

JAN 05 1994



January 4, 1994

Mr. Richard Spiese
Sites Management Section
Vermont Department of
Environmental Conservation
103 South Main Street
Waterbury, Vermont 05676

RE: Summary of Emergency Response and Phase I Contaminant Investigation
at the 7 & 17 Corner Store (Site #93-1477), New Haven, VT.

Dear Mr. Spiese:

Lincoln Applied Geology, Inc. (LAG) has continued with emergency response measures and has completed the Phase I tasks outlined in our November 11, 1993 preliminary scope of work which was approved in your November 17, 1993 work scope approval letter for the 7 & 17 Corner Store in New Haven, VT (**Figures 1, 2 and 3**). The emergency response was initiated because free floating gasoline product was discovered during routine removal of several underground storage tanks (UST's). It was apparent from the beginning of the emergency response that soil, ground water, and the adjacent wetland were impacted by soluble phase and free floating hydrocarbons.

In response to the conditions observed during tank removal activities, LAG immediately directed the installation of a 24-inch slotted culvert type recovery well (RW-1) and began manually removing free floating product. To further facilitate the removal of free floating product, LAG installed a ground water depression and treatment system equipped with an automatic product recovery pump. A 1272 Discharge Order was obtained to discharge treated ground water to the adjacent wetland. Automatic product recovery was successful through November to early December. Recovery rates have declined in December due to high water conditions causing an influx of shallow ground water from the adjacent wetland. Recently, surface water levels appear to be on the decline, and we expect product recovery rates to increase as the zone of ground water control increases again. There is no question that the existing ground water depression and treatment, and product recovery systems will be in place and operating for an extended period.

The Phase I Investigation was directed toward defining the full extent and magnitude of contamination, as well as defining whether other potential

receptors were impacted. Tasks completed as a part of the Phase I Investigation included:

1. conducting a detailed soil gas survey to define the extent of vapor phase contamination and determine monitoring well locations,
2. installing, developing, and sampling four ground water monitor wells, and
3. sampling and analyzing water samples from the adjacent wetland, the 7 & 17 Corner Store well and basement, the Post Office/Antioch Press bedrock well, the Junction Sports shallow well, and Pete's Auto Body bedrock well for the presence of benzene, toluene, ethylbenzene, xylenes (BTEX), and methyl-tert-butyl-ether (MTBE).

Results of the investigation indicate that elevated levels of vapor phase, soluble phase, and free floating phase gasoline related contaminants are currently impacting the soil and ground water systems beneath the site. The adjacent wetland is also being impacted to a lesser degree by both soluble and free floating gasoline. The investigation results also indicate no significant impacts to local drinking water wells. Although environmental impacts have been minimized by the use of adsorbent booms, contaminant migration to the wetland is being minimized by the on-going ground water depression and product removal. Because the shallow ground water system discharges directly to the adjacent wetland, that system will have to be continuously controlled through pumping to prevent further impact to the wetland.

As part of the emergency response, LAG began ground water depression and product recovery on November 2, 1993. **Chart 1** shows the cumulative gallons of product recovered and the total gallons of water pumped during November and December. Approximately 178 gallons of free floating hydrocarbons were removed from RW-1. Product recovery slowed in December because water levels in the adjacent wetland rose making ground water depression at present pumping rates difficult. Recently, surface water levels have declined and product has started to return to RW-1. **Table 1 and 2** present the fluid level data and photoionization detector (PID) data obtained from the monitor wells and surface water points (SW-1 and SW-2).

A site visit was made by the LAG hydrogeologist and technician on November 17 and 18, 1993 to conduct a soil gas survey. A copy of the HASP utilized for all on-site work is included in **Appendix A**. The soil gas survey was



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conducted by drilling small diameter holes to 3 feet below the ground surface and assaying each with a PID. **Figure 4** shows the locations of each of the seventy-five vapor points that were assayed as well as the delineated vapor phase contaminant plume. Buried utilities and product lines around the dispenser island areas and in front of the corner store prevented drilling in these areas. Results of the soil gas survey indicate that elevated levels of volatile organic compounds (VOC's) were detected near the former dispenser island and between the former UST area and the adjacent wetland. Preliminary data from excavations and available well log data indicate that the subsurface is composed of variable textured sand and gravel overlying a relatively thick silt/clay layer.

The results of the soil gas survey along with the locations of the former island area and UST area were utilized to locate the four 2-inch monitor wells that were installed on November 23, 1993. **Figure 3** shows the locations of the completed monitor wells. Borings were made utilizing hollow stem auger techniques with split spoon collection of soil samples. Detailed soil sample descriptions can be found on the attached geologic logs included as **Appendix B**. Sediment samples were screened with a PID for VOC's. Two inch PVC ground water monitoring wells were constructed and installed after sufficient saturated sediments were encountered. The split spoon soil sample logs confirm our initial evaluation that the site consists of variable textured sands with a relatively thick underlying silt/clay horizon. The silt/clay horizon appears to be somewhat fractured. The fracturing may serve to enhance contaminant migration through what is normally considered an impermeable material. Well logs that were reviewed for area water supply wells indicate that the silt/clay is approximately 100 feet deep in the valley and significantly thins toward the valley wall.

Soil PID assays and well construction details can also be found on each attached geologic log in **Appendix B**. Monitor wells were constructed utilizing PVC materials, 20 slot screen and flush grade road boxes. Following installation, each well was developed until the discharge waters were clear and free of sediment. A stadia survey was completed for locations and elevations of the monitor wells and pertinent site features so that an accurate base map could be prepared. The base map has been used to show site, ground water, and contaminant related conditions.

The wetlands, the drinking water wells, and the four newly installed monitor wells were appropriately purged and sampled on November 30, 1993. The samples were analyzed by purge and trap gas chromatography techniques for the presence of BTEX and MTBE constituents. The 7 & 17



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Corner Store well and the adjacent wetland were also sampled on November 9, 1993 during the emergency response. The monitor wells were purged using industry accepted methods and samples were collected and placed in 40 milliliter bottles. All samples were acidified, chilled, and brought to MicroAssays of Vermont in Montpelier, VT along with the proper chain-of-custody forms and trip blanks.

Water quality results obtained from the emergency response and Phase I activities indicate that the ground water beneath the site is contaminated with elevated concentrations of soluble phase BTEX ranging from 863 parts per billion (ppb) to 76,230 ppb in MW-1 and MW-3 respectively. All wells except MW-1 contained elevated levels of MTBE. Surface water samples obtained from the wetland showed trace concentrations of BTEX and MTBE. Drinking water supplies serving the 7 & 17 Corner Store, the Post Office/Antioch Press, Pete's Auto Body, and the Junction Sports were also sampled and analyzed for BTEX and MTBE on November 9, 1993. No BTEX or MTBE was detected in the sample collected from the 7 & 17 Corner Store well. The Post Office/Antioch Press well and the Junction Sports shallow well showed trace concentrations of toluene and MTBE, respectively. Pete's Auto Body bedrock well did not contain levels of contaminants above practical quantitation limits. **Table 3** contains tabulated BTEX and MTBE results for the monitor wells and surface water points and **Appendix C** contains copies of all analytical results. **Figure 5** has been prepared to show the spatial distribution of contaminants quantified.

Fluid level data obtained from December 13, 1993 was used along with the stadia survey information to generate **Figure 6**, a ground water contour map. Ground water flows to the north-northeast along a relatively flat gradient and ultimately discharges to the adjacent wetland. Based on the ground water flow maps, RW-1 is appropriately placed to intercept contamination migrating from the former island area. It is important to note, however, that limited thicknesses of free floating gasoline have recently been detected in MW-2. The more recent occurrence of product in MW-2 indicates that the plume of floating gasoline extends beyond the former UST area and is more downgradient of the former island area.

Concentrations of BTEX and MTBE are elevated in all monitor wells. Free product has recently been detected in MW-2 and has consistently been detected in RW-1. The ultimate receptor of the contamination is the adjacent wetland to the north. Through product recovery efforts (i.e. ground water depression) further migration of contamination to the wetland is being minimized. Further delineation of the soluble phase BTEX and MTBE plume is



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necessary in order to evaluate an appropriate remedial technology to effectively clean-up the site. As a result, LAG recommends that five additional wells be installed to delineate the southern, eastern, and western extent of the contaminant plume (**Figure 7**). Delineation of contamination to the west, across Route 7, may not be warranted because we have not obtained any water quality data to suggest that migration has occurred in that direction. We do believe that one well on the Junction Sports property would effectively bound the contaminants plume and allow for more accurate ground water flow maps to be produced. A complete sampling round will be conducted as soon as the new wells are installed and developed.

LAG has initiated a weekly monitoring schedule of the system and site.. The system is maintained, fluid levels are obtained, product is bailed and, when warranted, granular activated carbon (GAC) drums are rotated into the system in order to maintain compliance with the 1272 Discharge Order. Product that is detected in monitor wells during monitoring rounds will be bailed and placed in the on-site product tank. Due to the elevated level of contaminants we are changing carbon canisters approximately every two weeks. Monthly update reports will be prepared to inform you of the status of our current efforts.

A cost estimate for the additional monitoring well array and summary report is attached as **Appendix D**. Based on the results of that summary report and monitoring data of the existing remedial system a CAP (Corrective Action Plan) will be prepared. If you have any questions or concerns with regard to this matter, please do not hesitate to call me or Project Manager, John Amadon at 453-4384. In the interim we will continue with our weekly site visits.

Sincerely yours,

Richard S. Vandenberg
Richard S. Vandenberg
Hydrogeologist

RSV/cds
enclosures
cc: Jim Devlin
John Townsend



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**7 & 17 Corner Store
New Haven, Vermont
(VDEC Site #93-1440)
Cost Estimate for Additional Work
January 1994**

A. Additional Monitor Well Installations

Drillers Charges (5 wells)	\$ 3319.00
Hydrogeologist 12 hrs. @ \$45	540.00
PID and Interface Probe @ \$100/day	100.00
Mileage 50 mi. @ \$.30/mi.	15.00
Subtotal	\$ 3974.00

B. Monitor Well Sampling, Stadia Survey and Resampling of
Drinking Water Wells and Wetland

Hydrogeologist 2 hrs. @ \$45	\$ 90.00
Technician 6 hrs. @ \$30	180.00
PID and Interface Probe @ \$100/day	100.00
Pump and Generator @ \$110/day	110.00
Bailers and gloves	60.00
16 EPA Method 8020 & MTBE @ \$62/ea.	992.00
Mileage 100 mi. @ .30/mi.	30.00
Subtotal	\$ 1562.00

C. Summary Report

Senior Hydrogeologist 1 hr. @ \$75	\$ 75.00
Project Manager 1.5 hr. @ \$50	75.00
Hydrogeologist 6 hr. @ \$45	270.00
Computer Technician 6 hr. @ \$30	180.00
Administrative Assistant 4 hrs. @ \$30	120.00
Subtotal	\$ 720.00
TOTAL A, B, C	\$ 6256.00

Project: 7 & 17 Corner Store
 Location: New Haven, Vermont

Ground Water Elevation/Product Level (feet)

Data Point	TOC	11-8-93	11-9-93	11-12-93	11-17-93	11-18-93	11-22-93	11-30-93	12-6-93
		0.07	0.13	0.04	0.23	0.26	0.20	0.30	0.10
RW-1	100.00	94.52	93.88	93.71	93.69	93.64	93.60	95.15	94.90
MW-1	100.43							95.97	95.43
MW-2	98.51							95.96	94.96
MW-3	99.11							96.48	95.31
MW-4	100.18							93.91	95.66
SW-1	96.33		95.05	95.03	94.97	95.04	94.99	95.50	95.33
SW-2	97.49		95.01	94.89	94.58	95.00	94.96	96.41	95.69

Notes:
 1 - Elevation datum assumed
 2 - Reference elevation is elevation of top of PVC well casing

Project: 7 & 17 Corner Store
 Location: New Haven, Vermont

Table 1
 Job Number:
 Sheet 2 of 2

Ground Water Elevation/Product Level (feet)

Data Point	TOC	12-13-93	12-21-93	12-28-93	1-3-94				
RW-1	100.00	94.83 ^{0.02}	94.42	93.96 ^{0.10}	93.82 ^{0.08}				
MW-1	100.43	95.88	96.23	96.41	96.13				
MW-2	98.51	94.76 ^{0.01}	94.81	94.49 ^{0.01}	94.28				
MW-3	99.11	95.00	94.59	94.55	94.41				
MW-4	100.18	95.60	95.56	95.41	95.13				
SW-1	96.33	95.42	95.50	95.58					
SW-2	97.49	95.33	95.49	95.49					

Notes:

- 1 - Elevation datum assumed
- 2 - Reference elevation is elevation of top of PVC well casing

Project: 7 & 17 Corner Store
Location: New Haven, Vermont

Table 2
Job Number:
Sheet 1 of 2

Photoionization Results (PID - ppm)

Data Point	11-8-93	11-9-93	11-12-93	11-17-93	11-18-93	11-22-93	11-25-93	11-29-93	11-30-93
RW-1		180	100	115	SL	SL		SL	160
MW-1									60
MW-2									SL
MW-3									SL
MW-4									100
7 & 17 Basement		SL	1.6	BG	BG	BG		2.4	2.0
Treatment Shed			10.0	10.0	50	15.0	3.4	4.8	

Notes:
BG - Background
SL - Saturated Lamp

Project: 7 & 17 Corner Store
Location: New Haven, Vermont

Photoionization Results (PID - ppm)

Data Point	12-6-93	12-13-93	12-21-93	12-28-93	1-3-94				
RW-1		100		260	50				
MW-1	12.0	0.0	14.0	22	10.2				
MW-2	SL	SL	SL	200	SL				
MW-3	SL	SL	SL	SL	SL				
MW-4	195	SL	190	SL	SL				
7 & 17 Basement		1.2	BG	0.6	1.2				
Treatment Shed	5.4	BG	3.2	2.6	6.0				

Notes:
BG - Background
SL - Saturated Lamp

Ground Water Quality Results (ppb)

Data Point	11-30-93						
RW-1	51200	26000					
MW-1	863	<5					
MW-2	68340	27700					
MW-3	76230	14300					
MW-4	12893	9010					
SW-1	<6	1					
SW-2	6	1					

NOTES:
 MTBE in upper right corner of cell
 BTEX in lower left corner of cell
 < - Contaminant not detected at specified detection limit

**7 & 17 Corner Store
Product Recovery and Total Gallons Pumped
For RW-1**

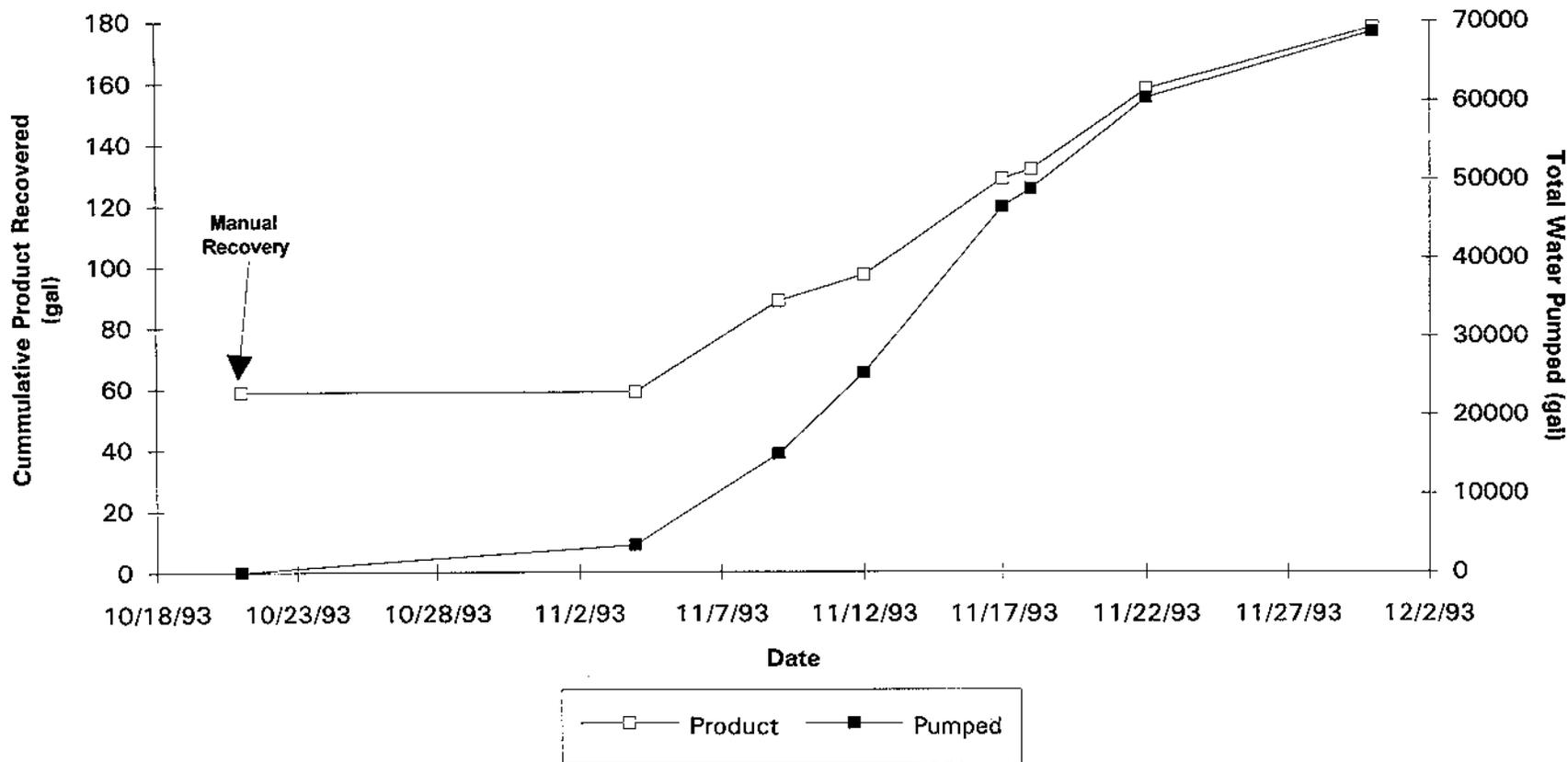
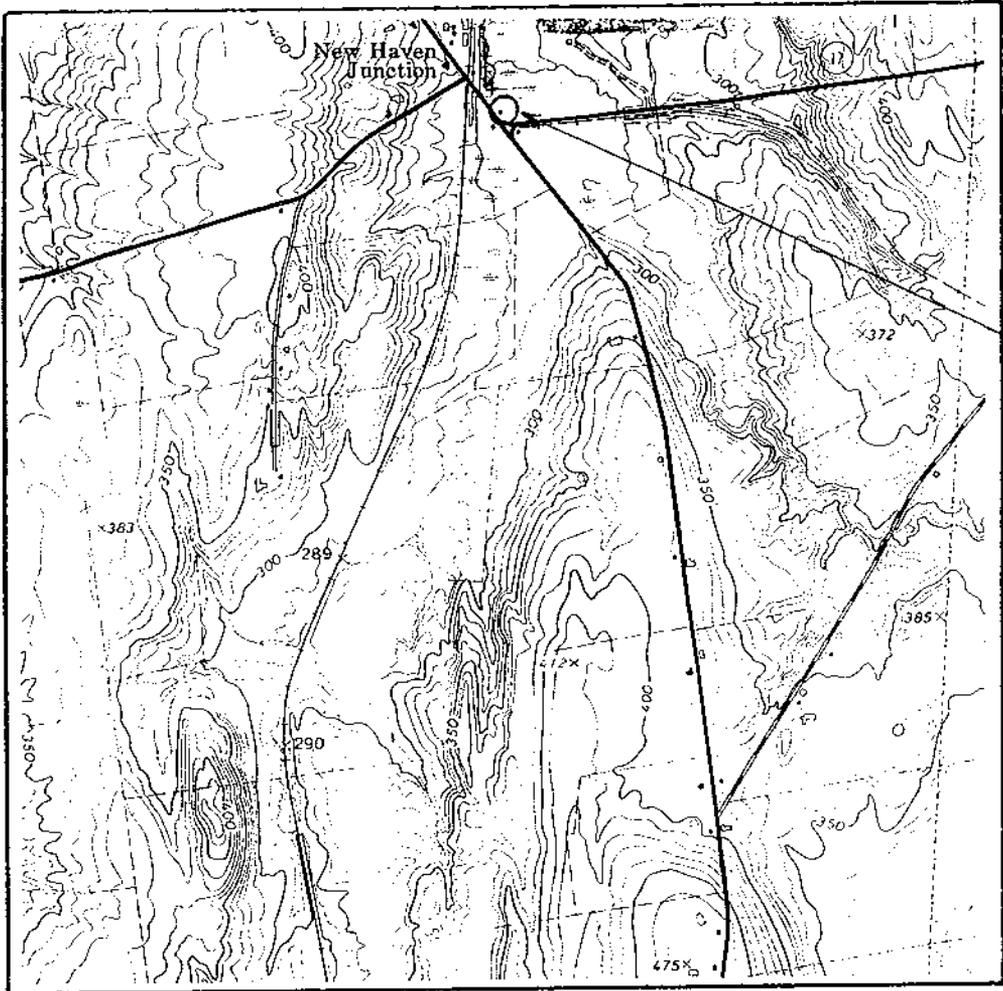


Chart 1

7 & 17 Corner Store GENERAL LOCATION MAP



7 & 17 Corner Store

Source: U.S.G.S. 7.5 min.
Topo Series
Middlebury, VT Quad.

Scale: 1" = 2000'

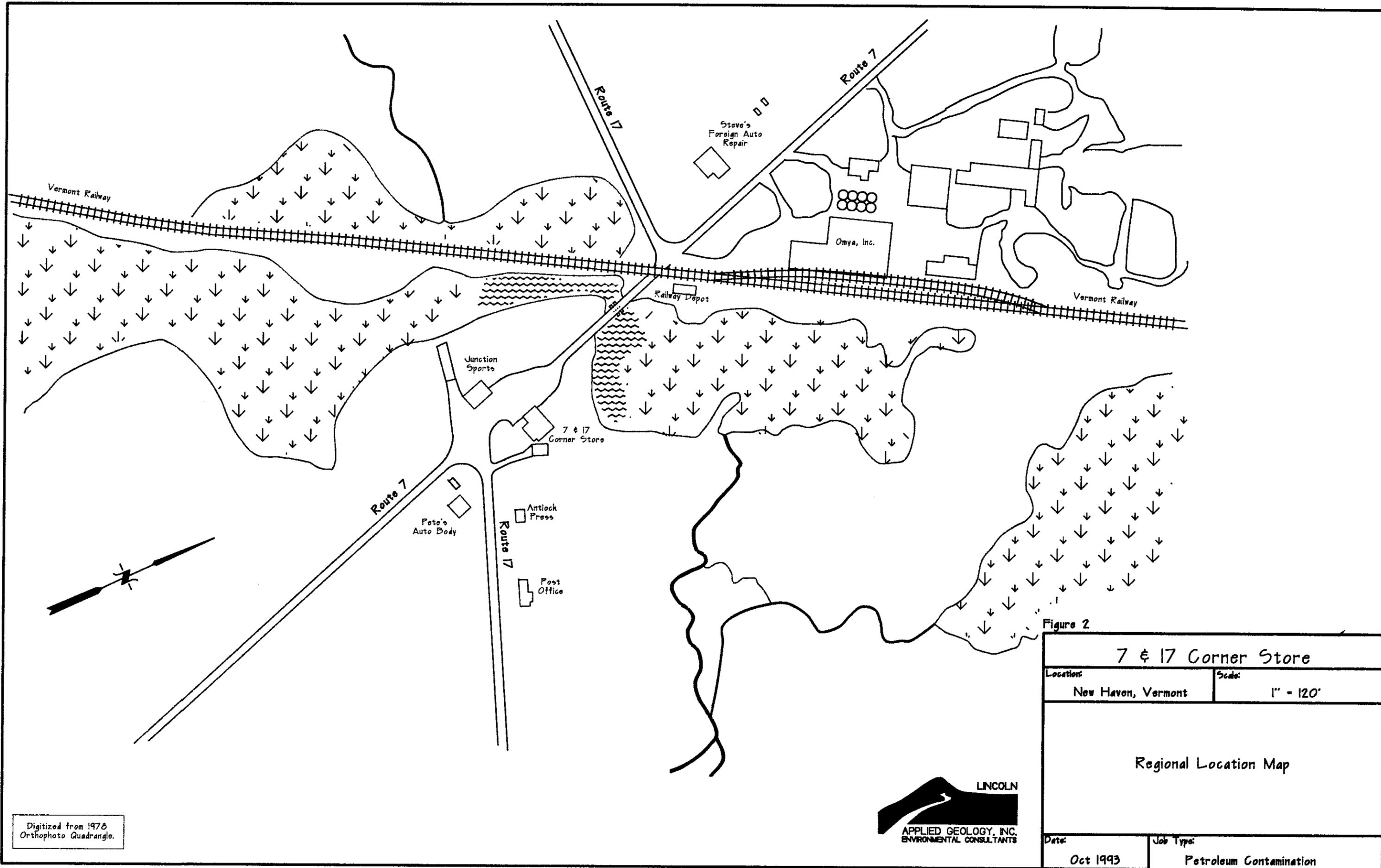
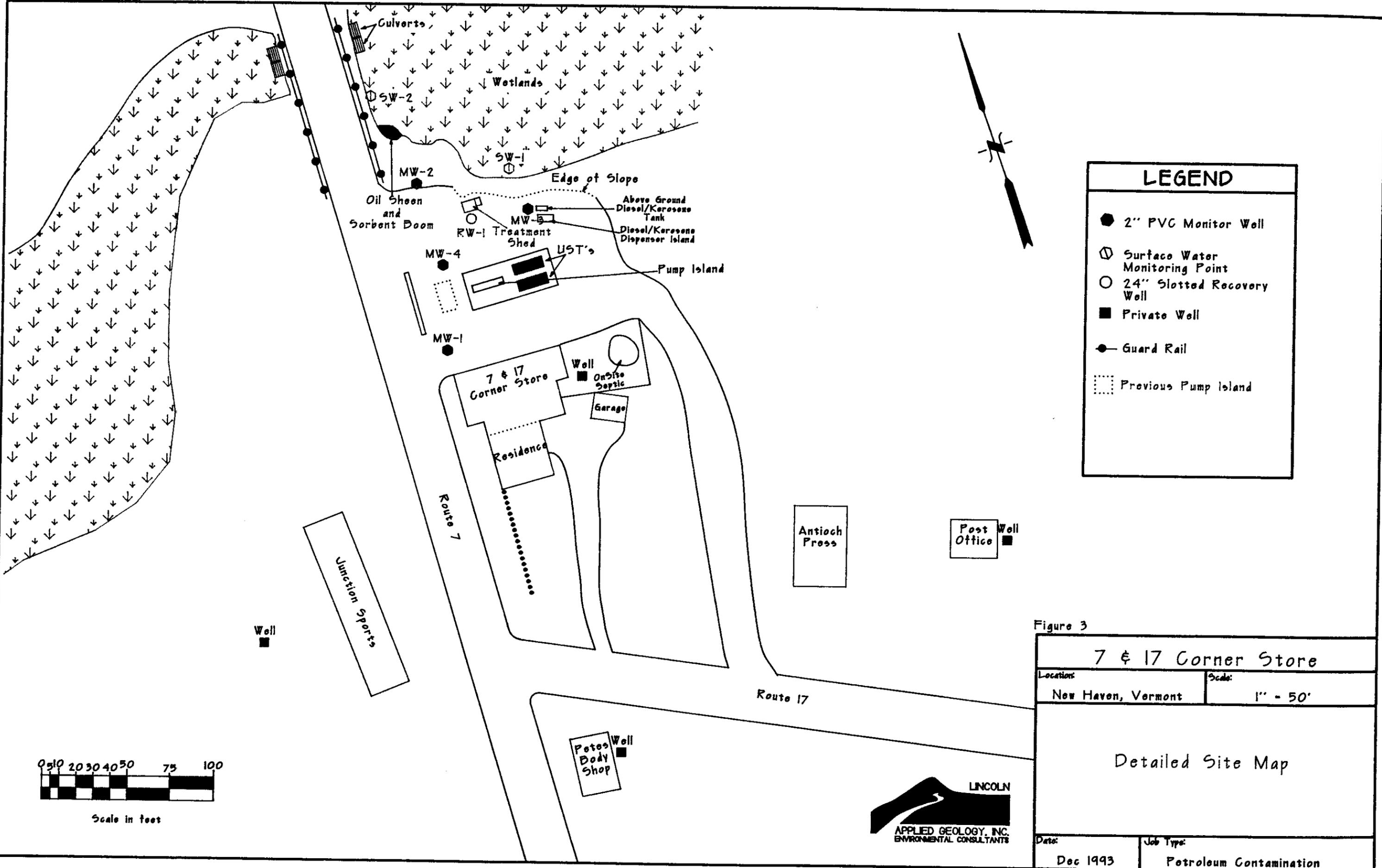


Figure 2

7 & 17 Corner Store	
Location:	Scale:
New Haven, Vermont	1" = 120'
Regional Location Map	
Date:	Job Type:
Oct 1993	Petroleum Contamination

Digitized from 1978
Orthophoto Quadrangle.





LEGEND

- 2" PVC Monitor Well
- ⊕ Surface Water Monitoring Point
- 24" Slotted Recovery Well
- Private Well
- Guard Rail
- ⋯ Previous Pump Island

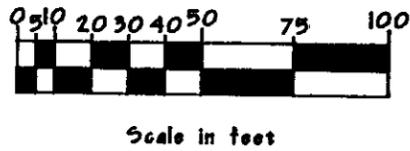


Figure 3

7 & 17 Corner Store

Location:	Scale:
New Haven, Vermont	1" - 50'

Detailed Site Map

Date:	Job Type:
Dec 1993	Petroleum Contamination



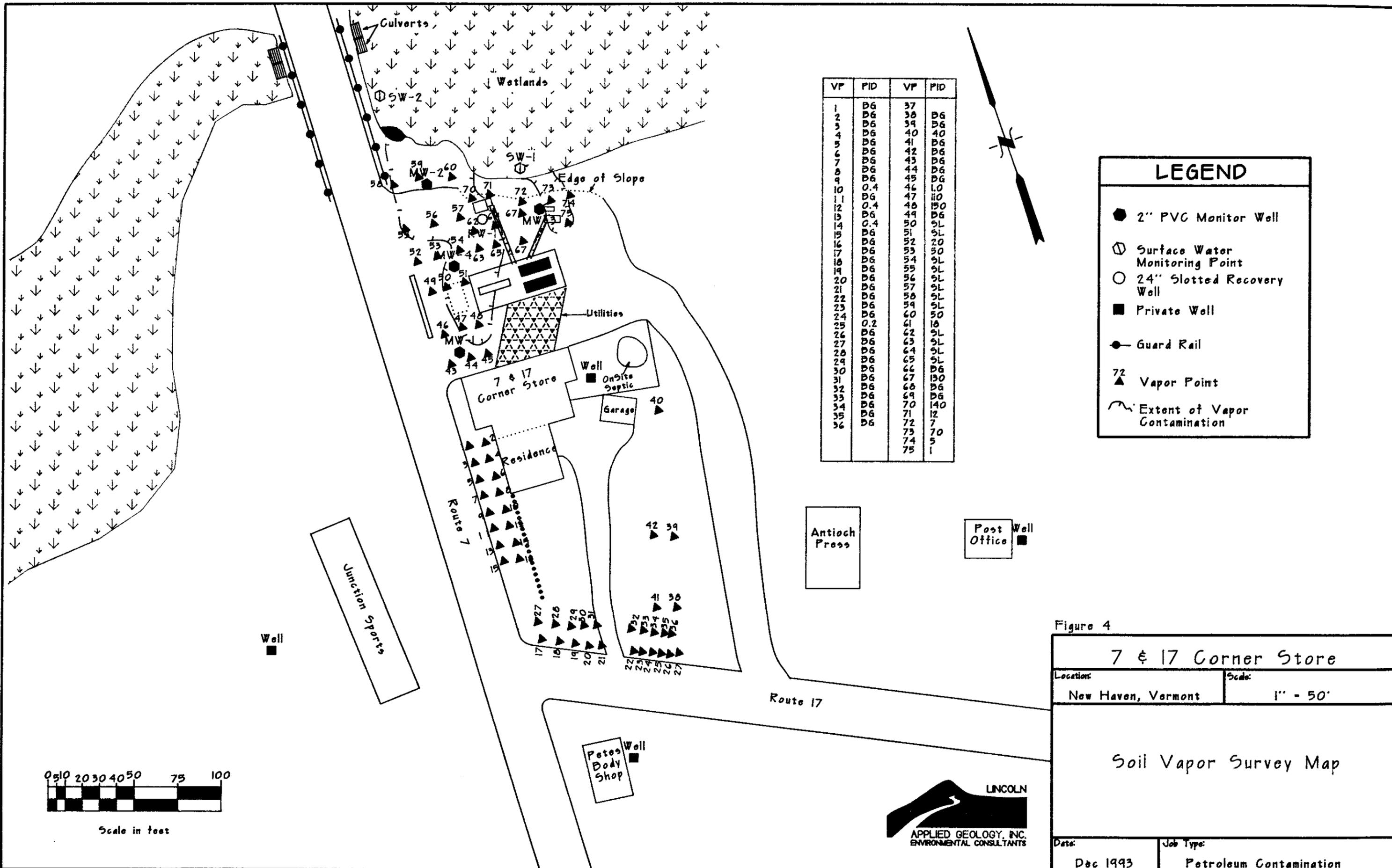
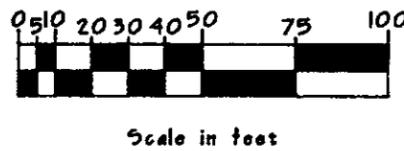
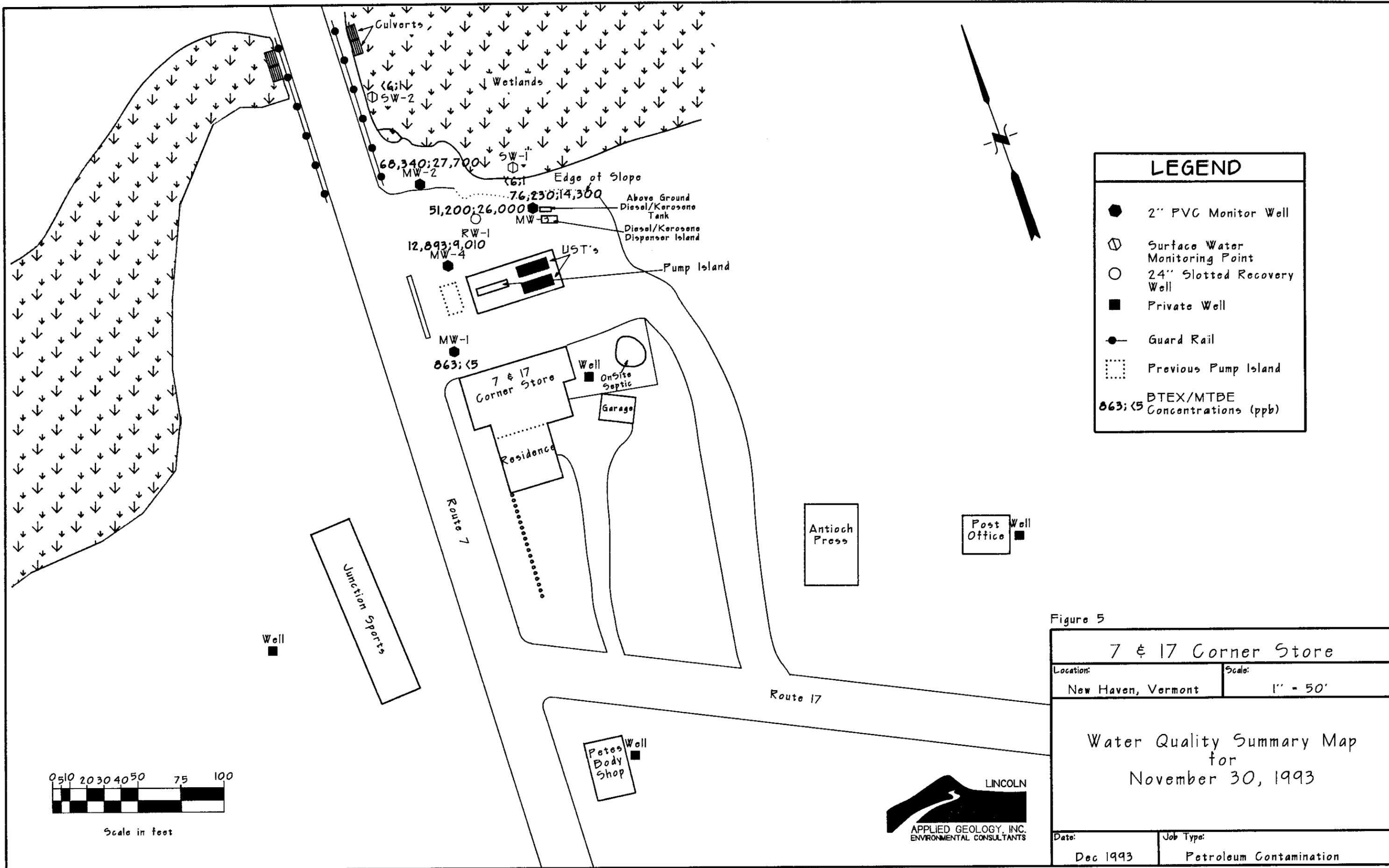


Figure 4

7 & 17 Corner Store	
Location:	Scale:
New Haven, Vermont	1" = 50'
Soil Vapor Survey Map	
Date:	Job Type:
Dec 1993	Petroleum Contamination

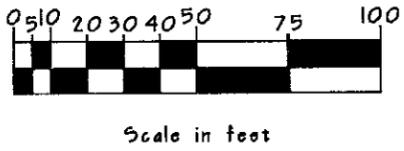


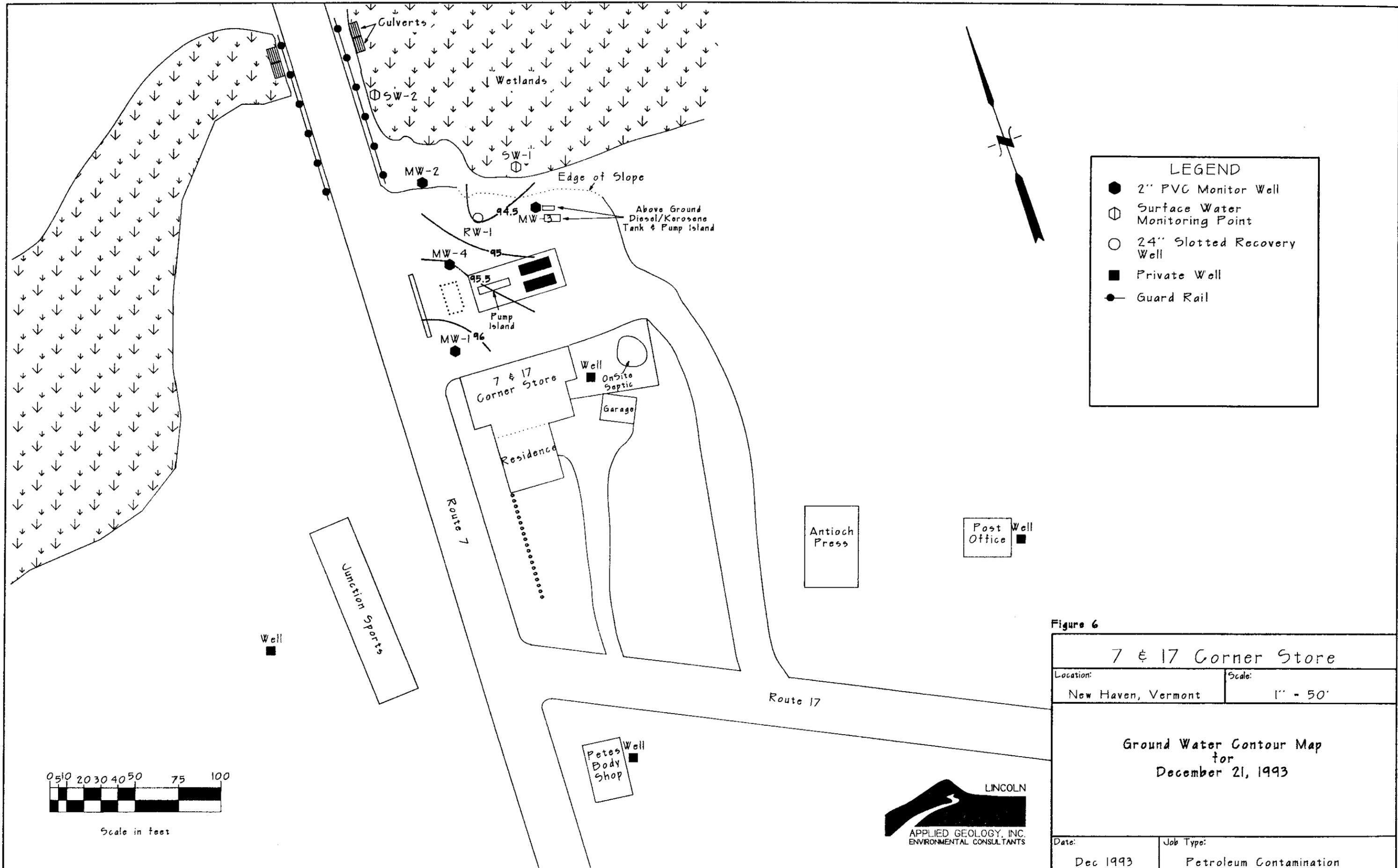


LEGEND	
●	2" PVC Monitor Well
⊕	Surface Water Monitoring Point
○	24" Slotted Recovery Well
■	Private Well
—●—	Guard Rail
⋮	Previous Pump Island
863; <5	BTEX/MTBE Concentrations (ppb)

Figure 5

7 & 17 Corner Store	
Location:	Scale:
New Haven, Vermont	1" = 50'
Water Quality Summary Map for November 30, 1993	
Date:	Job Type:
Dec 1993	Petroleum Contamination



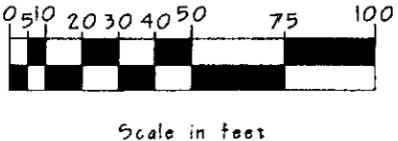
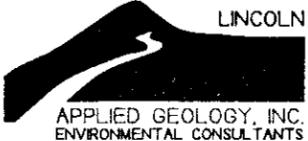


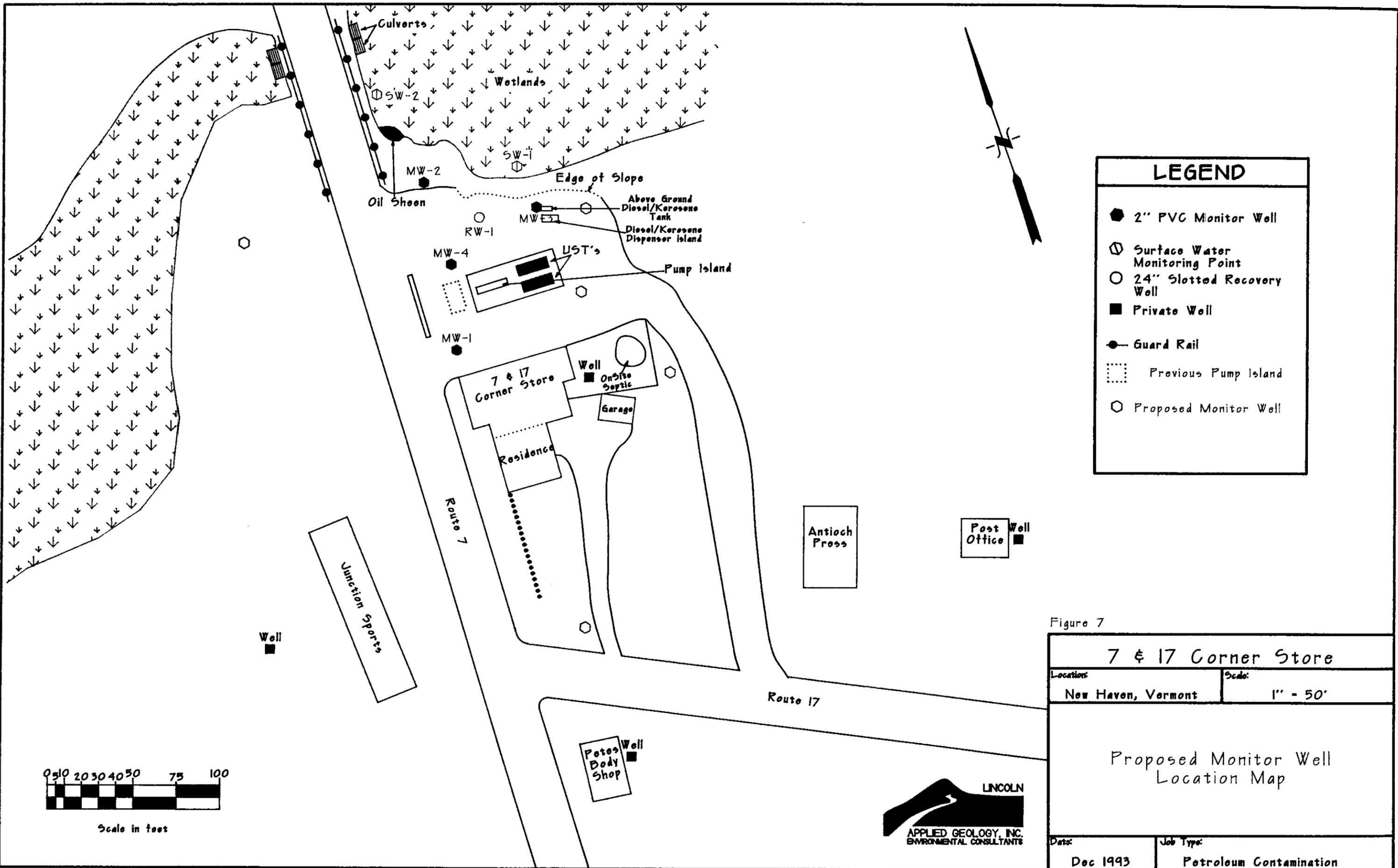
LEGEND

- 2" PVC Monitor Well
- ⊕ Surface Water Monitoring Point
- 24" Slotted Recovery Well
- Private Well
- Guard Rail

Figure 6

7 & 17 Corner Store	
Location: New Haven, Vermont	Scale: 1" = 50'
Ground Water Contour Map for December 21, 1993	
Date: Dec 1993	Job Type: Petroleum Contamination





APPENDIX A

HASP

SITE HEALTH AND SAFETY PLAN

Site Name: 7 & 17 Corner Store

Date: October 18, 1993

Site Address: Junction Route 7 and 17, New Haven, VT.

Site Manager: R.S. Vandenberg

Client Contact: Jim Devlin

Site and Project Description:

The 7 and 17 Corner Store has been identified as the source of subsurface petroleum contamination. An unknown quantity of gasoline has been released into the subsurface. Remedial activities, soil gas survey, monitor well installations will be necessary to define the extent and magnitude of the problem. Monitor wells will be installed, monitored, and sampled on a routine basis. The remedial system will also be monitored.

Site Health and Safety Information:

Gasoline does contain known and suspected carcinogens including benzene, toluene, xylenes and naphthalene. Detailed MSDS and chemical description are available at LAG.

Site Personnel Protection Requirements:

Activity	Level of Protection	Special Equipment Requirements
Remedial system monitoring, ground water monitor installation, Soil Vapor Study, Sample Collection and Monitoring the installation of remediation systems.	D	Work Clothes, steel toe shank boots; surgical gloves, hard hat

Monitoring:

During monitor installation and installation of remedial system monitor every 15 minutes with HNU PID in area of soil boring. Also, PID measurement will be ample as soon as the remedial shed door is opened.

Contingency:

PID 10 - 20 ppm - monitor continuously
PID 20 - 100 - upgrade to level C
PID >100 - shut down activities and evacuate

Decontamination:

Personnel protective equipment shall be rinsed and washed with a Liquinox Soap solution, hands and face shall be washed in the same manner.

IMPORTANT PHONE NUMBERS

Fire Department 453-3340
Ambulance 453-2401
Local Hospital 388-7901
State Police 388-4914
Safety Director - Steven Revell - Lincoln Applied Geology - 453-4384

Project Manager - Rick Vandenberg - Lincoln Applied Geology, Inc. - 453-4384 (office)
453-4764 (home)

Client Contact - Jim Devlin - 453-3788

Directions to Hospital - South on Route 7 to Route 30. Follow blue hospital signs to hospital.

Site Personnel:

Michael Sealley
Sean Hogeworth State

James Robideau

Bob Hines

Bob Hines

James Holman

Rick Vandenberg

Other Comments:

Steven Revell

Site Manager

Site Safety Officer

This site ___ does x does not require a detailed site safety plan.

APPENDIX B

Geologic Logs

GEOLOGIC LOG

WELL: MW-1
LOCATION: 7 and 17 Corner Store, New Haven, VT
DRILLER: Tri-State Drilling & Boring, Inc.
GEOLOGIST: Rick Vandenberg
DATE: November 23, 1993

Soils Description

BG = Background

<u>Depth</u>	<u>Description</u>	<u>HNU (ppm)</u>
0-2'	Pea gravel, grey.	BG
2'-3.5'	Sand, fine to medium, brown; some silt.	BG
3.5'-4.0'	Sand, very fine, olive; silt; some clay.	6
4'-10'	Silt, light green; clay; trace, fine sand; (soft sediment deformation).	25 30 30
10'-18'	Silt, light green and fine sand; moist	20 10 17 15

Well Construction

Bottom of Boring: 18'
Well Screen: 6'-16' (20 slot)
Solid riser: 0-6'
Sand Pack: 4'-16'
Bentonite Seal: 2'-4'
Backfill: 0-2'
Wellbox: Flush grade bolt down

GEOLOGIC WELL

WELL: MW-2
LOCATION: 7 and 17 Corner Store, New Haven, VT
DRILLER: Tri-State Drilling and Boring, Inc.
GEOLOGIST: Rick Vandenberg
DATE: November 23, 1993

Soils Description

BG = Background

<u>Depth</u>	<u>Description</u>	<u>HNU (ppm)</u>
0-2	Pea gravel, grey.	SL
2'-4'	Sand, fine to coarse, tan; some cobble.	SL
4'-8'	Sand, fine, blade; some silt; some cobble (ground water encountered at 4').	SL
8'-12'	Silt, blade stained; some very fine sand; some clay.	200

Well Construction

Bottom of Boring: 12'
Well Screen: 2'-12'
Solid Riser: 0-12'
Sand Pack: 0.5'-12'
Bentonite Seal: 0'-0.5'
Backfill: None
Wellbox: Flush grade bolt down

GEOLOGIC LOG

WELL: MW-3
LOCATION: 7 & 17 Corner Store, New Haven, VT
DRILLER: Tri-State Drilling & Boring, Inc.
GEOLOGIST: Rick Vandenberg
DATE: September 9, 1993

Soils Description

BG = Background
PPM = parts per million

<u>Depth</u>	<u>Description</u>	<u>HNU (ppm)</u>
0-4'	Silt, fine to medium, brown; trace cobble; (ground water encountered at 4').	10
4'-8'	Cobble; sand, medium to coarse, brown; trace gravel, fine; trace silt.	SL
8'-12'	Silt, brown to light green; and clay.	20

Well Construction

Bottom of Boring: 13'
Well Screen: 3'-13'
Solid Riser: 0-13'
Sand Pack: 2'-13'
Bentonite Seal: 1'-2'
Backfill: None
Wellbox: Flush grade bolt down

GEOLOGIC LOG

WELL: MW-4
LOCATION: 7 & 17 Corner Store, New Haven
DRILLER: Tri-State Drilling & Boring, Inc.
GEOLOGIST: Rick Vandenberg
DATE: November 23, 1993

Soils Description

BG = Background

<u>Depth</u>	<u>Description</u>	<u>HNU (ppm)</u>
0-2'	Pea gravel, grey.	SL
2'-4'	Silt brown; some sand, medium to coarse; trace cobble; trace clay.	SL
4'-12'	Silt, light green; some medium sand lenses; (mottled silt, brown and green).	SL 20
12'-17'	Clay, grey	10

Well Construction

Bottom of Boring: 15'
Well Screen: 5'- 15'
Solid Riser: 0 - 5'
Sand Pack: 4'- 5'
Bentonite Seal: 3'- 4'
Backfill: 0 - 3'
Finish: Flush grade bolt down

APPENDIX C

Ground Water Chemistry Results
November 9 and 30, 1993



LABORATORY ANALYSIS

CLIENT NAME:	Lincoln Applied Geology	REF #:	7726
ADDRESS:	RD #1 Box 710 Bristol, VT 05443	PROJECT NO.:	not given
SAMPLE LOCATION:	7 & 17 Corner Store	DATE OF SAMPLE:	11/9/93
SAMPLER:	Rick Vandenberg & Jim Holman	DATE OF RECEIPT:	11/10/93
		DATE OF ANALYSIS:	11/19, 11/20/93
ATTENTION:	John Amadon	DATE OF REPORT:	11/27/93

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

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

Reviewed by:

Brendan McMahon, Ph.D.
Director, Chemical Services



LABORATORY REPORT

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

CLIENT NAME:	Lincoln Applied Geology	PROJECT CODE:	not given
PROJECT NAME:	7 & 17 Corner Store	REF.#:	7,726
REPORT DATE:	November 27, 1993	STATION:	Wetland by Boom
DATE SAMPLED:	November 9, 1993	TIME SAMPLED:	11:10
DATE RECEIVED:	November 9, 1993	SAMPLER:	R.V. & J.H.
ANALYSIS DATE:	November 20, 1993	SAMPLE TYPE:	Water

PARAMETER	PQL ($\mu\text{g/L}$)	Concentration ($\mu\text{g/L}$)
Benzene	1	BPQL
Toluene	1	1
Ethylbenzene	1	BPQL
Xylenes	3	8
MTBE	1	3

Surrogate % Recovery: 100%

BPQL = Below Practical Quantitation Limit (PQL).



LABORATORY REPORT

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

CLIENT NAME:	Lincoln Applied Geology	PROJECT CODE:	not given
PROJECT NAME:	7 & 17 Corner Store	REF.#:	7,726
REPORT DATE:	November 27, 1993	STATION:	Wetland by SW-1(70')
DATE SAMPLED:	November 9, 1993	TIME SAMPLED:	11:15
DATE RECEIVED:	November 9, 1993	SAMPLER:	R. V. & J.H.
ANALYSIS DATE:	November 19, 1993	SAMPLE TYPE:	Water

PARAMETER	PQL (µg/L)	Concentration (µg/L)
Benzene	1	BPQL
Toluene	1	BPQL
Ethylbenzene	1	BPQL
Xylenes	3	BPQL
MTBE	1	52

Surrogate % Recovery: 100%

BPQL = Below Practical Quantitation Limit (PQL).



LABORATORY REPORT

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

CLIENT NAME:	Lincoln Applied Geology	PROJECT CODE:	not given
PROJECT NAME:	7 & 17 Corner Store	REF.#:	7,726
REPORT DATE:	November 27, 1993	STATION:	7 & 17 Basement
DATE SAMPLED:	November 9, 1993	TIME SAMPLED:	10:02
DATE RECEIVED:	November 9, 1993	SAMPLER:	R.V. & J.H.
ANALYSIS DATE:	November 19, 1993	SAMPLE TYPE:	Water

PARAMETER	PQL ($\mu\text{g/L}$)	Concentration ($\mu\text{g/L}$)
Benzene	1	95
Toluene	1	80
Ethylbenzene	1	56
Xylenes	3	145
MTBE	1	2

Surrogate % Recovery: 100%

BPQL = Below Practical Quantitation Limit (PQL).



LABORATORY REPORT

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

CLIENT NAME:	Lincoln Applied Geology	PROJECT CODE:	not given
PROJECT NAME:	7 & 17 Corner Store	REF.#:	7,726
REPORT DATE:	November 27, 1993	STATION:	Post Office Well
DATE SAMPLED:	November 9, 1993	TIME SAMPLED:	10:52
DATE RECEIVED:	November 9, 1993	SAMPLER:	R.V. & J.H.
ANALYSIS DATE:	November 19, 1993	SAMPLE TYPE:	Water

PARAMETER	PQL ($\mu\text{g/L}$)	Concentration ($\mu\text{g/L}$)
Benzene	1	BPQL
Toluene	1	2
Ethylbenzene	1	BPQL
Xylenes	3	BPQL
MTBE	1	BPQL

Surrogate % Recovery: 100%

BPQL = Below Practical Quantitation Limit (PQL).



LABORATORY REPORT

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

CLIENT NAME:	Lincoln Applied Geology	PROJECT CODE:	not given
PROJECT NAME:	7 & 17 Corner Store	REF.#:	7,726
REPORT DATE:	November 27, 1993	STATION:	Junction Sports Well
DATE SAMPLED:	November 9, 1993	TIME SAMPLED:	14:45
DATE RECEIVED:	November 9, 1993	SAMPLER:	R.V. & J.H.
ANALYSIS DATE:	November 19, 1993	SAMPLE TYPE:	Water

PARAMETER	PQL ($\mu\text{g/L}$)	Concentration ($\mu\text{g/L}$)
Benzene	1	BPQL
Toluene	1	BPQL
Ethylbenzene	1	BPQL
Xylenes	3	BPQL
MTBE	1	1

Surrogate % Recovery: 100%

BPQL = Below Practical Quantitation Limit (PQL).

LINCOLN APPLIED



LABORATORY REPORT

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

CLIENT NAME:	Lincoln Applied Geology	PROJECT CODE:	not given
PROJECT NAME:	7 & 17 Corner Store	REF.#:	7,726
REPORT DATE:	November 27, 1993	STATION:	Antioch Press Tap
DATE SAMPLED:	November 9, 1993	TIME SAMPLED:	10:42
DATE RECEIVED:	November 9, 1993	SAMPLER:	R. V. & J.H.
ANALYSIS DATE:	November 19, 1993	SAMPLE TYPE:	Water

PARAMETER	PQL ($\mu\text{g/L}$)	Concentration ($\mu\text{g/L}$)
Benzene	1	BPQL
Toluene	1	BPQL
Ethylbenzene	1	BPQL
Xylenes	3	BPQL
MTBE	1	BPQL

Surrogate % Recovery: 100%

BPQL = Below Practical Quantitation Limit (PQL).



LABORATORY REPORT

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

CLIENT NAME:	Lincoln Applied Geology	PROJECT CODE:	not given
PROJECT NAME:	7 & 17 Corner Store	REF.#:	7,726
REPORT DATE:	November 27, 1993	STATION:	Shallow Well Tap (70')
DATE SAMPLED:	November 9, 1993	TIME SAMPLED:	10:00
DATE RECEIVED:	November 9, 1993	SAMPLER:	R.V. & J.H.
ANALYSIS DATE:	November 19, 1993	SAMPLE TYPE:	Water

PARAMETER	PQL ($\mu\text{g/L}$)	Concentration ($\mu\text{g/L}$)
Benzene	1	BPQL
Toluene	1	BPQL
Ethylbenzene	1	BPQL
Xylenes	3	BPQL
MTBE	1	BPQL

Surrogate % Recovery: 100%

BPQL = Below Practical Quantitation Limit (PQL).



LABORATORY REPORT

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

CLIENT NAME:	Lincoln Applied Geology	PROJECT CODE:	not given
PROJECT NAME:	7 & 17 Corner Store	REF.#:	7,726
REPORT DATE:	November 27, 1993	STATION:	Pete's Body Shop 200'
DATE SAMPLED:	November 9, 1993	TIME SAMPLED:	10:26
DATE RECEIVED:	November 9, 1993	SAMPLER:	R.V. & J.H.
ANALYSIS DATE:	November 19, 1993	SAMPLE TYPE:	Water

PARAMETER	PQL ($\mu\text{g/L}$)	Concentration ($\mu\text{g/L}$)
Benzene	1	BPQL
Toluene	1	BPQL
Ethylbenzene	1	BPQL
Xylenes	3	BPQL
MTBE	1	BPQL

Surrogate % Recovery: 100%

BPQL = Below Practical Quantitation Limit (PQL).



LABORATORY REPORT

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

CLIENT NAME:	Lincoln Applied Geology	PROJECT CODE:	not given
PROJECT NAME:	7 & 17 Corner Store	REF.#:	7,726
REPORT DATE:	November 27, 1993	STATION:	Trip Blank
DATE SAMPLED:	November 9, 1993	TIME SAMPLED:	08:32
DATE RECEIVED:	November 9, 1993	SAMPLER:	R.V. & J.H.
ANALYSIS DATE:	November 19, 1993	SAMPLE TYPE:	Water

PARAMETER	PQL ($\mu\text{g/L}$)	Concentration ($\mu\text{g/L}$)
Benzene	1	BPQL
Toluene	1	BPQL
Ethylbenzene	1	BPQL
Xylenes	3	BPQL
MTBE	1	BPQL

Surrogate % Recovery: 100%

BPQL = Below Practical Quantitation Limit (PQL).



MicroAssays of Vermont

RR#3 Box 5210 P.O. Box 189
 Montpelier, VT 05602
 Ph. (802)223-1468 Fax (802)223-8688

ANALYSIS REQUESTED

Page _____
 of _____
 MAV # _____

CLIENT NAME *LINCOLN Applied Geology, Inc.*
 ADDRESS *RD#1 Box 710, BRISTOL, VT 05443*
 PROJECT NAME *7 and 17 Corner store*
 PROJECT NUMBER *980144*
 PROJECT MANAGER *JOHN AMADON*
 SAMPLER *Rick Vandenberg / Jim Holman*

BTEX and MTBE

6

Sample Location	Date	Time	# of cont.	pres ervd	Sample Type															REMARKS:	
WETLAND BY BOOM	11/9/93	1110	2	Hcl	Water	✓															
WETLAND BY SW-1	11/9/93	1115	2	Hcl	Water	✓															
7 and 17 Shallow well (70')	11/9/93	1000	2	Hcl	Water	✓															
POST OFFICE Well	11/9/93	1052	2	Hcl	Water	✓														H ₂ S ODOR	
JUNCTION SPORTS			2	Hcl	Water	✓															
7 and 17 Basement	4/9/93	1002	2	Hcl	Water	✓															
PETES BODY SHOP 200' well	11/9/93	1026	2	Hcl	Water	✓															
ANTILOCK press TAP	11/9/93	1042	2	Hcl	Water	✓															
BLANK (TRIP)	4/9/93	0832	2	Hcl	Water	✓															
JUNCTION Sports 13' well	11/9/93	1445	2	Hcl	Water	✓															

Relinquished by: <i>Rick Vandenberg</i>	Received by: <i>Jim Holman</i>	Date/Time <i>11/10/93 07:45</i>	Relinquished by:	Received by:	Date/Time
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LABORATORY ANALYSIS

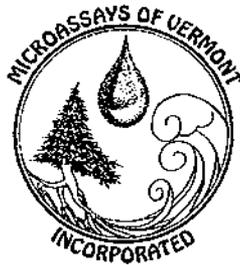
CLIENT NAME:	Lincoln Applied Geology	REF #:	7861
ADDRESS:	RD #1 Box 710 Bristol, VT 05443	PROJECT NO.:	not given
SAMPLE LOCATION:	7 & 17 Corner Store	DATE OF SAMPLE:	11/30/93
SAMPLER:	Jim Holman	DATE OF RECEIPT:	11/30/93
		DATE OF ANALYSIS:	12/2,12/3,12/6/93
ATTENTION:	John Amadon/Rick Vandenberg	DATE OF REPORT:	12/6/93

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

- Samples submitted for VOC's 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 inferred efficiency of analyte recovery for individual samples was monitored by the addition of surrogate analytes to all samples, standards, and blanks. Surrogate recoveries were found to be within laboratory QA/QC acceptance limits, unless noted otherwise.

Reviewed by:

Brendan McMahon, Ph.D.
Director, Chemical Services



LABORATORY REPORT

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

CLIENT NAME:	Lincoln Applied Geology	PROJECT CODE:	not given
PROJECT NAME:	7 & 17 Corner Store	REF.#:	7,861
REPORT DATE:	December 6, 1993	STATION:	MW-1
DATE SAMPLED:	November 30, 1993	TIME SAMPLED:	09:17
DATE RECEIVED:	November 30, 1993	SAMPLER:	Jim Holman
ANALYSIS DATE:	December 3, 1993	SAMPLE TYPE:	Water

PARAMETER	PQL ($\mu\text{g/L}$)	Concentration ($\mu\text{g/L}$)
Benzene	5	272
Toluene	5	60
Ethylbenzene	5	293
Xylenes	15	238
MTBE	5	BPQL

Surrogate % Recovery: 100%

BPQL = Below Practical Quantitation Limit (PQL).



LABORATORY REPORT

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

CLIENT NAME:	Lincoln Applied Geology	PROJECT CODE:	not given
PROJECT NAME:	7 & 17 Corner Store	REF.#:	7,861
REPORT DATE:	December 6, 1993	STATION:	MW-2 4
DATE SAMPLED:	November 30, 1993	TIME SAMPLED:	09:42
DATE RECEIVED:	November 30, 1993	SAMPLER:	Jim Holman
ANALYSIS DATE:	December 6, 1993	SAMPLE TYPE:	Water

PARAMETER	PQL ($\mu\text{g/L}$)	Concentration ($\mu\text{g/L}$)
Benzene	100	2,830
Toluene	100	6,120
Ethylbenzene	100	613
Xylenes	300	3,330
MTBE	100	9,010

Surrogate % Recovery: 100%

BPQL = Below Practical Quantitation Limit (PQL).



LABORATORY REPORT

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

CLIENT NAME:	Lincoln Applied Geology	PROJECT CODE:	not given
PROJECT NAME:	7 & 17 Corner Store	REF.#:	7,861
REPORT DATE:	December 6, 1993	STATION:	MW-3 ²
DATE SAMPLED:	November 30, 1993	TIME SAMPLED:	09:55
DATE RECEIVED:	November 30, 1993	SAMPLER:	Jim Holman
ANALYSIS DATE:	December 3, 1993	SAMPLE TYPE:	Water

PARAMETER	PQL (µg/L)	Concentration (µg/L)
Benzene	500	16,100
Toluene	500	36,000
Ethylbenzene	500	3,240
Xylenes	1,500	13,000
MTBE	500	27,700

Surrogate % Recovery: 99%

BPQL = Below Practical Quantitation Limit (PQL).



LABORATORY REPORT

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

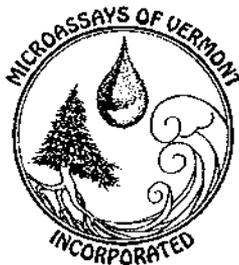
CLIENT NAME:	Lincoln Applied Geology	PROJECT CODE:	not given
PROJECT NAME:	7 & 17 Corner Store	REF.#:	7,861
REPORT DATE:	December 6, 1993	STATION:	MW-A ³
DATE SAMPLED:	November 30, 1993	TIME SAMPLED:	09:30
DATE RECEIVED:	November 30, 1993	SAMPLER:	Jim Holman
ANALYSIS DATE:	December 3, 1993	SAMPLE TYPE:	Water

PARAMETER	PQL (µg/L)	Concentration (µg/L)
Benzene	500	15,700
Toluene	500	35,500
Ethylbenzene	500	2,630
Xylenes	1,500	22,400
MTBE	500	14,300

Surrogate % Recovery: 99%

BPQL = Below Practical Quantitation Limit (PQL).

11-30-93
MICROASSAYS OF VERMONT, INC.



LABORATORY REPORT

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

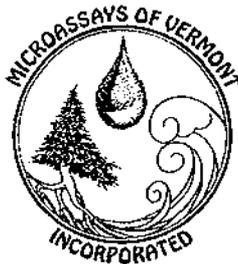
CLIENT NAME:	Lincoln Applied Geology	PROJECT CODE:	not given
PROJECT NAME:	7 & 17 Corner Store	REF.#:	7,861
REPORT DATE:	December 6, 1993	STATION:	RW-1A
DATE SAMPLED:	November 30, 1993	TIME SAMPLED:	09:00
DATE RECEIVED:	November 30, 1993	SAMPLER:	Jim Holman
ANALYSIS DATE:	December 3, 1993	SAMPLE TYPE:	Water

PARAMETER	PQL ($\mu\text{g/L}$)	Concentration ($\mu\text{g/L}$)
Benzene	5	82
Toluene	5	155
Ethylbenzene	5	31
Xylenes	15	56
MTBE	5	18300*

Surrogate % Recovery: 99%

BPQL = Below Practical Quantitation Limit (PQL).

* The MTBE concentration is estimated from an average response factor.



LABORATORY REPORT

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

CLIENT NAME:	Lincoln Applied Geology	PROJECT CODE:	not given
PROJECT NAME:	7 & 17 Corner Store	REF.#:	7,861
REPORT DATE:	December 6, 1993	STATION:	RW-1 Influent
DATE SAMPLED:	November 30, 1993	TIME SAMPLED:	09:00
DATE RECEIVED:	November 30, 1993	SAMPLER:	Jim Holman
ANALYSIS DATE:	December 3, 1993	SAMPLE TYPE:	Water

PARAMETER	PQL ($\mu\text{g/L}$)	Concentration ($\mu\text{g/L}$)
Benzene	500	8,900
Toluene	500	24,100
Ethylbenzene	500	3,000
Xylenes	1,500	15,200
MTBE	500	26,000

Surrogate % Recovery: 99%

BPQL = Below Practical Quantitation Limit (PQL).



LABORATORY REPORT

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

CLIENT NAME:	Lincoln Applied Geology	PROJECT CODE:	not given
PROJECT NAME:	7 & 17 Corner Store	REF.#:	7,861
REPORT DATE:	December 6, 1993	STATION:	RW-1 Effluent
DATE SAMPLED:	November 30, 1993	TIME SAMPLED:	09:00
DATE RECEIVED:	November 30, 1993	SAMPLER:	Jim Holman
ANALYSIS DATE:	December 2, 1993	SAMPLE TYPE:	Water

PARAMETER	PQL ($\mu\text{g/L}$)	Concentration ($\mu\text{g/L}$)
Benzene	1	1
Toluene	1	9
Ethylbenzene	1	10
Xylenes	3	6
MTBE	1	1760*

Surrogate % Recovery: 100%

BPQL = Below Practical Quantitation Limit (PQL).

* The MTBE concentration is estimated from an average response factor.



LABORATORY REPORT

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

CLIENT NAME:	Lincoln Applied Geology	PROJECT CODE:	not given
PROJECT NAME:	7 & 17 Corner Store	REF.#:	7,861
REPORT DATE:	December 6, 1993	STATION:	SW-1
DATE SAMPLED:	November 30, 1993	TIME SAMPLED:	09:07
DATE RECEIVED:	November 30, 1993	SAMPLER:	Jim Holman
ANALYSIS DATE:	December 2, 1993	SAMPLE TYPE:	Water

PARAMETER	PQL ($\mu\text{g/L}$)	Concentration ($\mu\text{g/L}$)
Benzene	1	BPQL
Toluene	1	BPQL
Ethylbenzene	1	BPQL
Xylenes	3	BPQL
MTBE	1	1

Surrogate % Recovery: 99%

BPQL = Below Practical Quantitation Limit (PQL).



LABORATORY REPORT

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

CLIENT NAME:	Lincoln Applied Geology	PROJECT CODE:	not given
PROJECT NAME:	7 & 17 Corner Store	REF.#:	7,861
REPORT DATE:	December 6, 1993	STATION:	SW-2
DATE SAMPLED:	November 30, 1993	TIME SAMPLED:	09:09
DATE RECEIVED:	November 30, 1993	SAMPLER:	Jim Holman
ANALYSIS DATE:	December 3, 1993	SAMPLE TYPE:	Water

PARAMETER	PQL ($\mu\text{g/L}$)	Concentration ($\mu\text{g/L}$)
Benzene	1	BPQL
Toluene	1	1*
Ethylbenzene	1	BPQL
Xylenes	3	BPQL
MTBE	1	1*

Surrogate % Recovery: 100%

BPQL = Below Practical Quantitation Limit (PQL).

* A replicate analysis was performed with the same results.



LABORATORY REPORT

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

CLIENT NAME:	Lincoln Applied Geology	PROJECT CODE:	not given
PROJECT NAME:	7 & 17 Corner Store	REF.#:	7,861
REPORT DATE:	December 6, 1993	STATION:	Trip Blank
DATE SAMPLED:	November 30, 1993	TIME SAMPLED:	07:15
DATE RECEIVED:	November 30, 1993	SAMPLER:	Jim Holman
ANALYSIS DATE:	December 2, 1993	SAMPLE TYPE:	Water

PARAMETER	PQL ($\mu\text{g/L}$)	Concentration ($\mu\text{g/L}$)
Benzene	1	BPQL
Toluene	1	BPQL
Ethylbenzene	1	BPQL
Xylenes	3	BPQL
MTBE	1	BPQL

Surrogate % Recovery: 99%

BPQL = Below Practical Quantitation Limit (PQL).

APPENDIX D

Cost Estimate