

SEP 24 1991



900559

September 21, 1990

Mr. Chuck Schwer  
State of Vermont  
Department of Environmental Conservation  
Petroleum Sites Management Section  
103 South Main St.  
Waterbury, VT 05676

Dear Chuck:

Enclosed is the report on the investigation of subsurface petroleum contamination at the West Topsham General Store. Please call me with any questions which you may have regarding the report.

Sincerely,

A handwritten signature in black ink, appearing to read "Peter M. Murray". The signature is written in a cursive style with a large, sweeping initial "P".

Peter M. Murray  
Project Hydrogeologist

SEP 24 1990

559

REPORT ON THE INVESTIGATION  
OF SUBSURFACE PETROLEUM CONTAMINATION  
WEST TOPSHAM GENERAL STORE  
WEST TOPSHAM, VERMONT

August, 1990

Prepared for:

Mr. Clarence Nelson  
West Topsham, Vermont

Prepared by:

Griffin International  
2B Dorset Ln.  
Williston, Vermont



Peter M. Murray  
Project Hydrogeologist

## TABLE OF CONTENTS

### 1.0 INTRODUCTION

### 2.0 SITE BACKGROUND

2.2 Site History

2.3 Site Description

### 3.0 INVESTIGATIVE PROCEDURES

3.1 Monitoring Well Installation

3.2 Groundwater Gradient and Flow Direction Determination

3.3 Groundwater Sampling and Analysis

### 4.0 CONCLUSIONS

### 5.0 RECOMMENDATIONS

APPENDIX A: Site Maps

APPENDIX B: Laboratory Results

## 1.0 INTRODUCTION

This report details the investigation of subsurface petroleum contamination at the West Topsham General Store in West Topsham, Vermont. The investigation has been conducted by Griffin International, Inc. for Mr. Clarence Nelson, the owner of the General Store. The petroleum contamination is the result of a leak in one of two underground gasoline storage tanks which were excavated and removed from the property on July 31st, 1990.

## 2.0 SITE BACKGROUND

### 2.1 Site History

On July 31st, 1990, two underground gasoline storage tanks were excavated and removed from the West Topsham General Store. Upon excavation of one of the tanks, several holes were discovered in the tank, through which, gasoline had been leaking to the subsurface. This tank was located next to the store (see Site Map in Appendix A for location). The Vermont Department of Environmental Conservation, (D.E.C.) inspector who was on site that day detected significant petroleum contamination in the surrounding soils and on the groundwater in the bottom of the tank pit, in the form of sheens. The inspector then requested that Wyman's Meter and Tank Company, the outfit that was replacing the tanks, install four groundwater monitoring wells using an excavator. The wells were to be used in any further investigation.

Mr. Nelson was then requested by D.E.C. to engage a qualified consultant to conduct an investigation to determine the extent of the contamination and to identify any possible receptors. On August 5th, Griffin International was hired to conduct the investigation. Along with the investigation of petroleum contamination, Mr. Nelson also requested that Griffin collect a sample of water from the supply well for the store for lead analysis. Mr. Nelson is concerned that an illegal car battery dump, to the west of his property, may be contributing lead to the groundwater and contaminating his well.

### 2.2 SITE DESCRIPTION

The West Topsham General Store is located in the center of the small village of West Topsham on the east side of Route 25. The village consists of several residences, the general store, a church and a grange hall. All homes in the area, as well as the church

and the grange, receive drinking water from a spring on the west side of Route 25.

The Waits River flows approximately parallel to Route 25, about 1,000 feet to the east. The village is situated on a terrace which is approximately 200 feet above the river. According to the Surficial Geologic Map of Vermont, the terrace is an ice marginal glacial moraine. A steep bank down to the river begins approximately 170 feet west of the General Store. An inspection of the river by Griffin personnel on August 13th revealed no visible petroleum contamination in the river immediately downgradient of the General Store.

### 3.0 INVESTGATIVE PROCEDURES

#### 3.1 Monitoring Well Installation

The four monitoring wells were installed on July 31st, using a track mounted hoe. The holes for the wells were dug to three to four feet below the water table. The water table in the vicinity of MW-1 is approximately nine feet below grade. The water table in the vicinity of the other three monitoring wells is approximately six to seven feet below grade. Four inch diameter well screens were installed in each hole. The holes were then backfilled to grade, leaving a one foot PVC stickup on each well.

Soils encountered during excavation of these holes consisted of fine to coarse sand, silt, gravel, cobbles and small to large boulders. Permeability through this type of overburden deposit would presumably be high.

#### 3.2 Groundwater Gradient and Flow Direction Determination

On August 13th, Griffin measured water table elevations in each monitoring well and in the supply well for the store. The elevations were measured relative to an arbitrary benchmark (top of casing of MW-1) which was assigned an elevation of 100'. These elevations are listed next to each well on the Groundwater Contour Map in Appendix A. Water table contours were then plotted on the map. Groundwater flow direction is perpendicular to the contours and is to the southeast. The groundwater gradient in the vicinity of the leaky tank is 6% and flattens to a slighter gradient of 1.5% in the yard behind the store. It is likely that the groundwater gradient drops sharply east of the top of the bank.

### 3.3 Groundwater Sampling and Analysis

On August 13th, Griffin Collected groundwater samples from each of the four monitoring wells and from the supply well for analysis for BTEX and MTBE using EPA Method 602. The laboratory results in Appendix B indicate that MW-1 appears to be located in the most contaminated area. Water from this well contained a total of 9.05 ppm BTEX and MTBE on that date. Only one other well, MW-3, contained detectable concentrations of those compounds on that date. No free floating product was observed in these wells on the sampling date.

The lab data indicates that the highest concentrations of dissolved hydrocarbons are near the old tank which was found to be leaking. The contamination is apparently migrating downgradient, toward MW-3. Apparently, most of the contamination is adsorbed to the soils in the vicinity of MW-1. As groundwater migrates through the contaminated soil, hydrocarbons are slowly released into the dissolved phase and carried downgradient. The high rate of groundwater flow through the area results in rapid dilution and dispersion of the dissolved contamination, however. The result is a several order of magnitude reduction in the contamination concentrations over a distance of 70'. The levels are likely non-detectable near the top of the bank.

The results of the lead analysis on water from the supply well do not indicate the presence of lead in the well.

### 4.0 CONCLUSIONS

1. There was a release of gasoline to the subsurface in the vicinity of one of the old tanks which was excavated from the West Topsham General Store on July 31st. The amount and duration of the release are unknown. The source has since been removed.
2. The release has resulted in the contamination of the soils and the groundwater in the vicinity of and downgradient of the tank. Dissolved contamination in the vicinity of the leaky tank has been detected at a concentration of 9.05 ppm total BTEX and MTBE. Dissolved contamination levels in a monitoring well 70' downgradient of the leaky tank were detected at a total concentration of 0.0127 ppm.

3. The overburden deposits in the vicinity of the General Store are assumed to be relatively thick and consist of sand, silt, gravel, cobbles and boulders. According to the Geologic Map of Vermont, the bedrock beneath the store is part of the Waits River formation and could be any of a number of rock types including limestone, schist and phyllite.
4. The groundwater gradient in the vicinity of the store is relatively steep. Combined with the high permeability of the soils, the steep gradient likely results in a rapid rate of groundwater and contamination migration across the site. This high groundwater flow rate likely results in the rapid dispersion and dilution of the contamination. If any of the contamination is entering the Waits River, it would likely be in nondetectable concentrations.
5. The only likely receptors of the subsurface contamination are the supply well for the store and the Waits River. The well did not contain detectable concentrations of BTEX and MTBE on August 13th, however, it may be possible that the well could become contaminated at some point, especially if there were a prolonged drought coupled with large withdrawals of water from the well. In that case, drawdown of the water table surrounding the well could result in infiltration of contaminants.

All other buildings are served by a spring which is upgradient of the leaky tank and is not likely to be affected. A visual inspection of the Waits River, immediately downgradient of the store, on August 13th, revealed no apparent petroleum contamination in the river.

6. Over time, the natural processes of dilution, dispersion and degradation of the contamination will result in the total elimination of adsorbed and dissolved hydrocarbons in the vicinity of the General Store.

## 5.0 RECOMMENDATIONS

1. To ensure that the public does not come into contact with the groundwater contamination via the supply well for the General Store, we recommend that the water from both the supply well and from MW-1 be analyzed regularly for BTEX and MTBE. Quarterly analysis should continue until concentrations in MW-1 have approached detectable limits.

2. To adequately assess the possibility that the battery dump to the west of the General Store is resulting in contamination of the local groundwater, we recommend that a preliminary investigation be conducted by the appropriate state agencies.

APPENDIX A

Site Maps

HOUSE

BARN

WEST TOPSHAM  
GENERAL STORE

● MW-2

LEAKING TANK  
(REMOVED)

● MW-1

PUMPS

● MW-3

NEW TANKS

SHED

○ SUPPLY  
WELL

● MW-4

TOP OF BANK

ROUTE  
25

WEST TOPSHAM  
COMMUNITY  
CHURCH



GRANGE HALL

### SITE MAP

PROJECT : WEST TOPSHAM GENERAL STORE  
LOCATION : WEST TOPSHAM, VERMONT  
PROJECT NO. : 890421

● MONITORING WELL

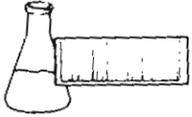




APPENDIX B

Laboratory Results

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**ENDYNE, INC.**

Laboratory Services

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

LABORATORY REPORT

EPA METHOD 602 -- PURGEABLE AROMATICS

CLIENT: Griffin International  
PROJECT NAME: W. Topsham General Store  
REPORT DATE: August 24, 1990      ANALYSIS DATE: August 13, 1990  
SAMPLER: Don Tourangeau      STATION: MW #1  
DATE SAMPLED: August 13, 1990      REF.#: 13,807  
DATE RECEIVED: August 13, 1990      TIME SAMPLED: 11:00

<u>Parameter</u>	<u>Concentration (ug/L)</u> <sup>1</sup>
Benzene	115.
Chlorobenzene	ND <sup>2</sup>
1,2-Dichlorobenzene	ND
1,3-Dichlorobenzene	ND
1,4-Dichlorobenzene	ND
Ethylbenzene	112.
Toluene	2,810.
Xylenes	5,500.
MTBE	510.

NUMBER OF UNIDENTIFIED PEAKS FOUND: 10

NOTES:

- 1 Method 602 detection limit is 1 ug/L
- 2 None detected

Reviewed by Suzanne M. Grenloch



**ENDYNE, INC.**

Laboratory Services

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

LABORATORY REPORT

EPA METHOD 602 -- PURGEABLE AROMATICS

CLIENT: Griffin International  
PROJECT NAME: W. Topsham General Store  
REPORT DATE: August 24, 1990      ANALYSIS DATE: August 13, 1990  
SAMPLER: Don Tourangeau      STATION: MW #2  
DATE SAMPLED: August 13, 1990      REF.#: 13,808  
DATE RECEIVED: August 13, 1990      TIME SAMPLED: 10:15

<u>Parameter</u>	<u>Concentration (ug/L)</u> <sup>1</sup>
Benzene	ND <sup>2</sup>
Chlorobenzene	ND
1,2-Dichlorobenzene	ND
1,3-Dichlorobenzene	ND
1,4-Dichlorobenzene	ND
Ethylbenzene	ND
Toluene	ND
Xylenes	ND
MTBE	ND

NUMBER OF UNIDENTIFIED PEAKS FOUND: 0

NOTES:

- 1 Method 602 detection limit is 1 ug/L
- 2 None detected

Reviewed by Suzanne M. Gendche



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Laboratory Services

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

LABORATORY REPORT

EPA METHOD 602 -- PURGEABLE AROMATICS

CLIENT: Griffin International  
PROJECT NAME: W: Topsham General Store  
REPORT DATE: August 24, 1990      ANALYSIS DATE: August 13, 1990  
SAMPLER: Don Tourangeau      STATION: MW #3  
DATE SAMPLED: August 13, 1990      REF.#: 13,809  
DATE RECEIVED: August 13, 1990      TIME SAMPLED: 10:30

<u>Parameter</u>	<u>Concentration (ug/L)</u> <sup>1</sup>
Benzene	ND <sup>2</sup>
Chlorobenzene	ND
1,2-Dichlorobenzene	ND
1,3-Dichlorobenzene	ND
1,4-Dichlorobenzene	ND
Ethylbenzene	ND
Toluene	ND
Xylenes	ND
MTBE	12.7

NUMBER OF UNIDENTIFIED PEAKS FOUND: 0

NOTES:

- 1 Method 602 detection limit is 1 ug/L
- 2 None detected

Reviewed by Suzanne M. Gendak



**ENDYNE, INC.**

RECORD

300

Laboratory Services

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

LABORATORY REPORT

EPA METHOD 602 -- PURGEABLE AROMATICS

CLIENT: Griffin International  
PROJECT NAME: W. Topsham General Store  
REPORT DATE: August 24, 1990      ANALYSIS DATE: August 13, 1990  
SAMPLER: Don Tourangeau      STATION: MW #4  
DATE SAMPLED: August 13, 1990      REF.#: 13,810  
DATE RECEIVED: August 13, 1990      TIME SAMPLED: 10:45

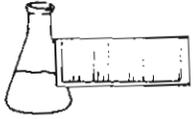
<u>Parameter</u>	<u>Concentration (ug/L)</u> <sup>1</sup>
Benzene	ND <sup>2</sup>
Chlorobenzene	ND
1,2-Dichlorobenzene	ND
1,3-Dichlorobenzene	ND
1,4-Dichlorobenzene	ND
Ethylbenzene	ND
Toluene	ND
Xylenes	ND
MTBE	ND

NUMBER OF UNIDENTIFIED PEAKS FOUND: 1

NOTES:

- 1 Method 602 detection limit is 1 ug/L
- 2 None detected

Reviewed by Suzanne M. Hencloke



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FAX 879-7103

LABORATORY REPORT

EPA METHOD 602 -- PURGEABLE AROMATICS

CLIENT: Griffin International  
PROJECT NAME: W. Topsham General Store  
REPORT DATE: August 24, 1990 ANALYSIS DATE: August 13, 1990  
SAMPLER: Don Tourangeau STATION: Field Blank  
DATE SAMPLED: August 13, 1990 REF.#: 13,811  
DATE RECEIVED: August 13, 1990 TIME SAMPLED: 11:30

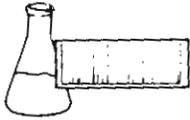
<u>Parameter</u>	<u>Concentration (ug/L)</u> <sup>1</sup>
Benzene	ND <sup>2</sup>
Chlorobenzene	ND
1,2-Dichlorobenzene	ND
1,3-Dichlorobenzene	ND
1,4-Dichlorobenzene	ND
Ethylbenzene	ND
Toluene	ND
Xylenes	ND
MTBE	ND

NUMBER OF UNIDENTIFIED PEAKS FOUND: 0

NOTES:

- 1 Method 602 detection limit is 1 ug/L
- 2 None detected

Reviewed by Suzanne M. Gaudin



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(802) 879-4333  
FAX 879-7103

LABORATORY REPORT

EPA METHOD 602 -- PURGEABLE AROMATICS

CLIENT: Griffin International  
PROJECT NAME: W. Topsham General Store  
REPORT DATE: August 24, 1990 ANALYSIS DATE: August 13, 1990  
SAMPLER: Don Tourangeau STATION: Supply Well  
DATE SAMPLED: August 13, 1990 REF.#: 13,812  
DATE RECEIVED: August 13, 1990 TIME SAMPLED: 11:15

<u>Parameter</u>	<u>Concentration (ug/L)<sup>1</sup></u>
Benzene	ND <sup>2</sup>
Chlorobenzene	ND
1,2-Dichlorobenzene	ND
1,3-Dichlorobenzene	ND
1,4-Dichlorobenzene	ND
Ethylbenzene	ND
Toluene	ND
Xylenes	ND
MTBE	ND

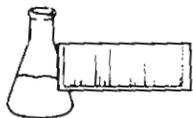
NUMBER OF UNIDENTIFIED PEAKS FOUND: 0

NOTES:

- 1 Method 602 detection limit is 1 ug/L
- 2 None detected

Reviewed by Suzanne M. Hendrich

RECEIVED AUG 20 1990



**ENDYNE, INC.**

Laboratory Services

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

LABORATORY REPORT

DATE: August 15, 1990  
CLIENT: Griffin International  
PROJECT: W. Topsham General Store  
SAMPLER: Don Tourangeau  
DATE SAMPLED: August 13, 1990  
DATE RECEIVED: August 13, 1990

Tested parameter is reported in milligrams per liter (ppm).

<u>Parameter</u>	<u>Reference Number</u>
	<u>13,813</u>
Lead	<0.004

Sample ID:

13,813: Supply Well; 11:15 a.m.

Reviewed by

Suzanne M. Furdak