



JUN 29 11 37 AM '98  
FISH & WILDLIFE

*Chuck  
If this meets with  
your approval, I will  
inform Mr. Ward the report  
meets with my approval  
Thanks  
Tom*

June 25, 1998

Mr. Tom Wiggins  
Fish Culture Operations Chief  
Vermont Fish and Wildlife Department  
103 South Main Street, 10 South  
Waterbury, VT 05671-0501

RE: Initial Investigation of Suspected Subsurface Petroleum Contamination  
Roxbury Fish Culture Station, Roxbury, Vermont (VTDEC Site #97-2217)

JUN 2 2 46 PM '98

Dear Mr. Wiggins:

Enclosed please find three (3) copies of the summary report for the site investigation conducted at the Roxbury Fish Culture Station. I am recommending that the Roxbury Fish Culture Station site be considered for closure and removed from the VTDEC Active Hazardous Waste Sites List.

Following your review and approval, a copy of this report will be forwarded to Mr. Chuck Schwer at the Vermont Department of Environmental Conservation (VTDEC) on your behalf.

Griffin is pleased to be doing this work for you. Please contact me if you have any questions or comments.

Sincerely,

*Christine E Ward*

Christine Ward  
Hydrogeologist

Enclosure

c: Mr. Ralph Barber, Roxbury Fish Culture Station  
GI#19841173

**INITIAL INVESTIGATION OF  
SUSPECTED SUBSURFACE PETROLEUM  
CONTAMINATION**

**ROXBURY FISH CULTURE STATION  
ROUTE 12A  
ROXBURY, VERMONT 05669**

(VTDEC SITE #97-2217)  
GI #19841173

June 1998

*Prepared for*

Vermont Department of Fish and Wildlife  
10 South Building  
103 South Main Street  
Waterbury, Vermont 05671-0501

*Prepared by*



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

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    Site Location Map

    Site Map

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## **I. INTRODUCTION**

This report summarizes the initial investigation of suspected subsurface petroleum contamination at the Roxbury Fish Culture Station on Route 12A in Roxbury, Vermont (see Site Location Map, Appendix A). This work was requested by the Vermont Department of Fish and Wildlife in their Request for Proposal for an UST Initial Site Investigation, dated November 10, 1997. This work was performed in accordance with the December 15, 1997, *Proposal for Initial Site Investigation at the Roxbury Fish Culture Station* prepared by Griffin. The Work Plan was approved by Mr. Schwer of the Vermont Department of Environmental Conservation (VTDEC) in a letter to Ms. Lilla Stutz-Lumbra of the Vermont Department of Fish and Wildlife, dated March 19, 1998.

## **II. SITE BACKGROUND**

### **A. Site History**

On June 25, 1997, petroleum impact was detected at the Roxbury Fish Culture Station during soil field screening at a routine removal of a 1,000-gallon No. 2 heating oil underground storage tank (UST). The former UST had been located on the east side of the Hatchery building. The UST had been out of service for several years. Soil samples collected during the UST closure were screened for volatile organic compounds (VOCs) using a portable photoionization detector (PID). PID readings greater than 10 parts per million (ppm) were present in the vicinity of the UST. Strong petroleum odors and petroleum saturated soils were observed below the fill pipe [2]. According to Mr. Ralph Barber, Supervisor at the Fish Culture Station, the fill pipe had apparently been hit by a snow plow sometime prior to 1990 [3]. During the UST closure, the water table was approximately 6 feet below grade and free product was observed on the water surface [2].

### **B. Site Description**

The site has been a fish hatchery since 1891 [3]. There are a series of trout ponds, connected by a small stream, running north to south through the property. The office and hatchery building is located on the west side of the stream. There is a gravel parking lot on the north side of the office building; grass lawns comprise the remainder of the ground cover. There are two storage buildings, on the east side of the small stream, northeast of the office building. The supply well for the site is approximately 290 feet northeast of the former UST location, and is reportedly completed in bedrock [3].

The Roxbury Fish Culture Station is bounded on the east by Route 12A. The Third Branch of the White River is on the opposite side of Route 12A. Beyond the river, is north-south trending topographic ridge. West of the site the surface topography slopes up to another north-south

trending ridge. There are railroad tracks, running north-south, approximately 150 feet west of the office building. There is approximately a 700-foot elevation difference between the site and the ridges to the east and to the west. The valley formed by these ridges slopes slightly toward the south. The ridges are predominately wooded. Exposed bedrock was observed in several locations around the site and on the east side of Route 12A.

South of the site are a trailer and a house, also owned by the State. The supply well that services these buildings is approximately 500-600 feet south of the former UST at the site. Sampling of this supply well is described in section IIID.

North of the site is partly wooded. There are some residences north of the site; the closest being approximately 500 feet.

### **C. Site Geology**

According to the Surficial Geologic Map of Vermont [4], the site is underlain by post glacial fluvial gravel. Bedrock below the site is mapped as the Stowe formation, consisting of greenstone and amphibolite [5].

## **III. INVESTIGATIVE PROCEDURES**

To further define the extent of subsurface petroleum contamination in the area of the former 1,000-gallon heating oil UST, 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-2 through MW-4, were installed on May 13, 1998, by Adams Engineering, under the direct supervision of a Griffin hydrogeologist. These monitoring wells supplement the existing monitoring well MW-1, which is located in the former UST pit. The soil borings for the monitoring wells were advanced with a truck mounted vibratory soil core sampler. The monitoring well locations are indicated on the Site Map (Appendix A).

Undisturbed soil samples, collected from the borings with the core sampler, were logged by the supervising hydrogeologist and screened for the presence VOCs using an HNu™ systems Model PI-101 PID. 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-2 was installed approximately 30 feet east-northeast of the former UST, in a presumed crossgradient direction. Soil encountered in the boring for MW-2 consisted primarily of gray-green gravel-size rock fragments with some brown sand and silt from grade to approximately 11 feet below grade. Bedrock refusal was encountered with the sampler at 11 feet below grade. The water table was encountered at a depth of approximately 4 feet.

Monitoring well MW-3 was installed approximately 60 feet southeast of the former UST, in a presumed downgradient direction. Soil encountered in the boring for MW-3 consisted primarily of brown topsoil from grade to 2 feet below grade, and gray-brown fine to coarse gravel with some coarse sand and silt from 2 feet to 8 feet below grade. Bedrock refusal was encountered with the sampler at 8 feet below grade. The water table was encountered at a depth of approximately 2.7 feet.

Monitoring well MW-4 was installed approximately 40 feet south-southeast of the former UST, in a presumed downgradient direction. Soil encountered in the boring for MW-3 consisted primarily of dark brown topsoil from grade to 1.5 feet below grade, and fine to coarse gravel with some silt and some sand from 1.5 feet to 11.2 feet below grade. Bedrock refusal was encountered with the sampler at approximately 11.2 feet below grade. The water table was encountered at a depth of approximately 3 feet.

Very low to non-detect VOC readings (0 ppm to 0.2 ppm) were measured from the soil samples from the three soil borings. No olfactory or visual indications of petroleum were noted from the soil samples.

Each of the new monitoring wells was constructed in a similar fashion, with 1.5-inch diameter Schedule 40 PVC 0.010-inch slotted well screen. Monitoring well MW-2 contains a 9.1-foot section of screen, from 1.6 feet to 10.7 feet below grade, and is coupled with a 2-inch diameter riser from 1.6 feet to 0.4 foot below grade. Monitoring well MW-3 contains a 6.4-foot section of screen, from 1.6 feet to 8 feet below grade, and is coupled with a 2-inch diameter riser from 1.6 feet to approximately 0.3 foot below grade. Monitoring well MW-4 contains a 10-foot section of screen from 1.2 feet to 11.2 feet below grade, and is completed with 1.5-inch diameter riser from 1.2 feet to approximately 0.3 foot below grade. A sand pack was installed in the annular space around the well screen from the bottom of the boring to just above the top of the screened interval in each borehole. Above the sand pack, the annulus was filled with a bentonite clay grout seal to prevent surface water from entering the borehole. Each well was fitted with a gripper cap, and secured with a 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 immediately following installation with a peristaltic pump and dedicated tubing.

## **B. Groundwater Flow Direction and Gradient**

Water table elevation measurements were collected from the four on-site monitoring wells on May 22, 1998. The top of casing elevations were determined relative to MW-4, 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 May 22, 1998. Water table elevations were plotted on the site map to generate the Groundwater Contour Map figure presented in Appendix A. The water surface elevations surveyed on May 13, 1998, from two locations on the small shallow stream that flows between the trout ponds adjacent to the site were included on the Groundwater Contour Map. On May 13, 1998, the stream water surface was higher in elevation than the surrounding water table, suggestive that there is recharge to the groundwater from the stream on this date.

The relative water table elevations measured on May 22, 1998, suggest that groundwater flow at the site is directed generally toward the south at a shallow hydraulic gradient of approximately 0.9%. The depth to groundwater measured on May 22, 1998, ranged from approximately 3 feet to 4 feet below ground surface.

Based on this flow direction, monitoring well MW-2 is located in a crossgradient to upgradient direction from the former UST location; MW-3 is located in a downgradient to crossgradient direction from the former UST location; and MW-4 is located in a downgradient direction from the former UST location.

## **C. Groundwater and Surface Water Sampling and Analyses**

Griffin collected groundwater samples from the four on-site monitoring wells on May 22, 1998. Additionally, a surface water sample was collected from the small stream approximately in the location of S2. The water samples were analyzed by Endyne, Inc. of Williston, Vermont, by EPA Method 8020 for the presence of benzene, toluene, ethylbenzene, and xylenes (BTEX) and methyl tertiary butyl ether (MTBE), and for total petroleum hydrocarbons (TPHs) by modified EPA Method 8100.

The laboratory analysis report is contained in Appendix D. Analytical results of the trip blank and duplicate samples indicate that adequate quality assurance and control were maintained during sample collection and analysis.

No VOCs or TPHs were detected by laboratory analysis in the groundwater or in the surface water samples.

#### **D. Supply Well Sampling and Analyses**

Griffin collected a water sample from the supply well servicing the buildings south of the hatchery on May 22, 1998. This was the only on-site supply well located in a downgradient direction from the former UST location. The supply well is reportedly completed in bedrock. The supply well sample was collected from a faucet in the house. Water was run through the faucet for approximately 0.25 hour prior to collecting the sample to purge the water that had been sitting in the pipes.

The supply well water sample was analyzed EPA Method 8020 for the presence of BTEX and MTBE. The laboratory analysis report is contained in Appendix D.

No VOCs were detected by laboratory analysis in the water sample collected from the supply well.

#### **E. Sensitive Receptor Survey**

A qualitative risk assessment was conducted to identify known and potential receptors of the limited contamination detected at the Roxbury Fish Culture Station. A visual survey was conducted during the monitoring well installation on May 13, 1998. 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 1,000-gallon No. 2 fuel oil UST are potential receptors of the UST-related contamination. The risk to these sensitive receptors is considered minimal based on the very low to non-detect concentrations of VOCs with the PID from soil samples during drilling and based on the non-detection of VOCs and TPHs measured in the groundwater samples collected at the site.

The nearest surface water is the Third Branch of the White River located approximately 300 feet east of the site, on the opposite side of Route 12A. The risk to the Third Branch posed by the limited petroleum impact in the vicinity of the former No. 2 fuel oil UST is considered minimal based on the negligible source area strength.

The immediate area surrounding the Roxbury Fish Culture Station is served by private water supplies. The supply well for the site is approximately 290 feet northeast of the former UST and reportedly completed in bedrock. Based on the surface topography and the estimated shallow groundwater flow direction measured on May 22, 1998, the supply well is located in an upgradient direction from the former UST with respect to the surficial aquifer at the site. The risk of impact to the hatchery's supply well from the petroleum contamination detected in the surficial aquifer in the area of the former UST is considered minimal based on the construction of the supply well and because the supply well is in an estimated upgradient direction from the former UST and given low source area strength.

There is another supply well located approximately 500 to 600 feet south and downgradient of the former UST. This well is reportedly completed in bedrock. A water sample was collected from this well for laboratory analysis; no targeted VOCs were detected. The risk of impact to this supply well is considered minimal based on the construction of the supply well and since no VOCs were detected by laboratory analysis in the water sample collected from this well and given low source area strength.

#### IV. CONCLUSIONS

Based on the results of this investigation at the Roxbury Fish Culture Station, Griffin presents the following conclusions:

- 1) The source of petroleum contamination detected in soils at the Roxbury Fish Culture Station was a former 1,000-gallon No. 2 Fuel Oil UST at the property. The release(s) appears to be the result of leakage through the damaged fill pipe and/ or minor spills or overfills over time. The volume of product released is unknown. The source of the petroleum contamination (i.e., the UST system) was removed in June of 1997.
- 2) VOC readings of soils collected during the UST closure in June of 1997 indicate that adsorbed petroleum compounds exist in the soils in the immediate vicinity of the former UST pit. With the source UST 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) One groundwater monitoring well, MW-1, was installed in the former UST pit at the time of the UST closure.
- 4) Three groundwater monitoring wells, MW-2 through MW-4, were installed by Griffin at the Roxbury Fish Culture Station on May 13, 1998. VOCs were not detected by field screening methods at concentrations greater than 0.2 ppm in soil samples collected from the borings for the monitoring wells. These results indicate that adsorbed contamination is limited to the direct vicinity of former UST pit.
- 5) Bedrock refusal was encountered at 11 feet, 8 feet, and 11.2 feet below grade, in the soil borings for MW-2, MW-3, and MW-4, respectively.
- 6) The depth to groundwater measured on May 22, 1998, was approximately 3 to 4 feet below the ground surface. The shallow groundwater flow beneath the site on this date was estimated to be directed toward the south at a shallow hydraulic gradient of approximately 0.9%.

- 7) Groundwater samples were collected from the four site monitoring wells on May 22, 1998. No VOCs or TPHs were detected by laboratory analysis in the groundwater samples.
- 8) A surface water sample was collected on May 22, 1998, from the small stream that runs between the trout ponds east of the former UST pit. The surface water sample was collected in the vicinity of S2 on the Groundwater Contour Map. No VOCs or TPHs were detected by laboratory analysis in the stream surface water sample.
- 9) A water sample was collected on May 22, 1998, from a bedrock supply well located approximately 500 to 600 feet south of the former UST pit. This supply well is in a downgradient direction from the former UST pit with respect to the surficial aquifer. No VOCs were detected by laboratory analysis (EPA Method 602) in the supply well sample.
- 10) There appear to be no significant potential risks to identified sensitive receptors, at this time, based on currently available data.

## V. RECOMMENDATIONS

Based on the results of this site investigation, Griffin recommends that the Roxbury Fish Culture Station in Roxbury, Vermont site be considered for closure and be removed from the VTDEC Active Hazardous Waste Sites List. This recommendation is offered based upon achievement of the following closure criteria, as per the VTDEC Site Management Activity Completed (SMAC) Checklist (dated December 1, 1997):

- 1) The source(s), nature, and extent of the petroleum contamination at the site has been adequately defined.

The source of petroleum contamination detected in soils at the Roxbury Fish Culture Station was a former 1,000-gallon No. 2 Fuel Oil UST at the property. The release(s) appears to be the result of leakage through the damaged fill pipe and/ or minor spills or overfills over time. The volume of product released is unknown.

Three monitoring wells were advanced in the vicinity of the former UST on May 13, 1998. VOCs were non-detectable with the PID in soil samples collected from the soil borings for the monitoring wells.

Dissolved petroleum contamination was not detected by laboratory analysis in groundwater samples collected from the on-site monitoring wells on May 22, 1998.

- 2) Source(s) has been removed, remediated, or adequately contained.

The 1,000-gallon No. 2 heating oil UST system was removed in June 1997.

- 3) Levels of contaminants in soil and groundwater shall be stable, falling, or non-detectable.

No detectable readings of VOCs above background were measured in soil samples from the three soil borings on May 13, 1998.

VOCs and TPHs were not detected in the groundwater samples collected from the four on-site monitoring wells on May 22, 1998. Detection limits in the analyses were well below the VGES.

VOCs were not detected in the water sample collected from a supply well located approximately 500-600 feet south and downgradient of the former UST. Detection limits for the targeted constituents were well below Drinking Water Standards.

- 4) Groundwater enforcement standards are met on entire property.

VOCs and TPHs were not detected in the groundwater samples collected from the four on-site monitoring wells on May 22, 1998. Detection limits in the analyses were well below the VGES.

- 5) Soil guideline levels are met. If not, engineering or institutional controls are in place.

No detectable readings of VOCs above background were measured with the PID in soil samples the from soil borings on May 13, 1998.

- 6) No unacceptable threat to human health or the environment exists on site.

VOCs were not detected with the PID in soil samples collected from the three soil borings for the monitoring wells on May 13, 1998. No petroleum compounds were detected by laboratory analysis in the groundwater samples collected from the four monitoring wells on May 22, 1998. No petroleum compounds were detected by laboratory analysis in the stream water sample collected on May 22, 1998. No petroleum compounds were detected by laboratory analysis in the water sample collected from a downgradient supply well.

There are no known sensitive receptors adversely affected.

7) Site meets RCRA requirements.

Available records indicate that the Roxbury Fish Culture Station is not in violation of the Resource Conservation and Recovery Act (RCRA) as defined in 40 CFR 264.

8) Site meets CERCLA requirements.

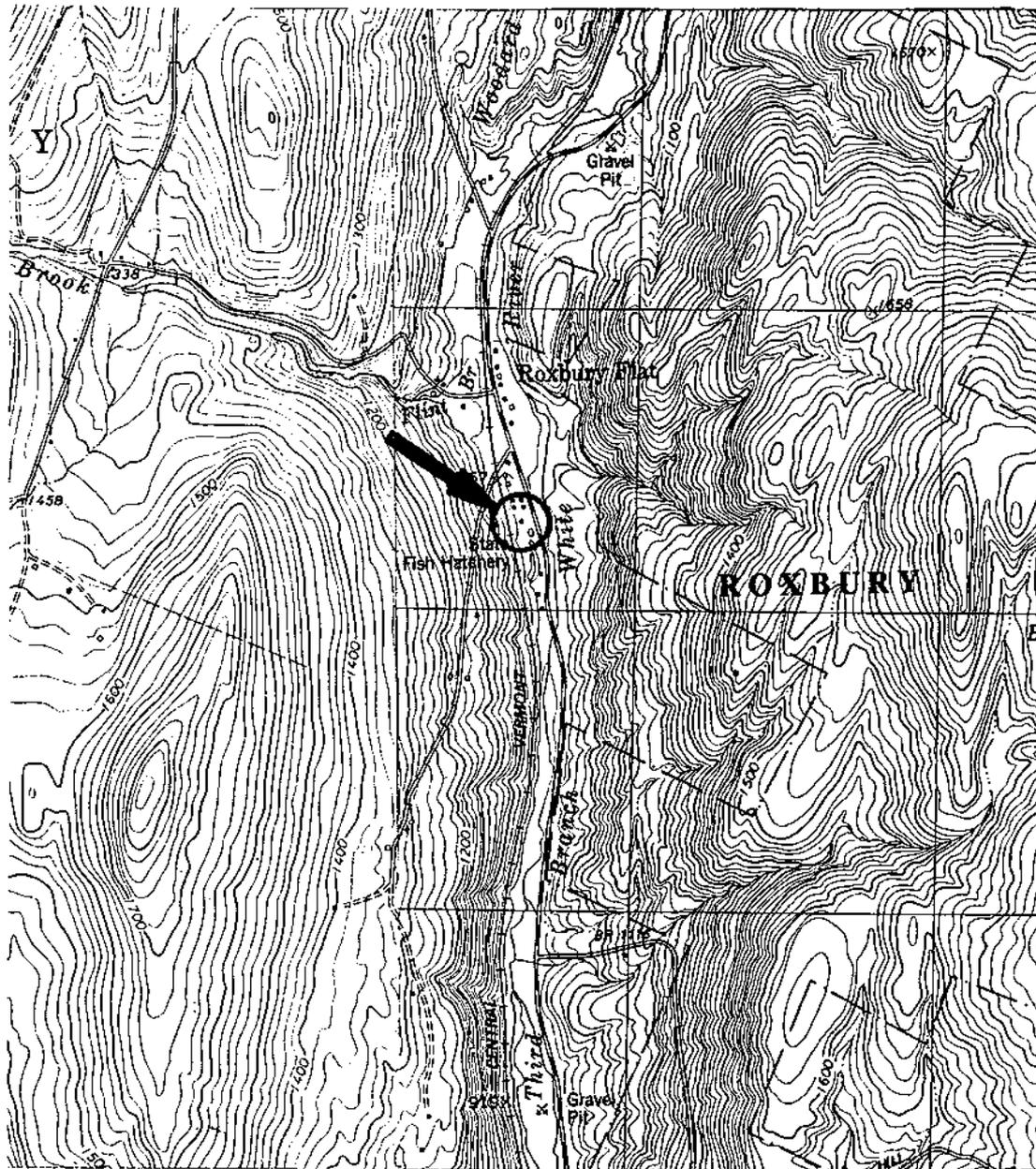
Available records indicate that the Roxbury Fish Culture Station is not in violation of the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) as defined in 40 CFR 300.

## REFERENCES

1. USGS 7.5 Minute Topographic Map, Roxbury, VT quadrangle, dated 1980 and photoinspected 1983.
2. Vermont Fish and Wildlife Department, Request for Proposal, November 10, 1997.
3. Barber, Ralph, Supervisor, Roxbury Fish Culture Station, personal communication, May 13, 1998.
4. Doll, Charles G., ed., 1970, *Surficial Geologic Map of Vermont*, Vermont Geological Survey.
5. Doll, Charles G., ed., 1961, *Centennial Geologic Map of Vermont*, Vermont Geological Survey.

**APPENDIX A**

**Site Location Map  
Site Map  
Groundwater Contour Map**



JOB #: 19841173  
 SOURCE: USGS- ROXBURY AND WARREN, VERMONT QUADRANGLES

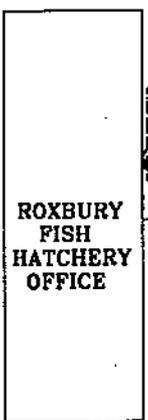
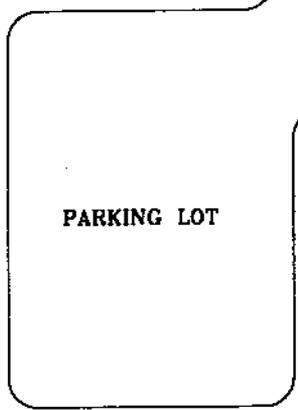


**ROXBURY FISH CULTURE STATION**

**ROXBURY, VERMONT**

**SITE LOCATION MAP**

DATE: 5/28/98	DWG.#:1	SCALE: 1:24000	DRN.:SB	APP.:CW
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FORMER LOCATION OF  
1,000 GALLON FUEL  
OIL UST REMOVED 6/97.

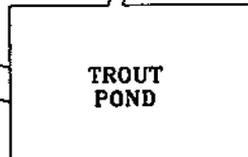
EXISTING  
PROPANE  
AST's



EXISTING  
SEPTIC TANK



ROUTE 12A



**LEGEND**



MONITORING WELL

JOB #: 19841173



**ROXBURY FISH CULTURE STATION**

**ROXBURY, VERMONT**

**SITE MAP**

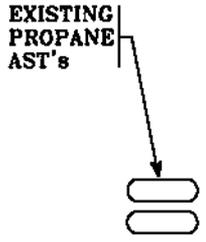
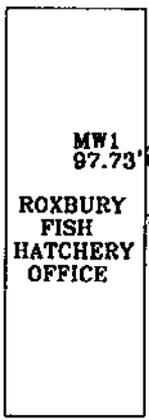
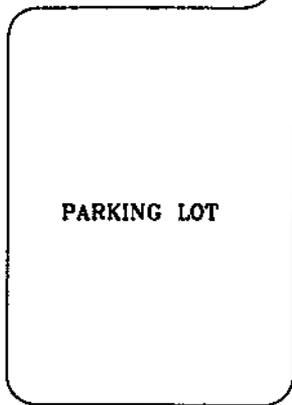
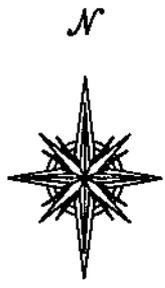
DATE: 5/28/98

DWG.#:2

SCALE: 1"=40'

DRN.:SB

APP.:CW



MW2  
97.94'

MW1  
97.73'

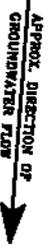
MW4  
97.35'

MW3  
97.38'

FORMER LOCATION OF  
1,000 GALLON FUEL  
OIL UST REMOVED 6/97.

EXISTING  
SEPTIC TANK

ROUTE 12A



S1  
99.57'

TROUT  
POND

S2  
97.57'

**LEGEND**

MW2 MONITORING WELL AND WATER TABLE ELEVATION IN FEET

97.8' GROUNDWATER CONTOUR IN FEET (DASHED WHERE INFERRED)

JOB #: 19841173  
MEASUREMENT DATE: 5/22/98



**ROXBURY FISH CULTURE STATION**

ROXBURY, VERMONT

**GROUNDWATER CONTOUR MAP**

DATE: 5/28/98	DWG.#:3	SCALE: 1'=40'	DRN.:SB	APP.:CW
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**APPENDIX B**

**Soil Logs and Monitoring Well Specifications**

PROJECT ROXBURY FISH CULTURE STATION

LOCATION ROXBURY, VERMONT

DATE DRILLED 5/13/98 TOTAL DEPTH OF HOLE 11.0'

DIAMETER 2.75"

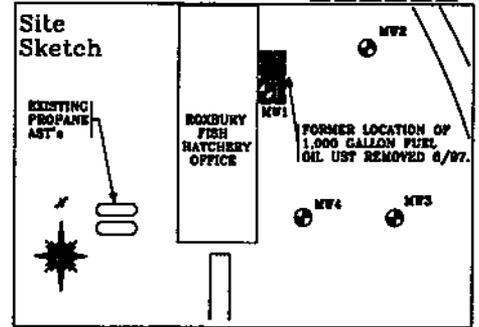
SCREEN DIA. 1.5" LENGTH 9.0' SLOT SIZE 0.010"

CASING DIA. 2" LENGTH 1.2' TYPE NA

DRILLING CO. ADAMS ENGR. DRILLING METHOD VIBRATORY

DRILLER GERRY ADAMS 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 LOCKING WELL CAP				0
1	CONCRETE				1
2	BENTONITE			Gray/green chlorite schist GRAVEL, (rock frags), some brown sand, some silt, damp.	2
3			0'-4.5' 0 ppm		3
4	SAND PACK			4.0' WATER TABLE	4
5					5
6	WELL SCREEN		4.5'-9.5' 0 ppm	Gray/green chlorite schist fine to coarse gravel (rock frags), some brown coarse sand, some silt, wet.	6
7					7
8					8
9					9
10	BOTTOM CAP		9.5'-11.0' 0 ppm	Same as above.	10
11	BEDROCK			BASE OF WELL AT 10.7' BEDROCK REFUSAL AT 11.0'	11
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					25

PROJECT ROXBURY FISH CULTURE STATION

LOCATION ROXBURY, VERMONT

DATE DRILLED 5/13/98 TOTAL DEPTH OF HOLE 8.0'

DIAMETER 2.75"

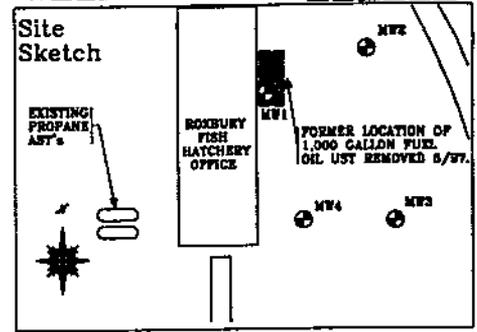
SCREEN DIA. 1.5" LENGTH 6.4' SLOT SIZE 0.010"

CASING DIA. 2" LENGTH 1.4' TYPE NA

DRILLING CO. ADAMS ENGR. DRILLING METHOD VIBRATORY

DRILLER GERRY ADAMS 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	LOCKING WELL CAP			0
1	CONCRETE	BENTONITE		Brown, fine to medium SAND and SILT, little fine gravel.	1
2			0'-4.5' 0.1 ppm	2.7' WATER TABLE	2
3	SAND PACK			Gray/brown, fine/medium/coarse GRAVEL, and coarse SAND, some silt.	3
4					4
5	WELL SCREEN				5
6			4.5'-8' 0.2 ppm	Gray/brown, fine/medium/coarse GRAVEL, some coarse sand, some silt, wet.	6
7	BOTTOM CAP				7
8	BEDROCK				8
9				BASE OF WELL AT 8.0' BEDROCK REFUSAL AT 8.0'	9
10					10
11					11
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					25

PROJECT ROXBURY FISH CULTURE STATION

LOCATION ROXBURY, VERMONT

DATE DRILLED 5/13/98 TOTAL DEPTH OF HOLE 11.2'

DIAMETER 2.75"

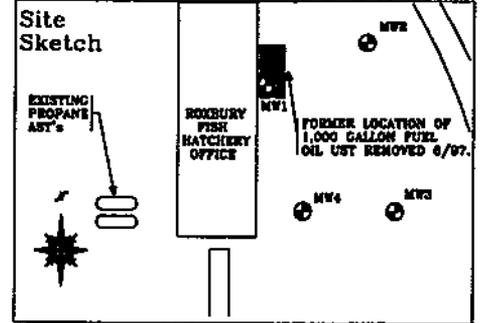
SCREEN DIA. 1.5" LENGTH 10.0' SLOT SIZE 0.010"

CASING DIA. 1.5" LENGTH 0.9' TYPE sch. 40

DRILLING CO. ADAMS ENGR. DRILLING METHOD VIBRATORY

DRILLER GERRY ADAMS LOG BY C. WARD

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	LOCKING WELL CAP			0
1	CONCRETE	BENTONITE		Brown top soil, dark brown, medium/fine SAND and SILT.	1
2	WELL RISER		0'-5' 0 ppm	3.0' WATER TABLE	2
3					3
4				Gray/brown, fine/medium/coarse GRAVEL, some silt, some sand.	4
5	SAND PACK				5
6					6
7			5'-10' 0.1 ppm	Gray/brown, fine/medium/coarse GRAVEL, some sand, some silt.	7
8	WELL SCREEN				8
9					9
10	BOTTOM CAP		10'-11.2' 0.1 ppm	Same as above.	10
11	BEDROCK			BASE OF WELL AT 11.2' REFUSAL AT 11.2'	11
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					25

**APPENDIX C**

**Liquid Level Monitoring Data**

**LIQUID LEVEL MONITORING DATA**

**ROXBURY FISH CULTURE STATION  
ROXBURY, VERMONT**

5/22/98

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	10.3	105.07	-	7.34	-	-	-	-	97.73
MW-2	10.7	101.77	-	3.83	-	-	-	-	97.94
MW-3	8.0	99.93	-	2.55	-	-	-	-	97.38
MW-4	11.0	100.00	-	2.65	-	-	-	-	97.35

All Values Reported in Feet

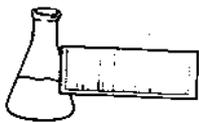
btoc - Below Top of Casing

bgs - Below Ground Surface

Elevations determined relative to top of casing of MW-4, which was arbitrarily set at 100'

**APPENDIX D**

**Water Quality Data**



**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 NAME: Roxbury Fish Station  
REPORT DATE: June 1, 1998  
DATE SAMPLED: May 22, 1998

PROJECT CODE: GIRF1812  
REF.#: 121,268 - 121,275

Enclosed please find the results of the analyses performed for the samples referenced on the attached chain of custody. Chain of custody indicated sample preservation with HCl.

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

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

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

Reviewed by,

Harry B. Locker, Ph.D.  
Laboratory Director

enclosures



### EPA METHOD 602--PURGEABLE AROMATICS

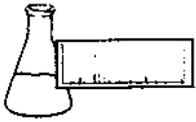
CLIENT: Griffin International  
PROJECT NAME: Roxbury Fish Station  
CLIENT PROJ. #: NI

DATE RECEIVED: May 26, 1998  
REPORT DATE: June 1, 1998  
PROJECT CODE: GIRF1812

Ref. #:	121,268	121,269	121,270	121,271	121,272
Site:	Trip Blank	Supply Well	MW-1	MW-2	MW-3
Date Sampled:	5/22/98	5/22/98	5/22/98	5/22/98	5/22/98
Time Sampled:	8:10	10:00	10:25	10:54	11:10
Sampler:	R. Basile				
Date Analyzed:	5/29/98	5/29/98	5/29/98	5/29/98	5/29/98
UIP Count:	0	0	0	0	0
Dil. Factor (%):	100	100	100	100	100
Surr % Rec. (%):	86	92	95	90	91
Parameter	Conc. (ug/L)				
Benzene	<1	<1	<1	<1	<1
Chlorobenzene	<1	<1	<1	<1	<1
1,2-Dichlorobenzene	<1	<1	<1	<1	<1
1,3-Dichlorobenzene	<1	<1	<1	<1	<1
1,4-Dichlorobenzene	<1	<1	<1	<1	<1
Ethylbenzene	<1	<1	<1	<1	<1
Toluene	<1	<1	<1	<1	<1
Xylenes	<1	<1	<1	<1	<1
MTBE	<10	<10	<10	<10	<10

Ref. #:	121,273	121,274	121,275		
Site:	Stream	Dup. (Stream)	MW-4		
Date Sampled:	5/22/98	5/22/98	5/22/98		
Time Sampled:	11:35	11:35	11:45		
Sampler:	R. Basile	R. Basile	R. Basile		
Date Analyzed:	5/29/98	6/1/98	5/29/98		
UIP Count:	0	0	0		
Dil. Factor (%):	100	100	100		
Surr % Rec. (%):	95	89	95		
Parameter	Conc. (ug/L)	Conc. (ug/L)	Conc. (ug/L)		
Benzene	<1	<1	<1		
Chlorobenzene	<1	<1	<1		
1,2-Dichlorobenzene	<1	<1	<1		
1,3-Dichlorobenzene	<1	<1	<1		
1,4-Dichlorobenzene	<1	<1	<1		
Ethylbenzene	<1	<1	<1		
Toluene	<1	<1	<1		
Xylenes	<1	<1	<1		
MTBE	<10	<10	<10		

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



**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 NAME: Roxbury Fish Station  
DATE REPORTED: June 12, 1998  
DATE SAMPLED: May 22, 1998

PROJECT CODE: GIRF1813  
REF. #: 121,276 - 121,280

Enclosed please find the results of the analyses performed for the samples referenced on the attached chain of custody record.

Chain of custody indicated sample preservation with HCl.

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

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

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

Analytical method precision and accuracy were 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.

Reviewed by,

Harry B. Locker, Ph.D.  
Laboratory Director

enclosures



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LABORATORY REPORT

TOTAL PETROLEUM HYDROCARBONS (TPH) BY MODIFIED EPA METHOD 8100

DATE: June 12, 1998  
CLIENT: Griffin International  
PROJECT: Roxbury Fish Station  
PROJECT CODE: GIRF1813  
COLLECTED BY: Rob Basile  
DATE SAMPLED: May 22, 1998  
DATE RECEIVED: May 26, 1998

Reference #	Sample ID	Concentration (mg/L) <sup>1</sup>
121,276	MW-1; 10:25	ND <sup>2</sup>
121,277	MW-2; 10:54	ND
121,278	MW-3; 11:10	ND
121,279	Stream; 11:35	ND
121,280	MW-4; 11:45	ND

Notes:

- 1 Value quantitated based on the response of #2 Fuel Oil. Method detection limit is 0.4 mg/L.
- 2 None detected

CHAIN-OF-CUSTODY RECORD

121,268 — 121,280

26765

Client Name: ROXBURY FISH STATION Location: ROXBURY VT	Reporting Address: GRIFFIN	Billing Address:
Project Number: GJRF1812	Company: Contact Name/Phone #: C. WARD	Sampler Name: ROB BASILE Phone #:

Sample No.	Sample Location	Matrix	GRA B	COMP	Date/Time	Sample Containers		Field Results/Remarks	Analysis Required	Sample Preservation	Rush
						No.	Type/Size				
68	TRIP BLANK	H <sub>2</sub> O	Yes		5/22/98 8:10	2	40ml		60227	HCl	
69	SUPPLY WELL				10:00				27		
70	MW-1				10:25				27, 30		
71	MW-2				10:54				27, 30		
72	MW-3				11:10				27, 30		
73	STREAM				11:35				27, 30		
74	DUPLICATE (STREAM)				11:35				27, 30		
75	MW-4				11:45				27		
									27, 30	*	

Collected by: Signature <i>Rob Basile</i>	Received by: Signature <i>Tina Desrosiers</i>	Date/Time 5-26-98 10:00
Collected by: Signature <i>Tina Desrosiers</i>	Received by: Signature <i>Jamie M. Chamberlain</i>	Date/Time 5-26-98 10:00

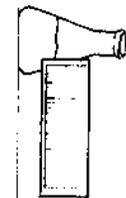
State Project: Yes  No

Requested Analyses: *COOL*

1 pH	6 TKN	11 Total Solids	16 Metals (Specify)	21 EPA 624	26 EPA 8270 B/N or Acid
2 Chloride	7 Total P	12 TSS	17 Coliform (Specify)	22 EPA 625 B/N or A	27 EPA 8010/8020
3 Ammonia N	8 Total Diss. P	13 TDS	18 COD	23 EPA 418.1	28 EPA 8080 Pest/PCB
4 Nitrite N	9 BOD <sub>5</sub>	14 Turbidity	19 BTEX	24 EPA 608 Pest/PCB	
5 Nitrate N	10 Alkalinity	15 Conductivity	20 EPA 601/602	25 EPA 8240	

CLP (Specify: volatiles, semi-volatiles, metals, pesticides, herbicides)

Other (Specify): *MODIFIED 8100 (TPH)*



ENDYNE, INC.

Laboratory Services