

2394



MAR 9 10 20 AM '99

March 5, 1999

Mr. Chuck Schwer
Vermont ANR/DEC
Waste Management Division
103 South Main St. /West Building
Waterbury, VT 05671-0404

RE: Initial Investigation of Suspected Subsurface Petroleum Contamination
Perry's Station, Main Street, Bradford, Vermont (VTDEC Site #98-2394)

Dear Mr. Schwer:

Enclosed please find the summary report for the site investigation conducted at the above referenced site.

Please contact me if you have any questions or comments.

Sincerely,

Christine Ward
Hydrogeologist

Enclosure

c.: Mr. Alson Perry (w/o enclosure)
GI#119841419

**INITIAL INVESTIGATION OF
SUSPECTED SUBSURFACE PETROLEUM
CONTAMINATION**

**PERRY'S STATION
67 MAIN STREET
BRADFORD, VERMONT**

(VTDEC SITE #98-2394)
GI #119841419

February 1999

Prepared for

Perry's Oil Service, Inc.
P.O. Box 390
Bradford, VT 05033

Prepared by



P.O. Box 943
Williston, Vermont 05495
(802) 865-4288

MAR 9 10 30 AM '99

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I. INTRODUCTION

This report summarizes the initial investigation of suspected subsurface petroleum contamination at Perry's Station (the Site) at 67 Main Street in Bradford, Vermont (see Site Location Map, Appendix A). This work was requested by Chuck Schwer of the Vermont Department of Environmental Conservation (VTDEC) in a letter to Alson Perry of Perry's Oil Service, Inc. dated July 15, 1998. This work was performed generally in accordance with the August 20, 1998, *Work Plan and Cost Estimate for an Initial Subsurface Investigation* prepared by Griffin. The work plan was approved by Bob Butler (VTDEC) in a letter to Alson Perry dated November 24, 1998.

The work plan specified four monitoring wells to be installed, however due to the winter weather conditions only three monitoring wells were able to be installed on January 5, 1999. A field decision was made by Griffin to omit the proposed upgradient well. On January 6, in a telephone conversation, Bob Butler of the VTDEC and Christine Ward of Griffin, discussed the omitted fourth monitoring well. An understanding was reached that the fourth monitoring well could be omitted from the investigation provided that three installed monitoring wells adequately characterized the suspected release at the site.

II. SITE BACKGROUND

A. Site History

On April 13, 1998, petroleum contamination was detected at the Site during soil field screening at the routine removal of two 10,000-gallon capacity gasoline underground storage tanks (USTs). Soil samples collected during the UST closure were screened for volatile organic compounds (VOCs) using an HNu™ systems Model HW-101 portable photoionization detector (PID) equipped with a 10.2 eV lamp. Soils collected from the excavation of the USTs had VOC readings up to >200 parts per million (ppm) [2]. The two USTs were located in a common UST pit which appeared to be an old cellar hole [2].

As a result of the petroleum contamination detected in the subsurface beneath the former USTs, the VTDEC requested that additional work be conducted at the Site in order to determine the extent and degree of petroleum contamination.

B. Site Description

The Site is located on the west side of Main Street (Route 5) in a commercial/ retail area of Bradford, Vermont. There are two fuel dispenser islands on the Site with an attendant booth on the eastern most island. The area west of the fuel dispenser islands is utilized

by Perry's Oil Service employees for vehicle parking, and on the west side of the property is a garage. West of the Site property, the ground surface slopes up steeply toward the west; this area is primarily residential. Perry's Oil Service building is on the south side of the Site property. North of the Site is a building with a Liquor Store in the front (east side) and a Laundromat in the back (west side). East of the Site, across Main Street, are several retail businesses in a row of abutting buildings. Beyond these buildings the ground surface slopes down to the east, toward the Waits River which meanders north and then east across the Connecticut River flood plain.

The Site and surrounding area are serviced by municipal water supplies. According to Alson Perry, the Town of Bradford obtains its water from a spring fed reservoir located west of town. The nearest surface water to the Site is the Waits River, located approximately 1,000 feet southeast of the Site. The Waits River flows into the Connecticut River approximately 3,000 feet east of the Site.

C. Site Geology

According to the Surficial Geologic Map of Vermont [3], the Site is underlain by postglacial fluvial alluvium. Bedrock below the Site is mapped as the Gile Mountain formation, consisting of gray quartz-muscovite phyllite or schist [4].

III. INVESTIGATIVE PROCEDURES

To further define the extent of subsurface petroleum contamination in the area of the former USTs, the following investigative tasks were undertaken: soil borings; monitoring well installations; determination of groundwater flow direction and gradient; groundwater sample collection and analyses for petroleum related constituents; and a sensitive receptor survey.

A. Monitoring Well Installation

Three shallow monitoring wells, MW-1 through MW-3, were installed on January 5, 1999, by T&K Drilling, Inc., under the direct supervision of a Griffin hydrogeologist. The soil borings for the monitoring wells were advanced with a truck mounted 4¼" hollow stem auger. The monitoring well locations are indicated on the Site Map (Appendix A).

During borehole advancement, a two-foot split spoon sampler was advanced ahead of the augers every five feet. Undisturbed soil samples, collected from the borings with the split spoon sampler, were logged by the supervising hydrogeologist and screened for the

presence of VOCs using an HNu™ systems Model HW-101 PID equipped with a 10:2 eV lamp. Prior to screening, the PID was calibrated with isobutylene referenced to benzene. Soils were screened using the Griffin Jar/Polyethylene Bag Headspace Screening Protocol, which conforms to state and industry standards. Soil characteristics and contaminant concentrations were recorded by the hydrogeologist in detailed well logs which are presented in Appendix B.

Monitoring well MW-1 was installed on the north side of the former UST pit, in a presumed crossgradient direction from the source area. Monitoring well MW-2 was installed east of the former UST pit, in a presumed downgradient direction from the source area. Monitoring well MW-3 was installed on the south side of the former UST pit, in a presumed crossgradient direction from the source area.

Soil encountered in the three borings for the monitoring wells consisted primarily of brown to gray-brown silty sand with gravel. During drilling, the water table was encountered in the borings for MW-1, MW-2, and MW-3, at approximate depths of 16, 20, and 17 feet below grade, respectively.

No VOCs were detected with the PID (i.e. readings were below 1 ppm) from the soils collected from the borings for the three monitoring wells, except for the samples collected near and below the water table in the borings for MW-2 and MW-3. The soil sample collected near the water table in MW-2, from 20 to 22 feet below grade, had a PID reading of 320 ppm; the next sample collected at 25 to 27 feet below grade had a PID reading of 30 ppm. The soil sample collected near the water table in MW-3, from 15 to 17 feet below grade, had a PID reading of 30 ppm; the next sample collected at 20 to 22 feet below grade had a PID reading of 9 ppm.

Each of the new monitoring wells was constructed in a similar fashion, with two-inch diameter, Schedule 40 PVC well screen and riser. Each well contains a ten-foot length of 0.010-inch, factory-slotted screen. Monitoring wells MW-1 and MW-2 are screened from 15 to 25 feet below grade; monitoring well MW-3 is screened from 13 to 23 feet below grade. A sand pack was installed in the annular space around the well screen from the bottom of the boring to one foot above the top of the screened interval in each borehole. An approximate one-foot thick bentonite surface seal was then installed above the sand pack. Each well was fitted with a gripper cap, and secured with an aluminum, water-tight road box. The road box on each well is flush-mounted, set in concrete, and suitable for vehicular traffic. The new monitoring wells were developed by bailing immediately after installation.

B. Groundwater Flow Direction and Gradient

Water table elevation measurements were collected from the three on-site monitoring wells on January 13, 1999. The top of casing elevations were determined relative to

MW-1, which was arbitrarily set at 100 feet. The depth to water in each well was subtracted from the top of casing elevation to obtain the relative water table elevation. Water level data are presented in Appendix C. No free phase product was detected in the wells on January 13, 1999. Water table elevations were plotted on the Site map to generate the Groundwater Contour Map figure presented in Appendix A.

The relative water table elevations measured on January 13, 1999, suggest that groundwater flow at the Site is directed generally toward the east-southeast at a hydraulic gradient of approximately 10.3%.

Based on this flow direction, monitoring well MW-2 is located in a downgradient direction from the former USTs. Monitoring wells MW-1 and MW-3 are each located in a crossgradient direction from the former USTs.

C. Groundwater Sampling and Analyses

Griffin collected groundwater samples from the three on-site monitoring on January 13, 1999. The water samples were analyzed by Endyne, Inc. of Williston, Vermont, by EPA Method 8021B for the presence of benzene, toluene, ethylbenzene, and xylenes (BTEX), methyl tertiary butyl ether (MTBE), naphthalene, and the alkylbenzenes: 1,3,5-trimethylbenzene and 1,2,4-trimethylbenzene.

Results of the laboratory analyses for the monitoring wells are summarized in Appendix D. The laboratory analysis report is contained in Appendix E. Analytical results of the trip blank and duplicate samples indicate that adequate quality assurance and control were maintained during sample collection and analysis.

Analysis of the groundwater sample collected from monitoring well MW-1 indicates a concentration of MTBE exceeding the Vermont Groundwater Enforcement Standard (VGES) for this compound. No other petroleum compounds targeted by EPA Method 8021B were detected in the groundwater sample from MW-1.

Analysis of the groundwater sample collected from MW-2 indicates concentrations of benzene, MTBE, 1,3,5-trimethylbenzene, 1,2,4-trimethylbenzene, and naphthalene exceeding the VGES for these compounds. Toluene, ethylbenzene and xylenes were also detected in the groundwater sample collected from MW-2, in concentrations below the VGES for these compounds.

Analysis of the groundwater sample collected from MW-3 indicates concentrations of benzene, 1,3,5-trimethylbenzene, and 1,2,4-trimethylbenzene, exceeding the VGES for these compounds. Toluene, ethylbenzene, xylenes, MTBE, and naphthalene were also detected in the groundwater sample collected from MW-3, in concentrations below the VGES for these compounds.

D. Sensitive Receptor Survey

A qualitative risk assessment was conducted to identify known and potential receptors of the contamination detected at the Site. A visual survey was conducted during the UST removal inspection on April 13, 1998, as well as during the monitoring well installation on January 5, 1999. Based on these observations, a determination of the potential risk to identified receptors was made.

The soil and groundwater in the vicinity of the former USTs are receptors of the contamination detected.

The depth to groundwater in the three on-site monitoring wells measured on January 13, 1999, ranged from approximately 16 to 20 feet below ground surface. Given these groundwater depths it is unlikely that subsurface utility lines along Main Street serve as potential conduits of the detected petroleum contamination.

The nearest surface water is the Waits River, located approximately 1,000 feet southeast of the Site. The risk to the Waits River is considered minimal given the relatively low concentrations of petroleum detected in the source area groundwater and given the sufficient distance between the Site and the river.

The Site and surrounding area are serviced by municipal water supplies. The Town of Bradford reportedly gets its water from a spring fed reservoir located west of town. The risk to the municipal water supply is considered minimal given that the reservoir is in a hydraulically and topographically upgradient direction from the Site.

The basement indoor air space of Perry's Oil Service, the Liquor Store, Hill's Department Store, and Aubuchon Hardware were screened for VOCs with the PID on January 5, 1999.

- Perry's Oil Service building is south of (and crossgradient from) the former USTs. The north wall of the basement was screened with the PID; no VOCs were detected.
- The Liquor Store is located north of (and crossgradient from) the former USTs. There is a partial basement under the west side of the Liquor Store and a connected crawl space under the east side of the Liquor Store. No VOCs were detected with the PID in the basement area. The crawl space was screened by holding the PID into the crawl space opening from the basement; no VOCs were detected near the crawl space opening.
- Hill's Department Store is located on the east side of Main Street, across from Perry's Oil Service building, in a hydraulically downgradient direction from the source area.

The basement of Hill's is finished and utilized for displaying products. No VOCs were detected in this basement space. An employee of Hill's mentioned that she has not noticed any petroleum odors.

- Aubuchon Hardware is located on the east side of Main Street, across from the former USTs (i.e. north of Hill's Department Store), in a hydraulically downgradient to crossgradient direction from the source area. The basement is utilized for storage. The basement for Aubuchon Hardware extends under the abutting business to the north. No VOCs were detected with the PID in the basement area.
- There are two small restaurants (Chinese food and Pizza) between Hill's and Aubuchon Hardware. Access to their basement spaces was not obtained on January 5, 1999.

The risk to the indoor air of the buildings in the vicinity of the Site posed by the petroleum contamination detected at the Site is considered minimal based on the relatively low concentrations of VOCs detected in the groundwater samples collected from the three on-site monitoring wells and based on the non-detection of VOCs with the PID in basements in the vicinity of the Site.

IV. SOIL STOCKPILE

During the installation of the new UST at the Site in April 1998, the VTDEC assisted Perry's Oil Service in gaining permission to stockpile approximately seven truckloads of soil off-site.

The off-site soil stockpile was not assessed during the initial site investigation, as the winter frost conditions would have precluded the collection with a hand auger of soil samples for VOC screening.

V. CONCLUSIONS

Based on the results of this initial site investigation at Perry's Station, Griffin presents the following conclusions:

- 1) There was an apparent release(s) of petroleum to the subsurface in the vicinity of the former 10,000-gallon gasoline USTs at the Site. The source of the detected petroleum contamination is likely due to spills, overfills, and leaks due to usage over time. The duration and volume of product released is unknown. The source of the petroleum contamination (i.e., the UST systems) was removed in April of 1998.
- 2) VOC readings of soils collected during the UST closures in April of 1998 indicate that adsorbed petroleum compounds existed in the soils in the immediate vicinity of the former USTs. With the source USTs eliminated, it is expected that adsorbed petroleum compound concentrations will decrease over time with the progressive action of natural mitigative processes including biodegradation, volatilization, and diffusion.
- 3) Three groundwater monitoring wells, MW-1 through MW-3, were installed by Griffin at the Site on January 5, 1999. VOCs were not detected by field screening methods in soil samples collected from the borings for the monitoring wells, except for the soil samples collected from the saturated zone (i.e. below the water table) in downgradient monitoring well MW-2 and in cross gradient monitoring well MW-3. This suggests that the residual petroleum contamination is primarily present in the dissolved phase. With the source USTs eliminated, it is expected that dissolved petroleum compound concentrations will decrease over time with the progressive action of natural mitigative processes including dilution, dispersion, and biodegradation.
- 4) The depth to groundwater measured on January 13, 1999, in the three site monitoring wells ranged from approximately 16 to 20 feet below grade. The shallow groundwater flow beneath the Site on this date was estimated to be directed toward the east-southeast at a hydraulic gradient of approximately 10.3%. Based on this flow direction, monitoring wells MW-1 and MW-3 are located crossgradient with respect to the former USTs, and monitoring well MW-2 is located in a downgradient direction with respect to the former USTs. The configuration of these three monitoring wells appears to be sufficient to adequately characterize the source area.
- 5) Groundwater samples were collected from the three site monitoring wells on January 13, 1999. Relatively low levels of petroleum contamination were detected in the groundwater samples collected from the three monitoring wells. However, concentrations of select petroleum compounds detected in the

groundwater samples exceeded their respective VGES. With the USTs replaced and some of the contaminated soil removed, it is expected that dissolved petroleum compound concentrations will decrease over time with the progressive action of natural mitigative processes, including dilution, dispersion, and biodegradation.

- 6) The Site and the surrounding area are served by municipal water supplies.
- 7) The air space of several basements in the vicinity of the Site (crossgradient and downgradient) were screened for the presence of VOCs using a PID on January 5, 1999. No VOCs were detected.
- 8) There appear to be no significant potential risks to identified sensitive receptors based on currently available data.

VI. RECOMMENDATIONS

Based on the results of this site investigation, Griffin recommends the following:

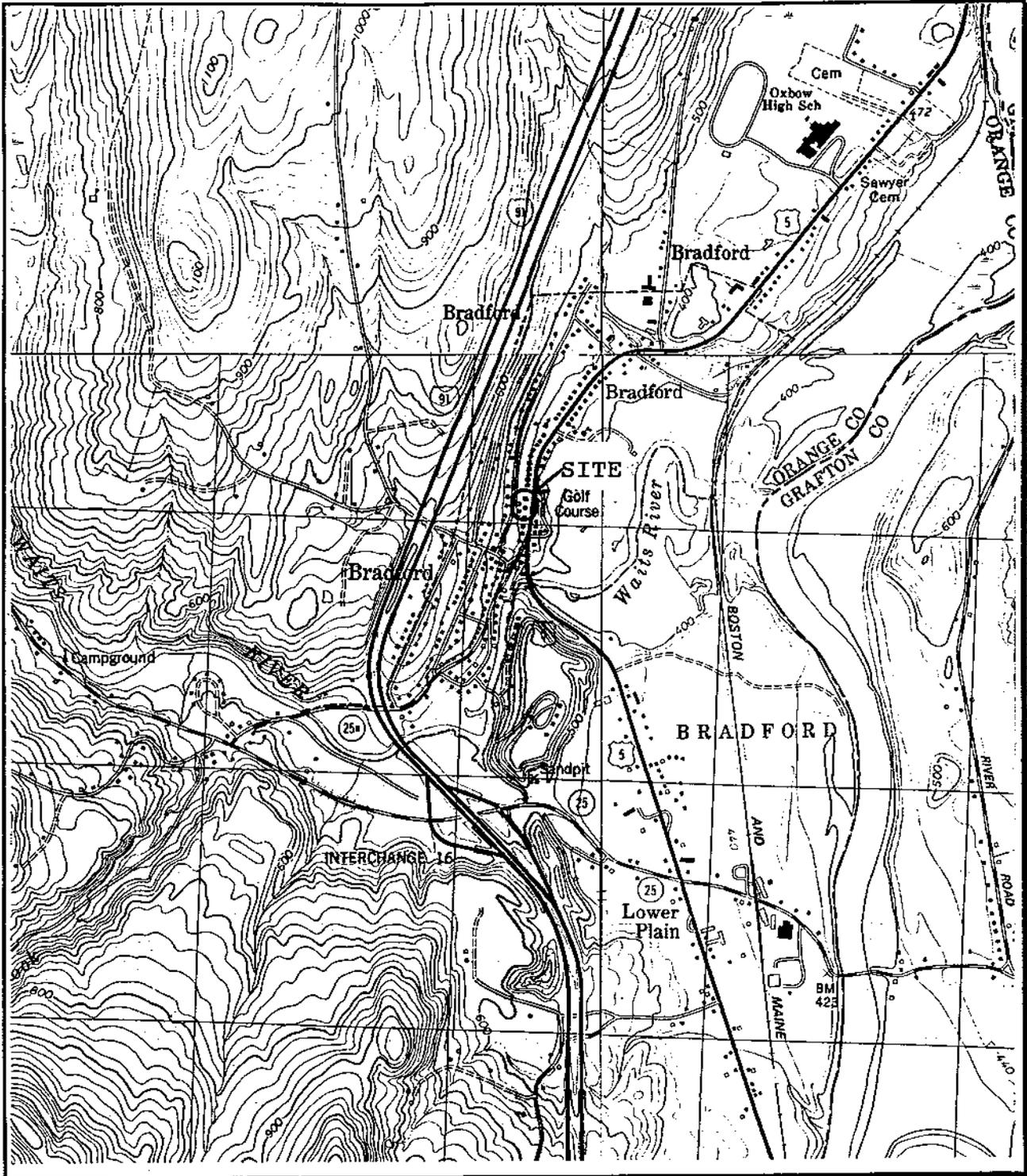
1. Since select compounds were detected in the groundwater at concentrations exceeding the VGES, a confirmatory round of groundwater elevations and samples should be collected from the three site related monitoring wells in April 1999. The groundwater samples should be analyzed for petroleum compounds by EPA Method 8021B. The frequency of future sampling will be reassessed following the April 1999 sampling event.
2. The off-site soil stockpile should be screened for VOCs with a PID during the April 1999 sampling event to determine if residual contamination still exists. If VOCs are non-detectable with the PID and there are no visual or olfactory indications of petroleum contamination, soil samples should be collected from the soil stockpile for laboratory analysis in accordance with VTDEC guidelines. Assuming the size of the soil stockpile is over 50 cubic yards but less than 100 cubic yards, three discrete soil samples should be collected from the stockpile for laboratory analysis. The soil samples should be analyzed for BTEX and MTBE by EPA Method 8021B and for total petroleum hydrocarbons (TPH) by modified EPA Method 8015. If the analytical results are satisfactory, the soil can be thin spread, with VTDEC approval.

REFERENCES

1. USGS 7.5 Minute Topographic Maps, Fairlee, VT-NH, dated 1981 and photorevised 1983, East Corinth, VT, dated 1973, Newbury, NH-VT, dated 1973, and Piermont, NH-VT, dated 1979.
2. Griffin International, April 16, 1998, *Perry's Station UST Closure Inspection*, letter report to Ms. Sue Thayer, State of Vermont, Department of Environmental Conservation.
3. Doll, Charles G., ed., 1970, *Surficial Geologic Map of Vermont*, Vermont Geological Survey.
4. Doll, Charles G., ed., 1961, *Centennial Geologic Map of Vermont*, Vermont Geological Survey.

APPENDIX A

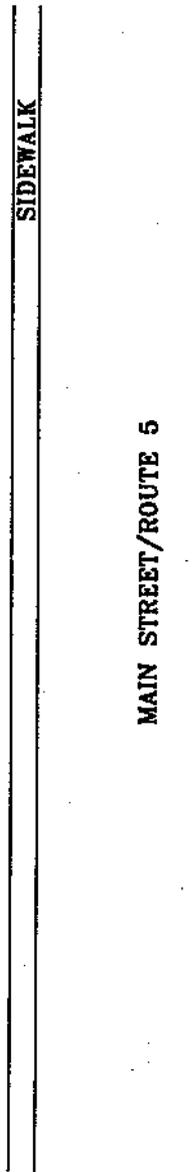
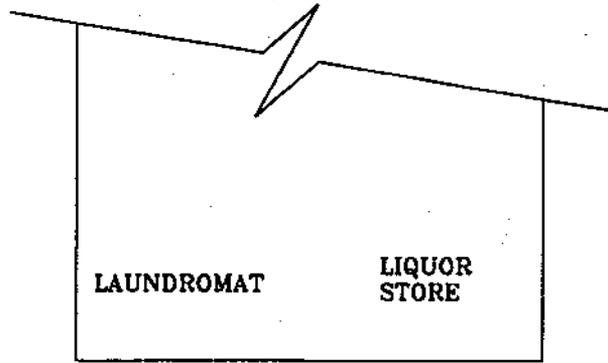
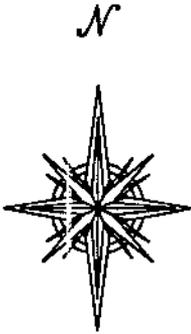
Site Location Map
Site Sketch
Groundwater Contour Map
Contaminant Distribution Map



**SITE LOCATION MAP - Perry's Oil
Bradford, Vermont**

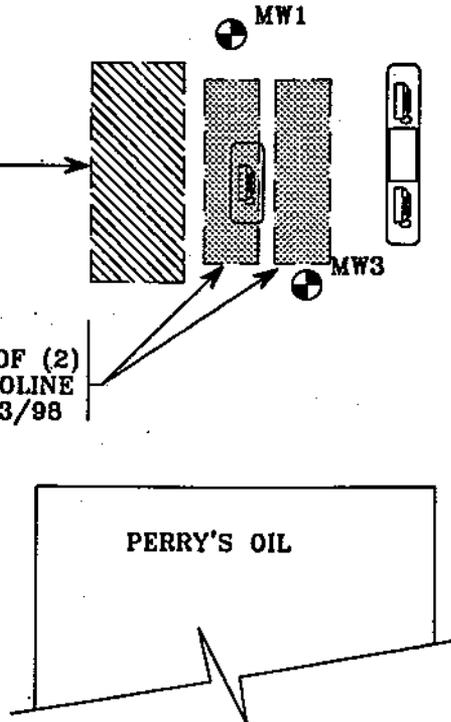
Sources: USGS 7.5 minute quadrangles: Fairlee VT-NH quadrangle, dated 1981 and photorevised 1983; East Corinth VT, dated 1973; Newbury NH-VT, dated 1973; Piermont NH-VT, dated 1979.
Scale: 1:24,000





APPROXIMATE LOCATION OF EXISTING 20,000 GALLON GASOLINE UST.

APPROXIMATE FORMER LOCATION OF (2) 10,000 GALLON GASOLINE USTs REMOVED 4/13/98



LEGEND

- MW2 MONITORING WELL
- PUMP ISLAND



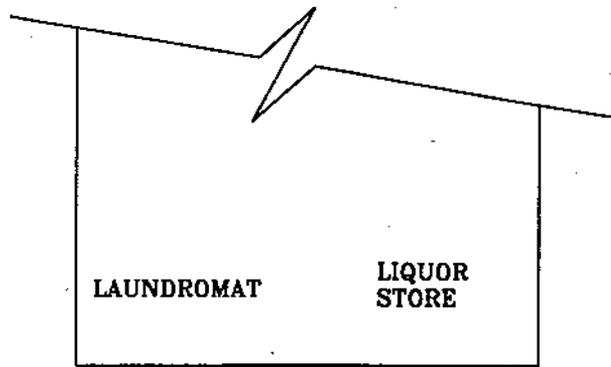
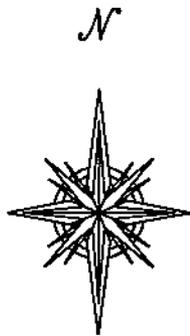
JOB #: 119841419

PERRY'S SERVICE STATION

BRADFORD, VERMONT

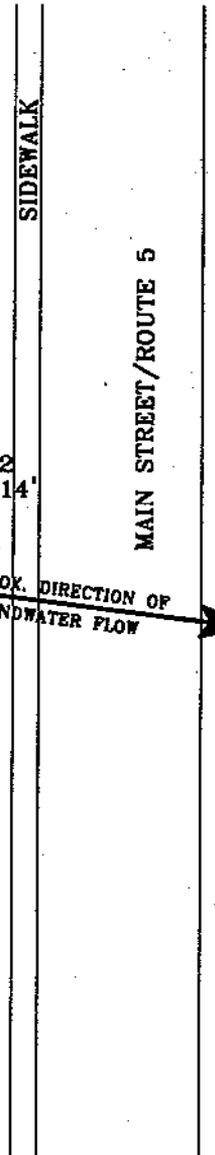
SITE MAP

DATE: 1/14/99 | DWG.#:2 | SCALE: 1"=30' | DRN.:SB | APP.:CW



LAUNDROMAT

LIQUOR STORE

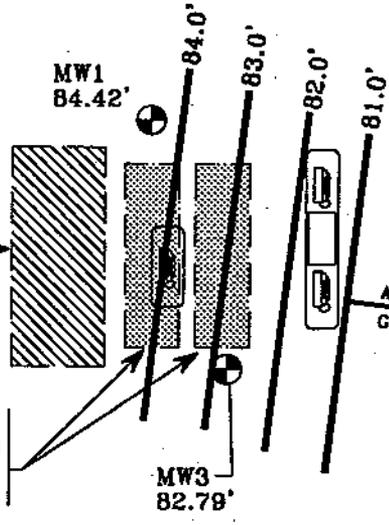


SIDEWALK

MAIN STREET/ROUTE 5

APPROXIMATE LOCATION OF EXISTING 20,000 GALLON GASOLINE UST.

APPROXIMATE FORMER LOCATION OF (2) 10,000 GALLON GASOLINE USTs REMOVED 4/13/98



APPROX. DIRECTION OF GROUNDWATER FLOW

PERRY'S OIL

LEGEND

MW2 80.14' MONITORING WELL AND WATER TABLE ELEVATION IN FEET

82.0' GROUNDWATER CONTOUR IN FEET (DASHED WHERE INFERRED)

PUMP ISLAND



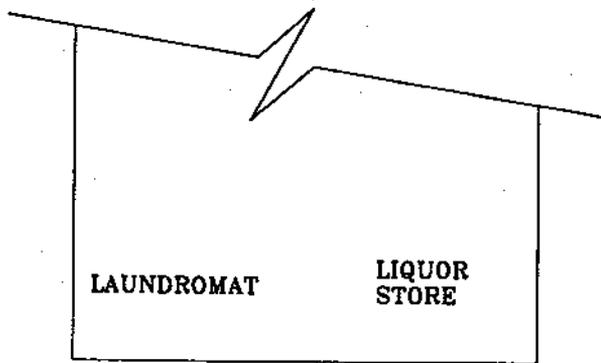
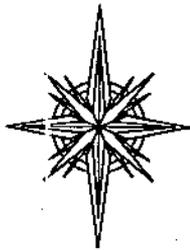
JOB #: 119841419

PERRY'S SERVICE STATION

BRADFORD, VERMONT

GROUNDWATER CONTOUR MAP
MEASUREMENT DATE: 1/13/99

DATE: 1/26/99	DWG.#:3	SCALE: 1"=30'	DRN.:SB	APP.:CW
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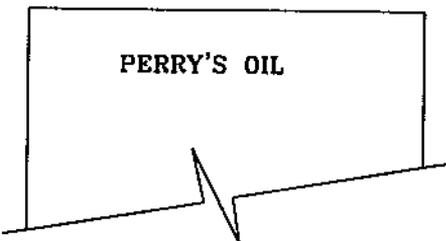
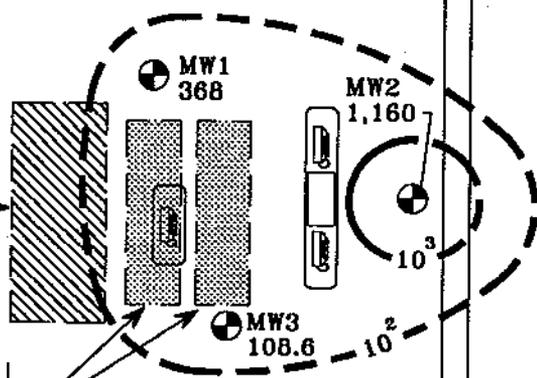


SIDEWALK

MAIN STREET/ROUTE 5

APPROXIMATE LOCATION OF EXISTING 20,000 GALLON GASOLINE UST.

APPROXIMATE FORMER LOCATION OF (2) 10,000 GALLON GASOLINE USTs REMOVED 4/13/98



LEGEND

MW2 MONITORING WELL AND TOTAL TARGETED VOCs CONCENTRATION (ppb)
⊕ 1,160

10³ ISOCONCENTRATION CONTOUR, TOTAL TARGETED VOCs (ppb), (DASHED WHERE INFERRED)

 PUMP ISLAND



JOB #: 119841419

PERRY'S SERVICE STATION

BRADFORD, VERMONT

CONTAMINANT DISTRIBUTION MAP
SAMPLE DATE: 1/13/99

DATE: 1/28/99

DWG.#:4

SCALE: 1"=30'

DRN.:SB

APP.:CW

APPENDIX B

Soil Logs and Monitoring Well Specifications

PROJECT PERRY'S SERVICE STATION

LOCATION BRADFORD, VERMONT

DATE DRILLED 1/5/99 TOTAL DEPTH OF HOLE 26.0'

DIAMETER 4.25"

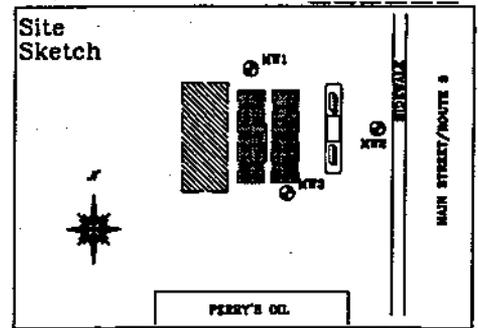
SCREEN DIA. 2" LENGTH 10.0' SLOT SIZE 0.010"

CASING DIA. 2" LENGTH 9.5' TYPE sch 40 pvc

DRILLING CO. T&K DRILLING METHOD HSA

DRILLER ALAN TOMMILA LOG BY C. WARD

WELL NUMBER MW1



GRIFFIN INTERNATIONAL, INC

DEPTH IN FEET	WELL CONSTRUCTION	NOTES	BLOWS PER 6" OF SPOON & PID READINGS	DESCRIPTION/SOIL CLASSIFICATION (COLOR, TEXTURE, STRUCTURES)	DEPTH IN FEET
0		ROAD BOX			0
0		LOCKING WELL CAP			0
0		CONCRETE	0'-2'	SILTY SAND (SM)- 40% silt, nonplastic fines; 50% fine to medium sand, 10% fine gravel; dry, dark brown.	2
2			0 ppm		2
4		NATIVE BACKFILL			4
6			5'-7'	SILTY SAND WITH GRAVEL (SM)- 15% silt, nonplastic fines; 80% fine to medium sand, 25% fine, angular gravel; dry, dark brown.	6
6		WELL RISER	8/16/22/25		8
8			0 ppm		8
10					10
10		BENTONITE	10'-12'	SILTY GRAVEL WITH SAND (GM)- 40% silt, rapid dilatancy, low toughness, nonplastic, low dry strength fines; 20% fine sand, 40% fine, subangular gravel; moist, gray/brown.	12
12			29/21/28/36		12
12		WELL SCREEN	0.2 ppm		14
14					14
14		SAND PACK	15'-17'	16.0' WATER TABLE	16
16			69/29/30/30		16
16			0.2 ppm	SILTY SAND WITH GRAVEL (ML)- 80% silt, rapid dilatancy, low toughness, nonplastic, low dry strength fines; 20% fine sand, 20% fine, angular gravel; moist, gray/brown.	18
18		BOTTOM CAP			20
20			20'-22'		20
20			100/4"		22
22			0.2 ppm		22
24		UNDISTURBED NATIVE SOIL			24
24			25'-26'	GRAY ELASTIC SILT (MH)- 60% silt, none to slow dilatancy, medium toughness, low plasticity, low dry strength fines; 10% fine sand, 50% fine, angular gravel; damp, olive gray.	24
26			37/80		26
26			0.2 ppm		26
28				SILTY GRAVEL (GM)- 40% silt, low dry strength fines; 60% fine, angular gravel and rock fragments; wet, olive gray.	28
30				BASE OF WELL AT 25'	30
32				END OF EXPLORATION AT 26'	32
34					34
36					36
38					38
40					40
42					42
44					44
46					46
48					48
50					50

PROJECT PERRY'S SERVICE STATION

LOCATION BRADFORD, VERMONT

DATE DRILLED 1/5/99 TOTAL DEPTH OF HOLE 27.0'

DIAMETER 4.25"

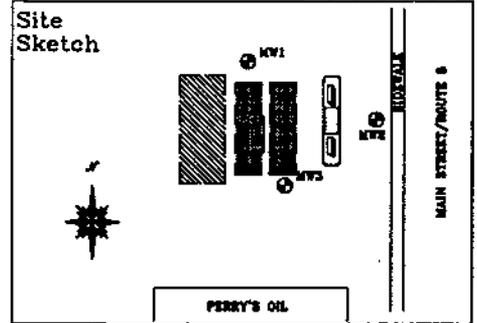
SCREEN DIA. 2" LENGTH 10.0' SLOT SIZE 0.010"

CASING DIA. 2" LENGTH 14.5' TYPE sch 40 pvc

DRILLING CO. T&K DRILLING METHOD HSA

DRILLER ALAN TOMMILA LOG BY C. WARD

WELL NUMBER MW2



GRIFFIN INTERNATIONAL, INC

DEPTH IN FEET	WELL CONSTRUCTION	NOTES	BLOWS PER 6" OF SPOON & PID READINGS	DESCRIPTION/SOIL CLASSIFICATION (COLOR, TEXTURE, STRUCTURES)	DEPTH IN FEET
0	ROAD BOX				0
0-2	LOCKING WELL CAP		0.2 ppm	SILTY SAND WITH GRAVEL (SM)- 20% silt fines; 60% sand, 20% gravel, loose; dry, dark brown.	2
2	CONCRETE				2
4	NATIVE BACKFILL				4
5-7			0.4 ppm	SILTY SAND WITH GRAVEL (SM)- 20% silt fines; 60% fine sand, 20% fine, angular gravel, loose; dry, dark brown.	6
6					6
8	WELL RISER				8
10					10
10-12			3/3/5/7 0.1 ppm	SILTY SAND (SM)- 30% silt fines; 70% fine sand, loose; moist/damp, orange/light brown.	12
12					12
14	BENTONITE				14
15-17			5/5/3/8 0.1 ppm	SILTY SAND (SM)- 30% silt fines; 70% fine sand; damp/moist, light gray/brown.	16
16					16
18	WELL SCREEN				18
20	SAND PACK				20
20-22			18/29/30/36 320 ppm	20.0' WATER TABLE	22
22	BOTTOM CAP			SILTY SAND WITH GRAVEL (SM)- 20% silt, nonplastic fines; 40% sand, 40% gravel; wet, dark gray, gasoline odor.	24
24					24
25-27			14/20/29/60 30 ppm	SILTY SAND WITH GRAVEL (SM)- 40% silt, slow dilatancy, medium toughness, low to medium dry strength fines; 30% fine sand, 30% fine, angular gravel; wet, gray/brown, till.	26
26					26
28	UNDISTURBED NATIVE SOIL				28
30					30
32				BASE OF WELL AT 25'	32
34				END OF EXPLORATION AT 27'	34
36					36
38					38
40					40
42					42
44					44
46					46
48					48
50					50

PROJECT PERRY'S SERVICE STATION

LOCATION BRADFORD, VERMONT

DATE DRILLED 1/5/99 TOTAL DEPTH OF HOLE 23.0'

DIAMETER 4.25"

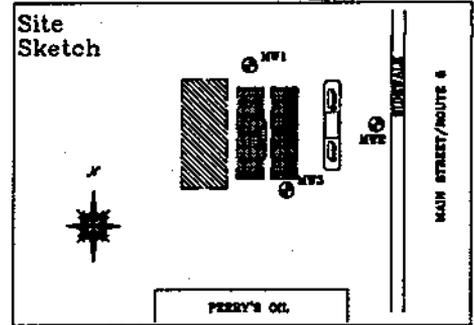
SCREEN DIA. 2" LENGTH 10.0' SLOT SIZE 0.010"

CASING DIA. 2" LENGTH 12.4' TYPE sch 40 pvc

DRILLING CO. T&K DRILLING METHOD HSA

DRILLER ALAN TOMMILA LOG BY C. WARD

WELL NUMBER MW3



GRIFFIN INTERNATIONAL, INC

DEPTH IN FEET	WELL CONSTRUCTION	NOTES	BLOWS PER 6" OF SPOON & PID READINGS	DESCRIPTION/SOIL CLASSIFICATION (COLOR, TEXTURE, STRUCTURES)	DEPTH IN FEET
0		ROAD BOX			0
0		LOCKING WELL CAP			0
1		CONCRETE	0'-2' 0 ppm	SILTY SAND (SM)- 40% silt, nonplastic, no dry strength fines; 50% sand, 10% angular gravel; dry, dark brown.	1
2					2
3		NATIVE BACKFILL			3
4					4
5					5
6		WELL RISER	5'-7' 6/12/10/4 0 ppm	SILTY SAND WITH GRAVEL (SM)- 30% silt, nonplastic, no dry strength fines; 50% sand, 20% angular to subangular gravel, moist, dark brown.	6
7					7
8					8
9					9
10					10
11			10'-12' 3/1/3/8 0 ppm	SILTY SAND WITH GRAVEL (SM)- 30% silt, nonplastic fines; 50% fine sand, 20% fine, angular gravel; damp, orange/brown.	11
12		BENTONITE			12
13					13
14					14
15					15
16		WELL SCREEN	15'-17' 6/8/13/27 30 ppm	SILTY SAND (SM)- 40% silt, nonplastic, low dry strength fines; 50% fine sand, 10% fine gravel, loose; moist to wet, light gray/brown.	16
17				17.0' WATER TABLE	17
18					18
19		SAND PACK			19
20					20
21			20'-22' 5/8/19/41 9 ppm	SILTY GRAVEL WITH SAND (GM)- 30% silt, slow dilatancy, low toughness, nonplastic, low to medium dry strength fines; 20% sand, 50% fine gravel; wet, gray/brown.	21
22		BOTTOM CAP			22
23		UNDISTURBED NATIVE SOIL			23
24					24
25					25

APPENDIX C

Liquid Level Monitoring Data

LIQUID LEVEL MONITORING DATA

**PERRY'S SERVICE STATION
MAIN STREET
BRADFORD, VERMONT**

1/13/99

Well I.D.	Well Depth bgs	Top of Casing Elevation	Depth To Product btoc	Depth To Water btoc	Product Thickness	Specific Gravity Of Product	Water Equivalent	Corrected Depth To Water	Corrected Water Table Elevation
MW-1	25.0	100.00	-	15.58	-	-	-	-	84.42
MW-2	25.0	99.80	-	19.66	-	-	-	-	80.14
MW-3	23.0	100.28	-	17.49	-	-	-	-	82.79

All Values Reported in Feet

btoc - Below Top of Casing

bgs - Below Ground Surface

Elevations determined relative to top of casing of MW-1, which was arbitrarily set at 100'

Top of Casing Elevations surveyed by Griffin on 1/13/99

APPENDIX D

Water Quality Data

WATER QUALITY DATA

**PERRY'S SERVICE STATION
MAIN STREET
BRADFORD, VERMONT**

<i>Sample Location</i> <i>Sample Date:</i> <i>Analytical Method:</i>	MW-1 1/13/99 8021B				VGES (ppb)
PARAMETER					
Benzene	ND>5				5.
Toluene	ND>5				1,000.
Ethylbenzene	ND>5				700.
Xylenes	ND>5				10,000.
Total BTEX	ND				-
MTBE	368.				40.
1,3,5-Trimethyl Benzene	ND>5				4.
1,2,4-Trimethyl Benzene	ND>5				5.
Naphthalene	ND>5				20.
Total Targeted VOCs	368.				-

<i>Sample Location</i> <i>Sample Date:</i> <i>Analytical Method:</i>	MW-2 1/13/99 8021B				VGES (ppb)
PARAMETER					
Benzene	13.4				5.
Toluene	18.5				1,000.
Ethylbenzene	24.1				700.
Xylenes	179.				10,000.
Total BTEX	235.				-
MTBE	271.				40.
1,3,5-Trimethyl Benzene	183.				4.
1,2,4-Trimethyl Benzene	423.				5.
Naphthalene	48.0				20.
Total Targeted VOCs	1,160.				-

All Values Reported in ug/L (ppb)
 ND>1 - None Detected above Detection Limit
 TBQ<1 - Trace Below Quantitation Limit
 Detections are bolded.
 Blank cell - not analyzed

VGES - Vermont Groundwater Enforcement Standard

>VGES

WATER QUALITY DATA

**PERRY'S SERVICE STATION
MAIN STREET
BRADFORD, VERMONT**

PARAMETER	Sample Location: Sample Date: Analytical Method:	MW-3 1/13/99 8021B			VGES (ppb)
Benzene		9.7			5.
Toluene		4.5			1,000.
Ethylbenzene		4.8			700.
Xylenes		23.5			10,000.
Total BTEX		42.5			-
MTBE		10.2			40.
1,3,5-Trimethyl Benzene		17.6			4.
1,2,4-Trimethyl Benzene		28.9			5.
Naphthalene		9.4			20.
Total Targeted VOCs		108.6			-

All Values Reported in ug/L. (ppb)

ND>1 - None Detected above Detection Limit

TBQ<1 - Trace Below Quantitation Limit

Detections are bolded.

Blank cell - not analyzed

VGES - Vermont Groundwater Enforcement Standard

>VGES

**WATER QUALITY DATA
QUALITY ASSURANCE / QUALITY CONTROL**

**PERRY'S SERVICE STATION
MAIN STREET
BRADFORD, VERMONT**

<i>Sample Location</i>	Trip Blank	Duplicate (MW-2)	VGES
<i>Sample Date:</i>	1/13/99	1/13/99	
<i>Analytical Method:</i>	8021B	8021B	
PARAMETER			(ppb)
Benzene	ND>1	TBQ<10	5.
Toluene	ND>1	17.3	1,000.
Ethylbenzene	ND>1	23.3	700.
Xylenes	ND>1	171.	10,000.
Total BTEX	ND	212.	-
MTBE	ND>10	250.	40.
1,3,5-Trimethyl Benzene	ND>1	172.	4.
1,2,4-Trimethyl Benzene	ND>1	398.	5.
Naphthalene	ND>1	32.4	20.
Total Targeted VOCs	ND	1,064.	-

All Values Reported in ug/L (ppb)

ND>1 - None Detected above Detection Limit

TBQ<1 - Trace Below Quantitation Limit

Detections are bolded.

Blank cell - not analyzed.

VGES - Vermont Groundwater Enforcement Standard

APPENDIX E

Analytical Laboratory Report



Laboratory Services

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

REPORT OF LABORATORY ANALYSIS

CLIENT: Griffin International PROJECT CODE: 1048
PROJECT NAME: Perry's Serv. Stat./ 119841419 REF.#: 133,744 - 133,748
REPORT DATE: January 20, 1999
DATE SAMPLED: January 13, 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.

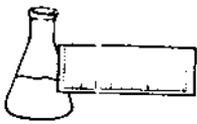
Individual sample performance was monitored by the addition of surrogate analytes to each sample. All surrogate recovery data was determined to be within laboratory QA/QC guidelines unless otherwise noted.

Reviewed by,

A handwritten signature in black ink, appearing to read "H. Locker", is written over the printed name below.

Harry B. Locker, Ph.D.
Laboratory Director

enclosures



ENDYNE, INC.

Laboratory Services

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

EPA METHOD 8021B--PURGEABLE AROMATICS

CLIENT: Griffin International	DATE RECEIVED: January 14, 1999
PROJECT NAME: Perry's Serv. Stat./ 119841419	REPORT DATE: January 20, 1999
CLIENT PROJ. #: 119841419	PROJECT CODE: 1048

Ref. #:	133,744	133,745	133,746	133,747	133,748
Site:	Trip Blank	MW #2	Duplicate	MW #3	MW #1
Date Sampled:	1/13/99	1/13/99	1/13/99	1/13/99	1/13/99
Time Sampled:	7:55	11:29	11:29	11:45	12:08
Sampler:	D. Tourangeau				
Date Analyzed:	1/19/99	1/19/99	1/20/99	1/20/99	1/20/99
UIP Count:	0	>10	>10	>10	0
Dil. Factor (%):	100	10	10	100	20
Surr % Rec. (%):	99	92	90	91	97
Parameter	Conc. (ug/L)				
MTBE	<10	271.	250.	10.2	368.
Benzene	<1	13.4	TBQ <10	9.7	<5
Toluene	<1	18.5	17.3	4.5	<5
Ethylbenzene	<1	24.1	23.3	4.8	<5
Xylenes	<1	179.	171.	23.5	<5
1,3,5 Trimethyl Benzene	<1	183.	172.	17.6	<5
1,2,4 Trimethyl Benzene	<1	423.	398.	28.9	<5
Naphthalene	<1	48.0	32.4	9.4	<5

Ref. #:					
Site:					
Date Sampled:					
Time Sampled:					
Sampler:					
Date Analyzed:					
UIP Count:					
Dil. Factor (%):					
Surr % Rec. (%):					
Parameter	Conc. (ug/L)				
MTBE					
Benzene					
Toluene					
Ethylbenzene					
Xylenes					
1,3,5 Trimethyl Benzene					
1,2,4 Trimethyl Benzene					
Naphthalene					

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

