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INITIAL SITE INVESTIGATION REPORT

WHITCOMB QUARRY
Colchester, Vermont

²⁵⁵⁹
(VT DEC SITE #98-2476)

30 November 1999

Sample date
7/23

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EXECUTIVE SUMMARY

Marin Environmental, Inc. (Marin) has conducted an initial site investigation (ISI) at Whitcomb Quarry, located on Roosevelt Highway in Colchester, Vermont. The ISI included the drilling of five soil borings, installation of four monitoring wells, ground-water testing, and an evaluation of potential threats to nearby receptors. Marin's findings related to this work are summarized as follows:

- Laboratory analytical results of ground-water samples collected at one on-site monitoring well (MW-1) indicate that the shallow aquifer beneath the former underground storage tank (UST) area east of the maintenance shop is contaminated with dissolved-phase, petroleum-related volatile organic compounds (VOCs). Given the available hydrogeologic and contaminant-distribution data, it appears that the petroleum contamination detected on-site is likely attributed to the former UST system. The lateral extent of dissolved-phase contamination has not been adequately defined. Additional data are necessary to adequately characterize hydrogeologic conditions at the site, and define the downgradient extent of contamination.
- During drilling activities, brown medium to coarse sands with silt and clay and few pebbles were encountered in the soil borings to depths of approximately 11 to 16 feet below ground surface (bgs). A petroleum odor was detected during the advancement of soil borings at MW-1 and MW-2.
- The highest photoionization detector (PID) reading observed during the soil-boring program was 527 parts per million (ppm), recorded on a soil sample collected from approximately ten feet bgs in MW-1. PID readings averaged 109 ppm on soil samples from MW-2. PID readings were generally 1.0 ppm or less on soil samples in SB-1, MW-3, and MW-4.
- Based on the limited hydrogeologic data collected at the site to date, ground water in the unconfined surficial aquifer at the site appears to flow north with an average horizontal hydraulic gradient of approximately four percent. The vertical ground-water flow components at the site, and the hydraulic relationship between the shallow unconfined aquifer and the bedrock aquifer, are currently unknown.
- In ground-water samples collected on 23 July 1999, the total BTEX (benzene, toluene, ethylbenzene, and xylenes) concentration in monitoring well MW-1 was 35,720 micrograms per liter ($\mu\text{g/L}$). Vermont Groundwater Enforcement Standards (VGESs) were exceeded for benzene, toluene, ethylbenzene, xylenes, 1,3,5-trimethylbenzene, 1,2,4-trimethylbenzene, naphthalene, and methyl tert-butyl ether (MTBE) in the sample collected from MW-1. No analyzed petroleum parameters were detected in ground-water samples collected from MW-3

EXECUTIVE SUMMARY

and MW-4. Ground-water samples were not collected from MW-2 because an insufficient volume of water was in the well.

- PID readings on samples collected from the soil stockpile ranged from 11.4 to 46.6 parts per million, and averaged 32 ppm. The stockpile encapsulation was found to be in good condition.
- Sensitive receptors include three on-site water-supply wells located, near the hot mix plant (300 feet northeast of the former UST area), the "finish end" area (located 600 feet northwest of the former UST area), and the sand plant (located less than ¼-mile northwest of the former UST area), respectively. These water-supply wells are reportedly not used for drinking water, but are used during production processes. Another sensitive receptor is a dust control pond located less than 1,000 feet northwest of the former UST area. The adjacent maintenance shop and garage do not have basements or crawlspaces.
- Given the relative locations of the supply wells at the hot mix plant and "finish end" area and of the dust control pond to the contaminant source area, these sensitive receptors are considered to be at low to moderate risk of being impacted by petroleum migration.

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

1. Two additional water-table monitoring wells should be installed to further characterize the lateral extent of contamination at the site.
2. The newly installed and existing monitoring wells, in addition to two of the on-site supply wells (hot mix plant and "finish end" area), should be sampled and analyzed for the possible presence of volatile petroleum compounds by EPA Method 8021B and total petroleum hydrocarbons (TPH), diesel-range organics (DRO) by EPA Method 8015. If free product is encountered in any of the wells at recoverable quantities, it should be removed and containerized on-site in a properly labeled drum.
3. The dust control pond should be visually inspected for signs of petroleum contamination.
4. The on-site soil stockpile should continue to be monitored on a semi-annual schedule to maintain the integrity of the polyencapsulation and monitor the contaminant degradation. When PID readings have decreased to below one ppm, permission should be sought from the Vermont Department of Environmental Conservation (VT DEC) to thin-spread soils on site, in accordance with VT DEC guidelines. The next monitoring event should be performed in April 2000.

EXECUTIVE SUMMARY

5. Upon completion of the additional work, a supplemental site investigation 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 Frank W. Whitcomb Quarry, located on Roosevelt Highway in Colchester, Vermont. This report has been prepared by Marin on behalf of Frank W. Whitcomb Construction (FWW) of Walpole, New Hampshire.

1.1 Site Description and Physical Setting

The site is located on Roosevelt Highway in Colchester, Vermont, south of exit 16 along Interstate 89 (Figure 1). The site is a 300-acre quarry owned by FWW (Figure 1a). The area south of the site consists primarily of commercial properties. A few residences are located within ¼-mile southwest of the site.

Area topography at the former underground storage tank (UST) area slopes to the north. The site and adjacent properties are supplied by municipal water and sewer; however, the on-site buildings are served by a private septic system located east of the maintenance shop building.

Three on-site supply wells are used during production processes and are not used as a drinking water supply. The wells are located at the hot mix plant (approximately 300 feet northeast of the former UST area), at the "finish end" area (approximately 600 feet northwest of the former UST area), and at the sand plant (less than ¼-mile northwest of the former UST area). Nine pre-existing monitoring wells located throughout the quarry were installed for engineering purposes.

A small pond used for dust control is located less than 1,000 feet northwest of the former UST area. The Winooski River is located approximately one mile south of the site.

1.2 Site History

On 19 February 1998, Marin inspected the removal of a 10,000-gallon lube oil UST at the Whitcomb Quarry. The UST was located approximately ten feet west of the shop building (Figure 2). The tank and piping were found to be in excellent condition with very little surface rust and no evidence of scaling, pitting, or holes. Photoionization detector (PID) readings on the soils from the UST excavation ranged from 0.0 - 1.1 parts per million (ppm). No petroleum odors or petroleum-stained soils were observed in the excavation.

Ground water was encountered at approximately 14 feet below ground surface (bgs) during the UST closure.

On 17 December 1998, Elkind Environmental Associates, Inc (EEA) inspected the removal of four USTs located east of the shop at the site. Site activities included the closure of two 10,000-gallon diesel fuel tanks; a 6,000-gallon #2 fuel oil tank; and a 6,000-gallon gasoline tank. Field screening conducted during excavation revealed PID readings between 0.3 and 8 ppm at the top of the tanks and peaks of 50 to 200 ppm at the sides and beneath the tanks. The tanks were reportedly in good condition and the piping was in fair condition. Approximately 30 cubic yards of contaminated soil were removed for on-site polyencapsulation during the tank closure activities.

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 appropriate monitoring and/or remedial actions based on the site conditions.

To accomplish these objectives, Marin has:

- supervised the advancement of five soil borings and subsequent installation of water-table monitoring wells in four of the borings;
- 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 three monitoring wells for laboratory analysis of volatile petroleum compounds by EPA Method 8021B and total petroleum hydrocarbons (TPH), diesel-range organics (DRO) by EPA Method 8015;

- identified sensitive receptors in the area, and assessed the risk posed by the contamination to these potential receptors; 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

During drilling activities, brown medium to coarse sands and few pebbles with silt and clay were encountered in the soil borings to depths of approximately 11 to 16 feet bgs. A petroleum odor was detected during the advancement of soil borings at MW-1 and MW-2 (Figure 2). Ground water was encountered approximately eight to ten feet bgs.

Marin supervised the completion of five soil borings and subsequent installation of four monitoring wells (MW-1 through MW-4) on 14 July 1999, to initially characterize contaminant and hydrogeologic conditions at the site. Soil boring SB-1 was advanced eleven feet bgs to auger refusal. No ground water was encountered in SB-1.

Monitoring wells MW-1, MW-2 and MW-3 were installed adjacent to the former USTs to evaluate the degree of contamination in the source areas east and west of the maintenance shop. Monitoring well MW-4 was installed in the presumed downgradient direction of the UST area.

The soil borings were installed using rotary drilling methods using M & W Soils Engineering, Inc. of Charlestown, New Hampshire. Soil samples were collected at five-foot intervals from each boring using a two-foot long, split-spoon sampler. Soil recovery was generally fair to good, ranging from 50 to 100 percent. All downhole drilling and sampling equipment was decontaminated during use, as appropriate.

The monitoring wells were constructed with two-inch diameter polyvinyl chloride (PVC) pipe with eight- to ten-foot lengths of 0.010-inch slot screen. The tops of the screen sections were set between 4.5 to 6.0 feet above the ground-water level. Sections of solid PVC riser were added to bring the tops of the well casings to approximately 0.5 feet bgs. Clean silica #1 filter sand was placed in the borehole annulus around each well one to 3.5 feet above the slotted interval. A granular bentonite seal, approximately one-foot thick,

was set above the sand pack and the remainder of the annular space was backfilled with native material. Each well casing was topped with a watertight compression cap. Each completed monitoring well was protected by a flush-mounted steel roadbox cemented into place.

To remove fine-grained sediment, the monitoring wells were developed immediately after installation using a peristaltic pump. Development water was discharged directly to the ground surface in the vicinity of each well. On 23 July 1999, the monitoring wells were surveyed relative to existing site features, with an azimuth accuracy of ± 1.0 feet, and an elevation accuracy of ± 0.01 feet. Monitoring-well construction details are included on the soil-boring and well-construction logs in Appendix B.

2.2 Soil-Screening Results

During the soil-boring program on 14 July 1999, the highest PID reading was 527 ppm, which was recorded on a soil sample collected from approximately ten feet bgs in MW-1. PID readings ranged from 67.2 to 150.3 and averaged 109 ppm on soil samples from MW-2. PID readings were generally 1.0 ppm or less on soil samples in SB-1, MW-3, and MW-4.

A Marin hydrogeologist screened soil samples from discrete intervals in each soil boring for the possible presence of VOCs using a Photovac Model 2020 portable PID. The PID was calibrated in the field with an isobutylene standard gas to a benzene reference. Soil samples were placed into a polyethylene bag, which was then sealed, agitated, and allowed to equilibrate. The PID probe was inserted into the headspace, and the highest reading was recorded. PID screening results are included on the boring logs in Appendix B.

2.3 Ground-Water Elevation Calculations and Flow Direction

Based on the limited hydrogeologic data collected at the site to date, ground water in the unconfined surficial aquifer at the site appears to flow west toward a tributary of the Winooski River, with an average horizontal hydraulic gradient of approximately four percent. The vertical ground-water flow components at the site, and the hydraulic relationship between the shallow unconfined aquifer and the bedrock aquifer, are currently unknown.

Fluid levels were measured in the four monitoring wells on 23 July 1999. Depth to ground water in the on-site monitoring wells ranged from 10.10 feet (MW-4) to 15.66 feet (MW-3) below top-of-casing. Static water-table elevations were computed for each monitoring well by subtracting the measured depth-to-water readings from the surveyed top-of-casing elevations, which are relative to an arbitrary site datum of 100.00 feet. Water-level measurements and elevation calculations are presented in Table 1. A ground water-table contour map was prepared using these data (Figure 3).

2.4 Sampling and Analysis

In ground-water samples collected on 23 July 1999, the total BTEX (benzene, toluene, ethylbenzene, and xylenes) concentration in monitoring well MW-1 was 35,720 micrograms per liter ($\mu\text{g/L}$). Vermont Groundwater Enforcement Standards¹ (VGESs) were exceeded for benzene, toluene, ethylbenzene, xylenes, 1,3,5-trimethylbenzene, 1,2,4-trimethylbenzene, naphthalene, and methyl tert-butyl ether (MTBE) in the sample collected from MW-1. No analyzed petroleum parameters were detected in ground-water samples collected from MW-3 and MW-4. Ground-water samples were not collected from MW-2 because an insufficient volume of water was in the well.

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

Prior to collecting ground-water samples, monitoring wells MW-1, MW-3, and MW-4 were purged and then sampled using dedicated bailers and dropline. Purge water was discharged directly to the ground in the vicinity of each well. A trip blank and a duplicate sample 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, and analyzed for VOCs by EPA Method 8021B and TPH-DRO by EPA Method 8015.

Analytical results from the QA/QC samples indicate that adequate QA/QC was maintained during sample collection and analysis. VOCs were not detected in the trip

¹ Vermont Groundwater Enforcement Standards (VGESs) for eight petroleum related VOCs are as follows: benzene - 5 $\mu\text{g/L}$; toluene — 1,000 $\mu\text{g/L}$; ethylbenzene - 700 $\mu\text{g/L}$; xylenes — 10,000 $\mu\text{g/L}$; MTBE, a gasoline additive, - 40 $\mu\text{g/L}$; naphthalene — 20 $\mu\text{g/L}$; 1, 2, 4-trimethylbenzene — 5 $\mu\text{g/L}$; and 1, 3, 5-trimethylbenzene — 4 $\mu\text{g/L}$.

blank. Analytical results of the duplicate sample, collected from MW-1, were within 27 percent of the original sample results. Table 2 also includes a summary of the QA/QC analytical results.

2.5 Soil Stockpile Sampling

PID readings on samples collected from the on-site soil stockpile ranged from 11.4 to 46.6 parts per million, and averaged 32 ppm. The stockpile encapsulation was found to be in good condition. Figure 5 presents the PID readings and sample locations for this event.

Seven samples were collected from depths between 1.25 and 2.5 feet in the pile, which is approximately 30 cubic yards in size. Each sample was placed into a polyethylene bag, which was sealed, agitated and allowed to equilibrate prior to headspace screening. The highest PID reading was recorded.

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 Whitcomb Quarry that could potentially be impacted by contamination associated with the site.

Sensitive receptors include three on-site water-supply wells, located near the hot mix plant (300 feet northeast of the former UST area), the "finish end" area (located 600 feet northwest of the former UST area), and the sand plant (located less than ¼-mile northwest of the former UST area), respectively. The water-supply wells are reportedly not used for drinking water, but are used during production processes.

Another sensitive receptor is a dust control pond located less than 1,000 feet northwest of the former UST area. The adjacent maintenance shop and garage do not have basements or crawlspaces.

In their December 1998 UST closure report, EEA reported the presence of a water-supply well at an unoccupied residence located in a commercial development within the site vicinity. According the Winooski City Clerk's office, the sole residence located in the commercial development south of the site (25 Tigan Street), is serviced by municipal water. Marin did not observe any evidence of a supply well at this address, and the property owner, Shirley Barber, reported that she was unaware of the existence of a

supply well on this property. The Winooski City Clerk's office also reported that all buildings located south of the site within Winooski city limits are served by municipal water.

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 three on-site water-supply wells are located downgradient ("finish end" and sand plant) or crossgradient (hot mix plant) of the former UST area. Although the lateral extent of ground-water contamination has not been defined, the distance to the wells and the fact that they are not used for drinking suggest that the risk to these receptors is relatively low.

The dust control pond is located approximately 1,000 feet downgradient of the former UST location. Based upon its extended distance from the source area, this sensitive receptor does not appear to be at significant risk.

4.0 CONCLUSIONS

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

- Laboratory analytical results of ground-water samples collected at MW-1 indicate that the shallow aquifer beneath the former UST area is contaminated with dissolved-phase petroleum-related VOCs.
- Given the available hydrogeologic and contaminant-distribution data, it appears that the petroleum contamination detected on-site is likely attributed to the former on-site UST system located east of the shop.
- The lateral extent of dissolved-phase contamination has not been adequately defined. Additional data are necessary to adequately characterize hydrogeologic conditions at the site, and define the cross- and downgradient extent of contamination.

- Given the relative locations to the contaminant source area of the two supply wells at the hot mix plant and "finish end" area, and of the dust control pond, these sensitive receptors are at low to moderate risk of being impacted by petroleum migration.

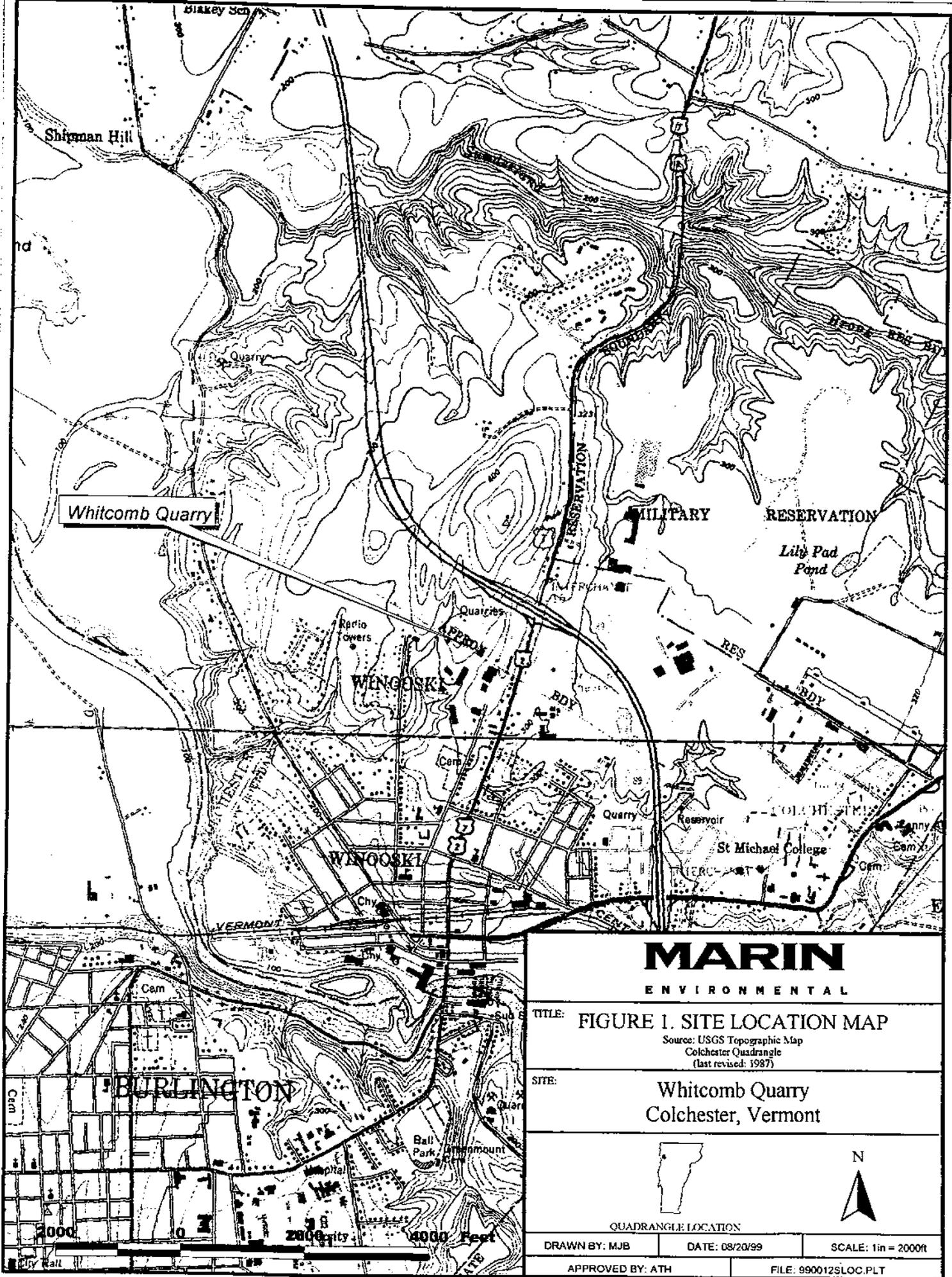
5.0 RECOMMENDATIONS

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

1. Two additional water-table monitoring wells should be installed to further characterize the lateral extent of cross- and downgradient contamination at the site. The proposed monitoring well locations are included on Figure 6. OK
2. The newly installed and existing monitoring wells, in addition to the supply wells located at the hot mix plant and "finish end" area should be sampled and analyzed for the possible presence of volatile petroleum compounds by EPA Method 8021B and TPH-DRO by EPA Method 8015. If free product is encountered in any of the wells at recoverable quantities, it should be removed and containerized on-site in a properly labeled drum. OK
3. The dust control pond should be visually inspected for signs of petroleum contamination. OK
4. The on-site soil stockpile should continue to be monitored on a semi-annual schedule to maintain the integrity of the polyencapsulation and monitor the contaminant degradation. When PID readings have decreased to below one ppm, permission should be sought from the Vermont Department of Environmental Conservation (VT DEC) to thin-spread soils on site, in accordance with VT DEC guidelines. The next monitoring event should be performed in April 2000. Upon completion of the additional work, a supplemental site investigation report should be prepared which includes relevant tables and figures, and identifies an appropriate course of action for the site.
5. Upon completion of the additional work, a supplemental site investigation report should be prepared which includes relevant tables and figures, and identifies an appropriate course of action for the site.

APPENDIX A

Figures & Tables



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TITLE: **FIGURE 1. SITE LOCATION MAP**

Source: USGS Topographic Map
Colchester Quadrangle
(last revised: 1987)

SITE: **Whitcomb Quarry
Colchester, Vermont**



QUADRANGLE LOCATION

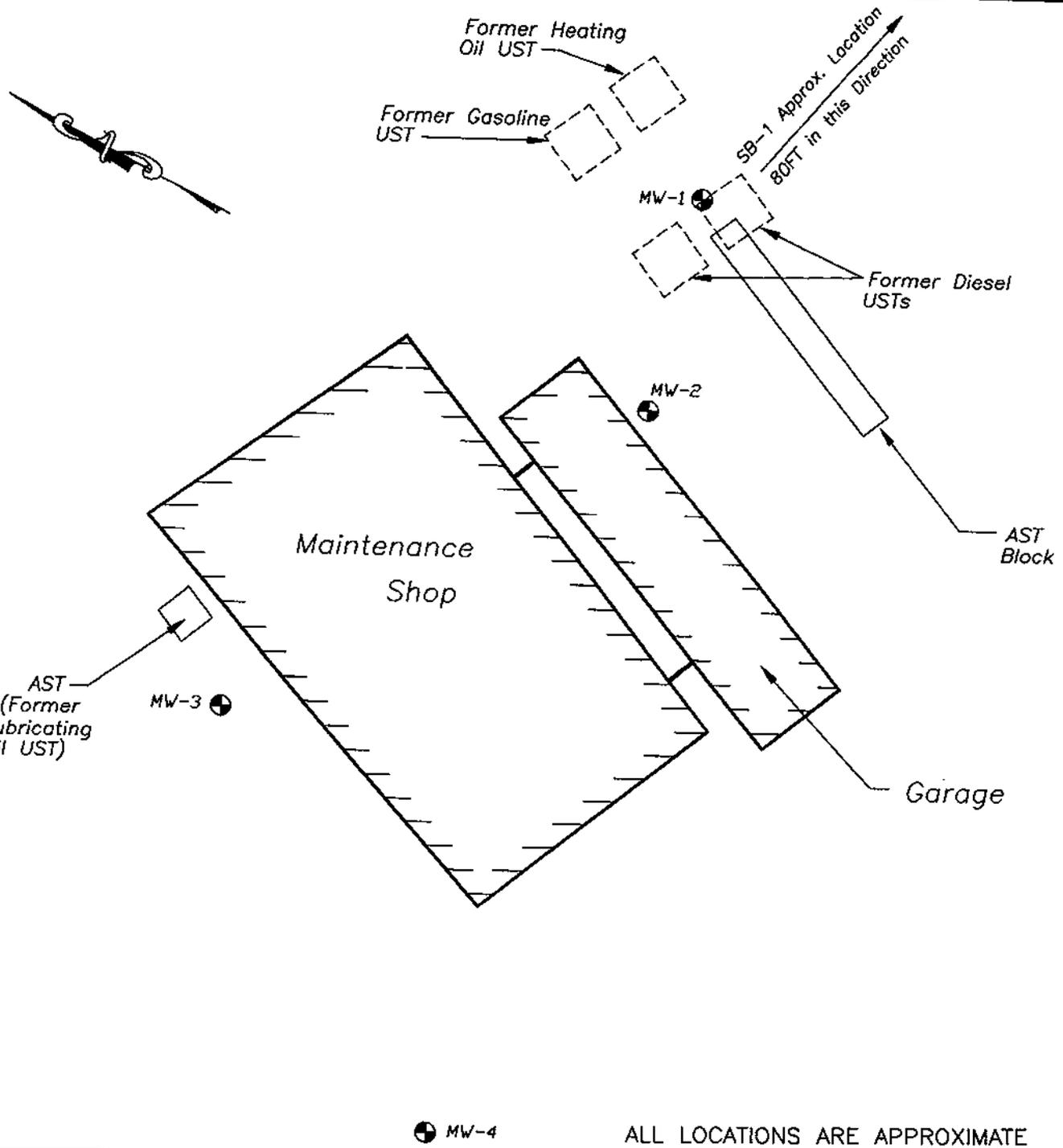
DRAWN BY: MJB

DATE: 08/20/99

SCALE: 1in = 2000ft

APPROVED BY: ATH

FILE: 990012SLOC.PLT



ALL LOCATIONS ARE APPROXIMATE

LEGEND

MW-2 MONITORING WELL

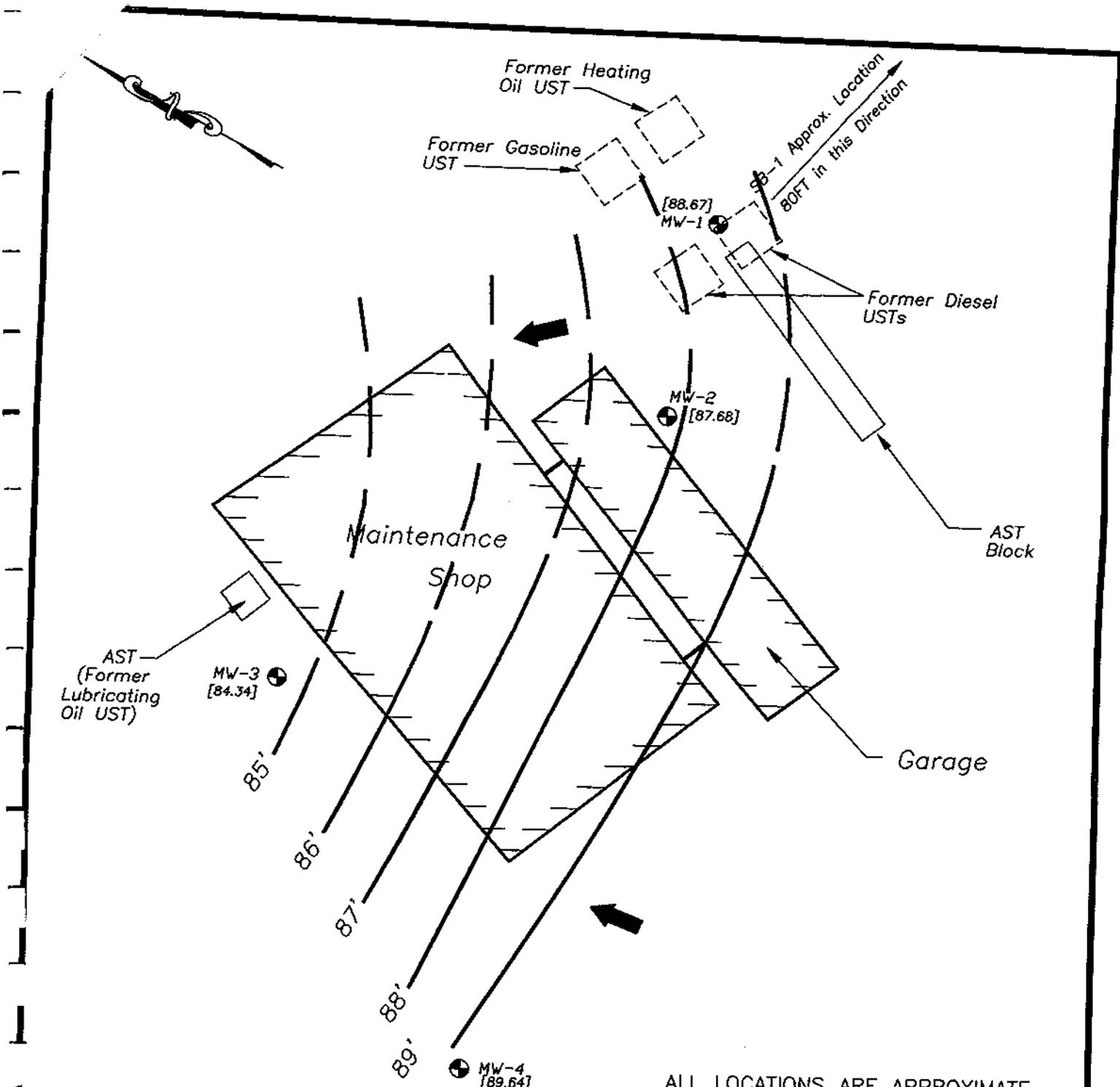


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FIGURE 2.
SITE PLAN
WITH MONITORING WELL LOCATIONS

Whitcomb Quarry
Colchester, VT

DRAWN BY: MJB	DATE: 08/26/99	SCALE: 1" = 40'
APPROVED BY: KL	FILE No.: 990012sp	



ALL LOCATIONS ARE APPROXIMATE

LEGEND

- MW-2 ● MONITORING WELL
- [88.15'] GROUND WATER ELEVATION (FT.)
- 89.0' — GROUND WATER ELEVATION CONTOUR (FT.)
- ← INFERRED GROUND WATER FLOW DIRECTION



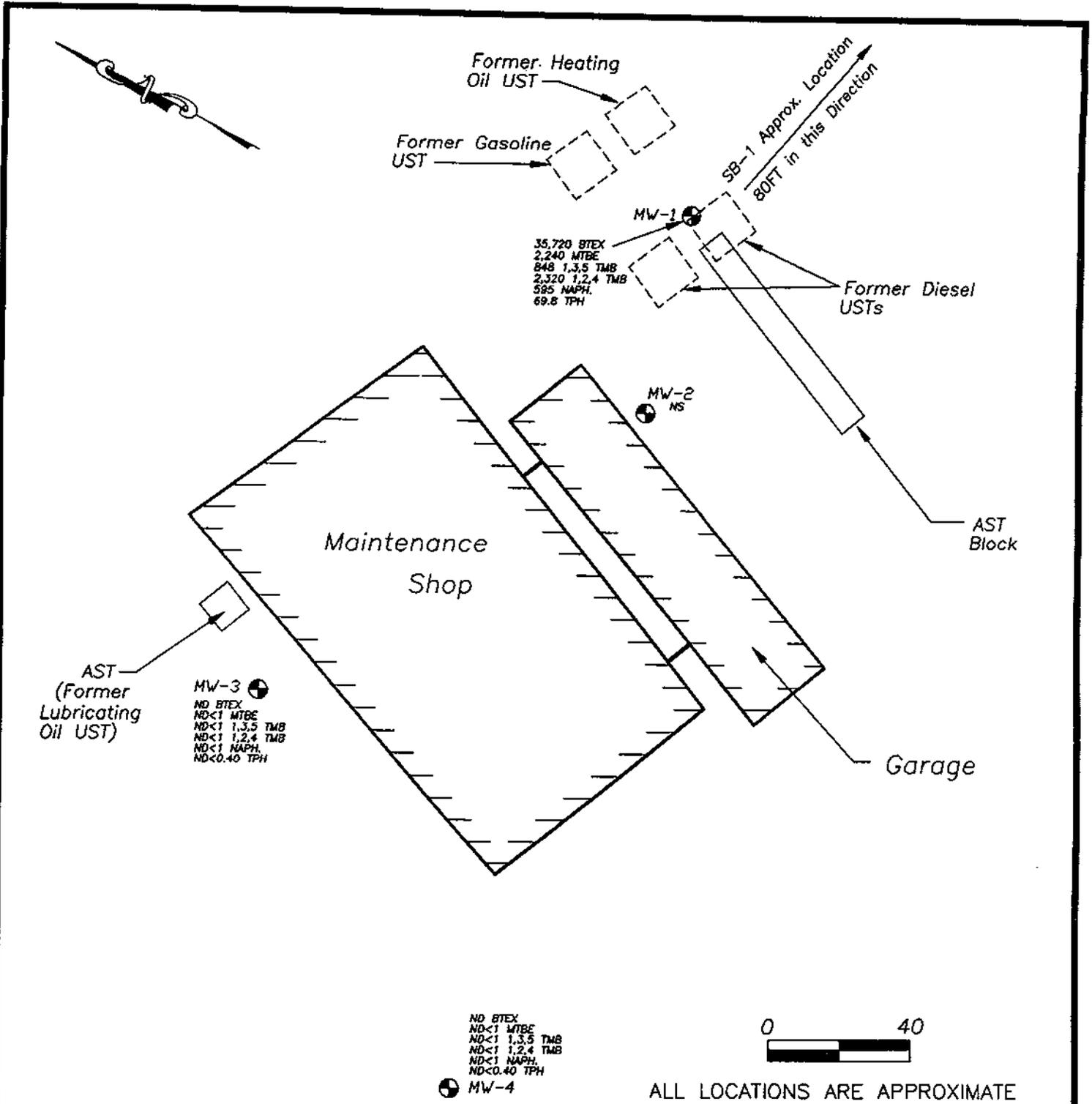
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FIGURE 3.
GROUNDWATER CONTOUR MAP

Monitoring Date: 27 July 1999

Whitcomb Quarry
Colchester, VT

DRAWN BY: MJB	DATE: 08/26/99	SCALE: 1" = 40'
APPROVED BY: KL	FILE No.: 990012sp	



LEGEND

MW-2	MONITORING WELL
89.0'	BTEX CONTOUR, (µg/L)
ND<1 BTEX	TOTAL BTEX CONCENTRATION, (µg/L)
ND<1 MTBE	MTBE CONCENTRATION, (µg/L)
ND	NONE DETECTED
NS	NOT SAMPLED
1,3,5 TMB	1,3,5 TRIMETHYL BENZENE CONCENTRATION, (µg/L)
1,2,4 TMB	1,2,4 TRIMETHYL BENZENE CONCENTRATION, (µg/L)
NAPH.	NAPHTHALENE CONCENTRATION, (µg/L)
TPH	TOTAL PETROLEUM HYDROCARBON CONCENTRATION, (mg/L)

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FIGURE 4.
CONTAMINANT DISTRIBUTION MAP
Monitoring Date: 27 July 1999

Whitcomb Quarry
Colchester, VT

DRAWN BY: MJB	DATE: 08/26/99	SCALE: 1" = 40'
APPROVED BY: KL	FILE No.: 990012sp	

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7 ISLAND DOCK ROAD
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1700 HEGEMAN AVENUE

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1.800.636.6030
1.800.520.6065
1.800.520.6065

SCIENTISTS
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GIS SPECIALISTS

SUBJECT:

FIGURE 5

DATE

PREPARED

CHECKED

DATE

PROJECT

BY

BY

NO.

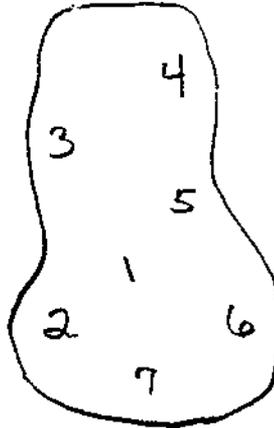
Whitcomb Quarry - Soil Stockpile Sampling

KL

990012

Monitoring Date: 30 July 1997

Soil Stockpile



Sample Number

Depth (feet)

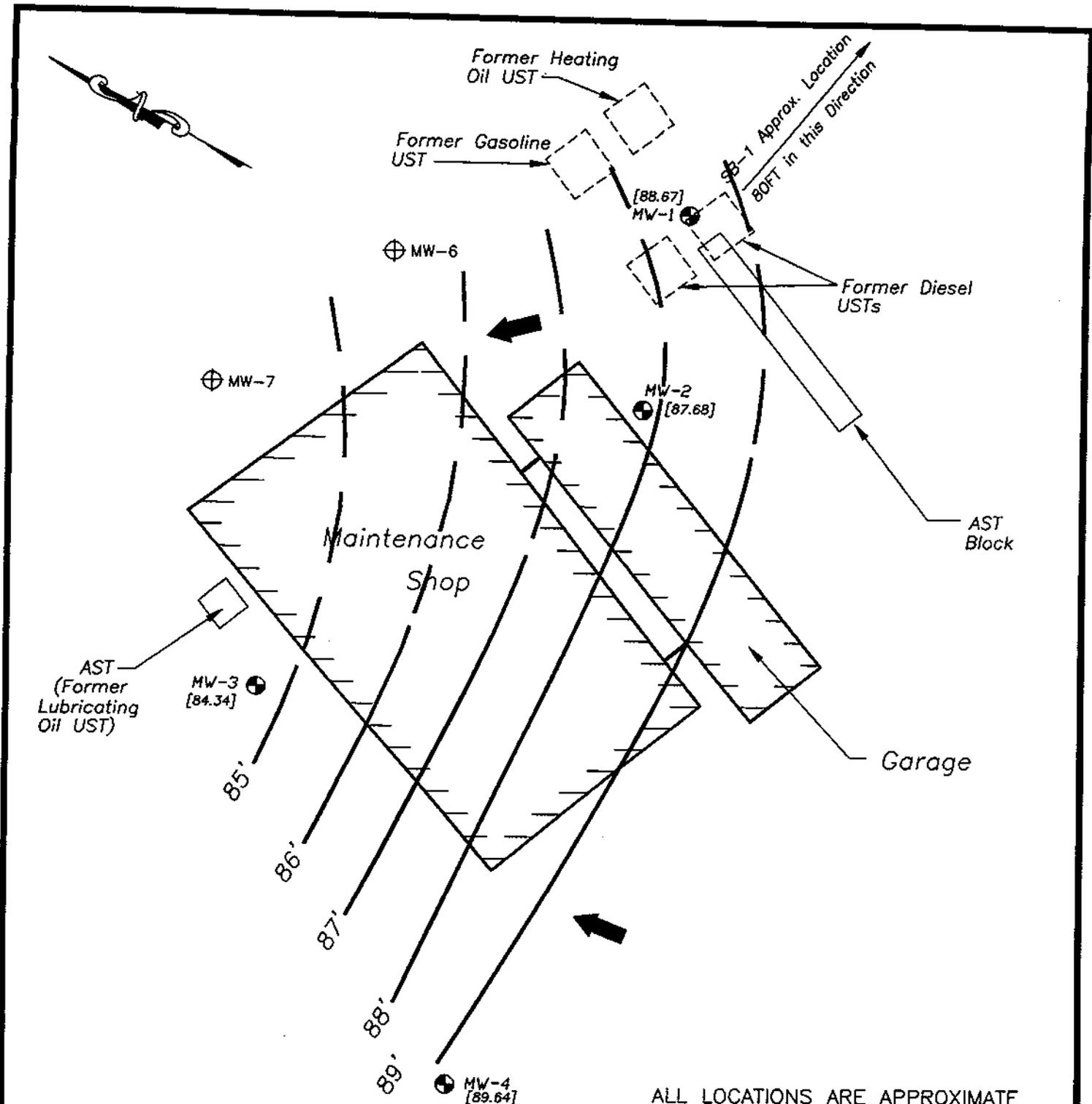
PID Readings

1607691

2.5
1.75
2.5
2.5
2.25
2.0
1.25

28.5
32.9
36.5
33.0
35.1
46.6
11.4

Average 32.03



LEGEND

- MW-2 ● MONITORING WELL
- MW-7 ⊕ PROPOSED MONITORING WELL
- [88.15'] GROUND WATER ELEVATION (FT.)
- 89.0'—— GROUND WATER ELEVATION CONTOUR (FT.)
- ← INFERRED GROUND WATER FLOW DIRECTION



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FIGURE 6.
PROPOSED MONITORING
WELL LOCATIONS

Whitcomb Quarry
Colchester, VT

DRAWN BY: MJB	DATE: 08/26/99	SCALE: 1" = 40'
APPROVED BY: KL	FILE No.: 990012sp	

TABLE 1
Ground-Water Elevation Calculations

Whitcomb Quarry
Colchester, VT

Monitoring Date: 23 July 1999

Well I.D.	Top of Casing Elevation	Depth to Water (ft, bgs)	Water Table Elevation
MW-1	98.94	10.27	88.67
MW-2	98.64	10.96	87.68
MW-3	100.00	15.66	84.34
MW-4	99.74	10.10	89.64

Notes:

Elevations reported in feet relative to arbitrary site datum of 100.00 feet.
ft, bgs - feet, below ground surface

TABLE 2
Summary of Analytical Results

Whitcomb Quarry
Colchester, VT

Monitoring Date: 23 July 1999

Well I.D.	Benzene	Toluene	Ethyl benzene	Xylenes	Total BTEX	MTBE	1,3,5-TMB	1,2,4-TMB	Naphthalene	TPH/DRO (mg/L)
MW-1	1,350	17,600	1,070	15,700	35,720	2,240	848	2,320	595	69.8
MW-2	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
MW-3	ND<1	ND<1	ND<1	ND<1	ND	ND<1	ND<1	ND<1	ND<1	ND<40
MW-4	ND<1	ND<1	ND<1	ND<1	ND	ND<1	ND<1	ND<1	ND<1	ND<40
Duplicate (MW-1)	1,620	20,200	1,200	17,700	40,720	2,850	923	2,520	460	--
% difference	20	15	12	13	14	27	9	9	23	--
Trip Blank	ND<1	ND<1	ND<1	ND<1	ND	ND<1	ND<1	ND<1	ND<1	--
VGES	5	1,000	700	10,000	--	40	4	5	20	--

Notes: Results given in micrograms per liter ($\mu\text{g/L}$), except where otherwise noted
 mg/L - milligrams per liter
 NS - not sampled
 ND - none detected at indicated detection limit
 TBQ - trace below quantitation
 MTBE - methyl tert-butyl ether
 TMB - trimethylbenzene
 TPH/DRO - total petroleum hydrocarbons/diesel-range organics
 VGES - Vermont Groundwater Enforcement Standards
 Shaded areas indicate VGES exceedences
 All samples collected by Marin and analyzed by Endyne, Inc.

APPENDIX B

Boring Logs /Monitoring Well Construction Diagrams

Marin Environmental, Inc.

SITE NAME: WHEATON'S QUARRY
 LOCATION: COLCHESTER, VT
 JOB NO. 990012
 DATE: 7/14/99

BORING NO: SB-1
 TOTAL DEPTH: 11'
 DEPTH TO WATER: NA

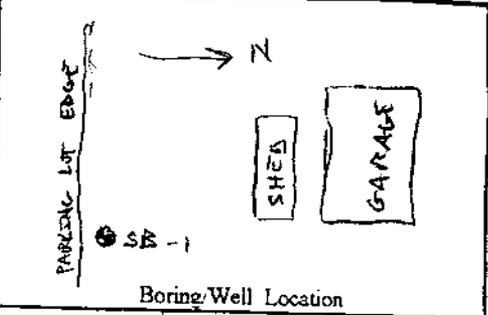
DRILLING METHOD
 HSA

FIELD SUPERVISOR: A. HEALIC

BORING DIAMETER
 8 3/4"

CONTRACTOR: M&W SOELS

DRILLERS: MYRON & CHRIS



Depth	SN	BLOW COUNTS PER 6"					Rec.
		0-6	6-12	12-18	18-24	24+	
5'	S-1	2	3				12"
				4	6		
0'	S-2	2					4"
15'							
20'							
5'							
30'							

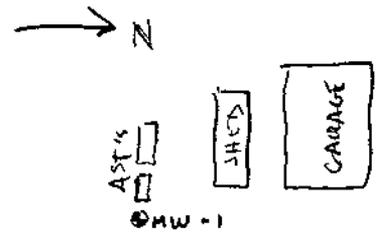
SAMPLE DESCRIPTION/COMMENTS	WELL DETAIL	PID (ppm)
Brown FINE SILTS AND CLAY, FEW PEBBLES, DRY, REFUSAL AT 11', NO WELL INSTALLED		0.0

		BLOW COUNT	MATERIALS USED	SIZE/TYPE	QUANTITY
ND	33-50%	0-4	VERY LOSE	WELL SCREEN	
OME	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	

Marin Environmental, Inc.

SITE NAME: WATCOMB QUARRY
 LOCATION: COLCHESTER, VT
 JOB NO. 990012
 DATE: 7/14/99

BORING NO: MW-1
 TOTAL DEPTH: 12'
 DEPTH TO WATER: ~10' BGS



DRILLING METHOD
 HSA
 BORING DIAMETER
 8 3/4"

FIELD SUPERVISOR: A. HERRICK
 CONTRACTOR: M & W SOILS
 DRILLERS: HYDROM & CHISS

Boring/Well Location

Depth	SN	BLOW COUNTS PER 6"					Rec.	SAMPLE DESCRIPTION/COMMENTS	WELL DETAIL	PID (ppm)
		0-6	6-12	12-18	18-24	24-30				
3'	S-1	2	3					BROWN MEDIUM TO COARSE SAND WITH SOME SILT AND FEW SMALL ANGULAR PEBBLES, MUST, PETROL ODOUR		3.7
0'	S-2	1	1			8"		BROWN TO BLACK MEDIUM TO COARSE SAND WITH SOME SILT AND FEW SMALL ANGULAR PEBBLES, WET, VERY STRONG PETROL ODOUR, POSSIBLE FREE PRODUCT, REFUSAL AT 12'		527
15'										
30'										

		BLOW COUNT		MATERIALS USED	SIZE TYPE	QUANTITY
AND	33-50%	0-4	VERY LOSE	WELL SCREEN	2" PVC	8'
OME	20-33%	4-10	LOOSE	SLOT SIZE	0.010	
LITTLE	10-20%	10-30	MEDIUM	RISER	2" PVC	4'
TRACE	0-10%	30-50	DENSE	GRADED SAND	12 - 3.5'	
		> 50	VERY DENSE	BENTONITE PELLETS	3.5 - 2.2'	
				BENTONITE GROUT		

Marin Environmental, Inc.

SITE NAME: WHELFORDS QUARRY

LOCATION: COLCHESTER, VT

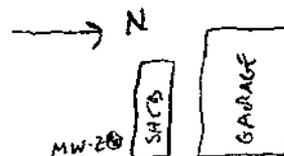
JOB NO. 990012

DATE: 7/14/99

BORING NO: MW-2

TOTAL DEPTH: 12'

DEPTH TO WATER: ~8 FT BGS



DRILLING METHOD HSA

FIELD SUPERVISOR: A. HOAK

BORING DIAMETER 8 3/4

CONTRACTOR: M&W SOILS

DRILLERS: MYRON & CHRIS

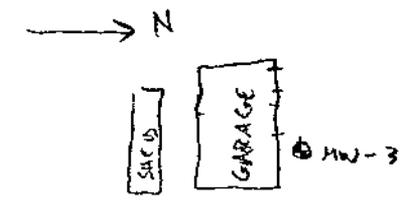
Boring/Well Location

Depth	SN	BLOW COUNTS PER 6"					Rec.	SAMPLE DESCRIPTION/COMMENTS	WELL DETAIL		PID (ppm)
		0-6	6-12	12-18	18-24	24-30					
5'	8-1	6	5					DARK BROWN MEDIUM TO COARSE SANDS WITH SOME SILT AND FEW SMALL ANGULAR PEBBLES, MOST WITH PETROL ODOUR, ROOTS AND OTHER ORGANIC MATTER			67.2
0'	5-2	1	1					DARK BROWN MEDIUM TO COARSE SAND, WET, PETROL ODOUR AND ORGANIC MATTER, REFUSAL AT 12'			150.3
15'											
30'											
40'											

	BLOW COUNT		MATERIALS USED	SIZE/TYPE	QUANTITY
AND	33-50%	0-4	VERY LOSE	WELL SCREEN	2" PVC 8'
ME	20-33%	4-10	LOOSE	SLOT SIZE	0.010
TITLE	10-20%	10-30	MEDIUM	RISER	2" PVC 4'
TRACE	0-10%	30-50	DENSE	GRADED SAND	12-3' BGS
		> 50	VERY DENSE	BENTONITE PELLETS	3-2' BGS
				BENTONITE GROUT	

SITE NAME: WHITCOMB QUARRY
 LOCATION: CHESTER, VT
 JOB NO. 990012
 DATE: 7/14/99

BORING NO: MW-3
 TOTAL DEPTH: 15
 DEPTH TO WATER:



DRILLING METHOD
 HSA
 BORING DIAMETER
 8 3/4

FIELD SUPERVISOR: A. HOAK
 CONTRACTOR: M & W SOILS
 DRILLERS: MYRON, CHRIS

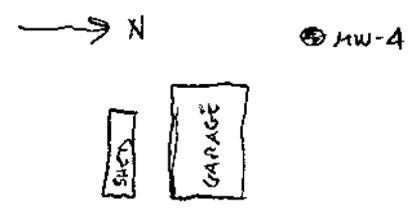
Depth	SN	BLOW COUNTS PER 6"					Rec.	SAMPLE DESCRIPTION/COMMENTS	Boring Well Location		PID (ppm)
		0-6	6-12	12-18	18-24	24-30			WELL DETAIL		
5'	S-1	5	3				18"	DARK BROWN MEDIUM TO COARSE SAND WITH SOME SILT AND FEW SMALL ANGULAR PEBBLES, FILL, MOIST			1.0
10'	S-2	2	1				20"	DARK BROWN MEDIUM TO COARSE SAND WITH SOME SILT AND FEW SMALL ANGULAR PEBBLES, FILL WET			0.3
15'	S-3	2					12"	COARSE BROWN SAND, WET, REFUSAL AT 15.5' BGS.			1.0
20'											
5'											
30'											
5'											

		BLOW COUNT		MATERIALS USED	SIZE TYPE	QUANTITY
ND	33-50%	0-4	VERY LOSE	WELL SCREEN	2" PVC	10'
OME	20-33%	4-10	LOOSE	SLOT SIZE	0.010	
LITTLE	10-20%	10-30	MEDIUM	RISER	2" PVC	5'
TRACE	0-10%	30-50	DENSE	GRADED SAND	15' - 3.5' BGS	
		> 50	VERY DENSE	BENTONITE PELLETS	0.5 - 2.2' BGS	
				BENTONITE GROUT		

Marr Environmental, Inc.

SITE NAME: WILTCOMB QUARRY
 LOCATION: COLCHESTER, VT
 JOB NO. 990012
 DATE: 7/14

BORING NO: MW-4
 TOTAL DEPTH: 22'
 DEPTH TO WATER: 16'



DRILLING METHOD: HSA

FIELD SUPERVISOR: A. HOAK

BORING DIAMETER: 8 3/4"

CONTRACTOR: M & W SOELS

DRILLERS: MYRON & CHARES

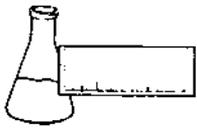
Boring Well Location

Depth	SN	BLOW COUNTS PER 6"					Rec.	SAMPLE DESCRIPTION/COMMENTS	WELL DETAIL	PID (ppm)
		0-6	6-12	12-18	18-24	24-30				
5'	S-1	6	5				2A"	LIGHT BROWN MEDIUM TO FINE SAND AND SILT, ABUNDANT ANGULAR QUARTZ PEBBLES, FILL, DRY	[Diagram]	0.3
	S-2	5	10	4	3		2A"			DARK BROWN MEDIUM WELL SORTED SAND MOIST
0'	S-3	6	7				2A"	BROWN MEDIUM WELL SORTED SAND, MOIST		0.0
15'	S-4	6	6					BROWN MEDIUM WELL SORTED SAND, WET, W.T. AT 16 FT		0.0
20'	S-5	4	5					DARK GRAY SILT AND CLAY, DRY WITH FEW ANGULAR PEBBLES, STIFF		0.0

BLOW COUNT		MATERIALS USED		SIZE/TYPE	QUANTITY
AND	33-50%	0-4	VERY LOSE	WELL SCREEN	2" PVC
ME	20-33%	4-10	LOOSE	SLOT SIZE	0.010
LITTLE	10-20%	10-30	MEDIUM	RISER	2" PVC
TRACE	0-10%	30-50	DENSE	GRADED SAND	20' - 6.6' DGS
		> 50	VERY DENSE	BENTONITE PELLETS	6.6' - 5.2' DGS
				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

ORDER ID: 3294

PROJECT NAME: Whitcomb Quarry/VT99-0012 REF.#: 141,620 - 141,624

REPORT DATE: August 4, 1999

DATE SAMPLED: July 23, 1999

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.

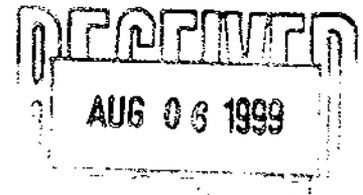
All samples were prepared and analyzed by requirements outlined in the referenced method and within the specified holding times. All instrumentation was calibrated with the appropriate frequency and verified by the requirements outlined in the referenced method. Blank contamination was not observed at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

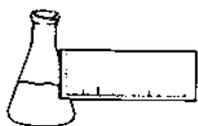
Individual sample performance was monitored by the addition of surrogate analytes to each sample. All surrogate recovery data was determined to be within laboratory QA/QC guidelines unless otherwise noted.

Reviewed by,

Harry B. Locker, Ph.D.
Laboratory Director



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ENDYNE, INC.

Laboratory Services

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

EPA METHOD 8021B--PURGEABLE AROMATICS

CLIENT: Marin Environmental

DATE RECEIVED: July 27, 1999

PROJECT NAME: Whitcomb Quarry/VT99-0012

REPORT DATE: August 4, 1999

CLIENT PROJ. #: VT99-0012

ORDER ID: 3294

Ref. #:	141,620	141,621	141,622	141,623	141,624
Site:	Trip Blank	Duplicate	MW-1	MW-3	MW-4
Date Sampled:	7/23/99	7/23/99	7/23/99	7/23/99	7/23/99
Time Sampled:	9:15	NI	11:05	10:55	10:45
Sampler:	JB	JB	JB	JB	JB
Date Analyzed:	7/30/99	8/2/99	8/3/99	7/30/99	8/2/99
UIP Count:	0	>10	>10	0	0
Dil. Factor (%):	100	0.5	0.5	100	100
Surr % Rec. (%):	96	126	103	98	93
Parameter	Conc. (ug/L)				
MTBE	<1	2,850.	2,240.	<1	<1
Benzene	<1	1,620.	1,350.	<1	<1
Toluene	<1	20,200.	17,600.	<1	<1
Ethylbenzene	<1	1,200.	1,070.	<1	<1
Xylenes	<1	17,700.	15,700.	<1	<1
1,3,5 Trimethyl Benzene	<1	923.	848.	<1	<1
1,2,4 Trimethyl Benzene	<1	2,520.	2,320.	<1	<1
Naphthalene	<1	460.	595.	<1	<1

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

CHAIN-OF-CUSTODY RECORD

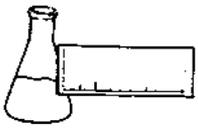
Project Name: <u>Whitcomb Quarry</u> Site Location: <u>Colchester VT</u>	Reporting Address: <u>marin</u>	Billing Address: <u>marin</u>
Endyne Project Number: <u>3794</u>	Company: <u>Marin Env</u> Contact Name/Phone #: <u>A Hunt 655-0011</u>	Sampler Name: <u>Steve Buckley</u> Phone #:

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				
141620	trip blank	Had	X		7/23 0915	2	40ml vial		30	HCl	
141621	duplicate				—	2			30		
141622	mw-1				1105	2			30		
	mw-1				1105	2			31		
141623	mw-3				1055	2			30		
	mw-3				1055	2			31		
141624	mw-4				1045	2			30		
	mw-4				1045	2			31		

Relinquished by: Signature <u>[Signature]</u>	Received by: Signature <u>Alison Flowers</u>	Date/Time <u>7/29/97 1:20</u>
Relinquished by: Signature	Received by: Signature	Date/Time

 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 Pest/PCB
4	Nitrite 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): <u>80216</u> <u>(31) TPH by soil 3015 DRG</u>										



ENDYNE, INC.

Laboratory Services

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

LABORATORY REPORT

CLIENT: Marin Environmental

ORDER ID: 3294

PROJECT: Whitcomb Quarry/VT99-0012

DATE RECEIVED: July 27, 1999

REPORT DATE: August 5, 1999

Enclosed please find the results of the analyses performed for the samples referenced on the attached chain of custody. Different groups of analyses may be reported under separate cover.

All samples were prepared and analyzed by requirements outlined in the referenced methods and within the specified holding times.

All instrumentation was calibrated with the appropriate frequency and verified by the requirements outlined in the referenced methods.

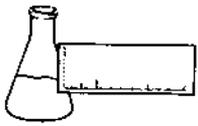
Blank contamination was not observed at levels affecting the analytical results.

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, unless otherwise noted.

Reviewed by,

Harry B. Locker, Ph.D.
Laboratory Director

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LABORATORY REPORT

CLIENT: Marin Environmental
PROJECT: Whitcomb Quarry/VT99-0012
REPORT DATE: August 5, 1999

ORDER ID: 3294
DATE RECEIVED: July 27, 1999
SAMPLER: JB
ANALYST: 820

Ref. Number: 141622 Site: MW-1 Date Sampled: July 23, 1999 Time: 11:05 AM

<u>Parameter</u>	<u>Result</u>	<u>Unit</u>	<u>Method</u>	<u>Analysis Date</u>
TPH 8015 DRO	69.8	mg/L	SW 8015B	8/4/99

Ref. Number: 141623 Site: MW-3 Date Sampled: July 23, 1999 Time: 10:55 AM

<u>Parameter</u>	<u>Result</u>	<u>Unit</u>	<u>Method</u>	<u>Analysis Date</u>
TPH 8015 DRO	< 0.40	mg/L	SW 8015B	8/4/99

Ref. Number: 141624 Site: MW-4 Date Sampled: July 23, 1999 Time: 10:45 AM

<u>Parameter</u>	<u>Result</u>	<u>Unit</u>	<u>Method</u>	<u>Analysis Date</u>
TPH 8015 DRO	< 0.40	mg/L	SW 8015B	8/4/99

CHAIN-OF-CUSTODY RECORD

Project Name: <u>Whitcomb Quarry</u>	Reporting Address: <u>main</u>	Billing Address: <u>main</u>
Site Location: <u>Colchester, VT</u>		
Endyne Project Number: <u>3294</u>	Company: <u>Marin Env.</u>	Sampler Name: <u>Jessie Bierly</u>
	Contact Name/Phone #: <u>A. Hawk 655-0011</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				
141620	fr. p blank	H ₂ O	X		7/23 0915	2	40ml van		30	HCl	
141621	duplicate				—	2			30		
141622	mw-1				1105	2			30		
	mw-1				1105	2			31		
141623	mw-3				1055	2			30		
	mw-3				1055	2			31		
141624	mw-4				1045	2			30		
	mw-4				1045	2			31		

Relinquished by: Signature <u>[Signature]</u>	Received by: Signature <u>Alison Howard</u>	Date/Time <u>7/29/99 1:20</u>
Relinquished by: Signature	Received by: Signature	Date/Time

 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 Pest/PCB
4	Nitrite 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): <u>8021b</u> <u>(31) TPH by mod 8015 DRO</u>										