

MARIN

ENVIRONMENTAL

4 March 1999

Mr. Henry Labrecque
RR #1, Box 103
Barton, VT 05822

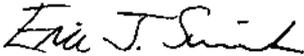
Re: *Initial Site Investigation Report*
Labrecque Farm, Barton, Vermont (VT DEC site #98-2520)

Dear Mr. Labrecque:

Enclosed is a copy of the *Initial Site Investigation Report* for the Labrecque Farm, located on Vermont Route 16 in Barton, Vermont. If you have any questions, please feel free to contact me at 655-0011.

Sincerely,

Marin Environmental, Inc.



Eric J. Swiech
Hydrogeologist

enclosure

Ref: 98095c01.doc

cc: Chuck Schwer, VT DEC

Mar 9 10 28 AM '99

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INITIAL SITE INVESTIGATION REPORT

LABRECQUE FARM
Barton, Vermont

(VT DEC SITE #98-2520)

4 March 1999

Prepared for:

Mr. Henry Labrecque
VT Route 16
Barton, Vermont 05822

Contact: Henry Labrecque
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EXECUTIVE SUMMARY

Marin Environmental, Inc. (Marin) has conducted an initial site investigation (ISI) at Labrecque Farm, located on Route 16 in Barton, Vermont. The ISI included the advancement of three soil borings, the installation of two monitoring wells, ground-water and surface-water testing, and an evaluation of potential threats to nearby receptors. Marin's findings related to this work are summarized as follows:

- Subsurface gasoline contamination was discovered at Labrecque Farm on 6 October 1998 during the closure of a 2,000-gallon gasoline underground storage tank (UST). Photoionization detector (PID) readings on soil samples collected from the UST ranged from 256 parts per million (ppm) to greater than 2,000 ppm, with the highest reading recorded immediately beneath the water table, approximately seven feet below ground surface (bgs).
- Analytical results from sampling performed on 13 November 1998 indicate that the shallow aquifer beneath the site, as well as a reach of the unnamed intermittent stream that traverses the property, are contaminated with petroleum-related volatile organic compounds (VOCs). Vermont Groundwater Enforcement Standards (VGESs) were exceeded for one or more petroleum-related VOCs in source-area monitoring well MW-1, in downgradient monitoring wells MW-2 and MW-3, and in a ground-water seep located approximately 180 feet downgradient of the former gasoline UST. Total VOC concentrations in ground water at the site ranged from 1,390 micrograms per liter (ug/L) in monitoring well MW-2 to 14,733 ug/L in source-area monitoring well MW-1.
- Benzene was detected at 5.5 micrograms per liter ($\mu\text{g/L}$) in the unnamed stream's mid-gradient sample, exceeding the Vermont Water Quality Criterion (WQC) of 1.2 $\mu\text{g/L}$ for this compound.
- Based on available hydrogeologic and contaminant-distribution data, the lateral extent of ground-water contamination has not been reasonably characterized. The vertical extent of ground-water contamination in the overburden aquifer apparently extends down to the bedrock interface. The potential contaminant impact to the bedrock aquifer has not been investigated.
- The intermittent stream, located approximately 200 feet hydraulically downgradient of the former gasoline UST, appears to be the only sensitive receptor that is impacted at this time. The stream ultimately discharges into Stillwater Swamp, located approximately 1,500 feet downgradient of the source area. Residential bedrock supply wells may potentially be located within a $\frac{1}{2}$ mile radius of the former UST. However, based on contaminant levels at the site, the regional hydrogeology, and the presumed distances to these wells, the risk to these sensitive receptors appears to be low. The

EXECUTIVE SUMMARY

water supply for the site is a spring, located approximately 2,000 feet upgradient of the Labrecque residence.

- In general, silty-sands are present across the site from ground surface to approximately four to five feet bgs. Evidence from boring logs suggests the upper unit overlies horizontally interbedded very-coarse and very-fine sands, deposited within an apparent trough of sandy glacial till. Auger refusal was encountered approximately 9.5 to 13.5 feet bgs at the site, presumably on bedrock. Bedrock outcrops were observed in the southeast portion of the site along the steep embankment adjacent to the intermittent stream.
- Based on the 13 November 1998 hydrogeologic data, ground water in the unconfined surficial aquifer at the site appears to flow in a southeasterly direction, presumably discharging as a ground water seep along the steep embankment adjacent to the seasonal stream. Shallow ground-water flow is likely largely controlled by the attitude of the underlying bedrock and the textural heterogeneity of the soils. Ground water was encountered at depths ranging from approximately 3.3 to 6.2 feet bgs. The average horizontal hydraulic gradient of the local water table was approximately 8.7 percent (MW-1 to MW-3). The vertical hydraulic gradient and flow direction at the site is currently unknown.

Based on all the data collected at the site to date, **Marin** recommends the following:

1. Three to four piezometers should be hand-installed along the steep embankment to further evaluate the lateral extent of VOCs in ground water at the site.
2. The piezometers, monitoring wells, ground-water seep, and surface-water locations should be sampled and analyzed for the possible presence of volatile petroleum compounds by EPA Method 8021B.
3. Upon completion of the additional work, a report should be prepared which includes relevant tables and figures, and identifies an appropriate course of action for the site.

1.0 INTRODUCTION

This report details the results of an Initial Site Investigation (ISI) performed by Marin Environmental, Inc. (Marin) at the Labrecque farm, located on Vermont Route 16 in Barton, Vermont (Figures 1 and 2, Appendix A). This report has been prepared by Marin on behalf of Mr. Henry Labrecque. The site investigation was conducted in accordance with the Vermont Department of Environmental Conservation (VT DEC) Expressway process following the discovery of subsurface petroleum contamination during the removal of a gasoline UST on 6 October 1998.

1.1 Site Location and Physical Setting

The site is located on Vermont Route 16 in Barton, Vermont, approximately three miles northeast of the center of town (Figure 1, Site Location Map). Two structures are present on the property: the Labrecque's residence and a barn (Figure 2, Site Map). The residence, located approximately 100 feet upgradient of the UST area, has a dirt floor basement. Water for the property is provided by a natural spring located approximately 2,000 feet upgradient of the site to the northwest. The water line is located upgradient of the UST area. The property has an on-site septic system.

The former 2,000-gallon gasoline UST and pump were located on the southern side of a horseshoe driveway, approximately 35 feet east of Route 16. A 500-gallon diesel UST remains onsite, adjacent to the former gasoline UST. Also, a 275-gallon diesel above ground storage tank (AST) is located on a concrete pad, approximately 80 feet east of the UST area.

The ground surface in the UST area slopes gently to the southeast at approximately two percent grade. Approximately 135 feet downgradient of the UST area, a relatively steep embankment (11 percent grade) is present, sloping to the southeast toward an unnamed intermittent stream. The stream flows west to east, traversing the property approximately 150 feet south of the UST area. This stream discharges into Stillwater Swamp, located approximately 2,000 feet northeast of the site.

1.2 Site History

On 6 October 1998, a 2,000-gallon gasoline UST was removed from the Labrecque property. The removed UST was approximately 18 years old, and appeared to be good condition, with little surface rust, and no apparent perforations, scaling, or pitting. During closure operations, evidence of petroleum contamination was observed in the UST excavation. Photoionization detector (PID) readings in the UST excavation ranged from 256 parts per million (ppm) to greater than 2,000 ppm,

with the highest reading recorded beneath the water table, approximately seven feet below ground surface (bgs). The contamination was believed to be related to surface spills and possibly historical piping releases.

Due to the apparent impact to ground water, all soils excavated during the UST closure were backfilled. Prior to backfilling, a test-pit monitoring well (MW-1), screened approximately four to nine feet bgs, was installed in the UST excavation. The boring log for MW-1 is included in Appendix B.

1.3 Objectives and Scope of Work

The objectives of this initial site investigation were to:

- evaluate the degree and extent of petroleum contamination in soil and ground water;
- qualitatively assess the risks to environmental and public health via relevant sensitive receptors and potential contaminant migration pathways; and
- identify potentially appropriate monitoring and/or remedial actions based on the site conditions.

To accomplish these objectives, **Marin** has:

- supervised the advancement of three soil borings, and the installation of two additional shallow monitoring wells;
- screened subsurface soils from the soil borings for the possible presence of volatile organic compounds (VOCs) using a PID;
- collected and submitted ground-water samples from the on-site monitoring wells, and a ground-water seep, for laboratory analysis of volatile petroleum compounds by EPA Method 8021B;
- collected and submitted surface-water samples from the on-site stream for laboratory analysis of volatile petroleum compounds by EPA Method 8021B;
- collected and submitted a soil sample from the ground-water seep for laboratory analysis of volatile petroleum compounds by EPA Method 8021B;
- identified sensitive receptors in the area, and assessed the risk posed by the contamination to these potential receptors;
- evaluated the need for treatment and/or a long-term monitoring plan for the site; and

- prepared this summary report, which details the work performed, qualitatively assesses risks, provides conclusions, and offers recommendations for further action.

2.0 INVESTIGATIVE PROCEDURES AND RESULTS

2.1 Soil Boring / Monitoring Well Installation

On 5 November 1998, **Marin** supervised the completion of three soil borings and two monitoring wells (MW-2 and MW-3) at the site (Figure 2 in Appendix A). The soil borings/monitoring wells were located in a fan-like array, approximately 100 to 110 feet downgradient of the UST area.

In general, silty-sands are present across the site from ground surface to approximately four to five feet bgs. Evidence from boring logs suggests the upper unit overlies horizontally interbedded very-coarse and very-fine sands, deposited within an apparent trough of sandy glacial till. Auger refusal was encountered approximately 9.5 to 13.5 feet bgs at the site, presumably on bedrock. Bedrock outcrops were observed in the southeast portion of the site along the steep embankment adjacent to the intermittent stream. During the boring program, ground water was encountered in MW-2 and MW-3 at approximately five to eight feet bgs, while no ground water was observed at soil boring SB-4 to 12 feet bgs. Geologic cross-section interpretations, based on soil boring logs and field observations, are included in Appendix A.

The soil borings were advanced by Tri-State Drilling and Boring (West Burke, Vermont) using the hollow-stem-auger (HSA) drilling method. Soil samples were collected at five-foot intervals from each boring using a standard split-spoon barrel. Sample recovery was poor to very good, ranging from 0 to 85 percent. The samples obtained were screened for the possible presence of VOCs with a PID, and logged for lithology by a **Marin** hydrogeologist. All downhole drilling and sampling equipment was decontaminated during use as appropriate.

No monitoring well was installed in soil boring SB-4 due the apparent absence of shallow ground water at this location. Monitoring wells MW-2 and MW-3 were constructed with two-inch-diameter schedule 40 poly-vinyl chloride (PVC) with flush threaded joints. Well screens consisted of 0.010-inch factory-slotted, five-foot screen sections, and were placed approximately 3.5 to 4.8 feet into the water. Sections of PVC riser were added to extend the tops of the well casings to approximately 2.5 to 3.0 feet above ground surface. Clean silica #1 filter sand was placed in the borehole annulus around each well screen extending approximately one to two feet above the slotted interval. A bentonite chip seal, at least one-foot thick, was set above each well's sand pack.

The remainder of the annular space around the solid PVC riser was backfilled with native material. Each well casing was topped with a water-tight compression cap. Soil-boring and monitoring-well construction logs are included in Appendix B.

To remove fine-grained sediment, monitoring wells MW-1, MW-2, and MW-3 were developed on 5 November 1998 using a peristaltic pump. None of the monitoring wells contained free-phase product during development, and development water was discharged directly to the ground surface in the vicinity of each well. The monitoring wells and soil boring were surveyed relative to existing site features, with an azimuth accuracy of (\pm) 1.0 feet, and an elevation accuracy of (\pm) 0.01 feet.

2.2 Soil-Screening Results

During the soil boring program on 5 November 1998, soil samples were collected from a ground-water seep, and from discrete intervals in each boring, for subsequent headspace screening with a PID. Elevated PID readings were measured on soil samples collected from the ground water seep and monitoring wells MW-2 and MW-3, while soils from soil boring SB-4 did not yield PID readings above background levels.

The highest PID reading (150 ppm) was recorded from a soil sample collected at the ground-water seep, located approximately 180 feet downgradient of the UST area. In MW-2, a PID reading of 22.1 ppm was observed near the water table, approximately five to six feet bgs. In MW-3, a PID reading of 38.1 ppm was recorded on saturated soils 10 to 11 feet bgs, presumably immediately above bedrock. At soil boring SB-4, no PID readings were observed above background levels. PID screening results are included on the boring logs in Appendix B.

A Marin hydrogeologist screened soil samples from each soil boring for the possible presence of volatile organic compounds (VOCs) using a PhotoVac Model 2020 portable photoionization detector (PID). The PID was calibrated in the field with an isobutylene standard gas to a benzene reference.

2.3 Ground-Water Elevation Calculations and Flow Direction

Based on the 13 November 1998 hydrogeologic data, ground water in the unconfined surficial aquifer at the site appears to flow in a southeasterly direction, presumably discharging as a ground water seep along the steep embankment adjacent to the seasonal stream. Shallow ground-water flow is likely largely controlled by the attitude of the underlying bedrock and the textural heterogeneity of the soils. Ground water was encountered at depths ranging from approximately

3.3 to 6.2 feet bgs. The average horizontal hydraulic gradient of the local water table was approximately 8.7 percent (MW-1 to MW-3). The vertical hydraulic gradient and flow direction at the site are currently unknown. Water-level measurements and elevation calculations for 13 November 1998 are presented in Table 1; Figure 3 is the water-table contour map prepared using these data (Appendix A).

TABLE 1. Ground-Water Elevation Data

(Monitoring Date: 13 November 1998)

Well I.D.	Top of Casing Elevation (feet)	Depth to Water (feet, TOC)	Ground Water Elevation
MW-1	100.00	4.38	95.62
MW-2	95.45	8.50	86.95
MW-3	95.30	9.22	86.08

Fluid levels were measured in the on-site monitoring wells on 13 November 1998. Depths to water ranged from 4.38 feet (MW-1) to 9.22 feet (MW-3) below top-of-casing. No free-phase product was observed in any of the monitoring wells; however, the ground water at MW-1 was approximately one foot above the screened interval. Static water-table elevations were computed for each monitoring well by subtracting the measured or corrected depth-to-water readings from the surveyed top-of-casing elevations, which are relative to an arbitrary site datum of 100.00 feet.

2.4 Sampling and Analysis

Analytical results from sampling performed on 13 November 1998 indicate that the shallow aquifer beneath the site, as well as a reach of the unnamed intermittent stream which traverses the property, are contaminated with petroleum-related VOCs. Based on available hydrogeologic and contaminant-distribution data, the lateral extent of ground-water contamination does not appear to be fully characterized. The vertical extent of ground-water contamination in the overburden aquifer apparently extends down to the bedrock interface. The potential contaminant impact to the bedrock aquifer has not been investigated. Surface-water contamination during this sampling event appeared to be localized in the vicinity of the ground-water seep.

Vermont Groundwater Enforcement Standards (VGESs) were exceeded for one or more petroleum-related VOCs in source-area monitoring well MW-1, in downgradient monitoring wells MW-2 and MW-3, and in a ground-water seep located approximately 180 feet downgradient of the former

gasoline UST. Total dissolved-phase VOC concentrations ranged from 1,390 micrograms per liter (ug/L) in monitoring well MW-2 to 14,733 ug/L in monitoring well MW-1.

Benzene was detected at 5.5 µg/L in the unnamed stream's mid-gradient sample, exceeding the Vermont Water Quality Criterion (WQC) of 1.2 µg/L for this compound.

Contaminant levels in the soil sample collected from the ground-water seep were generally similar to those detected in the ground-water sample collected from the same location, with the exception of benzene and toluene, which were significantly lower in the soil sample.

Analytical results are included in Table 2, and on the Contaminant-Distribution Map (Appendix A, Figure 4). Laboratory report forms are included in Appendix C.

TABLE 2. Laboratory Analytical Results

Sample I.D.	MTBE	Benzene	Toluene	Ethyl-benzene	Total Xylenes	1,3,5 TMB	1,2,4 TMB	Napthalene	Total VOCs
Ground Water									
MW-1	77.4	253	2,230	1,550	10,700	815	2,690	585	18,900
MW-2	ND <5	496	94.4	344	456	93.7	163	58.3	1,705
MW-3	ND <10	1,430	79.7	567	250	117	169	112	2,724
Seep	ND <20	1,270	2,180	319	2,620	184	530	141	7,244
VGES	40	5	1,000	700	10,000	4	5	20	—
Surface Water									
Up-Stream	ND <1	ND <1	ND <1	ND <1	ND <1	ND <1	ND <1	ND <1	ND
Mid-Gradient	ND <1	5.5	6.7	3.0	11.3	TBQ <1	2.9	3.7	33.1
Down-Stream	ND <1	ND <1	ND <1	ND <1	ND <1	ND <1	ND <1	ND <1	ND
WQC	—	1.2	6,800	3,100	—	—	—	—	—
Soil									
Seep (soil)	ND <50	85.7	ND <25	336	1,240	273	1,130	330	3,394
QA/QC									
Duplicate	68.4	173	2,480	1,710	11,900	877	2,950	631	20,789
Trip Blank	ND <1	ND <1	ND <1	ND <1	ND <1	ND <1	ND <1	ND <1	ND

Results reported as parts per billion (ppb).

ND = Compound not detected above indicated detection limit.

TBQ = Compound detected at trace levels below quantitation limit indicated.

TMB = Trimethylbenzene

VGES = Vermont Groundwater Enforcement Standard

WQC = Water Quality Criteria (for the protection of human health in Class B waters)

Note: duplicate collected from MW-1

Shaded values exceed respective standards

Water-quality samples were collected on 13 November 1998 from three monitoring wells (MW-1, MW-2, and MW-3), a ground water seep, and three surface-water locations (up-stream, mid-gradient, and down stream). A soil sample was also collected on this date from the ground-water seep. Monitoring wells were purged and then sampled using dedicated bailers and dropline. Purge water was discharged directly to the ground in the vicinity of each well. Trip blank and duplicate samples were collected to ensure that adequate quality assurance/quality control (QA/QC) standards were maintained. All field procedures were conducted in accordance with Marin standard protocols.

All samples were transported under chain-of-custody in an ice-filled cooler to Endyne, Inc. of Williston, Vermont. Samples were analyzed for the possible presence of volatile petroleum compounds by EPA Method 8021B. Analytical results from the QA/QC samples indicate that adequate QA/QC was maintained during sample collection and analysis. No VOCs were detected in the trip blank. Analytical results for the blind field duplicate sample collected from MW-1 were within approximately 31 percent of the original sample results. Table 2 also includes a summary of the QA/QC analytical results.

3.0 SENSITIVE RECEPTOR SURVEY AND RISK ASSESSMENT

3.1 Sensitive Receptor Survey

Marin conducted a survey to identify sensitive receptors in the vicinity of Labrecque Farm that could potentially be impacted by residual and dissolved-phase contamination associated with the site. The following sensitive receptors were identified in the vicinity of Labrecque Farm:

- an unnamed intermittent stream, located approximately 180 feet southeast (hydraulically downgradient) of the former gasoline USTs and pump island; and
- offsite bedrock-supply wells, which may potentially be located within a ½ mile radius of the former UST.

The water supply for the site is a spring, located approximately 2,000 feet upgradient of the site. Also, the basement of the Labrecque residence is located approximately 90 feet upgradient of the release area.

3.2 Risk Assessment

Marin assessed the risks that the residual soil and dissolved-phase subsurface contamination poses to the receptors identified above. In general, human exposure to petroleum related contamination is possible through inhalation, ingestion, or direct contact while impacts to environmental receptors are due either to a direct release or contaminant migration through one receptor to another or along a preferential pathway.

The results of our risk assessment are as follows:

- Based on the 13 November 1998 analytical results, a reach of the unnamed-seasonal stream located directly downgradient of the ground-water seep is impacted by petroleum hydrocarbons. Benzene was detected at 5.5 µg/L at this location, exceeding the WQC of 1.2 µg/L for this compound. The surface-water contamination appears to be localized in the vicinity of the ground-water seep, based on downgradient surface-water analytical results, and visual inspection of the stream.
- The risk to offsite bedrock supply wells that may be present within a ½ mile radius of the petroleum release appears to be low based on contaminant levels at the site, the regional hydrogeology, and the presumed distances to these wells.

4.0 CONCLUSIONS

Based on the results of the site investigation described above, Marin concludes the following:

- Subsurface gasoline contamination was discovered at Labrecque Farm on 6 October 1998 during the closure of a 2,000-gallon gasoline underground storage tank (UST). Photoionization detector (PID) readings on soil samples collected from the UST ranged from 256 parts per million (ppm) to greater than 2,000 ppm, with the highest reading recorded immediately beneath the water table, approximately seven feet below ground surface (bgs).
- Analytical results from sampling performed on 13 November 1998 indicate that the shallow aquifer beneath the site, as well as a reach of the unnamed intermittent stream that traverses the property, are contaminated with petroleum-related volatile organic compounds (VOCs). Vermont Groundwater Enforcement Standards (VGESs) were exceeded for one or more petroleum-related VOCs in source-area monitoring well MW-1, in downgradient monitoring wells MW-2 and MW-3, and in a ground-water seep located approximately 180 feet downgradient of the former gasoline

UST. Total VOC concentrations in ground water at the site ranged from 1,390 micrograms per liter (ug/L) in monitoring well MW-2 to 14,733 ug/L in source-area monitoring well MW-1.

- Benzene was detected at 5.5 micrograms per liter ($\mu\text{g/L}$) in the unnamed stream's mid-gradient sample, exceeding the Vermont Water Quality Criterion (WQC) of 1.2 $\mu\text{g/L}$ for this compound.
- Based on available hydrogeologic and contaminant-distribution data, the lateral extent of ground-water contamination appears to be reasonably characterized. The vertical extent of ground-water contamination in the overburden aquifer apparently extends down to the bedrock interface. The potential contaminant impact to the bedrock aquifer has not been investigated.
- The intermittent stream, located approximately 200 feet hydraulically downgradient of the former gasoline UST, appears to be the only sensitive receptor that is impacted at this time. The stream ultimately discharges into Stillwater Swamp, located approximately 1,500 feet downgradient of the source area. Residential bedrock supply wells may potentially be located within a $\frac{1}{2}$ mile radius of the former UST. However, based on contaminant levels at the site, the regional hydrogeology, and the presumed distances to these wells, the risk to these sensitive receptors appears to be low. The water supply for the site is a spring, located approximately 2,000 feet upgradient of the Labrecque residence.
- In general, silty-sands are present across the site from ground surface to approximately four to five feet bgs. Evidence from boring logs suggests the upper unit overlies horizontally interbedded very-coarse and very-fine sands, deposited within an apparent trough of sandy glacial till. Auger refusal was encountered approximately 9.5 to 13.5 feet bgs at the site, presumably on bedrock. Bedrock outcrops were observed in the southeast portion of the site along the steep embankment adjacent to the intermittent stream.
- Based on the 13 November 1998 hydrogeologic data, ground water in the unconfined surficial aquifer at the site appears to flow in a southeasterly direction, presumably discharging as a ground water seep along the steep embankment adjacent to the seasonal stream. Shallow ground-water flow is likely largely controlled by the attitude of the underlying bedrock and the textural heterogeneity of the soils. Ground water was encountered at depths ranging from approximately 3.3 to 6.2 feet bgs. The average horizontal hydraulic gradient of the local water table was approximately 8.7 percent (MW-1 to MW-3). The vertical hydraulic gradient and flow direction at the site is currently unknown.

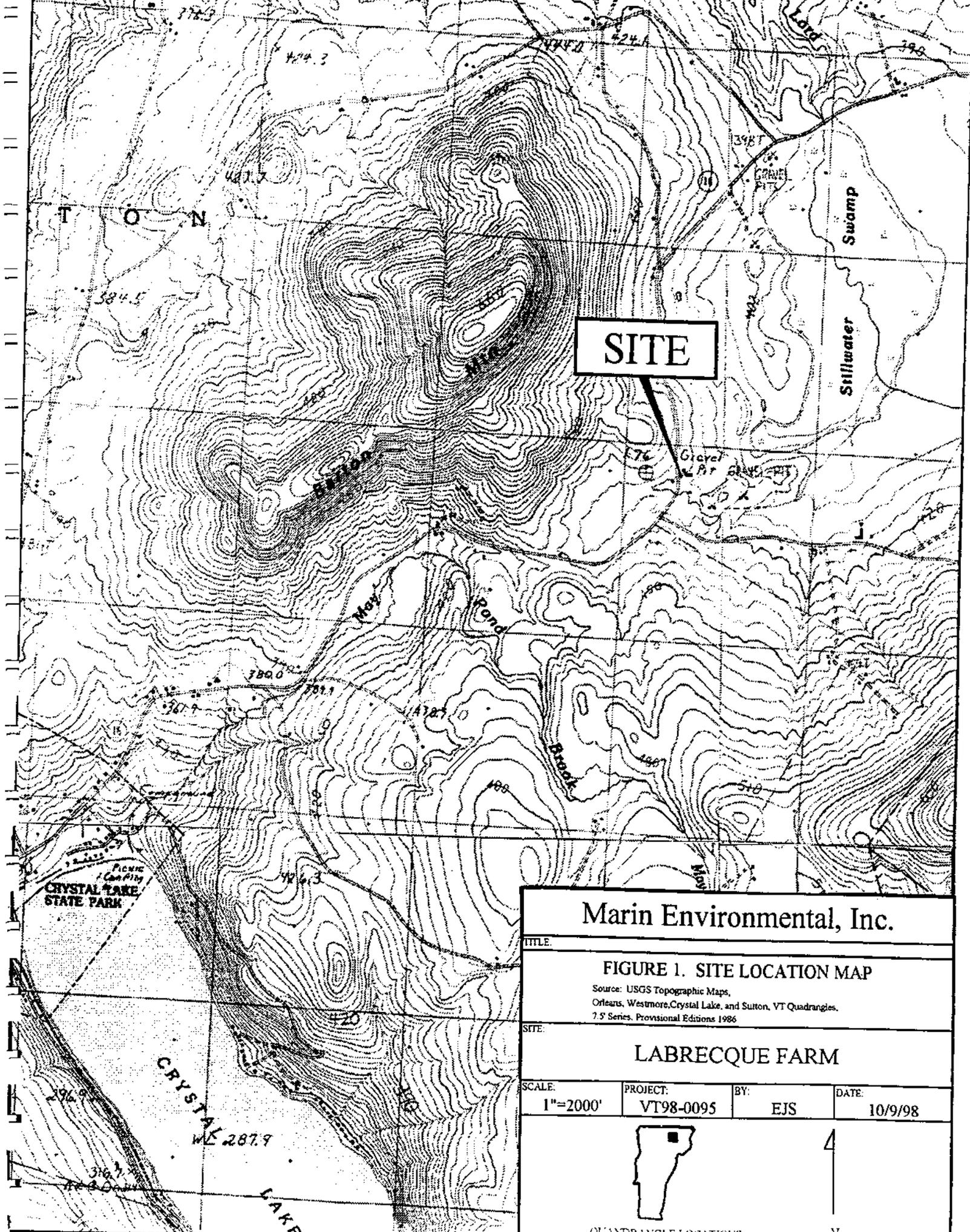
5.0 RECOMMENDATIONS

On the basis of the results of this investigation and the conclusions stated above, **Marin** recommends the following:

1. Three to four piezometers should be hand-installed along the steep embankment to further evaluate the lateral extent of VOCs in ground water at the site.
2. The piezometers, monitoring wells, ground-water seep, and surface-water locations should be sampled and analyzed for the possible presence of volatile petroleum compounds by EPA Method 8021B.
3. Upon completion of the additional work, a report should be prepared which includes relevant tables and figures, and identifies an appropriate course of action for the site.

APPENDIX A

Figures



Marin Environmental, Inc.

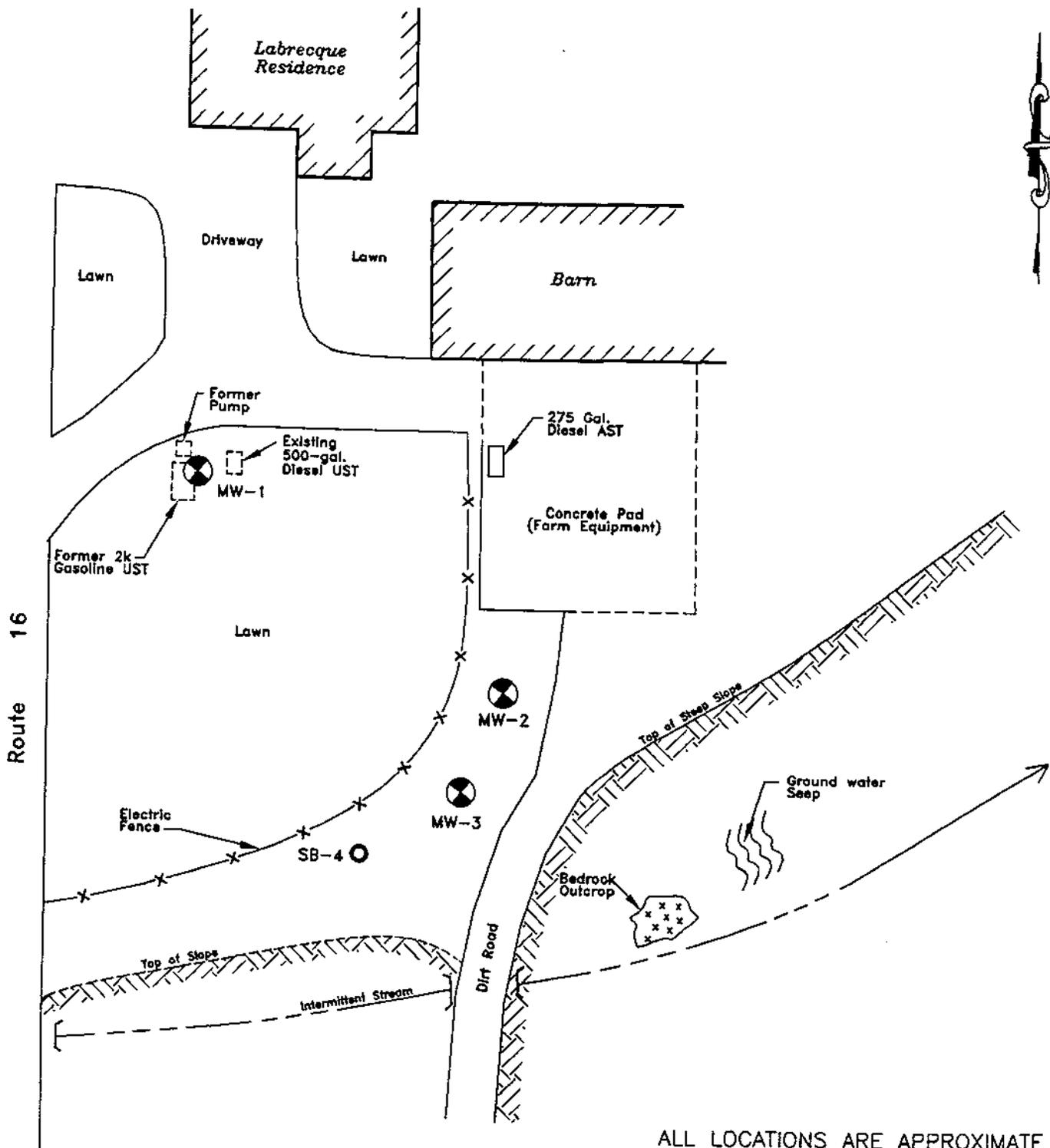
TITLE:
FIGURE 1. SITE LOCATION MAP

Source: USGS Topographic Maps, Orleans, Westmore, Crystal Lake, and Sutton, VT Quadrangles, 7.5 Series, Provisional Editions 1986

SITE:
LABRECQUE FARM

SCALE: 1"=2000'	PROJECT: VT98-0095	BY: EJS	DATE: 10/9/98
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QUADRANGLE LOCATIONS



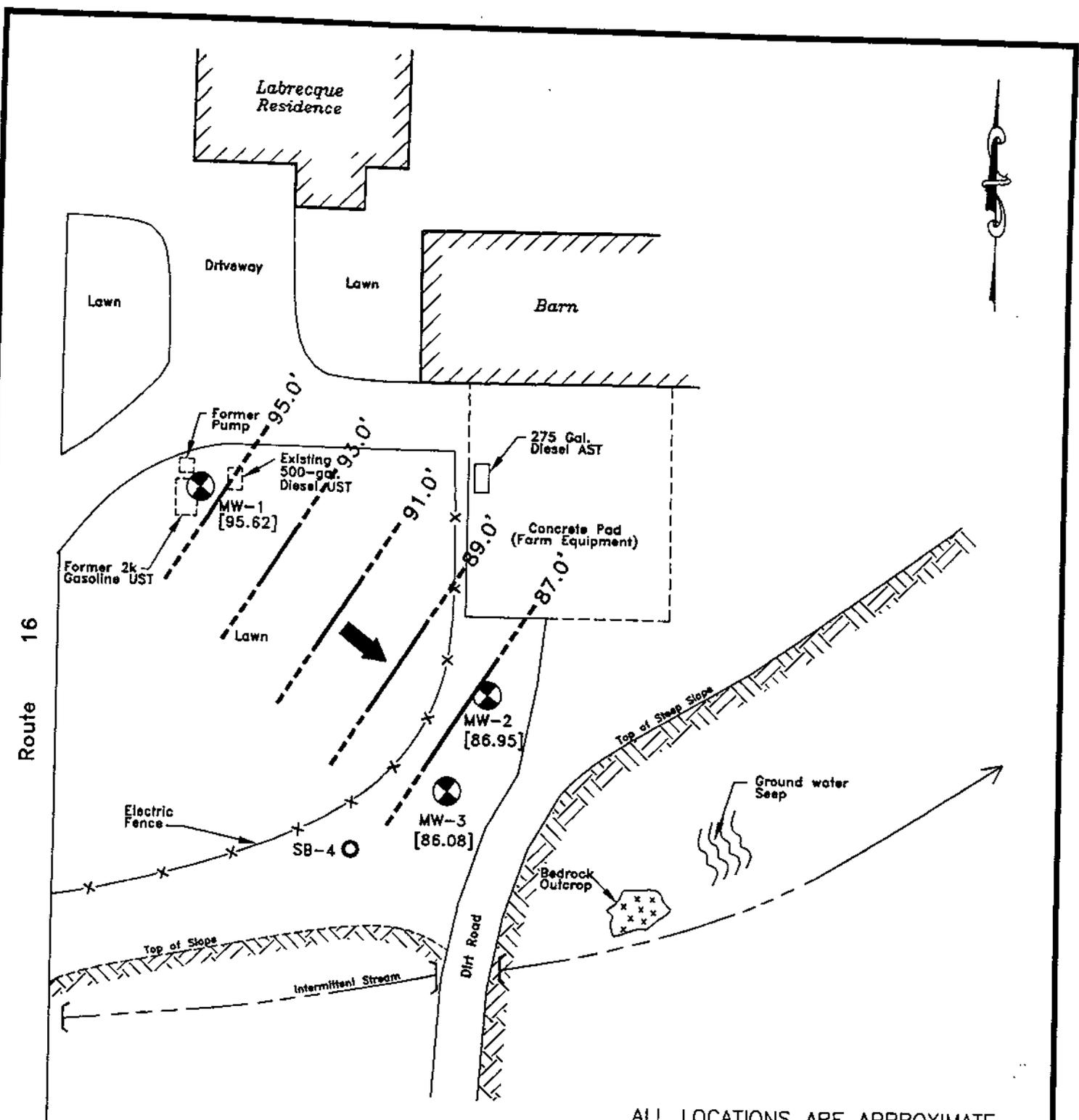
LEGEND

MW-2 Monitoring Well



ALL LOCATIONS ARE APPROXIMATE

MARIN ENVIRONMENTAL		
Title: FIGURE 2. SITE MAP WITH MONITORING WELL LOCATIONS		
Site: LABRECQUE FARM BARTON, VT		
DRAWN BY: MJB	DATE: 1/13/99	SCALE: 1" = 40'
APPROVED BY: ES	FILE No.: 980095sp	



ALL LOCATIONS ARE APPROXIMATE

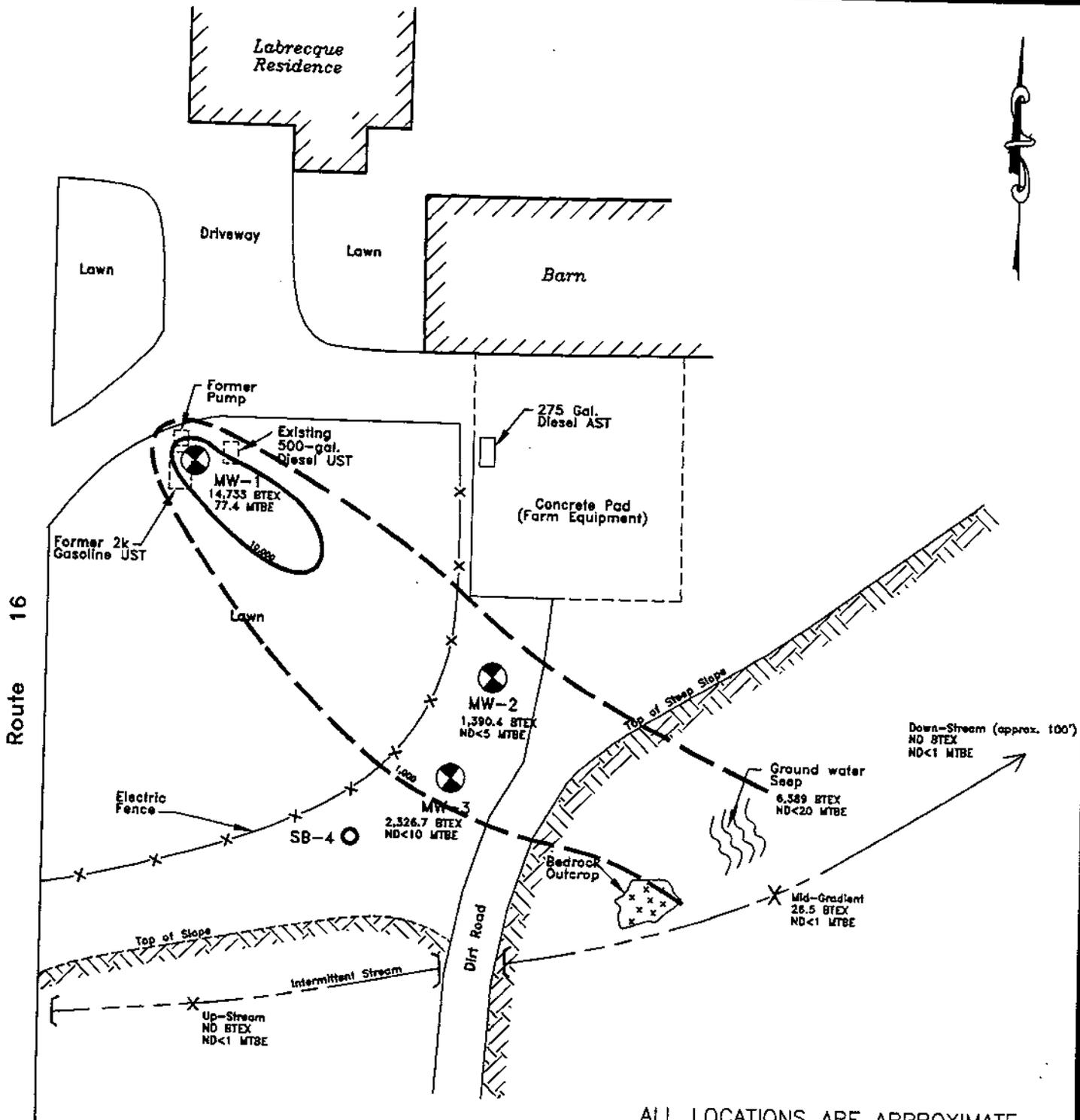
LEGEND

- MW-2  Monitoring Well
- [86.08'] GROUND WATER ELEVATION (FT.)
- 89.0'  GROUND WATER ELEVATION CONTOUR (FT.)
-  INFERRED GROUND WATER FLOW DIRECTION



MARIN ENVIRONMENTAL

Title:			FIGURE 3.		
			GROUND-WATER CONTOUR MAP		
			MONITORING DATE: 13 November 1998		
Site:			LABRECQUE FARM		
			BARTON, VT		
DRAWN BY: MJB	DATE: 1/13/99	SCALE: 1" = 40'			
APPROVED BY: ES	FILE No.: 980095sp				



LEGEND

- MW-2 Monitoring Well
- Total BTEX Contour (ppb)
- ND None Detected



ALL LOCATIONS ARE APPROXIMATE

MARIN ENVIRONMENTAL		
Title: FIGURE 4. BTEX and MTBE DISTRIBUTION MAP		
MONITORING DATE: 13 November 1998		
Site: LABRECQUE FARM BARTON, VT		
DRAWN BY: MJB	DATE: 1/13/99	SCALE: 1" = 40'
APPROVED BY: ES	FILE No.: 980095sp	



Marin Environmental, Inc.

7 Island Dock Road
Haddam, CT 06438

PREPARED
BY
EVS

DATE
1/6/99

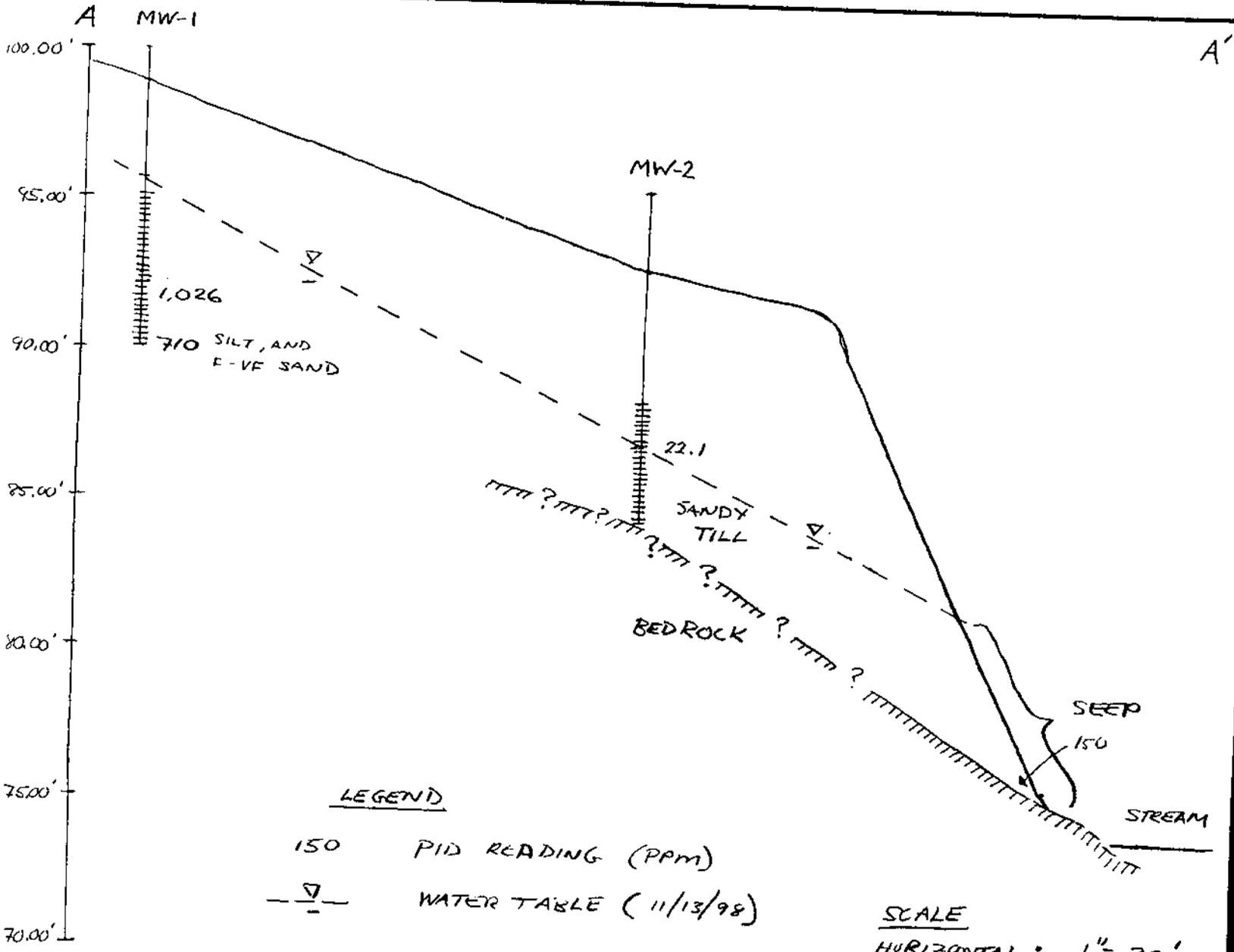
CHECKED
BY

DATE

PROJECT
NO.

VT 98-0095

SUBJECT: GEOLOGIC X-SECTION A-A' (LABRECCQUE FARM) FIGURE 5



LEGEND

150 PID READING (PPM)

-▽- WATER TABLE (11/13/98)

SCALE

HORIZONTAL : 1" = 30'

VERTICAL : 1" = 50'



Marin Environmental, Inc.

7 Island Dock Road
Haddam, CT 06438

PREPARED
BY
ETS

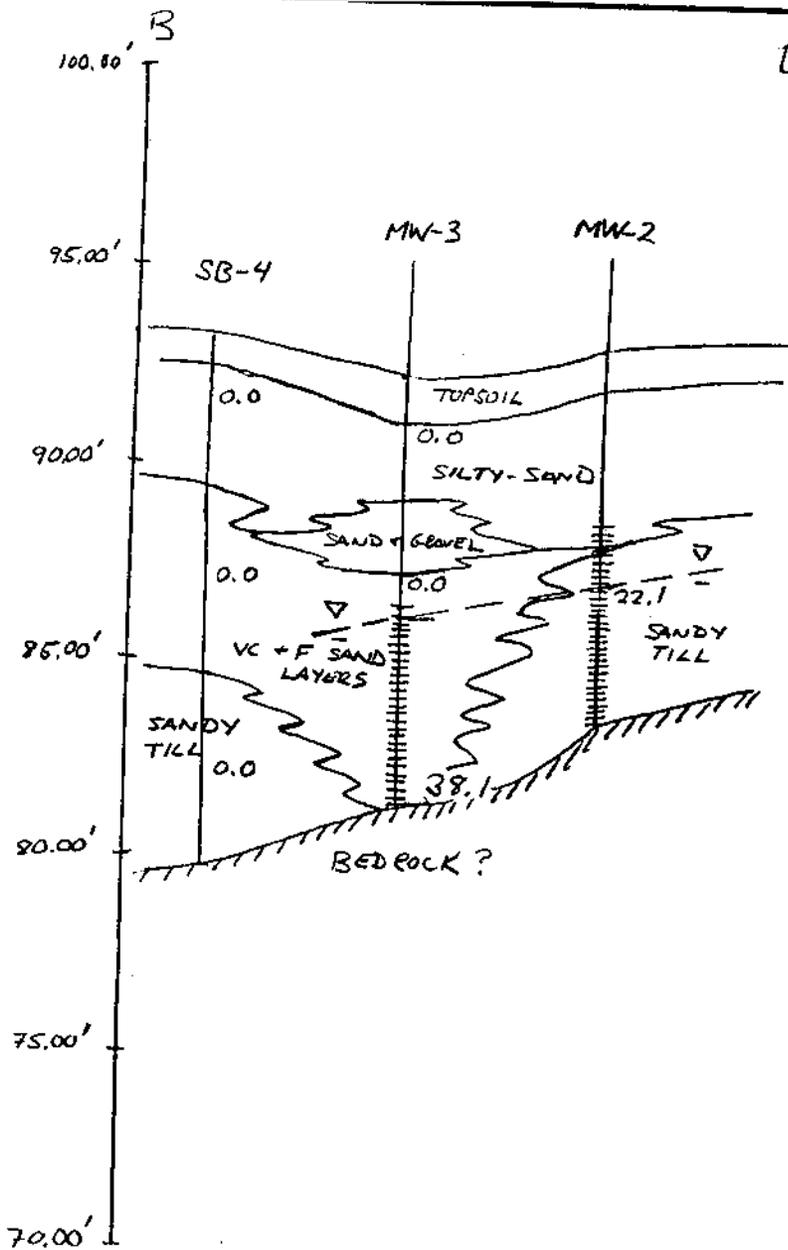
DATE
1/8/99

CHECKED
BY

DATE

PROJECT
NO.
VT 98-0095

SUBJECT: GEOLOGIC X-SECTION B-B' (LABRECQUE FARM) FIGURE 6



LEGEND

38.1 PID READING (PPM)
▽ --- WATER TABLE (11/13/98)

SCALE

HORIZONTAL : 1" = 30'
VERTICAL : 1" = 50'

APPENDIX B

Boring Logs /Monitoring Well Construction Diagrams

SITE NAME: LABRECQUE FARM		BORING NO: MW-1									
LOCATION: BARTON, VT		TOTAL DEPTH: ~9.0' BGS									
JOB NO. VT980095		DEPTH TO WATER: ~3.3' ON 11/13/98									
DATE: 10/6/98		FIELD SUPERVISOR: ERIC SWIERH		CONTRACTOR:							
DRILLING METHOD EXCAVATOR		DRILLERS:									
BORING DIAMETER											
Depth (ft)	Sample No.	BLOW COUNTS PER 6"					Rec. (ft)	SAMPLE DESCRIPTION	STRATA	WELL DETAIL	PID (ppm)
		0-6	6-12	12-18	18-24	24-30					
0-5'							M-F SAND, AND SILT, (FILL).		2" PVC RISER		
5-10'							SILT, AND F-F SAND.		0.010" SCREEN	1,026	
10-15'									NATIVE BACKFILL	710	
15-20'											
20-25'											
		BLOW COUNT		MATERIALS USED		SIZE/TYPE		QUANTITY			
AND	33-50%	0-4	VERY LOSE	WELL SCREEN	2"/PVC	5'					
ME	20-33%	4-10	LOOSE	SLOT SIZE	0.010"						
LITTLE	10-20%	10-30	MEDIUM	RISER	2"/PVC	5'					
ACE	0-10%	30-50	DENSE	GRADED SAND							
		> 50	VERY DENSE	BENTONITE PELLETS							
				BENTONITE GROUT							

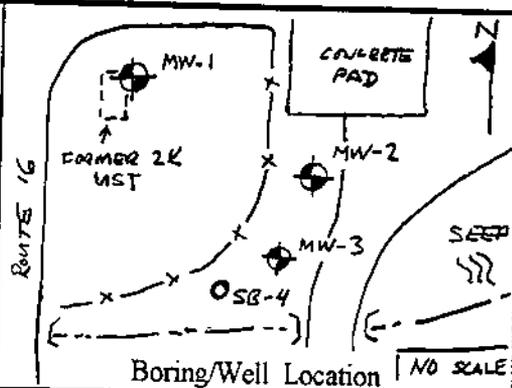
SITE NAME: LABRECQUE FARM
 LOCATION: BARTON, VT
 JOB NO. VT980095
 DATE: 11/5/98

BORING NO: MW-2
 TOTAL DEPTH: 9.5' BGS
 DEPTH TO WATER: ~ 6.0' BGS on 11/13/99

DRILLING METHOD
 HSA
 BORING DIAMETER

FIELD SUPERVISOR: ERIC SWIERH
 CONTRACTOR: TRI-STATE DRILLING + BORING

DRILLERS: WAYNE + JASON



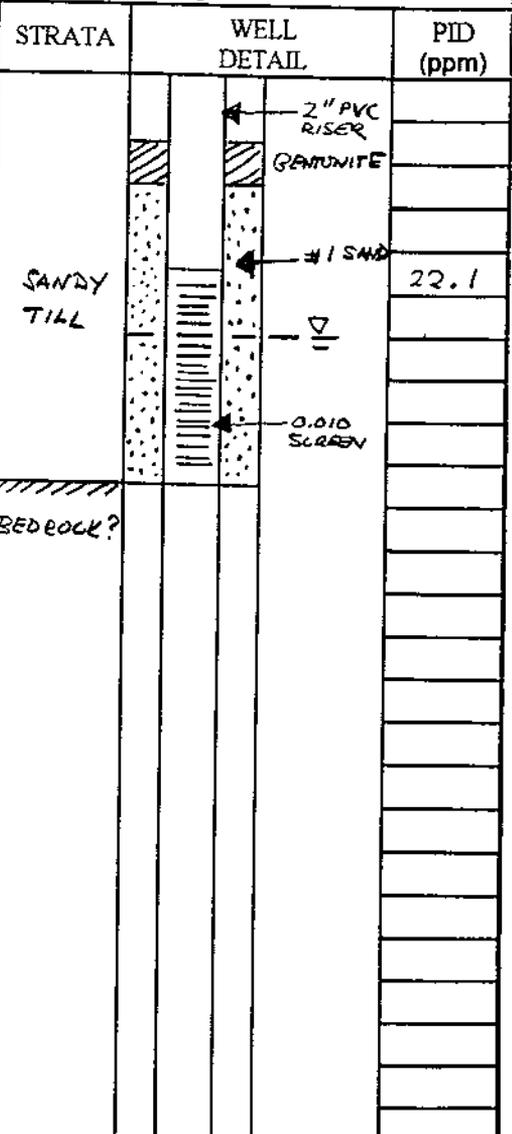
Depth (ft)	Sample No.	BLOW COUNTS PER 6"					Rec. (ft)
		0-6	6-12	12-18	18-24	24-30	
1-3		4	2	1	1	0.0	
5-7		4	5	5	6	1.5	
10'							
15'							
20'							
25'							

SAMPLE DESCRIPTION

— NO RECOVERY —

OLIVE-GREY VL-F SAND, AND CLAYEY-SILT, TRACE ANGULAR GRAVEL (OCCASSIONAL VC SAND LENSES). (GLACIAL TILL). WET. SLIGHT PETRO ODOR.

REFUSAL @ ~ 9.5' BGS.
 SET WELL @ 9.5'
 WELL FINISHED AS STICK-UP (~2.5') W/OUT WELL GUARD.



STRATA	WELL DETAIL	PID (ppm)
	2" PVC RISER	
	BENTONITE	
	#1 SAND	22.1
	0.010 SCREEN	

	BLOW COUNT	MATERIALS USED	SIZE/TYPE	QUANTITY
AND	33-50%	0-4 VERY LOSE	WELL SCREEN	2" / PVC 5'
SOME	20-33%	4-10 LOOSE	SLOT SIZE	0.010"
LITTLE	10-20%	10-30 MEDIUM	RISER	2" / PVC ~ 8.5'
TRACE	0-10%	30-50 DENSE	GRADED SAND	
		> 50 VERY DENSE	BENTONITE PELLETS	
			BENTONITE GROUT	

SITE NAME: LABRECQUE FARM
 LOCATION: BARTON, VT
 JOB NO. VT990095
 DATE: 11/5/98

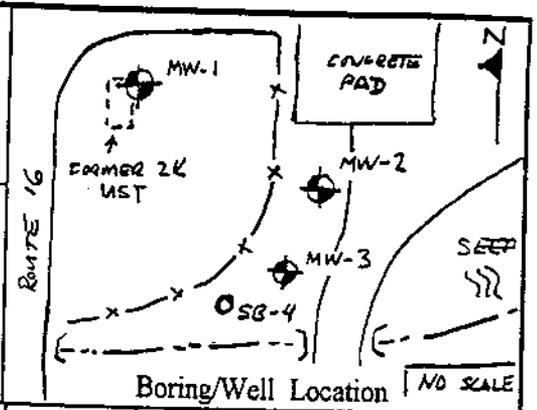
BORING NO: MW-3
 TOTAL DEPTH: ~11.0' BGS
 DEPTH TO WATER: ~6.2' BGS ON 11/12/98

DRILLING METHOD
 HSA

FIELD SUPERVISOR: ERIC SWIECH
 CONTRACTOR: TRI-STATE DRILLING + BORING

BORING DIAMETER

DRILLERS: WAYNE + JASON



Depth (ft)	Sample No.	BLOW COUNTS PER 6"					Rec. (ft)	SAMPLE DESCRIPTION	STRATA	WELL DETAIL		PID (ppm)
		0-6	6-12	12-18	18-24							
1-3		5	6	7	8	1.0	TOP 0.2' = DRK BRN TOP SOIL. NEXT 0.8' = LT BRN VC-F SAND AND SILT, TRACE GRAVEL. DRY	TOP SOIL SILTY-SAND	2" PVC RISER	BENTONITE	0.0	
5'-7'		12	18	22	27	1.5	TOP 0.3' = VC-F SAND, AND C GRAVEL (QTZITE), ORANGE MOTTLING, DRY. NEXT 1.2' = BRN VC(+)-F SAND (ALTERNATING VC+F LAYERS). DRY.	SAND + GRAVEL VC SAND + F SAND LAYERS	#1 SAND		0.0	
10'-12'		56	100	5"		0.8	SAME AS ABOVE PLUS FRACTURED LITHIC FRAGS. WET. STRONG ODOOR.		0.010" SCREEN		38.1	
15'							REFUSAL @ ~11.0' BGS SET WELL @ ~11.0' BGS WELL FINISHED AS STICK-UP (~3.0') W/OUT WELL GUARD	BEDROCK?				

		BLOW COUNT		MATERIALS USED		SIZE/TYPE	QUANTITY
ND	33-50%	0-4	VERY LOSE	WELL SCREEN		2"/PVC	5'
SOME	20-33%	4-10	LOOSE	SLOT SIZE		0.010"	
LITTLE	10-20%	10-30	MEDIUM	RISER		2"/PVC	9'
ACE	0-10%	30-50	DENSE	GRADED SAND			
		> 50	VERY DENSE	BENTONITE PELLETS			
				BENTONITE GROUT			

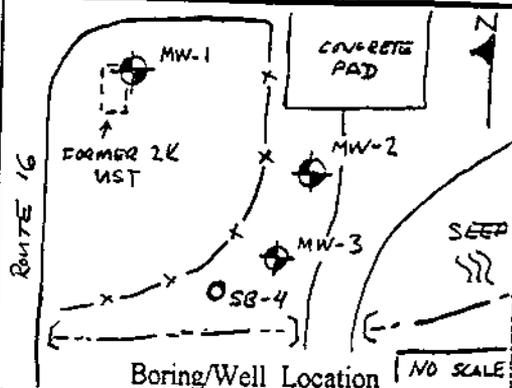
SITE NAME: LABRECQUE FARM
 LOCATION: BARTON, VT
 JOB NO. VT990095
 DATE: 11/5/98

BORING NO: SB-4
 TOTAL DEPTH: ~13.5' BGS
 DEPTH TO WATER:

DRILLING METHOD
 HSA
 BORING DIAMETER

FIELD SUPERVISOR: ERIC SWIECH
 CONTRACTOR: TRI-STATE DRILLING + BORING

DRILLERS: WAYNE + JASON



Depth (ft)	Sample No.	BLOW COUNTS PER 6"					Rec. (ft)
		0-6	6-12	12-18	18-24		
1-3		4	4	3	4	1.5	
5'-7		11	16	23	?	1.5	
10'		12	14	12	15	1.7	
15'							
20'							
25'							

SAMPLE DESCRIPTION

BRN C-F SAND, TRACE GRAVEL + SILT. MOIST.

ALTERNATING YC AND F SAND LAYERS, SOME GRAVEL. DRY.

DRK GREY C-F SAND, AND CLAYEY-SILT, TRACE GRAVEL. (OCCASSIONAL C-F SAND LENSES). (TILL). MOIST, NO ODOR.

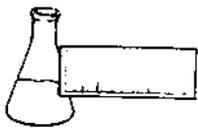
REFUSAL @ 13.5' BGS
 NO WELL SET.

STRATA	WELL DETAIL	PID (ppm)
		0.0
YC SAND + F SAND LAYERS		0.0
SANDY TILL		0.0
BEDROCK ?		

	BLOW COUNT		MATERIALS USED	SIZE/TYPE	QUANTITY
AND	33-50%	0-4	VERY LOSE	WELL SCREEN	
SOME	20-33%	4-10	LOOSE	SLOT SIZE	
LITTLE	10-20%	10-30	MEDIUM	RISER	
TRACE	0-10%	30-50	DENSE	GRADED SAND	
		> 50	VERY DENSE	BENTONITE PELLETS	
				BENTONITE GROUT	

APPENDIX C

Laboratory Report Forms

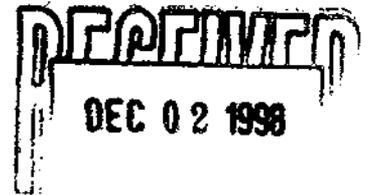


ENDYNE, INC.

Laboratory Services

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

REPORT OF LABORATORY ANALYSIS



CLIENT: Marin Environmental
PROJECT NAME: Labrecque
REPORT DATE: November 30, 1998
DATE SAMPLED: November 13, 1998

PROJECT CODE: GWVF1658
REF.#: 131,346 - 131,354

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.

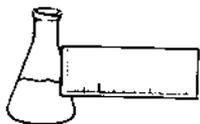
Analytical method precision and accuracy was monitored by laboratory control standards which included matrix spike, duplicate and quality control analyses. These standards were determined to be within established laboratory method acceptance limits.

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



EPA METHOD 8021B--PURGEABLE AROMATICS

CLIENT: Marin Environmental
PROJECT NAME: Labrecque
CLIENT PROJ. #: NI

DATE RECEIVED: November 17, 1998
REPORT DATE: November 30, 1998
PROJECT CODE: GWVT1658

Ref. #:	131,346	131,347	131,348	131,349	131,350
Site:	Duplicate	MW-1	MW-2	MW-3	Seep
Date Sampled:	11/13/98	11/13/98	11/13/98	11/13/98	11/13/98
Time Sampled:	NI	10:49	10:55	11:03	11:10
Sampler:	J.G.	J.G.	J.G.	J.G.	J.G.
Date Analyzed:	11/28/98	11/28/98	11/28/98	11/28/98	11/28/98
UIP Count:	>10	>10	>10	>10	>10
Dil. Factor (%):	2	2	20	10	5
Surr % Rec. (%):	115	99	90	86	103
Parameter	Conc. (ug/L)				
MTBE	68.4	77.4	<5	<10	<20
Benzene	173.	253.	496.	1,430.	1,270.
Toluene	2,480.	2,230.	94.4	79.7	2,180.
Ethylbenzene	1,710.	1,550.	344.	567.	319.
Xylenes	11,900.	10,700.	456.	250.	2,620.
1,3,5 Trimethyl Benzene	877.	815.	93.7	117.	184.
1,2,4 Trimethyl Benzene	2,950.	2,690.	163.	169.	530.
Naphthalene	631.	585.	58.3	112.	141.

Ref. #:	131,351	131,352	131,353	131,354	
Site:	Up-stream	Mid-gradient	Down-stream	Seep Soil	
Date Sampled:	11/13/98	11/13/98	11/13/98	11/13/98	
Time Sampled:	11:15	11:20	11:25	11:12	
Sampler:	J.G.	J.G.	J.G.	J.G.	
Date Analyzed:	11/24/98	11/28/98	11/25/98	11/26/98	
UIP Count:	0	>10	0	>10	
Dil. Factor (%):	100	100	100	40	
Surr % Rec. (%):	97	104	98	99	
Parameter	Conc. (ug/L)	Conc. (ug/L)	Conc. (ug/L)	Conc. (ug/kg)	
MTBE	<1	<1	<1	<50	
Benzene	<1	5.5	<1	85.7	
Toluene	<1	6.7	<1	<25	
Ethylbenzene	<1	3.0	<1	336.	
Xylenes	<1	11.3	<1	1,240.	
1,3,5 Trimethyl Benzene	<1	TBQ <1	<1	273.	
1,2,4 Trimethyl Benzene	<1	2.9	<1	1,130.	
Naphthalene	<1	3.7	<1	330.	

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

CHAIN-OF-CUSTODY RECORD
28486

Project Name: <u>Labrecque</u> Site Location: <u>Labrecque</u>	Reporting Address: <u>1700 Hogman Ave</u> <u>Colchester VT</u>	Billing Address:
Endyne Project Number: <u>GWNT 1658</u>	Company: <u>Mannin Farm</u> Contact Name/Phone #: <u>FMS</u>	Sampler Name: <u>SG</u> Phone #:

Lab #	Sample Location	Matrix	G R A B	C O M P	Date/Time	Sample Containers		Field Results/Remarks	Analysis Required	Sample Preservation	Rush
						No.	Type/Size				
131346	Duplicate	H ₂ O	X		11/18/98	2	4000		80213	HCl	
131347	mw-1				1049						
131348	mw-2				1055						
131349	mw-3				1103						
131350	Seep				1110						
131351	up-stream				1115						
131352	mid-gradient				1120						
131353	down-stream				1125						
131354	Seep soil	soil	X		1112						

Relinquished by: Signature 	Received by: Signature <u>PEX. J.E. Tammon</u>	Date/Time <u>11/17/98 10:70</u>
Relinquished by: Signature	Received by: Signature <u>Lonia M. Charles</u>	Date/Time <u>11-17-98 12:00</u>

 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	Amonia N	8	Total Diss. P	13	TDS	18	COD	23	EPA 418.1	28	EPA 8080 Pest/PCB
4	Nitrie N	9	BOD ₅	14	Turbidity	19	BTEX	24	EPA 608 Pest/PCB		
5	Nitrate N	10	Alkalinity	15	Conductivity	20	EPA 601/602	25	EPA 8240		
29	TCLP (Specify: volatiles, semi-volatiles, metals, pesticides, herbicides)										
30	Other (Specify):										