

Site Investigation Report
Rutland City Petroleum Vapors
SMS Site #94-1628
Rutland City, Vermont 05701

Prepared for:

Department of Environmental Conservation

under:

HMMD Site Investigation Contract # 0963399

by:

Lincoln Applied Geology, Inc.
RD #1 Box 710
Bristol, Vermont 05443
(802) 453-4384
Contact: Mr. Alan Moore

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Lincoln Applied Geology, Inc.
Environmental Consultants

RD # 1 Box 710 • Bristol, Vermont 05443 • (802) 453-4384 • FAX (802) 453-5399

1.0 EXECUTIVE SUMMARY

In response to reports of petroleum vapors in the Albank (former Marble Bank) building and in the Ellis home at 28 Elm St. in Rutland, on January 26, 1996 the Vermont Department of Environmental Conservation (VDEC) requested that Lincoln Applied Geology, Inc. (LAG) perform a site investigation and undertake appropriate corrective actions.

At both locations, air was monitored and air quality samples were collected for laboratory analysis. Granular activated carbon (GAC) vapor phase canisters and blowers were immediately installed to purify the air in both buildings.

The Albank building and the surrounding buildings and sewers were investigated and monitored in an attempt to locate the source of the fuel oil vapors. No specific sources were found. LAG believes that the vapors are generated when residual petroleum in the soils of downtown Rutland become "liberated" during times of high precipitation and the resulting high ground water levels. These vapors then migrate into buildings via the combined sewer system. Benzene levels in the Albank building were probably not greater than the Vermont Department of Health (VDOH) 2 parts per billion (ppb) limit. After five days, fuel oil vapors in the Albank subsided and the air purifiers were removed. These vapors may occur again if all drains are not properly sealed or functioning properly.

Soil, soil gas, sewer, and ground water investigations were also performed to determine the source of the fuel oil and sewer vapors in the Ellis basement. It appears that the vapors enter the house through the stone foundation wall after exfiltrating from leaky sewers. There is a 12 year old abandoned fuel oil tank on the property and evidence of petroleum has been seen in the nearby combined sewers. Based on the collected data and the timing of the occurrence of the vapors, the most likely source is the heating fuel oil that had been recently released in the dirt basement of the adjacent property at 45-47 Grant Street which is now for sale.

Benzene levels in the Ellis residence were slightly greater than the VDOH 2 ppb limit. However, cigarette smoke rather than the fuel oil vapors were probably the cause. After about two months, fuel oil vapors subsided according to Ms. Ellis and use of the air purifiers was discontinued. Sewage odors persist during heavy rains and it has been reported that sewage has flowed into the Ellis basement in the past.

Among other actions, LAG recommends that the cut stone foundation in the Ellis basement be sealed, that the leaky sewers be repaired, that the remainder of the fuel oil contaminated soils in the basement be removed and a concrete floor be poured over the entire basement area.



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- Figure 1,** Site Location Map;
Figure 2, Detailed Site Map - Ellis and Bell properties;
Figure 3, Ground Water Contours - February 21, 1996;



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RD #1 Box 710 • Bristol, Vermont 05443 • (802) 453-4384 • FAX (802) 453-5399

Section 2.0 describes the sites in Rutland investigated as part of this project and briefly describes the activities carried out. The subsequent sections present and evaluate the results of the inspections, site monitoring, soil borings and well installation, indoor air quality analysis, and ground water quality analysis. The report finishes with conclusions and appropriate recommendations.

2.0 PROJECT BACKGROUND AND SITE HISTORY

2.1 Albank

On Friday, January 26, 1996, Lincoln Applied Geology, Inc. was asked by the Hazardous Materials Management Division (HMMD) of the VDEC to respond to reports of fuel oil vapors in the basement first floor lobby and offices of the Albank bank building in downtown Rutland. Until a recent acquisition, this had been a Marble Bank office. The building is constructed of stone and brick and is on the corner of Merchants Row and West Street. Its location is shown on the area location map **Figure 1**. Surrounding properties are commercial or retail in nature and are either paved or occupied by buildings. The sanitary and storm sewers in the area are combined and convey wastewater westerly to the city's treatment plant.

Air quality samples were collected for laboratory analysis of the contaminants in the air and GAC vapor phase canisters and blowers were immediately installed to purify the air in the building. The Albank building and the surrounding buildings and sewers were investigated and monitored in an attempt to locate the source of the fuel oil vapors. After five days, fuel oil vapors subsided and the air purifiers were removed. Details about the findings are presented and evaluated in section 4.1.1.

2.2 Ellis Property

During the site survey of the utility conduits in the area of the Albank with Mr. Ira Earl, Emergency Manager for the City of Rutland, he was informed that petroleum vapors indoors were also reported by Ms. Linda Ellis, owner and occupant of 28 Elm Street. This two family wood frame home is located 1,200 feet northwest and upgradient of the Albank property. The Ellis property location is shown on the **Figure 1** General Location Map. Surrounding properties include residential homes with lawns. The sanitary and storm sewers are combined and convey wastewater and runoff downhill in a southerly and westerly direction. A detailed site map with approximate property boundaries is included as **Figure 2**. The Ellis residence and the surrounding buildings and sewers were investigated and monitored in an attempt to locate the source of the vapors. GAC vapor phase canisters and blowers were installed within the



of the nine monitoring wells. Utilizing the February 21, 1996 ground water level data a ground water contour map has been prepared and shown as **Figure 3**. This map confirms the general expected downhill ground water flow direction south-southwesterly toward downtown Rutland. Utilizing data from other days, such as April 8, 1996, results in an almost identical ground water contour situation.

4.0 INVESTIGATION RESULTS AND ASSESSMENT

4.1 Sewer and Building Inspections, Emergency Remedial Actions

4.1.1 Albank

Petroleum vapors were first reported on the first floor and basement on Wednesday, January 24, 1996 during and after a significant rainstorm and snowmelt had occurred. Odor strength had diminished but was still detectable during LAG's first site visit on January 26. Background [<0.2 parts per million (ppm)] levels were present in the bank lobby and 0.4 ppm was measured in the rear offices and basement. Mr. Lewis Watson, Senior Operations Officer of Albank (775-0025) and Mr. Ray McCarthy, Facilities Manager were contacted to facilitate LAG's on-site work.

In order to detect and try to determine the source of the fuel oil contamination, indoor air quality was monitored in real-time with a HNU photoionization detector (PID) with 10.2 eV lamp that is sensitive to the volatile organic vapors found in petroleum products. It appeared that the source of the vapors in the Albank building was a floor drain in the basement stairwell. To better quantify and specify the air contaminants, air samples were filtered through activated carbon adsorption tubes for laboratory analysis. The results of this monitoring are presented in the field notes of **Appendix A**, in **Table 2** and section 4.2.

To attempt to determine the source of petroleum in the floor drains, LAG performed a walking inspection of several surrounding city blocks in the vicinity of the Albank building with Ira Earl, Rutland City Emergency Manager. During this inspection, sewer manholes were surveyed for volatile organic vapors with the PID, and occupants of buildings were asked if they had recently detected any petroleum odors. The detailed results of this inspection are described in **Appendix A** and the PID values are shown on **Plate 1**, a copy of the Rutland sewer system map given to us by Alan Shelby from the City of Rutland Engineering Department. Measured PID in manholes or drains ranged as high as 90 ppm but were typically background (BG) to a few ppm. The field observations did not identify any specific release of petroleum products or potential source location.



volatile organics in the indoor air. On February 5, a "tent" of plastic sheathing was built around the area of the foundation emitting the fuel oil vapors. The air in this "tent" was drawn into a fourth air purifier before being released into the basement area. The GAC in all the units were changed as necessary to insure continued contaminant removal and clean effluent air. A review of **Table 2** shows how the indoor air concentrations decreased as a result of GAC purification and time. By February 20, all PID measurements in the Ellis residence were BG. The Ellis' still reported fuel oil odors after this date, but LAG technicians could not detect any odors. No further complaints of fuel oil vapors were reported by the Ellis' since the end of February. However, sewage odors have been periodically detected since then by the Ellis' and LAG technicians.

PID levels of 13 - 26 ppm were measured in the sanitary sewer manholes at the corner of Grant Ave. and Elm St. 125 feet south of the Ellis residence on January 26, 1996. These levels gradually decreased with time as shown in **Table 2**.

A discontinuous layer of floating liquid was seen in the catch basin about 350 feet north of the Ellis residence on January 26, but it was gone on January 29 and was not seen again.

On January 31, LAG personnel and Peter Kelley of the City of Rutland Engineering Department, monitored other sewer manholes in the area with the PID and olfactory means. This was done in order to possibly determine if the fuel oil had come via the sewers from a particular direction. A few manholes upgradient from the Bell house on Grant Ave. gave detectable readings on the PID but none had any fuel oil odors. However, the 2 or 3 manholes downgradient from the Bell house on Church Street, also had detectable PID levels and noticeable fuel oil odors. These PID values and more details of the observations from January 26 to February 5, 1996 are presented in the field notes of **Appendix A** and on the sewer map of **Plate 1**.

At this point in time, all data suggested the following contaminant scenario: fuel oil entered the combined sewers somewhere and during high precipitation this oily sewage leaked out of the sewers in front of the Ellis residence and flowed along the permeable backfill of the water and sewer lines to the Ellis foundation.

4.1.3 Bell Property (45-47 Grant St.)

Based on the proximity of the Bell property to the Ellis residence, the fact that it was unoccupied, and the fuel oil fill pipes seen on the east side of the Bell house, LAG contacted the owners/managers of this property to inquire as to the condition of the fuel oil tank(s). We were told that the property had not been inspected in some time. On February 13, 1996, Ron Bell (the owner's representative) called LAG to say that he had inspected the property and found that vandals had ripped out all the copper piping in

evaluated are significantly lower than the detection limit (0.2 ppm) of the PID. Therefore, other monitoring techniques must be utilized that can detect and quantify actual concentration of individual volatile compounds. One such technique is to filter air through GAC contained in specially prepared glass tubes. This was done to analyze the concentrations of potential airborne contaminants in the indoor air of the Ellis residence and the Albank office. The GAC adsorbs any volatile organic contaminants in the air. The contaminants are then desorbed from the GAC in the laboratory and analyzed. Since the flow rate of air that was filtered, the sampling time, and the amount of contaminant desorbed are all known, the air concentration can be calculated. **Table 3** is a summary of all the indoor air sampling results. **Appendix C** contains the actual analytical laboratory reports.

4.2.1 Albank

Air in the basement stairwell and loan reception area of the Albank building was sampled and analyzed. The results showed that total volatile hydrocarbons (TVH) were below 1 ppm in the basement stairwell and much lower (0.07 ppm) in the first floor loan reception area. Benzene concentrations were below 9 ppb. Due to the short sampling time available during the initial visit, the 2 ppb detection limit for benzene that is desirable for long term carcinogenic exposure evaluation was not reached. However, based on the ratio of benzene to TVH in other samples, the benzene concentration could be expected to be 0.4 ppb in the loan reception area where people work. This is lower than the 2 ppb level for benzene set by the VDOH. Since levels rather quickly subsided during the following few days, no other samples were taken and the air purifiers were removed soon afterwards.

4.2.2 Ellis residence

Air samples were collected from the Ellis living room on January 29, February 1, February 8, February 9, and February 20, 1996. The results are listed in **Table 3** and the laboratory results are provide in **Appendix C**. The levels of TVH correlated well with the PID measurements. After January 29, when the TVH was the highest at 0.43 ppm, TVH levels in February ranged from 0.08 ppm to 0.16 ppm and did not decrease further. Benzene concentrations ranged from 2.5 to 2.9 ppb, levels that are higher than the VDOH guideline of 2 ppb. To evaluate whether the source of the benzene was the vapors emanating from within the basement area or from cigarette smoke (both occupants are smokers) the air in the basement had to be sampled. This was on done on February 21. The results (**Table 3**) showed considerably less benzene in the basement than in the occupied living room. Therefore, one can conclude that the cigarette smoke was probably the cause of the elevated benzene levels detected in the living room.

4.2.3 Bell House



Lincoln Applied Geology, Inc.
Environmental Consultants

RD # 1 Box 710 • Bristol, Vermont 05443 • (802) 453-4384 • FAX (802) 453-5399

immediately below the fuel oil AST leak source. The locations of these wells are shown on **Figure 2**. The boring logs are attached as **Appendix E**.

During advancement of these borings, soil samples were collected and concentrations of volatile organics in the soil headspace was measured with a PID. These PID results are tabulated in the boring logs of **Appendix E**. To give an overall indication of the level of contamination in each boring the average of all non-BG PID values are presented in **Table 2**.

Wells MW-1, MW-2, HA-2, and MW-4 lie in a west-east line along the south side of the Ellis residence. Fill soil 2 to 2.5 feet thick was encountered in MW-1, MW-2, and HA-2 between the two houses, and 4.2 feet of fill was found in MW-4 near the front of both houses. In MW-3, placed in the dirt driveway of the Ellis residence, the fill extended to a depth of about 3 feet. Under this fill, native silt and very fine sand was present. Below the silt and sand, a sandy glacial till was encountered at depths ranging from 6 feet in the back (east) of the house to 4.5 feet in the front (west) of the house. A similar soil sequence was seen in MW-5 and MW-6 on the west side of the Bell house; and in HA-1 in the Bell basement.

Monitoring wells 1.5" in diameter with 5 foot long screens were installed in MW-1, 2, 3, 4, 5, and 6. The bottom of the screens range from 8 to 9 feet below surface. In HA-1 a 2" diameter, 4.6 foot long screen was placed at 5 feet below grade. In HA-2, the bottom of a 2" diameter, 4.8 foot screen is at a depth of 6.1 feet. These well screens intercept both the saturated and unsaturated zones. The concentration of organic vapors in the unsaturated zone, which may indicate the location of petroleum vapors surrounding the house, can therefore be monitored by measuring the headspace of the monitoring wells with the PID. These results on various days are listed in **Table 2**. They indicate that, even though there are significant variations over time, the highest levels (up to 32 ppm) have been detected in HA-2 and MW-4. These wells are located between and on the west side of both houses and are between the fuel oil release in the Bell basement and the location where the vapors enter the Ellis basement. Significantly lower headspace concentrations (up to 2.6 ppm) were seen next to the Ellis' abandoned fuel oil UST.

4.5 Ground Water Quality Analysis

As stated previously, eight monitoring wells were constructed in the soil borings. Together with the shallow BW-1 at the west end of the Bell AST, and the sump in the Bell basement, there are 10 ground water sampling locations. Ground water quality samples were collected on February 26, 1996 after appropriate purging, and were later analyzed by the VDEC LaRosa Laboratory. Copies of the analytical laboratory results are included in **Appendix D**. Results for toluene and TVH, which would be indicative of



sewage and/or sewage odors to enter the Ellis basement.

6.0 EXISTING AND POTENTIAL RISKS TO RECEPTORS

1. Workers and customers of the Albank had been exposed to fuel oil vapors. The concentrations to which they were exposed were probably not significant relative to any health risks. This situation could occur again if high ground water causes fuel oil vapors to enter the basement.
2. The occupants of the Ellis residence had been exposed to fuel oil vapors and could again be exposed if periods of high ground water cause fuel oil vapors to enter the basement and house. The concentrations to which they were exposed were probably not significant relative to health risks.
3. Sewage odors have been observed recently in the Ellis home and sewage has reportedly flowed into the basement at times in the past. The occupants of the Ellis residence could be exposed to pathogens via this sewage infiltration.
4. Future occupants of the Bell house will probably become exposed to contamination from the fuel oil in the basement through inhalation and dermal exposure, and potentially through ingestion (particularly if children are present).

7.0 RECOMMENDATIONS

7.1 Albank

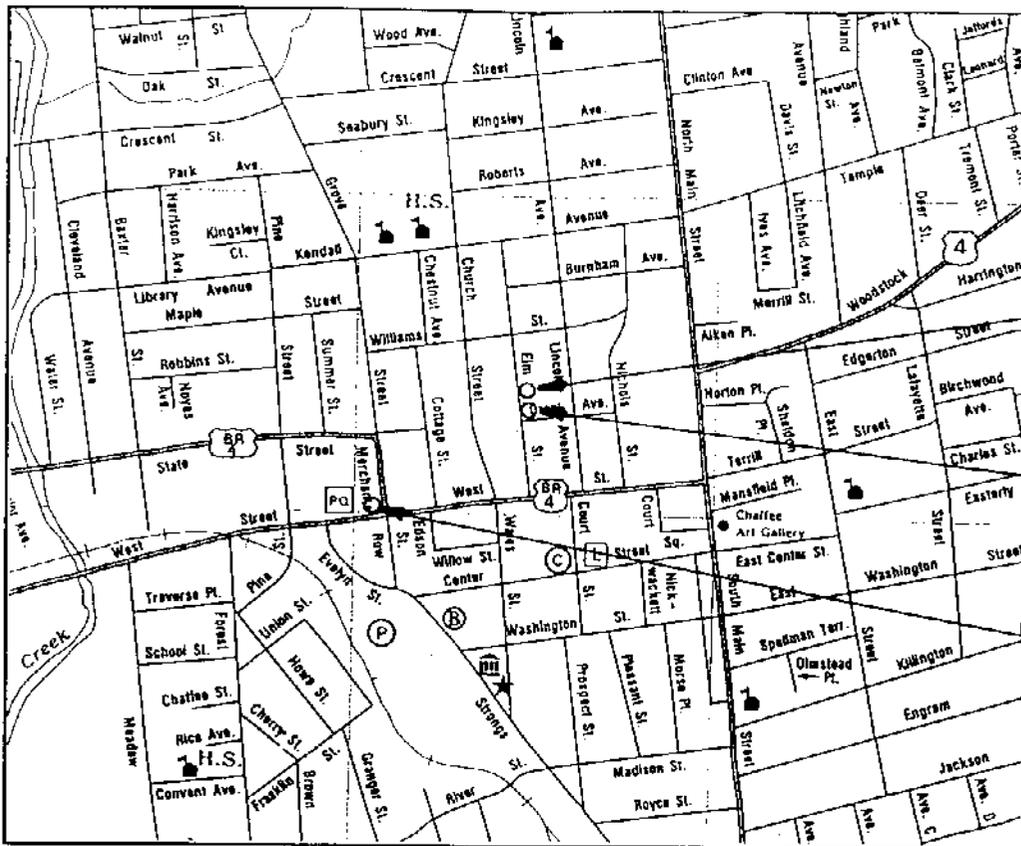
1. Hire a plumbing contractor to check that all plumbing drains have functioning traps. Permanently close and seal all unnecessary drains.

7.2 Ellis residence

1. Permanently seal the cut stone foundation wall from floor to ceiling. Monitor basement air to determine if this corrective action halts fuel oil and/or sewage odors.
2. Repair the leaky sewer(s) in front of the Ellis house, taking appropriate health and safety precautions for the workers due to likelihood of encountering petroleum contaminated soil.

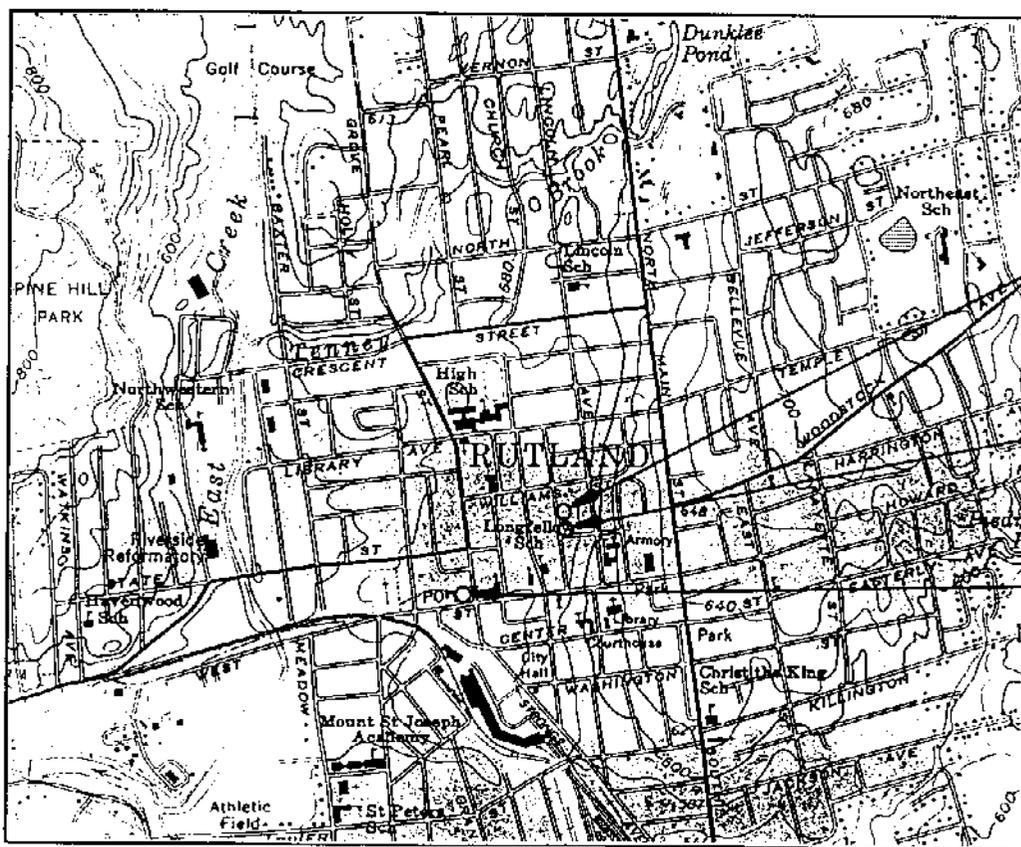


General Location Map



Source: VT City Map

Scale: 1" = 1,100'



Source: U.S.G.S. 7.5 Min
Topo Series
Rutland, VT Quad. (1961)

Scale: 1" = 2,000'

Ground Water Elevation/Product Level (feet)

Data Point	TOC	02/20/96	02/21/96	02/26/96	03/04/96	03/22/96	04/03/96	04/09/96
MW-1	100.00	95.85	97.06	95.58	96.54	97.33	97.00	96.94
MW-2	99.87	95.43	96.39	95.70	95.68	97.26	96.82	95.90
MW-3	98.52	94.15	94.30	94.34	94.16	94.81	94.30	94.39
MW-4	98.78	94.32	94.78	94.66	94.42	95.03	94.68	94.80
MW-5	98.55	94.00	94.32	94.51	94.33	94.82	94.53	94.45
MW-6	98.81	94.32	94.31	94.67	94.48	94.98	94.85	94.54
HA-1	96.27	1.43	1.52	1.17	94.78	94.73	96.02	94.86
HA-2	99.18		96.36	94.95	94.93	95.22	95.07	95.04
BW-1	95.32		95.11	94.82	94.99	95.61	92.90	94.97

Notes:

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

Indoor Air Sampling Results

Data Point	Sampling Date	Air sample Volume (l)	PID (ppm)	² Total Volatiles (ppm)	² Total Volatiles (mg/m3)	Benzene (ppb)	Benzene (ug)	Total BTEX (mg/m ³)	Total BTEX (ug)
Marble Bank basement	01/26/96	35.5	0.4	0.75	2.90	<9	<1	<0.11	<4.0
Marble Bank loan reception	01/26/96	37.5	0.4	0.07	0.27	<8	<1	<0.11	<4.0
Ellis residence living room	01/29/96	17	0.2 - 0.4	0.43	1.64	<18	<1	<0.24	<4.0
Ellis residence living room	02/01/96	33.5	0.2	0.15	0.56	<9	<1	<0.12	<4.0
Ellis residence living room	02/08/96	570	<0.2	0.08	0.29	2.5	4.55	<=0.03	<16.9
Ellis residence living room	02/09/96	196	<0.2	0.16	0.63	4.4	2.8	<=0.05	<9.6
Trip Blank	02/09/96						<1		<4.0
Ellis residence living room	02/20/96	189	<0.2	0.10	0.39	2.9	1.74	<=0.03	<6.1
Ellis residence basement	02/21/96		<0.2	0.13	0.50	0.8	1.24	<=0.01	<4.2
	02/21/96		<0.2	0.11	0.44	0.7	1.24	<=0.01	<4.2
	Actual volume uncertain but between these 2 values which generate slightly different concentrations								

NOTES:

<= Indicates concentration is less than or equal to value shown

blank cell = NOT APPLICABLE

² Based on the total chromatographic area and response factor for benzene

Soil Gas Survey Results

Soil Gas Point	Depth	PID (ppm)	Comments *
S-1	2.5'	BG	
S-2	3'	BG	(in borehole)
	4.5'	BG	
	5.5'	0.2	
	7'	0.7	
	8'	0.8	
S-3	2.2'	BG	(in borehole)
S-4	2.5'	BG	(in borehole)
	5'	0.3	wet
S-5	2.5'	0.1	
	4'	0.1	
	5'	BG	definite fuel oil odor on tip
	5'	6 - 9	in borehole
S-6	2.5'	0.2	hint of fuel odor
	3'	0.3	wet
S-7	2.5'	0.3	(in borehole)
	3'	BG	no odor
	4.5'	2.5	hint of odor
S-8	2.5'	BG	(in borehole)
	3'	BG	hint of odor
S-9	2.5'	BG	(in borehole) - no odor
S-10	2.5'	BG	(in borehole) - no odor
S-11	2.5'	BG	(in borehole) - no odor
S-12	2.5'	1	slight odor
S-13	2.5'	0.2	no odor
S-14	2.5'	BG	no odor
S-15	2.5'	BG	(in borehole)
S-15	4.5'	0.2	no odor
S-16	2.5'	BG	(in borehole)-no odor
S-17	2.5'	BG	(in borehole)
S-18	2.5'	BG	(in borehole)
	5'	>10	sheen on probe tip
S-19	2.5'	BG	(in borehole)
	5.5'	10	
S-20	3'	0.5	
	4.5'	0.5	
	6'	BG	wet
S-21	3'	4	
	4.5'	BG	wet, no odor
S-22	3'	BG	(in borehole)
	4'	0.2	no odor

NOTES:

PID reading from probe unless noted.

BG = BackGround

* = Odor is of fuel oil.

Soil Gas Survey Results

Soil Gas Point	Depth	PID (ppm)	Comments *
S-1	2.5'	BG	
S-2	3'	BG	(in borehole)
	4.5'	BG	
	5.5'	0.2	
	7'	0.7	
	8'	0.8	
S-3	2.2'	BG	(in borehole)
S-4	2.5'	BG	(in borehole)
	5'	0.3	wet
S-5	2.5'	0.1	
	4'	0.1	
	5'	BG	definite fuel oil odor on tip
	5'	6 - 9	in borehole
S-6	2.5'	0.2	hint of fuel odor
	3'	0.3	wet
S-7	2.5'	0.3	(in borehole)
	3'	BG	no odor
	4.5'	2.5	hint of odor
S-8	2.5'	BG	(in borehole)
	3'	BG	hint of odor
S-9	2.5'	BG	(in borehole) - no odor
S-10	2.5'	BG	(in borehole) - no odor
S-11	2.5'	BG	(in borehole) - no odor
S-12	2.5'	1	slight odor
S-13	2.5'	0.2	no odor
S-14	2.5'	BG	no odor
S-15	2.5'	BG	(in borehole)
S-15	4.5'	0.2	no odor
S-16	2.5'	BG	(in borehole)-no odor
S-17	2.5'	BG	(in borehole)
S-18	2.5'	BG	(in borehole)
	5'	>10	sheen on probe tip
S-19	2.5'	BG	(in borehole)
	5.5'	10	
S-20	3'	0.5	
	4.5'	0.5	
	6'	BG	wet
S-21	3'	4	
	4.5'	BG	wet, no odor
S-22	3'	BG	(in borehole)
	4'	0.2	no odor

NOTES:
 PID reading from probe unless noted.
 BG = BackGround
 * = Odor is of fuel oil.

Ground Water Quality Results (ppb)

Data Point	Compound	1/30/96	2/26/96				
MW-1	TVH		<100				
	Toluene		<5				
MW-2	TVH		<100				
	Toluene		<5				
MW-3	TVH		1,340				
	Toluene		110				
MW-4	TVH		39,600				
	Toluene		80				
MW-5	TVH		<100				
	Toluene		22				
MW-6	TVH		<100				
	Toluene		65				
BW-1	TVH		40,300				
	Toluene		<25				
HA-1	TVH		<330				
	Toluene		<100				
HA-2	TVH		<1,000				
	Toluene		<50				
Albank Sump	TVH	<5					
	Toluene	<6					
Ellis Sump	TVH	<5	<100				
	Toluene	<6	<5				
Bell Sump	TVH		1,030,000				
	Toluene		<500				
Trip Blank	TVH	<5	<100				
	Toluene	<6	<5				

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VDEC - Rutland (#94-1628)

Location	Scale
Rutland, Vermont	1" = 15'

Detailed Site Map

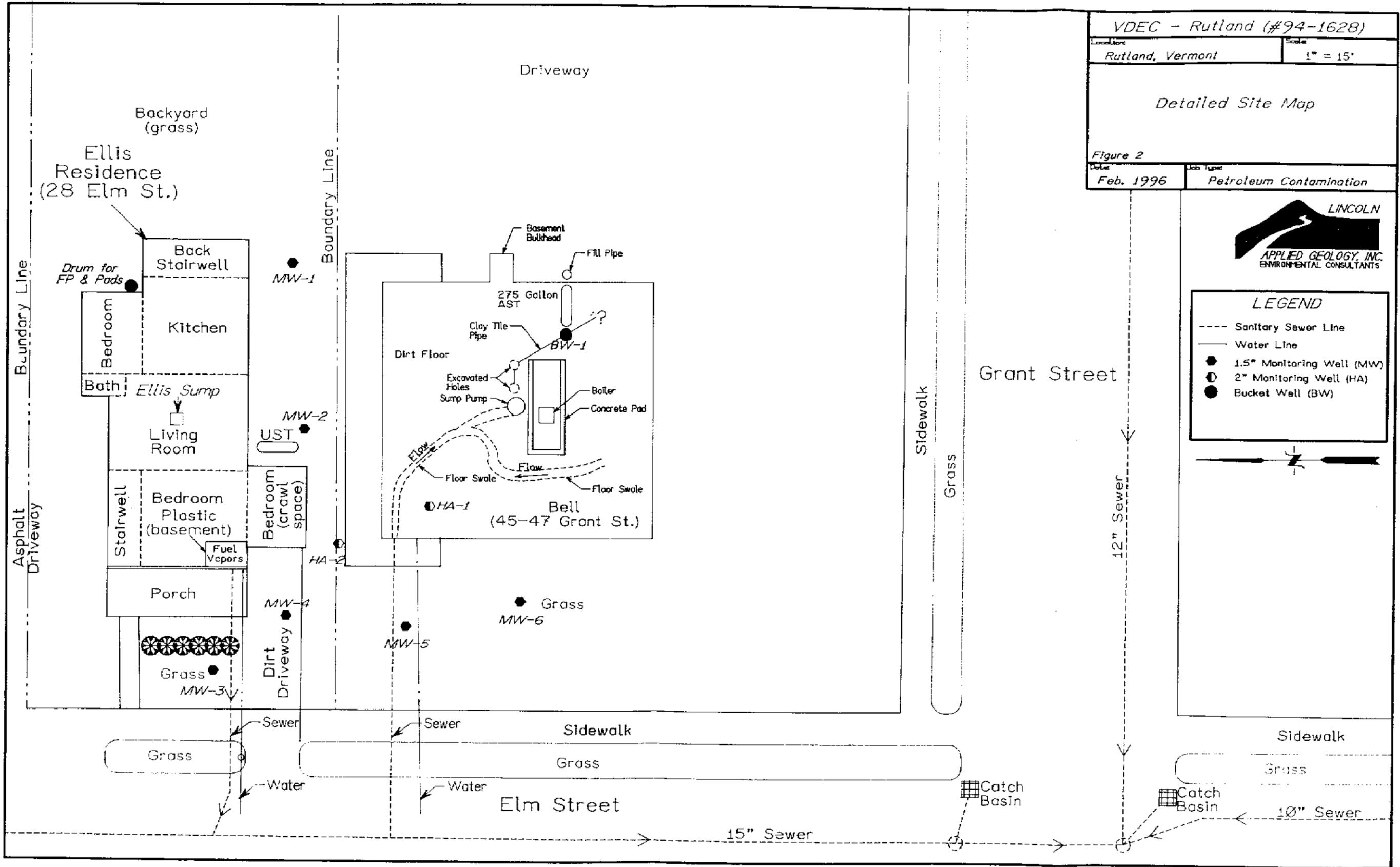
Figure 2

Date	Job Type
Feb. 1996	Petroleum Contamination



LEGEND

- Sanitary Sewer Line
- Water Line
- 1.5" Monitoring Well (MW)
- ⊙ 2" Monitoring Well (HA)
- Bucket Wall (BW)



VDEC - Rutland (#94-1628)

Location	Rutland, Vermont	Scale	1" = 15'
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Ground Water Contour Map
for
February 21, 1996

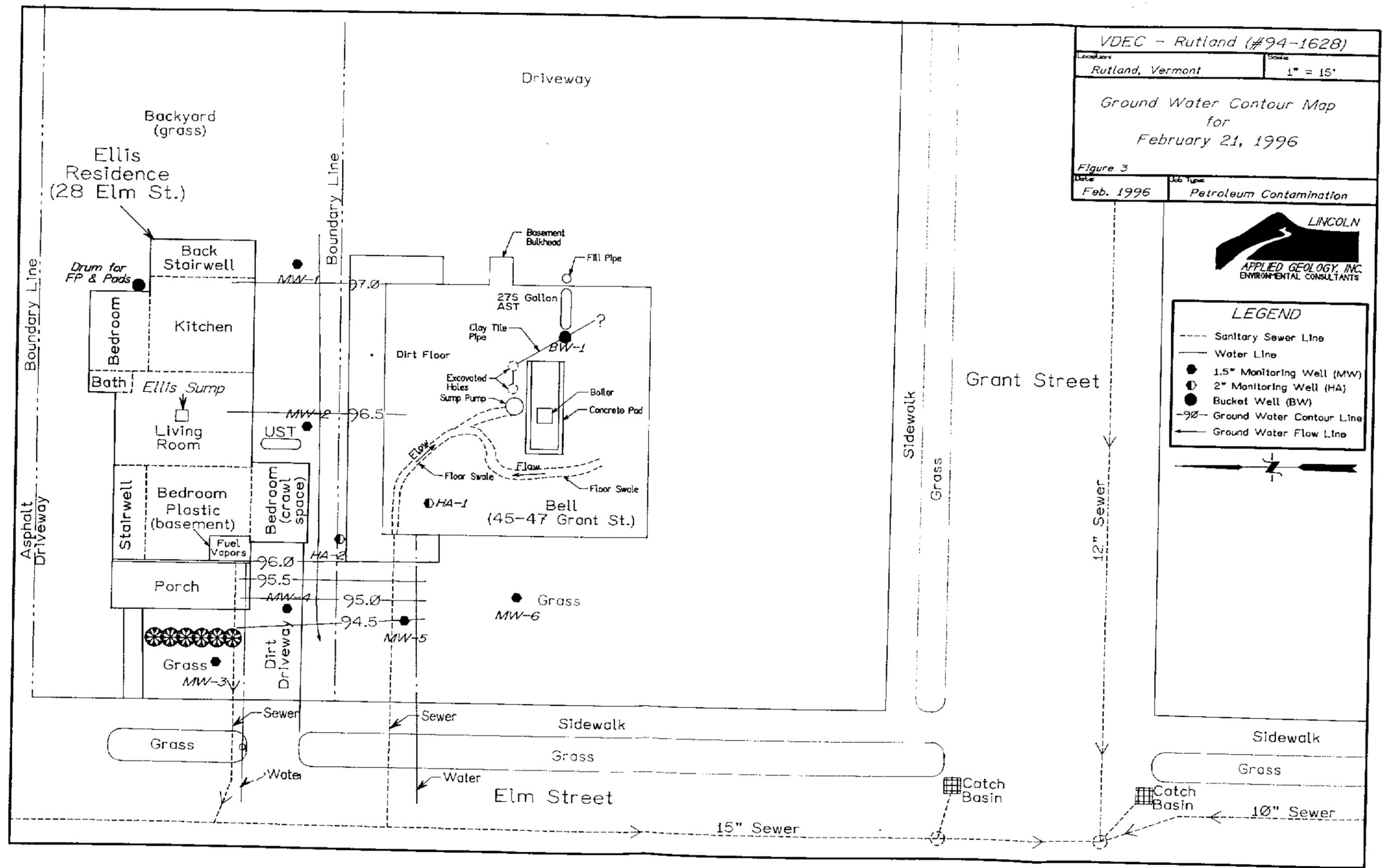
Figure 3

Date	Feb. 1996	Job Type	Petroleum Contamination
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LEGEND

- Sanitary Sewer Line
- Water Line
- 1.5" Monitoring Well (MW)
- ⊕ 2" Monitoring Well (HA)
- Bucket Well (BW)
- 96- Ground Water Contour Line
- Ground Water Flow Line



VDEC - Rutland (#94-1628)

Location	Rutland, Vermont	Scale	1" = 15'
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Site Map with Soil Gas Points with Highest PID Readings

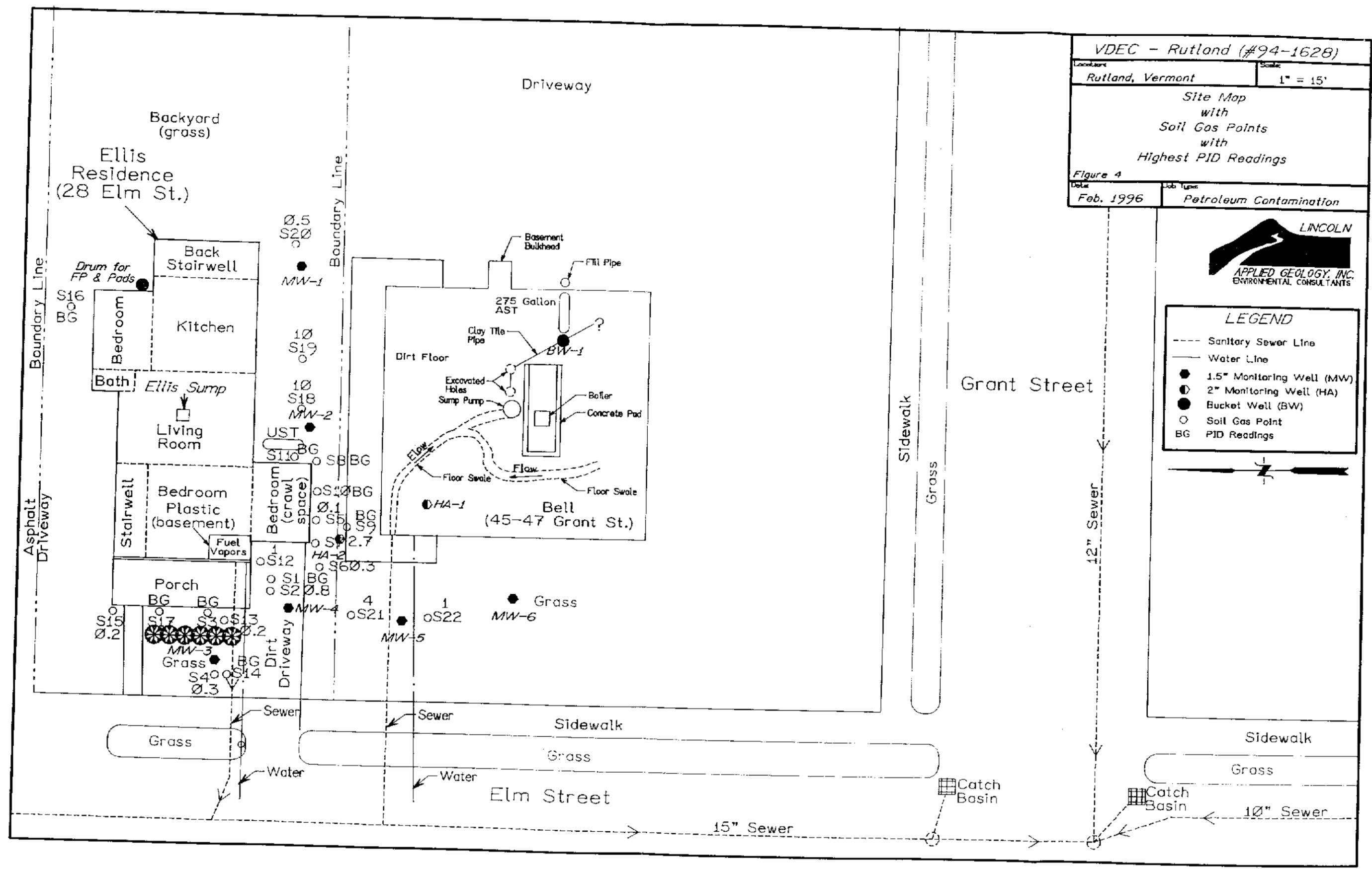
Figure 4

Date	Feb. 1996	Job Type	Petroleum Contamination
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LEGEND

- Sanitary Sewer Line
- Water Line
- 1.5" Monitoring Well (MW)
- 2" Monitoring Well (HA)
- Bucket Well (BW)
- Soil Gas Point
- BG PID Readings



Appendix A

Field Notes from January 26 to
February 5, 1996

DRAFT (updated February 6, 1996)
INVESTIGATION into INDOOR PETROLEUM VAPORS, RUTLAND
(SMS Site #94-1628)

OBSERVATIONS and TASKS PERFORMED

Friday January 26, 1996:

13:30 - 17:00

Monitored vapors in ALBANK/Marble Bank

- Teller area: no noticeable odors, PID @ background
- Loan dept. reception: noticeable odors, PID @ 0.4 ppm
- Stairwell to basement: PID @ 0.4 ppm

Collected air samples on carbon tubes for BTEX analysis in:

- Loan dept. reception (13:51 - 15:07 @ 0.5 lpm)
- Stairwell in basement (15:08 - 16:19 @ 0.5 lpm)

After air sampling completed, started large flow Filcorp air purifier in basement of stairwell.

Monitored PID levels in downtown area utilities

- in various sanitary sewer manholes and storm sewer catch basins: background (BG) to 5.6 ppm PID
- in ground level and basement of various businesses: BG to 0.2 ppm PID
- floor drains in businesses: Background (BG) to 90 ppm PID (DeVoe Color Center)

No obvious areal relationships seen.

Monitored utility headspaces at corner Elm and Grant streets (1 house away from Ellis residence)

- Sanitary sewer manholes: 13-26 ppm PID
- Storm sewer catch basins: BG PID

Catch Basin @ 40 Elm St. had 2.5 ppm PID and visible floating free product

Monitored indoor air at Ellis residence, 28 Elm St. (fuel oil odors noticeable in all rooms)

- Front entrance hallway: 0.6 ppm PID
- Living room/kitchen: 1.6 ppm PID
- Back hall landing: 2.4 ppm PID
- Cellar: 7 - 10 ppm PID
- Crack in concrete floor - 44 ppm PID
- Spaces in front fieldstone wall near where water line enters house: BG - 65 ppm PID
- headspace of sump: BG ppm PID

Set up low volume box air purifier in living room of Ellis residence

NOTES: observations noted by occupants:

- Water poured in through spaces in front fieldstone wall during a past big rainstorm. Sewage odors in the past. This is first time with fuel oil smell.
- Fuel oil UST on south side of house pumped out, filled with sand, and replaced with AST in cellar 12 years ago.
- Sewers at corner of Elm and Grant "under construction" last summer (might have meant simply cleaning out clogged catch basins)

Monday, January 29, 1996

Monitored vapors in AlBank/Marble Bank

- Teller area: no noticeable odors, PID @ BG
- Loan dept. reception: no noticeable odors, PID @ BG
- Stairwell to basement: slight but noticeable odors, PID @ 0.1 ppm

Collected water samples from sump in basement stairwell.

Left large volume air purifier in basement of stairwell operating

Monitored utility headspaces at corner Elm and Grant (1 house away from Ellis residence)

- Sanitary sewer manholes: 13 ppm PID
- Stormsewer catch basins: BG PID

Catch Basin @ 40 Elm St.: BG PID and earlier visible floating free product gone! (perhaps washed away in significant rain event previous Saturday)

Monitored indoor air at Ellis residence, 28 Elm St. (fuel oil odors still noticeable in all rooms, PID levels are ranges seen during 1.5 hours on site)

- Front entrance hallway: bg - 0.3 ppm PID
- Living room/kitchen: 0.2 - 0.4 ppm PID
- Back hall/landing: 0.2 - 0.6 ppm PID
- Cellar: 1-2 ppm PID
- Spaces in front fieldstone wall near where water line enters house: up to 20-30 ppm PID
- headspace of sump: BG ppm PID

Set up high volume air purifier in cellar near front wall

Collected air on carbon tube in living room before turning on air purifier in back stairwell landing.

Set up high volume air purifier in back stairwell landing

Collected water sample from sump in cellar.

Wednesday, January 31, 1996

9:25:

Monitored indoor air at Ellis residence

- Front entrance hallway: 0.2 ppm PID
- Living room/kitchen: 0.8 ppm PID
- Back hall/landing: 0.4 ppm PID
- Cellar: 0.6 ppm PID

9:40 - 11:15:

Obtained sewer map from Alan Shelvey, walked sewer lines with Pete Kelly

- Manholes at Grant and Elm = 4 - 5.5 ppm PID

Checked other manholes "downstream (across Elm St. and toward downtown)" and "upstream (north on Elm & east on Grant St.)" of the manholes at Grant and Elm with the PID readings. The results were noted on sewer map. In general, only low PID values and no noticeable fuel oil odors were observed "upstream". However, at the second, third, and fourth manholes "downstream", there were measureable PID values and noticeable fuel oil odors.

- Looked in basement of unoccupied (for the winter) home at 19 Kingsley St, 3 - 4 blocks from Ellis home where water lines burst, basement flooded, and AST tipped over on or about January 12, spilling about 100 gallons of fuel oil. Definite fuel oils in basement, 10 ppm PID. The water and oil was pumped out according to plumber and DPW, not discharged down sewer. The sewer carrying flow from 19 Kingsley St does intersect with the Elm St. sewer, but flow would only enter Elm St. under extremely high flow conditions.

- The manhole on Elm St. that contained visible floating product on January 26, but not on January 29 was still free of product, detectable vapors by PID, or odors on January 31.

11:15-13:00

- No odors at Marble Bank. PID = BG
- Removed drum size high volume Filcorp air purifier from Marble Bank

Slight fuel oil odors in the following spaces in Ellis home:

- Front entrance hallway: 0.6 ppm PID
 - Living room: couldn't measure because of use of "Pledge"
 - Back stairwell landing: 0.8 ppm PID
 - Cellar: 0.8 ppm PID with 1 purifier operating
 - Effluent of cellar purifier: 0.4 ppm PID
 - Dirt area in floor near front wall - 10 ppm PID
 - Cracks in front fieldstone wall near where water line enters house: up to 30 ppm PID
- Set up high volume Filcorp air purifier in back stairwell landing
 - Move second large box air purifier from back stairwell landing to the cellar near front wall

next to the unit that has been in basement since January 29. [Realized that unit installed on January 29 had been plugged into an outlet that turns off when back stairwell lights are turned off. Thus the cellar unit had actually not been operating since January 29. Left instructions to leave light switch on.]

- Replaced carbon in small box air purifier in living room and large unit #1 in cellar.

13:15

Investigates heating fuel source in other nearby homes:

- #45-57 Grant (boarded up) fill pipe on east side of house appears to go into cellar AST
Old metal utility box in ground near fill pipe - unknown function.
- #41 Grant: AST in basement according to neighbor
- #39 Grant: fill pipes to cellar
- #25-27 Elm St.: fill pipes to basement, 28 Elm St. says occupants reported no odors
- #30 Elm: 28 Elm St. resident says occupants reported no odors

13:45

Visit City Assessor to get name of present owner of boarded up house at Elm and Grant which was reportedly foreclosed by bank:

BCC Corp.
East Mt. Property Mgt.
P.O.Box 2126
Brattleboro tel:254-4848

Thursday, February 1, 1996

Noon: Ms. Linda Ellis called to say that:

- there are still noticeable fuel oil vapors in her house
- that when other electrical appliances were used, the circuit breaker supplying the 2 air purifiers tripped. Therefore, she had one of the units unplugged, leaving the other operating.

15:00

Monitor sewers:

- Sewer manholes at Grant and Elm = 2.4 & 3.0 ppm PID
- Catch basins at Grant and Elm = BG and 0.6 ppm PID

Slight fuel oil odors in the following spaces:

- Front entrance hallway: 0.1 ppm PID
- Living room/kitchen: 0.2 ppm PID
- Kitchen: 0.3 ppm PID
- Bathroom: 0.3 ppm PID (noticed that vapors can rise up around pipes into bathroom)
- Cellar: 0.3 ppm PID with 1 purifier on at arrival
- Cellar: 10 ppm PID with purifiers off

- Dirt area in floor near front wall - 18 ppm PID
- Cracks in front fieldstone wall near where water line enters house: up to 16 - 18 ppm PID
- Front and corner bedrooms: 0.3 ppm PID
- Cellar: 0.2 ppm PID with 2 purifiers on at departure

Plugged second large box air purifier into sump pump outlet which is on a separate circuit than the light switch which the first unit was plugged into.

Noticed that foundation wall is not a bearing wall and the real foundation wall sits a foot behind the obvious one. The air between the walls had BG PID levels but the spaces between the field stone low to the floor still are emitting volatiles.

Collect air sample in living room on activated carbon tube for 67 minutes at 0.5 lpm. Not scheduled for analysis.

Friday, February 2, 1996

To reduce transport of volatiles, polyethylene vapor barriers were erected at door between the cellar and rear stairwell, under the bathtub (where there is significant spacing around the piping leading from the cellar to the bathroom) and on the face of the front cellar wall where vapors have been emanating.

Monitored indoor air at Ellis residence after erecting above barriers with LAG #2 HNU, 10.2 ev

- Living room/kitchen: BG PID
- Back hall/landing: BG PID
- Cellar: 0.4 ppm PID

Talked with Ron Bell, Rex Bell, and Andy Kay owners (Brattleboro telephone no. 254-2323) of Grant St. house about possible fuel tanks. They weren't sure of heating source (above ground in cellar tank or underground). They will check condition of house and inform us.

Asked worker at Rutland Wastewater Treatment Facility (773-1813) if they've noticed any fuel oil or other petroleum odors at the facility. He said yes, 4-5 times in previous 2 weeks at times of high flow. Didn't remember anything specific about Wed., January 24.

Obtained lab results of analysis of sump water (collected 1-29-96) in both Ellis residence and Marble Bank. Both samples were non-detect at a PCL of 6 ppb total BTEX and 5 ppb MTBE.

Obtained lab results of analysis of indoor air both Ellis residence (living room) and Marble Bank (basement and loan reception areas). All samples were below non-detection with respect to benzene. Only trace amounts of some poly-substituted aromatics and aliphatics were detected. Total volatiles were also quantified. Results summarized on attached table.

Location		Ellis living room	Marble Bank basement stairwell	Marble Bank loan reception
Date		1-29-96	1-26-96	1-26-96
Volume of air sample		17 liters	35.5 liters	37.5 liters
Total volatiles hydrocarbons by carbon tube	mg/m ³	1.6	2.8	0.27
	ppm	0.43	0.73	0.07
Total volatiles by PID-ppm		0.2 - 0.4	0.4	0.4
butylbenzene (mg/m ³)		<0.06	0.05	<0.03
total BTEX (mg/m ³)		<0.24	<0.11	<0.11
Benzene (ppm)		<0.018	<0.008	<0.008

Monday, February 5

Checked Ellis residence with a HNU PID:

- Front hallway: BG
- Living room/kitchen: BG
- Cellar: 0.2 ppm

Difficult to smell if fuel oil odors were present because of cigarette smoke

Checked Marble Bank with a IINU PID: BG

Ms. Linda Ellis still says (via telephone conversation Monday 16:30) she and visitors smell fuel oil odors and wants something done.

Appendix B

1994 Reports from The Johnson Co.
and Wagner, Heindel, and Noyes, Inc.



State of Vermont

Department of Fish and Wildlife
Department of Forests, Parks and Recreation
Department of Environmental Conservation
State Geologist
Natural Resources Conservation Council
RELAY SERVICE FOR THE HEARING IMPAIRED
1-800-253-0191 TDD-Voice
1-800-253-0195 Voice-TDD

AGENCY OF NATURAL RESOURCES
Department of Environmental Conservation
Hazardous Materials Management Division
103 South Main Street / West Building
Waterbury, Vermont 05671-0404
802-241-3888
FAX 802-241-3296

July 7, 1994

Karl Johnson
The Johnson Company
100 State Street, Suite 600
Montpelier, VT 05602

RE: Petroleum Vapor Investigation - Rutland (Site # 94-1628)

Dear Karl:

Listed below are the businesses that have reported petroleum vapors or where investigated by WHN on June 28. Please try to notify each business of the June 11, 1994 visit.

First Vermont Bank
77 Merchants Row
773-3321

Freemans Jewelers
76-78 Merchants Row
773-2792

Marble Bank
47 Merchants Row
Lou Watson=775-0025

Opera House Association
67 Merchants Row
775-0339

Camille's Clothing Store
7 Evelyn Street
Karen Derosia=773-0971

Rutland Restaurant
57 Merchants Row
775-7447

The Fashion Shop
40 Merchants Row
773-2244

Rutland Wastewater Plant
Public Works
Mike Garafano=7731813

Knights of Columbus
21 Merchants Row
773-8283

Rutland Post Office
773-0222

In addition, please call the following people and apprise them of the site visit on June 11, 1994.

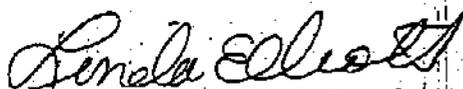
Rutland Fire Department
Captain Gregorio - 773-1812

Rutland Emergency Management
Ira Earl - 773-1810

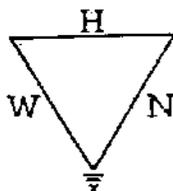
Vermont Dept. of Labor & Industry
Bob Schlacter - 773-5867

I'll plan on meeting you at the KMart Shopping Plaza (near entrance) at 12:00 p.m. on Monday, July 11, 1994. Please call me if you have any questions.

Sincerely,



Linda Elliott, Project Manager
Sites Management Section



Wagner, Helndel, and Noyes, Inc.

- Consulting Hydrogeologists
- Engineers
- Environmental Scientists

P.O. Box 1629 Burlington, Vermont 05402-1629

802-658-0820

FAX: 802-860-1014

June 29, 1994

Mr. Richard Spiese
 Project Coordinator
 Hazardous Materials Management Div.
 Vermont Agency of Natural Resources
 103 South Main Street/West Building
 Waterbury, Vermont 05671-0404

Re: Emergency Vapor Survey
 Rutland Business District

Dear Richard:

At your request I traveled to Rutland on Tuesday, June 28, 1994, for the purpose of determining if either the J.P. Noonan site or Midway Oil Co. Plaza Mobil site are the source(s) of petroleum vapors detected in buildings along Evelyn Street and West Street.

I first called on Lt. Walsh at the Rutland Fire Department, who together with a Captain Gregorio, briefed me on the Fire Departments response to notification from down town businesses of petroleum vapors in basement areas. The captain indicated that the fire department's emergency response protocols dictated a full response to each "gas leak" call, which includes dispatching fire engines, blocking off streets, evacuating buildings and SCBA entry procedures. The first report of gas odors was called in by the First Vermont Bank (77 Merchants Row) on Monday morning, June 27. Upon their arrival on the scene, other Merchants Row businesses, including the Rutland Restaurant, indicated that they too had gas odors in their buildings. The buildings were reported checked out by a Bob Schlacter (sp?) with the Department of Labor & Industry. Vapor screening with an explosivity meter indicated that none of the buildings had vapor levels greater than 1% of the LEL.

The following morning (Tuesday), the Fire Department received a call from the Marble Bank (located on the corner of West Street and Grove Street) at approximately 8 am. The Fire Department again responded to the scene. According to Captain Gregorio, the bank basement had a mild gasoline odor and vapor levels of 2 ppm (make of detector unknown). Throughout the day, additional gas odor reports were taken from several other businesses on West Street, including 121 West St., The Fashion Shop on Grove Street (across from the Marble Bank), and Camille's on Evelyn Street.

Apparently this is not the first incident where petroleum vapors have been detected. Notably, the detection of petroleum odors is coincident with storm events and increased storm/sewer flows.

HAZARDOUS MATERIALS
 MANAGEMENT DIVISION
 JUN 30 10 30 AM '94

Mr. Richard Spiese
June 29, 1994
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Captain Gregorio accompanied me as I conducted a reconnaissance and photoionization detector (PID) vapor survey of the impacted buildings. We first checked out the Fashion Shop on Grove Street. No odors or PID vapor were detectable on the ground floor (street level), no in the stairwell to the basement. Upon entering a closed room in the basement where the basement sump pump was located, a mild gas odor was discerned although the maximum PID level was only 1.1 ppm. No petroleum sheens were evident in the sump. PID screening of the foundation floor, walls, and water and sewer pipe penetrations yielded no elevated PID vapors. The business owner indicated that odor strength had mitigated. Groundwater occasionally flooded the basement floor.

We then visited the Marble Bank. No odors or PID vapors were detectable in the ground floor lobby. Lou Watson, the facility manager, took us to the rear (north side) of the building. Upon opening a door to the stairwell, moderate to strong gasoline odors were discerned. The gas vapor appear to enter the building via a sump located in the basement stairwell. Breathing space in the basement stairwell yielded sustained PID vapor levels of 170 ppm. Captain Gregorio indicated that the vapor levels in the building had increase markedly since the Fire Department's early morning visit. Investigation of the rest of the basement found that odor strength and PID levels decreased as we moved away from the sump area.

After investigating the Marble Bank site, we contacted City engineer Allen Shelvey to ascertain layout and flow directions of the storm sewer system. Mr. Shelvey met us on site, and we proceeded to investigate properties surrounding the Marble Bank, namely the Knights of Columbus Hall (located on Grove Street approximately 200 ft to the north). No odors or PID-detectable vapors were found in the basement of the K of C Hall. Notably, this building did not have a sump and the basement area was dry.

We then proceeded to check out the Post Office, located on West Street approximately 80 feet west of the Marble Bank site. No odors or PID-detectable vapors were found in the basement of the Post Office Building. Additionally, facility manager Ken Bates indicated that no odors have been detected in the past. The building has a large sump in the basement floor.

The last business checked was Camille's on Evelyn Street (located approximately 150 feet north of the Plaza Mobil Site). A slight gas odor and PID levels of only 1 ppm were detected in the basement of this used clothing store. The store owner indicated that odor levels had moderated since the morning. This building also has a basement floor sump.

The topography of the area exhibits a 2% to 5% slope to the southwest. City utility maps indicate that sewer lines traversing Merchants Row, Evelyn Street and Grove Street all converge on and flow towards a main trunk line which flows west down West Street. Note that there is a considerable difference in elevation (approximately 90 feet) between the top of West Street (at the junction with Route 7) and the bottom of West Street (which is lowest near the Meadow Street intersection).

At the City Engineer's office, we met with acting Chief Hurley and other Department of Public Works personnel. During the meeting it was revealed that there were at least two

Mr. Richard Spiese
June 29, 1994
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former businesses on Grove Street up-gradient (topographically) of the Marble Bank which likely had gasoline USTs. The suspected UST sites are a former laundry and dry cleaning operation (possibly owned by Foley's Services) located at the present day site of the Marble Bank drive-through bank facility and a former Firestone store located at the corner of Grove St. and State St. approximately 300 feet to the north. Active gasoline dispensing stations with USTs in the vicinity of the Marble Bank site include a Stewart's Shop (located at the corner of Grove St. and State Street approx. 450 feet to the north), Howie Parker (102 West Street, corner of West and Edson streets, approx. 350 ft. to the east) and Midway Oil Co. Plaza BP station (located on Evelyn St. approximately 400 feet to the south-southwest).

A PID vapor survey of the storm sewer catch basins was conducted along West Street and its intersecting streets in the downtown area. PID vapor screening yielded no detectable vapors in catchbasins along Grove Street, Merchants Row or Cottage Street. Vapor readings of up to 170 ppm were detected in a catchbasin at the southeast corner of the intersection of Evelyn and West Streets. No PID vapors were detected in catchbasins on West Street between Evelyn St. and Merchants Row, however a catchbasin on West St. located between Merchants Row and Edson St. yielded a PID vapor level ranging of 15 ppm. The Howie Parker gasoline station is located at the southeast corner of West and Edson Streets. No PID vapors were detected in the catchbasin on West St. opposite the service station, however a catchbasin at the corner of Edson and Willow Street (at the southwest corner of the gas station site) yielded a PID vapor reading of 1 ppm.

The City's wastewater treatment plant operator Mike Garofano indicated that fuel odors were first detected late Tuesday afternoon. Strong gas odors were detected in the Combined Sewer Overflow structure located at the south end of Meadow St.

PID vapor screening of catchbasins and water line valve boxes along Evelyn Street found no evidence of gasoline vapors. Headspace screening of groundwater discharged to the municipal sewer system at the Noonan's remediation site indicate that maximum vapor levels have not exceeded 5 ppm. On the basis of the routine monitoring performed at both the Noonan and Plaza Mobil sites, it is our opinion that it is unlikely that either site is the source of gasoline-like odors detected in downtown businesses.

As of 11:45 this morning (Wednesday, June 29), gas odors in the Marble Bank have moderated significantly. PID vapors in the basement sump area were down to 3 ppm. A check with the Fire Department found that there have not been any gas odor reports today.

- A common denominator in the presence of gasoline vapors in buildings in the West St./Evelyn St./Merchants Row area appears to be basement sumps. All the basement sumps observed are connected to the municipal wastewater system. The emergence of fuel odors in basement areas is coincidental with a recent rainstorm event.

Mr. Richard Spiese
June 29, 1994
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- Fuel odor strength increased and decreased rapidly (within a span of several hours) and persisted for less than a day in most cases.
- Potential sources for the gasoline vapors which warrant further investigation are the Stewart's gas station at Grove and State Streets, Howie Parker's gas station at West and Edson St., the Citgo gas station at State and Pine Streets. On the basis of elevated PID vapors detected west of Edson Street, we recommend closer examination of the Howie Parker site. The possibility of a one-time spill or release to the sewer system should be explored.
- Potential conduits for contaminant migration in the area include the municipal sewer system's West Street line and Pine Street lines (both of which are major pipelines). The possibility of an abandoned water or sewer line acting as a contaminant conduit should also be investigated. Initially, groundwater contamination was suspected, however the short duration of the fuel odor problem now leads us to believe that the contamination is migrating via manmade structures.

As we have been monitoring what appears to be gasoline-type contamination migrating onto the Noonan site on Meadow Street, we appreciate being kept informed as your investigation of this matter progresses. If we can be of any further assistance, please feel free to contact us.

Best Regards,



Michael K. Sparks, REM #5770
Hydrogeologist

THE JOHNSON COMPANY, INC.

Environmental Sciences and Engineering

July 26, 1994

Linda Elliott, Project Manager
Sites Management Section
Vermont Department of Environmental Conservation
103 South Main/West Building
Waterbury, Vermont 05671-0404

Re: Investigations of Fumes Reported in the Vicinity of Merchants Row
Rutland, Vermont
JCO No. 1-2267-7

Dear Linda:

We are writing to present the findings of our investigation of the fumes reported on June 27 and June 28, 1994 at numerous locations in the area of the intersection of Merchants Row and West Street in Rutland, Vermont. The appearance of fumes reportedly followed a significant rain event in the area of Rutland. The cause of the fumes has not been determined, but numerous potential sources and preferential pathways for migration of contaminants have been identified within less than 500 feet of this intersection, and we have recommended a list of tasks to prepare to address a recurrence.

SOURCES OF INFORMATION

Our investigations included a thorough review of all the Sites Management Section's files for Rutland and the identification of all of the Underground Storage Tank Program's files within the vicinity. Historical sources of information were reviewed to identify past land uses and historic geologic information. All Sanborn Maps held at the State Library were reviewed as were other sources of historic information such as city directories. We visited the Rutland Historical Society and the Rutland Free Library for sources of historic information germane to the investigations. Maps from 1869 (Rutland Free Library) and 1794 (Rutland Historical Society) proved useful in understanding the physical features such as topography and surface water drainage in the study area. The Sanborn Maps provided information on past land use and many historic Underground Storage Tanks in the vicinity that were not included in the SMS files reviewed as part of this investigation.

The above information was used to compile a map (copy enclosed) which includes open Vermont Department of Environmental Conservation (DEC) Sites in the downtown Rutland area; DEC-registered Underground Storage Tanks (USTs); preferential pathways for contaminant migration (water lines, sewer lines, and former surface water drainage courses); historic locations of potential sources of petroleum releases (such as automotive garages and gasoline tanks), and the locations of buildings known to have reported fumes on the days of the incident under investigation. Heating & fuel oil tanks (historic and

Linda Elliott, Project Manager
Sites Management Section
Waterbury, Vermont

July 26, 1994
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current) were not included due to the number of such facilities and the lack of a comprehensive source of information on them.

As you are aware, The Johnson Company also conducted a field inspection of the vicinity comprising a site walk to familiarize ourselves with the locations reporting odors as well as the general layout of the area and the areal topography along Merchants Row from Washington Street to State Street, and down West Street from Evelyn to its intersection with Church/Wales. We also inspected all or parts of Evelyn, Kissane, Willow, Edson, Wales, Center, and State Street in the general vicinity of those locations reporting fumes. During the field inspection we assessed areal topography, surface water runoff directions, and potential groundwater recharge areas.

OBSERVATIONS

During the course of the field inspection, we met with Ray McCarthy, Operations Manager at the Marble Bank, and inspected the three sumps in the basement of that building. The first sump, at the bottom of the stairs, was the location of the 170 ppm vapor reading obtained on a photoionization detector (PID) by Mike Sparks of Wagner, Heindel & Noyes on June 28, 1994. While we were inspecting the Marble Bank building and the sumps, we briefly interviewed an individual who indicated that they were one of the first people in the building on June 28. This person was not eager for their name to be used, but offered that the sump in the "smokers lounge" and the sump in the boiler room (adjacent to the smokers lounge) did not seem to be the source of the odors which were described as smelling like "gasoline". This may simply be due to the plumbing configuration of these sumps in conjunction with the municipal sewer system, as speculated in Mike Sparks letter of June 29, 1994. The sump with the recorded PID readings is the one located closest to Merchant's Row and is up slope from the other two sumps.

Drawings of sewer and water lines in the downtown area were obtained from Mr. Allan Shelvey, Assistant City Engineer for Rutland. Also, as you will recall, during our meeting with Mr. Shelvey, he confirmed that a city sewer has been constructed in an old stream bed. This fact was corroborated by matching the city sewer map with the historical maps that we located showing the stream channel. The location of this specific former surface water drainage course is shown on the map as a sewer line in blue, and we have included some information obtained from other sources on historic surface water drainage in the area. We believe that other preferential paths exist in the area under investigation, including other historic surface water drainage courses; former water, sewer, and natural gas lines; and, various cut and fill areas which are

Linda Elliott, Project Manager
Sites Management Section
Waterbury, Vermont

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common in such a heavily developed area with a long history. No drawings were available, for example, showing all of the storm sewer connections to the catch basins, as they are "too numerous".

CONCLUSIONS

1. All of the reports of fumes appear to cluster around the intersection of Merchants Row and West Street.
2. There are approximately 75 underground storage tanks indicated within a radius of approximately 500 feet from the intersection of Merchants Row and West Street (not including many fuel/heating oil tanks and fill pipes not included in this scope). Records provided to us by the UST Program list only ten USTs in the vicinity.
3. The sewer and water lines, and the various locations of both cut and fill likely located in such a heavily developed area represent a multitude of potential preferential pathways for migration of contaminants.
4. There is an historic natural stream channel (preferential pathway) indicated on the map by a dashed blue line and subsequently by a blue sewer line. The channel is shown beginning on Church Street, crossing Willow Street and passing through the vicinity of the former Woolworth's building. This channel apparently continues across Merchants Row and heads diagonally through the block of buildings on the western side of Merchants Row and onto West Street near the current location of the "Stop Light Lounge".
5. Each of the buildings reporting fumes are located in proximity to one or more potential sources of petroleum releases, and one or more potential preferential pathways for migration of groundwater or free product.
6. The Marble Bank and the combined storm sewer catch basin at the southeast corner of the intersection of West Street and Evelyn had the two highest recorded PID readings immediately following the reports of the petroleum odors.

Linda Elliott, Project Manager
Sites Management Section
Waterbury, Vermont

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7. The initial fumes dissipated relatively quickly after they were reported, and no additional reports of odors have been made to The Johnson Company, or to either City or State officials, as far as we are aware, as of the date of this writing.

Numerous possible explanations for the reports of fumes can be offered, but these are speculation at this point and must be viewed as hypothetical situations. However, the following examples of possible explanations illustrate the complexity of the situation.

- a) The fumes could result from a one time event, such as a release of petroleum hydrocarbons directly to the sewer system.
- b) A second scenario is that an underground source of contamination released the petroleum hydrocarbons in the subsurface, within close proximity to the city sewer lines, and/or one or more other preferential pathways, and the release was eventually introduced into the city sewer through inflow and infiltration, or by being pumped into the sewer after having been intercepted by a building drain or sump.
- c) A third possibility is that a recent subsurface disturbance such as an excavation or the activation of a remedial system may have contributed to the mobilization of petroleum product and/or vapors in the subsurface.

Another hypothetical explanation is the combination of one or more of the above, and that the many fume reports are actually due to multiple sources and combinations of migratory paths.

We also do not know whether or not the precipitation that preceded the reported fumes in June was a coincidence or part of the cause of the problems. The rainfall could have mobilized product or dissolved contaminants in the subsurface. However, the rainfall may have been a coincidence, and not at all connected with the reports of fumes.

RECOMMENDATIONS

The Johnson Company recommends preparing for a quick response to any future reports of fumes. Some tasks will need to be completed prior responding to additional reports of fumes, while some tasks need

Linda Elliott, Project Manager
Sites Management Section
Waterbury, Vermont

July 26, 1994
Page 5

only be completed after the recurrence of the fumes.

A) All the occupants along Merchant's Row and West Street, in the affected area should be advised of the efforts underway to figure out the source(s) and causation for the fumes. Each should be encouraged to report any petroleum hydrocarbon fumes. We propose to provide to the affected parties the names and appropriate home phone numbers of Johnson Company personnel that will be "on call" in the event of a recurrence of the petroleum fumes. This will provide us with the earliest possible notice, and allow us to mobilize to Rutland in the least amount of time, and enable us to conduct the most thorough and timely investigations.

B) Each location which reported fumes previously could be provided with a "sampling kit" and instructions on how to properly use the kit to obtain a sample (for later laboratory analysis) as soon as fumes are noted. We recommend that this measure be initiated only for those parties that indicate an interest and desire to participate in this manner.

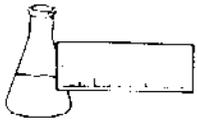
C) Upon receipt of a report of petroleum fumes, The Johnson Company project team would proceed to Rutland equipped with additional sampling and monitoring equipment to obtain samples; take PID readings from the appropriate buildings' indoor air quality, sewer catch basins, and any other indicated locations; and, to obtain water level measurements from the proximate groundwater monitoring wells contemporaneously with the reports of fumes. (The need to obtain water level measurements will necessitate prior preparatory coordination with the responsible parties for each of the sites in the vicinity that are currently under active SMS management, and have monitoring wells located on-site. The locations of the monitoring wells on each site will be added to the Site Map, and keys for any locks on the wells will be obtained from the appropriate party in preparation for this task.)

D) Samples of any contaminated waters collected by the parties reporting the fumes will be gathered, labeled, and the chain of custody documented by The Johnson Company, Inc.

E) Samples obtained of any "free product", including samples containing a "sheen", will be analyzed in a laboratory experienced in identifying what product(s) are present in a given sample. The results of this task will indicate if more than one type of petroleum product is involved, and similarly, could be critical to determining the source(s) of the release(s).

Appendix C

Endyne, Inc. Laboratory Reports on Indoor Air Analysis



ENDYNE, INC.

Laboratory Services

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

REPORT OF LABORATORY ANALYSIS

FEB 7 8 1996

CLIENT: Lincoln Applied Geology
PROJECT NAME: VDEC-Rutland City
REPORT DATE: February 5, 1996
DATE SAMPLED: January 29, 1996

PROJECT CODE: LAVD1696
REF.#: 85,304

Enclosed please find the results of the analyses performed for the samples referenced on the attached chain of custody.

All samples were prepared and analyzed by requirements outlined in the referenced methods and within the specified holding times.

All instrumentation was calibrated with the appropriate frequency and verified by the requirements outlined in the referenced methods.

Blank contamination was not observed at levels affecting the analytical results. Analyte breakthrough to rear sorbent section was not detected unless otherwise noted on report.

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

Reviewed by,

Harry B. Locker, Ph.D.
Laboratory Director

enclosures



ENDYNE, INC.

Laboratory Services

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

LABORATORY REPORT

BTEX/ Volatile Petroleum Hydrocarbons by NIOSH Method 1501

CLIENT: Lincoln Applied Geology
PROJECT NAME: VDEC-Rutland City
REPORT DATE: February 5, 1996
DATE SAMPLED: January 29, 1996
DATE RECEIVED: January 30, 1996
DATE ANALYZED: February 2, 1996

PROJECT CODE: LAVD1696
REF.#: 85,304
STATION: Ellis Living Room
TIME SAMPLED: Not Indicated
SAMPLER: Alan Moore

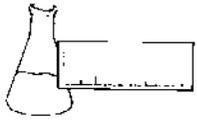
<u>Parameter</u>	<u>Detection Limit (ug)</u>	<u>Amount (ug)</u>
Benzene	1	ND ¹
Ethylbenzene	1	ND
Toluene	1	ND
Xylenes	1	ND
Propylbenzene	1	ND
1,2,4-Trimethylbenzene	1	ND
Butylbenzene	1	ND
Total Volatile Hydrocarbons ²	5	27.8

NUMBER OF UNIDENTIFIED PEAKS FOUND: >10

Notes:

1 None Detected

2 Value calculated as Toluene



ENDYNE, INC.

Laboratory Services

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Williston, Vermont 05495
(802) 879-4333
FAX 879-7103

REPORT OF LABORATORY ANALYSIS

CLIENT: Lincoln Applied Geology
PROJECT NAME: VDEC-Rutland City
REPORT DATE: February 6, 1996
DATE SAMPLED: February 1, 1996

PROJECT CODE: LAVD1724
REF.#: 85,367

Enclosed please find the results of the analyses performed for the samples referenced on the attached chain of custody.

All samples were prepared and analyzed by requirements outlined in the referenced methods and within the specified holding times.

All instrumentation was calibrated with the appropriate frequency and verified by the requirements outlined in the referenced methods.

Blank contamination was not observed at levels affecting the analytical results. Analyte breakthrough to rear sorbent section was not detected unless otherwise noted on report.

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

Reviewed by,

Harry B. Locker, Ph.D.
Laboratory Director

enclosures



ENDYNE, INC.

Laboratory Services

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

LABORATORY REPORT

BTEX/ Volatile Petroleum Hydrocarbons by NIOSH Method 1501

CLIENT: Lincoln Applied Geology
PROJECT NAME: VDEC-Rutland City
REPORT DATE: February 6, 1996
DATE SAMPLED: February 1, 1996
DATE RECEIVED: February 2, 1996
DATE ANALYZED: February 2, 1996

PROJECT CODE: LAVD1696
REF.#: 85,367
STATION: Ellis Living Room
TIME SAMPLED: Not Indicated
SAMPLER: B. Norland/ S. Larosa

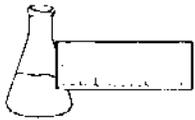
<u>Parameter</u>	<u>Detection Limit (ug)</u>	<u>Amount (ug)</u>
Benzene	1	ND ¹
Ethylbenzene	1	ND
Toluene	1	ND
Xylenes	1	ND
Propylbenzene	1	ND
1,2,4-Trimethylbenzene	1	ND
Butylbenzene	1	ND
Total Volatile Hydrocarbons ²	5	18.7

NUMBER OF UNIDENTIFIED PEAKS FOUND: >10

Notes:

1 None Detected

2 Value calculated as Toluene



ENDYNE, INC.

Laboratory Services

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

LABORATORY REPORT

Desorption Efficiency by NIOSH Method 1501

CLIENT: Lincoln Applied Geology
PROJECT NAME: VDEC-Rutland City

PROJECT CODE: LAVD1724
DATE ANALYZED: February 2, 1996

<u>Parameter</u>	<u>Desorption Efficiency</u>
Benzene	91%
Ethylbenzene	93%
Toluene	91%
Xylenes	90%
Propylbenzene	94%
1,2,4-Trimethylbenzene	85%
Butylbenzene	93%

CHAIN-OF-CUSTODY RECORD

17472

Project Name: <i>Rutland City/VOEC</i>	Reporting Address: <i>LAG, RD 1 Box 710, Bristol, VT 05443</i>	Billing Address: <i>- Same -</i>
Site Location: <i>Rutland, VT</i>		
Endyne Project Number: <i>LAVD 1724</i>	Company: <i>Same</i> Contact Name/Phone #: <i>(802) 453-4384</i>	Sampler Name: <i>Bill Norland / Steve LaRosa</i> Phone #: <i>- Same -</i>

Lab #	Sample Location	Matrix	G R A B	C O M P	Date/Time	Sample Containers		Field Results/Remarks	Analysis Required	Sample Preservation	Rush
						No.	Type/Size				
<i>85, 367</i>	<i>Ellis Living Room</i>	<i>Carbon</i>		<input checked="" type="checkbox"/>	<i>2/1/96</i>	<i>1</i>	<i>400/200</i>	<i>67 min @ 0.5 lpm</i>	<i>BTEX *</i>	<i>none</i>	
								<i>and * total volatile hydrocarbons</i>			

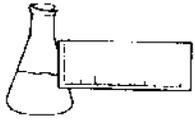
Relinquished by: Signature <i>William Norland</i> <i>2/1/96</i>	Received by: Signature <i>Kenneth Reder</i>	Date/Time <i>2-2-96 / 7:10 AM</i>
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Relinquished by: Signature <i>Kenneth Reder</i>	Received by: Signature <i>Ken Bean</i>	Date/Time <i>2/2/96 / 10:40 AM</i>
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New York State Project: Yes No

Requested Analyses

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



ENDYNE, INC.

Laboratory Services

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

REPORT OF LABORATORY ANALYSIS

CLIENT: Lincoln Applied Geology ^{Feb 19}
PROJECT NAME: VDEC Rutland City
DATE REPORTED: February 15, 1996
DATE SAMPLED: February 8 - 9, 1996

PROJECT CODE: LAVD1801
REF. #: 85,617 - 85,619

Enclosed please find the results of the analyses performed for the samples referenced on the attached chain of custody record.

All samples were prepared and analyzed by requirements outlined in the referenced methods and within the specified holding times.

All instrumentation was calibrated with the appropriate frequency and verified by the requirements outlined in the referenced methods.

Blank contamination was not observed at levels affecting the analytical results. Analyte breakthrough to rear sorbent section was not observed unless otherwise noted.

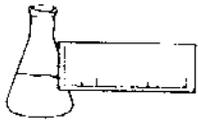
Analytical method precision and accuracy was monitored by laboratory control standards which included matrix spike, duplicate and quality control analyses. These standards were determined to be within established laboratory method acceptance limits.

Reviewed by,

Harry B. Locker, Ph.D.
Laboratory Director

LINCOLN APPLIED GEOLOGY

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ENDYNE, INC.

Laboratory Services

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Williston, Vermont 05495
(802) 879-4333
FAX 879-7103

LABORATORY REPORT

BTEX/VOLATILE HYDROCARBONS BY NIOSH METHOD 1501

CLIENT: Lincoln Applied Geology
PROJECT NAME: VDEC Rutland City
REPORT DATE: February 15, 1996
DATE SAMPLED: February 8, 1996
DATE RECEIVED: February 9, 1996

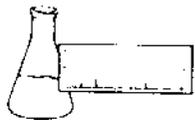
PROJECT CODE: LAVD1801
ANALYSIS DATE: February 14, 1996
STATION: Living Room 1140 min @ 0.5 lpm
REF. #: 85,617
TIME SAMPLED: Not Indicated
SAMPLER: Moore

<u>Parameter</u>	<u>Detection Limit (ug)</u>	<u>AMOUNT (ug)</u>
Benzene	1	4.55
Ethylbenzene	1	TBQ ¹
Toluene	1	8.65
Total Xylenes	1	2.70
Propyl benzene	1	2.42
1,2,4 Trimethyl benzene	1	5.61
Butyl benzene	1	6.64
Total Other Hydrocarbons ²	1	134.

Notes:

- 1 Trace below quantitation limit
- 2 Value calculated as Toluene

10
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ENDYNE, INC.

Laboratory Services

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Williston, Vermont 05495
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LABORATORY REPORT

BTEX/VOLATILE HYDROCARBONS BY NIOSH METHOD 1501

CLIENT: Lincoln Applied Geology
PROJECT NAME: VDEC Rutland City
REPORT DATE: February 15, 1996
DATE SAMPLED: February 9, 1996
DATE RECEIVED: February 9, 1996

PROJECT CODE: LAVD1801
ANALYSIS DATE: February 14, 1996
STATION: Living Room 392 min @ 0.51 lpm
REF. #: 85,618
TIME SAMPLED: Not Indicated
SAMPLER: Moore

<u>Parameter</u>	<u>Detection Limit (ug)</u>	<u>AMOUNT (ug)</u>
Benzene	1	2.80
Ethylbenzene	1	ND ¹
Toluene	1	4.77
Total Xylenes	1	ND
Propyl benzene	1	ND
1,2,4 Trimethyl benzene	1	1.47
Butyl benzene	1	1.96
Total Other Hydrocarbons ²	1	113.

Notes:

- 1 None detected
- 2 Value calculated as Toluene

APPLIED GEOL.



ENDYNE, INC.

Laboratory Services

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LABORATORY REPORT

BTEX/VOLATILE HYDROCARBONS BY NIOSH METHOD 1501

CLIENT: Lincoln Applied Geology
PROJECT NAME: VDEC Rutland City
REPORT DATE: February 15, 1996
DATE SAMPLED: February 9, 1996
DATE RECEIVED: February 9, 1996

PROJECT CODE: LAVD1801
ANALYSIS DATE: February 14, 1996
STATION: Trip Blank
REF. #: 85,619
TIME SAMPLED: Not Indicated
SAMPLER: Moore

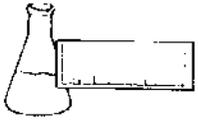
<u>Parameter</u>	<u>Detection Limit (ug)</u>	<u>AMOUNT (ug)</u>
Benzene	1	ND ¹
Ethylbenzene	1	ND
Toluene	1	ND
Total Xylenes	1	ND
Propyl benzene	1	ND
1,2,4 Trimethyl benzene	1	ND
Butyl benzene	1	ND
Total Other Hydrocarbons ²	1	ND

Notes:

- 1 None detected
- 2 Value calculated as Toluene

FL 1083

LINCOLN APPLIED GEOLOGY



ENDYNE, INC.

Laboratory Services

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Williston, Vermont 05495
(802) 879-4333
FAX 879-7103

LABORATORY REPORT

CLIENT: Lincoln Applied Geology
PROJECT NAME: VDEC - Rutland City

PROJECT CODE: LAVD1801
ANALYSIS DATE: February 14, 1996

Parameter

Desorption Efficiency

Benzene	110.
Ethylbenzene	112.
Toluene	110.
Total Xylenes	110.
Propylbenzene	112.
1,2,4-Trimethyl-benzene	108.
Butyl benzene	108.

CHAIN-OF-CUSTODY RECORD

17830

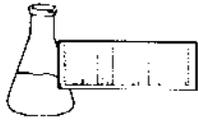
Project Name: VDEC-Rutland City	Reporting Address: RD#1 Box 710 Brz Rd 05443	Billing Address: same
Site Location: ELLIS HOME	Company: LAG	Sampler Name: MOORE
Endyne Project Number: LAVD1801	Contact Name/Phone #: →	Phone #: 453 4384

Lab #	Sample Location	Matrix	G R A B	C O M P	Date/Time	Sample Containers		Field Results/Remarks	Analysis Required	Sample Preservation	Rush
						No.	Type/Size				
85617	LIVING ROOM	AIR		✓	2/8/96	1	carbon	1140 min @ 0.5 lpm	BTEX*	none	
85618	LIVING ROOM	AIR		✓	2/9/96	1	"	392 min @ 0.5 lpm	BTEX*	"	
85619	TRIP BLANK	AIR		✓	2/9/96	1	"	—	BTEX*	"	
								* plus total volatile hydrocarbons			

Relinquished by: Signature Alan Moore	Received by: Signature Joy Good	Date/Time 2/9/96 8:30 AM
Relinquished by: Signature Joy Good	Received by: Signature M. Gaudin	Date/Time 2/9/96 9:00 am

New York State Project: Yes No Requested Analyses

1	pH	6	TKN	11	Total Solids	16	Metals (Specify)	21	EPA 624	26	EPA 8270 B/N or Acid
2	Chloride	7	Total P	12	TSS	17	Coliform (Specify)	22	EPA 625 B/N or A	27	EPA 8010/8020
3	Ammonia N	8	Total Diss. P	13	TDS	18	COD	23	EPA 418.1	28	EPA 8080 Pest/PCB
4	Nitrite N	9	BOD ₅	14	Turbidity	19	BTEX	24	EPA 608 Pest/PCB		MOSH-1501
5	Nitrate N	10	Alkalinity	15	Conductivity	20	EPA 601/602	25	EPA 8240		
29	ICLIP (Specify volatiles, semi-volatiles, metals, pesticides, herbicides)										
(30)	Other (Specify): MOSH-1501 - GC/FID										



ENDYNE, INC.

Laboratory Services

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

REPORT OF LABORATORY ANALYSIS

CLIENT: Lincoln Applied Geology
PROJECT NAME: Rutland/VDEC
DATE REPORTED: February 27, 1996
DATE SAMPLED: February 20, 1996

PROJECT CODE: LARV1908
REF. #: 86,017

Enclosed please find the results of the analyses performed for the samples referenced on the attached chain of custody record.

All samples were prepared and analyzed by requirements outlined in the referenced methods and within the specified holding times.

All instrumentation was calibrated with the appropriate frequency and verified by the requirements outlined in the referenced methods.

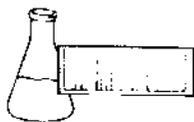
Blank contamination was not observed at levels affecting the analytical results. Analyte breakthrough to rear sorbent section was not observed unless otherwise noted.

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

Reviewed by,

Harry B. Locker, Ph.D.
Laboratory Director

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Laboratory Services

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Williston, Vermont 05495
(802) 879-4333
FAX 879-7103

LABORATORY REPORT

BTEX COMPOUNDS BY NIOSH METHOD 1501

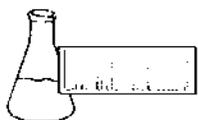
CLIENT: Lincoln Applied Geology
PROJECT NAME: Rutland/VDEC
REPORT DATE: February 27, 1996
DATE SAMPLED: February 20, 1996
DATE RECEIVED: February 21, 1996

PROJECT CODE: LARV1908
REF: 86,017
STATION: Ellis Living Room
TIME SAMPLED: 378 min @ 0.50 Lpm
SAMPLER: Bill Norland

<u>Parameter</u>	<u>Detection Limit (ug)</u>	<u>Amount (ug)</u>
Benzene	1	1.74
Toluene	1	2.40
Ethylbenzene	1	ND ²
Xylenes	1	ND
Propylbenzene	1	ND
1,2,4-Trimethylbenzene	1	ND
Butylbenzene	1	ND
Total Other Hydrocarbons ¹	5	68.7

Notes:

- 1 Value calculated as Toluene
- 2 None detected



ENDYNE, INC.

Laboratory Services

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

LABORATORY REPORT

NIOSH METHOD 1501

ANALYTICAL DESORPTION EFFICIENCY STUDY

CLIENT: Lincoln Applied Geology
PROJECT NAME: Rutland/VDEC
REPORT DATE: February 27, 1996

PROJECT CODE: LARV1908
ANALYSIS DATE: February 26, 1996

<u>Analyte</u>	<u>Percent Recovered</u>
Benzene	98.2
Toluene	99.8
Ethylbenzene	102.
Xylene	98.6
Propylbenzene	102.
1,2,4-Trimethylbenzene	99.0
Butylbenzene	101.

CHAIN-OF-CUSTODY RECORD

17473

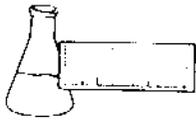
Project Name: <i>Rutland / VDEC</i>	Reporting Address: <i>L.A.G.</i>	Billing Address: <i>same</i>
Site Location: <i>Rutland, VT</i>	<i>RD 1 Box 710 Bristol VT</i>	
Endyne Project Number: <i>LARV1908</i>	Company: <i>LAG</i>	Sampler Name: <i>Bill Norland</i>
	Contact Name/Phone #: <i>same</i>	Phone #: <i>453-4384</i>

Lab #	Sample Location	Matrix	G R A B	C O M P	Date/Time	Sample Containers		Field Results/Remarks	Analysis Required	Sample Preservation	Rush
						No.	Type/Size				
<i>017</i>	<i>Ellis Living Room</i>	<i>Carbon</i>		<i>X</i>	<i>2/20/96</i>	<i>1</i>	<i>Glass Tube</i>	<i>1108-1722 378ml</i>	<i>*</i>	<i>Chilled</i>	
								<i>@ 0.50 lpm</i>			
								<i>BTEX & Total</i>			
								<i>Volatile Hydrocarbons</i>			

Relinquished by: Signature <i>Bill Norland</i>	Received by: Signature <i>Kenneth R. Kelly</i>	Date/Time <i>2-21-96 7:00 + 8:51</i>
Relinquished by: Signature <i>Kenneth R. Kelly</i>	Received by: Signature <i>John Elliott</i>	Date/Time <i>2-21-96 2:30</i>

New York State Project: Yes No Requested Analyses

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



ENDYNE, INC.

Laboratory Services

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

REPORT OF LABORATORY ANALYSIS

CLIENT: Lincoln Applied Geology
PROJECT NAME: VDEC/Rutland
DATE REPORTED: February 27, 1996
DATE SAMPLED: February 20-21, 1996

PROJECT CODE: LAVR1909
REF. #: 86,018

Enclosed please find the results of the analyses performed for the samples referenced on the attached chain of custody record.

All samples were prepared and analyzed by requirements outlined in the referenced methods and within the specified holding times.

All instrumentation was calibrated with the appropriate frequency and verified by the requirements outlined in the referenced methods.

Blank contamination was not observed at levels affecting the analytical results. Analyte breakthrough to rear sorbent section was not observed unless otherwise noted.

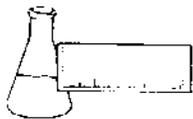
Analytical method precision and accuracy was monitored by laboratory control standards which included matrix spike, duplicate and quality control analyses. These standards were determined to be within established laboratory method acceptance limits.

Reviewed by,

Harry B. Locker, Ph.D.
Laboratory Director

LINCOLN APPLIED GEOLOGY

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ENDYNE, INC.

Laboratory Services

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

LABORATORY REPORT

BTEX COMPOUNDS BY NIOSH METHOD 1501

CLIENT: Lincoln Applied Geology
PROJECT NAME: VDEC/Rutland
REPORT DATE: February 27, 1996
DATE SAMPLED: February 20-21, 1996
DATE RECEIVED: February 21, 1996

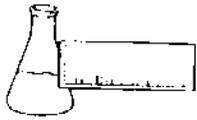
PROJECT CODE: LARV1909
REF: 86,018
STATION: Ellis Basement
TIME SAMPLED: 1,143 min
SAMPLER: James Robideau

<u>Parameter</u>	<u>Detection Limit (ug)</u>	<u>Amount (ug)</u>
Benzene	1	1.24
Toluene	1	TBQ ²
Ethylbenzene	1	ND ³
Xylenes	1	ND
Propylbenzene	1	ND
1,2,4-Trimethylbenzene	1	1.46
Butylbenzene	1	5.34
Total Other Hydrocarbons ¹	5	242.

Notes:

- 1 Value calculated as Toluene
- 2 Trace below quantitation limit
- 3 None detected

LABORATORY SERVICES



ENDYNE, INC.

Laboratory Services

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

LABORATORY REPORT

NIOSH METHOD 1501

ANALYTICAL DESORPTION EFFICIENCY STUDY

CLIENT: Lincoln Applied Geology
PROJECT NAME: VDEC/Rutland
REPORT DATE: February 27, 1996

PROJECT CODE: LAVR1909
ANALYSIS DATE: February 26, 1996

<u>Analyte</u>	<u>Percent Recovered</u>
Benzene	98.2
Toluene	99.8
Ethylbenzene	102.
Xylene	98.6
Propylbenzene	102.
1,2,4-Trimethylbenzene	99.0
Butylbenzene	101.

LINCOLN APPLIED GEOL.

FAX COVER PAGE



RD #1, Box 710
Bristol, Vermont 05443

802-453-4384
Fax 802-453-5399

To: <i>Roseann</i>	
From: <i>Bill Norland</i>	Number of Pages including Cover: <i>2</i>
Notes: <p>RE: COC # 17833</p> <p>Please adjust the total run times for the carbon tube to 1143 minutes as shown on the COC attached.</p> <p>Thanks, <i>Bill Norland</i></p> <p>VDEC Rutland Ellis Besenmont 2/21/96</p>	
Date & Time: <i>2/21/96 @1600</i>	

CHAIN-OF-CUSTODY RECORD

17833

Project Name: <i>Water Pollution</i>	Reporting Address: <i>1001 100th St. 1001 100th St.</i>	Billing Address:
Site Location: <i>RUTLAND, VT</i>	Company: <i>ENDYNE</i>	Sampler Name:
Endyne Project Number:	Contact Name/Phone #:	Phone #:

Lab #	Sample Location	Matrix	G R A B	C O M P	Date/Time	Sample Containers		Field Results/Remarks	Analysis Required	Sample Preservation	Rush
						No.	Type/Size				
	<i>ELL GARAGE</i>				<i>2/21/96</i>	<i>1</i>	<i>600 ml</i>	<i>1.84 mg/L Total</i>			
								<i>Start @ 1728 2/20/96</i>			
								<i>Stop @ 1231 2/21/96</i>			
								<i>Total Run Time = 1143 minutes</i>			
								<i>@ 0.50 Lpm</i>			
								<i>Analyse for</i>			
								<i>BTEX & Total Volatile</i>			
								<i>Hydrocarbons</i>			

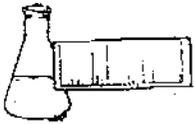
Relinquished by: Signature <i>[Signature]</i>	Received by: Signature <i>[Signature]</i>	Date/Time <i>2-21-96 2:32 PM</i>
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Relinquished by: Signature	Received by: Signature	Date/Time
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New York State Project: Yes No

Requested Analyses

1	pH	6	T&N	11	Total Solids	16	Metals (Specify)	21	EPA 624	26	EPA 8170 D/N or Acid
2	Chloride	7	Total P	12	TSS	17	Coliform (Specify)	22	EPA 625 B/N or A	27	EPA 8010/8020
3	Ammonia-N	8	Total Diss. P	13	TDS	18	COD	23	EPA 412.1	28	EPA 8080 Part/PCB
4	Nitrite-N	9	BOD ₅	14	Turbidity	19	BTEX	24	EPA 601 Part/PCB		
5	Nitrate-N	10	Alkalinity	15	Conductivity	20	EPA 501/602	25	EPA 8340		
25	TCLP (Specify volatiles, semi-volatiles, metals, pesticides, herbicides)										
30	Other (Specify)										

**ENDYNE, INC.****Laboratory Services**

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FAX 879-7103

REPORT OF LABORATORY ANALYSIS

CLIENT: Lincoln Applied Geology
PROJECT NAME: Rutland/VDEC
DATE REPORTED: February 27, 1996
DATE SAMPLED: February 20, 1996

PROJECT CODE: LARV1908
REF. #: 86,017

Enclosed please find the results of the analyses performed for the samples referenced on the attached chain of custody record.

All samples were prepared and analyzed by requirements outlined in the referenced methods and within the specified holding times.

All instrumentation was calibrated with the appropriate frequency and verified by the requirements outlined in the referenced methods.

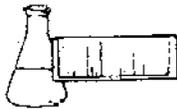
Blank contamination was not observed at levels affecting the analytical results. Analyte breakthrough to rear sorbent section was not observed unless otherwise noted.

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

Reviewed by,

Harry B. Locker, Ph.D.
Laboratory Director

enclosures



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Laboratory Services

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Williston, Vermont 05495
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LABORATORY REPORT

BTEX COMPOUNDS BY NIOSH METHOD 1501

CLIENT: Lincoln Applied Geology
PROJECT NAME: Rutland/VDEC
REPORT DATE: February 27, 1996
DATE SAMPLED: February 20, 1996
DATE RECEIVED: February 21, 1996

PROJECT CODE: LARV1908
REF: 86,017
STATION: Ellis Living Room
TIME SAMPLED: 378 min @ 0.50 Lpm
SAMPLER: Bill Norland

<u>Parameter</u>	<u>Detection Limit (ug)</u>	<u>Amount (ug)</u>
Benzene	1	1.74
Toluene	1	2.40
Ethylbenzene	1	ND ²
Xylenes	1	ND
Propylbenzene	1	ND
1,2,4-Trimethylbenzene	1	ND
Butylbenzene	1	ND
Total Other Hydrocarbons ¹	5	68.7

Notes:

- 1 Value calculated as Toluene
- 2 None detected



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LABORATORY REPORT

Desorption Efficiency by NIOSH Method 1501

CLIENT: Lincoln Applied Geology
PROJECT NAME: VDEC-Rutland City

PROJECT CODE: LAVD1696
DATE ANALYZED: February 2, 1996

<u>Parameter</u>	<u>Desorption Efficiency</u>
Benzene	91%
Ethylbenzene	93%
Toluene	91%
Xylenes	90%
Propylbenzene	94%
1,2,4-Trimethylbenzene	85%
Butylbenzene	93%

CHAIN-OF-CUSTODY RECORD

17475

Project Name: Site Location:	VDEC - Rutland City	Reporting Address:	RD#1 Box 710 Bristol VT	Billing Address:	same
Endyne Project Number:	LAVD1696	Company:	Lincoln Applied Geology	Sampler Name:	A. Moore
		Contact Name/Phone #:		Phone #:	453-4384

Lab #	Sample Location	Matrix	G R A B	C O M P	Date/Time	Sample Containers		Field Results/Remarks	Analysis Required	Sample Preservation	Rush
						No.	Type/Size				
85.304	Ellis Living room	Carbon		✓	9/29/96	1	carbon	34 min. @ 0.5 lpm	BTEX*	none	
								* total volatiles also if possible			

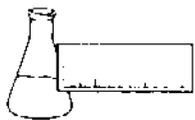
Relinquished by: Signature	<i>Alan Moore</i>	Received by: Signature	<i>Kevin Ben</i>	Date/Time	1/30/96 9:00 A.M.
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Relinquished by: Signature		Received by: Signature		Date/Time	
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New York State Project: Yes No

Requested Analyses

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



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01/13/96

REPORT OF LABORATORY ANALYSIS

CLIENT: Lincoln Applied Geology
PROJECT NAME: VDEC-Rutland City
REPORT DATE: February 5, 1996
DATE SAMPLED: January 26, 1996

PROJECT CODE: LAVD1689
REF.#: 85,293-85,294

Enclosed please find the results of the analyses performed for the samples referenced on the attached chain of custody.

All samples were prepared and analyzed by requirements outlined in the referenced methods and within the specified holding times.

All instrumentation was calibrated with the appropriate frequency and verified by the requirements outlined in the referenced methods.

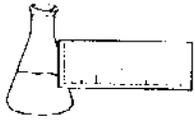
Blank contamination was not observed at levels affecting the analytical results. Analyte breakthrough to rear sorbent section was not detected unless otherwise noted on report.

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

Reviewed by,

Harry B. Locker, Ph.D.
Laboratory Director

enclosures



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Williston, Vermont 05495
(802) 879-4333
FAX 879-7103

LABORATORY REPORT

BTEX/ Volatile Petroleum Hydrocarbons by NIOSH Method 1501

CLIENT: Lincoln Applied Geology
PROJECT NAME: VDEC-Rutland City
REPORT DATE: February 5, 1996
DATE SAMPLED: January 26, 1996
DATE RECEIVED: January 29, 1996
DATE ANALYZED: February 1, 1996

PROJECT CODE: LAVD1689
REF.#: 85,293
STATION: Reception
TIME SAMPLED: Not Indicated
SAMPLER: Alan Moore

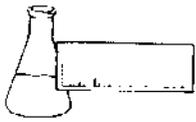
<u>Parameter</u>	<u>Detection Limit (ug)</u>	<u>Amount (ug)</u>
Benzene	1	ND ¹
Ethylbenzene	1	ND
Toluene	1	ND
Xylenes	1	ND
Propylbenzene	1	ND
1,2,4-Trimethylbenzene	1	ND
Butylbenzene	1	ND
Total Volatile Hydrocarbons ²	5	10.2

NUMBER OF UNIDENTIFIED PEAKS FOUND: > 10

Notes:

1 None Detected

2 Value calculated as Toluene



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LABORATORY REPORT

BTEX/ Volatile Petroleum Hydrocarbons by NIOSH Method 1501

CLIENT: Lincoln Applied Geology
PROJECT NAME: VDEC-Rutland City
REPORT DATE: February 5, 1996
DATE SAMPLED: January 26, 1996
DATE RECEIVED: January 29, 1996
DATE ANALYZED: February 1, 1996

PROJECT CODE: LAVD1689
REF.#: 85,294
STATION: Stairwell
TIME SAMPLED: Not Indicated
SAMPLER: Alan Moore

<u>Parameter</u>	<u>Detection Limit (ug)</u>	<u>Amount (ug)</u>
Benzene	1	ND ¹
Ethylbenzene	1	ND
Toluene	1	ND
Xylenes	1	ND
Propylbenzene	1	ND
1,2,4-Trimethylbenzene	1	TBQ ²
Butylbenzene	1	1.78
Total Volatile Hydrocarbons ³	5	101.

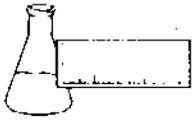
NUMBER OF UNIDENTIFIED PEAKS FOUND: >10

Notes:

- 1 None Detected
- 2 Trace Below Quantitation Limit
- 3 Value calculated as Toluene

100 1 8 1996

100 1 8 1996



ENDYNE, INC.

Laboratory Services

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LABORATORY REPORT

Desorption Efficiency by NIOSH Method 1501

CLIENT: Lincoln Applied Geology
PROJECT NAME: VDEC-Rutland City

PROJECT CODE: LAVD1689
DATE ANALYZED: February 2, 1996

<u>Parameter</u>	<u>Desorption Efficiency</u>
Benzene	91%
Ethylbenzene	93%
Toluene	91%
Xylenes	90%
Propylbenzene	94%
1,2,4-Trimethylbenzene	85%
Butylbenzene	93%

Appendix D

Vermont DEC LaRosa Laboratory Reports

3/25/96

Department of Environmental Conservation Laboratory
Method 8260 - Volatile Organics in Water

GJD

Lab Id: 19594 Report To: BILL NORLAND
Location: LINCOLN BW-1

Phone: 453-4384 Date Collected: 2/26/96
Program: 42 1628 Chain of Custody? No

Notes:

Date Analyzed: 3/08/96 Over hold? No Dilution: 100

Parameter	Units are ug/l		Remark Code	Rel % Diff.	Spiked Dups ?	Percent Recovery
	PQL	Result				
Vinyl chloride	1000	N.D.				
Chloromethane	1000	N.D.				
Bromomethane	1000	N.D.				
Chloroethane	1000	N.D.				
Trichlorofluoromethane	1000	N.D.				
Acetone	10000	N.D.				
1,1-Dichloroethene	500	N.D.				
Carbon disulfide	10000	N.D.				
Methylene chloride	500	N.D.				
Methyl-t-butylether (MTBE)	500	N.D.				
1,2-Dichloroethene	500	N.D.				
1,1-Dichloroethane	500	N.D.				
Vinyl acetate	5000	N.D.				
2-Butanone	10000	N.D.				
Chloroform	500	N.D.				
1,1,1-Trichloroethane	500	N.D.				
Carbon tetrachloride	500	N.D.				
Benzene	500	N.D.				
1,2-Dichloroethane	500	N.D.				
Trichloroethene	500	N.D.				
1,2-Dichloropropane	500	N.D.				
Bromodichloromethane	500	N.D.				
4-Methyl-2-pentanone	5000	N.D.				
cis-1,2-Dichloropropene	500	N.D.				
Toluene	500	N.D.				
trans-1,3-Dichloropropene	500	N.D.				
1,1,2-Trichloroethane	500	N.D.				
2-Hexanone	5000	N.D.				
Tetrachloroethene	500	N.D.				
Dibromochloromethane	500	N.D.				
Chlorobenzene	500	N.D.				
Ethylbenzene	500	N.D.				
Xylenes	500	N.D.				
Styrene	500	N.D.				
Bromoform	500	N.D.				
1,1,2,2-Tetrachloroethane	500	N.D.				
Total Volatile Hydrocarbons	10000	40300	E			

MAR 28 1996

Surrogate Percent Recoveries (S=Surrogate recovery out of range)

Dibromofluoromethane . 92% D8-Toluene 90% 4-Bromofluorobenzene . 82%

Notes:

Remarks: E=Estimated Value J=Value may be in Error O=Value outside Standard Curve

3/25/96

Department of Environmental Conservation Laboratory
Method 8260 - Volatile Organics in Water

GJD

Lab Id: 19593 Report To: BILL NORLAND
Location: LINCOLN BELL SUMP

Phone: 453-4384 Date Collected: 2/26/96
Program: 42 1628 Chain of Custody? No

Notes:

Date Analyzed: 3/08/96 Over hold? No Dilution: 100

Parameter	Units are ug/l		Remark Code	Rel % Diff.	Spiked Dups ?	Percent Recovery
	PQL	Result				
Vinyl chloride	1000	N.D.				
Chloromethane	1000	N.D.				
Bromomethane	1000	N.D.				
Chloroethane	1000	N.D.				
Trichlorofluoromethane	1000	N.D.				
Acetone	10000	N.D.				
1,1-Dichloroethene	500	N.D.				
Carbon disulfide	10000	N.D.				
Methylene chloride	500	N.D.				
Methyl-t-butylether (MTBE)	500	N.D.				
1,2-Dichloroethene	500	N.D.				
1,1-Dichloroethane	500	N.D.				
Vinyl acetate	5000	N.D.				
2-Butanone	10000	N.D.				
Chloroform	500	N.D.				
1,1,1-Trichloroethane	500	N.D.				
Carbon tetrachloride	500	N.D.				
Benzene	500	N.D.				
1,2-Dichloroethane	500	N.D.				
Trichloroethene	500	N.D.				
1,2-Dichloropropane	500	N.D.				
Bromodichloromethane	500	N.D.				
4-Methyl-2-pentanone	5000	N.D.				
cis-1,2-Dichloropropene	500	N.D.				
Toluene	500	N.D.				
trans-1,3-Dichloropropene	500	N.D.				
1,1,2-Trichloroethane	500	N.D.				
2-Hexanone	5000	N.D.				
Tetrachloroethene	500	N.D.				
Dibromochloromethane	500	N.D.				
Chlorobenzene	500	N.D.				
Ethylbenzene	500	N.D.				
Xylenes	500	N.D.				
Styrene	500	N.D.				
Bromoform	500	N.D.				
1,1,2,2-Tetrachloroethane	500	N.D.				
Total Volatile Hydrocarbons	10000	1030000	E			

MAR 11 1996

FIELD GROUP

Surrogate Percent Recoveries (S=Surrogate recovery out of range)

Dibromofluoromethane . 88% D8-Toluene 90% 4-Bromofluorobenzene . 84%

Notes:

Remarks: E=Estimated Value J=Value may be in Error O=Value outside Standard Curve

3/25/96

Department of Environmental Conservation Laboratory
Method 8260 - Volatile Organics in Water

GJD

Lab Id: 19592 Report To: BILL NORLAND
Location: LINCOLN MW-4

Phone: 453-4384 Date Collected: 2/26/96
Program: 42 1628 Chain of Custody? No

Notes:

Date Analyzed: 3/08/96 Over hold? No Dilution: 10

Parameter	Units are ug/l		Remark Code	Rel % Diff.	Spiked Dups ?	Percent Recovery
	PQL	Result				
Vinyl chloride	100	N.D.				
Chloromethane	100	N.D.				
Bromomethane	100	N.D.				
Chloroethane	100	N.D.				
Trichlorofluoromethane	100	N.D.				
Acetone	1000	N.D.				
1,1-Dichloroethene	50	N.D.				
Carbon disulfide	1000	N.D.				
Methylene chloride	50	N.D.				
Methyl-t-butylether (MTBE)	50	N.D.				
1,2-Dichloroethene	50	N.D.				
1,1-Dichloroethane	50	N.D.				
Vinyl acetate	500	N.D.				
2-Butanone	1000	N.D.				
Chloroform	50	N.D.				
1,1,1-Trichloroethane	50	N.D.				
Carbon tetrachloride	50	N.D.				
Benzene	50	N.D.				
1,2-Dichloroethane	50	N.D.				
Trichloroethene	50	N.D.				
1,2-Dichloropropane	50	N.D.				
Bromodichloromethane	50	N.D.				
4-Methyl-2-pentanone	500	N.D.				
cis-1,2-Dichloropropene	50	N.D.				
Toluene	50	80				
trans-1,3-Dichloropropene	50	N.D.				
1,1,2-Trichloroethane	50	N.D.				
2-Hexanone	500	N.D.				
Tetrachloroethene	50	N.D.				
Dibromochloromethane	50	N.D.				
Chlorobenzene	50	N.D.				
Ethylbenzene	50	N.D.				
Xylenes	50	N.D.				
Styrene	50	N.D.				
Bromoform	50	N.D.				
1,1,2,2-Tetrachloroethane	50	N.D.				
Total Volatile Hydrocarbons	1000	39600	E			

Surrogate Percent Recoveries (S=Surrogate recovery out of range)

Dibromofluoromethane . 102% DB-Toluene 88% 4-Bromofluorobenzene . 88%

Notes:

Remarks: E=Estimated Value J=Value may be in Error O=Value outside Standard Curve

3/25/96

Department of Environmental Conservation Laboratory
Method 8260 - Volatile Organics in Water

GJ

Lab Id: 19591 Report To: BILL NORLAND
Location: LINCOLN HA-2

Phone: 453-4384 Date Collected: 2/26/96
Program: 42 1628 Chain of Custody? No

Notes:

Date Analyzed: 3/07/96 Over hold? No Dilution: 10

Parameter	Units are ug/l		Remark Code	Rel % Diff.	Spiked Dups ?	Percent Recovery
	PQL	Result				
Vinyl chloride	100	N.D.				
Chloromethane	100	N.D.				
Bromomethane	100	N.D.				
Chloroethane	100	N.D.				
Trichlorofluoromethane	100	N.D.				
Acetone	1000	N.D.				
1,1-Dichloroethene	50	N.D.				
Carbon disulfide	1000	N.D.				
Methylene chloride	50	N.D.				
Methyl-t-butylether (MTBE)	50	N.D.				
1,2-Dichloroethene	50	N.D.				
1,1-Dichloroethane	50	N.D.				
Vinyl acetate	500	N.D.				
2-Butanone	1000	N.D.				
Chloroform	50	N.D.				
1,1,1-Trichloroethane	50	N.D.				
Carbon tetrachloride	50	N.D.				
Benzene	50	N.D.				
1,2-Dichloroethane	50	N.D.				
Trichloroethene	50	N.D.				
1,2-Dichloropropane	50	N.D.				
Bromodichloromethane	50	N.D.				
4-Methyl-2-pentanone	500	N.D.				
cis-1,2-Dichloropropene	50	N.D.				
Toluene	50	N.D.				
trans-1,3-Dichloropropene	50	N.D.				
1,1,2-Trichloroethane	50	N.D.				
2-Hexanone	500	N.D.				
Tetrachloroethene	50	N.D.				
Dibromochloromethane	50	N.D.				
Chlorobenzene	50	N.D.				
Ethylbenzene	50	N.D.				
Xylenes	50	N.D.				
Styrene	50	N.D.				
Bromoform	50	N.D.				
1,1,2,2-Tetrachloroethane	50	N.D.				
Total Volatile Hydrocarbons	1000	N.D.				

MAR 28 1996

Surrogate Percent Recoveries (S=Surrogate recovery out of range)

Dibromofluoromethane . 100% D8-Toluene 90% 4-Bromofluorobenzene . 82%

Notes: Sample contained traces of C3 and C4 alkyl benzenes.

Remarks: E=Estimated Value J=Value may be in Error O=Value outside Standard Curve

3/25/96

Department of Environmental Conservation Laboratory
Method 8260 - Volatile Organics in Water

GJD

Lab Id: 19590 Report To: BILL NORLAND
Location: LINCOLN HA-1

Phone: 453-4384 Date Collected: 2/26/96
Program: 42 1628 Chain of Custody? No

Notes:

Date Analyzed: 3/08/96 Over hold? No Dilution: 5

Parameter	Units are ug/l		Remark Code	Rel % Diff.	Spiked Dups ?	Percent Recovery
	PQL	Result				
Vinyl chloride	50	N.D.				
Chloromethane	50	N.D.				
Bromomethane	50	N.D.				
Chloroethane	50	N.D.				
Trichlorofluoromethane	50	N.D.				
Acetone	500	N.D.				
1,1-Dichloroethene	25	N.D.				
Carbon disulfide	500	N.D.				
Methylene chloride	25	N.D.				
Methyl-t-butylether (MTBE)	25	N.D.				
1,2-Dichloroethene	25	N.D.				
1,1-Dichloroethane	25	N.D.				
Vinyl acetate	250	N.D.				
2-Butanone	500	N.D.				
Chloroform	25	N.D.				
1,1,1-Trichloroethane	25	N.D.				
Carbon tetrachloride	25	N.D.				
Benzene	25	N.D.				
1,2-Dichloroethane	25	N.D.				
Trichloroethene	25	N.D.				
1,2-Dichloropropane	25	N.D.				
Bromodichloromethane	25	N.D.				
4-Methyl-2-pentanone	250	N.D.				
cis-1,2-Dichloropropene	25	N.D.				
Toluene	25	N.D.				
trans-1,3-Dichloropropene	25	N.D.				
1,1,2-Trichloroethane	25	N.D.				
2-Hexanone	250	N.D.				
Tetrachloroethene	25	N.D.				
Dibromochloromethane	25	N.D.				
Chlorobenzene	25	N.D.				
Ethylbenzene	25	N.D.				
Xylenes	25	N.D.				
Styrene	25	N.D.				
Bromoform	25	N.D.				
1,1,2,2-Tetrachloroethane	25	N.D.				
Total Volatile Hydrocarbons	500	330	E			

MAR 28 1996

Surrogate Percent Recoveries (S=Surrogate recovery out of range)

Dibromofluoromethane . 96% D8-Toluene 86% 4-Bromofluorobenzene . 82%

Notes:

Remarks: E=Estimated Value J=Value may be in Error O=Value outside Standard Curve

3/25/96,

Department of Environmental Conservation Laboratory
Method 8260 - Volatile Organics in Water

GJD

Lab Id: 19589 Report To: BILL NORLAND
Location: LINCOLN MW-2

Phone: 453-4384 Date Collected: 2/26/96
Program: 42 1628 Chain of Custody? No

Notes:

Date Analyzed: 3/07/96 Over hold? No Dilution: 1

Parameter	Units are ug/l		Remark Code	Rel % Diff.	Spiked Dups ?	Percent Recovery
	PQL	Result				
Vinyl chloride	10	N.D.				
Chloromethane	10	N.D.				
Bromomethane	10	N.D.				
Chloroethane	10	N.D.				
Trichlorofluoromethane	10	N.D.				
Acetone	100	N.D.				
1,1-Dichloroethene	5	N.D.		1	Y	115
Carbon disulfide	100	N.D.				
Methylene chloride	5	N.D.				
Methyl-t-butylether (MTBE)	5	N.D.				
1,2-Dichloroethene	5	N.D.				
1,1-Dichloroethane	5	N.D.				
Vinyl acetate	50	N.D.				
2-Butanone	100	N.D.				
Chloroform	5	N.D.				
1,1,1-Trichloroethane	5	N.D.				
Carbon tetrachloride	5	N.D.				
Benzene	5	N.D.		11	Y	99
1,2-Dichloroethane	5	N.D.				
Trichloroethene	5	N.D.		7	Y	108
1,2-Dichloropropane	5	N.D.				
Bromodichloromethane	5	N.D.				
4-Methyl-2-pentanone	50	N.D.				
cis-1,2-Dichloropropene	5	N.D.				
Toluene	5	N.D.		8	Y	105
trans-1,3-Dichloropropene	5	N.D.				
1,1,2-Trichloroethane	5	N.D.				
2-Hexanone	50	N.D.				
Tetrachloroethene	5	N.D.				
Dibromochloromethane	5	N.D.				
Chlorobenzene	5	N.D.		11	Y	108
Ethylbenzene	5	N.D.				
Xylenes	5	N.D.				
Styrene	5	N.D.				
Bromoform	5	N.D.				
1,1,2,2-Tetrachloroethane	5	N.D.				
Total Volatile Hydrocarbons	100	N.D.				

MAR 28 1996

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Surrogate Percent Recoveries (S=Surrogate recovery out of range)

Dibromofluoromethane . 98% D8-Toluene 94% 4-Bromofluorobenzene . 82%

Notes:

Remarks: E=Estimated Value J=Value may be in Error O=Value outside Standard Curve

3/25/96

Department of Environmental Conservation Laboratory
Method 8260 - Volatile Organics in Water

GJD

Lab Id: 19588 Report To: BILL NORLAND
Location: LINCOLN MW5

Phone: 453-4384 Date Collected: 2/26/96
Program: 42 1628 Chain of Custody? No

Notes:

Date Analyzed: 3/07/96 Over hold? No Dilution: 1

Parameter	Units are ug/l		Remark Code	Rel % Diff.	Spiked Dups ?	Percent Recovery
	PQL	Result				
Vinyl chloride	10	N.D.				
Chloromethane	10	N.D.				
Bromomethane	10	N.D.				
Chloroethane	10	N.D.				
Trichlorofluoromethane	10	N.D.				
Acetone	100	N.D.				
1,1-Dichloroethene	5	N.D.				
Carbon disulfide	100	N.D.				
Methylene chloride	5	N.D.				
Methyl-t-butylether (MTBE)	5	N.D.				
1,2-Dichloroethene	5	N.D.				
1,1-Dichloroethane	5	N.D.				
Vinyl acetate	50	N.D.				
2-Butanone	100	N.D.				
Chloroform	5	N.D.				
1,1,1-Trichloroethane	5	N.D.				
Carbon tetrachloride	5	N.D.				
Benzene	5	N.D.				
1,2-Dichloroethane	5	N.D.				
Trichloroethene	5	N.D.				
1,2-Dichloropropane	5	N.D.				
Bromodichloromethane	5	N.D.				
4-Methyl-2-pentanone	50	N.D.				
cis-1,2-Dichloropropene	5	N.D.				
Toluene	5	22		4		
trans-1,3-Dichloropropene	5	N.D.				
1,1,2-Trichloroethane	5	N.D.				
2-Hexanone	50	N.D.				
Tetrachloroethene	5	N.D.				
Dibromochloromethane	5	N.D.				
Chlorobenzene	5	N.D.				
Ethylbenzene	5	N.D.				
Xylenes	5	N.D.				
Styrene	5	N.D.				
Bromoform	5	N.D.				
1,1,2,2-Tetrachloroethane	5	N.D.				
Total Volatile Hydrocarbons	100	N.D.				

MAR 28 1996

Surrogate Percent Recoveries (S=Surrogate recovery out of range)

Dibromofluoromethane . 98% DB-Toluene 88% 4-Bromofluorobenzene . 78%

Notes:

Remarks: E=Estimated Value J=Value may be in Error O=Value outside Standard Curve

3/25/96

Department of Environmental Conservation Laboratory
Method 8260 - Volatile Organics in Water

GJJ

Lab Id: 19587 Report To: BILL NORLAND
Location: LINCOLN MW-3

Phone: 453-4384 Date Collected: 2/26/96
Program: 42 1628 Chain of Custody? No

Notes:

Date Analyzed: 3/08/96 Over hold? No Dilution: 10

Parameter	Units are ug/l		Remark Code	Rel % Diff.	Spiked Dups ?	Percent Recovery
	PQL	Result				
Vinyl chloride	100	N.D.				
Chloromethane	100	N.D.				
Bromomethane	100	N.D.				
Chloroethane	100	N.D.				
Trichlorofluoromethane	100	N.D.				
Acetone	1000	N.D.				
1,1-Dichloroethene	50	N.D.				
Carbon disulfide	1000	N.D.				
Methylene chloride	50	N.D.				
Methyl-t-butylether (MTBE)	50	N.D.				
1,2-Dichloroethene	50	N.D.				
1,1-Dichloroethane	50	N.D.				
Vinyl acetate	500	N.D.				
2-Butanone	1000	N.D.				
Chloroform	50	N.D.				
1,1,1-Trichloroethane	50	N.D.				
Carbon tetrachloride	50	N.D.				
Benzene	50	N.D.				
1,2-Dichloroethane	50	N.D.				
Trichloroethene	50	N.D.				
1,2-Dichloropropane	50	N.D.				
Bromodichloromethane	50	N.D.				
4-Methyl-2-pentanone	500	N.D.				
cis-1,2-Dichloropropene	50	N.D.				
Toluene	50	110				
trans-1,3-Dichloropropene	50	N.D.				
1,1,2-Trichloroethane	50	N.D.				
2-Hexanone	500	N.D.				
Tetrachloroethene	50	N.D.				
Dibromochloromethane	50	N.D.				
Chlorobenzene	50	N.D.				
Ethylbenzene	50	N.D.				
Xylenes	50	N.D.				
Styrene	50	N.D.				
Bromoform	50	N.D.				
1,1,2,2-Tetrachloroethane	50	N.D.				
Total Volatile Hydrocarbons	1000	1340	E			

6
LINCOLN APPLIED GEOLOGY, INC.

Surrogate Percent Recoveries (S=Surrogate recovery out of range)

Dibromofluoromethane . 98% D8-Toluene 90% 4-Bromofluorobenzene . 82%

Notes:

Remarks: E=Estimated Value J=Value may be in Error O=Value outside Standard Curve

3/25/96

Department of Environmental Conservation Laboratory
Method 8260 - Volatile Organics in Water

GJD

Lab Id: 19586 Report To: BILL NORLAND
Location: LINCOLN MW-6

Phone: 453-4384 Date Collected: 2/26/96
Program: 42 1628 Chain of Custody? No

Notes:

Date Analyzed: 3/07/96 Over hold? No Dilution: 1

Parameter	Units are ug/l		Remark Code	Rel % Diff.	Spiked Dups ?	Percent Recovery
	PQL	Result				
Vinyl chloride	10	N.D.				
Chloromethane	10	N.D.				
Bromomethane	10	N.D.				
Chloroethane	10	N.D.				
Trichlorofluoromethane	10	N.D.				
Acetone	100	N.D.				
1,1-Dichloroethene	5	N.D.				
Carbon disulfide	100	N.D.				
Methylene chloride	5	N.D.				
Methyl-t-butylether (MTBE)	5	N.D.				
1,2-Dichloroethene	5	N.D.				
1,1-Dichloroethane	5	N.D.				
Vinyl acetate	50	N.D.				
2-Butanone	100	N.D.				
Chloroform	5	N.D.				
1,1,1-Trichloroethane	5	N.D.				
Carbon tetrachloride	5	N.D.				
Benzene	5	N.D.				
1,2-Dichloroethane	5	N.D.				
Trichloroethene	5	N.D.				
1,2-Dichloropropane	5	N.D.				
Bromodichloromethane	5	N.D.				
4-Methyl-2-pentanone	50	N.D.				
cis-1,2-Dichloropropene	5	N.D.				
Toluene	5	65				
trans-1,3-Dichloropropene	5	N.D.				
1,1,2-Trichloroethane	5	N.D.				
2-Hexanone	50	N.D.				
Tetrachloroethene	5	N.D.				
Dibromochloromethane	5	N.D.				
Chlorobenzene	5	N.D.				
Ethylbenzene	5	N.D.				
Xylenes	5	N.D.				
Styrene	5	N.D.				
Bromoform	5	N.D.				
1,1,2,2-Tetrachloroethane	5	N.D.				
Total Volatile Hydrocarbons	100	N.D.				

MAR 28 1996

Surrogate Percent Recoveries (S=Surrogate recovery out of range)

Dibromofluoromethane . 98% D8-Toluene 90% 4-Bromofluorobenzene . 82%

Notes:

Remarks: E=Estimated Value J=Value may be in Error O=Value outside Standard Curve

3/25/96

Department of Environmental Conservation Laboratory
Method 8260 - Volatile Organics in Water

GJ

Lab Id: 19585 Report To: BILL NORLAND
Location: LINCOLN MW-1

Phone: 453-4384 Date Collected: 2/26/96
Program: 42 1628 Chain of Custody? No

Notes:

Date Analyzed: 3/07/96 Over hold? No Dilution: 1

Parameter	Units are ug/l		Remark Code	Rel % Diff.	Spiked Dups ?	Percent Recovery
	PQL	Result				
Vinyl chloride	10	N.D.				
Chloromethane	10	N.D.				
Bromomethane	10	N.D.				
Chloroethane	10	N.D.				
Trichlorofluoromethane	10	N.D.				
Acetone	100	N.D.				
1,1-Dichloroethene	5	N.D.				
Carbon disulfide	100	N.D.				
Methylene chloride	5	N.D.				
Methyl-t-butylether (MTBE)	5	N.D.				
1,2-Dichloroethene	5	N.D.				
1,1-Dichloroethane	5	N.D.				
Vinyl acetate	50	N.D.				
2-Butanone	100	N.D.				
Chloroform	5	N.D.				
1,1,1-Trichloroethane	5	N.D.				
Carbon tetrachloride	5	N.D.				
Benzene	5	N.D.				
1,2-Dichloroethane	5	N.D.				
Trichloroethene	5	N.D.				
1,2-Dichloropropane	5	N.D.				
Bromodichloromethane	5	N.D.				
4-Methyl-2-pentanone	50	N.D.				
cis-1,2-Dichloropropene	5	N.D.				
Toluene	5	<5				
trans-1,3-Dichloropropene	5	N.D.				
1,1,2-Trichloroethane	5	N.D.				
2-Hexanone	50	N.D.				
Tetrachloroethene	5	N.D.				
Dibromochloromethane	5	N.D.				
Chlorobenzene	5	N.D.				
Ethylbenzene	5	N.D.				
Xylenes	5	N.D.				
Styrene	5	N.D.				
Bromoform	5	N.D.				
1,1,2,2-Tetrachloroethane	5	N.D.				
Total Volatile Hydrocarbons	100	N.D.				

MAR 28 1996

APPLIED GEOLOGICAL

Surrogate Percent Recoveries (S=Surrogate recovery out of range)

Dibromofluoromethane . 102% D8-Toluene 92% 4-Bromofluorobenzene . 82%

Notes:

Remarks: E=Estimated Value J=Value may be in Error O=Value outside Standard Curve

3/25/96

Department of Environmental Conservation Laboratory
Method 8260 - Volatile Organics in Water

GJ

Lab Id: 19584 Report To: BILL NORLAND
Location: LINCOLN ELLIS SUMP

Phone: 453-4384 Date Collected: 2/26/96
Program: 42 1628 Chain of Custody? No

Notes:

Date Analyzed: 3/07/96 Over hold? No Dilution: 1

Parameter	Units are ug/l		Remark Code	Rel % Diff.	Spiked Dups ?	Percent Recovery
	PQL	Result				
Vinyl chloride	10	N.D.				
Chloromethane	10	N.D.				
Bromomethane	10	N.D.				
Chloroethane	10	N.D.				
Trichlorofluoromethane	10	N.D.				
Acetone	100	N.D.				
1,1-Dichloroethene	5	N.D.				
Carbon disulfide	100	N.D.				
Methylene chloride	5	N.D.				
Methyl-t-butylether (MTBE)	5	N.D.				
1,2-Dichloroethene	5	N.D.				
1,1-Dichloroethane	5	N.D.				
Vinyl acetate	50	N.D.				
2-Butanone	100	N.D.				
Chloroform	5	N.D.				
1,1,1-Trichloroethane	5	N.D.				
Carbon tetrachloride	5	N.D.				
Benzene	5	N.D.				
1,2-Dichloroethane	5	N.D.				
Trichloroethene	5	N.D.				
1,2-Dichloropropane	5	N.D.				
Bromodichloromethane	5	N.D.				
4-Methyl-2-pentanone	50	N.D.				
cis-1,2-Dichloropropene	5	N.D.				
Toluene	5	N.D.				
trans-1,3-Dichloropropene	5	N.D.				
1,1,2-Trichloroethane	5	N.D.				
2-Hexanone	50	N.D.				
Tetrachloroethene	5	N.D.				
Dibromochloromethane	5	N.D.				
Chlorobenzene	5	N.D.				
Ethylbenzene	5	N.D.				
Xylenes	5	N.D.				
Styrene	5	N.D.				
Bromoform	5	N.D.				
1,1,2,2-Tetrachloroethane	5	N.D.				
Total Volatile Hydrocarbons	100	N.D.				

MAR 28 1996

Surrogate Percent Recoveries (S=Surrogate recovery out of range)

Dibromofluoromethane . 92% DB-Toluene 94% 4-Bromofluorobenzene . 80%

Notes:

Remarks: E=Estimated Value J=Value may be in Error O=Value outside Standard Curve

3/25/96

Department of Environmental Conservation Laboratory
Method 8260 - Volatile Organics in Water

GJD

Lab Id: 19583 Report To: BILL NORLAND
Location: LINCOLN TRIP BLANK

Phone: 453-4384 Date Collected: 2/26/96
Program: 42 1628 Chain of Custody? No

Notes:

Date Analyzed: 3/14/96 Over hold? Yes Dilution: 1

Parameter	Units are ug/l		Remark Code	Rel % Diff.	Spiked Dups ?	Percent Recovery
	PQL	Result				
Vinyl chloride	10	N.D.				
Chloromethane	10	N.D.				
Bromomethane	10	N.D.				
Chloroethane	10	N.D.				
Trichlorofluoromethane	10	N.D.				
Acetone	100	N.D.				
1,1-Dichloroethene	5	N.D.				
Carbon disulfide	100	N.D.				
Methylene chloride	5	N.D.				
Methyl-t-butylether (MTBE)	5	N.D.				
1,2-Dichloroethene	5	N.D.				
1,1-Dichloroethane	5	N.D.				
Vinyl acetate	50	N.D.				
2-Butanone	100	N.D.				
Chloroform	5	N.D.				
1,1,1-Trichloroethane	5	N.D.				
Carbon tetrachloride	5	N.D.				
Benzene	5	N.D.				
1,2-Dichloroethane	5	N.D.				
Trichloroethene	5	N.D.				
1,2-Dichloropropane	5	N.D.				
Bromodichloromethane	5	N.D.				
4-Methyl-2-pentanone	50	N.D.				
cis-1,2-Dichloropropene	5	N.D.				
Toluene	5	N.D.				
trans-1,3-Dichloropropene	5	N.D.				
1,1,2-Trichloroethane	5	N.D.				
2-Hexanone	50	N.D.				
Tetrachloroethene	5	N.D.				
Dibromochloromethane	5	N.D.				
Chlorobenzene	5	N.D.				
Ethylbenzene	5	N.D.				
Xylenes	5	N.D.				
Styrene	5	N.D.				
Bromoform	5	N.D.				
1,1,2,2-Tetrachloroethane	5	N.D.				
Total Volatile Hydrocarbons	100	N.D.				

MAR 22 1996

Surrogate Percent Recoveries (S=Surrogate recovery out of range)

Dibromofluoromethane . 108% D8-Toluene 100% 4-Bromofluorobenzene . 80%

Notes:

Remarks: E=Estimated Value J=Value may be in Error O=Value outside Standard Curve

Appendix E

Soil Boring Logs

WELL LOG

Well: HA-1 - In the basement of the Bell house, near the sewer line exit.
Location: Bell property, 45-47 Grant Street, Rutland, Vermont
Driller: Lincoln Applied Geology, Inc. Hand augered monitor well.
Hydrogeologist: William Norland, Lincoln Applied Geology, Inc.
Date: February 16, 1996

Background = BG = 1.0 ppm

Sampling/Coring Depth below Surface (ft)	Core interval (ft)	Description	PID (ppm)
0' - 1'		Moist to wet, dark brown, coarse gravel and cobbles; some fine to coarse sand. Fill.	BG
1' - 3'		Wet, tan grey, fine sandy silt; little fine to medium gravel; trace clay. Sandy glacial till.	1.0
3' - 5.5'		Wet, tan grey, fine sandy silt; little fine to medium gravel; trace clay. Sandy glacial till. Fuel oil odor.	2.8

Well Construction:

Bottom of Boring: 5.5'
Bottom of Well: 5'
Solid Riser: 1.4' (+1' - 0.4') 2" PVC
Well Screen: 4.6' (0.4' - 5') 2" PVC, 0.020" slot
Sand Pack: 4.6' (0.4' - 5')
Bentonite Seal: 0.4' (0' - 0.4')
Backfill: none
Well Box: none, 1' riser stickup

WELL LOG

Well: HA-2 - Between Ellis and Bell houses.
 Location: Bell property, 45-47 Grant Street, Rutland, Vermont
 Driller: Lincoln Applied Geology, Inc. Hand augered monitor well.
 Hydrogeologist: William Norland, Lincoln Applied Geology, Inc.
 Date: February 20, 1996

Background = BG = 1.0 ppm

Sampling/Coring Depth below Surface (ft)	Core Interval (ft)	Description	PID (ppm)
0 - 2.5'		Moist, dark brown, silty fine sand; trace clinders, glass. Fill.	BG
2.5 - 4.4'		Moist to wet, tan to dark brown and mottled rust yellow, very fine sand, some silt; little medium to coarse gravel; trace medium to coarse sand. Sandy glacial till.	BG
4.4' - 6.1'		Moist to wet, tan to dark brown and mottled rust yellow, very fine sand; some silt; little medium to coarse gravel; trace medium to coarse sand. Sandy glacial till. Fuel oil odor, and sheen on water. Refusal at 6.1' on boulder in glacial till.	5.0

Well Construction:

Bottom of Boring: 6.1'
 Bottom of Well: 6.1'
 Solid Riser: 1' (0.3' - 1.3') 2" PVC
 Well Screen: 4.8' (1.3' - 6.1') 2" PVC, 0.020" slot
 Sand Pack: 5' (1.1' - 6.1')
 Bentonite Seal: 0.6' (0.5' - 1.1')
 Backfill: 0.2' (0.3' - 0.5')
 Well Box: Cemented flush with grade.

WELL LOG

Well: MW-2 - Near abandoned fuel oil UST, between Ellis and Bell properties.
 Location: Ellis property, 28 Elm Street, Rutland, Vermont
 Driller: Gerry Adams, Adams Engineering, Underhill, Vermont. Vibratory Soil cores.
 Hydrogeologist: William Norland, Lincoln Applied Geology, Inc.
 Date: February 19, 1996

Background = BG = 1.0 ppm

Sampling/Coring Depth below Surface (ft)	Core Interval (ft)	Description	PID (ppm)
0' - 2'		Dry, brown, fine sandy silt. 0.5' of frost. Fill.	
2' - 4.9' (2.9' recovery)			
2' - 2.6'	0' - 0.6'	Moist, dark brown, fine sandy silt; little medium sand.	BG
2.6' - 3.3'	0.6' - 1.3'	Moist, mottled olive and rust, silt; some very fine sand; trace clay.	BG
3.3' - 4.1'	1.3' - 2.1'	Moist, dark brown, silt; some very fine sand; trace clay.	0.6
4.1' - 4.9'	2.1' - 2.9'	Moist, grey and mottled olive, very fine sand; little silt, fine sand.	8.4
		Fuel oil odor.	
4.9' - 9.9' (5.0' recovery)			
4.9' - 5.9'	0' - 1.0'	Wet, olive with rust, very fine sand; some silt, fine sand.	0.6
5.9' - 9.9'	1.0' - 4.5'	Wet, tan with grey mottles to 0.6' (1.6'), fine to medium sand; little fine to coarse gravel; trace clay. Sandy glacial till.	0.4

Well Construction:

Bottom of Boring: 9.9'
 Bottom of Well: 9'
 Solid Riser: 3.7' (0.3' - 4'), 1.5' PVC
 Well Screen: 5' (4' - 9') 1.5" PVC, 0.010" slot
 Sand Pack: 7' (2' - 9')
 Bentonite Seal: 1' (1' - 2')
 Backfill: 0.6' (0.4' - 1')
 Well Box: Cemented flush with grade.

WELL LOG

Well: MW-3 - In front of Ellis residence in driveway.
 Location: Ellis property, 28 Elm Street, Rutland, Vermont
 Driller: Gerry Adams, Adams Engineering, Underhill, Vermont. Vibratory Soil cores.
 Hydrogeologist: William Norland, Lincoln Applied Geology, Inc.
 Date: February 19, 1996

Background = BG = 1.0 ppm

Sampling/Coring Depth below Surface (ft)	Core Interval (ft)	Description	PID (ppm)
0' - 1.6'		Moist, dark brown, <u>fine sandy silt</u> . <u>Fill</u> .	
1.6' - 4.9' (3.3' recovery)			
1.6' - 2'	0' - 0.4'	Moist, dark brown, <u>fine sand and silt</u> ; trace cinders, gravel. <u>Fill</u> .	BG
2' - 2.4'	0.4' - 0.8'	Moist, brown, <u>fine sand</u> ; some medium sand; little silt. <u>Fill</u> .	BG
2.4' - 2.8'	0.8' - 1.2'	Moist, buff and grey, <u>cinder fill</u> .	BG
2.8' - 3.5'	1.2' - 1.9'	Moist, brown, <u>silt</u> ; some very fine sand; trace clay.	BG
3.5' - 4.6'	1.9' - 3'	Moist, olive tan with grey and rust mottles; <u>silt</u> ; little very fine sand; trace clay.	BG
4.6' - 4.9'	3' - 3.3'	Wet, olive tan, <u>fine sand</u> ; some silt; little fine to coarse gravel; trace medium sand, clay. <u>Sandy glacial till</u> .	BG
4.9' - 9.9' (3.3' recovery)			
4.9' - 6.9'	0' - 2'	Wet, mottled olive tan, <u>fine sand</u> ; some silt, medium sand; little fine to coarse gravel; trace clay. <u>Sandy glacial till</u> .	BG
6.9' - 8.2'	2' - 3.3'	Wet, tan, <u>fine sand</u> ; some silt, medium sand; little fine to coarse gravel; trace clay. <u>Sandy glacial till</u> .	BG

Well Construction:

Bottom of Boring: 9.9'
 Bottom of Well: 9'
 Solid Riser: 3.7 (0.3' - 4'), 1.5" PVC
 Well Screen: 5' (4' - 9') 1.5" PVC, 0.010" slot
 Sand Pack: 7' (2' - 9')
 Bentonite Seal: 1' (1' - 2')
 Backfill: 0.6' (0.4' - 1')
 Well Box: Cemented flush with grade.

WELL LOG

Well: MW-4 - Between Ellis and Bell properties near front.
 Location: Ellis property, 28 Elm Street, Rutland, Vermont
 Driller: Gerry Adams, Adams Engineering, Underhill, Vermont. Vibratory Soil cores.
 Hydrogeologist: William Norland, Lincoln Applied Geology, Inc.
 Date: February 19, 1996

Background = BG = 1.0 ppm

Sampling/Coring Depth below Surface (ft)	Core Interval (ft)	Description	PID (ppm)
0' - 2'		Moist, dark brown, <u>silty fine sand</u> . <u>Fill</u> .	
2' - 4.9' (2.9' recovery)			
2' - 2.7'	0' - 0.7'	Moist, dark brown, <u>silty fine sand</u> . <u>Fill</u> .	BG
2.7' - 4.2'	0.7' - 2.2'	Moist, brown with olive mottles, <u>silt</u> ; some very fine sand; little gravel; trace glass. <u>Fill</u> .	BG
4.2' - 4.9'	2.2' - 2.9'	Moist to wet, olive with rust and brown mottles; <u>silt</u> ; some very fine sand, fine sand; trace coarse gravel.	BG
4.9' - 9.9' (3.1' recovery)			
4.9' - 5.2'	0' - 0.3'	Wet, olive tan with rust yellow, <u>fine sand</u> ; some silt; little fine to coarse gravel. <u>Sandy glacial till</u> .	13.4
5.2' - 6.9'	0.3' - 2'	Wet, olive tan with grey-black zone, <u>fine sand</u> ; some silt; little fine to coarse gravel. <u>Sandy glacial till</u> . Strong fuel oil odor. Permeable.	23
6.9' - 8'	2' - 3.1'	Wet, olive tan, <u>fine sand</u> ; some silt; little fine to coarse gravel. <u>Sandy glacial till</u> . Faint fuel oil odor. Denser, less permeable till.	13.4

Well Construction:

Bottom of Boring: 9.9'
 Bottom of Well: 9'
 Solid Riser: 3.7' (0.3' - 4'), 1.5" PVC
 Well Screen: 5' (4' - 9') 1.5" PVC, 0.010" slot
 Sand Pack: 7.5' (1.5' - 9')
 Bentonite Seal: 0.5' (1' - 1.5')
 Backfill: 0.6' (0.4' - 1')
 Well Box: Cemented flush with grade.

WELL LOG

Well: MW-5 - Bell property front lawn, between water and sewer line.
 Location: Bell property, 45-47 Grant Street, Rutland, Vermont
 Driller: Gerry Adams, Adams Engineering, Underhill, Vermont. Vibratory Soil cores.
 Hydrogeologist: William Norland, Lincoln Applied Geology, Inc.
 Date: February 19, 1996

Background = BG = 1.0 ppm

Sampling/Coring Depth below Surface (ft)	Core Interval (ft)	Description	PID (ppm)
0' - 2'		Moist, brown, silty fine sand. <u>Fill</u> .	
2' - 5' (2.8' recovery)			
2' - 4'	0' - 2'	Moist, brown, <u>silty fine sand</u> ; little fine to medium gravel; trace wood, cinders, coal. <u>Fill</u> .	BG
4' - 4.8'	2' - 2.8'	Moist, olive and grey black; <u>silt</u> ; some very fine sand; trace brick, organics, gravel. <u>Fill</u> .	BG
5' - 10' (4.4' recovery)			
5' - 5.5'	0' - 0.5'	Wet, olive and grey black; <u>silt</u> ; some very fine sand; trace brick, organics, gravel. <u>Fill</u> .	BG
5.5' - 7.5'	0.5' - 2.5'	Wet, olive tan with rust yellow, <u>fine sand</u> ; some silt; little fine to coarse gravel; trace clay. <u>Sandy glacial till</u> .	BG
7.5' - 9.4'	2.5' - 4.4'	Wet, olive tan, <u>fine sand</u> ; some silt; little fine to coarse gravel; trace clay. <u>Sandy glacial till</u> .	BG

Well Construction:

Bottom of Boring: 9.9'
 Bottom of Well: 9'
 Solid Riser: 3.7' (0.3' - 4'), 1.5" PVC
 Well Screen: 5' (4' - 9') 1.5" PVC, 0.010" slot
 Sand Pack: 6.8' (2.2' - 9')
 Bentonite Seal: 1' (1.2' - 2.2')
 Backfill: 0.6' (0.4' - 1')
 Well Box: Cemented flush with grade.

WELL LOG

Well: MW-6 - Bell property on lawn in front of house.
 Location: Bell property, 45-47 Grant Street, Rutland, Vermont
 Driller: Gerry Adams, Adams Engineering, Underhill, Vermont. Vibratory Soil cores.
 Hydrogeologist: William Norland, Lincoln Applied Geology, Inc.
 Date: February 19, 1996

Background = BG = 1.0 ppm

Sampling/Coring Depth below Surface (ft)	Core Interval (ft)	Description	PID (ppm)
0' - 2'		Moist, dark brown, <u>silty fine sand</u> . <u>Fill</u> .	
2' - 5' (3.0' recovery)			
2' - 2.5'	0' - 0.5'	Moist, dark brown, <u>silt</u> ; <u>some very fine sand</u> ; trace clay.	BG
2.5' - 4.3'	0.5' - 2.3'	Moist, tan to dark brown and mottled rust yellow, <u>silt</u> ; <u>some very fine sand</u> ; trace fine to medium sand, clay, glass. <u>Fill</u> .	BG
4.3' - 5'	2.3' - 3'	Moist, rust yellow and tan, <u>very fine sand</u> ; some silt; little to trace medium gravel, medium to coarse sand. <u>Sandy glacial till</u> .	BG
5' - 8' (3.0' recovery)			
5' - 7.4'	0' - 2.4'	Wet, rust yellow and tan, very fine sand; some silt; little to trace medium gravel, medium to coarse sand. <u>Sandy glacial till</u> .	BG
7.4' - 8'	2.4' - 3'	Wet, tan, very fine sand; some silt; little to trace medium gravel, medium to coarse sand. <u>Sandy glacial till</u> .	BG
		Refusal at 8' on boulder in glacial till.	

Well Construction:

Bottom of Boring: 8'
 Bottom of Well: 8'
 Solid Riser: 2.7' (0.3' - 3'), 1.5" PVC
 Well Screen: 5' (3' - 8') 1.5" PVC, 0.010" slot
 Sand Pack: 6.2' (1.8' - 8')
 Bentonite Seal: 0.8' (1.0' - 1.8')
 Backfill: 0.6' (0.4' - 1')
 Well Box: Cemented flush with grade.

Appendix F

Green Mountain Laboratory, Inc.
Water Quality Reports

Green Mountain Laboratories, Inc.

RR#3 Box 5210
Montpelier, Vermont 05602

Phone (802) 223-1468

Fax (802) 223-8688

LABORATORY RESULTS

CLIENT NAME:	Lincoln Applied Geology	REF #:	0451
ADDRESS:	RD #1 Box 710 Bristol, VT 05443	PROJECT NO.:	NA
SAMPLE LOCATION:	VDEC-Rutland City	DATE OF SAMPLE:	1/29/96
SAMPLER:	Bill Norland	DATE OF RECEIPT:	1/30/96
		DATE OF ANALYSIS:	1/30/96
ATTENTION:	Alan Moore	DATE OF REPORT:	1/30/96

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

Reviewed by:



Director, Chemical Services

GREEN MOUNTAIN LABORATORIES, INC.

RR 3, BOX 5210
Montpelier, Vermont 05602

Phone (802) 223 - 1468

Fax (802) 223 - 8688

LABORATORY RESULTS

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

GML REF. #: 0451
STATION: TRIP BLANK
REPORT DATE: 01/30/96
ANALYSIS DATE: 01/30/96
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: 127 %

ND = Not Detected

BPQL = Below Practical Quantitation Limits

105 1 3 85

3 634

GREEN MOUNTAIN LABORATORIES, INC.

RR 3, BOX 5210
Montpelier, Vermont 05602

Phone (802) 223 - 1468

Fax (802) 223 - 8688

LABORATORY RESULTS

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

GML REF. # : 0451
STATION: ALBANK SUMP
REPORT DATE: 01/30/96
ANALYSIS DATE: 01/30/96
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. 131 %

ND = Not Detected

BPQL = Below Practical Quantitation Limits

FEB 1 8 1996

GREEN MOUNTAIN LABORATORIES, INC.

RR 3, BOX 5210
Montpelier, Vermont 05602

Phone (802) 223 - 1468

Fax (802) 223 - 8688

LABORATORY RESULTS

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

GML REF. #: 0451
STATION: ELLIS SUMP
REPORT DATE: 01/30/96
ANALYSIS DATE: 01/30/96
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: 133 %

ND = Not Detected

BPQL = Below Practical Quantitation Limits

RD 13 96

Linda Elliott, Project Manager
Sites Management Section
Waterbury, Vermont

July 26, 1994
Page 7

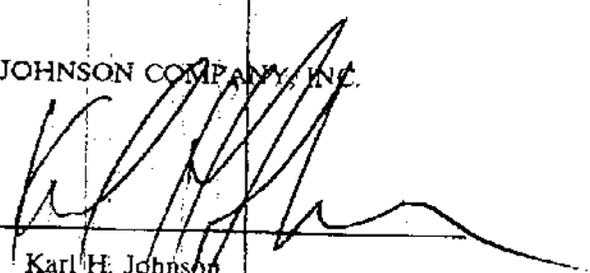
as in identified or suspected release areas and in suspected preferential pathways for migration including the sewer and water line bedding(s) and the historic surface water drainage course that now contains the sewer lines in the study area. One monitoring well should be installed along the sewer bed in front of the former Woolworth's building. Another monitoring well should be installed in the bed of the relief sewer along Merchant's Row. A third monitoring well should be installed in the sewer bed up-gradient from the former Woolworth's building and in the driveway area near the corner of Willow and Edson Streets. Additional monitoring wells and/or soils borings may be warranted due to the findings of the investigative tasks described above, and will be included as appropriate.

L) Following the completion of the above tasks a Work Plan, Schedule, and Cost Estimate will be prepared following the SMS' guidance for a Corrective Action Feasibility Investigation (CAFI).

We recognize that more questions have been generated than answered in this scope. We appreciate that the SMS wish to discuss the findings and the recommendations. Please call with any comments or questions that arise. We appreciate the opportunity to be of service to the SMS.

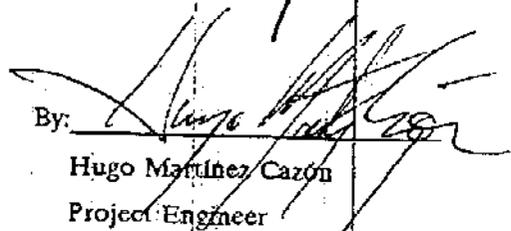
Sincerely Yours,

THE JOHNSON COMPANY, INC.

By: 

Karl H. Johnson

Senior Engineer - Project Manager

By: 

Hugo Martinez Cazon

Project Engineer

Reviewed by: hmc