



August 25, 1999

RECEIVED  
E.M.P. 8/25/99

Mr. David Pearson  
Valley Garage  
PO Box 188  
Shoreham, Vermont 05770

RE: Valley Garage, Shoreham, Vermont (Site #99-2600) - Subsurface Contaminant Investigation Report

Dear Mr. Pearson:

Lincoln Applied Geology, Inc. (LAG) is pleased to present this Subsurface Contaminant Investigation Report for The Valley Garage (VG) property located on Route 22A south in Shoreham, Vermont. In response to the discovery of petroleum contaminated soils adjacent to the property during exploratory drilling, the Vermont Department of Environmental Conservation (VDEC) Sites Management Section (SMS) requested that a subsurface contaminant investigation be performed to determine the extent and magnitude of the petroleum contamination. The requested contaminant investigation was performed by LAG on July 8, 1999.

The enclosed report includes well logs, monitoring data, soil and ground water quality results. Results indicate that soil and ground water beneath the site have been impacted by moderate levels of vapor, dissolved, and adsorbed phase petroleum contamination. Based on the collected data, it is apparent that the extent and magnitude of the contamination has not been fully delineated by the existing monitor well array. However, we do not believe that it is necessary to install additional monitor wells due to the presence of dense clay soils on the VG site and the absence of detectable petroleum concentrations in MW-1 at the Blaise property (SMS site #96-2099). Data collected during the sensitive receptor survey show that the indoor air of the VG and adjacent buildings, and utilities in the area have not been impacted by the contamination beneath the site.

We believe that only semiannual monitoring and sampling is necessary to track the natural bioremediation of the contaminant plume. Upon completion of your review and approval of this report, please call us so that we can forward a copy to the VDEC SMS. If you have any questions or comments, please contact me or Rick Vandenberg, Project Manager, at (802) 453-4384.

Sincerely,  
Lincoln Applied Geology, Inc.

  
Jake Peirce  
Environmental Scientist

JSP/njp  
Enclosures  
cc: Gerald Noyes, Sites Management Section

## Subsurface Contaminant Investigation Report

The Valley Garage  
Route 22A  
Shoreham, Vermont  
(VDEC Site #99-2600)

Prepared for:

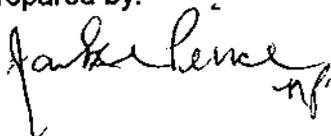
David Pearson  
The Valley Garage  
P.O. Box 188  
Shoreham, Vermont 05770  
Phone: (802) 897-5110

Prepared by:

Lincoln Applied Geology, Inc.

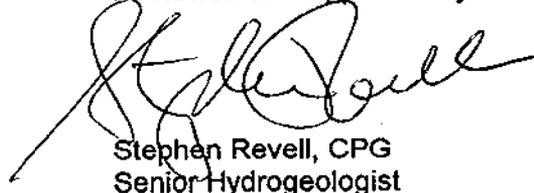
August 25, 1999

Prepared by:



Jake Peirce  
Environmental Scientist

Reviewed and Approved by:



Stephen Revell, CPG  
Senior Hydrogeologist



Lincoln Applied Geology, Inc.  
Environmental Consultants

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**The Valley Garage  
Route 22A  
Shoreham, Vermont  
(VDEC Site # 99-2600)**

**Executive Summary**

During April 1999, drilling associated with a Town sewer project was conducted along Route 22A immediately adjacent to The Valley Garage. Significant petroleum vapors were identified in the underlying soils. Due to the close proximity of the garage and because records indicate that underground storage tanks (USTs) once existed at the garage, the Vermont Hazardous Materials Division Sites Management Section (SMS) requested that an investigation be performed to define the extent and magnitude of possible contamination, if any, beneath the site. Mr. David Pearson, the owner of The Valley Garage, retained Lincoln Applied Geology, Inc. (LAG) in July 1999 to conduct the requested subsurface investigation.

As a part of the investigation, LAG directed the installation of four ground water monitor wells beneath the site on July 8, 1999. Two wells (MW-3 and MW-4) were installed upgradient of the former UST area and two wells (MW-1 and MW-2) were installed downgradient of the former USTs. LAG also conducted a sensitive receptor survey, completed a stadia survey to relate the elevation and location of all monitor wells and pertinent site features, and collected ground water samples from the newly installed wells.

Review of the water quality data shows that moderate levels of benzene, toluene, ethylbenzene, and xylenes (BTEX) were detected in three of the four wells. Low to moderate concentrations of total petroleum hydrocarbons (TPH) were also present in two of the wells. Methyl-tert butyl ether (MTBE) was detected in one well.

Results of this work indicate that the ground water downgradient of the former UST area is impacted by moderate levels of vapor, dissolved, and adsorbed phase petroleum contamination from the former USTs. Despite the fact that the downgradient extent of the plume is not completely delineated, no additional ground water monitor wells are recommended because this plume is developed in extremely dense clay that has significantly retarded the plume migration to the southwest. In fact, data obtained from a downgradient off-site well across Route 22A at a site listed on the Vermont Active Hazardous Waste Sites List suggests that the dissolved phase plume has not migrated very far.



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## Site Description

Figure 1 shows the general location of The Valley Garage (VG) in Shoreham. The property is bounded by Vermont Route 22A to the west, a private residence to the south, St. Genevieve Church to the north, and fields to the east. The garage building and surrounding buildings are all served by municipal water. The garage building is constructed on an at-grade concrete slab foundation. Pertinent site features including buildings, roads and ground water monitor wells are shown on Figure 2.

## Site History

Records obtained from the SMS indicate that three USTs, (a 1,000 and 4,000 gallon gasoline tank, a 1,000 gallon diesel tank) were removed from the VG property in 1986. Records further indicate the tanks were removed without notifying the state and no inspection of the excavation was performed. On April 1, 1999, exploratory drilling work completed along Route 22A, adjacent to the site revealed the presence of petroleum vapors. The discovery was reported to the SMS, which led to a records search and the discovery of the UST records. Based on the presence of gasoline contaminated soils adjacent to the VG and UST records showing the former presence of abovementioned USTs on the property, the SMS requested that a site investigation be conducted to determine the extent and magnitude of contamination (if any) beneath the property.

## Site Geology

In order to investigate the subsurface beneath the VG, four monitor wells (MW-1, 2, 3 and 4) were drilled and installed on July 8, 1999 by Adams Engineering, Inc. (AEI) using vibratory drilling techniques. Soil samples were collected continuously throughout the drilling, descriptively logged by the on-site environmental scientist, and screened using a photoionization detector (PID) equipped with a 10.0 electron volt (eV) lamp for the presence of volatile organic compounds (VOCs).

At the completion of each boring, a PVC well was installed to convert the boring to a monitor well. Monitoring wells were constructed of 1.5" diameter PVC. Each well was properly constructed with sufficient well screen to straddle the ground water table interface. An appropriately sized filter pack (No. 1 sand) was installed to ensure proper communication between the well and the surrounding ground water system. A bentonite seal was placed atop the sand pack to prevent the infiltration of surface related fluids. The remaining annulus above the bentonite seal was backfilled with drill cuttings and the well was completed with a bolt-down well box that was cemented flush



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with grade. The locations of the four newly installed monitoring wells are shown on **Figure 2**.

Unconsolidated sediments and soils encountered during drilling include a top layer of fill up to 4.5 feet thick, consisting primarily of coarse gravel and fine to coarse sand. Below it, a unit of dense clay was noted extending to at least 14.5 feet. Some fine to medium gravel was noted below 14.5 feet, extending to 24.5 feet. During drilling, bedrock was not encountered. However, it was noted on the surface at several places on the eastern portion of the site. Review of the Centennial Geologic Map of Vermont (C.G. Doll., 1961) shows that these rocks are the Upper Cambrian aged (505-520 million years old) Clarendon Springs Formation (grey dolomite with numerous geodes and white quartz). Descriptions of the soil encountered during the drilling of each boring and well construction details are included on the well logs attached as **Appendix A**.

The geologic logs also include PID assays of the collected soil samples. Review of the PID assays indicates that VOCs were noted in soil samples collected from all wells. Elevated levels were noted in the soils collected for analysis from MW-1. Soil samples from MW-1 and MW-2 were collected from the bottom of the boring (i.e. deepest depth of penetration) and from the interval with the highest PID value. These were collected because the wells were initially dry.

### **Ground Water Level and Well Headspace Monitoring**

On July 8, 1999, LAG conducted a top of casing (TOC) stadia survey of all monitor wells and other pertinent site features to the subsurface investigation. On July 22<sup>nd</sup>, depth to ground water level data and well headspace vapor level PID data were collected from all monitor wells. Free phase petroleum product was not detected in any wells. A summary of ground water elevation data is presented in **Table 1**, and PID assays are included as **Table 2**. Review of the collected data indicates that depth to ground water varied between 2.91 feet (MW-3) and 6.6 feet (MW-1) across the site.

MW-1 and MW-2 contained PID headspace assays of 99 parts per million (ppm) and 118 ppm, which suggests that moderate levels of vapor and adsorbed phase contamination exist in the vicinity of the former USTs.

### **Site Hydrogeology**

Water level data collected on July 22<sup>nd</sup> were used to develop a Ground Water Contour Map of the shallow ground water system (**Figure 3**). Ground water flows to the



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southwest along a moderate gradient of 0.083.

### **Soil Quality Results**

The soil samples collected from MW-1 and MW-2 were analyzed via EPA method 8260M and total petroleum hydrocarbons (TPH) method 8015. The results are presented on **Table 3**. Significant concentrations of BTEX were detected in MW-1 at a depth of 14 to 16 feet. Copies of Laboratory results are attached in **Appendix B**.

### **Water Quality Sampling and Results**

On July 22, 1999, water quality samples were collected from all wells. They were analyzed along with a trip blank for the petroleum constituents BTEX and MTBE via EPA Method 8021b, and TPH via Method 8015 at Green Mountain Laboratories, Inc. in Montpelier, Vermont. The water quality results are summarized on **Table 3** and are presented on the Water Quality Summary Map included as **Figure 4**. Copies of the laboratory reports are also included as **Appendix B**.

Review of **Table 4**, **Figure 4**, and **Appendix B** indicate that moderate concentrations of BTEX were present in the samples collected from monitor wells MW-1, 2 and 3. BTEX concentrations of 8,720 parts per billion (ppb), 15,030 ppb, and 5,930 ppb were detected in monitor wells MW-1, MW-2 and MW-3, respectively. MTBE was detected above detection limits in MW-2 at 1,100 parts per billion (ppb). In addition to BTEX and MTBE, Groundwater Quality Enforcement Standards (GQES) were exceeded in MW-1 for 1,3,5-trimethylbenzene, 1,2,4-trimethylbenzene, and naphthalene. The GQES for 1,2,4-trimethylbenzene was also exceeded in MW-2 and MW-3. Concentrations of total petroleum hydrocarbons (TPH) above method detection limits were also noted MW-1 and MW-2.

The spatial distribution of contaminants shown of **Figure 4** and the direction of ground water flow shown on **Figure 3** suggest that the plume of dissolved phase contamination is from the former UST area.

### **Potential Sensitive Receptors Survey**

On July 8, 1999, LAG conducted a sensitive receptor survey of the site and surrounding properties. Potential sensitive receptors include indoor air of the VG office and garage and the adjacent properties both north and south. The location of the Town water line also represents a potential sensitive receptor (**Figure 2**). As presented on **Table 2**, PID assays of indoor air in these buildings were not above background (BG).



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It is unlikely that the indoor air in these buildings will become impacted in the future because the foundations are shallow or at-grade. One culvert associated with the site, shown on **Figure 2**, was also assayed as a part of the survey. The culvert did not contain VOCs above BG. These results indicate that the VG office, garage, surrounding residences, and culvert have not been impacted by PID-detectable petroleum vapors. Based on these results, it appears there are no current health related risks associated with the petroleum contamination identified beneath the site. We also do not believe that any subsurface utilities (or waterlines) are threatened by this contamination due to the presence of the dense clay soils and lack of plume migration.

*Exploratory drilling for a proposed waterline found the contamination !!*

### Discussion

During the work on The Valley Garage, it was discovered that the property directly across Route 22A, to the west, is also an Active Hazardous Waste Site (Blaise property, VDEC Site #96-2099). Review of information regarding the site shows that it is impacted by a plume of gasoline contamination that is migrating to the north. It is worth noting the ground water and contaminant flow direction is more than 90 degrees different than the ground water and contaminant flow documented at the VG (i.e. southwest vs north). More importantly, the adjacent site has an associated monitor well (MW-1) that is almost directly downgradient of the VG contaminant plume and upgradient of the Blaise property plume. Reportedly, water quality data obtained from the monitor well shows that no BTEX or MTBE has been detected. This suggests that the VG plume despite its age (at least 1986) is not, and has not, actively migrated from the property.

### Summary of Findings

The results of the subsurface investigation are summarized below:

1. Three USTs (1,000 and 4,000 gallon gasoline and 1,000 gallon diesel) were removed from VG property in 1986.
2. No inspection or assessment of the tanks or excavation area was performed.
3. On the basis of petroleum odors noted on drill cuttings during exploratory sewer line work in front of the VG in April 1999, the SMS requested that Mr. Dave Pearson, current owner of the VG, hire a qualified consultant to define the extent and magnitude of subsurface contamination across the site.

4. Four monitor wells were installed on the property to assess the former UST area. The depth to the shallow ground water system on-site ranges from 2.91 feet to 6.6 feet below grade. The shallow ground water system flows to the southwest at a moderate gradient of 0.083 feet/foot. The ground water flow direction is more than 90° different at the Blaise property site across Route 22A.
5. The underlying soils and ground water in the vicinity of the former UST area are impacted by low to moderate levels of petroleum related contamination.
6. Off-site downgradient well MW-1 on the Blaise property is reportedly not impacted with detectable levels of BTEX, suggesting that the contamination is limited to the VG property.
7. There are no impacted sensitive receptors other than the soil and ground water beneath the VG property.

### **Recommendations**

As a result of the findings, the following recommendations are made:

1. No additional monitoring wells are necessary at this time due to lack of apparent plume migration as noted by the Blaise property well MW-1. If conditions change, we are prepared to recommend additional monitor wells.
2. When the sewer line work starts, we recommend that a LAG geologist be present on-site during the sewer line work to screen soils.
3. Semi-annual sampling and monitoring of all on-site wells and the Blaise property Site MW-1 should be implemented commencing in October.
4. Once all the collected data has been received and reviewed by LAG, a Summary Report will be submitted to the VDEC along with appropriate conclusions and recommendations for future actions as necessary.

A cost estimate to complete this work is attached as **Appendix C**.

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Project: Valley Garage  
Location: Shoreham, Vermont

Table 1  
VDEC Site # 99-2600  
Sheet 1 of 1

**Ground Water Elevation/Product Level (feet)**

Data Point	TOC	07/22/99						
MW-1	98.62	92.02						
MW-2	98.64	88.67						
MW-3	98.16	95.25						
MW-4	100.46	95.74						

Notes:

- 1 - Elevation datum assumed
  - 2 - Reference elevation is elevation of top of PVC well casing
- Light Grey Cell = DRY  
Dark Grey Cell = Inaccessible

Project: Valley Garage  
Location: Shoreham, Vermont

Table 2  
VDEC Site # 99-2600  
Sheet 1 of 1

**Photoionization Results (PID - ppm)**

Data Point	07/08/99	07/22/99						
MW-1		99						
MW-2		118						
MW-3		BG						
MW-4		BG						
Valley Garage Office	BG							
Valley Garage Well	BG							
Residence South	BG							
Residence North	BG							

Notes:  
BG - Background  
SL - Saturated Lamp

Soil Quality Results (mg/Kg)

Data Point	Compound	07/22/99				
MW-1 14' - 16'	Benzene	<250				
	Toluene	9,400				
	Ethylbenzene	11,000				
	Xylenes	50,000				
	1,3,5-Trimethylbenzene	13,000				
	1,2,4-Trimethylbenzene	35,000				
	Naphthalene	4,800				
	MTBE	<1,300				
	BTEX	70,650				
	TPH (8015M)	671				
MW-1 17.8'	Benzene	<250				
	Toluene	320				
	Ethylbenzene	390				
	Xylenes	1,600				
	1,3,5-Trimethylbenzene	<500				
	1,2,4-Trimethylbenzene	980				
	Naphthalene	<1,300				
	MTBE	<1,300				
	BTEX	2,560				
	TPH (8015M)	50.2				
MW-2 4.5' - 9.5'	Benzene	<240				
	Toluene	850				
	Ethylbenzene	480				
	Xylenes	2,900				
	1,3,5-Trimethylbenzene	<480				
	1,2,4-Trimethylbenzene	2,200				
	Naphthalene	<1,200				
	MTBE	<1,200				
	BTEX	4,470				
	TPH (8015M)	<24				
MW-2 17'	Benzene	<2				
	Toluene	5.4				
	Ethylbenzene	5.8				
	Xylenes	44				
	1,3,5-Trimethylbenzene	18				
	1,2,4-Trimethylbenzene	86				
	Naphthalene	42				
	MTBE	65				
	BTEX	57.2				
	TPH (8015M)	0.504				

NOTES:  
 < - Contaminant not detected at specified detection limit

Ground Water Quality Results (mg/L)

Data Point	Compound	07/22/99				
MW-1	Benzene	4,000				
	Toluene	2,200				
	Ethylbenzene	620				
	Xylenes	1,900				
	1,3,5-Trimethylbenzene	190				
	1,2,4-Trimethylbenzene	510				
	Naphthalene	36				
	MTBE	<5				
	BTEX	8,720				
	TPH (8015M)	14.3				
MW-2	Benzene	5,300				
	Toluene	6,700				
	Ethylbenzene	230				
	Xylenes	2,800				
	1,3,5-Trimethylbenzene	<100				
	1,2,4-Trimethylbenzene	260				
	Naphthalene	<250				
	MTBE	1,100				
	BTEX	15,030				
	TPH (8015M)	16.7				
MW-3	Benzene	3,200				
	Toluene	150				
	Ethylbenzene	480				
	Xylenes	2,100				
	1,3,5-Trimethylbenzene	<200				
	1,2,4-Trimethylbenzene	530				
	Naphthalene	<500				
	MTBE	<500				
	BTEX	5,930				
	TPH (8015M)	<10				
MW-4	Benzene	<1				
	Toluene	<1				
	Ethylbenzene	<1				
	Xylenes	<3				
	1,3,5-Trimethylbenzene	<2				
	1,2,4-Trimethylbenzene	<2				
	Naphthalene	<5				
	MTBE	<5				
	BTEX	<6				
	TPH (8015M)	<0.1				

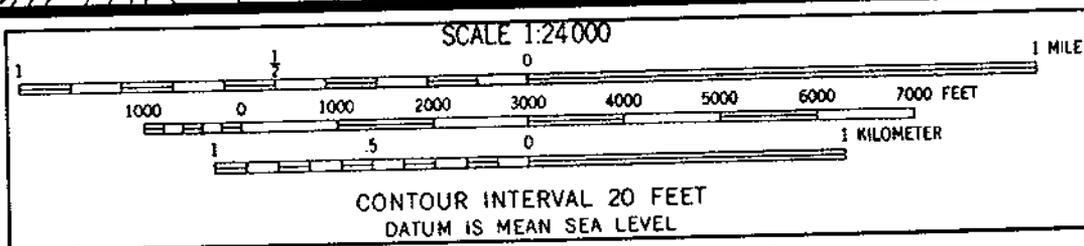
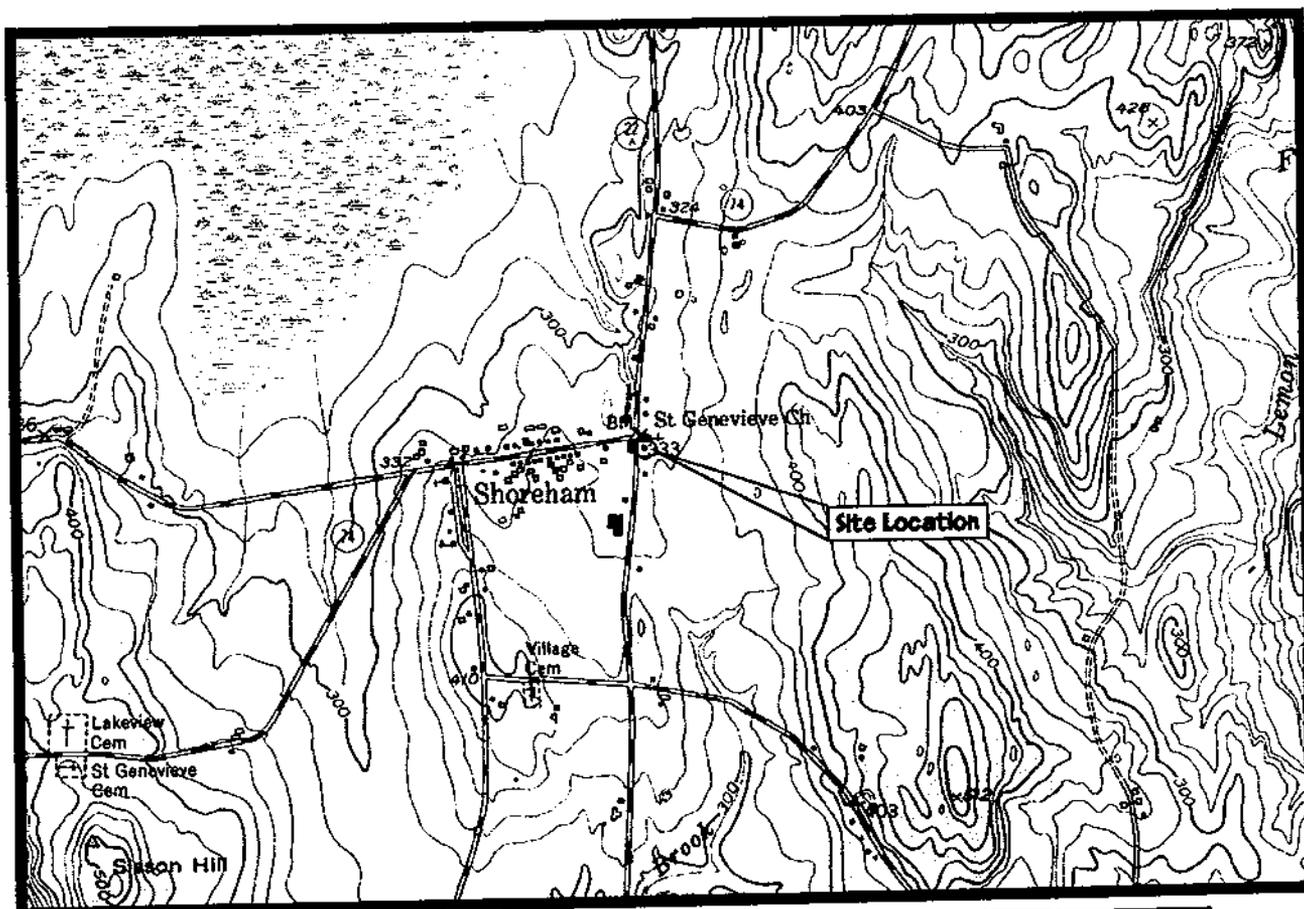
NOTES:

< - Contaminant not detected at specified detection limit

Figure 1

**Valley Garage  
VDEC Site #99-2600  
Shoreham, Vermont**

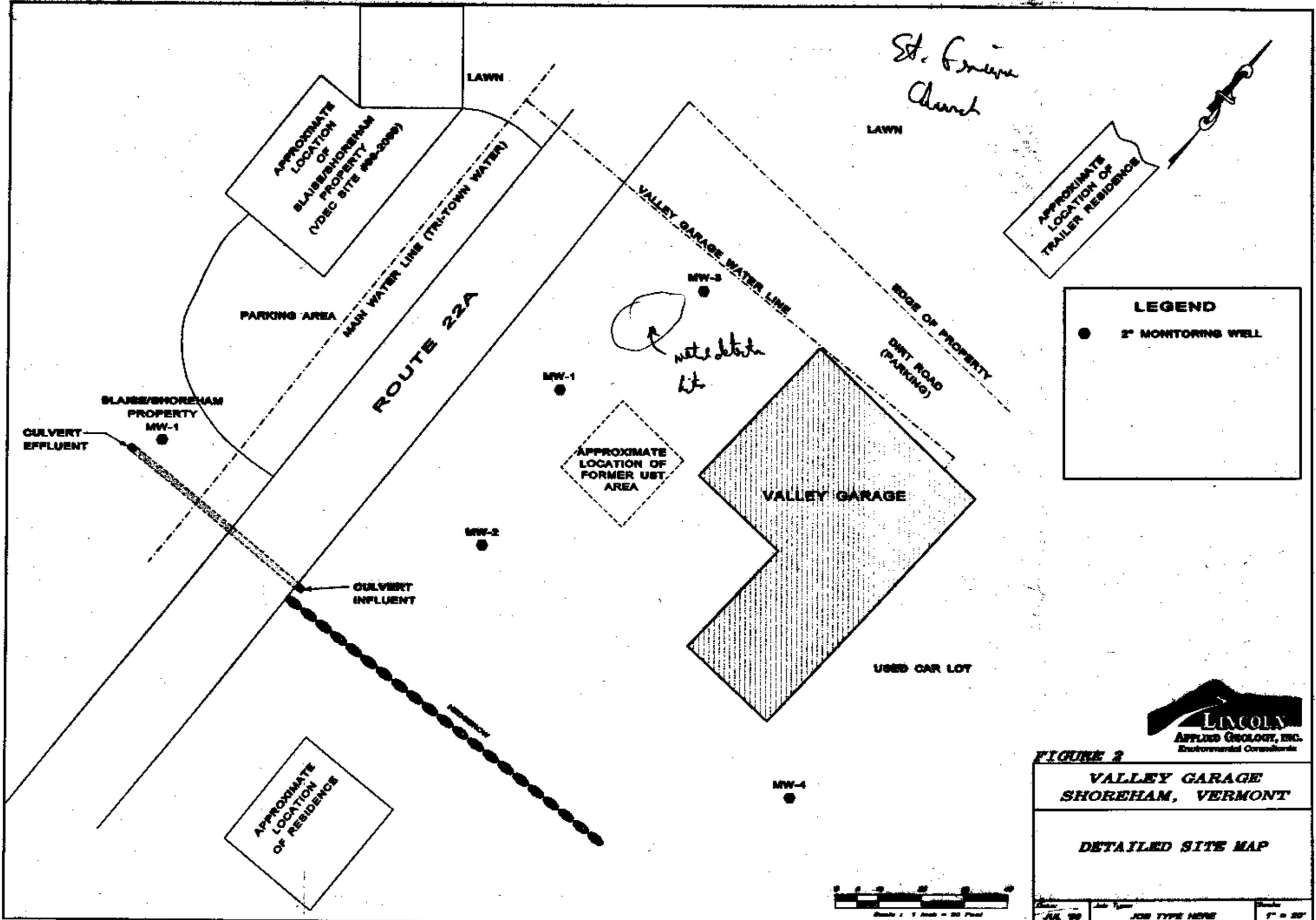
**GENERAL LOCATION MAP**



**BRIDPORT, VT.**  
NE/4 TICONDEROGA 15' QUADRANGLE  
N4352.5-W7315/7.5  
PHOTOINSPECTED 1983  
1949  
PHOTOREVISED 1972  
AMS 6371 IV NE-SERIES V813

QUADRANGLE LOCATION





**LEGEND**

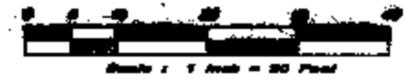
● 2" MONITORING WELL

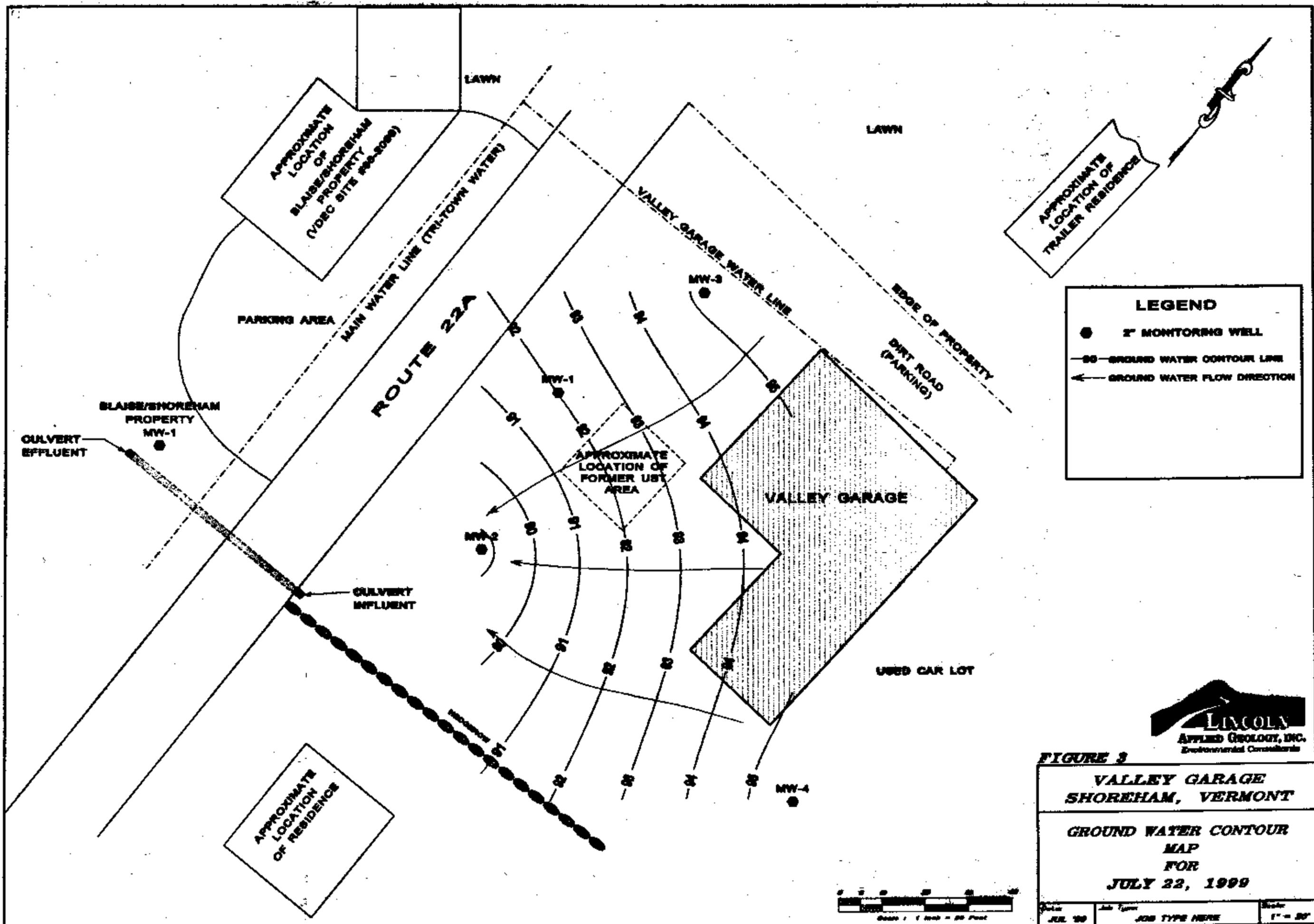


**FIGURE 2**

**VALLEY GARAGE**  
**SHOREHAM, VERMONT**

**DETAILED SITE MAP**





**LEGEND**

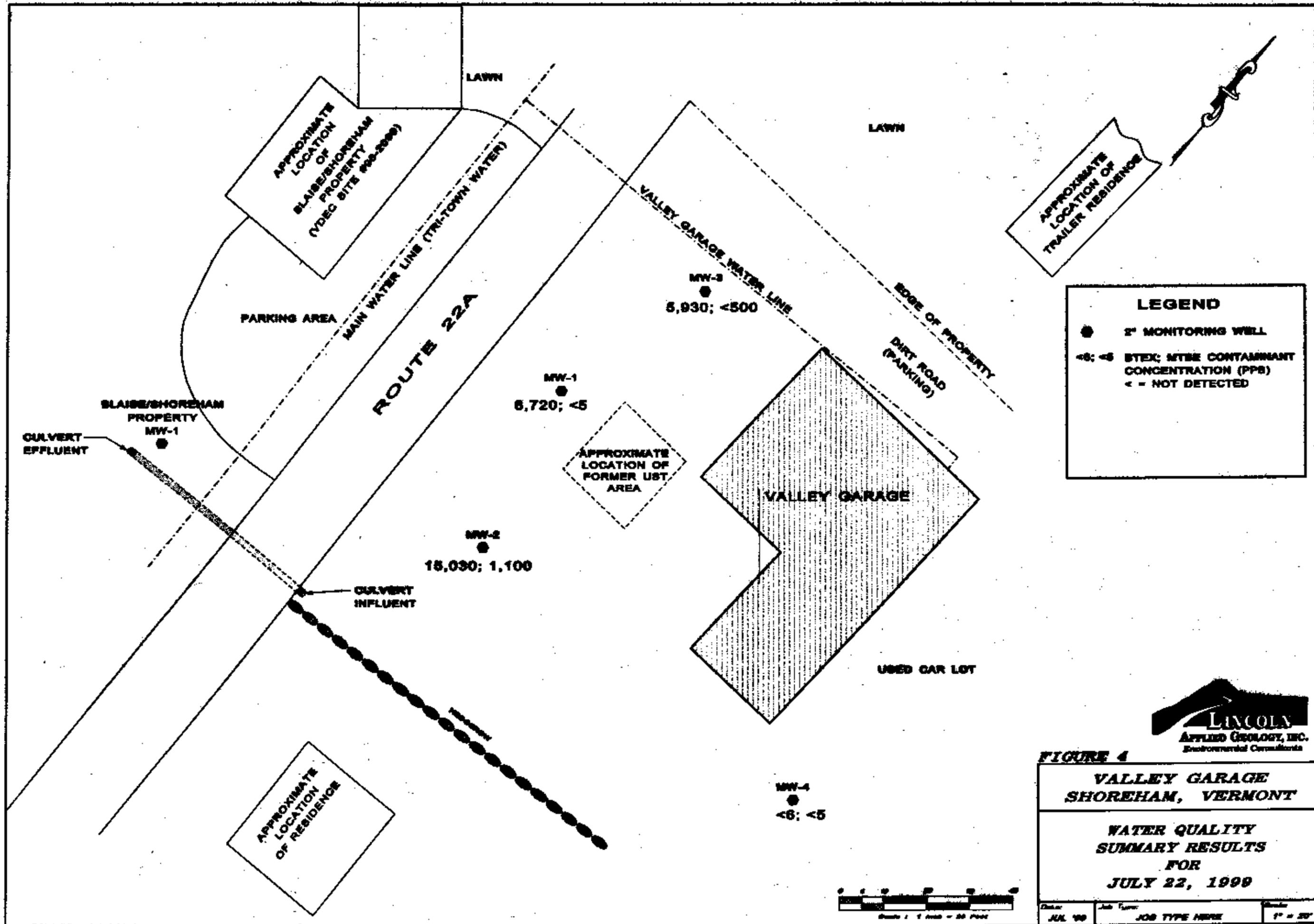
- 2" MONITORING WELL
- 90— GROUND WATER CONTOUR LINE
- ← GROUND WATER FLOW DIRECTION



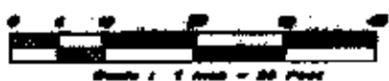
**FIGURE 3**  
**VALLEY GARAGE**  
**SHOREHAM, VERMONT**  
**GROUND WATER CONTOUR**  
**MAP**  
**FOR**  
**JULY 22, 1999**

Date	Job Type	Scale
JUL 99	JOB TYPE HERE	1" = 50'





**FIGURE 4**  
**VALLEY GARAGE**  
**SHOREHAM, VERMONT**  
**WATER QUALITY**  
**SUMMARY RESULTS**  
**FOR**  
**JULY 22, 1999**



Date: JUL 99	Job Type: JOB TYPE HERE	Scale: 1" = 50'
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DOCUMENT PREPARED BY CONSULTING ENGINEER: SEE PLAN: VCD 91/91/99

# Appendix A

## Detailed Well Logs

## WELL LOG

---

WELL: MW-1  
LOCATION: Valley Garage, Shoreham, VT.  
DRILLER: Adams Engineering, Inc.  
HYDROGEOLOGIST: Jake Peirce, Lincoln Applied Geology, Inc.,  
DATE: July 8, 1999

**Soils Description:** (BG = Background [0.2], SL = Saturated Lamp [>500], ppm = Parts Per Million)

<u>Depth</u>	<u>Description</u>	<u>PID (ppm)</u>
0.0-0.5'	Driveway gravel.	BG
0.5-4.5'	Gravel, coarse; and sand, fine to coarse; clay, olive to brown; some sand, fine to very fine; blocky; dry.	148
4.5-9.5'	Clay, olive to brown mottled; blocky; dry.	112
9.5-14.5'	Clay, olive to brown mottled; blocky; moist.	120
14.5-15.5'	Clay, olive to brown, some mottling; blocky; moist.	198
15.5-16'	Clay; and sand, fine to very fine; trace gravel, fine; brown; crumbly; damp.	198
16-17.9'	Clay, olive; silt, fine; gravel, fine to medium; solid; moist.	3.2

### Well Construction:

Bottom of Boring: 17.8'  
Bottom of Well: 17.8'  
Well Screen: 15.0'(2.8-17.8') of 1.5" sch. 40 PVC, 0.010" slot  
Solid Riser: 2.3'(0.5-2.8') of 1.5" sch. 40 PVC  
Sand Pack: 15.8'(2.0-17.8') of #1 sand  
Bentonite Seal: 1.0'(1.0-2.0')  
Backfill: None  
Well Box: Cemented flush

## WELL LOG

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WELL: MW-2  
LOCATION: Valley Garage, Shoreham, VT.  
DRILLER: Adams Engineering, Inc.  
HYDROGEOLOGIST: Jake Peirce, Lincoln Applied Geology, Inc.,  
DATE: July 8, 1999

**Soils Description:** (BG = Background [0.2], SL = Saturated Lamp [>500], ppm = Parts Per Million)

<u>Depth</u>	<u>Description</u>	<u>PID (ppm)</u>
0.0-0.5'	Driveway gravel.	BG
0.5-4.5'	Gravel, medium; and sand, fine to medium; and clay, olive to brown; blocky; dry.	138
4.5-9.5'	Clay, olive to brown mottled; blocky; dry.	162
9.5-14.8'	Clay, olive to brown mottled; pliable; moist.	68
14.8-17'	Clay, olive to brown mottled; and till; trace gravel, medium; trace sand, fine to medium; blocky; moist.	18

### Well Construction:

Bottom of Boring: 17.0'  
Bottom of Well: 17.0'  
Well Screen: 15.0'(2.0-17.0') of 1.5" sch. 40 PVC, 0.010" slot  
Solid Riser: 1.5'(0.5-2.0') of 1.5" sch. 40 PVC  
Sand Pack: 15.2'(1.8-17.0') of # 1 sand  
Bentonite Seal: 0.8'(1.0-1.8')  
Backfill: None  
Well Box: Cemented flush

## WELL LOG

---

WELL: MW-3  
LOCATION: Valley Garage, Shoreham, VT.  
DRILLER: Adams Engineering, Inc.  
HYDROGEOLOGIST: Jake Peirce, Lincoln Applied Geology, Inc.,  
DATE: July 8, 1999

**Soils Description:** (BG = Background [0.2], SL = Saturated Lamp [>500], ppm = Parts Per Million)

<u>Depth</u>	<u>Description</u>	<u>PID (ppm)</u>
0.0-0.5'	Driveway gravel.	BG
0.5-4.5'	Gravel, gray, medium to coarse; some sand; crumbly; damp.	48
4.5-9.5'	Clay, olive to brown mottled; blocky; dry.	3.4
9.5-14.5'	Clay, olive to brown mottled; pliable; moist.	2.0

### Well Construction:

Bottom of Boring: 12.5'  
Bottom of Well: 12.5'  
Well Screen: 10.0'(2.5-12.5') of 1.5" sch. 40 PVC, 0.010" slot  
Solid Riser: 2.2'(0.3-2.5') of 1.5" sch. 40 PVC  
Sand Pack: 10.5'(2.0-12.5') of # 1 sand  
Bentonite Seal: 1.0'(1.0-2.0')  
Backfill: None  
Well Box: Cemented flush

## WELL LOG

---

WELL: MW-4  
LOCATION: Valley Garage, Shoreham, VT.  
DRILLER: Adams Engineering, Inc.  
HYDROGEOLOGIST: Jake Peirce, Lincoln Applied Geology, Inc.,  
DATE: July 8, 1999

**Soils Description:** (BG = Background [0.2], SL = Saturated Lamp [>500], ppm = Parts Per Million)

<u>Depth</u>	<u>Description</u>	<u>PID (ppm)</u>
0.0-0.5'	Driveway gravel.	BG
0.5-4.5'	Clay, olive; and sand, fine to medium; loose to blocky; dry.	BG
4.5-9.5'	Clay, olive; trace sand, fine; blocky; dry.	BG
9.5-14.8'	Clay, olive to brown mottled; blocky; dry.	BG
14.8-19.8'	Clay, olive to brown mottled; trace gravel, medium; trace sand, fine; blocky; moist.	BG
19.8-24.8'	Clay, olive to brown mottled; till; and gravel, medium to coarse; and sand, medium to coarse; pliable; moist.	BG

### Well Construction:

Bottom of Boring: 25.0'  
Bottom of Well: 25.0'  
Well Screen: 19.7'(5.3-25') of 1.5" sch. 40 PVC, 0.010" slot  
Solid Riser: 5.0'(0.3-5.3') of 1.5" sch. 40 PVC  
Sand Pack: 21.0'(4.0-25.0') of # 1 sand  
Bentonite Seal: 3.5'(1.5- 4.0')  
Backfill: None  
Well Box: Pushed to grade with drill rig

## Appendix B

Soil & Water Quality  
Laboratory Reports  
for  
July 8 & 22, 1999

# GREEN MOUNTAIN LABORATORIES, INC.

27 Cross Road  
Middlesex, Vermont 05602

Phone (802) 223 - 1468

Fax (802) 223 - 8688

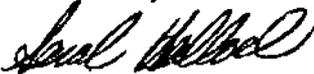
## LABORATORY RESULTS

CLIENT NAME:	Lincoln Applied Geology	REFERENCE NO:	5580
ADDRESS:	163 Revell Drive Lincoln, VT 05443	PROJECT NO:	NA
SAMPLE LOCATION:	Valley Garage	DATE OF SAMPLE:	07/08/99
SAMPLER:	Jake Peirce	DATE OF RECEIPT:	07/13/99
ATTENTION:	Rick Vandenberg	DATE OF ANALYSIS:	07/22/99
		DATE OF REPORT:	07/27/99

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

- 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.
- Naphthalene was detected in the blank associated with sample MW-2, 17' at a level of 5.8 ppb.
- 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:



Sarah Hallock  
Director of Chemical Services



# GREEN MOUNTAIN LABORATORIES, INC.

27 Cross Road  
Middlesex, Vermont 05602

Phone (802) 223 - 1468

Fax (802) 223 - 8688

## LABORATORY RESULTS

### GC/MS METHOD - EPA 8260M

GML REF. #: 5580  
STATION: MW-1, 14'-16'  
ANALYSIS DATE: 07/22/99  
DATE SAMPLED: 07/08/99  
SAMPLE TYPE: SOIL (78.3% DRY WEIGHT)

PARAMETER	PQL (µg/kg)	Conc. (µg/kg)
Benzene	250	ND
Toluene	250	9400
Ethylbenzene	250	11000
1,3,5-Trimethylbenzene	500	13000
1,2,4-Trimethylbenzene	500	35000
Xylenes	750	50000
Naphthalene	1300	4800
MTBE	1300	ND

Surrogate % Recovery: 115 %

ND = Not Detected

BPQL = Below Practical Quantitation Limits

ENTERED

# GREEN MOUNTAIN LABORATORIES, INC.

27 Cross Road  
Middlesex, Vermont 05602

Phone (802) 223 - 1468

Fax (802) 223 - 8688

## LABORATORY RESULTS

### GC/MS METHOD - EPA 8260M

GML REF. #: 5580  
STATION: MW-1, 17.8'  
ANALYSIS DATE: 07/22/99  
DATE SAMPLED: 07/08/99  
SAMPLE TYPE: SOIL (80.2% DRY WEIGHT)

PARAMETER	PQL ( $\mu\text{g}/\text{kg}$ )	Conc. ( $\mu\text{g}/\text{kg}$ )
Benzene	250	ND
Toluene	250	320
Ethylbenzene	250	390
1,3,5-Trimethylbenzene	500	ND
1,2,4-Trimethylbenzene	500	980
Xylenes	750	1600
Naphthalene	1300	ND
MTBE	1300	ND

Surrogate % Recovery: 112 %

ND = Not Detected

BPQL = Below Practical Quantitation Limits

**ENTERED**

# GREEN MOUNTAIN LABORATORIES, INC.

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Middlesex, Vermont 05602

Phone (802) 223 - 1468

Fax (802) 223 - 8688

## LABORATORY RESULTS

### GC/MS METHOD - EPA 8260M

GML REF. #: 5580  
STATION: MW-2, 4.5'-9.5'  
ANALYSIS DATE: 07/22/99  
DATE SAMPLED: 07/08/99  
SAMPLE TYPE: SOIL (79.0% DRY WEIGHT)

PARAMETER	PQL (µg/kg)	Conc. (µg/kg)
Benzene	240	ND
Toluene	240	850
Ethylbenzene	240	460
1,3,5-Trimethylbenzene	480	ND
1,2,4-Trimethylbenzene	480	2200
Xylenes	720	2900
Naphthalene	1200	ND
MTBE	1200	ND

Surrogate % Recovery: 112 %

ND = Not Detected

BPQL = Below Practical Quantitation Limits

~~ENTERED~~

# GREEN MOUNTAIN LABORATORIES, INC.

27 Cross Road  
Middlesex, Vermont 05602

Phone (802) 223 - 1468

Fax (802) 223 - 8688

## LABORATORY RESULTS

### GC/MS METHOD - EPA 8260M

GML REF. #: 5580  
STATION: MW-2, 17'  
ANALYSIS DATE: 07/22/99  
DATE SAMPLED: 07/08/99  
SAMPLE TYPE: SOIL (74.0% DRY WEIGHT)

PARAMETER	PQL (µg/kg)	Conc. (µg/kg)
Benzene	2	ND
Toluene	2	5.4
Ethylbenzene	2	5.8
1,3,5-Trimethylbenzene	4	18
1,2,4-Trimethylbenzene	4	86
Xylenes	6	44
Naphthalene	10	42
MTBE	10	65

Surrogate % Recovery: 111 %

ND = Not Detected

BPQL = Below Practical Quantitation Limits

**ENTERED**

G M L  S A M P L E  #	<b>Green Mountain Laboratories, Inc.</b>						<b>Analysis Requested</b>						Page <u>1</u> of <u>1</u>
	27 Cross Road												GML #
	Middlesex, Vermont 05602												5 5 8 0
	Phone (802) 223-1466 Fax (802) 223-8688												Remarks
	E-mail: GML@together.net												
	Client Name <i>Lincoln Applied Geology</i>												
	Address <i>163 Russell Dr, Lincoln UT 05443</i>												
Phone / Fax <i>(802) 453-4384</i>													
Project Name <i>Valley Garage</i>													
Project Number													
Project Manager <i>Rick Vandenberg</i>													
Sampler <i>Jake Peirce</i>													
	Sample Location	Date	Time	# of Cont.	Pres.	Sample Type							
1	MW-1, 14'-16'	7/18/99	1100	2	-	Soil	✓	✓					Please hold until further notice.
2	MW-1, 17.8'	↓	1100	2	-	↓	✓	✓					↑
3	MW-2, 4.5'-9.5'	↓	1300	2	-	↓	✓	✓					Analyze per Jake Peirce
4	MW-2, 17'	↓	1300	2	-	↓	✓	✓					7/13/99 14:05 AJ

Chain of Custody

Relinquished By: <i>Jake Peirce</i>	Date/Time: <i>7/13/99 1355</i>	Received By: <i>[Signature]</i>	Date/Time: <i>7/13/99 1355</i>
Relinquished By:	Date/Time:	Received By:	Date/Time:
Relinquished By:	Date/Time:	Received By:	Date/Time:
Temperature Blank:	Vial Lot ID #:		

# Green Mountain Laboratories, Inc.

27 Cross Road

Middlesex, Vermont 05602

Phone: (802) 223-1468

Fax: (802) 223-8688

## LABORATORY RESULTS

CLIENT NAME:	Lincoln Applied Geology	GML REFERENCE #:	5580
CLIENT ADDRESS:	163 Revell Drive	PROJECT NO:	NA
	Lincoln, VT 05443	DATE OF SAMPLE:	07/08/99
SAMPLE LOCATION:	Valley Garage	DATE OF RECEIPT:	07/13/99
SAMPLER:	Jake Peirce	DATE OF ANALYSIS:	07/22/99
ATTENTION:	Rick Vandenberg	DATE OF REPORT:	07/28/99

### Total Petroleum Hydrocarbons (TPH) by EPA Method 8015M (mg/kg - ppm)

Sample	% Dry Weight	PQL	Result
MW-1, 14'-16'	78.3	25.0	671
MW-1, 17.8'	80.2	25.0	50.2
MW-2, 4.5'-9.5'	79.0	24.0	BPQL
MW-2, 17'	74.0	0.200	0.504

PQL= Practical Quantitation Limit  
BPQL= Below Practical Quantitation Limit

Reviewed by:



Sarah Hallock  
Director of Chemical Services

**ENTERED**

G M L  S A M P L E  #	<b>Green Mountain Laboratories, Inc.</b> 27 Cross Road Middlesex, Vermont 05602 Phone (802) 223-1468 Fax (802) 223-8688 E-mail: GML@together.net						<b>Analysis Requested</b>						Page <u>1</u> of <u>1</u>
	Client Name <i>Lincoln Applied Geology</i>						TPH HLL EPA 802/B 5/208 413						GML #  5 5 8 0
	Address <i>163 Powell Dr, Lincoln UT 85443</i>												
	Phone / Fax <i>(802) 453-4384</i>												
	Project Name <i>Valley Garage</i>												
	Project Number												
	Project Manager <i>Rick Vandenberg</i>												
Sampler <i>Jake Pearce</i>													
	Sample Location	Date	Time	# of Cont.	Pres.	Sample Type							Remarks
1	MW-1, 14'-16'	7/13/99	1100	2	-	Soil	✓	✓					Please hold until further notice.
2	MW-1, 17.8'	↓	1100	2	-	↓	✓	✓					↑
3	MW-2, 4.5'-9.5'		1300	2	-		✓	✓					↑
4	MW-2, 17'	↓	1300	2	-	↓	✓	✓					Analyse per Jake Pearce 7/13/99 14:05 JL

Chain of Custody

Relinquished By: <i>Jake Pearce</i>	Date/Time: <i>7/13/99 1355</i>	Received By: <i>[Signature]</i>	Date/Time: <i>7/13/99 1355</i>
Relinquished By:	Date/Time:	Received By:	Date/Time:
Relinquished By:	Date/Time:	Received By:	Date/Time:
Temperature Blank:	Vial Lot ID #:		

# GREEN MOUNTAIN LABORATORIES, INC.

27 Cross Road  
Middlesex, Vermont 05602

Phone (802) 223 - 1468

Fax (802) 223 - 8688

## LABORATORY RESULTS

CLIENT NAME:	Lincoln Applied Geology	REFERENCE NO:	5631
ADDRESS:	163 Revell Drive Lincoln, VT 05443	PROJECT NO:	NA
SAMPLE LOCATION:	Valley Garage	DATE OF SAMPLE:	07/22/99
SAMPLER:	Jake Peirce	DATE OF RECEIPT:	07/22/99
ATTENTION:	Rick Vandenberg	DATE OF ANALYSIS:	07/27/99 - 07/29/99
		DATE OF REPORT:	07/29/99

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. However, samples MW-4 and MW-3 arrived at the laboratory with a pH of greater than two.
- The trip blank was prepared by the client from reagent water supplied by the laboratory.
- 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:



Sarah Hallock  
Director of Chemical Services

ENTERED

# GREEN MOUNTAIN LABORATORIES, INC.

27 Cross Road  
Middlesex, Vermont 05602

Phone (802) 223 - 1468

Fax (802) 223 - 8688

## LABORATORY RESULTS

### GC/MS METHOD - EPA 8260M

GML REF. #: 5631  
STATION: TRIP BLANK  
ANALYSIS DATE: 07/29/99  
DATE SAMPLED: 07/22/99  
SAMPLE TYPE: WATER

PARAMETER	PQL (µg/L)	Conc. (µg/L)
Benzene	1	ND
Toluene	1	ND
Ethylbenzene	1	ND
1,3,5-Trimethylbenzene	2	ND
1,2,4-Trimethylbenzene	2	ND
Xylenes	3	ND
Naphthalene	5	ND
MTBE	5	ND

Surrogate % Recovery: 109 %

ND = Not Detected  
BPQL = Below Practical Quantitation Limits

# GREEN MOUNTAIN LABORATORIES, INC.

27 Cross Road  
Middlesex, Vermont 05602

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## LABORATORY RESULTS

### GC/MS METHOD - EPA 8260M

GML REF. #: 5631  
STATION: MW-4  
ANALYSIS DATE: 07/27/99  
DATE SAMPLED: 07/22/99  
SAMPLE TYPE: WATER

PARAMETER	PQL (µg/L)	Conc. (µg/L)
Benzene	1	ND
Toluene	1	ND
Ethylbenzene	1	ND
1,3,5-Trimethylbenzene	2	ND
1,2,4-Trimethylbenzene	2	ND
Xylenes	3	ND
Naphthalene	5	ND
MTBE	5	ND

Surrogate % Recovery: 110 %

ND = Not Detected  
BPQL = Below Practical Quantitation Limits

ENTERED

# GREEN MOUNTAIN LABORATORIES, INC.

27 Cross Road  
Middlesex, Vermont 05602

Phone (802) 223 - 1468

Fax (802) 223 - 8688

## LABORATORY RESULTS

### GC/MS METHOD - EPA 8260M

GML REF. #: 5631  
STATION: MW-3  
ANALYSIS DATE: 07/28/99  
DATE SAMPLED: 07/22/99  
SAMPLE TYPE: WATER

PARAMETER	PQL (µg/L)	Conc. (µg/L)
Benzene	100	3200
Toluene	100	150
Ethylbenzene	100	480
1,3,5-Trimethylbenzene	200	BPQL
1,2,4-Trimethylbenzene	200	530
Xylenes	300	2100
Naphthalene	500	ND
MTBE	500	ND

Surrogate % Recovery: 111 %

ND = Not Detected  
BPQL = Below Practical Quantitation Limits

ENTERED

# GREEN MOUNTAIN LABORATORIES, INC.

27 Cross Road  
Middlesex, Vermont 05602

Phone (802) 223 - 1468

Fax (802) 223 - 8688

## LABORATORY RESULTS

### GC/MS METHOD - EPA 8260M

GML REF. #: 5631  
STATION: MW-1  
ANALYSIS DATE: 07/28/99 & 07/29/99  
DATE SAMPLED: 07/22/99  
SAMPLE TYPE: WATER

PARAMETER	PQL (µg/L)	Conc. (µg/L)
Benzene	1	4000 *
Toluene	1	2200 *
Ethylbenzene	1	620 *
1,3,5-Trimethylbenzene	2	190 *
1,2,4-Trimethylbenzene	2	510 *
Xylenes	3	1900 *
Naphthalene	5	36
MTBE	5	ND

Surrogate % Recovery: 113 %

ND = Not Detected  
BPQL = Below Practical Quantitation Limits

\* Sample was reanalyzed at a greater dilution to bring the concentration of this compound within the calibrated range.

**ENTERED**

# GREEN MOUNTAIN LABORATORIES, INC.

27 Cross Road  
Middlesex, Vermont 05602

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Fax (802) 223 - 8688

## LABORATORY RESULTS

### GC/MS METHOD - EPA 8260M

GML REF. #: 5631  
STATION: MW-2  
ANALYSIS DATE: 07/29/99  
DATE SAMPLED: 07/22/99  
SAMPLE TYPE: WATER

PARAMETER	PQL (µg/L)	Conc. (µg/L)
Benzene	50	5300
Toluene	50	6700
Ethylbenzene	50	230
1,3,5-Trimethylbenzene	100	ND
1,2,4-Trimethylbenzene	100	260
Xylenes	150	2800
Naphthalene	250	ND
MTBE	250	1100

Surrogate % Recovery: 112 %

ND = Not Detected  
BPQL = Below Practical Quantitation Limits

**ENTERED**

# Green Mountain Laboratories, Inc.

27 Cross Road

Middlesex, Vermont 05602

Phone (802) 223-1468 Fax (802) 223-8688

E-mail: GML@together.net

## Analysis Requested

Page

1 of 1

GML #

5631

Remarks

G  
M  
L  
  
S  
A  
M  
P  
L  
E

Client Name *Lincoln Applied Geology*  
 Address *163 Powell Dr, Lincoln VT 05443*  
 Phone / Fax *(802) 453-4284*  
 Project Name *Valley Garage*  
 Project Number  
 Project Manager *Rick Vandenberg*  
 Sampler *Sal DeToro*

802B + B7C5

#	Sample Location	Date	Time	# of Cont.	Pres.	Sample Type												
1	Trip Blank	7/22/99	0800	2	HCl	H <sub>2</sub> O	✓											
2	MW-4		1020	↓	↓	↓	↓											
3	MW-3		1040	↓	↓	↓	↓											
4	MW-1		1100	↓	↓	↓	↓											
5	MW-2	✓	1120	↓	↓	↓	↓											

### Chain of Custody

Relinquished By: <i>[Signature]</i>	Date/Time: 7/22/99 1350	Received By: <i>[Signature]</i>	Date/Time: 7/22/99 13:50
Relinquished By:	Date/Time:	Received By:	Date/Time:
Relinquished By:	Date/Time:	Received By:	Date/Time:
Temperature Blank:	Vial Lot ID #:		

# Green Mountain Laboratories, Inc.

27 Cross Road

Middlesex, Vermont 05602

Phone: (802) 223-1468

Fax: (802) 223-8688

## LABORATORY RESULTS

CLIENT NAME:	Lincoln Applied Geology	GML REFERENCE #:	5631
CLIENT ADDRESS:	163 Revell Drive	PROJECT NO:	NA
	Lincoln, VT 05443	DATE OF SAMPLE:	07/22/99
SAMPLE LOCATION:	Valley Garage	DATE OF RECEIPT:	07/22/99
SAMPLER:	Jake Peirce	DATE OF ANALYSIS:	07/27/99 - 07/29/99
ATTENTION:	Rick Vandenberg	DATE OF REPORT:	07/30/99

### Total Petroleum Hydrocarbons (TPH) by EPA Method 8015M (mg/L – ppm)

Sample	PQL	Result
Trip Blank	0.100	<0.100
MW-4	0.100	<0.100
MW-3	10.0	BPQL
MW-1	5.00	14.3
MW-2	5.00	16.7

PQL = Practical Quantitation Limit

BPQL = Below Practical Quantitation Limit

ENTERED

Reviewed by:



Sarah Hallock  
Director of Chemical Services

G M L  S A M P L E  #	<b>Green Mountain Laboratories, Inc.</b>						<b>Analysis Requested</b>							Page
	27 Cross Road													1 of 1
	Middlesex, Vermont 05602													GML #
	Phone (802) 223-1468 Fax (802) 223-8688													5631
	E-mail: GML@together.net													Remarks
	Client Name <i>Lincoln Applied Geology</i>													
	Address <i>163 Powell Dr, Lincoln VT 05443</i>													
Phone / Fax <i>(802) 453-4384</i>														
Project Name <i>Valley Garage</i>														
Project Number														
Project Manager <i>Rick Vandenberg</i>														
Sampler <i>Lake De Tree</i>														
	Sample Location	Date	Time	# of Cont.	Pres.	Sample Type								
1	<i>Trip Blank</i>	<i>7/22/99</i>	<i>0800</i>	<i>2</i>	<i>HCl</i>	<i>H<sub>2</sub>O</i>								
2	<i>MW-4</i>		<i>1020</i>											
3	<i>MW-3</i>		<i>1040</i>											
4	<i>MW-1</i>		<i>1100</i>											
5	<i>MW-2</i>		<i>1120</i>											

Chain of Custody

Relinquished By: <i>[Signature]</i>	Date/Time: <i>7/22/99 1350</i>	Received By: <i>[Signature]</i>	Date/Time: <i>7/22/99 13:50</i>
Relinquished By:	Date/Time:	Received By:	Date/Time: --
Relinquished By:	Date/Time:	Received By:	Date/Time:
Temperature Blank:	Vial Lot ID #:		

07/30/1999 08:14 0022238688 GREEN MT LABS INC. PAGE 02

Appendix C  
Cost Estimate

**Valley Garage  
Shoreham, Vermont  
Route 22A  
Work Plan Cost Estimate  
August 18, 1999**

Task I    Semi-annual Monitoring and Sampling

Field Technician-	8	hr(s) @	\$45.00	per hour	\$	360.00
PID and Interface Probe -	1	day(s) @	\$100.00	day	\$	100.00
Development Equipment -	1	day(s) @	\$110.00	per day	\$	110.00
Mileage -	160	mile(s) @	\$0.35	per mile	\$	56.00
Bailer(s) -	5	@	\$6.73	each	\$	33.65
Disposable Gloves-	14	@	\$0.20	pair	\$	2.80
Laboratory Analysis (8021B)-	5	samples@	\$54.00	each	\$	270.00

Total Task I	\$	932.45
Yearly Total Task I	\$	1,864.90

Task II    Summary Report

Geologist/Site Manager -	4	hr(s) @	\$65.00	per hour	\$	160.00
Administrative Assistant -	2	hr(s) @	\$35.00	per hour	\$	60.00
Computer Technician -	2	hr(s) @	\$55.00	per hour	\$	60.00
Principal/Senior Hydrogeologist -	0.5	hr(s) @	\$75.00	per hour	\$	37.50

Total Task II	\$	317.50
Yearly Total Task II	\$	635.00

Total Per Round	\$	1,249.95
Yearly Total	\$	2,499.90