LINCOLN
APPLIED GEOLOGY, INC.
Environmental Consultants

September 15, 1998

DEC 2 10 19 AM '98

Mr. William Hageman
Middlebury Department of Public Works
Route 7, South Main Street
Middlebury, Vermont 05753

RE: Middlebury Department of Public Works, Middlebury, Vermont (Site# 98-2362) - Subsurface Contaminant Investigation Report

Dear Mr. Hageman:

Lincoln Applied Geology, Inc. (LAG) is pleased to present this Subsurface Contaminant Investigation Report for The Town of Middlebury, Department of Public Works (MPW) property located on Route 7 South in Middlebury, Vermont. In response to the discovery of petroleum contaminated soils and a slight petroleum sheen on ground water during the removal of one 3,500 gallon diesel fuel underground storage tank (UST) on April 1, 1998, the Vermont Department of Environmental Conservation (VDEC) Sites Management Section (SMS) requested that a subsurface contaminant investigation be performed to determine the degree and extent of the petroleum contamination. The requested contaminant investigation was performed by LAG on July 9 and 22, 1998. The initial UST assessment and closure report dated April 6, 1998 was performed and previously submitted by Griffin International Inc. (GI) to the VDEC Underground Storage Tank Program (USTP).

The enclosed report includes well logs, monitoring data, and ground/surface water quality results. The investigation shows that soil and ground water beneath the site have been impacted by elevated levels of vapor, dissolved, and adsorbed phase petroleum related contamination. Based on the collected data, it is apparent that the degree and extent of the contamination has not been fully delineated by the existing monitor well array. Contamination present upgradient of the former and existing UST area may be related to former USTs that were apparently located in front of the MPW facility and were removed during the late 1970's. These findings will require that the investigation be extended to include the installation of additional monitor wells on the property to clearly define the degree and extent of the subsurface soil and ground water contamination. After these wells are installed, a complete site monitoring and water quality sampling event will be performed. Data collected during the sensitive receptor survey show that the indoor air of the MPW office and garage buildings has not been impacted by the contamination beneath the site.

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 Bill Norland, Project Manager, at (802) 453-4384.

Sincerely,
Lincoln Applied Geology, Inc.

Jason S. Barnard
Geologist

JSB/jb
enclosures

163 Revell Road • Lincoln, Vermont 05443 • (802) 453-4384 • FAX (802) 453-5399

Subsurface Contaminant Investigation Report

The Town of Middlebury
Department of Public Works
Route 7 South, Middlebury, Vermont
(VDEC Site #98-2362)

Prepared for:

The Town of Middlebury
Department of Public Works
Route 7 South
Middlebury, Vermont 05753
Contact: William Hageman
Phone: (802) 388-4045

Prepared by:

Lincoln Applied Geology, Inc.

September 15, 1998

Prepared by:

Jason S. Barnard
Geologist

Reviewed and Approved by:

Stephen Revell, CPG
Senior Hydrogeologist

Lincoln Applied Geology, Inc
Environmental Consultants

• (802) 453-4384 • FAX (802) 453-5399

Table of Contents

Executive Summary

On April 1, 1998, the combined efforts of Champlain Construction Co. (CCC), T.L. Boise Excavating Inc. (TLB) and Griffin International Inc. (GI) completed the removal and closure of one 3,500 gallon diesel fuel underground storage tank (UST #1) at the Middlebury Department of Public Works facility (MPW), in Middlebury, Vermont. UST #1 was in poor condition with a small (0.25") diameter hole on the bottom. Soils beneath UST #1 were excavated to a depth of approximately 11 feet below grade where soil contained 40 parts per million (ppm) and 125 ppm of volatile organic compounds (VOCs) as assayed with a photoionization detector (PID). A slight petroleum sheen was observed atop ground water encountered during the excavation. As described in the GI UST closure report, in order to accommodate the installation of a new 5,000 gallon UST, approximately 100 cubic yards of petroleum contaminated soil (PCS) were removed from the excavation and transported off-site following VDEC approval. The soils are currently stockpiled and covered on the east side of Route 7 on land owned by the Town of Middlebury.

Based on the results of the April 1998 UST removal and related data, the VDEC Sites Management Section (SMS) requested that additional work be performed to further define the degree and extent of the petroleum contamination. Mr. William Hageman, the MPW Director, contracted Lincoln Applied Geology, Inc. (LAG) to conduct the requested subsurface investigation. LAG installed four ground water monitor wells on-site on July 9, 1998. One well (MW-3) was installed upgradient of former UST #1 area and three wells (MW-4, MW-5, and MW-6) were installed in locations side/downgradient of former UST #1. LAG also conducted a sensitive receptor survey, monitored the ambient air space of the MPW garage and office buildings, and conducted a PID evaluation of the PCS stockpile on July 9th. The data collected during the soil pile evaluation indicates that only a small amount of vapor phase contamination remains in the stockpile. A complete stadia survey of all monitor wells and pertinent on-site structures was performed on July 13,1998, along with the installation of a new 6 mil thick polyethylene plastic cover over the PCS stockpile that day.

Following their installation, the wells were effectively developed, and on July 22, 1998 ground water levels and well headspace VOC vapor levels were monitored, and ground water quality samples were collected fromall monitor wells (MW-1, 2, 3, 4, 5, and 6). A surface water sample was also collected from the wetland area (WP-1) located west of the MPW facility. All water samples were analyzed for the presence of petroleum related compounds including BTEX, MTBE, and total petroleum hydrocarbons (TPH).

Review of the July 22nd water quality data shows that elevated levels of BTEX were detected in MW-3 and 4. There were also low to moderate levels of TPH in all monitor wells (except MW-6), and in WP-1. With the exception of moderate MTBE

Lincoln Applied Geology, Inc
Environmental Consultants
163 Revell Road • Lincoln, Vermont 05443 • (802) 453-4384 • FAX (802) 453-5399

levels in MW-2, non-detect to very low levels of MTBE were quantified in the remaining wells and WP-1. Data collected during the initial phase of the subsurface investigation shows that ground water in the vicinity and upgradient of the former and existing UST area has been impacted by elevated levels of vapor, dissolved, and adsorbed phase petroleum contamination. We believe that the elevated BTEX & TPH contaminant levels present in MW-3 are related to former USTs which had been located in front (east side) of the MPW facility. Interviews with persons familiar with the MPW site history indicate that one 3,000 gallon UST and one 5,000 gallon UST were excavated and removed from the front of the building in the late 1970's.

Data collected during the sensitive receptor survey shows that the indoor ambient air from the MPW garage and office building have not been impacted by the subsurface contamination. In light of the data collected the investigation will need to be extended to include the installation of additional ground water monitor wells to fully determine the extent and degree of the ground water contamination. Once the wells have been installed, developed, and ground water has stabilized, LAG will conduct a complete site monitoring and ground/surface water sampling event from all wells and the wetland area. Data collected during the second phase of the investigation will be used with historical data to determine which remedial actions will be necessary to remediate the subsurface petroleum contamination present at the MPW site.

Site Description

The MPW site is located on Route 7 South in Middlebury, Vermont as shown on the General Location Map presented as **Figure 1**. The property is bounded by Vermont Route 7 to the east, a private residence to the west, Champlain Construction Co. (CCC). to the south and Rosie's Restaurant to the north. The on-site and surrounding buildings are served by municipal water and sewer. The MPW office, garage, and other equipment sheds are all constructed with shallow or at grade concrete slab foundation. Pertinent site features including buildings, former/existing USTs, roads, ground water monitor wells, catch basins, and the wetland area are shown on **Figure 2**.

Site History

GI, in conjunction with CCC and TLB completed the excavation, removal, and assessment of UST #1 at the MPW facility on April 1, 1998. The UST Permanent Closure Form, PID data, and photographs of the site were submitted by GI to the VDEC Underground Storage Tank Program (USTP) in a report dated April 6, 1998. Excavated soils were screened for the presence of VOCs using a PID. The preliminary findings stated in the UST#1 closure report are summarized below.

UST #1: A 3,500 gallon single wall steel diesel UST, approximately 20 years old;

Lincoln Applied Geology, Inc
Environmental Consultants
... Lincoln, Vermont 05443 • (802) 453-4384 • FAX (802) 453-5399

- UST was found in poor condition;
- one 0.25" diameter hole was found in the bottom of the UST;
- PID soil assays ranged from non-detect 1.0 foot below grade to 140 ppm 8 feet below grade;
- ground water was encountered five feet below grade;
- a slight petroleum sheen was observed on ground water; and
- approximately 100 cubic yards of the most highly contaminated soils were removed and stockpiled on the east side of Route 7 on land owned by the Town of Middlebury.

Approximately 55 gallons of fuel oil and UST bottom wastes were generated during the UST #1 removal. No soil or ground water samples were collected for laboratory analysis during the removal of UST #1, and the extent and degree of soil and ground water contamination outside of the UST #1 area were not defined.

A contaminant investigation was requested by the VDEC, and the subject investigation was conducted by LAG. This Subsurface Contaminant Investigation Report presents the results of the investigation which was completed on July 22, 1998, along with conclusions and recommendations for the site.

Site Geology

Four monitor wells (MW-3, 4, 5, and 6) were drilled and installed using hollow stem auger drilling techniques on July 9, 1998 by Tri-State Drilling & Boring, Inc. (TSDB) of West Burke, Vermont. Two foot long soil samples were collected at five foot intervals, descriptively logged, and screened by PID (with a 10.2 eV lamp) for VOCs associated with petroleum. In each boring a PVC monitor well was installed. Monitoring wells were constructed of 2" diameter PVC, with 4 to17 foot long well screens, and 1.5 to 2.5 foot long solid riser pipes. Each well was properly constructed with sufficient well screen and sand pack. A bentonite seal was placed atop the sand pack, the remaining annulus was backfilled with drill cuttings, and a bolt-down well box was cemented flush with grade. The locations of the 4 newly installed and the 2 existing wells (MW-1 and 2) are shown on **Figures 2** and 3.

Unconsolidated sediments and soils encountered during drilling include the following. A layer of fill up to 3 feet thick, consisting primarily of coarse sand and medium gravel. Below the fill unit in MW-3 and MW-6 is a very fine to medium sandy silt from 4 feet (MW-3) to 5 feet (MW-6) thick. Below the fill unit in MW-4 and MW-5 is a silty clay from 5 feet (MW-4) to 14 feet (MW-5) thick. Beneath the silty clay unit in MW-4 and MW-5 is a more permeable and hydraulically conductive fine sandy glacial till directly in contact with the underlying bedrock. These unconsolidated sediments are mapped as

Lincoln Applied Geology, Inc
Environmental Consultants

glaciolacustrine lake bottom sediments. During drilling activities bedrock was encountered at depths of 6.0, 10.5, and 20.5 feet below grade in well borings MW-3, MW-4, and MW-5, respectively. Although no samples of bedrock were obtained, it is mapped as the lower ordovician age (505 to 475 million year old) Weybridge member of the Chipman formation, a grey limestone with their beds of sandy limestone.

The LAG well logs including soil descriptions, PID levels, and well construction details are included as **Appendix A**. The TSDB logs are also included in **Appendix A**. Review of **Appendix A** indicates that elevated levels of VOCs were present in soil samples collected from MW-3 and MW-4 (59 to 894 ppm) and low to moderate levels (0.9 to 20.6 ppm)of VOCs were present in samples collected from MW-5 and MW-6.

Ground Water Level and Well Headspace PID Monitoring

On July 13, 1998 LAG conducted a top of casing (TOC) stadia survey of all monitor wells and other on-site features pertinent to the subsurface investigation. On July 22nd 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 in **Table 2**. Review of the collected data indicates that depth to ground water varied from 3.1 feet below TOC (MW-6) to 6.95 feet (MW-1). Data in **Table 2** shows that well headspace PID readings in MW-2, MW-3, and MW-4 were at 265 ppm, 427 ppm, and 513 ppm, respectively. The remaining monitor wells assayed background (BG) levels. The elevated VOC levels present in MW-3, MW-4, and MW-5 correlate very well with the July 22nd water quality data. These data suggest that moderate levels of vapor and absorbed phase contamination continues to exist in the vicinity of the former and current UST area.

Site Hydrogeology

Ground water elevation data from July 22nd was used to develop the Ground Water Contour Map of the shallow ground water system presented as **Figure 2**. It shows ground water flow to the southwest. The ground water surface generally mimics the surface topography in the area, and has a calculated gradient of 0.035 feet/foot between MW-3 and MW-5.

Water Quality Sampling

On July 22, 1998 water quality samples were collected from wells MW-1,2,3,4,5 and 6, and the wetland point (WP-1). All samples were analyzed along with a trip blank for the petroleum constituents BTEX and MTBE via EPA Method 8020, and TPH via EPA Method 8100 at Green Mountain Laboratories, Inc. in Montpelier, Vermont.

Lincoln Applied Geology, Inc
Environmental Consultants

The water quality results are summarized in **Table 3** and are presented on the Water Quality Summary Map included as **Figure 3**. The laboratory reports are included as **Appendix B**. Review of **Table 3, Figure 3,** and **Appendix B** indicate that elevated concentrations of BTEX were present in MW-3 and MW-4 located upgradient and side gradient of the existing UST area, respectively. **Table 3** also shows that moderate concentrations of TPH were present in these two wells. Low to significant BTEX concentrations were present in all wells except MW-6 and WP-1 which did not contain BTEX. Low to moderate levels of MTBE were present in MW-1, MW-2, MW-5, MW-6, and WP-1. Based on this water quality data, it is clear that soil and ground water in the vicinity of the former and existing UST area have been impacted by moderate to elevated levels of petroleum contaminants.

Review of the July 22nd water quality data **(Table 3)** indicates that MW-3 and MW-4 contained BTEX concentrations of 75,700 parts per billion (ppb) and 39,900 ppb, respectively. MW-1, MW-2, and MW-5 contained BTEX concentrations of 8.8 ppb, 788 ppb, and 335 ppb, respectively. BTEX was not quantified above analytical detection limits in MW-6 and WP-1. This water quality data indicates that, with the exception of MW-1, low to moderate TPH concentrations were present in all wells and WP-1. MW-3 and MW-4 contained the highest TPH concentrations of 210 ppm and 54 ppm, respectively. A moderate MTBE concentration of 3,600 ppb was present in MW-2. MTBE levels in the remaining wells and WP-1 ranged from non-detect (MW-3 and MW-4) to 22 ppb (MW-5).

Data collected during this initial investigation and interviews with MPW persons suggest that the elevated contaminant levels in upgradient well MW-3 may have resulted from contamination caused by the UST system formerly located on the east side of the MPW facility which was excavated and removed in the early 1970s. Ground water contamination exists upgradient, sidegradient, and downgradient of the former and existing UST area. Elevated BTEX concentrations present in MW-3 may be caused by: contaminant diffusion through subsurface soils and ground water due to the relatively low ground water gradient; or "old" petroleum releases from former USTs formerly located east of the MPW facility. Because of the identified contamination will need to be installed to fully delineate the dissolved phase contaminant plume. The proposed monitor wells and former UST locations are shown on **Figure 4**. We are proposing that one well be installed upgradient of the former UST area near the Route 7 right-of-way and another be installed at the approximate location of the former 3,000 and 5,000 gallon USTs. Two wells should be installed between the MPW and CCC facilities and another installed downgradient of the source area near the western edge of the gravel drive.

Lincoln Applied Geology, Inc
Environmental Consultants
... • Lincoln, Vermont 05443 • (802) 453-4384 • FAX (802) 453-5399

Contaminated Soils Evaluation

During the April 1998 UST removal, approximately 100 cubic yards of petroleum contaminated soils were removed from the excavation in order to install the new 5,000 gallon UST. Following VDEC approval, the soils were moved off-site onto land owned by the Town of Middlebury located on the east side of Route 7 from the MPW facility. On July 9th LAG conducted a visual inspection and PID evaluation of the contaminated soil stockpile. The evaluation consisted of manually augering 15 soil borings into the pile to depths of three feet below its surface. PID data collected during the evaluation is summarized and presented as **Table 4,** and indicates that a very small amount of residual contamination exists in the soil pile. PID readings ranged between BG and 10.3 ppm at depths of 1 to 3 feet. Based on the data collected during the PID evaluation and inspection of the pile, these soils are not ready to be thinspread on-site. Their PID levels must decline to below 1ppm and there must be no petroleum odors. On July 13th LAG placed a new 6 mil polyethylene plastic cover over the entire stockpile. The stockpile will again be evaluated by PID next spring.

Potential Sensitive Receptors

On July 9, 1998 LAG conducted a sensitive receptor survey of the site, surrounding properties, and the wetland area. Potential sensitive receptors include indoor air from the MPW office and garage and the wetland area to the northwest. As presented in **Table 2,** PID assays of indoor air in these buildings yielded only BG levels. It is highly unlikely that the indoor air within these buildings will become impacted in the future because the foundations are shallow and or on grade. Three storm sewer catch basins (CB-1, 2, and 3) associated with the site are shown on **Figure 2** and assayed BG on July 9th. The wetland area was also evaluated by PID on July 9th and yielded only BG levels. The indoor air of the MPW office, garage, and equipment shed buildings has not been impacted by the petroleum contamination present beneath the site. LAG believes that there are no health related risks associated with the petroleum contamination present beneath the site.

Conclusions

Based on the results of the UST #1 removal assessment performed by GI, and the subsurface investigation conducted by LAG the following conclusions are made:

1. A 3,500 gallon diesel fuel UST (#1) was excavated and removed from the site by GI and TLB on April 1, 1998.

2. UST #1 was in poor condition with one 0.25" diameter hole found in the bottom of the UST during the inspection.

Lincoln Applied Geology, Inc
Environmental Consultants
• FAX (802) 453-5399

3. PID levels ranging from non-detect to 140 ppm were detected by GI from soils in the UST #1 excavation. In order to install a new 5,000 gallon UST, approximately 100 cubic yards of petroleum contaminated soil was removed and stockpiled on property owned by the Town of Middlebury located on the east side of Route 7.

4. Soils in the vicinity of former UST #1 consist primarily of gray clay and silt, with some sand and gravel. Ground water with a slight petroleum sheen was encountered during the excavation at a depth of five feet below grade.

5. The depth to the shallow ground water system on-site ranges from 3.6 feet (MW-6) to 5.33 feet (MW-3) below grade.

7. The shallow ground water flow direction on-site is toward the southwest at a low gradient of 0.035 feet/foot.

8. The underlying soil and ground water in the vicinity of the former and existing UST area has been impacted by low to elevated levels of petroleum related contamination. Elevated BTEX levels present in upgradient well MW-3 suggest that there may be some residual petroleum contamination related to USTs formerly located in front and east of the MPW facility. These USTs were apparently removed in the late 1970's.

9. The dissolved phase contaminant "plume" is not fully delineated by the existing monitor well array.

10. Indoor air in all on-site buildings (office, garage, and equipment shed) has not been impacted by the subsurface contamination.

11. Low level detections of MTBE and TPH were present in water from the wetland (WP-1).

Recommendations

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

1. Install five additional monitor wells on the MPW property at the locations shown on Figure 4.

2. Perform a complete site monitoring event and water quality sampling from all wells and the wetland area.

3. Conduct another PID evaluation of the contaminated soil stockpile in the

spring of 1999. If all PID levels are below 1 ppm and there are no petroleum odors then we will collect two discrete soil samples and have them analyzed for BTEX and MTBE by EPA Method 8020 and for TPH by EPA Method 8100.

4. Conduct a MPW file review relative to the two UST's formerly located east of and in front of the MPW facility.

5. 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 remedial actions as necessary.

A cost estimate to implement the abovementioned recommendations is provided as **Appendix C.** We look forward to your reply and approval.

F:\CLIENTS\SITES\MIDDLEBU\SUM0898.RPT

Lincoln Applied Geology, Inc
Environmental Consultants
• Lincoln, Vermont 05443 • (802) 453-4384 • FAX (802) 453-5399

Project: Middlebury Public Works
Location: Middlebury, Vermont

Table 1
VDEC Site # 98-2362

Ground Water Elevation/Product Level (feet)

Data Point	TOC	07/22/98					
MW-1	102.05	95.10					
MW-2	101.63	94.98					
MW-3	100.30	95.47					
MW-4	98.77	95.07					
MW-5	98.00	92.95					
MW-6	97.93	94.83					

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: Middlebury Public Works
Location: Middlebury, Vermont

Table 2
VDEC Site # 98-2362
Sheet 1 of 1

Photoionization Detector Results (PID - ppm)

Data Point	07/09/98	07/22/98					
MW-1		BG					
MW-2		265					
MW-3		427					
MW-4		513					
MW-5		BG					
MW-6		BG					
CB-1	BG						
CB-2	BG						
CB-3	BG						
MPW Garage	BG						
MPW Office	BG						
MPW Equipment Shed	BG						

Notes:
BG - Background
SL - Saturated Lamp

Project: Middlebury Public Works
Location: Middlebury, Vermont

Table 3
VDEC Site # 98-2362

Ground Water Quality Results *

Data Point	Compound	07/22/98
MW-1	Benzene	3.8
	Toluene	<1
	Ethylbenzene	<1
	Xylenes	<3
	MTBE	6.1
	BTEX	8.8
	BTEX + MTBE	14.9
	TPH	<0.1
MW-2	Benzene	640
	Toluene	99
	Ethylbenzene	29
	Xylenes	20
	MTBE	3,600
	BTEX	788
	BTEX + MTBE	4,388
	TPH	0.44
MW-3	Benzene	16,000
	Toluene	25,000
	Ethylbenzene	5,700
	Xylenes	29,000
	MTBE	<500
	BTEX	75,700
	BTEX + MTBE	76,200
	TPH	210
MW-4	Benzene	9,800
	Toluene	20,000
	Ethylbenzene	1,800
	Xylenes	8,300
	MTBE	<250
	BTEX	39,900
	BTEX + MTBE	40,150
	TPH	54
MW-5	Benzene	170
	Toluene	47
	Ethylbenzene	40
	Xylenes	78
	MTBE	22
	BTEX	335
	BTEX + MTBE	357
	TPH	0.42

NOTES:
< - Contaminant not detected at specified detection limit
* - BTEX and MTBE quantified in parts per billion (ppb), TPH quantified in parts per million (ppm)

Project: Middlebury Public Works
Location: Middlebury, Vermont

Table 3
VDEC Site # 98-2362
Sheet 2 of 2

Ground Water Quality Results *

Data Point	Compound	07/22/98				
MW-6	Benzene	<1				
	Toluene	<1				
	Ethylbenzene	<1				
	Xylenes	<3				
	MTBE	31				
	BTEX	<6				
	BTEX + MTBE	37				
	TPH	0.28				
WETLAND WP-1	Benzene	<1				
	Toluene	<1				
	Ethylbenzene	<1				
	Xylenes	<3				
	MTBE	12				
	BTEX	<6				
	BTEX + MTBE	18				
	TPH	0.18				
TRIP BLANK	Benzene	<1				
	Toluene	<1				
	Ethylbenzene	<1				
	Xylenes	<3				
	MTBE	<5				
	BTEX	<6				
	BTEX + MTBE	<11				
	TPH					

NOTES:
< - Contaminant not detected at specified detection limit
* - BTEX and MTBE quantified in parts per billion (ppb), TPH quantified in parts per million (ppm)

Project: Middlebury Public Works
Location: Middlebury, Vermont

Table 4
VDEC Site # 98-2362
Sheet 1 of 1

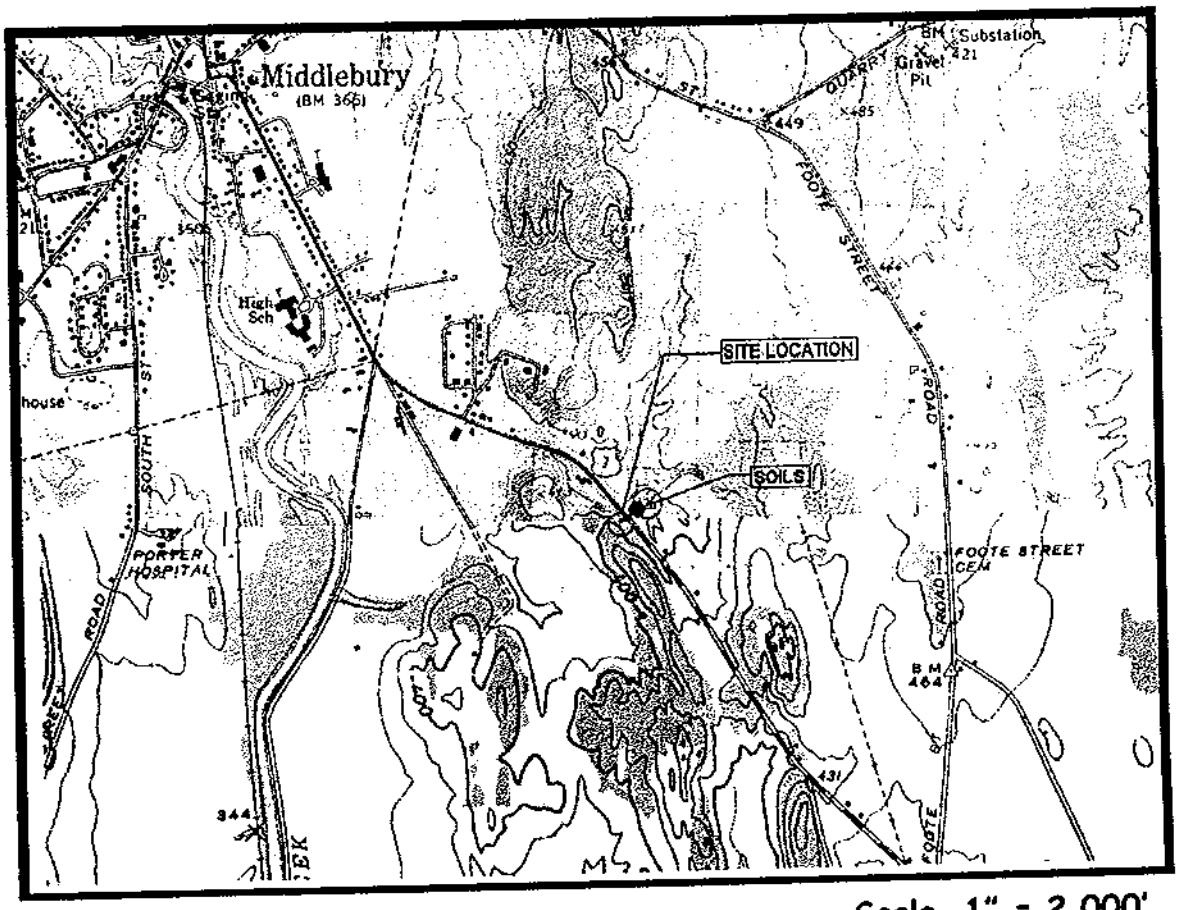
Photoionization Dectector Soil Stockpile Results (PID - ppm)

Data Point	Depth	07/09/98				
1	1-3'	0.9				
2	1-3'	1.0				
3	1-3'	2.0				
4	1-3'	1.0				
5	1-3'	6.9				
6	1-3'	10.3				
7	1-3'	3.6				
8	1-3'	1.6				
9	1-3'	0.9				
10	1-3'	BG				
11	1-3'	BG				
12	1-3'	0.3				
13	1-3'	BG				
14	1-3'	BG				
15	1-3'	0.3				

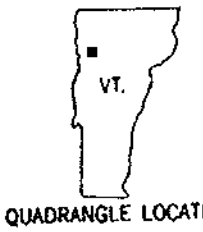
Notes:
BG - Background
SL - Saturated Lamp

Figure 1

Middlebury Public Works Town Garage
Middlebury, Vermont



Scale 1" = 2,000'



QUADRANGLE LOCATION

MIDDLEBURY, VT.

SW/4 MIDDLEBURY 15' QUADRANGLE

44073-A2-TF-024

1963

PHOTOINSPECTED 1983

DMA 6372 II SW—SERIES V813

&

CORNWALL, VT.

NW/4 BRANDON 15' QUADRANGLE

N4352.5—W7307.5/7.5

1943

PHOTOINSPECTED 1983

AMS 6371 I NW—SERIES V813

VERMONT US ROUTE 7

S

N

FORMER LOCATION OF
3,000 GALLON DIESEL
AND 5,000 GALLON GASOLINE UST
(REMOVED LATE 1970'S)

FORMER DISPENSER LOCATION
(REMOVED LATE 1970'S)

UST
FIELD

CONCRETE
PAD WITH
DISPENSERS

GRAVEL DRIVE

PUBLIC
WORKS
OFFICE

PUBLIC WORKS
GARAGE

MW-1
MW-2
MW-3
MW-4
MW-5
MW-6

MP-1

CB-1
CB-2
CB-3

EQUIPMENT
SHED

GRAVEL DRIVE

APPROXIMATE PROPERTY LINE LOCATION

CHARPLAIN
CONSTRUCTION
COMPANY

LEGEND

- CATCH BASIN
- 2" MONITOR WELL
- WETLAND POINT
- GROUND WATER ELEVATION CONTOUR
- GROUND WATER FLOW

Scale : 1 Inch = 40 Feet

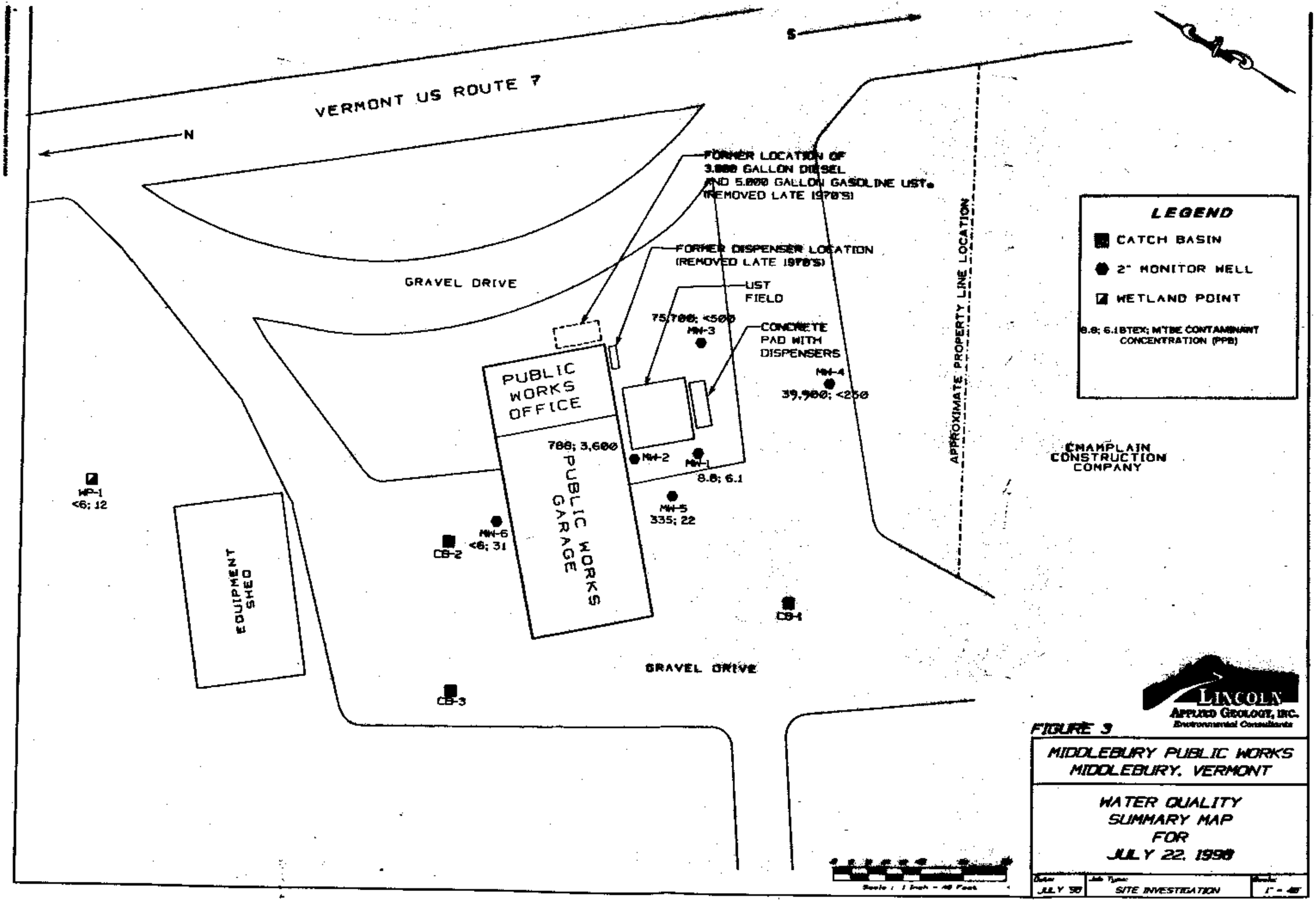
LINCOLN
APPLIED GEOLOGY, INC.
Environmental Consultants

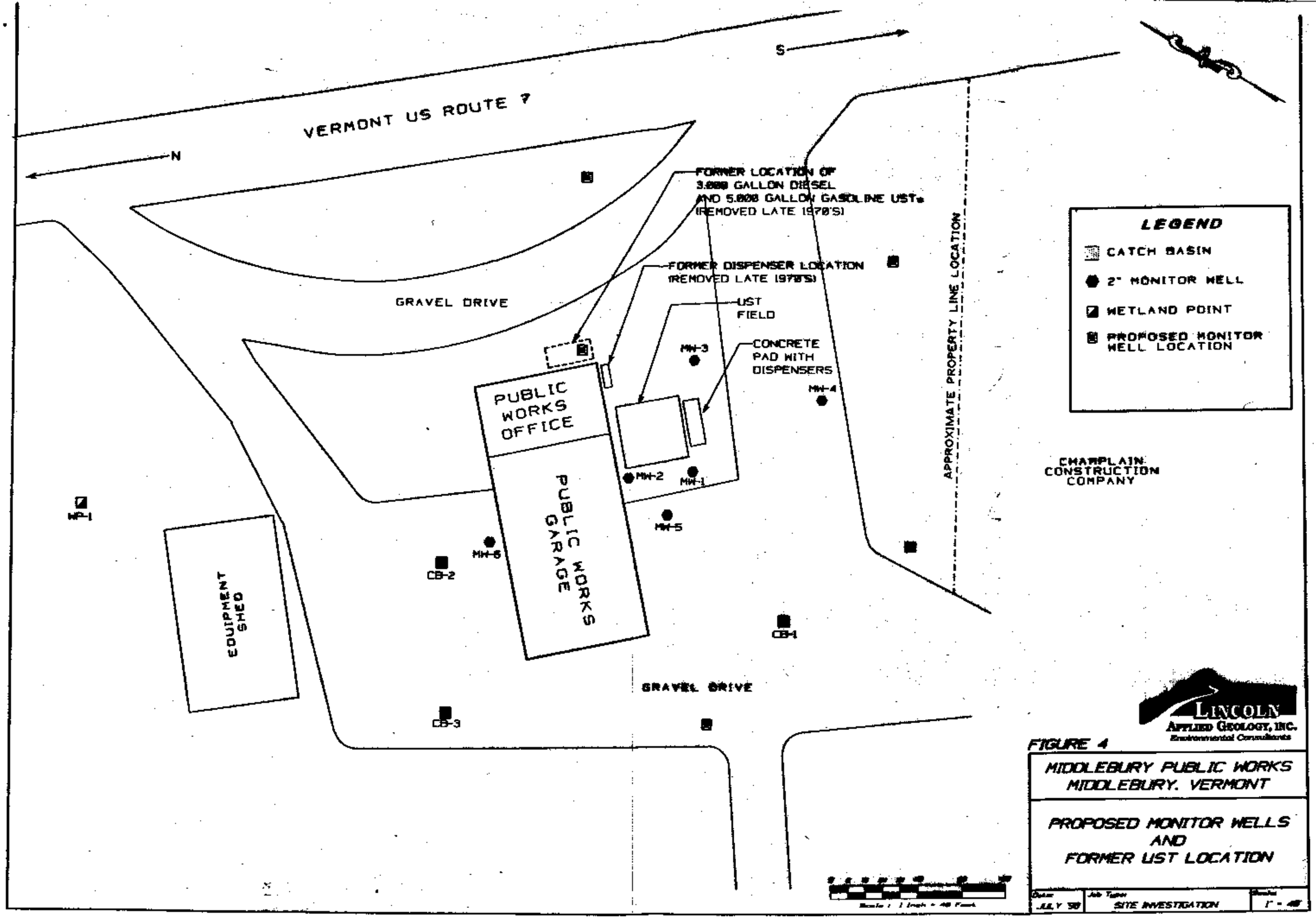
FIGURE 2

MIDDLEBURY PUBLIC WORKS
MIDDLEBURY, VERMONT

GROUND WATER ELEVATION
CONTOUR MAP
FOR
JULY 22, 1998

Date	Job Type	Number
JULY '98	SITE INVESTIGATION	1" = 40'


VERMONT US ROUTE 7
N
S
GRAVEL DRIVE
FORMER LOCATION OF
3,000 GALLON DIESEL
AND 5,000 GALLON GASOLINE USTs
(REMOVED LATE 1970'S)
FORMER DISPENSER LOCATION
(REMOVED LATE 1970'S)
UST
FIELD
CONCRETE
PAD WITH
DISPENSERS
PUBLIC
WORKS
OFFICE
PUBLIC WORKS GARAGE
EQUIPMENT
SHED
MW-1
788; 3,600
MW-2
MW-3
75,700; <500
MW-4
39,900; <250
8.8; 6.1
MW-5
335; 22
MW-6
<6; 31
MP-1
<6; 12
CB-1
CB-2
CB-3
GRAVEL DRIVE
APPROXIMATE PROPERTY LINE LOCATION
CHAMPLAIN
CONSTRUCTION
COMPANY
LEGEND
CATCH BASIN
2" MONITOR WELL
WETLAND POINT
8.8; 6.1 BTEX; MTBE CONTAMINANT
CONCENTRATION (PPB)
Scale : 1 Inch = 40 Feet
LINCOLN
APPLIED GEOLOGY, INC.
Environmental Consultants
FIGURE 3
MIDDLEBURY PUBLIC WORKS
MIDDLEBURY, VERMONT
WATER QUALITY
SUMMARY MAP
FOR
JULY 22, 1998
Date
JULY '98
Job Type
SITE INVESTIGATION
Scale
1" = 40'



LINCOLN
APPLIED GEOLOGY, INC.
Environmental Consultants

FIGURE 4

MIDDLEBURY PUBLIC WORKS
MIDDLEBURY, VERMONT

PROPOSED MONITOR WELLS
AND
FORMER UST LOCATION

Date	Job Type	Scale
JULY '98	SITE INVESTIGATION	1" = 40'

Appendix A

Well Logs

WELL LOG

WELL:	MW-3
LOCATION:	Middlebury Public Works Garage, Middlebury, Vermont - Upgradient of former and current UST area.
DRILLER:	Tri-State Drilling & Boring
HYDROGEOLOGIST:	Jason S. Barnard, Lincoln Applied Geology, Inc.
DATE:	July 9, 1998

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

Depth	Description	PID (ppm)
0.0 - 1.3'	Light brown to grey, medium sand and gravel, dry.	59
1.3 - 2.0'	Dark grey, very fine sandy silt, pliable, moist. Hydrocarbon odor present.	313
5.0 - 6.0'	Brown to dark grey, very fine sandy silt, pliable, saturated. Hydrocarbon odor present. Auger refusal at 6.0'.	515

Well Construction:

Bottom of Boring:	6.0'
Bottom of Well:	6.0'
Well Screen:	4.0' (2.0 - 6.0') of 2" sch. 40 PVC, 0.010" slot
Solid Riser:	1.5' (0.5 - 2.0') of sch. 40 PVC
Sand Pack:	5.0' (1.0 - 6.0') of No.1 Morie sand
Bentonite Seal:	0.5' (0.5 - 1.0') of bentonite chips
Backfill:	None
Well Box:	Cemented Flush

WELL LOG

WELL:	MW-4
LOCATION:	Middlebury Public Works Garage, Middlebury, Vermont - In the drive between the Public Works garage and Champlain Valley Construction.
DRILLER:	Tri-State Drilling & Boring
HYDROGEOLOGIST:	Jason S. Barnard, Lincoln Applied Geology, Inc.
DATE:	July 9, 1998

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

Depth	Description	PID (ppm)
1.0 - 3.0'	Dark grey, silty clay, dense blocky structure, dry.	84
5.0 - 7.0'	Dark brown to grey, clay, some silt, dense angular blocky structure, moist. Faint hydrocarbon odor.	655
10.0 - 10.5'	Olive grey, very fine sandy silt, some small to medium gravel, trace clay, saturated. Distinct hydrocarbon odor. Auger refusal at 10.5'.	894

Well Construction:

Bottom of Boring:	10.0'
Bottom of Well:	10.0'
Well Screen:	7.0' (3.0 - 10.0') of sch. 40 PVC, 0.010" slot
Solid Riser:	2.5' (0.5 - 3.0') of sch. 40 PVC
Sand Pack:	8.0' (2.0 - 10.0') of No.1 Morie sand
Bentonite Seal:	1.0' (1.0 - 2.0') of bentonite chips
Backfill:	None
Well Box:	Cemented Flush

WELL LOG

WELL: MW-5
LOCATION: Middlebury Public Works Garage, Middelbury, Vermont - On the east side of the garage building, in front of the first bay door.
DRILLER: Tri-State Drilling & Boring
HYDROGEOLOGIST: Jason S. Barnard, Lincoln Applied Geology, Inc.
DATE: July 9, 1998

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

Depth	Description	PID (ppm)
1.0 - 3.0'	Brown to grey, fine to medium sand and gravel, granular structure, dry.	3.6
5.0 - 7.0'	Dark grey, silty clay, dense blocky structure, moist.	0.9
10.0 - 12.0'	Dark brown to grey, silty clay, dense blocky structure, moist.	3.6
15.0 - 17.0'	Brown to grey, silty clay, dense blocky structure, moist.	0.9
20.0 - 20.5'	Light grey, fine to medium sandy silt, trace small gravel, saturated.	4.3
	Auger Refusal at 20.5'.	

Well Construction:

Bottom of Boring: 20.0'
Bottom of Well: 20.0'
Well Screen: 17.0' (3.0 - 20.0') of 2" sch. 40 PVC, 0.010" slot
Solid Riser: 2.5' (0.5 - 3.0') of 2" sch. 40 PVC
Sand Pack: 18.0' (2.0 - 20.0') of No.1 Morie sand
Bentonite Seal: 1.0' (1.0 - 2.0') of bentonite chips
Backfill: None
Well Box: Cemented Flush

WELL LOG

WELL:	MW-6
LOCATION:	Middlebury Public Works Garage, Middlebury, Vermont - Off the west side of the garage, near the first bay door.
DRILLER:	Tri-State Drilling & Boring
HYDROGEOLOGIST:	Jason S. Barnard, Lincoln Applied Geology, Inc.
DATE:	July 9, 1998

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

Depth	Description	PID (ppm)
0.0 - 1.5'	Brown, medium sand and gravel, trace large gravel, dry.	16.3
1.5 - 2.0'	Dark grey, very fine sandy silt, trace clay, dense blocky structure, dry.	14.3
5.0 - 7.0'	Dark grey, fine to medium sandy silt, saturated,	20.6
10.0 - 12.0'	Dark brown, silty clay, dense angular blocky structure, saturated.	2.9

Well Construction:

Bottom of Boring:	12.0'
Bottom of Well:	12.0'
Well Screen:	9.0' (3.0 - 12.0') of 2" sch. 40 PVC, 0.010" slot
Solid Riser:	2.5' (0.5 - 3.0') of sch. 40 PVC
Sand Pack:	10.0' (2.0 - 12.0') of No.1 Morie sand
Bentonite Seal:	1.0' (1.0 - 2.0') of bentonite chips
Backfill:	None
Well Box:	Cemented Flush

Tri-State Drilling & Boring, Inc.

RR#2 Box 113, Gaskell Hill
West Burke,Vermont 05871
802-467-3123

BIT # FTG

BIT # FTG

SHEET 1 of 4

TO Lincoln Applied Tech Address

DATE July 9, 1998

PROJECT NAME Middlebury Water works Location Middlebury

HOLE NO. MW 3

REPORT SENT TO

PROJECT #

LINE & STA.

SAMPLES SENTTO

OUR JOB # 405-24

OFFSET

RECEIVED
LINCOLN APPLIED TECH

GROUND WATER OBSERVATIONS	CASING	SAMPLER	CORE BAR
AT ____ AFTER ____ HRS	TYPE 4.25		
	SIZE ID		
AT ____ AFTER ____ HRS	HAMMER WT. 140		BIT
	HAMMER FAL 30		

DATE STARTED 7/9/98
DATE COMPLE. 7/9/98
BORING FOREMAN Wayne
INSPECTOR Jason
SOILS ENGR.

LOCATION OF BORING

DEPTH	CASING BLOWS PER/FT	SAMPLE DEPTHS FROM-TO	TYPE OF SAMPLE	BLOWS PER 6' ON SAMPLER FROM TO 0-6	6-12	12-18	18-24	MOISTURE DENSITY/ CONSIST.	NO.	PEN.	REC.	SOIL IDENTIFICATION REMARKS, INCLUDE COLOR, GRADATION, TYPE OF SOIL ROCK-COLOR, TYPE, CONDITION, HARNESS, DRILLING TIME, SEAMS AND ETC.
		0-2	Dry	19	17	16	5	Dry	1	24	12	Fine to coarse sand & gravel/silty
		5-6	2	refusal				Sat	2	12	12	Clay, sand & silt
												Set well @ 6'

WELL REPORT

Set well @ 6', used 4' screen, 1.5' Riser, sand to 1', chips to 6"

GROUND SURFACE TO

SAMPLE TYPE
D=DRY C=CORED W=WASHED
UP=UNDISTURBED PISTON
TP=TEST PIT A=AUGER V=VANE TEST
UT=UNDISTURBED THINWALL

USED
PROPORTIONS USED
TRACE 0 TO 10%
LITTLE 10 TO 20%
SOME 20 TO 35%
AND 35 TO 50%

CASING: THEN
140LB WT. X30" FALL ON 2" O.D. SAMPLER

COHESIONLESS DENSITY		COHESIVE CONSISTENCY
0-10	LOOSE	0-4 SOFT
10-30	MED.DENSE	4-8 M/STIFF
30-50	DENSE	8-15 STIFF
50+	VERY DENSE	15-30 VERY STIFF

SUMMARY
EARTH BORING 6
Steam
SAMPLES 2

MATERIALS USED

SCREEN	4	SAND	1	ROAD BOX	1
RISER	1.5	BENTONITE	1/2	WELL GUARDS	
CAPS	1	HOLE PLUG		MIS:	cement
L.PLUG	1	ENV GROUT			

Tri-State Drilling & Boring, Inc.

RR#2 Box 113, Gaskell Hill
West Burke,Vermont 05871
802-467-3123

BIT # ___ FTG _____

BIT # ___ FTG _____

SHEET 2 of 4

TO Lincoln Applied Tech Address

DATE July 8, 1998

PROJECT NAMEMiddlebury Public Works Location Newport, Vermont

HOLE NO. MW-4

REPORT SENT TO | PROJECT #

LINE & STA.

SAMPLES SENTTO | OUR JOB #

OFFSET

GROUND WATER OBSERVATIONS

AT _____ AFTER _____ HRS

AT _____ AFTER _____ HRS

	CASING	SAMPLER	CORE BAR
TYPE	4.25		
SIZE ID			
HAMMER WT.	140		BIT
HAMMER FAL	30"		

SURFACE ELEV.

DATE STARTED 7/7/98

DATE COMPLE. 7/7/98

BORING FOREMAN Wayne

INSPECTOR Jason

SOILS ENGR.

LOCATION OF BORING

DEPTH	CASING BLOWS PER/FT	SAMPLE DEPTHS FROM-TO	TYPE OF SAMPL	BLOWS PER 6" ON SAMPLER FROM TO 0-6	6-12	12-18	18-24	MOISTURE DENSITY/ CONSIST.	NO.	PEN.	REC.	SOIL IDENTIFICATION REMARKS, INCLUDE COLOR, GRADATION, TYPE OF SOIL ROCK-COLOR, TYPE, CONDITION, HARNESS, DRILLING TIME, SEAMS AND ETC.
		0-2	Dry	5	14	19	11		1	29	8	Clay with some silt
		5-7	Dry	10	8	9	11		2	24	22	Clay with 1/16" silty lens
		10-10.5										Very fine sandy silt/some fine to medium gravel, trace cl

WELL REPORT

Set well @ 10', 3' Riser, 7'Screen, Sand to 2', chips to 6"

GROUND SUFACE TO

SAMPLE TYPE
D=DRY C=CORED W=WASHED
UP=UNDISTURBED PISTON
TP=TEST PIT A=AUGER V=VANE TEST
UT=UNDISTURBED THINWALL

USED

PROPORTIONS USED
TRACE 0 TO 10%
LITTLE 10 TO 20%
SOME 20 TO 35%
AND 35 TO 50%

CASING: THEN

140LB WT. X30' FALL ON 2' O.D. SAMPLER

COHESIONLESS	DENSITY
0-10	LOOSE
10-30	MED.DENSE
30-50	DENSE
50+	VERY DENSE

COHESIVE CONSISTENCY
0-4 SOFT
4-8 M/STIFF
8-15 STIFF
15-30 VERY STIFF

SUMMARY

EARTH BORING

Steam

SAMPLES

MATERIALS USED

SCREEN	3	SAND	1 1/2	ROAD BOX	1
RISER	7	BENTONITE	1/2	WELL GUARDS	
CAPS	1	HOLE PLUG		MIS:	
L.PLUG	1	ENV GROUT			

Tri-State Drilling & Boring, Inc.

RR#2 Box 113, Gaskell Hill
West Burke,Vermont 05871
802-467-3123

BIT # ___ FTG _____

BIT # ___ FTG _____

SHEET 3 of 4

DATE July 9, 1998

TO Lincoln Applied Tech Address

PROJECT NAME Middlebury Public Works Location Middlebury, Vermont

HOLE NO. MW-6

REPORT SENT TO

PROJECT #

LINE & STA.

SAMPLES SENTTO

OUR JOB #

OFFSET

GROUND WATER OBSERVATIONS

AT _____ AFTER _____ HRS

AT _____ AFTER _____ HRS

CASING	SAMPLER	CORE BAR
TYPE 4.25		
SIZE ID		
HAMMER WT. 140		BIT
HAMMER FAL 30		

SURFACE ELEV.

DATE STARTED 7/9/98

DATE COMPLE. 7/9/98

BORING FOREMAN Wayne

INSPECTOR Jason

SOILS ENGR.

LOCATION OF BORING

DEPTH	CASING BLOWS PER/FT	SAMPLE DEPTHS FROM-TO	TYPE OF SAMPLE	BLOWS PER 6" ON SAMPLER FROM 0-6	TO 6-12	12-18	18-24	MOISTURE DENSITY/ CONSIST.	NO.	PEN.	REC.	SOIL IDENTIFICATION REMARKS, INCLUDE COLOR, GRADATION, TYPE OF SOIL ROCK-COLOR, TYPE, CONDITION, HARNESS, DRILLING TIME, SEAMS AND ETC.
		0-2	Dry	32	19	10	22	Dry	1	24	16	Fine to coarse sand & gravel into grey silty, clay with m to coarse sand
		5-7	Dry	5	4	3	7	Sat	2	24	2	Clay with fine gravel & medium sand
		10-12	Dry	5	6	8	10	Sat	3	24	20	Clay
												Set well @ 12'

RECEIVED

WELL REPORT

Set well @ 12' 2.5' Riser, 9' Screen, Sand to 2', Chips to 1'

GROUND SUFACE TO

SAMPLE TYPE
D=DRY C=CORED W=WASHED
UP=UNDISTURBED PISTON
TP=TEST PIT A=AUGER V=VANE TEST
UT=UNDISTURBED THINWALL

USED

PROPORTIONS USED
TRACE 0 TO 10%
LITTLE 10 TO 20%
SOME 20 TO 35%
AND 35 TO 50%

CASING: THEN

140LB WT. X30" FALL ON 2" O.D. SAMPLER

COHESIONLESS DENSITY		COHESIVE CONSISTENCY
0-10	LOOSE	0-4 SOFT
10-30	MED.DENSE	4-8 M/STIFF
30-50	DENSE	8-15 STIFF
50+	VERY DENSE	15-30 VERY STIFF

SUMMARY

EARTH BORING

ROCK CORING

SAMPLES

MATERIALS USED

SCREEN	9	SAND	3	ROAD BOX	1
RISER	2.5	BENTONITE	1/2	WELL GUARDS	
CAPS	1	HOLE PLUG		MIS:	
L.PLUG	1	ENV GROUT			

Tri-State Drilling & Boring, Inc.

RR#2 Box 113, Gaskell Hill
West Burke,Vermont 05871
802-467-3123

BIT # FTG

BIT # FTG

SHEET 4 of 4

TO Lincoln Applied Tech Address

DATE July 8, 1998

PROJECT NAME Middlebury Public Works Location Middlebury, Vermont

HOLE NO. MW-4

REPORT SENT TO PROJECT #

LINE & STA.

SAMPLES SENTTO OUR JOB #

OFFSET

GROUND WATER OBSERVATIONS

AT AFTER HRS

AT AFTER HRS

	CASING	SAMPLER	CORE BAR
TYPE			
SIZE ID			
HAMMER WT.			BIT
HAMMER FALL			

SURFACE ELEV.

DATE STARTED 7/8/98

DATE COMPLE. 7/8/98

BORING FOREMAN Wayne

INSPECTOR Jason

SOILS ENGR.

LOCATION OF BORING

DEPTH	CASING BLOWS PER/FT	SAMPLE DEPTHS FROM-TO	TYPE OF SAMPLE	BLOWS PER 6" ON SAMPLER FROM TO 0-6	6-12	12-18	18-24	MOISTURE DENSITY/ CONSIST.	NO.	PEN.	REC.	SOIL IDENTIFICATION REMARKS, INCLUDE COLOR, GRADATION, TYPE OF SOIL ROCK-COLOR, TYPE, CONDITION, HARNESS, DRILLING TIME, SEAMS AND ETC.
		0-2	Dry	13	11	17	22	Dry	1	24	12	Fine to coarse sand & gravel
		5-7	Dry	4	6	5	7	Moist	2	24	16	Clay
		10-12	Dry	4	5	6	8	Moist	3	24	18	Clay
		15-17	Dry	6	5	4	7	Sat	4	24	24	Clay
		20-22	Dry	4	4	4	Ref	Sat	5	12	12	Clay

WELL REPORT

GROUND SUFACE TO

SAMPLE TYPE
D=DRY C=CORED W=WASHED
UP=UNDISTURBED PISTON
TP=TEST PIT A=AUGER V=VANE TEST
UT=UNDISTURBED THINWALL

USED

PROPORTIONS USED
TRACE 0 TO 10%
LITTLE 10 TO 20%
SOME 20 TO 35%
AND 35 TO 50%

CASING: THEN

140LB WT. X30" FALL ON 2" O.D. SAMPLER

COHESIONLESS DENSITY		COHESIVE CONSISTENCY
0-10	LOOSE	0-4 SOFT
10-30	MED.DENSE	4-8 M/STIFF
30-50	DENSE	8-15 STIFF
50+	VERY DENSE	15-30 VERY STIFF

SUMMARY

EARTH BORING

ROCK CORING

SAMPLES

MATERIALS USED

SCREEN	17	SAND	5	ROAD BOX	1
RISER	3	BENTONITE	1/2	WELL GUARDS	
CAPS	1	HOLE PLUG		MIS:	cement
L.PLUG	1	ENV GROUT			

Appendix B

Water Quality Laboratory Reports for July 22, 1998

GREEN MOUNTAIN LABORATORIES, INC.

27 Cross Road
Middlesex, Vermont 05602

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

JUL 29 1998

LABORATORY RESULTS

CLIENT NAME:	Lincoln Applied Geology	REFERENCE NO:	3940
ADDRESS:	RD #1, Box 710	PROJECT NO:	NA
	Bristol, VT 05443	DATE OF SAMPLE:	07/22/98
SAMPLE LOCATION:	Middlebury Dept.of Public Works	DATE OF RECEIPT:	07/22/98
SAMPLER:	Jeremy Revell	DATE OF ANALYSIS:	07/23/98 - 07/24/98
ATTENTION:	Jason Barnard	DATE OF REPORT:	07/27/98

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

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

Reviewed by:

Sarah Hallock
Director of Chemical Services

JUL 28 1998

LINCOLN APPLIED GEOLOGY, INC.

GREEN MOUNTAIN LABORATORIES, INC.

27 Cross Road
Middlesex, Vermont 05602

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

LABORATORY RESULTS

GC/MS METHOD - BTEX (BENZENE, TOLUENE, ETHYLBENZENE, XYLENES) + MTBE

GML REF. # :	3940
STATION:	TRIP BLANK
ANALYSIS DATE:	07/23/98
DATE SAMPLED:	07/22/98
SAMPLE TYPE:	WATER

PARAMETER	PQL (µg/L)	Conc. (µg/L)
Benzene	1	ND
Toluene	1	ND
Ethylbenzene	1	ND
Xylenes	3	ND
MTBE	5	ND

Surrogate % Recovery: 103 %

JUL 29 1998

ND = Not Detected
BPQL = Below Practical Quantitation Limits

GREEN MOUNTAIN LABORATORIES, INC.

27 Cross Road
Middlesex, Vermont 05602

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

LABORATORY RESULTS

GC/MS METHOD - BTEX (BENZENE, TOLUENE, ETHYLBENZENE, XYLENES) + MTBE

GML REF. # :	3940
STATION:	WETLAND
ANALYSIS DATE:	07/23/98
DATE SAMPLED:	07/22/98
SAMPLE TYPE:	WATER

PARAMETER	PQL (µg/L)	Conc. (µg/L)
Benzene	1	ND
Toluene	1	ND
Ethylbenzene	1	ND
Xylenes	3	ND
MTBE	5	12

Surrogate % Recovery: 103 %

ND = Not Detected
BPQL = Below Practical Quantitation Limits

7/22 1130

GREEN MOUNTAIN LABORATORIES, INC.

27 Cross Road
Middlesex, Vermont 05602

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

LABORATORY RESULTS

GC/MS METHOD - BTEX (BENZENE, TOLUENE, ETHYLBENZENE, XYLENES) + MTBE

GML REF. # :	3940
STATION:	MW-5
ANALYSIS DATE:	07/24/98
DATE SAMPLED:	07/22/98
SAMPLE TYPE:	WATER

PARAMETER	PQL (µg/L)	Conc. (µg/L)
Benzene	1	170
Toluene	1	47
Ethylbenzene	1	40
Xylenes	3	78
MTBE	5	22

Surrogate % Recovery: 103 %

ND = Not Detected
BPQL = Below Practical Quantitation Limits

JUL 29 1998

GREEN MOUNTAIN LABORATORIES, INC.

27 Cross Road
Middlesex, Vermont 05602

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

LABORATORY RESULTS

GC/MS METHOD - BTEX (BENZENE, TOLUENE, ETHYLBENZENE, XYLENES) + MTBE

GML REF. # :	3940
STATION:	MW-6
ANALYSIS DATE:	07/24/98
DATE SAMPLED:	07/22/98
SAMPLE TYPE:	WATER

PARAMETER	PQL (µg/L)	Conc. (µg/L)
Benzene	1	ND
Toluene	1	ND
Ethylbenzene	1	ND
Xylenes	3	ND
MTBE	5	31

Surrogate % Recovery: 104 %

ND = Not Detected
BPQL = Below Practical Quantitation Limits

JUL 28 1998

APPLIED GEOLOGY, INC.

GREEN MOUNTAIN LABORATORIES, INC.

27 Cross Road
Middlesex, Vermont 05602

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

LABORATORY RESULTS

GC/MS METHOD - BTEX (BENZENE, TOLUENE, ETHYLBENZENE, XYLENES) + MTBE

GML REF. # : 3940
STATION: MW-3
ANALYSIS DATE: 07/23/98 & 07/24/98
DATE SAMPLED: 07/22/98
SAMPLE TYPE: WATER

PARAMETER	PQL (µg/L)	Conc. (µg/L)
Benzene	100	16000
Toluene	100	25000 *
Ethylbenzene	100	5700
Xylenes	300	29000
MTBE	500	ND

Surrogate % Recovery: 103 %

JUL 29 1998

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.

JUL 2 3

GREEN MOUNTAIN LABORATORIES, INC.

27 Cross Road
Middlesex, Vermont 05602

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

LABORATORY RESULTS

GC/MS METHOD - BTEX (BENZENE, TOLUENE, ETHYLBENZENE, XYLENES) + MTBE

GML REF. # : 3940
STATION: MW-4
ANALYSIS DATE: 07/23/98 & 07/24/98
DATE SAMPLED: 07/22/98
SAMPLE TYPE: WATER

PARAMETER	PQL (µg/L)	Conc. (µg/L)
Benzene	50	9800
Toluene	50	20000 *
Ethylbenzene	50	1800
Xylenes	150	8300
MTBE	250	ND

Surrogate % Recovery: 103 %

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.

GREEN MOUNTAIN LABORATORIES, INC.

27 Cross Road
Middlesex, Vermont 05602

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

LABORATORY RESULTS

GC/MS METHOD - BTEX (BENZENE, TOLUENE, ETHYLBENZENE, XYLENES) + MTBE

GML REF. # : 3940
STATION: MW-2
ANALYSIS DATE: 07/23/98 & 07/24/98
DATE SAMPLED: 07/22/98
SAMPLE TYPE: WATER

PARAMETER	PQL (µg/L)	Conc. (µg/L)
Benzene	1	640 *
Toluene	1	99
Ethylbenzene	1	29
Xylenes	3	20
MTBE	5	3600 *

Surrogate % Recovery: 104 %

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.

JUL 29 1998

GREEN MOUNTAIN LABORATORIES, INC.

27 Cross Road
Middlesex, Vermont 05602

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

LABORATORY RESULTS

GC/MS METHOD - BTEX (BENZENE, TOLUENE, ETHYLBENZENE, XYLENES) + MTBE

GML REF. # :	3940
STATION:	MW-1
ANALYSIS DATE:	07/24/98
DATE SAMPLED:	07/22/98
SAMPLE TYPE:	WATER

PARAMETER	PQL (µg/L)	Conc. (µg/L)
Benzene	1	3.8
Toluene	1	ND
Ethylbenzene	1	ND
Xylenes	3	ND
MTBE	5	6.1

Surrogate % Recovery: 104 %

ND = Not Detected
BPQL = Below Practical Quantitation Limits

Green Mountain Laboratories, Inc.

RR #3, Box 5210
Montpelier, VT 05602
Phone (802) 223-1468 Fax (802) 223-8688
E-mail : GML@together.net

Page 1 of 1

GML # 3940

GML SAMPLE #

Client Name LAG
Address Revell Drive Lincoln Vt 05443
Phone / Fax 453-4384
Project Name Middlebury Department of Public Works
Project Number
Project Manager Jason Barnard
Sampler Jeremy Revell

	Sample Location	Date	Time	# of Cont.	Pres.	Sample Type	Analysis Requested 8260	8100	Remarks
1	Trip Blank	7-22-96	8:00	3	HCl	H_2O	X		
2	Wetland	↑	9:40	↓	↓	↓	↓	X	
3	MW-5		10:10						
4	MW-6		10:30						
5	MW-3		10:40						
6	MW-4		11:00						
7	MW-2		11:15						
8	MW-1	↓	11:35	↓	↓	↓	↓	↓	

Chain of Custody

Relinquished By:	Date / Time: 7-22-96 1550	Received By: 7/22/96 1700	Date / Time:
Relinquished By:	Date / Time:	Received By:	Date / Time:
Relinquished By:	Date / Time:	Received By:	Date / Time:
Lot Temperature:	Vial Lot ID # :	Accepted By:	

AUG 18 1998

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	REF #:	3940
CLIENT ADDRESS:	163 Revell Drive	PROJECT NO.:	NA
	Lincoln, VT 05443	DATE OF SAMPLE:	07/22/98
PROJECT NAME:	Middlebury Dept. of Public Works	DATE OF RECEIPT:	07/22/98
SAMPLER:	Jeremy Revell	DATE OF ANALYSIS:	08/03/98-08/04/98
ATTENTION:	Jason Barnard	DATE OF REPORT:	08/12/98

Total Petroleum Hydrocarbons (TPH) by EPA Method 8100M (mg/L - ppm)

Sample	PQL	TPH Results
WETLAND	0.11	0.18
MW-5	0.10	0.42
MW-6	0.10	0.28
MW-3	0.11	210
MW-4	0.11	54
MW-2	0.11	0.44
MW-1	0.10	<0.10

PQL= Practical Quantitation Limit

Reviewed by:

Sarah Hallock
Director of Chemical Services

RECEIVED
AUG 17 1998
LINCOLN APPLIED GEOLOGY, INC

Green Mountain Laboratories, Inc.

RR #3, Box 5210
Montpelier, VT 05602
Phone (802) 223-1468 Fax (802) 223-8688
E-mail : GML@together.net

Page 1 of 1

GML # 3940

GML SAMPLE #

Client Name LAG
Address Revell Drive Lincoln VT 05443
Phone / Fax 453-4384
Project Name Middlebury Department of Public Works
Project Number
Project Manager Jason Barnard
Sampler Jeremy Revell

	Sample Location	Date	Time	# of Cont.	Pres.	Sample Type	Analysis Requested: 8260	Analysis Requested: 8100	Remarks
1	Trip Blank	7-22-98	8:00	3	HCl	H_2O	X		
2	Wetland		9:40					X	
3	MW-5		10:10						
4	MW-6		10:30						
5	MW-3		10:40						
6	MW-4		11:00						
7	MW-2		11:15						
8	MW-1	↓	11:35	↓	↓	↓	↓	↓	

Chain of Custody

Relinquished By:	Date / Time: 7-22-98 1150	Received By: 7/22/98 1400	Date / Time:
Relinquished By:	Date / Time:	Received By:	Date / Time:
Relinquished By:	Date / Time:	Received By:	Date / Time:
Lot Temperature:	Vial Lot ID # :	Accepted By:	

RECEIVED
[redacted] 7 1998
LINCOLN APPLIED GEOLOGY, IN

Appendix C

Cost Estimate

Middlebury Department of Public Works - Town Garage
Route 7, Middlebury, Vermont
VDEC #98-2362
15-Sep-98
Cost Estimate for Additional Monitor Wells, Site Monitoring and Sampling, and File Review

A. Soil Boring and Well Installation (HSA, 2" diameter)

Five 10-15' deep borings/wells-	5	@	$450.00	per well	$	2,250.00
Principal/Senior Hydrogeologist -	1	hr(s) @	$85.00	per hour	$	85.00
Hydrogeologist -	2	hr(s) @	$60.00	per hour	$	120.00
Geologist -	14	hr(s) @	$50.00	per hour	$	700.00
Metal Detector -	1	day(s) @	$40.00	per day	$	40.00
PID and Interface Probe -	1	day(s) @	$100.00	per day	$	100.00
Mileage -	50	mile(s) @	$0.30	per mile	$	15.00
				Subtotal A	**$**	**3,310.00**

B. Site Monitoring & Ground Water Sampling (One Round)

Hydrogeologist/Site Manager -	1	hr(s) @	$60.00	per hour	$	60.00
Field Technician -	8	hr(s) @	$35.00	per hour	$	280.00
Field Technician O.T. -	2	hr(s) @	$52.50	per hour	$	105.00
Disposable Bailer (1.5") -	12	@	$8.89	each	$	106.68
BTEX, MTBE by EPA 8020 -	13	@	$59.40	each	$	772.20
TPH by EPA 8100 -	13	@	$99.00	each	$	1,287.00
Mileage (includes to lab) -	125	mile(s) @	$0.30	per mile	$	37.50
PID and Interface Probe -	1	day(s) @	$100.00	per day	$	100.00
Sampling Equipment -	1	day(s) @	$110.00	per day	$	110.00
				Subtotal B	**$**	**2,858.38**

C. VDEC File Review

Geologist -	5	hr(s) @	$50.00	per hour	$	250.00
Mileage -	80	mile(s) @	$0.30	per mile	$	24.00
				Subtotal C	**$**	**274.00**

D. Reporting

Principal/Senior Hydrogeologist -	1	hr(s) @	$85.00	per hour	$	85.00
Hydrogeologist/Site Manager -	2	hr(s) @	$60.00	per hour	$	120.00
Geologist -	9	hr(s) @	$50.00	per hour	$	450.00
Computer/CAD Technician -	6	hr(s) @	$40.00	per hour	$	240.00
Administrative Assistant -	3	hr(s) @	$35.00	per hour	$	105.00
				Subtotal D	**$**	**1,000.00**

Grand Total >>> **$ 7,442.38**

Lincoln Applied Geology, Inc
Environmental Consultants

163 Revell Road • Lincoln, Vermont 05443 • (802) 453-4384 • FAX (802) 453-5399