



# TWIN STATE ENVIRONMENTAL CORP.

P.O. Box 719, Commercial Park, 1A Huntington Road, Richmond, VT 05477

Tel.: (802) 434-3350 • Fax (802) 434-4478

Phase (check one)	Type (check one)
<input checked="" type="checkbox"/> Site Investigation	<input type="checkbox"/> Work Scope
<input type="checkbox"/> Corrective Action Feasibility Investigation	<input checked="" type="checkbox"/> Technical Report
<input type="checkbox"/> Corrective Action Plan	<input type="checkbox"/> PCF Reimbursement Request
<input type="checkbox"/> Corrective Action Summary Report	<input type="checkbox"/> General Correspondence
<input type="checkbox"/> Operations & Monitoring Report	

## INITIAL SITE INVESTIGATION REPORT

July 9, 1997

North Hero House  
US Route 2  
North Hero, Vermont

SMS Site #97-2142  
TSEC #97-017

Prepared for:  
Mr. David Carter  
Carter and Pingert, Esq.  
600 Route 2  
South Hero, VT 05486

Written By:

Jon Berntsen  
Geologist

Reviewed By:

John R. Diego  
Vice President

WASTE MANAGEMENT BOARD  
JUL 14 11 04 AM '97



# TWIN STATE ENVIRONMENTAL CORP.

P.O. Box 719, Commercial Park, 1A Huntington Road, Richmond, VT 05477

Tel.: (802) 434-3350 • Fax (802) 434-4478

July 9, 1997

Mr. David Carter  
Carter and Pingert, Esq.  
600 Route 2  
South Hero, VT 05486

**RE: Initial Site Investigation  
North Hero House, North Hero, Vermont  
TSEC Project # 97-017, SMS Site #97-2142**

Dear Mr. Carter:

Enclosed is the Site Investigation Report that was prepared to evaluate the environmental condition of the above mentioned SITE following the removal of one (1) 550 gallon capacity gasoline underground storage tank (UST). This investigation was requested by the State of Vermont Agency of Natural Resources (ANR), Sites Management Section (SMS).

Soil and groundwater contamination was observed in the former UST excavation during tank removal activities in January 1997. Our recent subsurface investigation in January 1997 has indicated that petroleum contamination, a result of the former tank, has impacted soil and groundwater beneath the SITE.

We have recommended that a quarterly groundwater sampling program be implemented at the SITE.

Please call to discuss our findings or other matters of concern.

Sincerely,

**TWIN STATE ENVIRONMENTAL CORPORATION**

Jon P. Berntsen  
Geologist

encl.

cc: Mr. Chuck Schwer, ANR, SMS

North Hero House  
North Hero, Vermont  
July 9, 1997

## 1.0 INTRODUCTION

This Initial Site Investigation (ISI) Report has been prepared by Twin State Environmental Corporation (TSEC) to present the findings of environmental conditions encountered during a recent subsurface site investigation at North Hero House in North Hero, Vermont (SITE) (see SITE Location Map, **Figure 1**). This investigation was initiated in response to conditions encountered during the removal of one (1) on-SITE underground storage tank (UST) formerly containing gasoline.

The 550 gallon capacity gasoline UST was removed from the SITE on January 16, 1997 under the supervision of TSEC. During the removal of the UST, contaminated soil was encountered as indicated by elevated readings on a photoionization detector (PID).

During the subsequent removal and inspection of the UST, numerous small diameter ( $\frac{1}{4}$ -inch) holes were identified in the tank, and a product sheen was observed on top of the water table. Based on the amount of contamination present, it was determined that additional site work was necessary.

## 2.0 SCOPE OF SERVICES

The following scope of services were performed by TSEC during this investigation:

- Four (4) Geoprobe<sup>®</sup> borings were advanced to investigate soil and groundwater contamination resulting from the former USTs. Recovered soil samples were field screened using a PID equipped with a 10.6 eV lamp.
- Four (4)  $1\frac{1}{2}$  x  $\frac{1}{2}$ -inch diameter prepacked groundwater monitoring wells were installed into these borings.
- Groundwater samples were collected from the four (4) newly installed monitoring wells as well as Lake Champlain, and submitted for analysis at Endyne by USEPA Method 8020 for volatile organic compounds (VOCs).
- Elevations and locations of the four (4) on-SITE monitoring wells were surveyed. The data obtained has been used to create a site map, a groundwater flow map and contaminant concentration maps.
- A survey of sensitive receptors was conducted, focusing on surface water, residential basements (if present), and private drinking water wells.
- A summary report of the above-mentioned work was prepared.

North Hero House  
North Hero, Vermont  
July 9, 1997

### 3.0 SITE LOCATION AND DESCRIPTION

**SITE Owner:** Mr. Walter Blasberg  
**SITE Address:** US 2  
North Hero, Vermont  
**Zoning:** Commercial  
**Utilities:** Water - Municipal Connection  
Sewer - On-SITE Septic  
Electric - Overhead connection  
Telephone - Underground connection  
**Structures:** One (1) three story house, three (3) one story out buildings, and three (3) additional structures across Route 2.

The SITE is located on the west side of Route 2, just north of Station Road in North Hero, Vermont (see SITE Location Map, **Figure 1**). The main building on-SITE is being renovated into a bed and breakfast inn. There are no known additional USTs used for gasoline or motor fuel storage on SITE.

The site is commercially zoned and is situated in a mixed land use area. The properties adjacent to the site consist of a field to the west; Route 2 to the east; a residence to the south; and a Methodist Church to the north.

The topography of the site slopes towards the east, down to the shore of Lake Champlain. The nearest surface water, and potential receptor is an unnamed drainage feature that flows to the south and into Lake Champlain. The drainage is approximately 100 feet west of the former UST, and Lake Champlain is approximately 250 feet east of the SITE.

### 4.0 UST CLOSURES ON SITE

One (1) 550 gallon gasoline UST, formerly located on the back lawn of the main house and adjacent to the septic system, was removed from the SITE on January 16, 1997. The tank was uncovered using a backhoe, and the soils were screened for the presence of VOCs using a PID calibrated to an isobutylene standard.

Soils encountered above the tank include a loamy fill with some cobbles. Due to the presence of a water supply line, the on-SITE septic system, and a propane gas line, the sides of the tank were not excavated. Soils above the tank (0 to 3.5 ft) did not exhibit any positive PID readings.

The tank was cut and cleaned in place, and approximately 25 gallons of liquid waste and one (1) drum of solids were removed from the tank. Following the cleaning of the tank, it was removed from the ground. Upon removal of the tank, the side walls of the

North Hero House  
North Hero, Vermont  
July 9, 1997

excavation caved into the hole. Subsequent inspection of the tank carcass identified numerous small (1/4-inch) holes in both ends of the tank.

Further excavation within the tank cavity showed significant soil contamination beneath the tank, with peak PID readings greater than 1,100 parts per million vapor (ppmv). Groundwater was encountered at approximately 7.5 ft below ground surface (bgs) and had a petroleum associated sheen. Further excavation was prevented due to the above mentioned utilities.

## 5.0 SUBSURFACE EXPLORATION AND RESULTS

The subsurface exploration program was developed to gather data to provide a better understanding of the hydrogeology and contaminant distribution on SITE.

### 5.1 Advancement of Soil Borings

Four (4) soil borings were advanced using the Geoprobe® on April 8, 1997 by TSEC in locations indicated on **Figure 2**. Logs for these borings are presented in **Appendix A**. These borings were advanced to depths ranging from 5.5 to 12 feet bgs. All borings were logged, describing soil strata conditions, and field screened for VOCs with a PID using conventional headspace techniques.

General soil conditions encountered at the SITE consisted of silty sand overlying a clayey till material with some gravel. Groundwater was encountered between 1.03 and 5.30 ft bgs.

Contaminated soil was encountered during the installation of boring B-1, which was placed in the center of the former tank cavity. A headspace analysis performed on the samples collected from B-1 indicated VOCs were present at concentrations ranging from non-detect (ND) to 1,200+ ppmv. Boring B-1 exhibited the highest readings in the sample collected between 4 and 8 ft bgs.

Samples collected from soil borings B-3 and B-4 did not exhibit any elevated PID readings. The sample collected from boring B-2, at 8-12 ft had a concentration of 8 ppmv on the PID. No other sample collected from this boring exhibited any detectable concentrations of VOCs.

### 5.2 Monitor Well Installation

The four (4) above mentioned borings were all completed as monitoring wells. The wells are constructed of 1 1/2 x 1/2-inch diameter prepacked groundwater monitoring wells.

North Hero House  
North Hero, Vermont  
July 9, 1997

The wells were installed in the following locations and are depicted on the SITE Plan, **Figure 2:**

- Monitoring Well MW-1 was installed in the former UST cavity ;
- MW-2 was installed in the driveway, downgradient of the former UST cavity;
- MW-3 was installed to the west in the apparent downgradient direction of the former tank cavity; and,
- MW-4 was installed to the south in a crossgradient location from the former UST in order to monitor the lateral migration of contaminants, and to determine the effect of the septic system of contamination and groundwater transport.

Further construction details of the monitoring wells are presented below and in **Appendix A: Monitoring Well and Boring Logs.**

### 5.2.1 Monitoring Well Construction

The newly installed wells are constructed of 1½ x ½-inch diameter schedule 40 polyvinylchloride (PVC) pre-packed monitoring wells with 0.010-inch machine slotted screen. These pre-packed monitoring wells consist of a ½-inch diameter inner screen surrounded by a clean sand filter pack, placed inside a 1½-inch diameter outer screen, and a ½-inch diameter schedule 40 PVC riser. A bentonite seal is placed above the 1½-inch diameter prepacked screen, and the well is sealed with a locking expansion plug and a curb box set in concrete that is flush grade. The depths of the wells range from 5.5 to 12.0 ft bgs.

### 5.3 SITE Geology

A summary of the predominate geological units encountered during boring activities indicated a sandy fill material overlying clayey sand and gravel till. Refusal, a good indication of bedrock, was encountered between 1 and 2.5 ft bgs in several borings attempted to the east of the former tank cavity. The deepest sample that was collected from these borings contained a dark gray shale, consistent with bedrock outcroppings observed in the vicinity of the SITE. Reports published by the Vermont Geological Survey indicate that the bedrock beneath the SITE is comprised of a dark gray to black, fissile, calcareous shale known as the Stony Point Shale. For a more detailed description of geological units, see Monitoring Well and Boring Logs, **Appendix A.**

### 5.4 SITE Survey

A Topcon AT-G6 auto level was used to perform a stadia survey to identify the location of the newly installed monitoring wells with respect to existing site features. The collected data was used to update the SITE Plan (**Figure 2**) to include the location of the

North Hero House  
North Hero, Vermont  
July 9, 1997

newly installed wells. The septic system manhole adjacent to the flagpole was used as a benchmark and given an assumed elevation of 100 feet.

## 6.0 COLLECTION OF GROUNDWATER SAMPLES

Groundwater sampling was performed at this SITE by TSEC on April 18, 1997. Samples were collected from the newly installed wells MW-1, MW-2, MW-3, and MW-4, as well as from Lake Champlain. The samples were submitted to Endyne for analysis by USEPA Method 8020 for VOCs.

### 6.1 Monitoring Well Sample Collection

Prior to sampling, depth to groundwater measurements were collected at all of the wells. Depth to water ranged from 1.03 to 5.30 ft bgs at monitoring wells MW-3 and MW-1, respectively.

To provide for a representative groundwater sample, each well was adequately purged of water with a low flow peristaltic pump with dedicated discharge line. Purge water from the wells was discharged directly to the ground surface. Sampling at each location was conducted using a clean bailer.

Quality Assurance/Quality Control (QA/QC) samples incorporated into this sampling round included one (1) duplicate sample taken from monitoring well MW-1 and one (1) field blank. The samples were analyzed via USEPA Method 8020 for VOCs. All chemical analyses for this round of groundwater sampling were performed by Endyne Inc. of Williston, Vermont. The results of the groundwater sampling round are discussed in the following sections.

### 6.2 Lake Champlain Sample Collection

The sample from Lake Champlain was collected by immersing a 40 ml clear glass vial into the lake. The bottle was allowed to fill almost completely. Acid was added to the bottles, and the remainder of the bottle was filled using water collected in a clean 40 ml vial. *whose in the lake?*

## 7.0 RESULTS OF SAMPLING ACTIVITIES

### 7.1 Groundwater Flow Direction

Groundwater levels on SITE were measured by TSEC personnel on April 18, 1997. As previously mentioned, depth to groundwater measurements ranged from 1.03 to 5.30 ft

North Hero House  
North Hero, Vermont  
July 9, 1997

bgs at wells MW-3 and MW-1 respectively. A full analysis of groundwater elevation data is presented in **Table 1** (Summary of Groundwater Elevations).

Based on measured depths to groundwater observed in monitoring wells on SITE at the time of sampling, groundwater underlying the SITE has been calculated to flow to the west in the overburden aquifer, towards an intermittent surface water drainage. A graphical interpretation of the groundwater elevation data is presented on the Groundwater Contour Plan provided as **Figure 3**.

According to published hydraulic conductivity values for sand, silt and clay, the subsurface materials encountered at the SITE, the hydraulic conductivity for the aquifer ranges between 0.003 feet per day (ft/d) and 3 ft/d (Fetter, 1994). Under the measured site hydraulic gradient of 0.053 ft/ft, and an assumed formation porosity of 40%, the calculated apparent groundwater flow velocity beneath the site ranges from 0.0004 ft/d to 0.4 ft/d.

## **7.2 Analytical Results**

### **7.2.1 Groundwater Results**

VOC analytical results received from Endyne indicate that petroleum associated compounds are detectable in MW-1 only. Benzene is present at 488 micrograms per liter (ug/l), well above its Maximum Contaminant Level (MCL) of 5 ug/l as promulgated by the US EPA. Toluene and ethylbenzene were also present in MW-1 above their MCLs of 1,000 ug/l and 700 ug/l in MW-1 at 1,090 ug/l and 758 ug/l respectively. MTBE was not detected above the sample specific method detection limit of 1,000 ug/l. Duplicate results from MW-1 were also returned with benzene, toluene, and ethylbenzene above the MCL.

Although the MTBE detection limit is well above the Vermont Health Advisory (VHA) of 40 ug/l for the sample collected from monitoring well MW-1, it does not appear as though contamination has migrated from the source area. MTBE is below the method detection limit of 10 ug/l in all of the downgradient wells.

The complete analytical laboratory report from Endyne is provided as **Attachment 1**.

### **7.2.2 Surface Water Results**

The water sample collected from Lake Champlain did not contain any detectable concentrations of VOCs.

North Hero House  
North Hero, Vermont  
July 9, 1997

### 7.3 QA/QC Results

The relative percent difference (RPD) was calculated for BTEX compounds present in MW-1 to be 14.2%. The RPD for MTBE was calculated to be 0.7%. Both values are well within accepted value of 25% for RPD.

## 8.0 RECEPTOR EVALUATION

Following the removal of the USTs and the initial discovery of petroleum contamination at the SITE, a sensitive receptor evaluation was conducted in the immediate vicinity. This investigation focused on surface water receptors, groundwater supply wells, and residences.

Analytical data received from Endyne indicated that Lake Champlain has not been directly impacted by the contamination originating on-SITE. Additionally, there has been no visible impact to the surface water drainage feature flowing to the west of the SITE.

During tank excavation activities, a black plastic water line that formerly serviced the northernmost on-SITE building was observed within the tank cavity. This line, approximately 1½ ft bgs, rests approximately 2 ft above the contaminated soils in the former excavation.

All buildings surrounding the SITE are now supplied by municipal water, and no other drinking water sources appear to have been impacted.

## 9.0 SUMMARY AND CONCLUSIONS

Based on the information and analytical data obtained during this investigation, TSEC concludes the following:

- The source of the contamination, the former UST at the site, has been removed.
- Groundwater quality in monitoring well MW-1 exceeds the MCLs for benzene, toluene, and ethylbenzene. No other wells contain detectable quantities of target VOCs.
- With groundwater flowing to the west, away from Lake Champlain, it does not appear that there is potential for the lake to be contaminated directly from this SITE.
- With municipal water supplying all neighboring properties, it does not appear as though any drinking water sources are at risk.

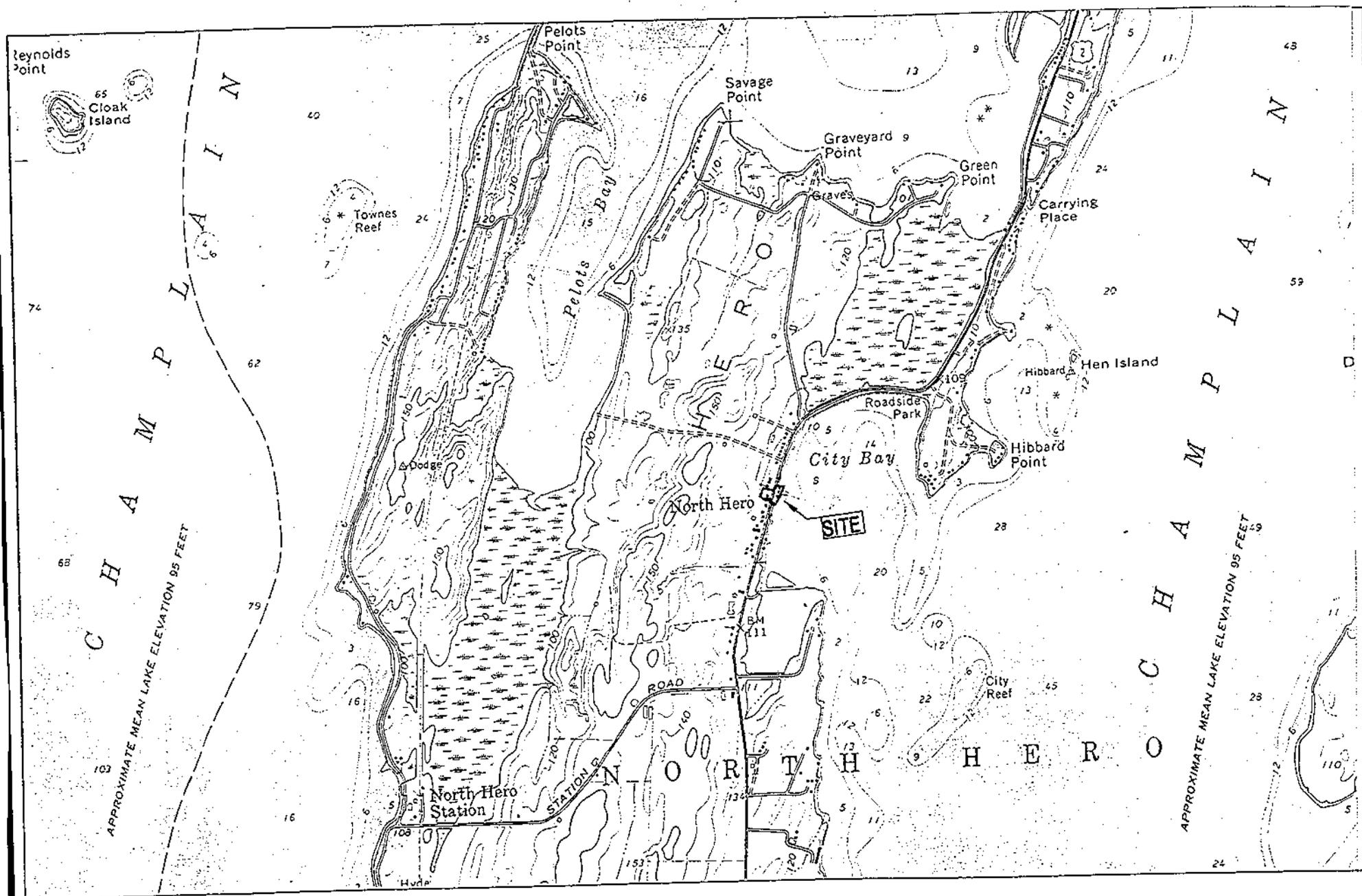
North Hero House  
North Hero, Vermont  
July 9, 1997

## 10.0 RECOMMENDATIONS

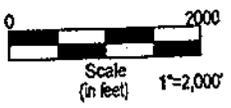
Due to the presence of contamination in both soil and groundwater at the SITE, TSEC recommends the following:

- Based on the degree of groundwater contamination present in MW-1, a quarterly monitoring program is suggested. This program would include the sampling of the four (4) on-SITE groundwater monitoring wells for BTEX and MTBE. It does not appear necessary to collect samples from Lake Champlain in subsequent sampling rounds.
- During peak groundwater flow periods (i.e.- spring sampling round), TSEC recommends collecting one (1) surface water sample from the surface water drainage feature along the western edge of the SITE. This sample would also be analyzed for BTEX and MTBE.
- When sampling, it is imperative that the newly installed wells be properly purged. Three (3) well volumes of water should be evacuated from the wells, with the outer 1½-inch diameter screen used to calculate purge volume.

FIGURES



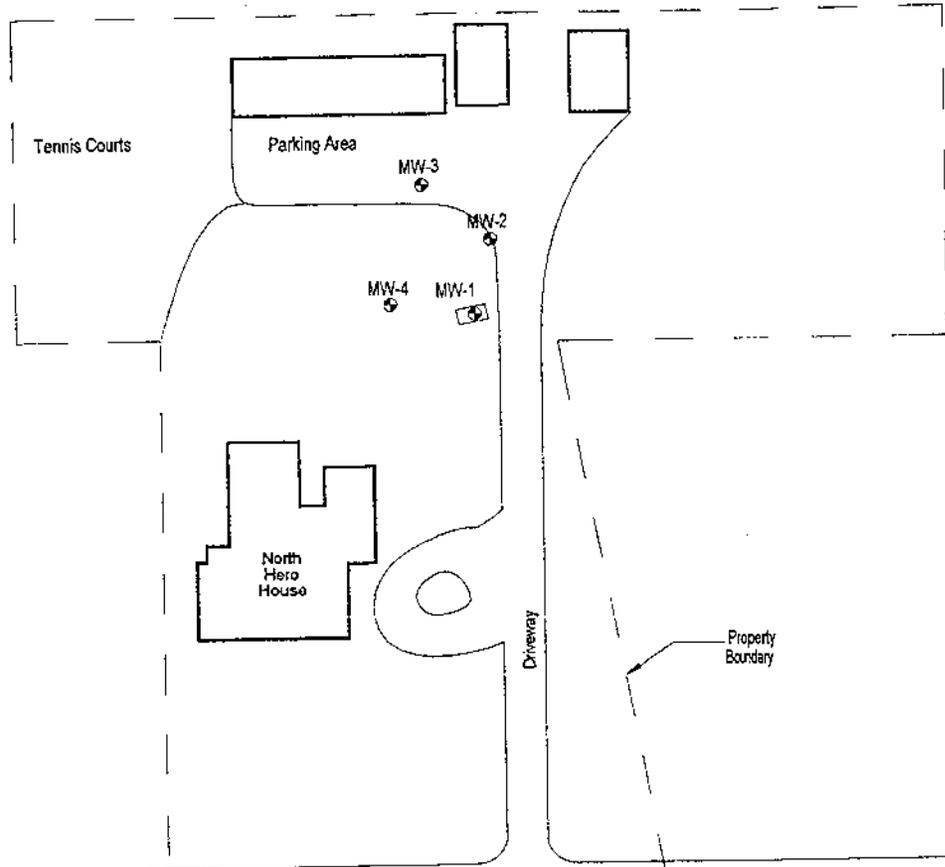
Source: USGS 7.5 Minute Topographic Series  
 North Hero, Vermont Quadrangle



Project No: 97-017	Designed By: jpb
	Checked By:
	Approved By:
	Drawn By: jpb
	Scale: as shown
Date: 08/17/97	

TWIN STATE ENVIRONMENTAL CORP.  
 1A Huntington Rd.  
 P.O. Box 719  
 Richmond, Vermont  
 (802) 434-3360

FIGURE 1  
 SITE LOCATION MAP  
 North Hero House  
 North Hero, Vermont



**LEGEND**

MW-4  Monitoring Well Location

U.S. Route 2

Lake Champlain

Lake Champlain

Dock

House

Old Church

House

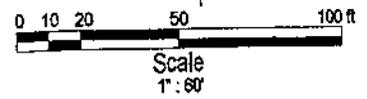
Parking Area

Tennis Courts

North Hero House

Drieway

Property Boundary



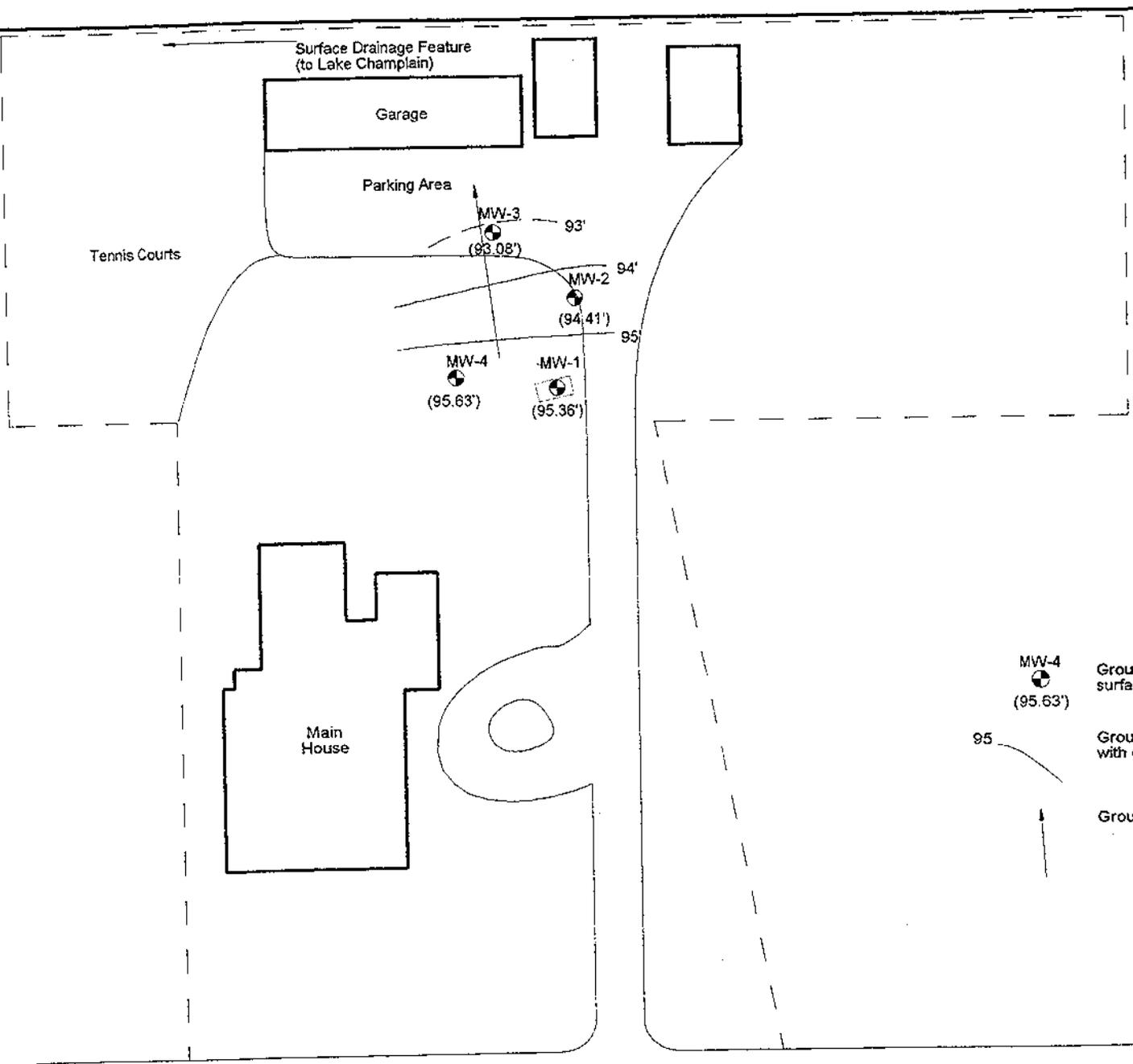
SOURCE: Buck & Pierce, Civil Engineers  
April 1973

jpb:\project\97-017nh\siteplan.skd

Project No: 97-017	Designed By: jpb
	Approved By:
	Drawn By: jpb
	Scale: 1" = 60'
	Date: 04/17/97
Revised:	

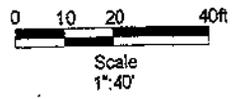
TWIN STATE ENVIRONMENTAL CORP.  
1A Huntington Road  
P.O. Box 719  
Richmond, Vermont  
(802) 434-3360

FIGURE 2  
SITE PLAN  
North Hero House  
North Hero, Vermont



**LEGEND**

-  MW-4 (95.63')
  -  95
  - 
- Groundwater monitoring well with groundwater surface elevation on April 18, 1997, in feet.
- Groundwater elevation contour, with elevation in feet.
- Groundwater flow direction.



Project No: 94-XXX	Designed By:	TWIN STATE ENVIRONMENTAL CORP. 1A Huntington Rd. P.O. Box 719 Richmond, Vermont (802) 434-3360	FIGURE 3 Groundwater Elevation Map April 18, 1997  North Hero House North Hero, Vermont
	Checked By:		
	Approved By:		
	Drawn By:		
	Date:		

TABLES

**TABLE 1**  
**SUMMARY OF GROUNDWATER ELEVATIONS**

North Hero House  
 North Hero, Vermont

April 18, 1997

Well Identification	Top of Riser Elev.	Depth to Product	Depth to Water	Depth of Well	Water Column Thickness	Water Table Elev.
MW-1	100.39	ND	5.3	11.37	6.07	95.09
MW-2	96.79	ND	2.38	11.00	8.62	94.41
MW-3	94.11	ND	1.03	5.05	4.02	93.08
MW-4	100.38	ND	4.75	10.98	6.23	95.63

*Notes:*

*Elevation data are referenced to a TBM and are in units of feet.*

*ND - Not detected.*

*NA - Not applicable.*

*Measurements recorded are referenced to a marking on top of PVC riser for each well.*

*Depth to fluid measurements were obtained using a Solinst Interface Probe.*

*ipb:\project\97-017nh\wettab.xls\April18,1997*

**TABLE 2**  
**SUMMARY OF GROUNDWATER QUALITY**

North Hero House  
 North Hero, Vermont

April 18, 1997

Test	Benzene	Toluene	Ethyl- benzene	Total Xylenes	Total BTEX	MTBE
Sample ID	Concentration, ppb					
MW-1	<b>488</b>	<b>1,090</b>	<b>758</b>	2,460	4,796	<1,000
MW-2	<1	<1	<1	<1	--	<10
MW-3	<1	<1	<1	<1	--	<10
MW-4	<1	<1	<1	<1	--	<10
DUP-1	<b>470</b>	<b>1,050</b>	561	2,080	4,161	<1,000
Lake	<1	<1	<1	<1	--	<10
Field Blank	<1	<1	<1	<1	--	<10
MCL	5	1,000	700	10,000	--	40 (1)

*Notes:*

*MCL - Maximum Contaminant Level promulgated by USEPA.*

*(1) - Vermont Health Advisory (VHA) standard for MTBE.*

*All samples were tested using EPA Method 8020.*

*Bold and italic numbers indicate concentrations that exceed VGES or VHA standards.*

jp:\project\97-017nh\gwqual.xls\April 18, 1997

**APPENDIX A**

**Monitoring Well and Boring Logs**



# TWIN STATE ENVIRONMENTAL CORPORATION

1A Huntington Road, P.O. Box 719 Richmond, Vermont 05477  
 (802) 434-3350 FAX: (802) 434-4478

## MONITORING WELL/SOIL BORING LOG

WELL/BORING NO:	MW-1	WELL DEPTH:	11.4 ft	BORING DEPTH:	12.0 ft
PROJECT NAME:	North Hero House	DEPTH TO WATER:	5.30 ft on 4/18/97.		
PROJECT NO:	97-017	SCREEN DIA:	1 1/4 inch	DEPTH:	1.4-11.4 ft bgs
INSTALL DATE:	April 8, 1997	SCREEN TYPE/SIZE:	0.010 slot Schedule 40 PVC		
TSEC REP:	Jon Berntsen	RISER TYPE:	Schedule 40 PVC		
DRILLING CO:	TSEC	RISER DIA.:	1/2 inch	DEPTH:	0.5-1.4 ft bgs
DRILLING METHOD:	Geoprobe®	GUARD TYPE:	Flush mounted aluminum road box.		
SAMPLING METHOD:	Macrocore Sampler	RISER CAP:	Locking j-plug.		
REMARKS:					

DEPTH IN FEET	WELL PROFILE	SAMPLE DEPTH (FT)	PID (PPMV)	BLOWS/6" AND RECOVERY	SOIL DESCRIPTION AND NOTES	LEGEND	
0		0-4 ft	<1	2.0 ft recovery	0.0-1.0: Sandy, silty CLAY with organic material. 1.0-2.0: SAND, medium. Fill material. Tan, loose.	CEMENT GROUT NATIVE BACKFILL	
1							
2							
3							
4			4-8 ft	1200+	2.0 ft recovery	4.0-4.8: SAND, medium. Fill material. Brown, saturated. 4.8-6.0: Clayey SILT. Very tight. PHC odor.	BENTONITE SEAL SAND PACK
5							
6							
7							
8			8-12 ft	601	4.0 ft recovery	8.0-8.2: SAND (from above) 8.2-10.0: Clayey SILT. Very tight. PHC odor. 10.0-12.0: Sandy, silty till material with gravel. Tan, saturated.	WELL SCREEN RISER PIPE
9							
10							
11							
12						End of Boring = 12.0 feet End of Sampling = 12.0 feet	HS HEAD SPACE
13							
14							WATER LEVEL (APPROX)
15							
16							
17							
18							
19							
20							
21							
22							
23							
24							
25							
<b>GRANULAR SOILS</b> BLOWS/FT    DENSITY 0-4            V.LOOSE 4-10          LOOSE 10-30        M.DENSE 30-50        DENSE >50          V.DENSE		<b>COHESIVE SOILS</b> BLOWS/FT    DENSITY <2            V.SOFT 2-4            SOFT 4-8            M.STIFF 8-15          STIFF 15-30        V.STIFF >30          HARD		<b>PROPORTIONS USED</b> TRACE        0-10% LITTLE        10-20% SOME         20-35% AND            35-50%		<b>NOTES:</b> 1. Well is located in former UST cavity. 2. PID readings were obtained using a Thermo Environmental Instruments Model 580 B PID equipped with a 10.6eV lamp. Conventional headspace techniques were used.  PHC Petroleum Hydro Carbon	



# TWIN STATE ENVIRONMENTAL CORPORATION

1A Huntington Road, P.O. Box 719 Richmond, Vermont 05477  
 (802) 434-3350 FAX: (802) 434-4478

## MONITORING WELL/SOIL BORING LOG

WELL/BORING NO:	MW-2	WELL DEPTH:	11.0 ft	BORING DEPTH:	12.0 ft
PROJECT NAME:	North Hero House	DEPTH TO WATER:	2.38 ft on 4/18/97.		
PROJECT NO:	97-017	SCREEN DIA:	1 1/2 x 1/2 -inch	DEPTH:	1.0-11.0 ft bgs
INSTALL DATE:	April 8, 1997	SCREEN TYPE/SIZE:	0.010 slot Schedule 40 PVC		
TSEC REP:	Jon Berntsen	RISER TYPE:	Schedule 40 PVC		
DRILLING CO:	TSEC	RISER DIA:	1/2 -inch	DEPTH:	0.5-1.0 ft bgs
DRILLING METHOD:	Geoprobe®	GUARD TYPE:	Flush mounted aluminum road box.		
SAMPLING METHOD:	Macrocore Sampler	RISER CAP:	Locking j-plug.		
REMARKS:					

DEPTH IN FEET	WELL PROFILE	SAMPLE DEPTH (FT)	PID (PPMV)	BLOWS/6" AND RECOVERY	SOIL DESCRIPTION AND NOTES	LEGEND	
0		0-4 ft	<1	3.5 ft recovery	0.0-3.5: Sandy, silty CLAY with organic material.	CEMENT GROUT NATIVE BACKFILL BENTONITE SEAL SAND PACK WELL SCREEN RISER PIPE HS HEAD SPACE WATER LEVEL (APPROX)	
1							
2							
3							
4			4-8 ft	<1	3.0 ft recovery	4.0-4.8: Sandy silty CLAY till with gravel. Tan, tight, dry. 4.8-7.0: Sandy silty CLAY till with gravel. Grey, tight. Wet at 5.5'.	
5							
6							
7							
8			8-12 ft	8.0	3.0 ft recovery	8.0-10.0: Sandy clay till with gravel. Saturated, grey, loose. 10.0-11.0: Sandy clay till with gravel. Brown, tight.	
9							
10							
11							
12					End of Boring = 12.0 feet End of Sampling = 12.0 feet		
13							
14							
15							
16							
17							
18							
19							
20							
21							
22							
23							
24							
25							
<b>GRANULAR SOILS</b> BLOWS/FT DENSITY 0-4 V.LOOSE 4-10 LOOSE 10-30 M.DENSE 30-50 DENSE >50 V.DENSE		<b>COHESIVE SOILS</b> BLOWS/FT DENSITY <2 V.SOFT 2-4 SOFT 4-8 M.STIFF 8-15 STIFF 15-30 V.STIFF >30 HARD		<b>PROPORTIONS USED</b> TRACE 0-10% LITTLE 10-20% SOME 20-35% AND 35-50%		<b>NOTES:</b> 1. Well is located downgradient of the former UST cavity. 2. PID readings were obtained using a Thermo Environmental Instruments Model 580 B PID equipped with a 10.6eV lamp. Conventional headspace techniques were used.	



# TWIN STATE ENVIRONMENTAL CORPORATION

1A Huntington Road, P.O. Box 719 Richmond, Vermont 05477  
 (802) 434-3350 FAX: (802) 434-4478

## MONITORING WELL/SOIL BORING LOG

WELL/BORING NO:	MW-3	WELL DEPTH:	5.5 ft	BORING DEPTH:	5.5 ft
PROJECT NAME:	North Hero House	DEPTH TO WATER:	1.03 ft on 4/18/97.		
PROJECT NO:	97-017	SCREEN DIA:	1 1/2-inch	DEPTH:	0.5-5.5 ft bgs
INSTALL DATE:	April 8, 1997	SCREEN TYPE/SIZE:	0.010 slot Schedule 40 PVC		
TSEC REP:	Jon Berntsen	RISER TYPE:	Schedule 40 PVC		
DRILLING CO:	TSEC	RISER DIA:	1/2-inch	DEPTH:	See remarks
DRILLING METHOD:	Geoprobe®	GUARD TYPE:	Flush mounted aluminum road box.		
SAMPLING METHOD:	Macrocore Sampler	RISER CAP:	Locking j-plug.		
REMARKS:	0.25 ft of solid PVC is sticking up from screen				

DEPTH IN FEET	WELL PROFILE	SAMPLE DEPTH (FT)	PID (PPMV)	BLOWS/6" AND RECOVERY	SOIL DESCRIPTION AND NOTES	LEGEND	
0		0-4 ft	<1	1.0 ft recovery	0.0-1.0: SAND and GRAVEL driveway base over brown till.	CEMENT GROUT NATIVE BACKFILL BENTONITE SEAL SAND PACK WELL SCREEN RISER PIPE HHS HEAD SPACE WATER LEVEL (APPROX)	
1							
2							
3							
4			4-8 ft	No PID	4.0 ft recovery	4.0-5.0: SAND, coarse, and GRAVEL. Tan, saturated. 5.0-8.0: Clayey SILT. Very tight. PHC odor.	
5							
6							
7							
8						End of Boring = 8.0 feet End of Sampling = 8.0 feet	
9							
10							
11							
12							
13							
14							
15							
16							
17							
18							
19							
20							
21							
22							
23							
24							
25							

GRANULAR SOILS		COHESIVE SOILS		PROPORTIONS USED	
BLOWS/FT	DENSITY	BLOWS/FT	DENSITY	TRACE	0-10%
0-4	V.LOOSE	<2	V.SOFT	LITTLE	10-20%
4-10	LOOSE	2-4	SOFT	SOME	20-35%
10-30	M.DENSE	4-8	M.STIFF	AND	35-50%
30-50	DENSE	8-15	STIFF		
>50	V.DENSE	15-30	V.STIFF		
		>30	HARD		

NOTES:
1. Well is located downgradient of former UST cavity, adjacent to septic leach field.
2. PID readings were obtained using a Thermo Environmental Instruments Model 580 B PID equipped with a 10.6eV lamp. Conventional headspace techniques were used.
PHC Petroleum Hydrocarbon



# TWIN STATE ENVIRONMENTAL CORPORATION

1A Huntington Road, P.O. Box 719 Richmond, Vermont 05477  
(802) 434-3350 FAX: (802) 434-4478

## MONITORING WELL/SOIL BORING LOG

WELL/BORING NO: MW-4	WELL DEPTH: 10.98 ft	BORING DEPTH: 12.0 ft
PROJECT NAME: North Hero House	DEPTH TO WATER: 4.75 ft on 4/18/97.	
PROJECT NO: 97-017	SCREEN DIA: 1 1/2 x 1/2-inch	DEPTH: 0.98-10.98 ft bgs
INSTALL DATE: April 8, 1997	SCREEN TYPE/SIZE: 0.010 slot Schedule 40 PVC	
TSEC REP: Jon Berntsen	RISER TYPE: Schedule 40 PVC	
DRILLING CO: TSEC	RISER DIA: 1/2-inch	DEPTH: 0.5-0.98 ft bgs
DRILLING METHOD: Geoprobe®	GUARD TYPE: Flush mounted aluminum road box.	
SAMPLING METHOD: Macrocore Sampler	RISER CAP: Locking j-plug.	
REMARKS:		

DEPTH IN FEET	WELL PROFILE	SAMPLE DEPTH (FT)	PID (PPMV)	BLOWS/6" AND RECOVERY	SOIL DESCRIPTION AND NOTES	LEGEND																			
0		0-4 ft	<1	2.5 ft recovery	0.0-0.5: GRASS and Silty fine sand (topsoil) 0.5-2.5: Silty fine to medium sand (fill material). Tan, dry.	CEMENT GROUT NATIVE BACKFILL																			
1		2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25
4		4-8 ft	<1	3.5 ft recovery	4.0-4.5: CLAY, brown. Dry 4.5-6.5: Sand, silt, and clay. Loose, orange/brown, saturated. 6.5-7.5: CLAY, brown. Damp.	BENTONITE SEAL SAND PACK																			
8		8-12 ft	<1	4.0 ft recovery	8.0-9.0: Sand, silt, and clay till. Trace of gravel. Brown/tan. 9.0-9.5: SAND, coarse. Tan, saturated. 9.5-10.0: SILT and very fine SAND. Tan, damp. 10.0-12.0: CLAY, brown, tight, dry.	WELL SCREEN RISER PIPE																			
End of Boring = 12.0 feet End of Sampling = 12.0 feet					HS HEAD SPACE WATER LEVEL (APPROX)																				
<b>GRANULAR SOILS</b> BLOWS/FT    DENSITY 0-4            V.LOOSE 4-10          LOOSE 10-30        M.DENSE 30-50        DENSE >50          V.DENSE		<b>COHESIVE SOILS</b> BLOWS/FT    DENSITY <2            V.SOFT 2-4            SOFT 4-8            M.STIFF 8-15          STIFF 15-30        V.STIFF >30          HARD		<b>PROPORTIONS USED</b> TRACE        0-10% LITTLE        10-20% SOME         20-35% AND            35-50%		<b>NOTES:</b> 1. Well is located down/crossgradient of the former UST. 2. PID readings were obtained using a Thermo Environmental Instruments Model 580 B PID equipped with a 10.6eV lamp. Conventional headspace techniques were used.																			

**ATTACHMENT 1**

**Laboratory Analytical Report**

**ENDYNE, INC.**Laboratory Services

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

REPORT OF LABORATORY ANALYSIS

CLIENT: Twin State Environmental Corp.  
PROJECT NAME: N. Hero House  
REPORT DATE: April 23, 1997  
DATE SAMPLED: April 18, 1997

PROJECT CODE: TSEC1814  
REF.#: 102,299 - 102,305

Enclosed please find the results of the analyses performed for the samples referenced on the attached chain of custody. Chain of custody indicated sample preservation with HCl.

All samples were prepared and analyzed by requirements outlined in the referenced method and within the specified holding times. All instrumentation was calibrated with the appropriate frequency and verified by the requirements outlined in the referenced method. Blank contamination was not observed at levels affecting the analytical results.

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.

Individual sample performance was monitored by the addition of surrogate analytes to each sample. All surrogate recovery data was determined to be within laboratory QA/QC guidelines unless otherwise noted.

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

**EPA METHOD 8020--PURGEABLE AROMATICS**

CLIENT: Twin State Environmental Corp.	DATE RECEIVED: April 18, 1997
PROJECT NAME: N. Hero House	REPORT DATE: April 23, 1997
CLIENT PROJ. #: 97017	PROJECT CODE: TSEC1814

Ref. #:	102,299	102,300	102,301	102,302	102,303
Site:	MW-1	MW-2	MW-3	MW-4	Dup-1
Date Sampled:	4/18/97	4/18/97	4/18/97	4/18/97	4/18/97
Time Sampled:	12:12	12:34	12:43	12:26	13:00
Sampler:	R. Lindsay				
Date Analyzed:	4/22/97	4/23/97	4/22/97	4/22/97	4/22/97
UIP Count:	>10	0	0	0	>10
Dil. Factor (%):	1	100	100	100	1
Surr % Rec. (%):	84	90	93	90	85
Parameter	Conc. (ug/L)				
Benzene	488.	TBQ <1	TBQ <1	<1	470.
Chlorobenzene	<100	<1	<1	<1	<100
1,2-Dichlorobenzene	<100	<1	<1	<1	<100
1,3-Dichlorobenzene	<100	<1	<1	<1	<100
1,4-Dichlorobenzene	<100	<1	<1	<1	<100
Ethylbenzene	758.	<1	<1	<1	561.
Toluene	1,090.	<1	TBQ <1	<1	1,050.
Xylenes	2,460.	<1	<1	<1	2,080.
MTBE	<1000	<10	<10	<10	<1000

Ref. #:	102,304	102,305			
Site:	Lake	F.B.			
Date Sampled:	4/18/97	4/18/97			
Time Sampled:	10:37	9:30			
Sampler:	R. Lindsay	R. Lindsay			
Date Analyzed:	4/22/97	4/22/97			
UIP Count:	1	1			
Dil. Factor (%):	100	100			
Surr % Rec. (%):	89	92			
Parameter	Conc. (ug/L)	Conc. (ug/L)			
Benzene	<1	<1			
Chlorobenzene	<1	<1			
1,2-Dichlorobenzene	<1	<1			
1,3-Dichlorobenzene	<1	<1			
1,4-Dichlorobenzene	<1	<1			
Ethylbenzene	<1	<1			
Toluene	<1	<1			
Xylenes	<1	<1			
MTBE	<10	<10			

Note: UIP = Unidentified Peaks    TBQ = Trace Below Quantitation    NI = Not Indicated

**CHAIN-OF-CUSTODY RECORD**

21187

Project Name: <b>N. Hero House</b>	Reporting Address: <b>SAME AS</b>	Billing Address: <b>1A Huntington Rd. Richmond, VT 05477</b>
Site Location: <b>N. Hero, VT.</b>	Company: <b>Twin State Env. Corp.</b>	Sampler Name: <b>Red Lindsay</b>
Endyne Project Number: <b>TSEC1814 97017</b>	Contact Name/Phone #: <b>Jon Bernstein</b>	Phone #: <b>802-434-8350</b>

Lab #	Sample Location	Matrix	GRA B	COMP	Date/Time	Sample Containers		Field Results/Remarks	Analysis Required	Sample Preservation	Rush
						No.	Type/Size				
102,299	MW-1	L	X		4/18/97 1212	2	40ml VOA		SO207 MTBE	PCB ICE	
102,300	MW-2				1234						
102,301	MW-3				1243						
102,302	MW-4	PL	AL		1226						
102,303	Dup-1				1300						
102,304	CARA				1037						
102,305	F.B.				0930						

Relinquished by: Signature	Received by: Signature	Date/Time
Relinquished by: Signature <i>[Signature]</i>	Received by: Signature <i>[Signature]</i>	Date/Time <b>4.18.97 1345</b>

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 Pests/PCB
4	Nitrite N	9	BOD <sub>5</sub>	14	Turbidity	19	BTEX	24	EPA 608 Pests/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):										