

NOV 23 1993

CATAMOUNT CONSULTING GROUP, INC.
P.O. BOX 8
MONTPELIER, VERMONT 05601

(802) 229-2600

November 22, 1993

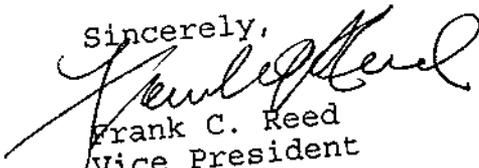
Mr. Robert Haslam
Sites Management Section
Hazardous Materials Management Section
Agency of Natural Resources
103 South Main Street
Waterbury, Vermont 05671-0404

Dear Bob:

Enclosed is a copy of the initial phase of subsurface investigation conducted behind the Critics Choice at 12 1/2 Main Street in Montpelier (DEC Site # 93-1478). This is submitted as part of the response to the letter of Chuck Schwer dated October 28, 1993, received by Jeffrey Jacobs.

If you have any questions regarding this report, please contact me at the above address. After you have read this please call me so we can meet to discuss this and future actions required. Thanks for your help.

Sincerely,


Frank C. Reed
Vice President

STONE ENVIRONMENTAL INC

REPORT:

**SUBSURFACE INVESTIGATION
AT A PROPERTY LOCATED BEHIND
26 MAIN STREET IN
MONTPELIER, VERMONT
SEI #93500**

FOR:

**Mr. Richard Unger, Esquire
2 Spring Street
Montpelier, VT 05602**

**Mr. Frank Reed
Catamount Consulting Group, Inc.
P.O. Box 8
Montpelier, VT 05601**

November 19, 1993

**58 East State Street
Montpelier, Vermont 05602**

**Telephone / 802.229.4541
Fax / 802.229.5417**

Mr. Richard Unger, Esquire
2 Spring Street
Montpelier, VT 05602

Mr. Frank Reed
Catamount Consulting Group, Inc.
P.O. Box 8
Montpelier, VT 05601

STONE ENVIRONMENTAL INC

58 East State Street Phone / 802. 229.4541
Montpelier, Vermont Fax / 802. 229.5417
05602

RE: Report on the Subsurface Investigation at a property located behind 26 Main street in Montpelier, Vermont, SEI Project # 93500

Dear Mr. Unger and Mr. Reed,

Stone Environmental Inc. (SEI) is pleased to present a report on the subsurface investigation at a property located behind 26 Main Street in Montpelier, Vermont (see Figure 1, Location Map). The investigation was in response to a request by the State of Vermont Agency of Natural Resources, Hazardous Materials Management Division (HMMD). HMMD made the request after a leaking #2 fuel oil underground storage tank (UST) was removed from the property. The removal of the leaking UST was prompted by the discovery of #2 fuel oil entering the North Branch of the Winooski river in the vicinity of the UST.

1.0 INTRODUCTION

The above referenced subsurface investigation was performed by SEI personnel on October 29, 30, 31, and November 1, 2 and 8, 1993, and consisted of the installation of one free-product recovery well, six groundwater monitoring wells, surveying of the general site layout with locations of the wells, and the sampling and laboratory analysis of all monitoring wells and three recovery wells.

In addition to work performed by SEI, the U.S. EPA Region 1 and The Johnson Company have performed investigations and executed remediation in the vicinity of the UST. The documentation on data developed by these two other organizations was not available at the time of writing this report. Such information would be useful in developing a complete understanding on the magnitude of the UST leak that is purported to have occurred. This investigation is complicated by the fact that the UST, which supplied heating oil to a building owned by Mr. Jeff Jacobs, was situated on property owned by the Vermont League of Cities and Towns (VLCT). Moreover, the site is situated in a highly urbanized setting, where many properties potentially may have had releases of hazardous materials in the past 30 to 100 years. This investigation has been limited to the characterization of hydrocarbon contamination in the immediate vicinity of the removed UST. A property map is included as Figure 2.

2.0 OBJECTIVES

This investigation had two specific goals:

- 1) To determine the lateral extent of free phase petroleum that may have been released from the UST;
- 2) Determine if sources other than the removed UST may be contributing to the contamination along the North Branch of the Winooski and at the EPA recovery well.

3.0 SCOPE OF SERVICES

3.1 Recovery Well Installation

A groundwater recovery well, SEI-1, was installed on October 29, 1993 to allow for the immediate implementation of free product recovery. The well is located adjacent to another recovery well, JCO-1, (see Figure 3, Site Map) which was installed by The Johnson Company after the removal of the UST. SEI-1 was necessary as JCO-1 was not installed at an adequate depth to allow for sufficient free product removal.

DIGSAFE was contacted on October 29, 1993, and emergency clearance to drill was granted. Tri-State Drilling & Boring of East Burke, Vermont, was contracted to install the recovery well under the supervision of SEI. All on-site personnel were required to read and sign the site safety plan before the commencement of drilling. The single recovery well was installed using a B-57 drill rig equipped with 10 inch outside diameter hollow stem augers. The well boring was continuously sampled with a split spoon sampler commencing at nine feet, as this was the approximate depth of the removed tank. Each split spoon sample was collected in a one-pint mason jar and covered with clean aluminum foil. Volatile organic compounds (VOC's) were allowed to develop in the headspace of the sample jar for a minimum of five minutes. The sample was agitated occasionally during this time. The aluminum foil was then pierced by a Microtip photo ionization detector (PID) equipped with a 10.6 volt lamp, and the sample headspace was measured. The maximum "peak" reading was recorded from the PID. The PID had been calibrated at the SEI office in Montpelier to 100 ppm isobutylene before leaving for the site on October 29. The well logs for SEI-1 and all monitoring wells can be found in Appendix 1.

Prior to well installation, it was learned that Tetrachloroethylene (PCE) was present in EPA-1, which was assumed downgradient of the SEI recovery well site and UST excavation area. In light of this, the recovery well installation proceeded cautiously in order to identify any potential confining layer present in the substrate. If a confining layer is breached, it would potentially create a conduit for downward migration of any PCE present in the water table.

3.2 Monitoring Well Installation

Six groundwater monitoring wells were installed on October 30 and 31, and November 1, 1993. All wells were installed using a B-57 rig equipped with eight inch outside diameter hollow stem augers. Each well

was sampled with a split spoon sampler beginning at the three foot depth, in the same fashion as SEI-1.

3.2 Surveying

All relative locations and elevations of monitoring wells , as well as relevant on-site markings (buildings, parking lots, roads etc.) were surveyed by Todd Hill of Montpelier, and SEI personnel. All points were surveyed relative to a temporary bench mark with an assumed elevation of 100.00 feet.

3.3 Sampling

The monitoring wells were sampled on November 8, 1993 by SEI per Standard Operating Procedure (SOP) # SEI-017 (see Appendix 2). The wells were sampled with disposable bailers dedicated to each well. The six monitoring wells were sampled and analyzed using EPA methods 8240 and 418.1. Samples from the three recovery wells were analyzed using EPA method 8240 only. Sample collection for EPA method 8240 analyses was modified as to allow the bailer to completely sink to the bottom of the well, thereby aiding in the collection of potential chlorinated solvents such as PCE and Trichloroethene (TCE), which have a specific gravity greater than water and will therefore sink when reaching the water table. Microassays of Vermont, located in Montpelier, performed the 418.1 analyses, while the State of Vermont Environmental Laboratory in Waterbury performed the analyses for EPA method 8240. EPA method 8240 was employed due to the presence of PCE in recovery well EPA-1. As the sampling collection was completed after both laboratories had closed for the day, the samples were placed in a refrigerator overnight and delivered to their respective laboratories the following morning (November 9, 1993). Copies of the laboratory documents are located in Appendix 3, while laboratory results are tabulated in Table 1. Additionally, a map depicting laboratory results at each well is included as Figure 4.

Water level elevations were also recorded on November 8, and November 14, 1993, per SOP #SEI-003 (see Appendix 4). The elevations were incorporated with the monitoring well elevations in the development of a water table elevation map (see Figures 5 and 6). It must be noted that measurements were not made in all wells at the site.

3.4 Operation & Maintenance of Recovery Wells

As part of the investigation, free product was removed from SEI-1 and screened with the PID in the same manner as with the split spoon sampling. The headspace of the free product registered 274 ppm. Both SEI-1 and JCO-1 have been manually bailed periodically. Free product is still present in both wells at approximately 1/8". The amount of product removed from both wells is estimated at 30 to 50 gallons. There is also free product being removed by vacuum truck from EPA-1. The amount removed to date is not known. Groundwater from EPA-2 and EPA-3 was removed with disposable bailers on November 18, 1993 for visual inspection. There was no free phase liquid petroleum product observed in those two samples.

It should be noted that prior to SEI's investigation, the U.S. EPA Region 1 performed an investigation that

uncovered clay pipe resembling an old sewer pipe near what is now EPA-1. It is SEI's understanding that the clay pipe was acting to channel what has been characterized as #2 fuel oil. During the UST removal, another pipe similar to the pipe at EPA-1 was uncovered in the tank removal area. This uncovered pipe was oriented towards EPA-1, suggesting that it is possibly connected to the pipe noted earlier which may be serving as a conduit for migration of #2 fuel oil toward the river.

4.0 Findings / Discussion

Based on water table measurements on November 8 and November 14, 1993, groundwater flow direction was in a northwesterly direction from the tank pull area toward the river. There was an apparent mound or high water area at MW#1 where the water table is approximately six feet higher than in MW#4. The cause of this mound is unclear.

The soils in MW#2 and MW#4 exhibited very low concentrations of VOC's based on the PID readings during their installation. It is felt that these two wells represent locations outside of the extent of soil contaminated by the leaking #2 fuel oil UST. 418.1 laboratory analyses revealed 6.5 ppm Total Petroleum Hydrocarbons (TPH) in MW#2, which is considered low and possibly due to naturally occurring hydrocarbons in the soils. 418.1 analysis of MW#4 revealed 5.6 ppm TPH, also considered low.

The soils of MW#1 exhibited the highest peak PID reading: 1189 ppm at approximately eight feet (91.6 foot relative elevation). As the headspace of #2 fuel oil free product registered only 274 ppm using the same Microtip PID, it would suggest that the contamination in MW#1 is made up of compounds more volatile than #2 fuel oil. Further, 418.1 analysis revealed only 5.6 ppm TPH, reflecting a negligible amount of non-volatile compounds such as #2 fuel oil. Finally, as the relative elevation of MW#1 is above the estimated 90 foot relative elevation of the bottom of the removed UST, it appears that these peak readings are attributable to contaminants other than the #2 fuel oil from the removed UST.

MW#3 exhibited peak PID readings of 190 ppm at five feet (93.6 foot elevation), and 87 ppm at nine feet (89.6 foot elevation). However, 418.1 analysis for MW#3 revealed less than 5 ppm TPH. MW #5 was relatively clean until the 10 foot depth, where the peak PID reading was 186 ppm at 11 feet (87.9 foot elevation). Again, however, 418.1 analysis revealed less than 5 ppm TPH. MW#6 had a peak PID reading of 15.7 ppm at the 10 foot depth (87.8 foot elevation). However, as the 418.1 analysis revealed less than 5 ppm TPH, the PID may have been recognizing a compound other than #2 fuel oil.

5.0 Conclusions & Recommendations

Laboratory analyses show that there are contaminants present in the groundwater that are not a result of a release of #2 fuel oil, or of the #2 fuel oil in the removed UST. Specifically, PCE, Vinyl Chloride, and Acetone were all identified by the 8240 analyses. Although it is not in the scope of this investigation to determine the source or extent of these other compounds, their presence at the site is certainly significant and may have an impact on remediation of the #2 fuel oil.

Soil screening, recovery well observation, and laboratory analyses suggest that the free phase #2 fuel oil contamination is limited to the tank pull area and the vicinity of recovery well EPA-1. There is also

evidence of contamination other than #2 fuel oil throughout the area, both upgradient and downgradient of the tank pull area.

In light of this, we recommend to continue removing free product from EPA 1 which appears to be the most direct means to eliminate the seepage of hydrocarbon sheen to the North Branch of the Winooski River. At this point recommendations on further monitoring and investigation should be delayed until data from the EPA investigation have been issued.

Thank you again for the opportunity to perform this project. If you have any questions, please call anytime.

Sincerely,

STONE ENVIRONMENTAL, INC



Jeff Kelley, Project Geoscientist

Attachments:

- Table 1: Sample Analytical Results
- Figure 1: Site Location Map
- Figure 2: Property Map
- Figure 3: Site Map
- Figure 4: Site Map Showing Analytical Results for Samples Collected 11/8/93
- Figure 5: Water Table Elevations 11/8/93
- Figure 6: Water Table Elevations 11/14/93
- Appendix 1: Well Construction Logs
- Appendix 2: SOP SEI-017
- Appendix 3: Laboratory Results
- Appendix 4: SOP SEI-003

**TABLE 1
SAMPLE ANALYTICAL RESULTS**

Site Investigation of a Property in Downtown Montpelier, Vermont
Stone Environmental, Inc. Project Number 93500

EPA Method 8240

Analyses done by the Vermont Department of Environmental Conservation Laboratory

Sample Identification	undiluted PQL	MW-1	MW-2	MW-3	MW-4	MW-5	MW-6	EPA-1	EPA-2	SEI-Recovery
Perchloroethylene (PCE)	5	nd	nd	nd	nd	13	nd	800	600	nd
1,2 Dichloroethene	5	nd	nd	nd	10	nd	nd	< 500 E	nd	nd
Vinyl Chloride	10	nd	nd	nd	11	nd	nd	nd	nd	nd
Methyl-t-butylether (MTBE)	10	nd	nd	nd	nd	nd	nd	nd	nd	< 100 E
Acetone	100	nd	968 J	205 J	nd	1,395 J	100 J	nd	nd	nd
Benzene	5	nd	nd	nd	nd	nd	nd	nd	nd	180
Toluene	5	nd	nd	nd	nd	nd	nd	nd	nd	620
Ethylbenzene	5	nd	nd	nd	nd	nd	nd	nd	nd	110
Xylenes	5	nd	nd	31	nd	nd	nd	nd	nd	990
Total Volatile Hydrocarbons	100	4,450	nd	10,300 E	nd	3,150 E	nd	74,700 E	38,500 E	80,200 E
Dilution factor		1	1	1	1	1	1	100	50	10
Tentative ID of fuel related compounds		yes	yes	yes	yes	yes	no	yes	yes	yes

EPA Method 418.1

Analyses done by Micro Assays of Vermont

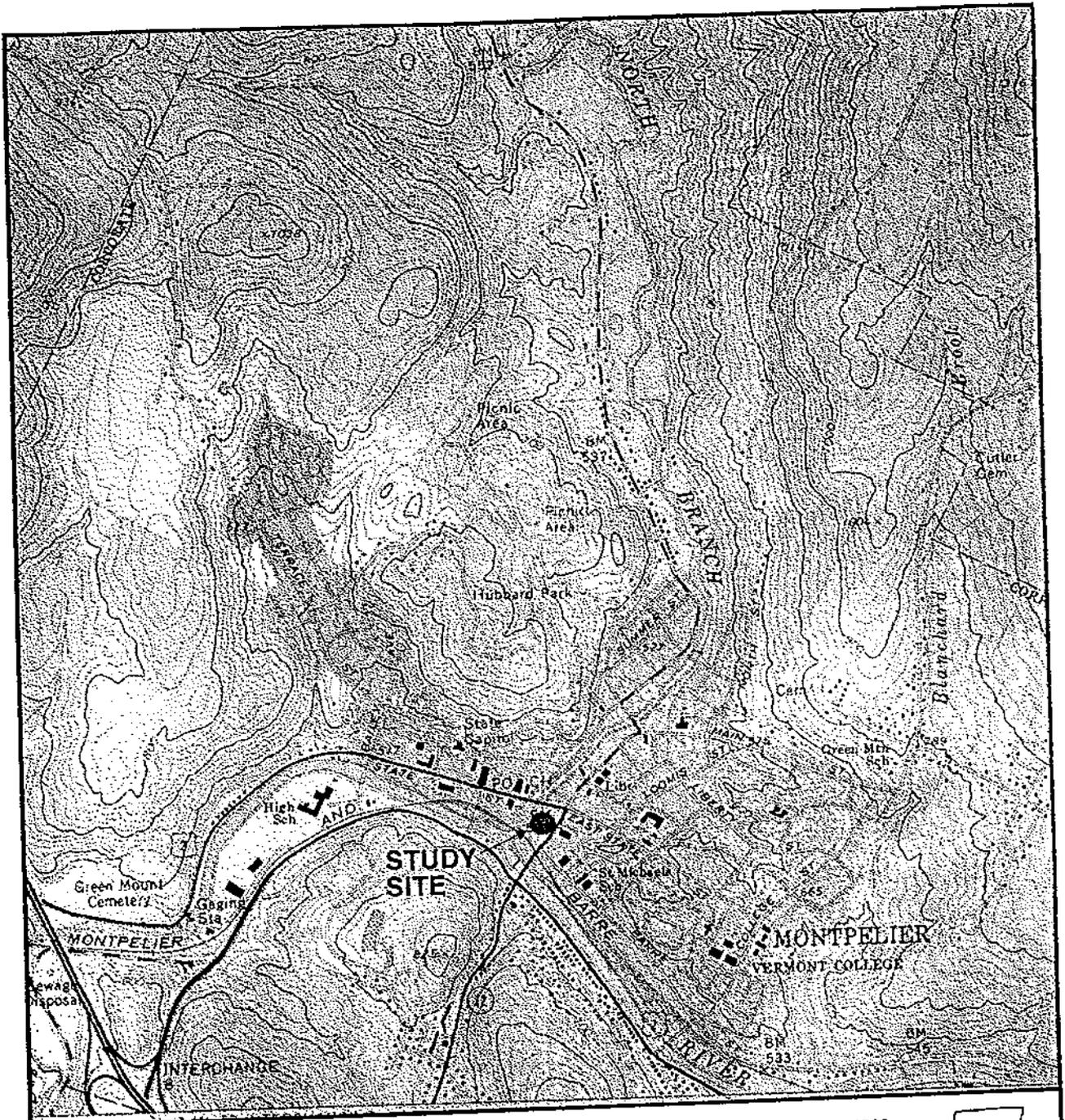
Well ID.	MW-1	MW-2	MW-3	MW-4	MW-5	MW-6	EPA-1	EPA-2	SEI-Recovery
Total Petroleum Hydrocarbons	5.6 mg/l	6.5 mg/l	< 5 mg/l	5.6 mg/l	<5 mg/l	<5 mg/l	NA	NA	NA

Notes:

All results are in parts per billion (ppb) unless otherwise noted
 Perchloroethylene (PCE) reported as tetrachloroethene by laboratory
 Laboratory report sheets included in Appendix 3
 See site map, Figure 3, for well locations
 For analyses with dilution factor >1, the PQL = (undiluted PQL) x (dilution factor)

Abbreviations:

PQL = practical quantitation limit
 nd = compound not detected above PQL
 NA = not analyzed
 J = value may be in error
 E = estimated value



SCALE IN FEET
 CONTOUR INTERVAL = 20 FEET

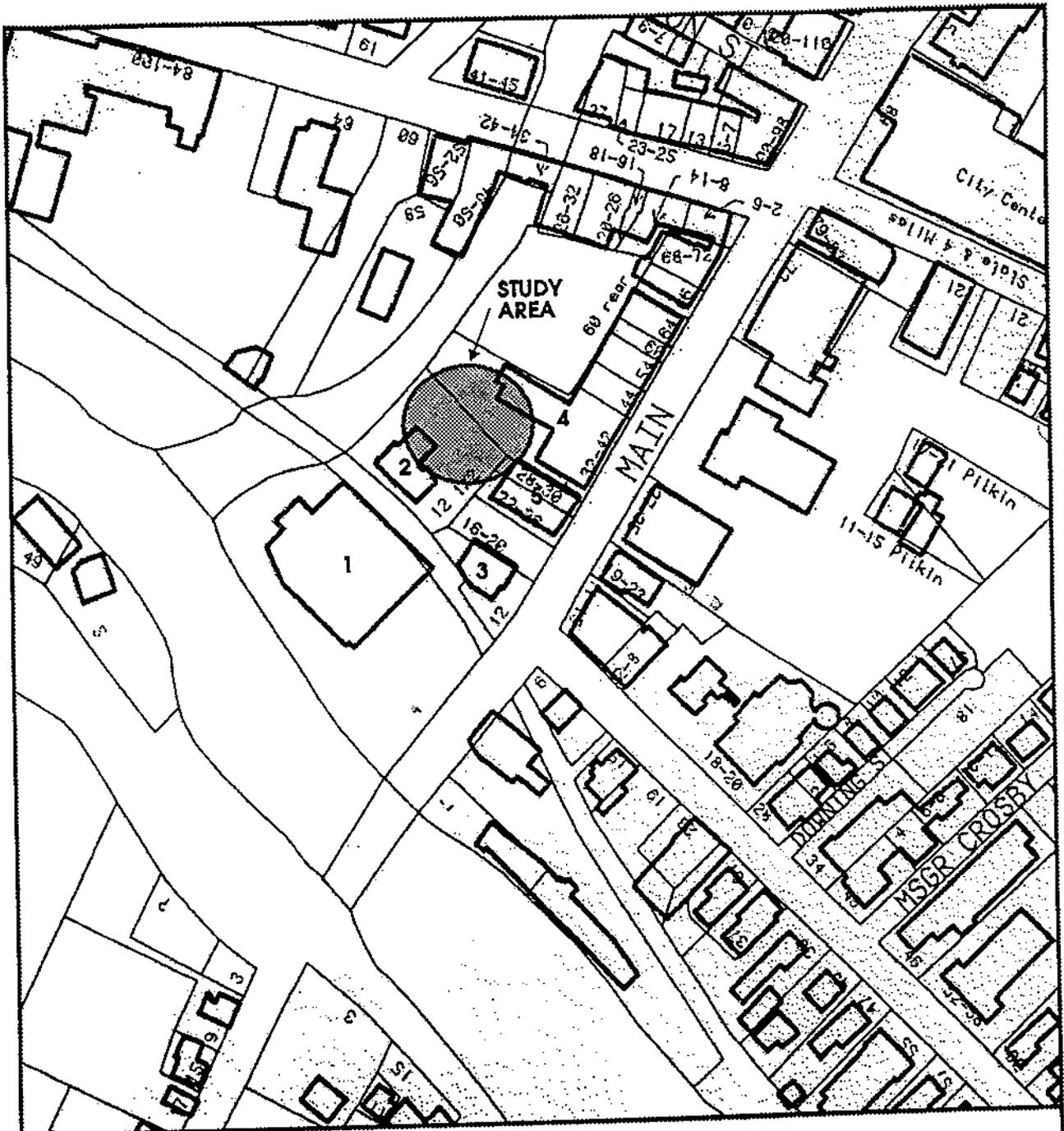
Source: USGS 7.5 min. Quadrangle; Montpelier, Vermont 1986



STONE ENVIRONMENTAL INC

G:\Proj\93-500\locmap.cdr

FIGURE 1
 Site Location Map
 Study Site, Montpelier, Vermont



Source
 City of Montpelier
 Dept. of Public Works Planning Map
 Scale: 1" = 20'

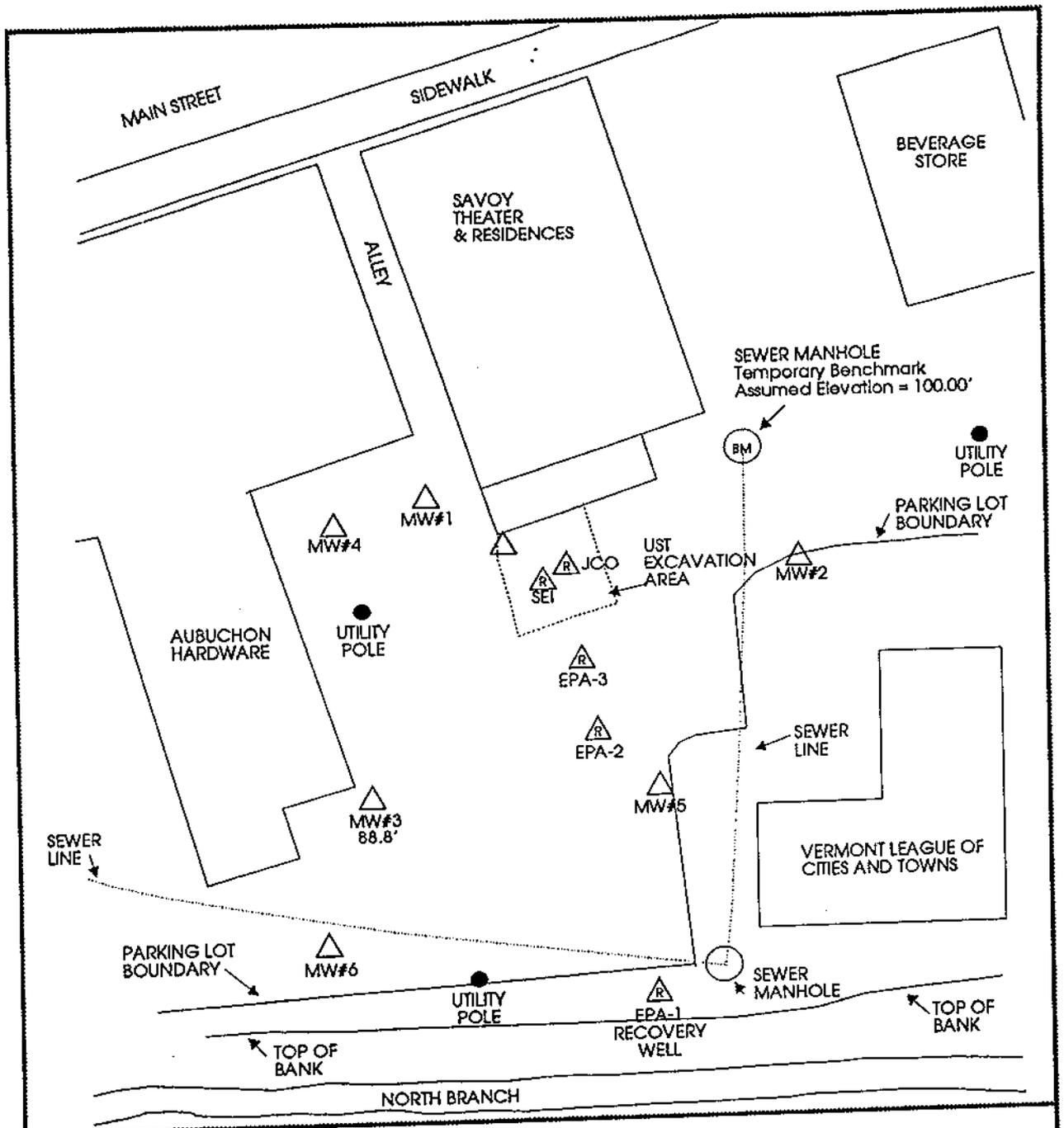
LEGEND:

- 1 = Grand Union
- 2 = VT League of Cities & Towns
- 3 = M & M Beverage
- 4 = Aubuchon Hardware
- 5 = Savoy Theater, Downstairs Video, and Residences

G:\Proj\93-500\propmap.cdr

STONE ENVIRONMENTAL INC

FIGURE 2
 Property Map
 Downtown Montpelier Area, Vermont



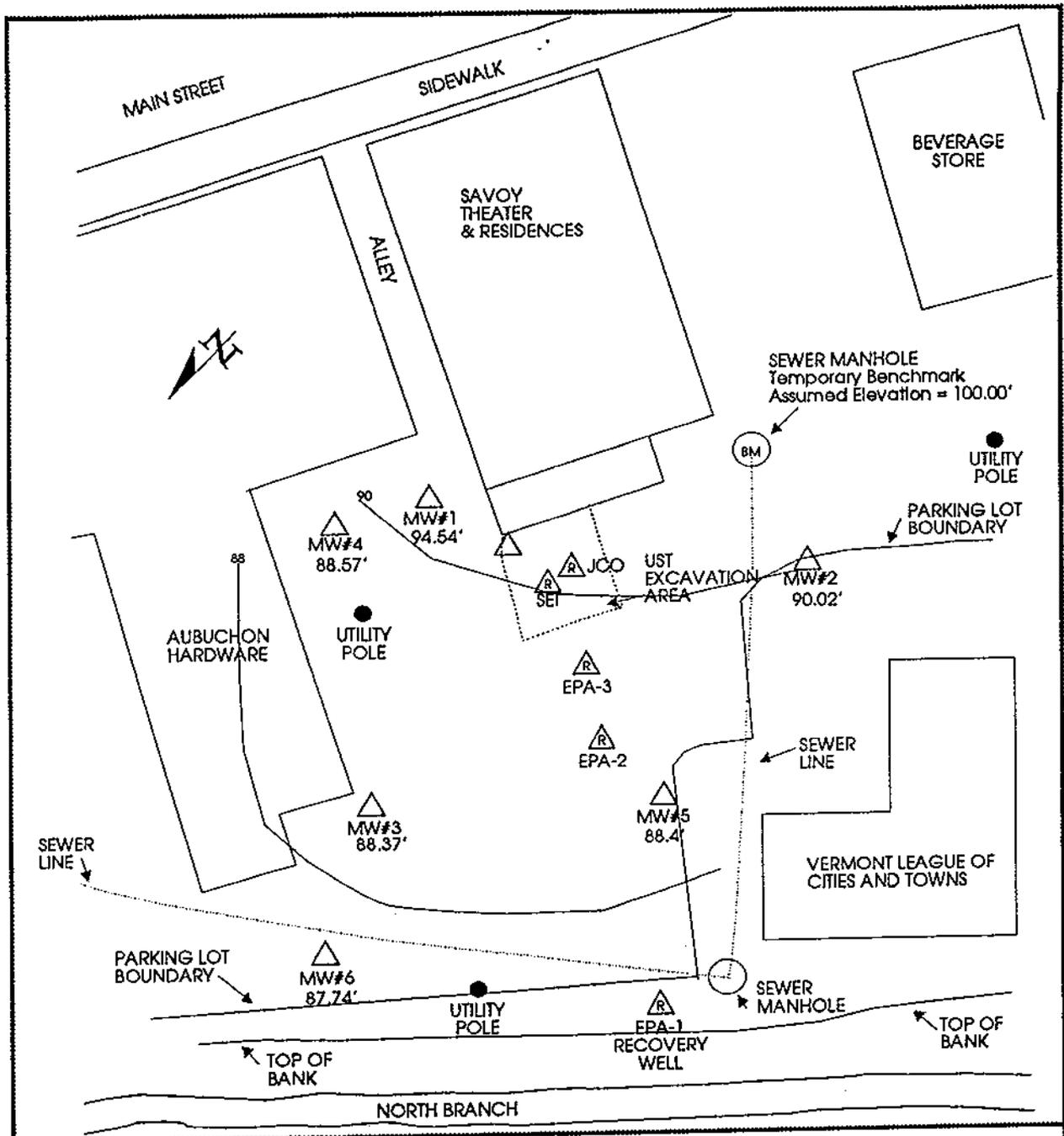
LEGEND

- △ = Monitoring Well
- △^R = Recovery Well

STONE ENVIRONMENTAL INC

G:\proj\93-5001\stemap.cdr

FIGURE 3
Site Map
 Area behind 26 Main Street, Montpelier, Vermont

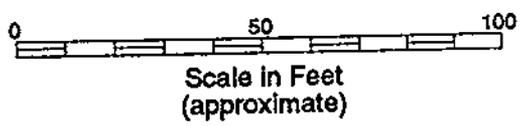
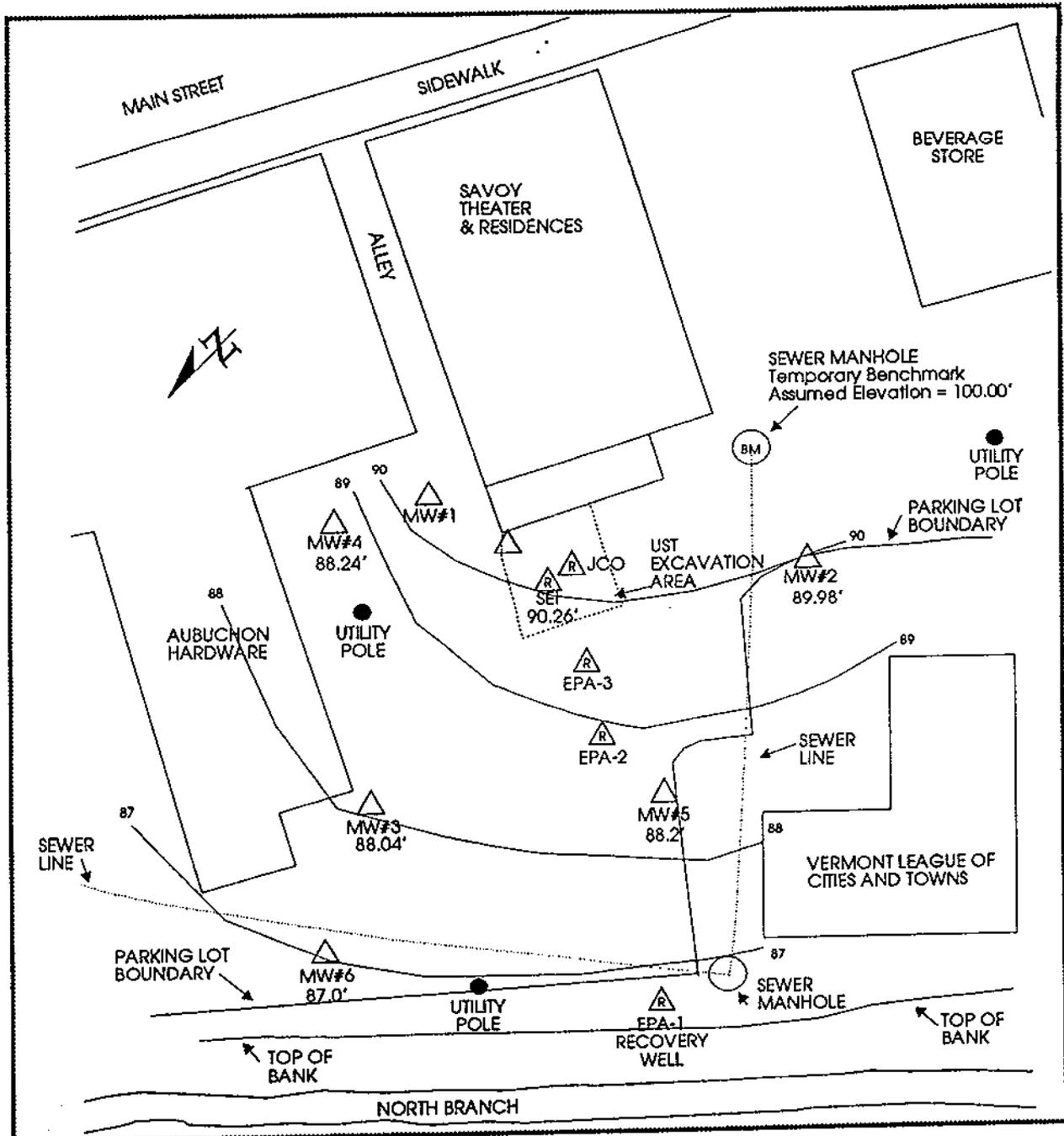


- LEGEND**
- △ = Monitoring Well
 - ⊠ = Recovery Well
 - 88.5' = Relative Water Table Elevations
 - 88 = Groundwater Contours

G:\proj\93-500\w111-8.cdr

STONE ENVIRONMENTAL INC

FIGURE 5
 Water Table Elevations, November 8, 1993
 Area behind 26 Main Street, Montpelier, Vermont



- LEGEND**
- △ = Monitoring Well
 - △_R = Recovery Well
 - 88.5' = Relative Water Table Elevations
 - 88- = Groundwater Contours

G:\proj\93-500\w411-14.cdr

STONE ENVIRONMENTAL INC

FIGURE 6
 Water Table Elevations, November 14, 1993
 Area behind 26 Main Street, Montpelier, Vermont

APPENDIX 1

WELL CONSTRUCTION LOGS

WELL ID:	SEI Recovery Well	Date Drilled:	10/29/93
Project:	93-500	Total Depth:	12.5'
Drilling Contractor:	Tri-State Drilling	Screened Interval:	2.5'-12.5'
Drilling Method:	10 inch outside diameter HSA	Sand Pack:	1.5'-12.5'
Sponsor/Client:	Frank Reed	Plug Interval:	1'-1.5'
Sampling Method:	2 inch split spoon	Well Diameter:	4 inch
Geoscientist:	Jeff Kelley	Well Completion:	Road Box

Sample interval (ft-in)lbs (ft)	Blow Counts per 0.5'	Recovery (inches)	Sample Description	Peak PID Reading (ppm)
9' - 10'	3-2-2-2	16"	0-6" Fine-med sand, oil odor, saturated 6"-16" Fine sand, gray, ribbons, saturated	65 ppm
9'8" - 10'8"	1-1-1-2	14"	0-14" Fine-med sand, oil odor, gray saturated	45 ppm
10'6" - 11'6"	Weight of Hammer	13"	0-13" Silt, dark brown, sheen present saturated	250 ppm
11'6" - 12'6"	1-1-?-?	15"	0-15" Loamy to clay, dense	8 ppm
12'6" - 13'6"	1-1-?-?	13"	0-13" Loamy-silty fine sand, ribbons	4.5 ppm

WELL ID:	MW#1	Date Drilled:	10/30/93
Project:	93-500	Total Depth:	11'
Drilling Contractor:	Tri-State Drilling	Screened Interval:	6' - 11'
Drilling Method:	4 inch outside diameter HSA	Sand Pack:	4' - 11'
Sponsor/Client:	Frank Reed	Plug Interval:	2' - 4'
Sampling Method:	2 inch split spoon	Well Diameter:	4 inch
Geoscientist:	Jeff Kelley	Well Completion:	Road Box

Sample interval (fm-to) bgs (ft)	Blow Counts per 0.5'	Recovery (inches)	Sample Description	Peak PID Reading (ppm)
5' - 7'	6-6-5-7	16"	0-8" Loamy medium sand 8-16" Clayey silt, dense	10-14" 5.7 ppm
7' - 9'	7-4-3-2	18"	0-11" fine sand 11-18" Loamy fine sand, more dense than above	0-6" 28 ppm 11-18" 1189 ppm
9' - 11'	2-2-3-3	18"	0-18" Loamy fine sand	0-6" 972 ppm 11-18" 386 ppm

WELL ID:	MW#2	Date Drilled:	10/30/93
Project:	93-500	Total Depth:	12'10"
Drilling Contractor:	Tri-State Drilling	Screened Interval:	5'10"-12'10"
Drilling Method:	4 inch outside diameter HSA	Sand Pack:	3'10"-12'10"
Sponsor/Client:	Frank Reed	Plug Interval:	1'10"-3'10"
Sampling Method:	2 inch split spoon	Well Diameter:	4 inch
Geoscientist:	Jeff Kelley / Chris Stone	Well Completion:	Road Box

Sample interval (fm-to)lbg (ft)	Blow Counts per 0.5'	Recovery (inches)	Sample Description	Peak PID Reading (ppm)
3' - 5'	7-14-7-4	16"	0-16" 8-10" Med-coarse sand, fill material piece of coal, gaseous odor	0-11" 2 ppm 11-16" 11.9 ppm
5' - 7'	4-3-4-2	2"	0-2" Dark brown silty sand, piece of wood	none taken
7' - 9'	4-1-1-6	2"	0-2" Piece of wood, some sand	0.4 ppm
7' - 9'	3-3-3-10	8"	0-8" Loamy fine - med sand, moist, fill Used 3" split spoon	0 ppm
9' - 11'	9-8-10-8	20"	0-3" 3-20" Piece of wood, fill, moist silty fine sand, moist	0 ppm
11' - 13'	3-3-3-100/2"	18"	0-18" fine sand, wet	0 ppm

WELL ID:	MW#3	Date Drilled:	10/30/93
Project:	93-500	Total Depth:	12'10"
Drilling Contractor:	Tri-State Drilling	Screened Interval:	5'10"-12'10"
Drilling Method:	4 inch outside diameter HSA	Sand Pack:	3'10"-12'10"
Sponsor/Client:	Frank Reed	Plug Interval:	1'10"-3'10"
Sampling Method:	2 inch split spoon	Well Diameter:	4 inch
Geoscientist:	Jeff Kelley	Well Completion:	Road Box

Sample Interval (fm-to) bgs (ft)	Blow Counts per 0.5'	Recovery (inches)	Sample Description	Peak PID Reading (ppm)
3'			Sampled bottom of auger	0 ppm
4.5' - 6.5'	4-3-4-7	18"	0-1" sand, moist 1-4" clay 4-5" piece of wood 5-18" clay, gray, dense, sand lense at 10"	1-4" 0.1 ppm 5-18" 190 ppm
6' - 8'	3-4-5-6	2"	0-2" piece of rock, some sand	61.4 ppm
6.5' - 8.5'	2-3-3-4	8"	Used 3" split spoon	47 ppm
8.5' - 10.5'	wt of hammer	10"	0-10" Silty loam, fairly dense, gray, hydrocarbon odor	87 ppm

WELL ID:	MW#4	Date Drilled:	10/31/93
Project:	93-500	Total Depth:	16'
Drilling Contractor:	Tri-State Drilling	Screened Interval:	6' - 16'
Drilling Method:	4 inch outside diameter HSA	Sand Pack:	4' - 16'
Sponsor/Client:	Frank Reed	Plug Interval:	2' - 4'
Sampling Method:	2 inch split spoon	Well Diameter:	4 inch
Geoscientist:	Jeff Kelley	Well Completion:	Road Box

Sample Interval (fm-to)lgs (ft)	Blow Counts per 0.5'	Recovery (inches)	Sample Description	Peak PID Reading (ppm)
3' - 5'	6-5-5-11	17"	0-8" Coarse sand fill 8-14" Loamy fine sand, gray 14-17" Fine-med sand, brown	14-17" 0.5 ppm
5' - 7'	6-5-5-10	18"	0-4" Medium sand 4-6" Piece of clay brick, red 6-16" Lo amy fine sand, olive gray 16-18" Coarse sand	11-16" 1.3 ppm
7' - 9"	6-5-5-4	13"	0-5" Appeared to be weathered granite, friable, wet 5-8" Fill, multi-colored, pieces of glass 8-13" Medium sand, dark gray, wet	0-4" 0.8 ppm 4-13" 1.1 ppm
9' - 11'	3-3-5-9	15"	0-5" dark black gravel, organic smell 5-15" Loamy fine sand, gray, dense, wet	0-5" 0.9 ppm 5-10" 1.0 ppm 10-15" 0.9 ppm
11' - 13'	6-5-7-8	24"	0-10" Loamy fine sand, dry 10-24" Clayey to loamy silt, dry	3-8" 0.9 ppm 11-16" 0.8 ppm 22-24" 0.8 ppm
13' - 15'	2-3-7-6	22"	0-16" Gray-brown fine sand 16-22" Coarse sand and gravel	6-10" 0.7 ppm 10-16" 1.0 ppm 16-22" 1.2 ppm

WELL ID:	MW#5	Date Drilled:	10/31/93
Project:	93-500	Total Depth:	11'
Drilling Contractor:	Tri-State Drilling	Screened Interval:	4' - 11'
Drilling Method:	4 Inch outside diameter HSA	Sand Pack:	3' - 11'
Sponsor/Client:	Frank Reed	Plug Interval:	1.5' - 3'
Sampling Method:	2 Inch split spoon	Well Diameter:	4 Inch
Geoscientist:	Jeff Kelley	Well Completion:	Road Box

Sample Interval (fm-to)bgs (ft)	Blow Counts per 0.5'	Recovery (Inches)	Sample Description	Peak PID Reading (ppm)
3' - 5'	5-5-3-1	6"	0-6" Silty fine sand, moist	0.7 ppm
5' - 7'	4-3-1-12	7"	0-7" Fine-coarse sand, pieces of wood, appeared to be fill	0.3 ppm
7' - 9'	5-4-5-4	13"	0-3" Silty fine sand, brown, moist 3-13" Clayey loam, gray,	0-3" 0.6 ppm 10-13" 3.1 ppm
9' - 11'	6-5-4-6	24"	0-24" Clayey loam, dense, moist, gray, strong hydrocarbon odor	0-5" 9.1 ppm 10-15" 158 ppm 22-24" 186 ppm

WELL ID:	MW#6	Date Drilled:	11/1/93
Project:	93-500	Total Depth:	13'4"
Drilling Contractor:	Tri-State Drilling	Screened Interval:	6'4" - 13'4"
Drilling Method:	4 inch outside diameter HSA	Sand Pack:	4' - 13'4"
Sponsor/Client:	Frank Reed	Plug Interval:	2' - 4'
Sampling Method:	2 inch split spoon	Well Diameter:	4 inch
Geoscientist:	Jeff Kelley	Well Completion:	Road Box

Sample Interval (fm-to) bgs (ft)	Blow Counts per 0.5'	Recovery (inches)	Sample Description	Peak PID Reading (ppm)
3' - 5'		15"	0-2" Medium sand 2-15" Clayey loam, gray, dense, dry	11-15" 0.2 ppm
5' - 7'		16"	0-16" Clayey loam, gray, dense, dry	12-16" 0.1 ppm
7' - 9"		21"	0-21" Sand mixed with gray clayey loam of above	10-16" 0.1 ppm 16-21" 0.2 ppm
9' - 11'		22"	0-8" Fine sand, reddish, saturated 8-22" Fine sand, gray, saturated	2-10" 15.1 ppm 18-22" 15.7 ppm
11' - 13'		24"	0-24" Silty fine sand, wet	10-15" 11 ppm 19-21" 3.6 ppm

APPENDIX 2

SOP SEI-017

STANDARD OPERATING PROCEDURE

SOP Number: SEI-017
Date Issued: April 9, 1993
Revision Number: n/a
Date of Revision: n/a

Title:

GROUNDWATER SAMPLING OF MONITORING WELLS USING BAILERS

1.0 OBJECTIVE

The goal of a groundwater sampling program is to accurately assess the quality of the groundwater that occurs under the study site. Bailers provide a simple, inexpensive means for collecting samples from a monitoring well. Care must be taken not to contaminate the sample during collection; using dedicated or disposable bailers can help toward this end.

2.0 EQUIPMENT

- a) Bailers. One dedicated bailer for each well is preferred. If a bailer is to be shared between wells, make sure it can be dismantled and thoroughly decontaminated in the field. Disposable bailers commonly have seams that can collect dirt and are impossible to clean; these bailers should not be used in more than one well. The bailers must be constructed of materials that will not react with the compounds to be analyzed.
- b) Clean, inert line or string for lowering the bailer into the well.
- c) A calibrated bucket for measuring the amount of water purged from the well prior to sample collection (optional).
- d) Clean gloves for sampling, to avoid contact with the string and bailers.
- e) Sample bottles

- f) Water marker
- g) Field notebook, sample collection forms, or other appropriate medium for recording field data.

3.0 PROCEDURE

3.1 Sample Collection

- a) Measure the water level in the well before dropping the bailer into the well.
- b) Use a clean bailer made of material that will be inert in contact with the study compound. Do not allow the bailer to come in contact with surface soils on the site during sampling; it may be useful to spread plastic sheeting on the ground on which to place the bailer during sampling. Disposable latex gloves are recommended to avoid skin contact with the bailer.
- c) Tie a length of clean, inert line to the bailer, making sure the knot is secure. The line must be long enough for the bailer to reach the bottom of the well, and care must be taken not to allow the entire string to fall down the well after the bailer.
- d) Purge the well. The standing water in a well has been out of direct contact with the soil and exposed to the open air. The effects of this on the quality of the water are difficult to determine, but to avoid any question of whether the sample is representative of true groundwater quality on the site, it is best to purge the well.

To purge the well, calculate the volume of standing water in the well, based on the height of the water column and the diameter of the well, and pump 3-5 times this amount from the well before collecting the sample. Alternatively, the pH, temperature, conductivity, and oxidation-reduction potential of the groundwater can be monitored while the well is purged. When the values of the chemical parameters are observed to vary less than 10% during the purging process, the well is considered adequately purged for representative sampling. Record the method of purging and the volume of water purged. Avoid purging the well completely dry.

- e) Collect the groundwater sample in a clean bottle or other container appropriate for the analytical method to be used. The sample is collected by removing the cap carefully from the sample bottle, taking care not to touch the inside of the cap or bottle with the bailer or any other apparatus. The sample bottle is filled approximately half full and rinsed with the well water. The sample bottle is then completely filled by pumping the well water into the bottle slowly so that no air bubbles are introduced.
- f) The bottle is tightly capped, sealed with tape, and a sample label is fixed to the bottle with the following identification: study number(s), project site, sampling point; date and time of sample collection; name of person who collected the sample; and analytical method to

be used.

- g) The following chemical parameters of the groundwater may be measured in the field at the time of sample collection: pH, temperature, conductivity, and where applicable, oxidation-reduction potential (ORP).

3.2 Documentation

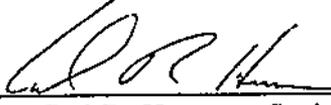
A record of the sample collection must be made in the field at the time the sample is collected. The record should be made in a field notebook, a sample collection form, or other medium acceptable according to the study protocol. The information to be recorded must include the following:

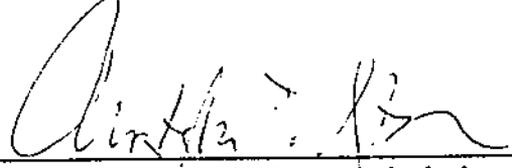
- a) Date and time of sample collection
- b) Name(s) of the personnel performing the sampling
- c) Sample location
- d) Project/study designation
- e) Volume purged from the well prior to sampling
- f) Method of sample collection
- g) Chemical parameters monitored in the field
- h) Weather

3.3 Packing and Transportation

Package the samples in an insulated cooler or other sturdy container with refrigerant if required for the analytical procedures to be used. Send the samples to the laboratory for analysis as soon as is reasonable, but within the maximum holding time for the sample. A completed Chain-of-Custody Form must accompany the sample set, in accordance with standard operating procedures for chain of custody forms.

4.0 AUTHORIZATION

Written by:  4/12/93
Carl R. Hanson, Senior Geoscientist Date

Approved by:  4-12-93
Christopher T. Stone, Principal Date

APPENDIX 3

LABORATORY RESULTS

NOV 17 1993

CHEMICAL ANALYSIS REPORT

MAV Control No. 7710

November 11, 1993

TO: Jeff Kelley
58 E. State St.
Montpelier, Vermont 05602

EXAMINATION REQUESTED:

Test - Total Petroleum Hydrocarbons in water.

SPECIMENS:

7710 Six (6) Bottles containing water samples.

FINDINGS:

Specimen # MW-1 was found to contain 5.6 milligrams Petroleum Hydrocarbons per liter.

Specimen # MW-2 was found to contain 6.5 milligrams Petroleum Hydrocarbons per liter.

Specimen # MW-3 was found to contain less than 5 milligrams Petroleum Hydrocarbons per liter.

Specimen # MW-4 was found to contain 5.6 milligrams Petroleum Hydrocarbons per liter.

Specimen # MW-5 was found to contain less than 5 milligrams Petroleum Hydrocarbons per liter.

Specimen # MW-6 was found to contain less than 5 milligrams Petroleum Hydrocarbons per liter.

Respectfully,



Kenneth Somerville
Head Chemist, Chemical Services

11/16/93

Department of Environmental Conservation Laboratory
Method 8240 - Volatile Organics in Water

GJD

Lab Id: 5923 Report To: Chris Stone
Location: Jacobs MW-1

Phone: 229-4541 Date Collected: 11/08/93
Program: 41 1478 Chain of Custody? No

Notes:

Date Analyzed: 11/09/93 Over hold? No Dilution factor: 1

Parameter	Units are ug/l		Remark Code	Rel % Diff.	Spiked Dups ?	Percent Recovery
	PQL	Result				
Vinyl chloride	10	N.D.				
Chloromethane	10	N.D.				
Bromomethane	10	N.D.				
Chloroethane	10	N.D.				
Trichlorofluoromethane	10	N.D.				
Acetone	100	N.D.				
1,1-Dichloroethane	5	N.D.				
Carbon disulfide	100	N.D.				
Methylene chloride	5	N.D.				
Methyl-t-butyl ether (MTBE)	10	N.D.				
1,2-Dichloroethene	5	N.D.				
1,1-Dichloroethane	5	N.D.				
Vinyl acetate	50	N.D.				
2-Butanone	100	N.D.				
Chloroform	5	N.D.				
1,1,1-Trichloroethane	5	N.D.				
Carbon tetrachloride	5	N.D.				
Benzene	5	N.D.				
1,2-Dichloroethane	5	N.D.				
Trichloroethene	5	N.D.				
1,2-Dichloropropane	5	N.D.				
Bromodichloromethane	5	N.D.				
4-Methyl-2-pentanone	50	N.D.				
cis-1,2-Dichloropropene	5	N.D.				
Toluene	5	N.D.				
trans-1,3-Dichloropropene	5	N.D.				
1,1,2-Trichloroethane	5	N.D.				
2-Hexanone	50	N.D.				
Tetrachloroethene	5	N.D.				
Dibromochloromethane	5	N.D.				
Chlorobenzene	5	N.D.				
Ethylbenzene	5	N.D.				
Xylenes	5	N.D.				
Styrene	5	N.D.				
Bromoform	5	N.D.				
1,1,2,2-Tetrahydroethane	5	N.D.				
Total Volatile Hydrocarbons	100	4450	E			

Surrogate Percent Recoveries (S-Surrogate recovery out of range)

1,2-Dichloroethane-D4 96% D8-Toluene 90% 4-Bromofluorobenzene . 100%

Notes: Capillary column used with EPA approval. Tentatively identified fuel related compounds.

Remarks: E-Estimated Value J=Value may be in Error Q=Value outside Standard Curve

11/16/93

Department of Environmental Conservation Laboratory
Method 8240 - Volatile Organics in Water

GJD

Lab Id: 5924 Report To: Chris Stone
Location: Jacobs MW-2

Phone: 229-4541 Date Collected: 11/08/93
Program: 41 1478 Chain of Custody? No

Notes:

Date Analyzed: 11/09/93 Over hold? No Dilution Factor: 1

Parameter	Units are ug/L		Remark Code	Rel % Diff.	Spiked Dups ?	Percent Recovery
	PQL	Result				
Vinyl chloride	10	N.D.				
Chloromethane	10	N.D.				
Bromomethane	10	N.D.				
Chloroethane	10	N.D.				
Trichlorofluoromethane	10	N.D.				
Acetone	100	968	J			
1,1-Dichloroethene	5	N.D.				
Carbon disulfide	100	N.D.				
Methylene chloride	5	N.D.				
Methyl-t-butylether (MTBE)	10	N.D.				
1,2-Dichloroethene	5	N.D.				
1,1-Dichloroethane	5	N.D.				
Vinyl acetate	50	N.D.				
2-Butanone	100	N.D.				
Chloroform	5	N.D.				
1,1,1-Trichloroethane	5	N.D.				
Carbon tetrachloride	5	N.D.				
Benzene	5	N.D.				
1,2-Dichloroethane	5	N.D.				
Trichloroethene	5	N.D.				
1,2-Dichloropropane	5	N.D.				
Bromodichloromethane	5	N.D.				
4-Methyl-2-pentanone	50	N.D.				
cis-1,2-Dichloropropene	5	N.D.				
Toluene	5	N.D.				
trans-1,3-Dichloropropene	5	N.D.				
1,1,2-Trichloroethane	5	N.D.				
2-Hexanone	50	N.D.				
Tetrachloroethene	5	N.D.				
Dibromochloromethane	5	N.D.				
Chlorobenzene	5	N.D.				
Ethylbenzene	5	N.D.				
Xylenes	5	N.D.				
Styrene	5	N.D.				
Bromoform	5	N.D.				
1,1,2,2-Tetrachloroethane	5	N.D.				
Total Volatile Hydrocarbons	100	N.D.				

Surrogate Percent Recoveries (5=Surrogate recovery out of range)

1,2-Dichloroethane-D4 102% D8-Toluene 94% 4-Bromofluorobenzene . 94%

Notes: Capillary column used with EPA approval. Tentatively identified traces of fuel related compounds.

Remarks: E-Estimated Value J-Value may be in Error O=Value outside Standard Curve

11/16/93

Department of Environmental Conservation Laboratory
Method 8240 - Volatile Organics in Water

GJD

Lab Id: 5925 Report To: Chris Stone
Location: Jacobs MW-3

Phone: 229-4541 Date Collected: 11/08/93
Program: 41 1478 Chain of Custody? No

Notes:

Date Analyzed: 11/10/93 Over hold? No Dilution factor: 1

Parameter	Units are ug/l		Remark Code	Rel % Diff.	Spiked Dups ?	Percent Recovery
	PQL	Result				
Vinyl chloride	10	N.D.				
Chloromethane	10	N.D.				
Bromomethane	10	N.D.				
Chloroethane	10	N.D.				
Trichlorofluoromethane	10	N.D.				
Acetone	100	205	J			
1,1-Dichloroethane	5	N.D.				
Carbon disulfide	100	N.D.				
Methylene chloride	5	N.D.				
Methyl-t-butylether (MTBE)	10	N.D.				
1,2-Dichloroethane	5	N.D.				
1,1-Dichloroethane	5	N.D.				
Vinyl acetate	50	N.D.				
2-Butanone	100	N.D.				
Chloroform	5	N.D.				
1,1,1-Trichloroethane	5	N.D.				
Carbon tetrachloride	5	N.D.				
Benzene	5	N.D.				
1,2-Dichloroethane	5	N.D.				
Trichloroethane	5	N.D.				
1,2-Dichloropropane	5	N.D.				
Bromodichloromethane	5	N.D.				
4-Methyl-2-pentanone	50	N.D.				
cis-1,2-Dichloropropene	5	N.D.				
Toluene	5	N.D.				
trans-1,3-Dichloropropene	5	N.D.				
1,1,2-Trichloroethane	5	N.D.				
2-Hexanone	50	N.D.				
Tetrachloroethane	5	N.D.				
Dibromochloromethane	5	N.D.				
Chlorobenzene	5	N.D.				
Ethylbenzene	5	N.D.				
Xylenes	5	31				
Styrene	5	N.D.				
Bromoform	5	N.D.				
1,1,2,2-Tetrachloroethane	5	N.D.				
Total Volatile Hydrocarbons	100	10300	B			

Surrogate Percent Recoveries (S=Surrogate recovery out of range)

1,2-Dichloroethane-D4 96% DB-Toluene 90% 4-Bromofluorobenzene . 100%

Notes: Capillary column used with EPA approval. Tentatively identified fuel related compounds.

Remarks: I=Estimated Value J=Value may be in Error O=Value outside Standard Curve

11/16/93

Department of Environmental Conservation Laboratory
Method 8240 - Volatile Organics in Water

GJD

Lab Id: 5926 Report To: Chris Stone
Location: Jacobs MW-4

Phone: 229-4541 Data Collected: 11/08/93
Program: 41 1478 Chain of Custody? No

NOTES:

Date Analyzed: 11/10/93 Over hold? No Dilution factor: 1

Parameter	Units are ug/l		Remark Code	Rel % Diff.	Spiked Dups ?	Percent Recovery
	PQL	Result				
Vinyl chloride	10	11				
Chloromethane	10	N.D.				
Bromomethane	10	N.D.				
Chloroethane	10	N.D.				
Trichlorofluoromethane	10	N.D.				
Acetone	100	N.D.				
1,1-Dichloroethene	5	N.D.				
Carbon disulfide	100	N.D.				
Methylene chloride	5	N.D.				
Methyl-t-butylether (MTBE)	10	N.D.				
1,2-Dichloroethane	5	10				
1,1-Dichloroethane	5	N.D.				
Vinyl acetate	50	N.D.				
2-Butanone	100	N.D.				
Chloroform	5	N.D.				
1,1,1-Trichloroethane	5	N.D.				
Carbon tetrachloride	5	N.D.				
Benzene	5	N.D.				
1,2-Dichloroethane	5	N.D.				
Trichloroethene	5	N.D.				
1,2-Dichloropropane	5	N.D.				
Bromodichloromethane	5	N.D.				
4-Methyl-2-pentanone	50	N.D.				
cis-1,2-Dichloropropene	5	N.D.				
Toluene	5	N.D.				
trans-1,3-Dichloropropene	5	N.D.				
1,1,2-Trichloroethane	5	N.D.				
2-Hexanone	50	N.D.				
Tetrachloroethene	5	N.D.				
Dibromochloromethane	5	N.D.				
Chlorobenzene	5	N.D.				
Ethylbenzene	5	N.D.				
Xylenes	5	N.D.				
Styrene	5	N.D.				
Bromoform	5	N.D.				
1,1,2,2-Tetrachloroethane	5	N.D.				
Total Volatile Hydrocarbons	100	N.D.				

Surrogate Percent Recoveries (S=Surrogate recovery out of range)

1,2-Dichloroethane-D4 94% DB-Toluene 90% 4-Bromofluorobenzene . 90%

Notes: Capillary column used with EPA approval. Tentatively identified traces of fuel related compounds.

Remarks: E=Estimated Value J=Value may be in Error O=Value outside Standard Curve

11/16/93

Department of Environmental Conservation Laboratory
Method 8240 - Volatile Organics in Water

GJD

Lab Id: 5927 Report To: Chris Stone
Location: Jacobs MW-5

Phone: 229-4541 Date Collected: 11/08/93
Program: 41 1478 Chain of Custody? No

Notes:

Date Analyzed: 11/09/93 Over hold? No Dilution factor: 1

Parameter	Units are ng/l PQL	Result	Remark Code	Rel % Diff.	Spiked Dups ?	Percent Recovery
Vinyl chloride	10	N.D.				
Chloromethane	10	N.D.				
Bromomethane	10	N.D.				
Chloroethane	10	N.D.				
Trichlorofluoromethane	10	N.D.				
Acetone	100	1395	J			
1,1-Dichloroethene	5	N.D.				
Carbon disulfide	100	N.D.				
Methylene chloride	5	N.D.				
Methyl-t-butylether (MTBE)	10	N.D.				
1,2-Dichloroethene	5	N.D.				
1,1-Dichloroethane	5	N.D.				
Vinyl acetate	50	N.D.				
2-Butanone	100	N.D.				
Chloroform	5	N.D.				
1,1,1-Trichloroethane	5	N.D.				
Carbon tetrachloride	5	N.D.				
Benzene	5	N.D.				
1,2-Dichloroethane	5	N.D.				
Trichloroethene	5	N.D.				
1,2-Dichloropropane	5	N.D.				
Bromodichloromethane	5	N.D.				
4-Methyl-2-pentanone	50	N.D.				
cis-1,2-Dichloropropene	5	N.D.				
Toluene	5	N.D.				
trans-1,3-Dichloropropene	5	N.D.				
1,1,2-Trichloroethane	5	N.D.				
2-Hexanone	50	N.D.				
Tetrachloroethane	5	13				
Dibromochloromethane	5	N.D.				
Chlorobenzene	5	N.D.				
Ethylbenzene	5	N.D.				
Xylenes	5	N.D.				
Styrene	5	N.D.				
Bromoform	5	N.D.				
1,1,2,2-Tetrachloroethane	5	N.D.				
Total Volatile Hydrocarbons	100	3150	Z			

Surrogate Percent Recoveries (S=Surrogate recovery out of range)

1,2-Dichloroethane-D4 100% DB-Toluene 94% 4-Bromofluorobenzene . 94%

Notes: Capillary column used with EPA approval. Tentatively identified fuel related compounds.

Remarks: E=Estimated Value J=Value may be in Error O=Value outside Standard Curve

11/16/93

Department of Environmental Conservation Laboratory
Method 8240 - Volatile Organics in Water

GJD

Lab Id: 3928 Report To: Chris Stone
Location: Jacobs MW-6

Phone: 229-4541 Date Collected: 11/08/93
Program: 41 1478 Chain of Custody? No

Notes:

Date Analyzed: 11/09/93 Over hold? No Dilution factor: 1

Parameter	Units are ug/l		Remark Code	Rel % Diff.	Spiked Dups ?	Percent Recovery
	PQL	Result				
Vinyl chloride	10	N.D.				
Chloromethane	10	N.D.				
Bromomethane	10	N.D.				
Chloroethane	10	N.D.				
Trichlorofluoromethane	10	N.D.				
Acetone	100	100	J			
1,1-Dichloroethene	5	N.D.				
Carbon disulfide	100	N.D.				
Methylene chloride	5	N.D.				
Methyl-t-butylether (MTBE)	10	N.D.				
1,2-Dichloroethene	5	N.D.				
1,1-Dichloroethane	5	N.D.				
Vinyl acetate	50	N.D.				
2-Butanone	100	N.D.				
Chloroform	5	N.D.				
1,1,1-Trichloroethane	5	N.D.				
Carbon tetrachloride	5	N.D.				
Benzene	5	N.D.				
1,2-Dichloroethane	5	N.D.				
Trichloroethene	5	N.D.				
1,2-Dichloropropane	5	N.D.				
Bromodichloromethane	5	N.D.				
4-Methyl-2-pentanone	50	N.D.				
cis-1,2-Dichloropropene	5	N.D.				
Toluene	5	N.D.				
trans-1,3-Dichloropropene	5	N.D.				
1,1,2-Trichloroethane	5	N.D.				
2-Hexanone	50	N.D.				
Tetrachloroethane	5	N.D.				
Dibromochloromethane	5	N.D.				
Chlorobenzene	5	N.D.				
Ethylbenzene	5	N.D.				
Xylenes	5	N.D.				
Styrene	5	N.D.				
Bromoform	5	N.D.				
1,1,2,2-Tetrachloroethane	5	N.D.				
Total Volatile Hydrocarbons	100	N.D.				

Surrogate Percent Recoveries (S=Surrogate recovery out of range)

1,2-Dichloroethane-D4 98% DB-Toluene 96% 4-Bromofluorobenzene . 94%

Notes: Capillary column used with EPA approval.

Remarks: E=Estimated Value J=Value may be in Error O=Value outside Standard Curve

11/16/93

Department of Environmental Conservation Laboratory
Method 8240 - Volatile Organics in Water

GJD

Lab Id: 5929 Report To: Chris Stone
Location: Jacobs EPA-1

Phone: 229-4541 Date Collected: 11/08/93
Program: 41 1478 Chain of Custody? No

Notes:

Date Analyzed: 11/09/93 Over hold? No Dilution factor: 100

Parameter	Units are ug/l		Remark Code	Rel % Diff.	Spiked Dups ?	Percent Recovery
	PQL	Result				
Vinyl chloride	1000	N.D.				
Chloromethane	1000	N.D.				
Bromomethane	1000	N.D.				
Chloroethane	1000	N.D.				
Trichlorofluoromethane	1000	N.D.				
Acetone	10000	N.D.				
1,1-Dichloroethane	500	N.D.				
Carbon disulfide	10000	N.D.				
Methylene chloride	500	N.D.				
Methyl-t-butylether (MTBE)	1000	N.D.				
1,2-Dichloroethane	500	<500				
1,1-Dichloroethane	500	N.D.				
Vinyl acetate	5000	N.D.				
2-Butanone	10000	N.D.				
Chloroform	500	N.D.				
1,1,1-Trichloroethane	500	N.D.				
Carbon tetrachloride	500	N.D.				
Benzene	500	N.D.				
1,2-Dichloroethane	500	N.D.				
Trichloroethane	500	N.D.				
1,2-Dichloropropane	500	N.D.				
Bromodichloromethane	500	N.D.				
4-Methyl-2-pentanone	5000	N.D.				
cis-1,2-Dichloropropene	500	N.D.				
Toluene	500	N.D.				
trans-1,3-Dichloropropene	500	N.D.				
1,1,2-Trichloroethane	500	N.D.				
2-Hexanone	5000	N.D.				
Tetrachloroethane	500	800				
Dibromochloromethane	500	N.D.				
Chlorobenzene	500	N.D.				
Ethylbenzene	500	N.D.				
Xylenes	500	N.D.				
Styrene	500	N.D.				
Bromoform	500	N.D.				
1,1,2,2-Tetrachloroethane	500	N.D.				
Total Volatile Hydrocarbons	10000	747000	E			

Surrogate Percent Recoveries (S=Surrogate recovery out of range)

1,2-Dichloroethane-D4 104% DB-Toluene 92% 4-Bromofluorobenzene . 96%

Notes: Capillary column used with EPA approval. Tentatively identified fuel related compounds.

Remarks: E=Estimated Value J=Value may be in Error O=value outside Standard Curve

11/16/93

Department of Environmental Conservation Laboratory
Method 8240 - Volatile Organics in Water

GJD

Lab Id: 5930 Report To: Chris Stone
Location: Jacobs EPA-2

Phone: 229-4541 Date Collected: 11/08/93
Program: 41 1478 Chain of Custody? No

Notes:

Date Analyzed: 11/09/93 Over hold? No Dilution factor: 50

Parameter	Units are ug/l		Remark Code	Rel % Diff.	Spiked Dups ?	Percent Recovery
	PQL	Result				
Vinyl chloride	500	N.D.				
Chloromethane	500	N.D.				
Bromomethane	500	N.D.				
Chloroethane	500	N.D.				
Trichlorofluoromethane	500	N.D.				
Acetone	5000	N.D.				
1,1-Dichloroethane	250	N.D.				
Carbon disulfide	5000	N.D.				
Methylene chloride	250	N.D.				
Methyl-t-butylether (MTBE)	500	N.D.				
1,2-Dichloroethane	250	N.D.				
1,1-Dichloroethane	250	N.D.				
Vinyl acetate	2500	N.D.				
2-Butanone	3000	N.D.				
Chloroform	250	N.D.				
1,1,1-Trichloroethane	250	N.D.				
Carbon tetrachloride	250	N.D.				
Benzene	250	N.D.				
1,2-Dichloroethane	250	N.D.				
Trichloroethane	250	N.D.				
1,2-Dichloropropane	250	N.D.				
Bromodichloromethane	250	N.D.				
4-Methyl-2-pentanone	2500	N.D.				
cis-1,2-Dichloropropene	250	N.D.				
Toluene	250	N.D.				
trans-1,3-Dichloropropene	250	N.D.				
1,1,2-Trichloroethane	250	N.D.				
2-Hexanone	2500	N.D.				
Tetrachloroethene	250	600				
Dibromochloromethane	250	N.D.				
Chlorobenzene	250	N.D.				
Ethylbenzene	250	N.D.				
Xylenes	250	N.D.				
Styrene	250	N.D.				
Bromoform	250	N.D.				
1,1,2,2-Tetrachloroethane	250	N.D.				
Total Volatile Hydrocarbons	5000	38500				

Surrogate Percent Recoveries (8=Surrogate recovery out of range)

1,2-Dichloroethane-D4 100% D8-Toluene 94% 4-Bromofluorobenzene . 98%

Notes: Capillary column used with EPA approval. Tentatively identified fuel related compounds.

Remarks: E=Estimated Value J=Value may be in Error O=Value outside Standard Curve

11/16/93

Department of Environmental Conservation Laboratory
Method 8240 - Volatile Organics in Water

GJD

Lab Id: 5931 Report To: Chris Stone
Location: Jacobs SXI-Recovery

Phone: 229-4541 Date Collected: 11/08/93
Program: 41 1478 Chain of Custody? No

Notes:

Date Analyzed: 11/09/93 Over hold? No Dilution factor: 10

Parameter	Units are ug/l		Remark Code	Rel % Diff.	Spiked Dups ?	Percent Recovery
	PQL	Result				
Vinyl chloride	100	N.D.				
Chloromethane	100	N.D.				
Bromomethane	100	N.D.				
Chloroethane	100	N.D.				
Trichlorofluoromethane	100	N.D.				
Acetone	1000	N.D.				
1,1-Dichloroethene	50	N.D.				
Carbon disulfide	1000	N.D.				
Methylene chloride	50	N.D.				
Methyl-t-butylether (MTBE)	100	<100	E			
1,1-Dichloroethene	50	N.D.				
1,1-Dichloroethane	50	N.D.				
Vinyl acetate	500	N.D.				
2-Butanone	1000	N.D.				
Chloroform	50	N.D.				
1,1,1-Trichloroethane	50	N.D.				
Carbon tetrachloride	50	N.D.				
Benzene	50	180				
1,2-Dichloroethane	50	N.D.				
Trichloroethene	50	N.D.				
1,2-Dichloropropane	50	N.D.				
Bromodichloromethane	50	N.D.				
4-Methyl-2-pentanone	500	N.D.				
cis-1,2-Dichloropropene	50	N.D.				
Toluene	50	620				
trans-1,3-Dichloropropene	50	N.D.				
1,1,2-Trichloroethane	50	N.D.				
2-Hexanone	500	N.D.				
Tetrachloroethane	50	N.D.				
Dibromochloromethane	50	N.D.				
Chlorobenzene	50	110				
Ethylbenzene	50	990				
Xylenes	50	N.D.				
Styrene	50	N.D.				
Bromoform	50	N.D.				
1,1,2,2-Tetrachloroethane	50	N.D.				
Total Volatile Hydrocarbons	1000	80200	E			

Surrogate Percent Recoveries (S=Surrogate recovery out of range)

1,2-Dichloroethane-D4 98% DB-Toluene 92% 4-Bromofluorobenzene . 102%

Notes: Capillary column used with EPA approval. Tentatively identified fuel related compounds.

Remarks: E=Estimated Value J=Value may be in Error O=Value outside standard Curve

11/16/93

Department of Environmental Conservation Laboratory
Method 8240 - Volatile Organics in Water

GJD

Lab Id: 5932 Report To: Chris Stone
Location: Jacobs Trip Blank

Phone: 229-4541 Date Collected: 11/08/93
Program: 41 1478 Chain of Custody? No

Notes:

Data Analyzed: 11/09/93 Over hold? No Dilution factor: 1

Parameter	Units are ug/l		Remark Code	Rel % Diff.	Spiked Dups ?	Percent Recovery
	PQL	Result				
Vinyl chloride	10	N.D.				
Chloromethane	10	N.D.				
Bromomethane	10	N.D.				
Chloroethane	10	N.D.				
Trichlorofluoromethane	10	N.D.				
Acetone	100	N.D.				
1,1-Dichloroethene	5	N.D.				
Carbon disulfide	100	N.D.				
Methylsane chloride	5	N.D.				
Methyl-t-butylether (MTBE)	10	N.D.				
1,2-Dichloroethene	5	N.D.				
1,1-Dichloroethane	5	N.D.				
Vinyl acetate	50	N.D.				
2-Butanone	100	N.D.				
Chloroform	5	N.D.				
1,1,1-Trichloroethane	5	N.D.				
Carbon tetrachloride	5	N.D.				
Benzene	5	N.D.				
1,2-Dichloroethane	5	N.D.				
Trichloroethene	5	N.D.				
1,2-Dichloropropane	5	N.D.				
Bromodichloromethane	5	N.D.				
4-Methyl-2-pentanone	50	N.D.				
cis-1,2-Dichloropropene	5	N.D.				
Toluene	5	N.D.				
trans-1,3-Dichloropropane	5	N.D.				
1,1,2-Trichloroethane	5	N.D.				
2-Hexanone	50	N.D.				
Tetrachloroethene	5	N.D.				
Dibromochloromethane	5	N.D.				
Chlorobenzene	5	N.D.				
Ethylbenzene	5	N.D.				
Xylenes	5	N.D.				
Styrene	5	N.D.				
Bromoform	5	N.D.				
1,1,2,2-Tetrachloroethane	5	N.D.				
Total Volatile Hydrocarbons	100	N.D.				

Surrogate Percent Recoveries (S=Surrogate recovery out of range)

1,2-Dichloroethane-D4 100% DS-Toluene 92% 4-Bromofluorobenzene . 92%

Notes: Capillary column used with EPA approval.

Remarks: E=Estimated Value J=Value may be in error O=value outside standard Curve

APPENDIX 4

SOP SEI-003

STANDARD OPERATING PROCEDURE

SOP Number: SEI-003
Date Issued: April 9, 1993
Revision Number: n/a
Date of Revision: n/a

Title:
WATER LEVEL MEASUREMENT

1.0 OBJECTIVE

The objective of water level measurement is to determine the elevation of the water table in a well at a given time. The elevation may be tied to a USGS datum point to give the elevation above mean sea level, or it may be relative to another datum such as the ground surface, the water level in a nearby well, or an artificial datum.

2.0 EQUIPMENT

- a) Map of locations of wells to be measured
- b) Keys to locked wells.
- c) Proper protective clothing.
- d) Field notebook or other acceptable recording medium.
- e) Water level measuring device (electronic water marker, interface probe, or other device).
- f) Decontamination materials, as necessary.
- g) A clean blanket or other material on which well cap and other equipment may be placed.

3.0 PROCEDURE

- a) Unlock the well guard if one is present, then remove the well cap. Be careful to prevent the inside of the well cap from touching the ground in order to prevent possible contamination. A clean blanket or tarp may be spread on the ground to set the cap on.
- b) Determine the established measuring point, which will be marked on the well casing with indelible ink. If no mark exists, establish a measuring point at the highest point on the rim of the well casing and mark it with indelible ink. The measuring point must be on the well casing itself and not on a separate well guard, since the well guard may shift due to ground surface settling or frost heaves.
- c) Whenever possible, use an electric water level markers to measure the water level. The water marker consists of a graduated electric cable with a weighted probe at the end. The probe consists of an open electric connection; when the probe come in contact with the water, the connection is closed and a current travels through the wire, causing a signal to be activated. The signal may be an audible alarm or a light that is turned on. Lower the probe into the well slowly until the signal is noted. Put the graduated wire against the measurement point, then raise and lower the probe with decreasing increments to determine precisely where the water surface is. The water level should be measured to the nearest 1/100 of a foot.
- d) If a non-aqueous phase liquid (NAPL) is known or expected to be present, the measurements shall be made with an interface probe. The probe is lowered slowly into the well until a liquid is encountered. The probe signifies a low conductance liquid (NAPL) with a continuous tone. The probe is then slowly lowered deeper into the well to determine the position of the NAPL/water interface. The presence of a high conductance fluid (water) is indicated by an intermittent tone.
- e) Other measuring devices, such as a measuring tape or a string, may be used to make rough water level measurements, but they should be used only if an electronic water marker is not available.
- f) Note the water level, and the NAPL level if applicable, in a field notebook or other acceptable medium as a measurement below the top of the well casing (BTOC). Also note the time of the measurement.
- g) Decontaminate the measuring instrument after each measurement in accordance with SOP-SEI-009.
- h) The sequence of water level measurements shall be from least likely to most likely contaminated sampling points in order to reduce the potential for cross contamination.
- i) Following sampling, the well cap is then set back on the well casing, and the locking well guard re-locked (if applicable).

