ATC ASSOCIATES INC.
ENVIRONMENTAL, GEOTECHNICAL AND MATERIALS PROFESSIONALS

March 6, 1998

Mr. Bob Butler
State of Vermont
Agency of Natural Resources
Waste Management Division
103 South Main Street/West Office
Waterbury, Vermont 05671-0404

RE: Initial Site Investigation Report
Brook Street School
Barre, Vermont
ATC Project #17643-0001
VT DEC Site #97-2298

Dear Bob:

Please find enclosed ATC Associates Inc.'s (ATC) Initial Site Investigation Report for the field work conducted on January 26, 1998 and January 29, 1998 at the above referenced site.

On November 14, 1997, an 8,000 gallon No. 2 fuel-oil underground storage tank (UST) was removed at the site. The findings presented in the UST closure report prepared by Marin Environmental, Inc. dated November 18, 1997 indicate that a release of fuel-oil has occurred at the site. The report identified two possible sources of the apparent fuel oil release: 1) a former UST within the immediate vicinity, which was removed in 1986 and required no follow-up investigation at that time; and 2) a welded seam along the surface of the UST removed on November 14, 1997. In order to determine the degree and extent of contamination at the site, ATC conducted an Initial Site Investigation in accordance with the Sites Management Section's site investigation expressway process. The enclosed report details the subsurface site investigation performed by ATC for the City of Barre at the site above referenced site.

If you have any questions concerning this correspondence, please feel free to contact me at 434-2113.

Sincerely,
ATC ASSOCIATES INC.

Joseph J. Duncan
Project Engineer

enclosure

cc: Mr. Reginald Abare, City of Barre

ATC ASSOCIATES INC.

ENVIRONMENTAL, GEOTECHNICAL AND MATERIALS PROFESSIONALS

Prepared for:

Mr. Reginald Abare
City Engineer
Barre City Engineering Department
12 North Main Street
Barre, Vermont 05641

Initial Site Investigation Report
Brook Street School
Barre, Vermont
VT DEC Site #97-2298

Prepared by:

ATC Associates Inc.
Brown's Trace Building
Richmond, Vermont

ATC Project #17643-0001

March 1998

Table of Contents

Appendices

1.0 INTRODUCTION

This report details the subsurface site investigation performed by ATC Associates Inc. (ATC) under contract with the City of Barre, at the Brook Street School in Barre, Vermont (the site) (Figure 7.1). At the time of this report the legal owner of this property is the City of Barre. This work was performed pursuant to the December 4, 1997 ATC work plan for the site, which was designed to further define the degree and extent of subsurface contamination at the site and its potential for impact on nearby receptors.

1.1 Site Description

The site is located on Brook Street in Barre, Vermont. The on-site building is an out-of-service, three-story school house. A chainlink fence surrounds the perimeter of the site. During the site visit, the ground surface was snow covered, however, it appears that the entire site, excluding the building, is covered with asphalt. Residential properties abut the site to the north and east. Brook Street fronts the site to the west and Seminary Street abuts the site to the south. Dense clusters of residential and commercial buildings surround the properties immediately abutting the site.

The site gently slopes to the southeast and surface runoff from the site would generally flow in a southeasterly direction to Seminary Street. Based upon the U.S. Geological Survey (Barre West, Vermont Quadrangle), the site is approximately 600 meters above sea level. According to the Surficial Geologic Map of Vermont, the surficial geology of the area consists of till mantling the bedrock and reflecting the topography of the underlying bedrock surface. Please refer to Appendix B for a description of specific soil types noted on site during the soil boring activities performed by ATC for this investigation. A Site Plan is included as Figure 7.2.

1.2 Previous Site Investigations

An out of service 8,000 gallon underground storage tank (UST) was removed from the site on November 14, 1997. The assessment of the UST closure was conducted by Marin Environmental, Inc. (Marin) and documented in a report dated November 18, 1997. The report documented an apparent fuel oil release with petroleum stained soils and product sheens. The report identified two possible sources of the apparent fuel oil release: 1) a former UST within the immediate vicinity, which was removed in 1986; and 2) a welded seam along the surface of the most recent UST removed from the site on November 14, 1997. The report indicated that headspace readings on soil samples collected from the UST excavation ranged from non-detect to 75.3 parts per million (ppm). At the time of the UST closure, Marin installed one two inch monitoring well (designated as MW-1) in the northern section of the UST excavation to a depth of approximately 12 feet below ground surface (fbgs). According to the report, all soils from the UST excavation were backfilled due to the

apparent presence of contamination at the water table. A copy of the UST closure report at the site prepared by Marin is included in Appendix A.

Additional information regarding the former UST removed in 1986 was obtained from Mr. Reginald Abare of the City of Barre as follows:

- On November 18, 1997 Mr. Abare spoke with Mr. Roscoe Fisher (current School Department Maintenance Supervisor) who advised that the 8,000 gallon fuel oil tank recently removed at the site on November 14, 1997 was a replacement for an 8,000 gallon tank which had a release at the site approximately 13 to 14 years ago. No follow-up investigation was required at that time.
- Mr. Fisher also indicated that he had spoken with the School Department plumber Mr. Louis Renaud who was present at the 1986 tank pull. Mr. Renaud also advised that Mr. Glenn Smith from the Vermont Department of Labor and Industry was present the tank pull.

In order to determine the degree and extent of contamination identified in the findings generated from previous site investigations, ATC developed a work plan to perform a subsurface site investigation. The results of this investigation are included below.

2.0 MATERIALS AND METHODS

2.1 Soil Borings

On January 26, 1998 soil borings were drilled at two locations on site to define subsurface stratigraphy, as well as to determine any impact to the subsurface in the vadose and saturated zones. Soil borings were drilled by Green Mountain Boring (GMB) of East Barre, Vermont using a truck mounted hollow stem auger drill rig. The soil borings extended to 15 fbgs. Soil boring locations, MW-2 and MW-3, are shown in Figure 7.2. Soil samples were collected at five foot intervals to 17 fbgs from each borehole using a split spoon sampler. Soil screening using a photoionization detector was performed on the soil samples as discussed in Section 2.3 of this report.

2.2 Monitoring Well Installation

Groundwater monitoring wells MW-2 and MW-3 were installed at the site on January 26, 1998 to define groundwater flow direction and gradient as well as to determine any dissolved contaminant impact to the ground water. Well installations at soil borings were conducted by GMB. The monitoring wells were constructed using two inch flush threaded PVC casing and five foot sections of 0.10 slot sized screen. The annulus of the borehole was filled with sand pack to a minimum of 6 inches above the well screen to provide sufficient filtering of silt

laden waters which would otherwise inhibit groundwater entry to the well. A bentonite seal was placed above the sand pack to prevent surface runoff from entering the well. The monitoring wells were secured with locking well caps and keyed padlocks and completed with a limited access flush mount road box set in a concrete apron.

During the site visit, the existing two-inch PVC monitoring well installed in the tank grave, designated as MW-1, was found to be damaged. As a result, the damaged PVC casing was replaced to the top of the existing flush threaded PVC screen, which was approximately 1.5 fbgs. The monitoring well was secured with locking well caps and keyed padlocks and completed with a limited access flush mount road box set in a concrete apron. According to Terry Robbins of Marin, the existing well (MW-1) is constructed of a bottom cap, 10 feet of 0.10 slot sized screen, and 2 feet of PVC casing. Monitoring well locations, MW-1, MW-2 and MW-3, are shown in Figure 7.2. Monitoring well schematics for MW-2 and MW-3 are presented in Appendix B. Monitoring well data and ground water elevations can be found in Table 6.1.

2.3 Soil Screening

During borehole advancement soil samples were collected for subsurface geology notation and then screened by headspace analysis for volatile organic compounds (VOCs) utilizing a HNU Model PI-101 Photoionization Detector (PID) (serial #601430) equipped with a 10.2 electron-volt lamp and calibrated on site with isobutylene (98 ppm), referenced to benzene. Refer to Appendix B for a summary of borehole geology and PID screening results of split spoon samples obtained for borings completed and logged by ATC on January 26, 1997.

2.4 Collection of Groundwater Samples

One round of groundwater samples was collected by ATC on January 29, 1998 from monitoring wells MW-1, MW-2, and MW-3. Using dedicated bailers for each well, approximately three well volumes were removed from MW-1, MW-2, and MW-3 prior to sample collection. Figure 7.2 details the location of these sampling points. All groundwater samples were analyzed by EPA Method 8020 for benzene, toluene, ethylbenzene, and xylenes (BTEX) and for the gasoline additive methyl-tert-butyl-ether (MTBE). All samples were collected in 40 ml glass vials equipped with a Teflon septum and preserved with an HCL solution. All water samples were kept chilled until analyzed at the ATC Associates Analytical Laboratory in Indianapolis, Indiana under chain of custody protocol. Water quality results are discussed in Section 3.3 of this report. A copy of the groundwater analytical results are included in Appendix C.

2.5 Site Survey and Groundwater Elevations

A site survey was conducted by ATC on January 29, 1998 to ascertain spatial relationships and relative elevations between monitoring wells. The monitoring

well top of casing (TOC) elevation for each well was determined by performing a site survey with a transit and rod. TOC was measured from the top of the PVC casing with the locking well cap removed. A benchmark was established on site with an assumed elevation of 100.00 feet and was utilized to determine relative TOC elevations. Spatial relationships between monitoring wells and other significant site features were determined by use of a 100 ft. cloth tape.

Water level and product thickness measurements and TOC elevations were obtained from the three monitoring wells on the site. Water level and product thickness measurements were determined using an interface probe, which is accurate to within one-hundredth of a foot. Groundwater elevations were calculated by subtracting the measured water levels from the top of the inner PVC casing elevations.

2.6 Sensitive Receptor Survey

On January 29, 1998 ATC performed a localized sensitive receptor survey of the site and abutting properties and land features to determine any sensitive receptors that may exist which could potentially be impacted by subsurface contamination identified on site. This survey included identification of surface waters, drinking water sources, residential or business dwellings, subsurface service conduits and native flora or fauna which may be impacted. The survey also included PID assay of the on-site building and stormwater drain basins. During the walk through of the on-site building, ATC was escorted by Larry Morgan of the Barre City Engineering Department. The results of this survey are included in Section 3.4 of this report.

3.0 RESULTS

3.1 Soils

Lithology

On January 26, 1998 a total of eight split spoons were obtained by ATC during soil borings for MW-2 and MW-3. Split spoons for MW-2 and MW-3 indicated brown fine to medium sand with trace clay, some silt, and some fine/coarse gravel from 0 to 2 fbgs and fine to medium sand and trace silt between 5 and 17 fbgs. For MW-2 and MW-3 the water table was encountered at approximately 9 fbgs. Results of the soil classification for each soil boring are included in the soil boring logs in Appendix B.

Soil Quality

Soil samples collected by ATC during borehole advancement on January 26, 1998 were screened by headspace analysis for VOCs. Headspace analyses of split spoon samples for soil boring MW-2 yielded PID responses of 1.0 ppm at 0 to 2 fbgs

increasing to 5.0 ppm for soil obtained at 15 to 17 fbgs. Headspace analyses of split spoon samples for soil boring MW-3 yielded PID responses of 3.0 ppm at 0 to 2 fbgs increasing to 4.0 ppm at 15 to 17 fbgs. Based on visual and olfactory observations, none of the split spoon samples collected during soil boring activities exhibited petroleum impact. Results of the headspace analyses for each soil boring are included in the soil boring logs in Appendix B.

3.2 Site Survey

A site survey was conducted by ATC on January 29, 1998 to ascertain spatial relationships and relative elevations between monitoring wells and other significant site features as specified in Section 2.5 of this report. The results of the site survey were used to develop a site plan included as Figure 7.2.

3.3 Groundwater

Hydrogeology

On January 29, 1998, ATC measured all monitoring wells to determine groundwater elevation and gradient. No product was detected atop groundwater in any of the monitoring wells. For MW-1 groundwater was measured at a depth of 8.16 feet below top of casing or at 91.68 feet relative to a 100 foot assumed datum. Groundwater within MW-2 was measured at 8.01 feet below top of casing or at 90.27 feet relative to a 100 foot assumed datum. For MW-3 groundwater was measured at a depth of 7.60 feet below top of casing or at 90.27 feet relative to a 100 foot datum. Groundwater flow direction as determined by ATC on January 29, 1998 is in a southerly direction, with an approximate gradient of 1.2% across the study area in the direction of groundwater flow. Refer to Table 6.1 for a summary of groundwater elevation data and the Groundwater Gradient Map included as Figure 7.3 which depicts groundwater flow.

Groundwater Quality

On January 29, 1998 monitoring wells MW-1, MW-2, and MW-3 were sampled and analyzed for BTEX and MTBE by EPA Method 8020. The results of these analyses indicate non-detect concentrations of BTEX and MTBE in MW-1 and MW-2. The results also indicate that concentrations of BTEX and MTBE in MW-3 are non-detect, except for ethylbenzene (1.1 *ug*/L) and total xylenes (1.2 *ug*/L). The results of these analyses indicate that concentrations of BTEX and MTBE in all on-site wells are below their respective Vermont Ground Water Enforcement Standards (VT GWES). A summary of groundwater analytical results is presented in Table 6.2. Complete laboratory reports of groundwater analyses are presented in Appendix C.

3.4 Sensitive Receptor Survey

On January 29, 1998 ATC performed a sensitive receptor survey and determined the following:

- The site contains an out-of-service, three-story school house. The site is situated among a dense cluster of residential and commercial buildings. The school house has a below-grade basement with a stone foundation and concrete floor, which would be the closest receptor downgradient of the tank grave. The PID assay of the school house indicated non-detect levels of VOCs in the basement, first floor, and second floor. During the walk-through of the school house, no visual or olfactory evidence of contamination was observed in the school house basement, specifically along the northern interior face of the stone foundation.
- The nearest residence is located approximately 20 feet northeast of the site in the upgradient direction of the former UST. According to Larry Morgan, the on-site school house and surrounding residential and commercial buildings are serviced by municipal water and sewer services.
- ATC was unable to perform the PID assay of the stormwater drain basins due to the piles of snow covering the basins at the time of the survey. According to Larry Morgan, stormwater captured by the drain basins is discharged to local surface water bodies.
- During the site visit, the ground surface was snow covered, however, it appears that the entire site is covered with asphalt. At the time of this report, there was no native flora or fauna on-site which may be impacted by subsurface contamination.
- There are no surface water bodies on-site. The nearest surface water body is Gunners Brook, which is located approximately 200 feet south of the site. Gunners Brook drains into Stevens Branch, which is located approximately 500 feet southwest of the site.

4.0 FINDINGS

- An out of service 8,000 gallon UST was removed from the site on November 14, 1997. The assessment of the UST closure report prepared by Marin in a report dated November 18, 1997 documented an apparent fuel oil release with petroleum stained soils and product sheens. The report identified two possible sources of the apparent fuel oil release: 1) a former UST within the immediate vicinity, which was removed in 1986; and 2) a welded seam along the surface of the UST removed on November 14, 1997. According to the closure report, all soils from the UST excavation were backfilled due to the apparent presence of contamination at the water table. Therefore, the backfilled soils in the tank grave are a potential source of petroleum contamination at the site.

- Additional information from the City of Barre indicates the following: 1) the 8,000 gallon tank removed from the site on November 14, 1997 was a replacement for an 8,000 gallon tank which had a release approximately 13 to 14 years ago; 2) no follow-up investigation was required at the time of the former UST removal in 1986; and 3) Mr. Glenn Smith from the Vermont Department of Labor and Industry was present at the 1986 UST removal.
- The site consists of brown fine to medium sand with trace clay, some silt, and some fine/coarse gravel from 0 to 2 fbgs and fine to medium sand and trace silt between 5 and 17 fbgs.
- Soil screening performed during soil borings indicates that soils at the southern boundaries of the site in the vadose zone and saturated zone have not been impacted by VOCs.
- During groundwater monitoring no product was detected atop groundwater in any of the monitoring wells. Groundwater flow direction as determined by ATC on January 29, 1998 is in a southerly direction, with an approximate gradient of 1.2% across the study area in the direction of groundwater flow.
- Groundwater on the site has not been significantly impacted by petroleum contamination. Groundwater analytical results indicate concentrations of BTEX and MTBE that are well below their respective VT GWES.
- The potential receptor survey identified the school house basement as the closest downgradient receptor of subsurface contamination related to the former UST. During the PID assay of the school house, no evidence of contamination was observed in the school house basement, specifically along the northern interior face of the stone foundation.

5.0 RECOMMENDATIONS

Based upon the results of this investigation, the following recommendations are presented:

1. A copy of this report should be submitted to VT DEC Sites Management Section.

2. To verify the results of the first round of groundwater analysis and to determine if contamination concentrations are reducing, an additional round of groundwater samples should be collected from each of the three on-site monitoring wells. These samples should be collected in June 1998.

3. Since the PID assay of the stormwater drain basins was not performed and stormwater captured by the drain basins is discharged to local surface water bodies, a PID assay of the stormwater drain basins should be performed during the June 1998 sampling round.

4. If dissolved VOC concentrations in each of the three wells have decreased or have not significantly increased and the PID assay of the stormwater drain basins does not indicate significant VOC concentrations, no additional analysis should be necessary and the site should be assigned Site Management Activity Closed designation by VT DEC.

Table 6.1 • Monitoring Well Data & Groundwater Elevations
Brook Street School • Barre, Vermont
January 1998 • Page 1 of 1

Well	Elevation at top of Casing [1] (feet above MSL) [3]	Date	Depth to Free Product (feet)	Free Product Thickness (feet)	Depth to Water (feet below top of casing)	Uncorrected Groundwater Elevation (feet above MSL)	Corrected Groundwater Elevation [2] (feet above MSL)
MW-1	99.84	29-Jan-98	-	-	8.16	91.68	-
MW-2	98.28	29-Jan-98	-	-	8.01	90.27	-
MW-3	97.87	29-Jan-98	-	-	7.6	90.27	-

MSL - Mean Sea Level
[1]-As measured by ATC January 29, 1998. All measurements relative to a common 100 foot datum located as a flange nut on a fire hydrant (See Figure 7.2).
[2]-Correction for free product assumes a density of 0.88.
[3]-Relative to assumed datum.

TABLE 6.2
SUMMARY OF GROUNDWATER RESULTS THROUGH JANUARY, 1998
BROOK STREET SCHOOL • BARRE, VERMONT

SAMPLE LOCATION	SAMPLE DATE	BENZENE (ug/L)	ETHYL BENZENE (ug/L)	MTBE (ug/L)	TOLUENE (ug/L)	TOTAL XYLENES (ug/L)	TOTAL BTEX (ug/L)	TOTAL VOLATILES (ug/L)
MW-1	**1/29/98**	**ND**	**ND**	**ND**	**ND**	**ND**	**ND**	**ND**
MW-2	**1/29/98**	**ND**	**ND**	**ND**	**ND**	**ND**	**ND**	**ND**
MW-3	**1/29/98**	**ND**	**1.1**	**ND**	**ND**	**1.2**	**2.3**	**2.3**
Enforcement Standard*		5	700	40	1000	10000	N/A	N/A
Preventive Action Limit*		0.5	350	20	500	5000	N/A	N/A
Laboratory Detection Limit		1.0	1.0	1.0	1.0	1.0	N/A	100.0

Notes:

* From the Vermont Department of Environmental Conservation's, "Chapter 12 Groundwater Protection Rule and Strategy, Effective Date November 18, 1997."

Shade areas indicate enforcement standard exceedances.

-- Not analyzed N/A - Not Applicable

ND - Not Detected NS - Not Sampled

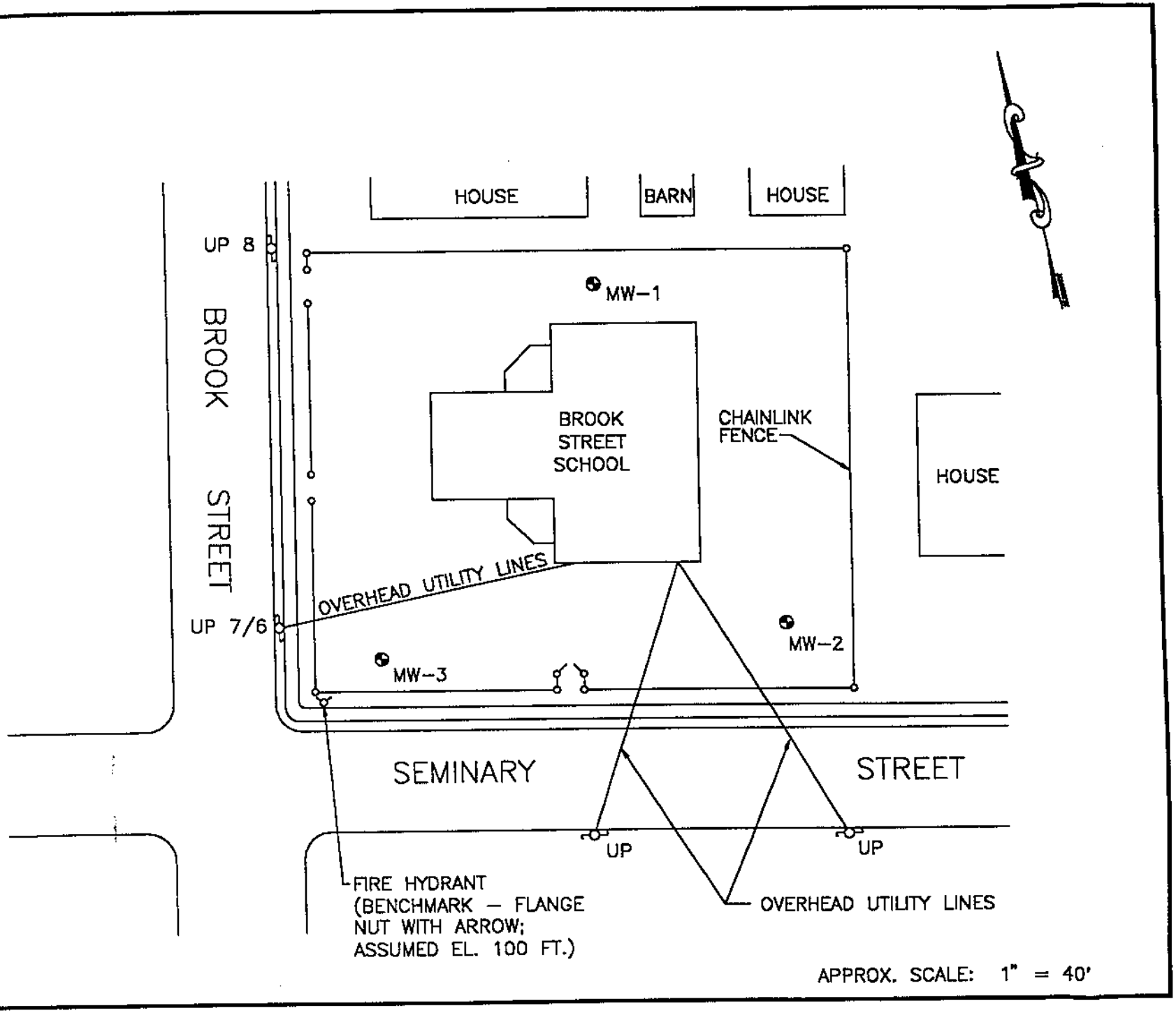
Figure 7.1

Site Vicinity Map
Brook Street School
Barre, Vermont

project manager Joseph Duncan	**Figure 1** **Site Locus Map** **Brook Street School** **Barre, Vermont**	**ATC Associates Inc.** P.O. Box 3, Richmond, VT 05477
project number 17643-0001		Map Source: USGS, East and West Barre Quadrangles 7.5 min. 1:24000 scale

Figure 7.2

Site Plan
Brook Street School
Barre, Vermont



VAC ASSOCIATES INC.
BROWNS TRACE BUILDING
ROUTE 2
P.O. BOX 3
RICHMOND, VT 05477
Tel (802)434-4113 Fax (802)434-2190

BARRE, VERMONT

BROOK STREET SCHOOL
INITIAL SITE INVESTIGATION

SITE PLAN

Proj. No.	17643.0001
Proj. Mgr.	JJD
Date	02/17/98
A	FIG. 7-2

Figure 7.3

Ground Water Gradient Map
Brook Street School
Barre, Vermont

VAT ASSOCIATES INC.
BROWNS TRACE BUILDING
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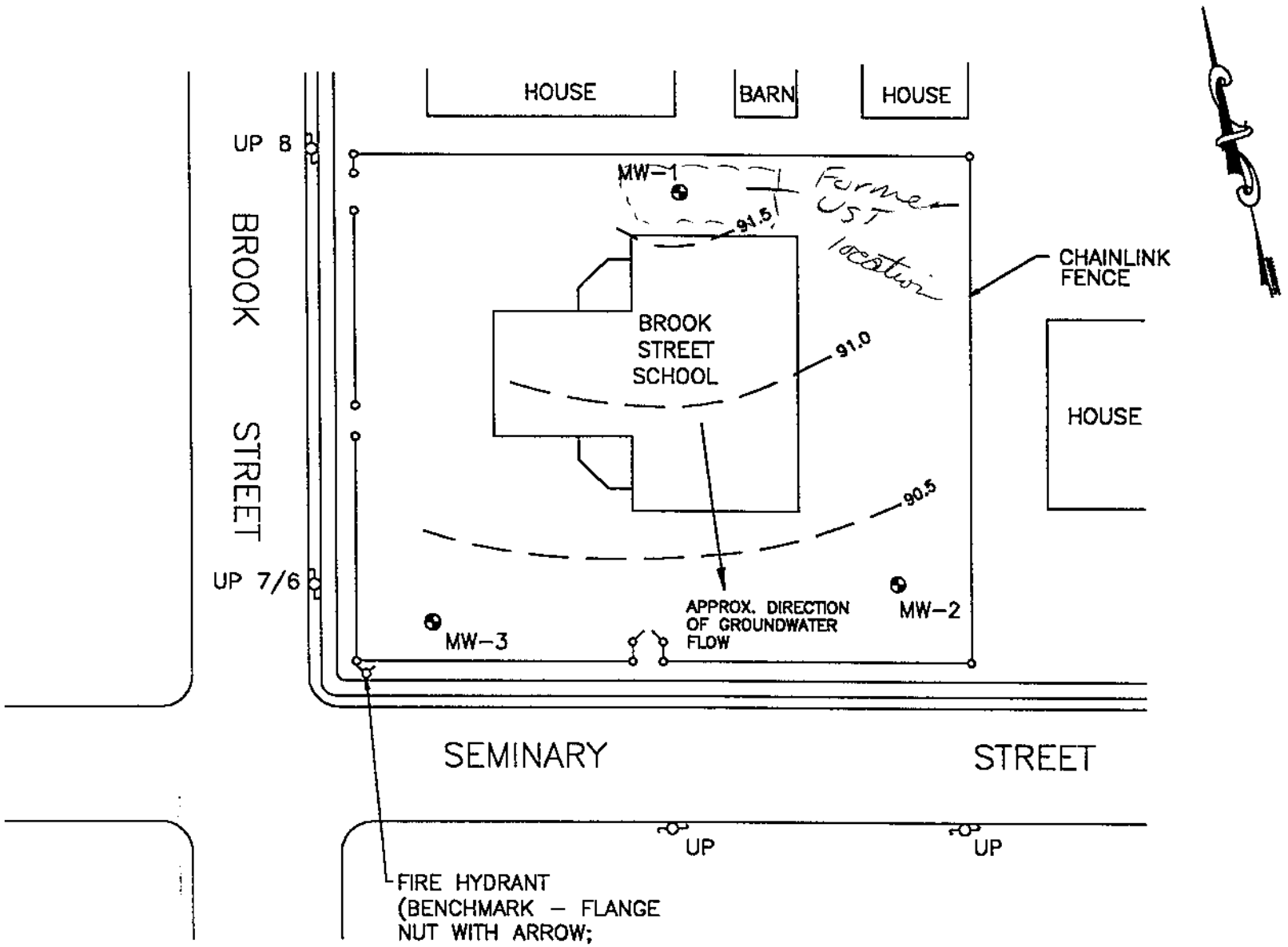
RICHMOND, VT 05477
TEL (802)434-2113 FAX (802)434-2180

BROOK STREET SCHOOL
INITIAL SITE INVESTIGATION

GROUNDWATER GRADIENT MAP: JANUARY 29, 1998

BARRE, VERMONT



APPROX. SCALE: 1" = 40'

Proj. No.	17643.0001
Proj. Mgr.	JJD
Date	02/17/98
A	FIG. 7.3

Appendix A

Report Prepared by Marin Environmental, Inc. Presenting the Results of the UST Closure at the Brook Street School, Barre, Vermont

Marin Environmental, Inc.
Environmental Consultants and Engineers

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7 Island Dock Road
Haddam, CT 06438
Phone: (860) 345-4578
Fax: (860) 345-3854

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63 School Street
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Concord, NH 03302
Phone: (603) 224-8871
Fax: (603) 224-3688

Internet
www.marinenv.com

18 November 1997

Ms. Susan Thayer
Management and Prevention Section
Vermont Department of Environmental Conservation
103 S. Main Street, West Building
Waterbury, Vermont 05671-0404

RE: UST Closure at the Brook Street School, Barre, Vermont

Dear Ms. Thayer:

On 14 November 1997, I inspected the removal of one registered, out-of-service underground storage tank (UST) located at the Brook Street School located in Barre, Vermont. The UST cleaning, purging and excavation services were performed by Calkins Excavating of Danville, Vermont. Copies of the Vermont Department of Environmental Conservation (VT DEC) UST closure forms and photographs of the closure activities are attached.

Findings

The findings of this assessment are summarized as follows:

- A fuel-oil release apparently has occurred at the Brook Street School. Two possible sources have been identified—A former UST within the immediate vicinity, which was removed in 1986, and a welded seam along the surface of the most recent UST.
- The UST and piping were found to be in fair condition upon removal with some surface rust and pitting; but no apparent holes. However, oil appeared to be seeping from one of the welded seams around the tank following removal.
- PID readings on soils from the UST excavation ranged from 0.0 to 75.3 ppm.
- Dark petroleum stained soils were observed beneath the former UST from approximately 11 feet to 14 feet below ground surface (bgs).
- Product sheens were observed on the ground-water surface at a depth of approximately 10 feet bgs.
- The extent of subsurface soil and ground-water contamination was not determined.
- A two-inch PVC monitoring well was installed in the northern section of the UST excavation at a depth of approximately 12 feet bgs

Recommendations

Based on observations and soil screening during the UST closure assessment, MARIN recommends completing an initial site investigation at the site under the VT DEC expressway process.

Site Information

The site is located on Brook Street in Barre City, Vermont and situated among a dense cluster of residential and commercial buildings. The on-site building is an out-of-service, three-story schoolhouse, located at the intersection of Brook and Seminary Streets in downtown Barre. The fuel-oil UST was located beneath a narrow asphalt drive, between the west side of the school and an adjacent residential area (Figure 1).

Gunners Brook is located approximately 200 feet west of the site, and flows into Stevens Branch, which is located approximately 850 feet to the south-southwest. The site and surrounding buildings are served by municipal water and sewer services.

UST and Piping Observations

The removed UST was an 8,000-gallon single-walled-steel fuel-oil UST, reportedly installed in 1986, located adjacent to the west side of the on-site building (Figure 1).

Prior to excavation, approximately 1,058 gallons of No. 2 fuel-oil and approximately 40 gallons of sludge/tank bottoms were removed from the tank. The UST excavation was approximately 14 feet wide, 26 feet long, and 11 feet deep. The UST was anchored in place by concrete, which was poured around the UST's base during installation.

The UST was found to be in fair condition upon removal with some surface rust and pitting. No holes were observed along the tank surface; however, a possible fuel-oil seep was observed at the northern bottom of the UST along a welded seam. Associated fill, supply/return, and vent-line piping for the UST was in good condition, with some surface rust but no apparent holes.

Environmental Observations

Soils in the UST excavation consisted of well-sorted medium sand to a depth of 11 feet, with coarse sand and pea gravel beneath the UST to a depth of 14 feet. Black-stained soils were encountered between 11 and 14 feet bgs in the UST excavation, exhibiting a weathered fuel-oil odor.

Product sheens were observed on the ground-water surface in the UST excavation at a depth of approximately 10 feet bgs. No free product was observed in the UST excavation during closure activities. Prior to backfilling, a two-inch PVC monitoring well was installed at a depth of approximately 12 feet bgs in the northern end of the UST excavation.

PID readings on soil samples collected from the UST excavation ranged from 0.0 to 75.3 parts per million (ppm), with the highest readings noted at approximately 14 feet bgs in the southeast portion of the excavation, beneath the concrete pad. PID readings on the soil samples collected from the UST excavation averaged 11 ppm. A summary of the PID readings is included on Table 1. Due to the apparent presence of contamination at the water table, all soils were backfilled.

Soils in the vicinity of the UST were screened for the possible presence of volatile organic compounds (VOCs) with a Thermo Environmental Model 580B portable photoionization detector (PID). The PID was calibrated on the day of the UST closure assessment with isobutylene gas to a benzene reference. Soil samples were placed in Ziploc-type bags, which were then sealed, agitated, and heated. Bag headspace was then screened for the presence of VOCs with the PID.

Receptor Evaluation

On the day of the UST removal, I inspected the site and adjacent surroundings for possible receptors. The closest downgradient receptor appears to be the basement of the unoccupied schoolhouse, located directly adjacent the former UST. The nearest residence is located approximately 20 feet northeast in the presumed upgradient direction from the former UST. Gunners Brook is located approximately 200 feet west of the site, and drains into Stevens Branch, which is located approximately 850 feet to the south-southwest. The site and surrounding buildings are served by municipal water and sewer services.

Please call me if you have any questions or concerns about this work.

Sincerely,

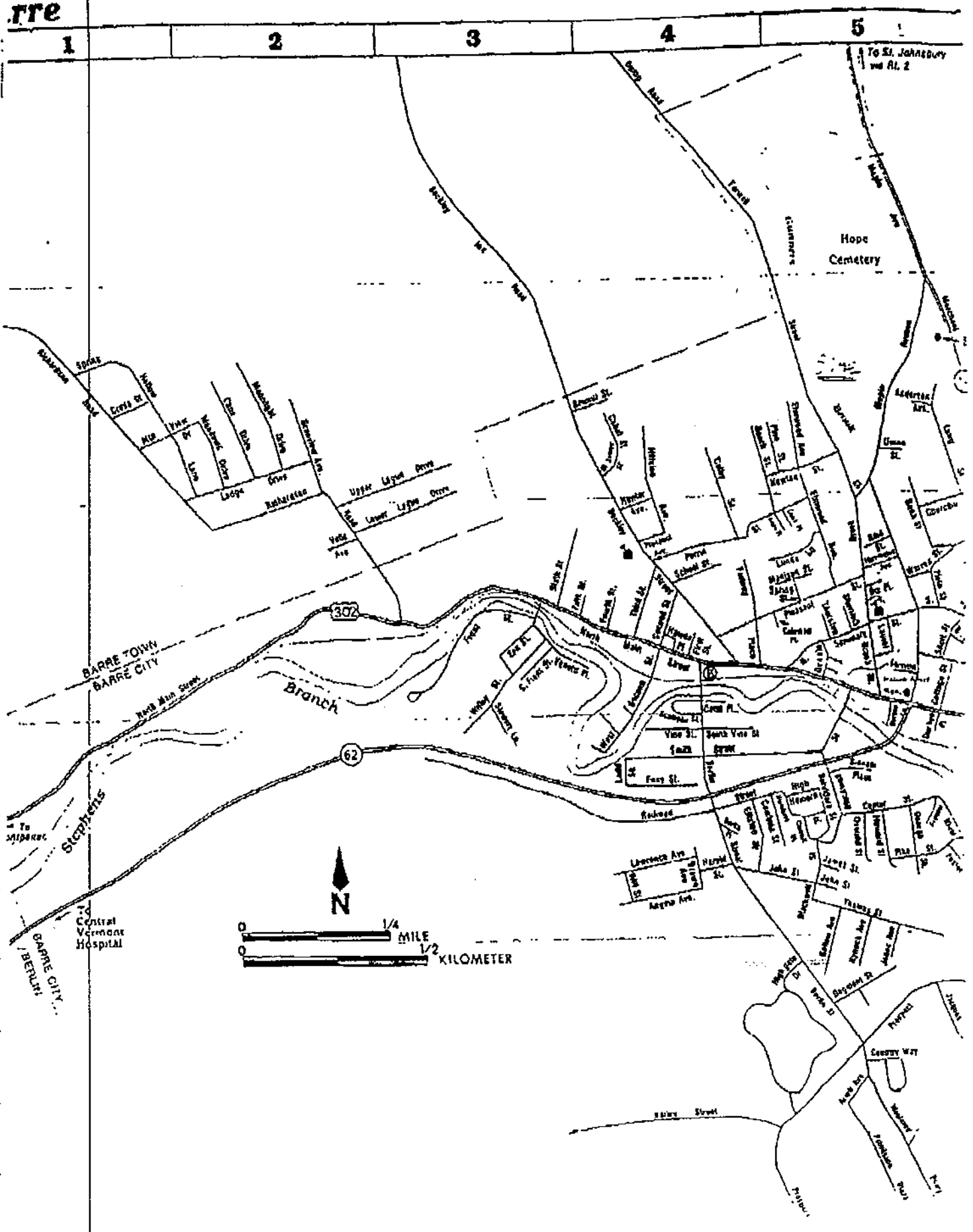
Terry W. Robbins

Terry W. Robbins, E.I.T.
Environmental Scientist

cc: Mr. Dana Calkins, Calkins Excavating
Reginald Abare, Director of Public Works, City of Barre, Vermont

Attachments

REF: 97114R01.DOC


rre
1
2
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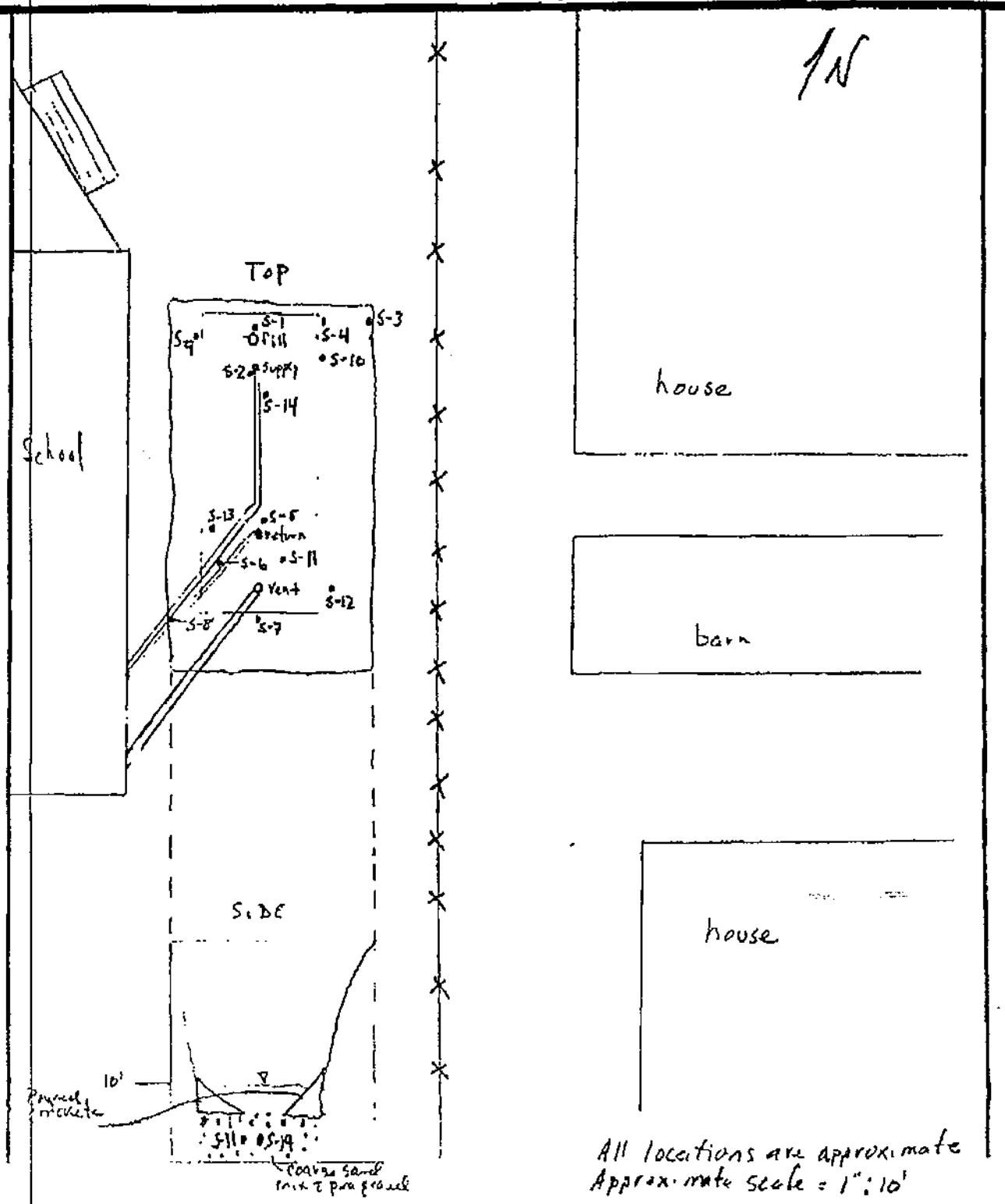
4
5
To St. Johnsbury via Rt. 2
Hope Cemetery
BARRE TOWN
BARRE CITY
Stephens Branch
302
62
N
0 1/4 MILE
0 1/2 KILOMETER
Central Vermont Hospital
BARRE CITY / BERLIN

Marin Environmental, Inc.
1700 Hegeman Avenue
Colchester, VT 05446

PREPARED BY	DATE	CHECKED BY	DATE	PROJECT NO.
Tom	11/14/97			V97114-03

SUBJECT: Brook St School - Barre City PID sample locations



All locations are approximate
Approximate scale = 1" : 10'

TABLE 1.

Table 1. PID Readings
Brook Street School
Barre, VT
November 14, 1997

Location	Description (see Fig 1.0)	Depth (ft)	Response
S-1	Under fill pipe	2.5	0.0
S-2	Under supply line	2.5	0.0
S-3	Northern sidewall	5.0	0.0
S-4	Northern side (adjacent tank)	5.0	0.0
S-5	Under return line	2.5	1.0
S-6	Under supply/return lines	2.5	1.7
S-7	South, end of tank	5.0	0.3
S-8	Under supply/return lines	3.0	1.0
S-9	Northwest sidewall	11.0	0.3
S-10	Northeast sidewall	11.0	15.8
S-11	Beneath concrete, south end of tank	14.0	75.3
S-12	Southeast sidewall	11.0	27.1
S-13	Southwest sidewall	11.0	2.4
S-14	Beneath concrete, north end of tank	14.0	28.4

Note : PID: Thermo Environmental Model 580B
Calibration w/ 100 ppm isobutylene to benzene reference.
All samples from the UST excavation were backfilled.

UNDERGROUND STORAGE TANK PERMANENT CLOSURE FORM

Agency Use Only
Facility ID# 142
Date of scheduled activity: 11/14/97
Facility Town: Barre City
DEC Official: ___ Eval. by ___

Vermont Agency of Natural Resources
Dept. of Environmental Conservation
Waste Management Division
103 South Main Street, West Building
Waterbury, Vermont 05671-0404
Telephone: (802) 241-3888

Site assessment company: Marin Environmental
Site assessor: Terrance Robbins
Phone Number of company (or person): (802) 655-4011
Date of UST closure: 11.14.97
Date of site assessment: 11.14.97

Section A. Facility Information: Number of employees: Ø
Name of facility: Brook St. School
Street address of facility: Brook St. Barre City Contact(if different than owner): (Reg Abare)
Owner of UST(s) to be closed: City of Barre VT 05641
Mailing address of owner: 12 No. Main St Barre Contact telephone #: 476-0250
Telephone number of owner: 476-0250

Section B. UST Closure Information: (please check one)
Reason for initiating UST closure. __Suspected Leak ✓ Liability __Replacement __Abandoned
Which Portion of UST is to be closed: __Tanks __Piping ✓ Tanks & Piping

USTs (piping is considered a part of UST system) undergoing permanent closure. Include condition of USTs

UST #	Product	Size (gallons)	Tank age	Tank Condition	Piping age	Piping condition
1	#2 fuel oil	8,000	11 years	Fair - Good	11 years	good

Which tanks, if any, will be closed in-place: USTs# ___ Authorized by: ___ Date: / /
Disposal/destruction of removed UST(s): Location St. Johnsbury Method Scrap Date: 11/14/97
Amount (gal.) and type of waste generated from USTs: 1,058 gallons usable - 40 gallons sludge
(tank contents are hazardous wastes unless recovered as usable product)
Tank cleaning company (must be trained in confined space entry) Calkins Excavating Generator ID number: ___
Certified hazardous waste hauler: Waste hauling contracted by City of Barre

Section C. Initial site characterization:
Work in this section must be completed by a professional environmental consultant or hydrogeologist with experience in environmental sampling for the presence of hazardous materials. A full report from the consultant must accompany this form.

PID information:
Make: Thermo Model: 580B Calibration information (date, time, gas): 11/14/97 0940 isobutylene gas

Excavation information: (some tank pulls require more than one excavation)

Tank(s) # and Excavation (A,B,C,etc)	Depth (ft)	Excavation size(ft³)	Peak PID reading	Depth of Peak (ft)	Avg PID reading	Bedrock Depth (ft)	Groundwater encountered? (y/n) and at depth (ft)	Soil type
1	11	364	75.3	14.0	11 ppm	—	Y - 10	medium sand - fill

Locate all readings and samples on site diagram
Number of soil samples collected for laboratory analysis? Ø results due date __/__/__
Have any soils been polyencapsulated on site? Yes__ (#yds³__ PID range above zero ___-___ppm) No ✓
Have any soils been transported off site? Yes__ list amount (yds³): ___ No ✓
Location transported to: ___ DEC official who approved ___
Amount of soils backfilled(yds³): All PID range above zero ___
Have limits of contamination been defined? Yes__ No ✓
Is there any other known contamination on-site? Yes__ No ✓ Comments: ___

Free Phase product encountered? Yes__ thickness___ No ✓ sheen
Groundwater encountered? Yes ✓ depth(ft) 10 No___
Are there existing monitoring wells on-site? Yes___ how many:___ (locate on site diagram)No ✓
Have new monitoring wells been installed? Yes ✓ how many: 1 (locate on site diagram)No___
Have samples been taken from any monitoring wells for lab analysis? Yes__ results due date __/__/__ No ✓

Facility ID# 743

Section D: Tanks/Piping Remaining/Installed

Regardless of size, include USTs at site as to "status, e.g. "abandoned", "in use", or "to be installed". (Most installations require permits and advance notice to this office.)

	UST#	Product	Size(gallons)	Tank age	*Tank status	Piping age	*Piping Status

✓ There are no other tanks at this site.

Section E. Statements of UST closure compliance:
(must have both signatures or site assessment not complete)

As the party responsible for compliance with the Vermont UST Regulations and related statutes at this facility, I hereby certify that the all of the information provided on this form is true and correct to the best of my knowledge.

[signature] Date: 11/14/97
Signature of UST owner or owner's authorized representative

As the environmental consultant on site, I hereby certify that the site assessment requirements were performed in accordance with DEC policy and regulations, and that information which I have provided on this form is true and correct to the best of my knowledge.

[signature] Date: 11/17/97
Signature of Environmental Consultant

Site diagram

See attached site map

Return form along with complete narrative report and photographs to the Department of Environmental Conservation(DEC), Underground Storage Tank Program within 72 hours of closure.

This Closure Form may only be issued for the facility and the date indicated in the upper left hand corner of page 1. Changes in the scheduled closure date should be phoned in at least 48 hours in advance. Both the yellow and white copies of this form must be returned to the address on the top of page 1 of this form; the pink copy should be retained by the UST owner. A written report from an environmental consultant covering all aspects of closure and site assessment, complete with photographs and any other relevant data, must accompany this form. All procedures must be conducted by qualified personnel, to include training required by 29 CFR 1910.120. All work must be performed in compliance

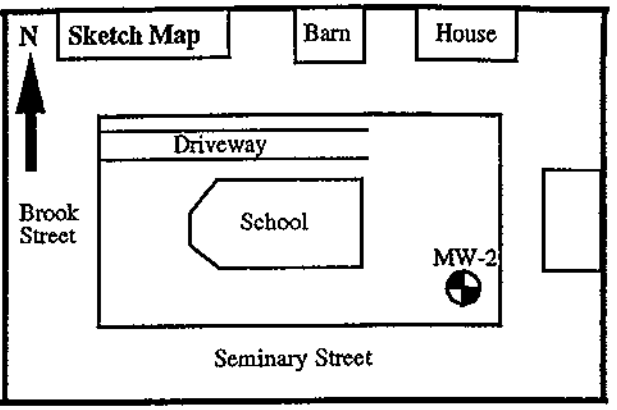
Appendix B

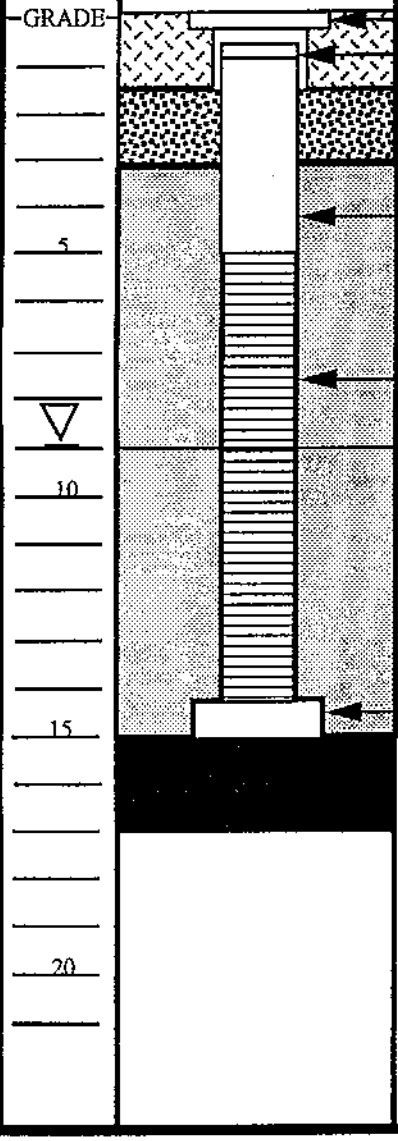
Soil Boring and Monitoring Well Logs

ATC Associates Inc.
Monitoring Well Log

WELL NUMBER MW-2

PROJECT NAME Brook Street School
PROJECT # 17643-0001
LOCATION Brook Street, Barre, Vermont
DATE DRILLED 01/26/98 **BORING DEPTH** 15.0'
DIAMETER 4"
SCREEN DIA. 2" **LENGTH** 10.0' **SLOT SIZE** 0.10
CASING DIA. 2" **LENGTH** 4.5' **TYPE** PVC
DRILLING CO. G.M.B. **DRILLING METHOD** HSA
DRILLER Ron Garneau **LOG BY** D. Allardyce



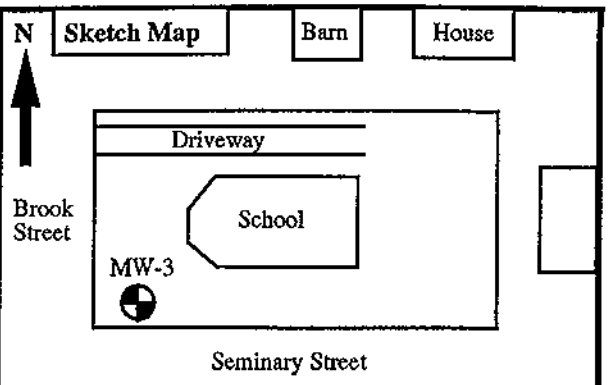


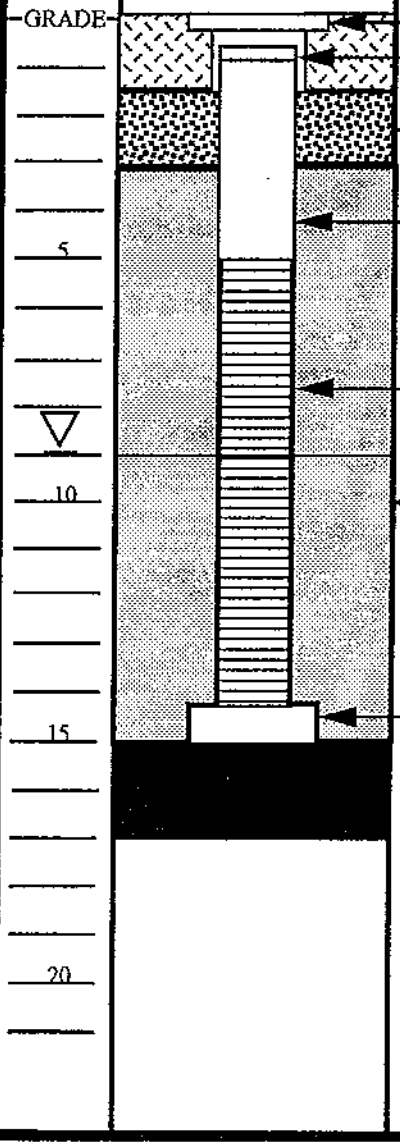
DEPTH IN FEET	NOTES	PID/OVM READINGS	DESCRIPTION / SOIL CLASSIFICATION (COLOR, TEXTURE, STRUCTURES)
		1 ppm	0.0-2.0' (21-11-10-11) Brown, fine to medium sand, trace clay, some fine to coarse gravel, dry; No odor. 5" recovery.
		2 ppm	5.0-7.0' (2-2-2-2) Brown, fine to medium sand, trace silt moist; No odor. 12" recovery.
		3 ppm	10.0-12.0' (3-3-3-3) Brown, fine to medium sand, trace silt, wet; No odor. 18" recovery.
		5 ppm	15.0-17.0' (1-2-2-2) Brown, fine to medium sand, trace silt, wet; No odor. 20" recovery.
			WELL CONSTRUCTION: Screen 15.0' to 5.0' Riser 5.0' to 0.5' Sand 15.0' to 3.0' Plug 3.0' to 1.5'

ATC Associates Inc.
Monitoring Well Log

WELL NUMBER MW-3

PROJECT NAME Brook Street School
PROJECT # 17643-0001
LOCATION Brook Street, Barre, Vermont
DATE DRILLED 01/26/98 **BORING DEPTH** 15.0'
DIAMETER 4"
SCREEN DIA. 2" **LENGTH** 10.0' **SLOT SIZE** 0.10
CASING DIA. 2" **LENGTH** 4.5' **TYPE** PVC
DRILLING CO. G.M.B. **DRILLING METHOD** HSA
DRILLER Ron Garneau **LOG BY** D. Allardyce





DEPTH IN FEET	WELL CONSTRUCTION	NOTES	PID/OVM READINGS	DESCRIPTION / SOIL CLASSIFICATION (COLOR, TEXTURE, STRUCTURES)
			3 ppm	0.0-2.0' (5-4-3-4) Brown, fine to medium sand, trace clay, some silt and fine/coarse gravel, dry; No odor. 6" recovery.
			4 ppm	5.0-7.0' (13-15-12-10) Brown, fine to medium sand, trace silt, some fine/coarse gravel, dry; No odor. 6" recovery.
			4 ppm	10.0-12.0' (2-1-2-2) Brown, fine to medium sand, trace silt, wet; No odor. 12" recovery.
			4 ppm	15.0-17.0' (1-3-3-4) Brown, fine to medium sand, trace silt, wet; No odor. 8" recovery.

WELL CONSTRUCTION: Screen 15.0' to 5.0'
Riser 5.0' to 0.5'
Sand 15.0' to 3.0'
Plug 3.0' to 1.5'

Appendix C

Ground Water Laboratory Analytical Results

ATC Associates, Inc.
Brown's Trace Building
Route 2, Box 3
Richmond VT 054779601

Attn : Joseph J. Duncan

Lab Proj #: 98010415
Date : 02/05/1998

Cust Proj #: 17643.0001 City of Barre

Date Received : 01/30/1998
Date Completed: 02/05/1998

REPORT OF ANALYSIS

ATC Sample Number	Client Sample Description
98-001943	MW-1 (WS-1)
98-001945	MW-3 (WS-3)

ATC Sample Number	Client Sample Description
98-001944	MW-2 (WS-2)
98-001946	Field Blank (WS-4)

Certified By
Donna S. Spyker

Date of Report: 02/05/98
Project Number: 98010415
Lab ID: 98-0001943
Date Collected: 01/29/98 00:00
Collected By: Client
Date Received: 01/30/98 13:45
C of C Number:
Temperature: Received on Ice

Attention: Joseph J. Duncan
ATC Associates, Inc.
Brown's Trace Building
Route 2, Box 3
Richmond VT 05477-9601
Sample Desc: MW-1 (WS-1)

	Result	Unit	PQL	Procedure	Test Date
ORGANIC					
GC VOLATILES					
Benzene	<1.0	ug/L	1.0	8020 BTEX	02/03/98
Ethylbenzene	<1.0	ug/L	1.0	8020 BTEX	02/03/98
Methyl Tertiary Butyl Ether (MTBE)	<10	ug/L	10	8020 BTEX	02/03/98
o-Xylene	<1.0	ug/L	1.0	8020 BTEX	02/03/98
m,p-Xylene	<1.0	ug/L	1.0	8020 BTEX	02/03/98
Toluene	<1.0	ug/L	1.0	8020 BTEX	02/03/98

Date of Report: 02/05/98
Project Number: 98010415
Lab ID: 98-0001944
Date Collected: 01/29/98 00:00
Collected By: Client
Date Received: 01/30/98 13:45
C of C Number:
Temperature: Received on Ice

Attention: Joseph J. Duncan
ATC Associates, Inc.
Brown's Trace Building
Route 2, Box 3
Richmond VT 05477-9601
Sample Desc: MW-2 (WS-2)

	Result	Unit	PQL	Procedure	Test Date
ORGANIC					
GC VOLATILES					
Benzene	<1.0	ug/L	1.0	8020 BTEX	02/03/98
Ethylbenzene	<1.0	ug/L	1.0	8020 BTEX	02/03/98
Methyl Tertiary Butyl Ether (MTBE)	<10	ug/L	10	8020 BTEX	02/03/98
o-Xylene	<1.0	ug/L	1.0	8020 BTEX	02/03/98
m,p-Xylene	<1.0	ug/L	1.0	8020 BTEX	02/03/98
Toluene	<1.0	ug/L	1.0	8020 BTEX	02/03/98

Date of Report: 02/05/98
Project Number: 98010415
Lab ID: 98-0001945
Date Collected: 01/29/98 00:00
Collected By: Client
Date Received: 01/30/98 13:45
C of C Number:
Temperature: Received on Ice

Attention: Joseph J. Duncan
ATC Associates, Inc.
Brown's Trace Building
Route 2, Box 3
Richmond VT 05477-9601
Sample Desc: MW-3 (WS-3)

	Result	Unit	PQL	Procedure	Test Date
ORGANIC					
GC VOLATILES					
Benzene	<1.0	ug/L	1.0	8020 BTEX	02/03/98
Ethylbenzene	1.1	ug/L	1.0	8020 BTEX	02/03/98
Methyl Tertiary Butyl Ether (MTBE)	<10	ug/L	10	8020 BTEX	02/03/98
o-Xylene	<1.0	ug/L	1.0	8020 BTEX	02/03/98
m,p-Xylene	1.2	ug/L	1.0	8020 BTEX	02/03/98
Toluene	<1.0	ug/L	1.0	8020 BTEX	02/03/98

Date of Report: 02/05/98
Project Number: 98010415
Lab ID: 98-0001946
Date Collected: 01/29/98 00:00
Collected By: Client
Date Received: 01/30/98 13:45
C of C Number:
Temperature: Received on Ice

Attention: Joseph J. Duncan
ATC Associates, Inc.
Brown's Trace Building
Route 2, Box 3
Richmond VT 05477-9601
Sample Desc: Field Blank (WS-4)

	Result	Unit	PQL	Procedure	Test Date
ORGANIC					
GC VOLATILES					
Benzene	<1.0	ug/L	1.0	8020 BTEX	02/03/98
Ethylbenzene	<1.0	ug/L	1.0	8020 BTEX	02/03/98
Methyl Tertiary Butyl Ether (MTBE)	<10	ug/L	10	8020 BTEX	02/03/98
o-Xylene	<1.0	ug/L	1.0	8020 BTEX	02/03/98
m,p-Xylene	<1.0	ug/L	1.0	8020 BTEX	02/03/98
Toluene	<1.0	ug/L	1.0	8020 BTEX	02/03/98

Chain of Custody

Serial No. № 003223

Project Name: Brook Street School | Project No.: 17643.0001 | Client: City of Barre | Lab No.: 98010415

Sampler: (Signature) Joseph F. Duncan | Turnaround: (Circle One) 24 hours 48 hours 72 hours 1 week Normal | Date Required: _____

Possible Hazard: Yes ✓ Unknown ____ (Comment Below) | Sample Disposal: Return to Client ____ Disposal by Lab* ✓ (*May be an additional Charge)

Special Instructions:
Analyze all samples for BTEX (602/8020 w/ MTBE and report MTBE

Compliance Samples: Yes ____ No ✓ State: _____

Cooler Temperature: On Ice ✓ Temperature _____

Client Sample I.D. No.	Lab I.D. No.	Date	Time	Water	Soil	Comp.	Grab	Preservatives: Filtered	Iced	Acidified	Preservative Confirmed	No. of Containers	BTEX 602/8020	BTEX 624/8240	VOC 624/8240	SVOC 625/8270	TPH Method:	PNA 610/8310	Pb: Total or TCLP	RCRA 8 Metals	TCLP Metals	Bacterial	Asbestos	Remarks/ Sample Location
WS-1	981043	1/28/98		✓					✓	✓		2	✓											MW-1
WS-2	44			✓					✓	✓		2	✓											MW-2
WS-3	45			✓					✓	✓		2	✓											MW-3
WS-4	46	↓	↓	✓					✓	✓		2	✓											Field Blank

302 352 1476

ATEC Associates, Inc.
Analytical Services
5150 E. 65th Street
Indianapolis, IN 46220
(317) 849-4990 • FAX (317) 849-4278

Relinquished By: (Signature) Joseph F. Duncan | Date: 1/29/98 | Time: 1430 | Received By: (Signature) | Date: | Time: | Project Manager: (Signature) Joseph F. Duncan

Relinquished By: (Signature) | Date: | Time: | Received By: (Signature) | Date: | Time: | Project Manager: (Print) Joseph F. Duncan

Relinquished By: (Signature) | Date: | Time: | Received By: (Signature) | 1-30-98 | 13:45 | Phone Number: 802-434-2113

The Laboratory must provide a copy of this Chain of Custody with results.

VATC ASSOCIATES INC.
ENVIRONMENTAL, GEOTECHNICAL AND MATERIALS PROFESSIONALS

98046 (R)
980104/5

Chain of Custody

ATC Project # 17643.0001 Analysis Method BTEX 602/8020 w/MTBE

Total # of Samples 4 Laboratory ATC Indy

Supplemental Billing Code

Turn-Around-Time Requested: Same Day 24HR 48HR 3-4 DAY 5-7 DAY (Normal)

Sample Numbers WS-1, WS-2, WS-3, WS-4

	Name	Signature	Date
Samples collected by:	Joe Duncan		1/29/98
Samples transferred to:	DAVID BARGA		1-30-98 13:45
Samples transferred to: x	M. Armacost	M. Armacost	2-3-98
Samples transferred to:			
Samples analyzed by: x	M. Armacost M. Armacost	M. Armacost	2-3-98
Samples analyzed by:			
Analysis checked by:	DONNA S. SPOKER	Donna S. Spoker	2-5-98
Recorded in log book by: x	M. Armacost	M. Armacost	2-3-98
Verbal report by:			
Written report by:	DONNA S. SPOKER	Donna S. Spoker	2-5-98

Comments/Special Considerations: Please analyze all samples for BTEX 602/8020 w/MTBE and report MTBE results along w/ BTEX results

Browns Trace Building, Rt. 2, PO Box 3 • Richmond, VT 05477 • (802) 434-2113 • FAX (802) 434-2160