



**aquatec** INC. ENVIRONMENTAL SERVICES

OCT 03 1988

75 GREEN MOUNTAIN DRIVE, SOUTH BURLINGTON, VERMONT 05403, TELEPHONE (802) 658-1074

September 30, 1988

Mr. Bill Sellinger  
Bradford Oil Company  
P.O. Box 394  
Bradford, Vermont

Re: Summary Report - Korner Kwik Stop  
Williston, Vermont  
Aquatec Project No. 88062

Dear Mr. Sellinger:

Enclosed is a summary report outlining the findings of the site investigation conducted at the Korner Kwik Stop in Williston, Vermont.

If you have any questions regarding the enclosed information, feel free to contact me at your convenience.

Sincerely,

Robert J. Ross  
Hydrogeologist

RJR/cmd

cc. Mr. Richard Spiese  
VT Agency of Natural Resources

Enclosures

**Summary Report  
Korner Kwik Stop  
Williston, Vermont**

**Prepared For:  
Bradford Oil Company  
P.O. Box 394  
Bradford, Vermont**

**Prepared By:  
Aquatec, Inc.  
75 Green Mountain Drive  
South Burlington, VT**

**September 1988**

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## Introduction

Aquatec, Inc. was retained by the Bradford Oil Company to investigate the need for remediation of a gasoline release at the Korner Kwik Stop convenience store in Williston, Vermont (Figure 1). The store located at the intersection of Route 2 and North Williston Road also sells gasoline. Gasoline vapors and free product were entering the store basement to explosive levels. Prior to Aquatec's involvement, emergency clean-up was performed by New England Marine Contractors. The source has apparently been rectified. A sump pump located in the basement was shut off to reduce the amount of product entering the basement.

## Site Investigation

On Tuesday, May 3, 1988, Aquatec personnel visited the Korner Kwik Stop to investigate the pathway of the gasoline migration and the magnitude of the subsurface contamination. Attempts to advance borings along the south side of the building were not successful due to the presence of a concrete pad approximately four inches below ground surface. Four soil borings were advanced to approximately 8 feet below grade along the east side of the building (Figure 2). Soil samples from each boring were screened for the presence of volatile organic compounds (VOC's) using an HNU photoionization detector (PID). The HNU readings ranged between 80 to 190 parts per million (ppm) in the soil samples obtained between 6 to 8 feet below grade and indicated an increasing trend from south to north. The ambient air within each boring was also screened with the HNU PID which indicated the presence of VOC's between 35 and 90 ppm. One soil sample was obtained for laboratory analysis from boring SV-2, Analytical Results of this sample indicated the presence of hydrocarbon fuels at 3200 ppm (Attachment A).

Stainless steel well points were installed in the four borings along the east side of the building to approximately 7 feet below grade. The points were installed to serve as soil vents to remove gasoline vapor from the subsurface soils before entering the basement of the store. The well points consisted of a 6 foot section of 60 gauge screen with a 2 foot riser.

On Wednesday, May 4, 1988, a water sample was obtained from the basement of the convenience store and analyzed at the Aquatec laboratory for the presence of benzene, toluene, ethylbenzene, xylenes and hydrocarbons. The results of the water analysis indicated the presence of benzene, toluene, ethylbenzene and xylenes at 670, 1600, 62, and 1800 ppb respectively. Additional aromatic hydrocarbons and aliphatic hydrocarbons were detected at a total concentration of 3400 ppb (Attachment A).

On Friday, May 6, 1988, Aquatec completed installation of the soil gas venting system (SVS). The four well points were manifolded together using schedule 80 PVC pipe to a Rotron regenerative blower, model DR313. The exhaust of the blower was connected to a Hoyt activated carbon canister. The activated carbon in the canister adsorbs hydrocarbons from the soil vapors as the air passes through the canister. Aquatec personnel monitored the exhaust of the SVS periodically throughout the investigation using a PID. A summary of the PID results from the SVS monitoring is included in Table 1.

On May 6, 1988, approximately 1000 gallons of water was pumped from the basement of the convenience store to minimize damage to personal property. Approval to discharge the water into the municipal sewer system was granted on a one-time basis by Ms. Nancy Manley of the Vermont Agency of Natural Resources (ANR).

On May 12, 1988, water from the basement of the convenience store was pumped into a holding tank by the Northern Petroleum Company, under the supervision of Aquatec personnel. Approximately 1000 gallons of water was pumped from the basement at this time. During pumping, a water sample was collected for laboratory analysis. The analytical results indicated the presence of benzene, toluene, ethylbenzene and xylenes at 320, 670, 30 and 1700 parts per billion (ppb) respectively (Attachment A). These results indicated that the concentrations of benzene and total hydrocarbons in the water sample were above the State of Vermont wastewater discharge requirements. Therefore the water was temporarily stored on site while arrangements for off site disposal could be completed. On May 19, 1988 the water pumped from the basement on May 12 was transported off site by P & H Transportation for proper disposal.

After pumping the water out of the basement on May 12, water continued to accumulate. On May 16, 1988 Aquatec personnel obtained another sample of the basement water for laboratory analysis. Results of this sample indicated the presence of benzene, toluene and xylenes at 480, 650, and 1600 ppb. Ethylbenzene was identified at less than 5 ppb (Attachment A).

On July 8, 1988 Aquatec personnel installed a monitoring well (MW-1) downgradient of the gasoline pump island (Figure 1). The boring was advanced to refusal at 4.5 feet below ground surface. The soil consisted of a moist clayey sand and silt. Screening of the soil with a PID did not indicate the presence of volatile organic compounds. No water was encountered at the time of drilling (Figure 3).

Following installation of MW-1, Aquatec personnel surveyed the horizontal locations and vertical elevations of the soil venting well points and monitoring well. Using this information in conjunction with water level measurements and total depth measurements of soil venting well points and MW-1, Aquatec estimated the direction of ground water flow in the over burden.

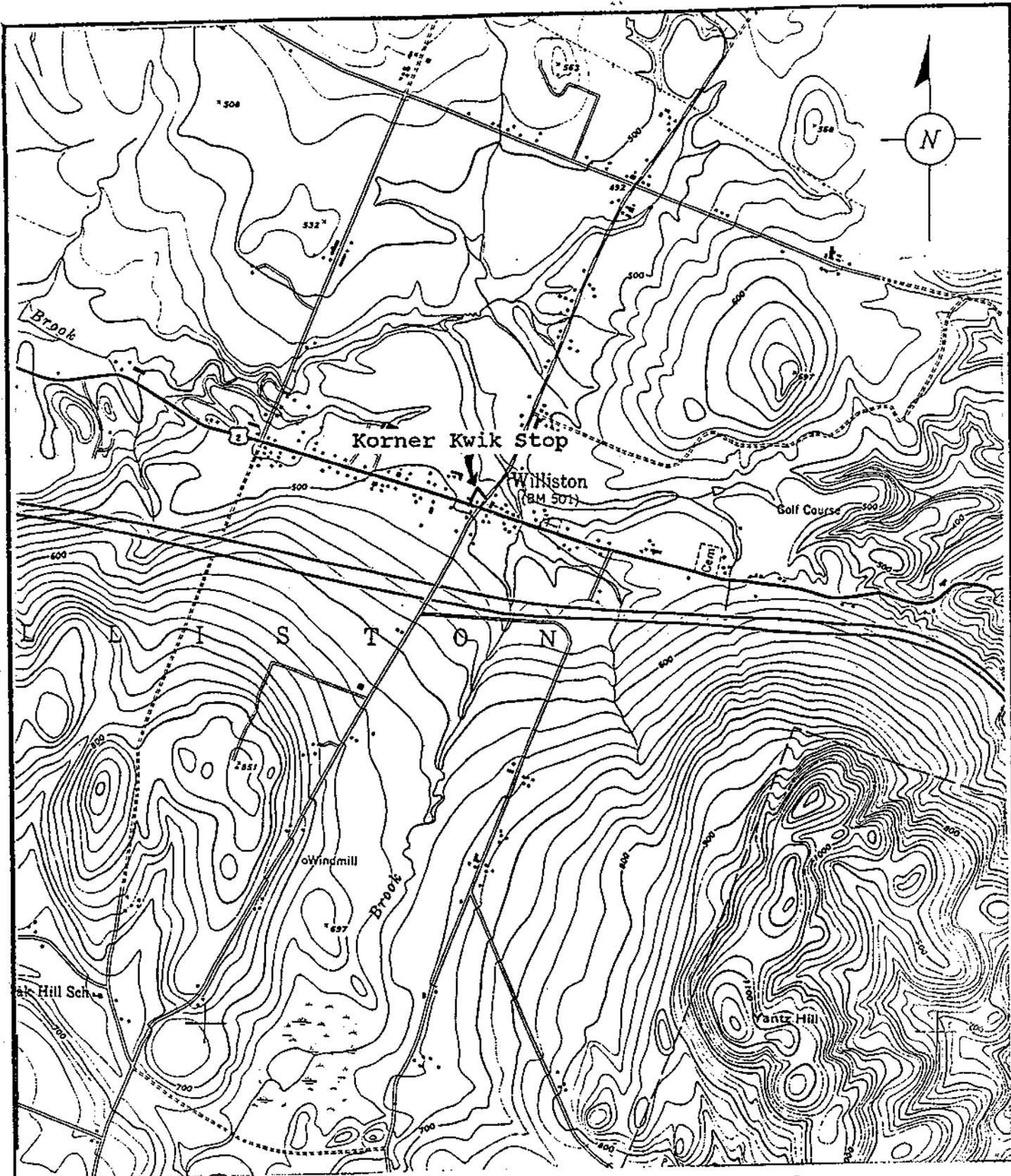
Aquatec estimated the general direction of ground water flow beneath the site to be toward the north. Elevation data for the soil venting well points and MW-1 is included in Table 2.

### **Recommendations**

Review of PID monitoring results (Table 1) of the soil venting system (SVS) indicate a decreasing trend in soil gas concentrations since installing the system in May 1988. Based on this information and anticipated weather conditions of the upcoming fall and winter seasons, Aquatec recommends shutting down the SVS until next spring. At this time Aquatec cannot assess the need for continuing operation of the SVS however, as warming trends progress in late spring and early summer the SVS should be inspected to determine if continued operation is appropriate.

Based on the geologic material encountered on site and the direction of ground water flow, it does not appear that subsurface contamination has migrated off site. The likely receptor for contaminated ground water is the convenience store basement. Analytical results of water samples obtained from the basement identified the presence of benzene, toluene, ethylbenzene and xylenes at concentrations ranging between 30 and 1800 parts per billion (ppb). Water was present in the basement of the convenience store throughout the study and appears to be a common occurrence.

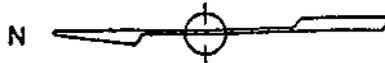
Based on this information and the potential hazards associated with the contaminated water in the basement, Aquatec recommends removal of the water and clean up of the basement. Precautions should also be taken to minimize accumulation of contaminated water in the basement in the future. Aquatec has developed a ground water pump and treat system that could be installed as an option for site remediation. Another option would be to periodically analyze water samples from the basement and either discharge the water to the municipal wastewater treatment facility or transport the water off site as hazardous waste, depending on analytical results of the water sample.



Source: U.S.G.S. 1972. Essex  
 Junction Quadrangle, Vermont.  
 U.S. Geological Survey. 7.5'  
 Series (topographic). 1948,  
 Photorevised 1972.

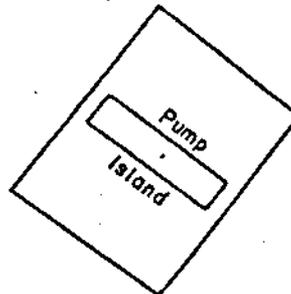
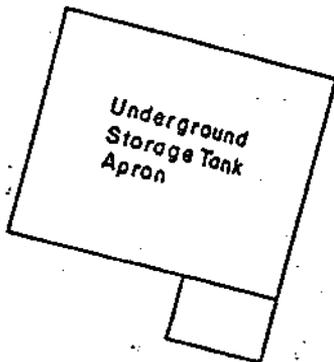
**aquatec inc.**  
 ENVIRONMENTAL SERVICES

Figure 1  
 Site Locus Plan  
 Korner Kwik Stop  
 Williston, Vermont



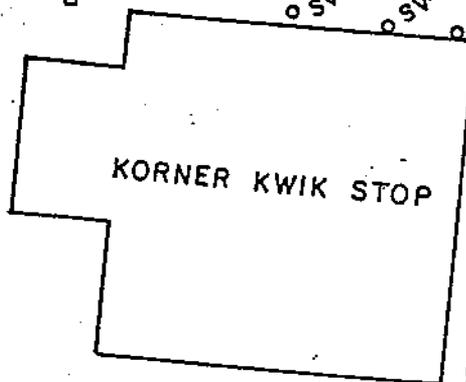
NORTH WILLISTON ROAD

MW-1



Diesel Pump

SV-4  
SV-3  
SV-2  
SV-1



U S ROUTE 2

**LEGEND**

-  Monitoring Well
-  Soil Venting Point

KORNER KWIK STOP  
Williston, Vermont

SURVEYED JSW	 <b>aquatec</b> INC. ENVIRONMENTAL SERVICES SOUTH BURLINGTON, VERMONT	SCALE No Scale
DRAWN BCM		PROJECT NO. 88062
CHECKED RJR	Figure 2	DATE Sept '88

**Attachment A**  
**Laboratory Analytical Results**

# FIELD BORING LOG

**Aquatec, Inc.**  
 75 Green Mountain Drive  
 South Burlington, VT 05403

Project: Williston Soil Gas  
 Project No: 88062  
 Location: Williston, VT

Boring No:	<u>MW-1</u>
Sheet	<u>1</u> of <u>1</u>
Dates:	<u>7/8/88</u>

Elev. T.O.W: 95.76    Elev. B.O.W: 91.26    Well Dia: 2"    Boring Dia: 4"  
 Screen Inter: 1.5 - 4.5'    Screen Matl: 0.20 inch slot    Casing Matl: sch. 40 pvc  
 Packing Matl: silica sand    Seal Matl:  bentonite pellets    Backfill Matl: ---  
 Contractor: Aquatec    Driller: JRD    Method: drive casing    Logged By: RJR

Depth (Feet)	Sample				Well Const.	Soil and Rock Descriptions/Comments (Unified soil class system, Rock description, Depth to water, Loss of drill water, discoloration, PID, etc.)
	Type and No	Depth Range (Feet)	Recovery or RQD	Blows		
5.0						moist clayey sand and silt  Refusal @ 4.5' - no water encountered at time of drilling.
10.0						

Figure 3  
 Korner Kwik Stop  
 Williston, Vermont

Sample Type:    A-Auger    SS-Split Spoon    RC-Rock Core    C-Chips

Summary:    Overburden Depth: ---    Bedrock Depth: ---    Total Depth: 4.5'

**Table 1**  
**Soil Venting System (SVS)**  
**Photoionization Detector Monitoring Results**  
**Korner Kwik Stop - Williston, Vermont**  
**Aquatec Project No. 88062**

<u>Date Time</u>	<u>Location</u>	<u>PID Reading (ppm)</u>	<u>Comments</u>
May 9, 1988 0925	Port	14.0	Readings obtained while SVS was shut down for repair
	Exhaust	<0.1	
	Basement	<0.1	
1100	Port	14.5	Readings obtained after repairs
	Exhaust	0.5	
1112	Port	12.0	
	Exhaust	1.0	
May 10, 1988 1331	Port	6.4	
	Exhaust	1.2	
May 25, 1988 1555	Port	6.0	
	Exhaust	<0.1	
June 2, 1988 1512	Port	5.0	Shut down SVS to replace carbon canister
	Exhaust	4.0	
1525	Port	5.5	Readings obtained after replacement of carbon canister
	Exhaust	<0.1	
June 14, 1988 0755	Port	3.2	
	Exhaust	0.5	
	Basement	<0.1	
June 24, 1988 1520	Port	9.0	
	Exhaust	8.0	
	Basement	<0.1	

Table 1 (continued)  
 Soil Venting System (SVS)  
 Photoionization Detector Monitoring Results  
 Korner Kwik Stop - Williston, Vermont  
 Aquatec Project No. 88062

<u>Date Time</u>	<u>Location</u>	<u>PID Reading (ppm)</u>	<u>Comments</u>
June 30, 1988			
1400	Port	12.2	Shut down SVS to replace carbon canister Readings obtained before and after replacement of carbon canister
	Exhaust	8.2	
1520	Exhaust	<0.1	
July 6, 1988			
1043	Port	3.0	
	Exhaust	<0.1	
July 18, 1988			
1245	Port	4.8	
	Exhaust	1.5	
	Basement	<0.1	
August 8, 1988			
1125	Port	12.2	
	Exhaust	7.0	
	Basement	<0.1	
August 17, 1988			
	--	--	Carbon canister was replaced
	--	--	
September 1, 1988			
1507	Port	4.0	
	Exhaust	5.5	
	Basement	<0.5	
September 15, 1988			
1300	Port	1.0	
	Exhaust	3.5	

Note: All PID readings obtained using an HNU Systems Model 101 photoionization detector with a 10.2 eV lamp. PID readings at the port sampling location were obtained prior to air passing through the carbon canister.

**Table 2**  
**Well Elevation Data**  
**Korner Kwik Stop - Williston, VT**  
**Aquatec Project No. 88062**

Well ID	Elevation to Top of well (ft)	Elevation to Bottom of well (ft)	Water level to Top of well (ft)	Water level elevation(ft)
SV-1	99.74	91.34	6.00	93.74
SV-2	99.70	91.45	8.24	91.46
SV-3	99.40	91.52	--	--
SV-4	99.35	91.44	--	--
MW-1	95.76	91.26	--	--



# aquatec

ENVIRONMENTAL SERVICES

75 Green Mountain Drive, So. Burlington, VT 05403  
TEL. 802/658-1074

## ANALYTICAL REPORT

Williston Soil Gas

Date: 6/17/88

Project No: 88062

ETR No: 13621

Sample(s) Received On: 5/4/88

Page 1 of 1

Standard analyses were performed in accordance with Methods for Analysis of Water and Wastes, EPA-600/4/79-020, Test Methods for Evaluating Solid Waste, SW-846, or Standard Methods for the Examination of Water and Wastewater. All results are in mg/l unless otherwise noted.

Parameter	83003							
Fuels in Soil (mg/Kg)	3200							

Lab No.

Sample Description

83003. Soil sample labeled 5/3/88, 1500 hours.

Submitted By:

*R. Mason Purcell*

Aquatec Inc.



# aquatec

## ENVIRONMENTAL SERVICES

75 Green Mountain Drive, So. Burlington, VT 05403  
TEL. 802/658-1074

### ANALYTICAL REPORT

Williston Soil Gas

Date: 5/6/88

Project No: 88062

ETR No: 13628

Sample(s) Received On: 5/4/88

Page 1 of 1

Standard analyses were performed in accordance with Methods for Analysis of Water and Wastes, EPA-600/4/79-020, Test Methods for Evaluating Solid Waste, SW-846, or Standard Methods for the Examination of Water and Wastewater. All results are in mg/l unless otherwise noted.

Parameter	83031							
<u>Following Results are in µg/l</u>								
Benzene	670							
Toluene	1600							
Ethylbenzene	62							
Xylenes	1800							
Other Aromatic Hydrocarbons as o-Xylene	1700							
Aliphatic Hydrocarbons as Hexane	1700							

Lab No.

Sample Description

83031. Water sample labeled GO-GO gas basement, 5/4/88 at 1125 hours.

Submitted By:

*R. Mason*

Aquatec Inc.



# aquatec

## ENVIRONMENTAL SERVICES

75 Green Mountain Drive, So. Burlington, VT 05403  
TEL. 802/658-1074

### ANALYTICAL REPORT

Williston Soil Gas

Date: 5/13/88  
Project No: 88062  
ETR No: 13699  
Sample(s) Received On: 5/12/88  
Page 1 of 1

Standard analyses were performed in accordance with Methods for Analysis of Water and Wastes, EPA-600/4/79-020, Test Methods for Evaluating Solid Waste, SW-846, or Standard Methods for the Examination of Water and Wastewater. All results are in mg/l unless otherwise noted.

Parameter	83339							
<u>Following Results are in µg/l</u>								
Benzene	320							
Toluene	670							
Ethylbenzene	30							
Xylenes	1700							

Lab No.

Sample Description

83339. Water sample collected from basement at the Korner Kwik Stop during pumping, 5/12/88 at 1001 hours.

Submitted By:

*R. Mason Purdee*

Aquatec Inc.



# aquatec

ENVIRONMENTAL SERVICES

75 Green Mountain Drive, So. Burlington, VT 05403  
TEL. 802/658-1074

## ANALYTICAL REPORT

Williston Soil Gas

Date: 5/18/88  
Project No: 88062  
ETR No: 13731  
Sample(s) Received On: 5/16/88  
Page 1 of 1

Standard analyses were performed in accordance with Methods for Analysis of Water and Wastes, EPA-600/4/79-020, Test Methods for Evaluating Solid Waste, SW-846, or Standard Methods for the Examination of Water and Wastewater. All results are in mg/l unless otherwise noted.

Parameter	83466							
Following Results are in $\mu\text{g/l}$								
Benzene	480							
Toluene	650							
Ethylbenzene	<5							
Xylenes	1600							

Lab No.

Sample Description

83466. Water sample labeled store basement, 5/16/88 at 1020 hours.

Submitted By:

*R. Mason Purdee*

Aquatec Inc.



**aquatec** INC. ENVIRONMENTAL SERVICES

JUN 15 1988

75 GREEN MOUNTAIN DRIVE, SOUTH BURLINGTON, VERMONT 05403, TELEPHONE (802) 658-1074

June 14, 1988

Mr. Richard Spiese  
Hazardous Materials Management  
Vermont Agency of Natural Resources  
103 South Main Street  
Waterbury, VT 05676

Re: Williston Soil Gas Venting Program  
PID Monitoring Results through June 14, 1988  
Aquatec Project No. 88062

Dear Mr. Spiese:

During our meeting on Thursday, June 9, 1988 regarding the gasoline contamination incident at the Korner Kwik Stop in Williston, Vermont, you requested an update of the photo-ionization detector (PID) monitoring results from the soil venting system. Enclosed is a table which summarizes the PID results through Tuesday, June 14, 1988.

Also enclosed for your records, is a project memo dated May 9, 1988 which summarizes field activities during installation of the soil venting system.

If you have any questions regarding the enclosed information, feel free to call me at your convenience.

Sincerely,

Robert J. Ross  
Hydrogeologist

RJR/lam

Enclosure

cc: Mr. William Sellinger, Bradford Oil Company

88086B14JUN88

**Soil Venting System (SVS)  
Photoionization Detector Monitoring Results  
Korner Kwik Stop - Williston, Vermont  
Aquatec Project No. 88062**

<u>Date Time</u>	<u>Location</u>	<u>PID Reading (ppm)</u>	<u>Comments</u>
<b>May 9, 1988</b>			
0925	Port	14.0	Readings obtained while SVS was shut down for repair
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	Exhaust	0.5	
1112	Port	12.0	
	Exhaust	1.0	
<b>May 10, 1988</b>			
1331	Port	6.4	
	Exhaust	1.2	
<b>May 25, 1988</b>			
1555	Port	6.0	
	Exhaust	<0.1	
<b>June 2, 1988</b>			
1512	Port	5.0	Shut down SVS to replace carbon canister
	Exhaust	4.0	
1525	Port	5.5	Readings obtained after replacement of carbon canister
	Exhaust	<0.1	
<b>June 14, 1988</b>			
0755	Port	3.2	
	Exhaust	0.5	
	Basement	<0.1	

Note: All PID readings obtained using an HNu Systems Model 101 photoionization detector with a 10.2 eV lamp. PID readings at the port sampling location were obtained prior to air passing through the carbon canister.

TO: Aquatec Project File (88062)  
FROM: Robert Ross *RR 5/9/88*  
DATE: May 9, 1988  
RE: Williston Soil Gas - Project Update

Aquatec, Inc. was retained by the Bradford Oil Company to investigate the need for remediation of a gasoline release at the Korner Kwik Stop convenience store in Williston, Vermont. The store located at the intersection of Route 2 and North Williston Road sells gasoline. Gasoline vapors and free product were entering the store basement to explosive levels. Prior to Aquatec's involvement, emergency clean-up was performed by New England Marine Contractors. The source has apparently been rectified. A sump pump located in the basement was shut off to reduce the amount of product entering the basement.

On Tuesday, May 3, 1988, Aquatec personnel visited the site to investigate the pathway of the gasoline migration and the magnitude of the subsurface contamination. Attempts to advance borings along the south side of the building were not successful due to the presence of a concrete pad approximately four inches below ground surface. Four soil borings were advanced to approximately 8 feet below grade along the east side of the building. Soil samples from each boring were screened for the presence of volatile organic compounds (VOC's) using an HNU photoionization detector (PID). The HNU readings ranged between 80 to 190 parts per million (ppm) in the soil samples obtained between 6 to 8 feet below grade and indicated an increasing trend from south to north. The ambient air within each boring was also screened with the HNU PID which indicated the presence of VOC's between 35 and 90 ppm.

Stainless steel well points were installed in the four borings along the east side of the building to approximately 7 feet below grade. The points will serve as soil vents to remove gasoline vapor before entering the basement of the store. The well points consisted of a 6 foot section of 60 gauge screen with a 2 foot riser.

On Wednesday, May 4, 1988, a water sample was obtained from the basement of the convenience store and analyzed at the Aquatec laboratory for the presence of benzene, toluene, ethylbenzene, xylenes and hydrocarbons. The results of the water analysis are enclosed.

Aquatec Project File (88062)

May 9, 1988

Page 2

On Friday, May 6, 1988, Aquatec completed installation of the soil gas venting system. The four well points were manifolded together using schedule 80 PVC pipe to a Rotron regenerative blower, model DR313.

The exhaust of the blower is connected to a Hoyt activated carbon canister. The activated carbon will adsorb the hydrocarbons as the air passes through the canister.

On May 6, 1988, Aquatec pumped approximately 1000 gallons of water from the basement of the convenience store to minimize damage to personal property. Approval to discharge the water into the municipal sewer system was granted on a one-time basis by Ms. Nancy Manley of the Vermont Agency of Natural Resources (ANR).

On behalf of Bradford Oil Company, Aquatec has applied for a Wastewater Discharge Permit (1272) from the Vermont ANR. A discharge permit is required by the ANR before discharging the treated ground water to the municipal sewer system. It is anticipated that the ground water treatment system will be installed and operating within three days of the ANR approval.

RR/lam

Attachment