



Mar 10 10 40 AM '99

March 8, 1999

Mr. Chuck Schwer
Sites Management Section
VTDEC WMD
103 South Main St./ West Bldg.
Waterbury, VT 05671-0404

RE: Investigation of Subsurface Petroleum Contamination at Blouin Brothers Oil, Enosburg, Vermont. (VTDEC #96-2069)

Dear Mr. Schwer:

Enclosed please find the March 1999 report titled *Investigation of Subsurface Petroleum Contamination at Blouin Brothers Oil*. Mr. Dan Carswell of Blouin Brothers requested that a copy be forwarded to you for review. Please do not hesitate to call, if you have any questions or comments.

Sincerely,

Robert Higgins
Engineer

Enc.

cc: Mr. Dan Carswell, Blouin Brothers(w/out Enc.)
GI #12984151

Mar 10 10:40 AM '99

**INVESTIGATION OF
SUBSURFACE PETROLEUM CONTAMINATION AT
BLOUIN BROTHERS OIL**

MARCH 2, 1999

Site Location:

**Blouin Brothers Oil
Pleasant Street
Enosburg, VT**

**GI Project # 129841451
VTDEC # 96-2069**

Prepared For:

**Blouin Brothers Oil
PO Box 425
Enosburg Falls, VT 05430
(802) 933-4420**

Prepared By:



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

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I. INTRODUCTION

This report summarizes the investigation of subsurface petroleum contamination at the Blouin Brothers (Blouin) bulk fuel storage facility located on Pleasant Street in Enosburg, VT (see location map in Appendix A). This investigation was conducted by Griffin International, Inc. (Griffin) for Blouin to address petroleum contamination detected at the site in September of 1996 during a Phase II Environmental Site Assessment. Work at the site was conducted in accordance with the January 23, 1997 Griffin workplan / cost estimate prepared for Blouin Brothers. Approval to proceed with the plan was given by Mr. Chuck Schwer in a November 23, 1998 letter to Mr. Dan Carswell of Blouin Brothers.

Work conducted at the site included the installation of seven groundwater monitoring wells (MW-1 through MW-7) and the collection and laboratory analysis of groundwater samples from these new monitoring wells. In addition, a sensitive receptor risk assessment was conducted to assess the risk that subsurface petroleum contamination at the site may pose to potentially sensitive receptors identified in the site vicinity. Additional tasks scheduled for the investigation (hand augering and soil screening in the drainage swale vicinity) were not conducted due to the winter weather conditions. These additional tasks will be conducted when the ground thaws.

II. SITE BACKGROUND

A. *Site History*

Petroleum contamination was detected in soils and groundwater at the site during a Phase II Site Assessment conducted for Blouin Brothers by Groundwater of Vermont in the fall of 1997 (1). Based on a review of the Phase II Report, the contaminant distribution suggests that the most significant source of the majority of the groundwater contamination was a former gasoline underground storage tank (UST). The UST was reportedly removed in 1986. Petroleum fingerprinting analyses conducted on groundwater samples during the Phase II indicate that the contaminants are a combination of both gasoline and diesel/No. 2 fuel.

According to Mr. Dan Carswell of Blouin Brothers, soils located in an area formerly utilized for the storage of waste oil had been reportedly excavated and polyencapsulated on the site. Soils located along a drainage swale on the northern boundary of the property line reportedly had historically been sprayed with petroleum products for the purpose of weed control.

For further information regarding Site History, the reader is referred to the October 30, 1997 Phase II Environmental Site Assessment completed by Groundwater of Vermont.

B. Site Description

The Blouin bulk fuel facility is located on Pleasant Street in Enosburg, Vermont. The area consists of a mix of residential and commercial properties. The subject property consists of approximately 1.2 acres of land. The property is bordered by Pleasant Street to the west, by an abandoned rail road line to the north, by residential properties to the south, and by a large ravine to the east. The Missisquoi River is located approximately 1,000 feet to the southeast of the site. The site is primarily flat and slopes slightly toward the north and east.

Structures on the property include a garage building for vehicle maintenance and storage, two storage sheds, an overhead canopy and bulk fuel loading platform, several above ground storage tanks (see table below), and a diesel fuel dispenser island. The following table lists the inventory of the ASTs at the site (1). The tank numbers listed below correspond to the tanks on the site sketch.

Tank Number	Volume (gallons)	Product	Approximate Age
1	100,000	No. 2 fuel oil	30 years
2	15,000	kerosene	50 years
3	15,000	kerosene	50 years
4	15,000	diesel	50 years
5	15,000	gasoline	50 years
6	5,000	empty	40 years
7	5,000	gasoline	40 years
8	5,000	diesel	40 years
9	500	diesel	7 years
10	1,000	gasoline	10 years
11	550	gasoline	unknown
12	550	diesel	unknown

C. Site Geologic Setting

According to the Surficial Geologic Map of Vermont [2], the site is underlain by lake bottom sediment consisting of silt, silty clay, and clay. Soils encountered during monitoring well installation consisted primarily of silt and clay. Bedrock at the site is mapped as being a Tibbit Hill volcanic member of the Pinnacle Formation [3].

Based on visual site inspections shallow groundwater in the vicinity of the Blouin site would be expected to flow to the east toward the Missisquoi River, following topographic contours.

III. INVESTIGATIVE PROCEDURES

A. Monitoring Well Installation

On January 7, 1999 and January 22, 1999 seven monitoring wells were installed by Adams Engineering of Underhill, VT, under the direct supervision of a Griffin engineer. These wells were installed to help define the extent of petroleum contamination. Soil borings were advanced with a truck mounted vibratory soil core sampler.

The monitoring wells are constructed of 1.5 inch diameter, schedule 40 PVC, with a length of 0.010-inch slotted screen; the length of the riser and the screened section of pipe varied depending on the depth of the well. With the vibratory method of drilling, the monitoring well is installed in the open borehole following removal of the sampler. The annulus between the borehole wall and the screened section of each well is filled with a sand pack to filter fine sediments in groundwater from entering the well. Above the sand pack, the annulus is filled with a 1 to 2 foot thick bentonite clay grout seal to prevent surface water from entering the borehole. Due to the collapse of soils in MW-5 and MW-6, a sand pack was not installed around these wells. Each well is protected at the surface by a flush mounted steel well head protective casing and a bolt down cover. The well head protection casing is set in cement. The soil boring logs and monitoring well as-built specifications are presented in Appendix B. The monitoring well locations are indicated on the Site Map (Appendix A).

B. Soil Boring and Screening

Undisturbed soil samples, collected from the boring with the sampler, were logged by the supervising geologist and screened for the presence of volatile organic compounds (VOCs) using an HNu™ systems photo ionizing detector (PID). Soils were screened using the Griffin Jar/Polyethylene Bag Headspace Screening Protocol, which conforms to state and industry standards. Detailed soil descriptions and VOC concentrations are listed on the well logs in Appendix B.

MW-1 is located in the northwest corner of the property, in the former gasoline UST area. Soil samples collected from grade to a depth of 5 feet below grade from this boring were non-detect for VOCs; the VOC concentration in soils collected from depths of 5 to 10 feet below grade was 50 parts per million (ppm).

MW-2 is located on the southwest corner of the AST field, approximately 50 feet downgradient of the former gasoline UST. VOC concentrations in soils from this boring were 190 ppm at depths of 0 to 4 feet; 30 ppm at depths of 4 to 5 feet; and 60 ppm at depths of 5 to 9 feet. Soil samples collected from depths greater than 9 feet below grade were non-detect for VOCs.

MW-3 is located on the southern side of the parking lot, southeast of the former gasoline UST. VOC concentrations in soils from this boring were 0.2 ppm at depths of 0 to 2 feet below grade. Soil samples collected from depths greater than 2 feet below grade were non-detect for VOCs.

MW-4 is located on the southeast corner of the AST field, approximately 140 feet downgradient of the former gasoline UST. There was no sample recovery from grade to a depth of 5 feet. VOC concentrations in soils from this boring were 15 ppm at depths of 5 to 6.5 feet; 31 ppm at depths of 6.5 to 7 feet; 40 ppm at depths of 7 to 7.5 feet; and 180 ppm at depths of 7.5 to 10.5 feet. Soil samples collected from depths greater than 10.5 feet below grade were non-detect for VOCs.

MW-5 is located to the southeast of the AST field, approximately 150 feet cross-to-down-gradient of the former gasoline UST. There was no sample recovery from grade to a depth of 5 feet. No VOCs were detected in any of the soil samples collected from MW-5.

MW-6 is located on the northern property boundary, approximately 200 feet downgradient of the former gasoline UST. There was no sample recovery from grade to a depth of 5 feet. No VOCs were detected in any of the soil samples collected from MW-6.

MW-7 is located on the southern property boundary, approximately 270 feet cross-to-down-gradient of the former gasoline UST. No VOCs were detected in any of the soil samples collected from MW-7.

Soil types from all borings were similar. Soil generally consisted of fine sand and silt underlain by clay. Monitoring wells containing sufficient water were developed immediately following installation with a peristaltic pump and dedicated tubing. Each well developed with a clean flow.

C. Determination of Groundwater Flow Direction and Gradient

On January 29, 1999, depth to water measurements were taken with the use of an MMCTM interface probe in all seven site wells. These measurements were subtracted from the top of casing elevations, which were determined relative to an arbitrary datum of 100 feet at the top of the casing for MW-3, to determine the water table elevation at each of the wells. Groundwater level data are recorded in Appendix C.

As displayed on the groundwater contour map included in Appendix A, the groundwater flow direction for January 29, 1999, was estimated to be to the northeast at a gradient varying from approximately 1.25% on the eastern portion of the site to approximately 2.5% on the central portion of the property. The water table elevations calculated for MW-4 and MW-7 are extremely low in comparison to that of the rest of the site. This is likely due to the greater depth of the clay confining layer in the vicinity of these two wells; the water table elevations for MW-4 and MW-7 were not taken into account for the calculation of groundwater flow direction or

gradient. No free phase petroleum product was observed in any of the monitoring wells gauged on January 29, 1999.

D. Groundwater Sample Collection and Analysis

On January 29, 1999 samples of the groundwater were collected from each of the seven monitoring wells. Samples were analyzed per EPA Method 602 for benzene, toluene, ethyl benzene, and xylenes (BTEX), and methyl tertiary butyl ether (MTBE). Results of the laboratory analyses for wells sampled on January 29, 1999 are summarized in Appendix D. Laboratory report forms are presented in Appendix E.

Benzene, toluene, and ethylbenzene were detected in the sample collected from MW-1 at concentrations exceeding the Vermont Groundwater Enforcement Standards (VGESs) for those compounds. Benzene and ethylbenzene were detected in the sample collected from MW-2 at concentrations exceeding the VGESs for those compounds. No other targeted compounds were present above VGES in the samples collected from MW-1 or MW-2. Low levels of toluene, ethylbenzene, and xylenes were detected in the sample collected from MW-4. Due to the contaminant concentrations, the detection limit for MTBE was raised to levels exceeding the VGES in the samples for MW-1, MW-2, and MW-4. None of the petroleum compounds targeted by EPA Method 602 were found above detection limits in the primary groundwater samples collected from MW-3, MW-5, MW-6, or MW-7.

All samples were collected according to Griffin's groundwater sampling protocol which complies with industry and state standards. Results from the analyses of the trip blank sample indicate that adequate quality assurance and control (QA/QC) were maintained during sample collection and analysis.

The samples collected from MW-3, MW-5, MW-6, and MW-7, which are located in a hydraulically cross to downgradient directions of the former gasoline UST area and the bulk fuel area dispenser area, were non-detect for all compounds targeted by the analysis. Based on these facts, the downgradient extent of the dissolved contaminant plume is currently limited to the source areas.

E. Sensitive Receptor Risk Assessment

A visual survey of the area surrounding the Blouin site was conducted at the time of monitoring well installation. Based on these observations, an estimation of the potential risk to identified receptors was made based on proximity to the source areas, groundwater flow direction, and contaminant concentration levels in subsurface soils and groundwater.

Water Supplies

The Village of Enosburg receives its water from two drilled bedrock wells located approximately

5 miles to the east of the site in the town of Berkshire (1). It is not likely that the town water supply is at risk of petroleum contamination from the Blouin site given its sufficient distance from the site. Properties immediately surrounding Blouin are reportedly all served by this municipal water source (1).

Buildings in the Vicinity

The maintenance/storage garage is the only fully enclosed building located on the subject property. The building is constructed on a slab foundation. The garage is used to store and repair bulk fuel delivery trucks. Based on the distance between the building and the source area, there is likely little risk of petroleum vapor migration posed to the maintenance/storage garage by the subsurface contamination present at the site.

Surface Water

The Missisquoi River is located approximately 1,000 feet to the southeast of the site. Based on the distance between the Blouin site and the Missisquoi River, as well as the low source strength, the environmental risk posed by the contamination at the site to the Missisquoi River is considered minimal.

Utility Corridors

Underground utilities (municipal water and municipal wastewater/stormwater collection) cross the site in both a north-south direction and in an east-west direction. Based on a sketch provided by the Town of Enosburg, the municipal water line is believed to cross the property from east to west on the southern property boundary, along MW-3, MW-5, and MW-7. A stormwater collection system passes through the property from north to south in the area between MW-4 and MW-6. The catch basins associated with the stormwater collection system were frozen over at the time of the investigation and could not be inspected for petroleum contamination. Based on the fact that no contamination was detected in the presumed vicinity of the municipal water line, and the lack of contamination detected in the vicinity of the stormwater utility, the potential for dissolved contaminant migration through utility corridors is considered negligible.

IV. CONCLUSIONS

Based on the initial site investigation of petroleum contamination associated with the Blouin site, the following conclusions are offered:

1. As displayed on the groundwater contour map included in Appendix A, the groundwater flow direction for January 29, 1999, was estimated to be to the northeast at a gradient varying from approximately 1.25% on the eastern portion of the site to approximately 2.5% on the central portion of the property.

2. There was no free product present in any of the site wells on January 29, 1999.
3. None of the petroleum compounds targeted by EPA Method 602 were found above detection limits in the primary groundwater samples collected from MW-3, MW-5, MW-6, or MW-7.
4. Benzene, toluene, and ethylbenzene were detected in the sample collected from MW-1 at concentrations exceeding the VGESs for those compounds. Benzene and ethylbenzene were detected in the sample collected from MW-2 at concentrations exceeding the VGESs for those compounds. No other targeted compounds were present above VGES in the samples collected from MW-1 and MW-2. Low levels of toluene, ethylbenzene, and xylenes were detected in the sample collected from MW-4.
5. The contaminant distribution suggests that the most significant source of the majority of the groundwater contamination was the former gasoline UST.
6. The apparent major source of contamination at the site (former gasoline UST) has been closed and removed from the site.
7. The samples collected from MW-3, MW-5, MW-6, and MW-7, which are located in a hydraulically cross to downgradient directions of the former gasoline UST area and the bulk fuel area dispenser area, were non-detect for all compounds targeted by the analysis. Based on these facts, the downgradient extent of the dissolved contaminant plume is currently limited to the source areas.
8. Due to the winter weather conditions, the petroleum contaminated soil stockpile was not assessed. In addition, also due to the weather conditions, the drainage swale on the northern property boundary where petroleum was reportedly used for weed control was not assessed.
9. Over time, the natural processes of dilution, dispersion, and biodegradation will continue to reduce dissolved contaminant concentrations present in the subsurface at the Blouin site.
10. Other than site soils and groundwater in the direct vicinity of the source area, there are no known receptors currently affected by subsurface petroleum contamination at the Blouin facility, and none are deemed at significant risk, based on currently available data.

V. RECOMMENDATIONS

Based upon the above conclusions, Griffin offers the following recommendations:

In order to monitor and track the expected decrease in contaminant concentrations, the on-site monitoring wells should be sampled on a quarterly basis for one year (three more sampling

events). The next sampling event will take place in April of 1999. These samples will be analyzed by EPA Method 8021B for the presence of petroleum related compounds. Following one year of quarterly sampling, Griffin will review the data and determine what further work (if any) may be necessary. Additional sampling events will be conducted in accordance with the Griffin workplan/cost estimate dated January 23, 1997.

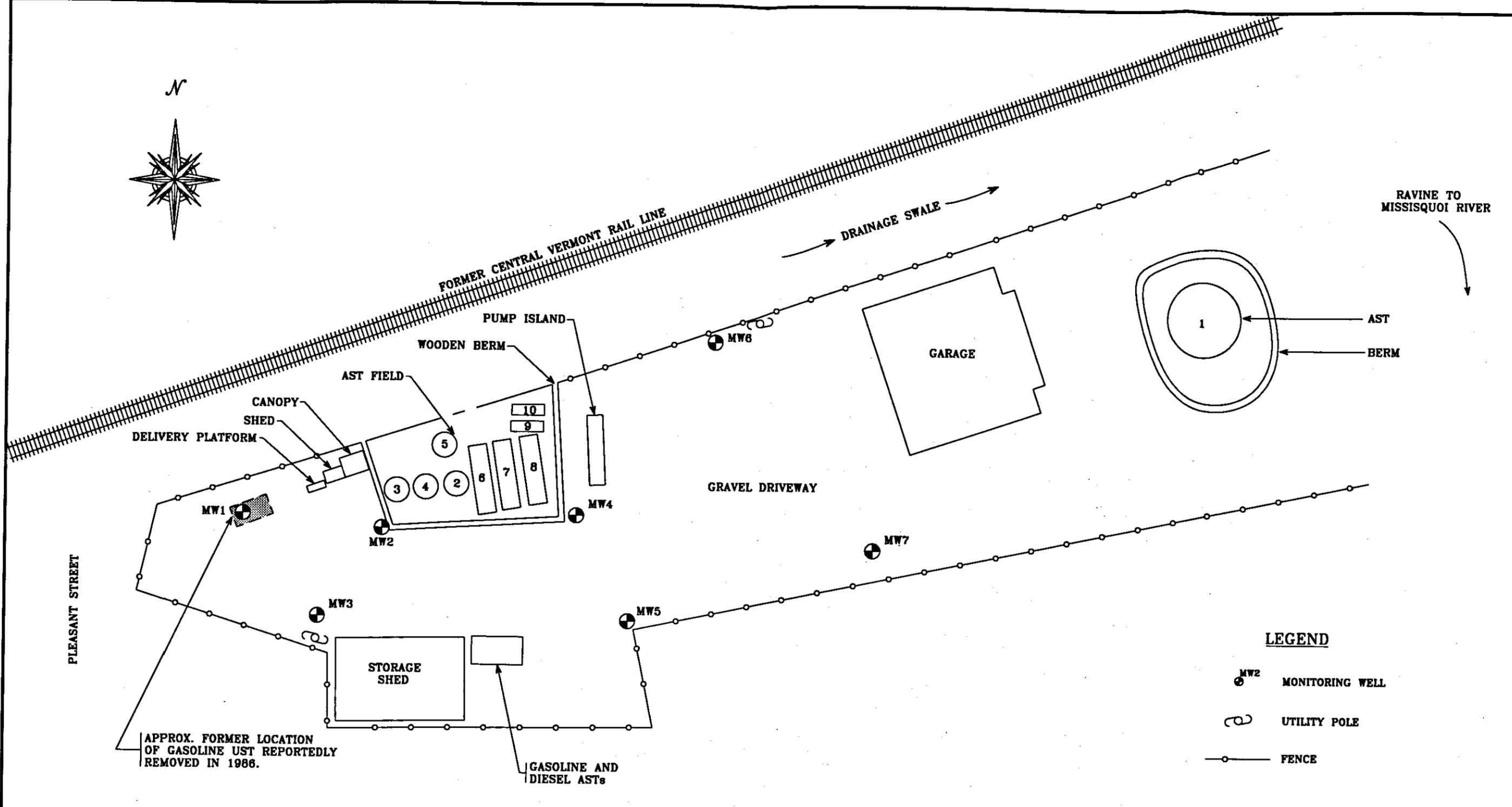
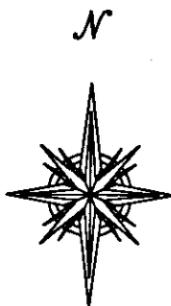
Inspection of the petroleum contaminated soil stockpile and of the drainage swale area will be conducted when the ground has thawed. This work will likely be conducted in April during the quarterly monitoring event and will be conducted in accordance with the Griffin workplan/cost estimate dated January 23, 1997.

REFERENCES

1. Groundwater of Vermont, October 31, 1996, *Phase II Environmental Site Assessment of Blouin Brothers, Inc., Enosburg, VT.*
2. Doll, Charles G., ed., 1970, Surficial Geologic Map of Vermont, State of Vermont.
3. Doll, Charles G., ed., 1961, Centennial Geologic Map of Vermont, State of Vermont.

APPENDIX A

Maps



APPROX. FORMER LOCATION OF GASOLINE UST REPORTEDLY REMOVED IN 1986.

GASOLINE AND DIESEL ASTs

LEGEND

- MW2 MONITORING WELL
- UTILITY POLE
- FENCE

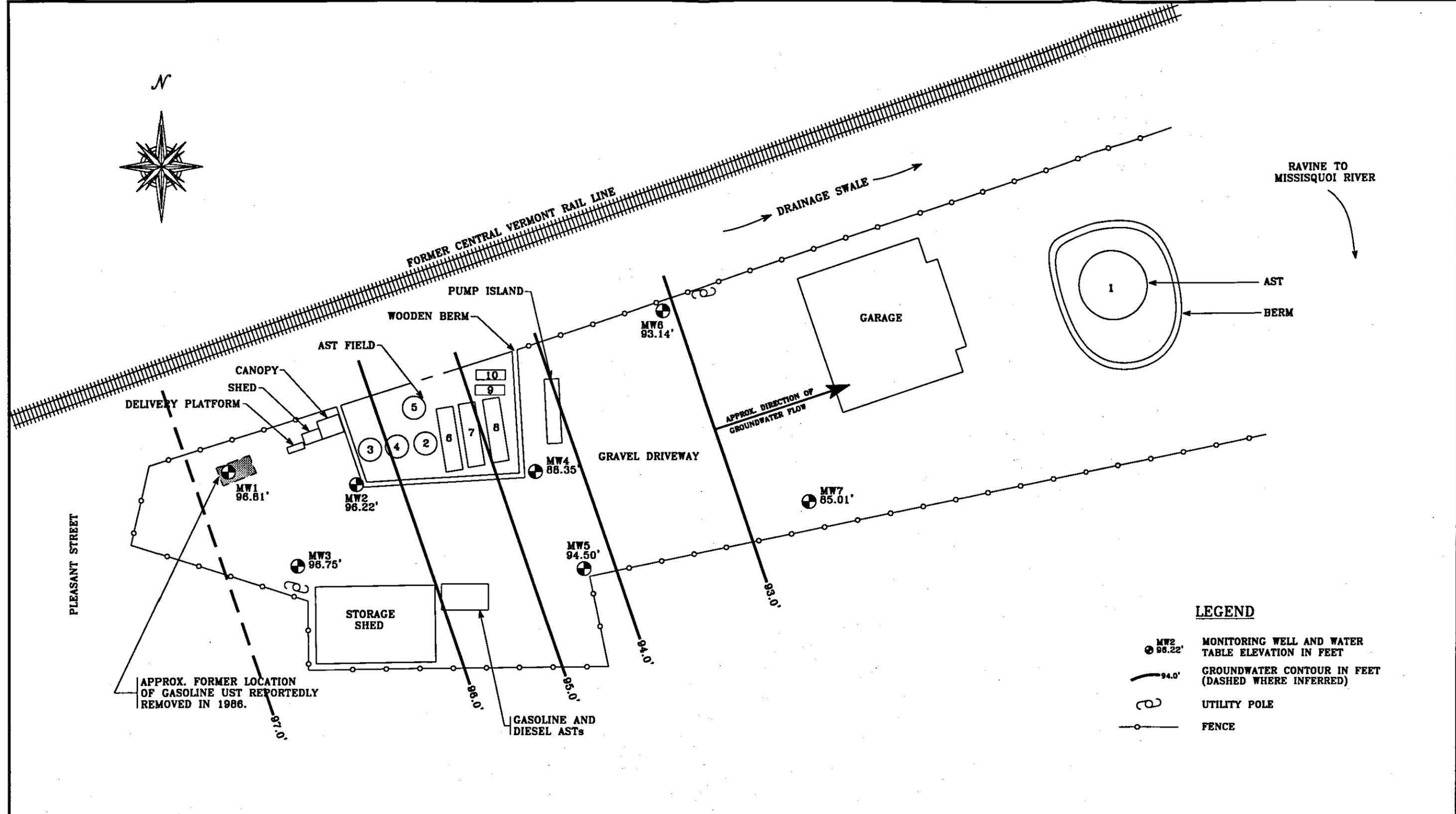
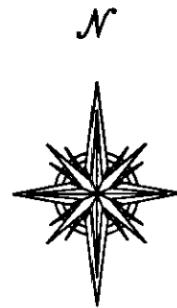
NOTE: SITE SKETCH ADAPTED FROM A SITE PLAN BY GROUND WATER OF VERMONT DATED OCT. 98. MONITORING WELLS SURVEYED BY GRIFFIN INTERNATIONAL.



JOB NO. 129841451

BLOUIN BROTHERS, INC.
 ENOSBURG, VERMONT
 SITE SKETCH

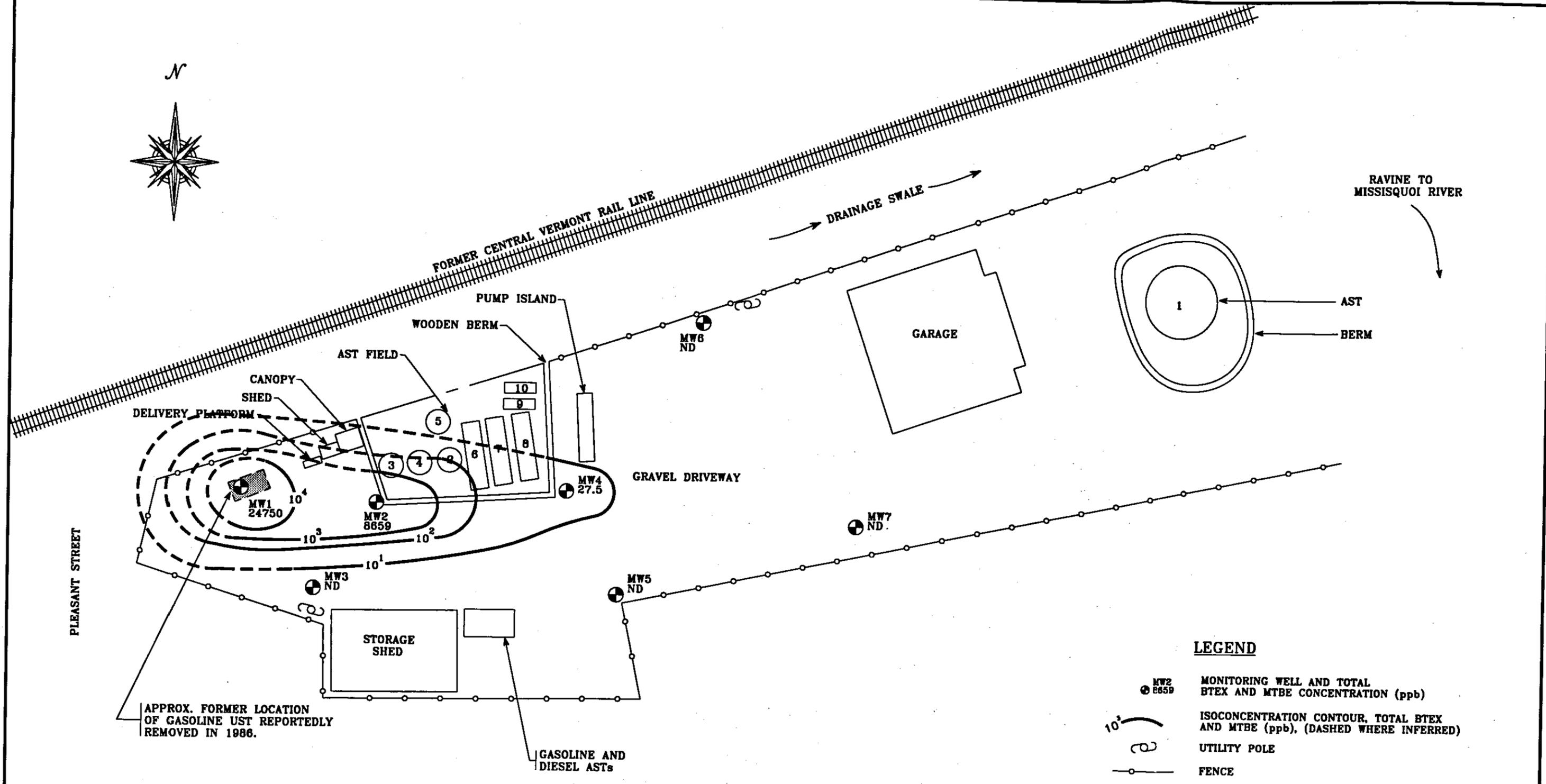
DATE: 3/1/99	DWG.#: 2	SCALE: 1"=40'	DRN.: SJB	APP.: RH
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- LEGEND**
- MW2 96.22' MONITORING WELL AND WATER TABLE ELEVATION IN FEET
 - 94.0' GROUNDWATER CONTOUR IN FEET (DASHED WHERE INFERRED)
 - UTILITY POLE
 - FENCE

NOTE: SITE SKETCH ADAPTED FROM A SITE PLAN BY GROUND WATER OF VERMONT DATED OCT. 96, MONITORING WELLS SURVEYED BY GRIFFIN INTERNATIONAL

 GRIFFIN INTERNATIONAL	JOB NO. 129841451		BLOUIN BROTHERS, INC.	
			ENOSBURG, VERMONT	
			GROUNDWATER CONTOUR MAP MEASUREMENT DATE: 1/29/99	
DATE: 3/1/99	DWG.#: 3	SCALE: 1"=40'	DRN.: SJB	APP.: RH



LEGEND

- MW2 8659 MONITORING WELL AND TOTAL BTEX AND MTBE CONCENTRATION (ppb)
- 10³ ISOCENTRATION CONTOUR, TOTAL BTEX AND MTBE (ppb), (DASHED WHERE INFERRED)
- UTILITY POLE
- FENCE

APPROX. FORMER LOCATION OF GASOLINE UST REPORTEDLY REMOVED IN 1986.

GASOLINE AND DIESEL ASTs

	JOB NO. 129841451			
	BLOUIN BROTHERS, INC.			
ENOSBURG, VERMONT				
CONTAMINANT DISTRIBUTION MAP				
SAMPLE DATE: 1/29/99				
DATE: 3/1/99	DWG.#: 4	SCALE: 1"=40'	DRN.: SJB	APP.: RH

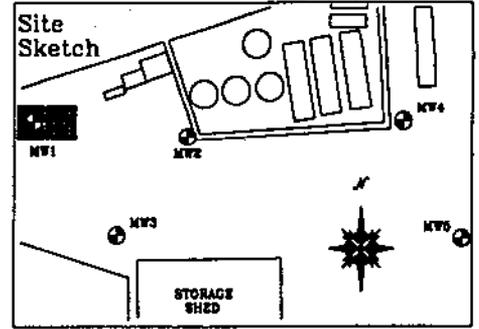
NOTE: SITE SKETCH ADAPTED FROM A SITE PLAN BY GROUND WATER OF VERMONT DATED OCT. 96, MONITORING WELLS SURVEYED BY GRIFFIN INTERNATIONAL.

APPENDIX B

Well Logs

PROJECT BLOUIN BROS. OIL CO.
 LOCATION ENOSBURG, VERMONT
 DATE DRILLED 1/22/99 TOTAL DEPTH OF HOLE 10.0'
 DIAMETER 2.75"
 SCREEN DIA. 1.5" LENGTH 8.0' SLOT SIZE 0.010"
 CASING DIA. 1.5" LENGTH 1.0' TYPE sch 40 pvc
 DRILLING CO. ADAMS ENGR. DRILLING METHOD VIBRATORY
 DRILLER GERRY ADAMS LOG BY R. HIGGINS

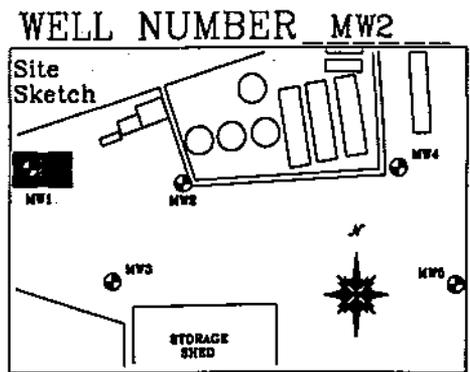
WELL NUMBER MW1



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
0-1	CONCRETE		0'-1'		1
0-1	BENTONITE		0 ppm		1
1	WELL RISER			SANDS WITH FINES (SC) 30% silt, no dilatancy, low toughness, low plasticity, high dry strength, soft consistency, fines; 70% medium, subangular sand, poorly graded, weak cementation, black, moist.	2
2					3
3				4.0' WATER TABLE	4
4	SAND PACK				5
5					6
6	WELL SCREEN			SILTS AND CLAYS (CH)- 100% clay, no dilatancy, high toughness, medium plasticity, very high dry strength, fines; very hard consistency, gray, moist.	7
7			5'-10'		8
8	BOTTOM CAP		50 ppm		9
9					10
10	UNDISTURBED NATIVE SOIL			BASE OF WELL AT 9.5'	11
11				END OF EXPLORATION AT 10.0'	12
12					13
13					14
14					15
15					16
16					17
17					18
18					19
19					20
20					21
21					22
22					23
23					24
24					25

PROJECT BLOUIN BROS. OIL CO.
 LOCATION ENOSBURG, VERMONT
 DATE DRILLED 1/22/99 TOTAL DEPTH OF HOLE 12.0'
 DIAMETER 2.75"
 SCREEN DIA. 1.5" LENGTH 7.5' SLOT SIZE 0.010"
 CASING DIA. 1.5" LENGTH 0.5' TYPE sch 40 pvc
 DRILLING CO. ADAMS ENGR. DRILLING METHOD VIBRATORY
 DRILLER GERRY ADAMS LOG BY R. HIGGINS



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 LOCKING WELL CAP CONCRETE BENTONITE				0
1	WELL RISER		0'-4' 190 ppm	CLEAN SAND (SW)- 10% silt, rapid dilatancy, low toughness, low plasticity, high dry strength, fines; soft consistency, 90% medium, rounded sand, well graded, weak cementation, gray, moist.	1
2					2
3	SAND PACK				3
4			4'-5' 30 ppm	4.0' WATER TABLE	4
5	WELL SCREEN			SANDS WITH FINES (SM)- 40% silt, slow dilatancy, low toughness, low plasticity, high dry strength, fines; firm consistency, 80% medium, angular sand, poorly graded, weak cementation.	5
6					6
7	BOTTOM CAP		5'-9' 60 ppm	SILTS AND CLAYS (ML)- 100% silt, rapid dilatancy, medium toughness, low plasticity, high dry strength, fines; firm consistency, gray, wet.	7
8					8
9					9
10			9'-12' 0 ppm	SILTS AND CLAYS (CH)- 100% clay, slow dilatancy, medium toughness, high plasticity, high dry strength, fines; hard consistency, gray, moist.	10
11					11
12	UNDISTURBED NATIVE SOIL			BASE OF WELL AT 8.5' END OF EXPLORATION AT 12.0'	12
13					13
14					14
15					15
16					16
17					17
18					18
19					19
20					20
21					21
22					22
23					23
24					24
25					25

PROJECT BLOUIN BROS. OIL CO.

LOCATION ENOSBURG, VERMONT

DATE DRILLED 1/7/99 TOTAL DEPTH OF HOLE 12.5'

DIAMETER 2.75"

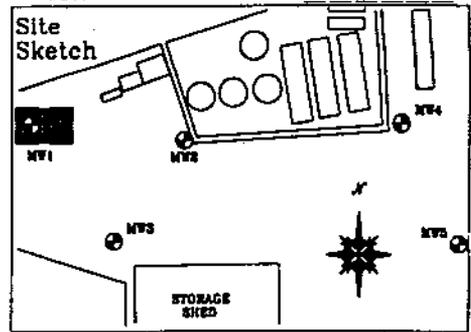
SCREEN DIA. 1.5" LENGTH 10.0' SLOT SIZE 0.010"

CASING DIA. 1.5" LENGTH 2.0' TYPE sch 40 pvc

DRILLING CO. ADAMS ENGR. DRILLING METHOD VIBRATORY

DRILLER GERRY ADAMS LOG BY R. HIGGINS

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
0	CONCRETE				0
1	BENTONITE		0'-2'	SANDS WITH FINES (SC) 75% silt, rapid dilatancy, low toughness, low plasticity, medium dry strength, soft consistency, fines; 25% fine, subrounded sand, well graded, weak cementation, black, dry.	1
2	WELL RISER		0.2 ppm		2
3				CLEAN SAND (SW) 100% medium, subrounded sand, well graded, weak cementation, brown, dry.	3
4			2'-6.5'		4
5	SAND PACK		0 ppm	SILTS AND CLAYS (CL) 85% silt, rapid dilatancy, medium toughness, medium plasticity, high dry strength, firm consistency, fines; 15% fine, rounded sand, well graded, weak cementation, gray, wet.	5
6					6
7			6.5'-8.5'		7
8			0 ppm	8.0' WATER TABLE	8
9	WELL SCREEN			SILTS AND CLAYS (CL) 100% clay, no dilatancy, high toughness, medium plasticity, high dry strength, hard consistency, fines; gray, moist.	9
10			8.5'-12.5'		10
11			0 ppm		11
12	BOTTOM CAP				12
13	UNDISTURBED NATIVE SOIL			BASE OF WELL AT 12.5'	13
14				END OF EXPLORATION AT 12.5'	14
15					15
16					16
17					17
18					18
19					19
20					20
21					21
22					22
23					23
24					24
25					25

PROJECT BLOUIN BROS. OIL CO.

LOCATION ENOSBURG, VERMONT

DATE DRILLED 1/7/99 TOTAL DEPTH OF HOLE 15.0'

DIAMETER 2.75"

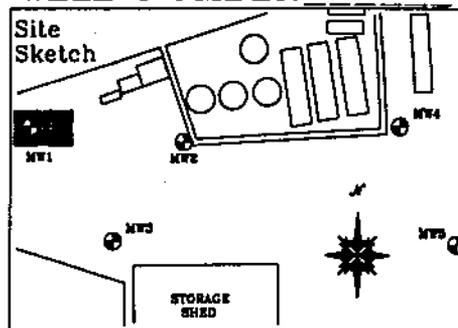
SCREEN DIA. 1.5" LENGTH 10.0' SLOT SIZE 0.010"

CASING DIA. 1.5" LENGTH 4.5' TYPE sch 40 pvc

DRILLING CO. ADAMS ENGR. DRILLING METHOD VIBRATORY

DRILLER GERRY ADAMS LOG BY R. HIGGINS

WELL NUMBER MW4



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
1					1
2	BENTONITE				2
3				SILT AND CLAYS (ML) 70% silt and clay, rapid dilatancy, low toughness, medium plasticity, medium dry strength, soft consistency, fines; 30% medium, subrounded sand, poorly graded, brown, moist.	3
4					4
5	WELL RISER		5'-6.5' 15 ppm	SILTS AND CLAYS (ML) 50% silt, rapid dilatancy, low toughness, medium plasticity, medium dry strength, soft consistency, fines; 50% coarse, subrounded sand, poorly graded, reddish, moist.	5
6					6
7					7
8	SAND PACK		6.5'-7' 15 ppm	SILTS AND CLAYS (ML) 75% silt and clay, rapid dilatancy, low toughness, medium plasticity, medium dry strength, soft consistency, fines; 25% fine, rounded sand, well graded, black, moist, kerosene odor.	8
9					9
10					10
11	WELL SCREEN		7'-7.5' 40 ppm	SILT AND CLAY (CL) 85% clay, rapid dilatancy, low toughness, medium plasticity, medium dry strength, soft consistency, fines; 15% fine, rounded, sand, well graded, gray, wet, kerosene odor.	11
12					12
13					13
14	BOTTOM CAP		7.5'-10.5' 180 ppm	11.0' WATER TABLE	13
15	UNDISTURBED NATIVE SOIL		10.5'-15' 0 ppm	SILT AND CLAY (CH) 100% clay, slow dilatancy, high toughness, high plasticity, high dry strength, soft consistency, fines; moist.	14
16					15
17					16
18					17
19					18
20					19
21					20
22					21
23					22
24					23
25					24
					25
					25

PROJECT BLOUIN BROS. OIL CO.

LOCATION ENOSBURG, VERMONT

DATE DRILLED 1/7/99 TOTAL DEPTH OF HOLE 20.0

DIAMETER 2.75"

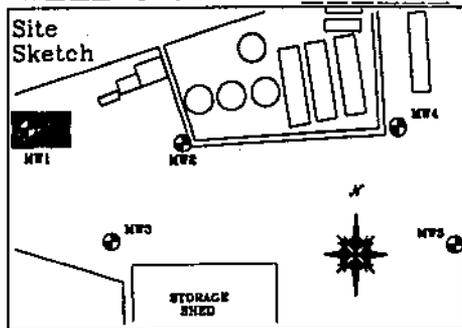
SCREEN DIA. 1.5" LENGTH 10.0' SLOT SIZE 0.010"

CASING DIA. 1.5" LENGTH 7.5' TYPE sch 40 pvc

DRILLING CO. ADAMS ENGR. DRILLING METHOD VIBRATORY

DRILLER GERRY ADAMS LOG BY R. HIGGINS

WELL NUMBER MW5



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
1		BENTONITE			1
2					2
3					3
4		WELL RISER			4
5			5'-6.5'		5
6			0 ppm	SILT AND CLAY (MH) 100% silt, rapid dilatancy, low toughness, low plasticity, high dry strength, soft consistency, fines; yellowish orange, wet.	6
7					7
8		COLLAPSED NATIVE SOIL			8
9			6.5'-14.5'		9
10			0 ppm	SILT AND CLAY (CH) 100% silt, slow dilatancy, medium toughness, high plasticity, high dry strength, soft consistency, fines; light gray, dry.	10
11					11
12					12
13					13
14		WELL SCREEN			14
15				15.0' WATER TABLE	15
16					16
17		BOTTOM CAP	14.5'-20'		17
18			0 ppm	SILT AND CLAY (CH) 100% clay, rapid dilatancy, high toughness, high plasticity, high dry strength, very soft consistency, fines; light gray, moist to wet.	18
19					19
20		UNDISTURBED NATIVE SOIL			20
21				BASE OF WELL AT 18.0' END OF EXPLORATION AT 20.0'	21
22					22
23					23
24					24
25					25

PROJECT BLOUIN BROS. OIL CO.

LOCATION ENOSBURG, VERMONT

DATE DRILLED 1/7/99 TOTAL DEPTH OF HOLE 20.0

DIAMETER 2.75"

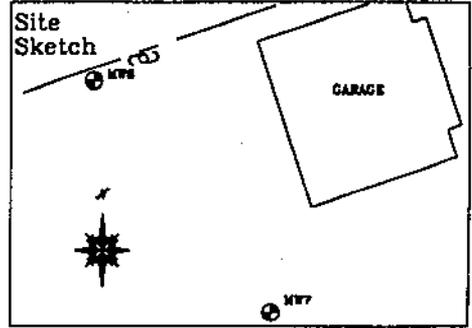
SCREEN DIA. 1.5" LENGTH 10.0' SLOT SIZE 0.010"

CASING DIA. 1.5" LENGTH 7.5' TYPE sch 40 pvc

DRILLING CO. ADAMS ENGR. DRILLING METHOD VIBRATORY

DRILLER GERRY ADAMS LOG BY R. HIGGINS

WELL NUMBER MW6

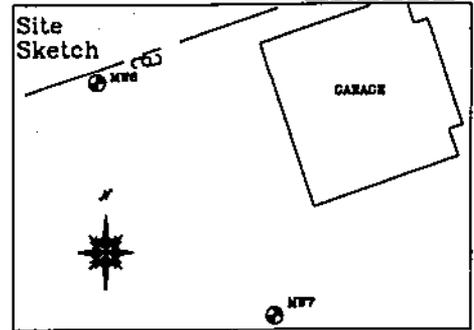


GRIFFIN INTERNATIONAL, INC

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	LOCKING WELL CAP			0
1	CONCRETE	BENTONITE			1
2					2
3					3
4	WELL RISER				4
5					5
6					6
7					7
8		COLLAPSED NATIVE SOIL	5'-13' 0 ppm	SILT AND CLAY (CH) 100% clay, no dilatancy, medium toughness, high plasticity, high dry strength, hard consistency, fines; gray, dry.	8
9					9
10					10
11					11
12					12
13				13.0' WATER TABLE	13
14	WELL SCREEN			SILT AND CLAY (CH) 100% clay, rapid dilatancy, high toughness, high plasticity, high dry strength, very soft consistency, fines; light gray, wet.	14
15			13'-18' 0 ppm		15
16					16
17	BOTTOM CAP				17
18				SILT AND CLAY (CH) 100% clay, slow dilatancy, high toughness, high plasticity, medium dry strength, soft consistency, fines; gray, wet.	18
19			18'-20' 0 ppm		19
20	UNDISTURBED NATIVE SOIL			BASE OF WELL AT 18.0' END OF EXPLORATION AT 20.0'	20
21					21
22					22
23					23
24					24
25					25

PROJECT BLOUIN BROS. OIL CO.
 LOCATION ENOSBURG, VERMONT
 DATE DRILLED 1/22/99 TOTAL DEPTH OF HOLE 20.0
 DIAMETER 2.75"
 SCREEN DIA. 1.5" LENGTH 10.0' SLOT SIZE 0.010"
 CASING DIA. 1.5" LENGTH 6.5' TYPE sch 40 pvc
 DRILLING CO. ADAMS ENGR. DRILLING METHOD VIBRATORY
 DRILLER GERRY ADAMS LOG BY R. HIGGINS

WELL NUMBER MW7



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
0-1	CONCRETE				1
0-1	NATIVE BACKFILL				1
1-2	BENTONITE		1'-5' 0 ppm	CLEAN GRAVEL (GW)- 100% fine, angular to rounded gravel, well graded, moderate cementation, yellowish orange, dry.	2
2-3					3
3-4					4
4-5					5
5-6	WELL RISER		5'-7.5' 0 ppm	GRAVEL WITH FINES (GC)- 40% silt, rapid dilatancy, low toughness, nonplastic, high dry strength, fines; soft consistency, 80% fine gravel, well graded, weak cementation, gray, dry, some organic material.	6
6-7					7
7-8					8
8-9	SAND PACK		7.5'-10.5' 0 ppm	SILTS AND CLAYS (OL)- 90% silt, slow dilatancy, low toughness, low plasticity, high dry strength, fines; soft consistency, 10% fine, angular sand, well graded, weak cementation, black, moist, some organic material.	9
9-10					10
10-11			10.5'-11.5' 0 ppm	GRAVEL WITH FINES (GC)- 20% rapid dilatancy, low toughness, low plasticity, high dry strength, fines; soft consistency, 80% fine, angular gravel, well graded, gray, wet.	11
11-12	WELL SCREEN		11.5'-15' 0 ppm		12
12-13					13
13-14				13.0' WATER TABLE	14
14-15					15
15-16	BOTTOM CAP			SILTS AND CLAYS (CL)- 100% silt and clay, rapid dilatancy, medium toughness, medium plasticity, high dry strength, fines; firm consistency, gray, wet.	16
16-17					17
17-18			15'-20' 0 ppm	SILTS AND CLAYS (CH)- 100% clay, no dilatancy, medium toughness, medium plasticity, very high dry strength, fines; very hard consistency.	18
18-19					19
19-20					20
20-21	UNDISTURBED NATIVE SOIL			BASE OF WELL AT 17.0' END OF EXPLORATION AT 20.0'	21
21-22					22
22-23					23
23-24					24
24-25					25

APPENDIX C

Liquid Level Monitoring Data

Liquid Level Monitoring Data
Blouin Brothers Oil Company
Enosburg, VT

Monitoring Date: 1/29/99

Well I.D.	Top of Casing Elevation	Depth To Product	Depth To Water	Product Thickness	Specific Gravity Of Product	Hydro Equivalent	Corrected Depth To Water	Corrected Water Table Elevation
MW-1	99.65	-	2.84	-	-	-	2.84	96.81
MW-2	97.97	-	1.75	-	-	-	1.75	96.22
MW-3	100.00	-	3.25	-	-	-	3.25	96.75
MW-4	97.51	-	9.16	-	-	-	9.16	88.35
MW-5	97.21	-	2.71	-	-	-	2.71	94.50
MW-6	97.89	-	4.75	-	-	-	4.75	93.14
MW-7	95.86	-	10.85	-	-	-	10.85	85.01

All Values Presented in Units of Feet

APPENDIX D

Groundwater Analytical Data

**Groundwater Quality Summary
Blouin Brothers Oil Company
Enosburg, VT**

PARAMETER	MW1				VGES
	1/29/99				
MTBE	<1,000				40
Benzene	1,970.				5
Toluene	9,080.				1,000
Ethylbenzene	1,600.				700
Xylenes	12,100.				10,000
Chlorobenzene	<100				100
1,2-DCB	<100				600
1,3-DCB	<100				600
1,4-DCB	<100				75
Total BTEX	24,750.				-
BTEX + MTBE	24,750.				-

PARAMETER	MW2				VGES
	1/29/99				
MTBE	<500				40
Benzene	2,170.				5
Toluene	579.				1,000
Ethylbenzene	1,510.				700
Xylenes	4,400.				10,000
Chlorobenzene	<50				100
1,2-DCB	<50				600
1,3-DCB	<50				600
1,4-DCB	<50				75
Total BTEX	8,659.				-
BTEX + MTBE	8,659.				-

all values in parts per billion (ppb)

TBQ - trace below quantitation limit

Analysis per EPA Method 602

VGES - Vermont Groundwater Enforcement Standard

**Groundwater Quality Summary
Blouin Brothers Oil Company
Enosburg, VT**

PARAMETER	MW3				VGES
	1/29/99				
MTBE	<10				40
Benzene	<1				5
Toluene	<1				1,000
Ethylbenzene	<1				700
Xylenes	<1				10,000
Chlorobenzene	<1				100
1,2-DCB	<1				600
1,3-DCB	<1				600
1,4-DCB	<1				75
Total BTEX					-
BTEX + MTBE					-

PARAMETER	MW4				VGES
	1/29/99				
MTBE	<50				40
Benzene	<5				5
Toluene	6.6				1,000
Ethylbenzene	10.0				700
Xylenes	10.9				10,000
Chlorobenzene	<5				100
1,2-DCB	<5				600
1,3-DCB	<5				600
1,4-DCB	<5				75
Total BTEX	27.5				-
BTEX + MTBE	27.5				-

all values in parts per billion (ppb)

TBQ - trace below quantitation limit

Analysis per EPA Method 602

VGES - Vermont Groundwater Enforcement Standard

**Groundwater Quality Summary
Blouin Brothers Oil Company
Enosburg, VT**

PARAMETER	MW5				VGES
	1/29/99				
MTBE	<10				40
Benzene	<1				5
Toluene	<1				1,000
Ethylbenzene	<1				700
Xylenes	<1				10,000
Chlorobenzene	<1				100
1,2-DCB	<1				600
1,3-DCB	<1				600
1,4-DCB	<1				75
Total BTEX					-
BTEX + MTBE					-

PARAMETER	MW6				VGES
	1/29/99				
MTBE	<10				40
Benzene	<1				5
Toluene	<1				1,000
Ethylbenzene	<1				700
Xylenes	<1				10,000
Chlorobenzene	<1				100
1,2-DCB	<1				600
1,3-DCB	<1				600
1,4-DCB	<1				75
Total BTEX					-
BTEX + MTBE					-

all values in parts per billion (ppb)

TBQ - trace below quantitation limit

Analysis per EPA Method 602

VGES - Vermont Groundwater Enforcement Standard

**Groundwater Quality Summary
Blouin Brothers Oil Company
Enosburg, VT**

PARAMETER	MW7			VGES
	1/29/99			
MTBE	<10			40
Benzene	<1			5
Toluene	<1			1,000
Ethylbenzene	<1			700
Xylenes	<1			10,000
Chlorobenzene	<1			100
1,2-DCB	<1			600
1,3-DCB	<1			600
1,4-DCB	<1			75
Total BTEX				-
BTEX + MTBE				-

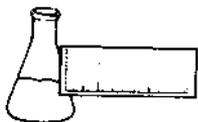
all values in parts per billion (ppb)

TBO - trace below quantitation limit

Analysis per EPA Method 602

VGES - Vermont Groundwater Enforcement Standard

APPENDIX E
Laboratory Analysis Reports



ENDYNE, INC.

Laboratory Services

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

REPORT OF LABORATORY ANALYSIS

CLIENT: Griffin International

PROJECT CODE: 1220

PROJECT NAME: Blouin Bros. Oil/129841451

REF.#: 134,372 - 134,380

REPORT DATE: February 3, 1999

DATE SAMPLED: January 29, 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.

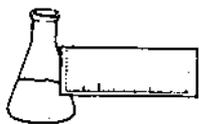
Analytical method precision and accuracy was monitored by laboratory control standards which included matrix spike, duplicate and quality control analyses. These standards were determined to be within established laboratory method acceptance limits.

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

enclosures



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

EPA METHOD 602--PURGEABLE AROMATICS

CLIENT: Griffin International DATE RECEIVED: February 1, 1999
 PROJECT NAME: Blouin Bros. Oil/129841451 REPORT DATE: February 3, 1999
 CLIENT PROJ. #: 129841451 PROJECT CODE: 1220

Ref. #:	134,372	134,373	134,374	134,375	134,376
Site:	Trip	MW-1	MW-2	MW-3	MW-4
Date Sampled:	1/29/99	1/29/99	1/29/99	1/29/99	1/29/99
Time Sampled:	6:30	9:55	9:48	9:40	9:28
Sampler:	Steve	Steve	Steve	Steve	Steve
Date Analyzed:	2/2/99	2/2/99	2/2/99	2/2/99	2/2/99
UIP Count:	0	>10	>10	0	>10
Dil. Factor (%):	100	1	2	100	20
Surr % Rec. (%):	88	87	81	102	89

Parameter	Conc. (ug/L)				
MTBE	<10	<1000	<500	<10	<50
Benzene	<1	1,970.	2,170.	<1	<5
Toluene	<1	9,080.	579.	<1	6.6
Ethylbenzene	<1	1,600.	1,510.	<1	10.0
Xylenes	<1	12,100.	4,400.	<1	10.9
Chlorobenzene	<1	<100	<50	<1	<5
1,3-Dichlorobenzene	<1	<100	<50	<1	<5
1,4-Dichlorobenzene	<1	<100	<50	<1	<5
1,2-Dichlorobenzene	<1	<100	<50	<1	<5

Ref. #:	134,377	134,378	134,379	134,380	
Site:	MW-5	MW-6	Dup MW-6	MW-7	
Date Sampled:	1/29/99	1/29/99	1/29/99	1/29/99	
Time Sampled:	9:22	9:12	9:12	9:05	
Sampler:	Steve	Steve	Steve	Steve	
Date Analyzed:	2/2/99	2/2/99	2/3/99	2/2/99	
UIP Count:	0	0	0	0	
Dil. Factor (%):	100	100	100	100	
Surr % Rec. (%):	99	93	98	95	

Parameter	Conc. (ug/L)	Conc. (ug/L)	Conc. (ug/L)	Conc. (ug/L)	
MTBE	<10	<10	<10	<10	
Benzene	<1	<1	<1	<1	
Toluene	<1	<1	<1	<1	
Ethylbenzene	<1	<1	<1	<1	
Xylenes	<1	<1	<1	<1	
Chlorobenzene	<1	<1	<1	<1	
1,3-Dichlorobenzene	<1	<1	<1	<1	
1,4-Dichlorobenzene	<1	<1	<1	<1	
1,2-Dichlorobenzene	<1	<1	<1	<1	

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

