500	700
Xylenes	833	2,290	10,800	10000
MTBE	ND < 200	ND < 500	5,770	40
Total BTEX + MTBE	1,390	6,248	44,240	-
1,3,5-Trimethylbenzene	242	254	959	4
1,2,4-Trimethylbenzene	694	717	2,810	5
Naphthalene	79	97.6	472	20
Total VOCs	2,305	7316.6	48,281	-

ANALYSIS: EPA Method 8021B

VGES = Vermont Groundwater Enforcement Standard (November 1997)

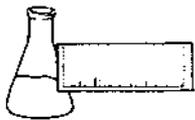
ND < 1 = not detected less than detection limit

**Bold indicates a detection. Shaded areas indicate concentrations which are equal to or exceed the applicable VGES.**

All Values Reported in ug/L (ppb)

**APPENDIX E**

**GROUNDWATER LABORATORY ANALYTICAL REPORT**



**ENDYNE, INC.**

Laboratory Services

32 James Brown Drive  
Williston, Vermont 05495  
(802) 879-4333  
FAX 879-7103

REPORT OF LABORATORY ANALYSIS

CLIENT: Griffin International

ORDER ID: 3360

PROJECT NAME: Lake Hortonia Store/#6994155 REF.#: 141,849 - 141,853

REPORT DATE: August 10, 1999

DATE SAMPLED: July 29, 1999

Enclosed please find the results of the analyses performed for the samples referenced on the attached chain of custody. Chain of custody indicated sample preservation with HCl.

All samples were prepared and analyzed by requirements outlined in the referenced method and within the specified holding times. All instrumentation was calibrated with the appropriate frequency and verified by the requirements outlined in the referenced method. Blank contamination was not observed at levels affecting the analytical results.

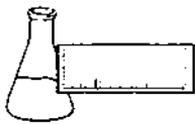
Analytical method precision and accuracy was monitored by laboratory control standards which included matrix spike, duplicate and quality control analyses. These standards were determined to be within established laboratory method acceptance limits.

Individual sample performance was monitored by the addition of surrogate analytes to each sample. All surrogate recovery data was determined to be within laboratory QA/QC guidelines unless otherwise noted.

Reviewed by,

Harry B. Locker, Ph.D.  
Laboratory Director

enclosures



**ENDYNE, INC.**

Laboratory Services

32 James Brown Drive  
Williston, Vermont 05495  
(802) 879-4333  
FAX 879-7103

EPA METHOD 8021B--PURGEABLE AROMATICS

CLIENT: Griffin International

DATE RECEIVED: July 30, 1999

PROJECT NAME: Lake Hortonia Store/#69941552

REPORT DATE: August 10, 1999

CLIENT PROJ. #: 69941552

ORDER ID: 3360

Ref. #:	141,849	141,850	141,851	141,852	141,853
Site:	MW 1	MW 2	MW 3	Duplicate	Trip Blank
Date Sampled:	7/29/99	7/29/99	7/29/99	7/29/99	7/29/99
Time Sampled:	5:23	5:35	5:25	5:35	7:17
Sampler:	T.C. & J.R.				
Date Analyzed:	8/10/99	8/10/99	8/10/99	8/10/99	8/9/99
UIP Count:	>10	>10	>10	>10	0
Dil. Factor (%):	5	2	0.5	2	100
Surr % Rec. (%):	89	91	90	90	94
Parameter	Conc. (ug/L)				
MTBE	<200	<500	5,770.	<500	<10
Benzene	151.	558.	7,470.	498.	<1
Toluene	368.	3,020.	18,700.	2,680.	<1
Ethylbenzene	37.8	380.	1,500.	343.	<1
Xylenes	833.	2,290.	10,800.	2,090.	<1
1,3,5 Trimethyl Benzene	242.	254.	959.	250.	<1
1,2,4 Trimethyl Benzene	594.	717.	2,610.	702.	<1
Naphthalene	78.9	97.6	472.	89.1	<1

Note: UIP = Unidentified Peaks    TBQ = Trace Below Quantitation    NI = Not Indicated



32 James Brown Drive  
Williston, Vermont 05495  
(802) 879-4333

Griffin Job # 69941552

CHAIN-OF-CUSTODY RECORD

1-Orig 32499

Project Name: <u>Lake Hortonia Store</u>	Reporting Address: <u>Griffin</u>	Billing Address: <u>Griffin</u>
Site Location: <u>Lake Hortonia VT</u>	Company: <u>Griffin</u>	Sampler Name: <u>Trey 270 Rocket</u>
Endyne Project Number: <u>3360</u>	Contact Name/Phone #: <u>Rolo Higgins</u>	Phone #: <u>80542828</u>

Lab #	Sample Location	Matrix	G R A B	C O M P	Date/Time	Sample Containers		Field Results/Remarks	Analysis Required	Sample Preservation	Rush
						No.	Type/Size				
141849	MW1	H2O	X		07/19/99/723	2	VOA 40ml		8001B	HCI	
141850	MW2				1/135						
141851	MW3				1/1725						
141852	DUP				1/1735						
141853	Trip Blank				1/0717						

Relinquished by: Signature <u>Jana L. Capp</u>	Received by: Signature <u>Stacy Benjamin</u>	Date/Time <u>07/29/99 11:30</u>
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Relinquished by: Signature <u>Stacy Benjamin</u>	Received by: Signature <u>Alison Flued</u>	Date/Time <u>7/30/99 10:15</u>
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New York State Project: Yes 1 No X

Requested Analyses

1	pH	6	TKN	11	Total Solids	16	Metals (Specify)	21	EPA 624	26	EPA 8270 B/N or Acid
2	Chloride	7	Total P	12	TSS	17	Coliform (Specify)	22	EPA 625 B/N or A	27	EPA 8010/8020
3	Ammonia N	8	Total Diss. P	13	TDS	18	COD	23	EPA 418.1	28	EPA 8080 Pest/PCB
4	Nitrite N	9	BOD <sub>5</sub>	14	Turbidity	19	BTEX	24	EPA 608 Pest/PCB		
5	Nitrate N	10	Alkalinity	15	Conductivity	20	EPA 601/602	25	EPA 8240		
29	TCLP (Specify: volatiles, semi-volatiles, metals, pesticides, herbicides)										
30	Other (Specify):										



32 James Brown Drive  
Williston, Vermont 05495  
(802) 879-4333

### CHAIN-OF-CUSTODY RECORD

32499

Project Name: <u>USC NOT FOR USE</u>	Reporting Address: <u>711717</u>	Billing Address: <u>711717</u>
Site Location: <u>USC NOT FOR USE</u>	Company: <u>USC NOT FOR USE</u>	Sampler Name: <u>USC NOT FOR USE</u>
Endyne Project Number: <u>USC NOT FOR USE</u>	Contact Name/Phone #: <u>USC NOT FOR USE</u>	Phone #: <u>USC NOT FOR USE</u>

Lab #	Sample Location	Matrix	G R A B	C O M P	Date/Time	Sample Containers		Field Results/Remarks	Analysis Required	Sample Preservation	Rush
						No.	Type/Size				
	MW1	H <sub>2</sub> O	X		11/11/99	2	100ml		031B	7C1	
	MW2	↓	↓		11/15	↓	↓		↓	↓	
	MW3	↓	↓		11/15	↓	↓		↓	↓	
	DUP	↓	↓		11/15	↓	↓		↓	↓	
	Trip Blank	↓	↓		1/9/17	↓	↓		↓	↓	

Relinquished by: Signature <u>[Signature]</u>	Received by: Signature <u>[Signature]</u>	Date/Time <u>07/29/99 11:30</u>
Relinquished by: Signature <u>[Signature]</u>	Received by: Signature <u>[Signature]</u>	Date/Time <u>7/20/99 11:15</u>

New York State Project: Yes  No  Requested Analyses

1	pH	6	TKN	11	Total Solids	16	Metals (Specify)	21	EPA 624	26	EPA 8270 B/N or Acid
2	Chloride	7	Total P	12	TSS	17	Coliform (Specify)	22	EPA 625 B/N or A	27	EPA 8010/8020
3	Ammonia N	8	Total Dist. P	13	TDS	18	COD	23	EPA 418.1	28	EPA 8080 Pest/PCB
4	Nitrite N	9	BOD <sub>5</sub>	14	Turbidity	19	BTEX	24	EPA 608 Pest/PCB		
5	Nitrate N	10	Alkalinity	15	Conductivity	20	EPA 601/602	25	EPA 8240		
29	TCLP (Specify: volatiles, semi-volatiles, metals, pesticides, herbicides)										
30	Other (Specify):										