

ROSS ENVIRONMENTAL ASSOCIATES, INC.

Hydrogeology, Water Quality,
Contaminant Fate & Transport, Remediation,
& Regulatory Compliance and Permitting.



2 April, 1999

Ms. Linda Elliot
Department of Environmental Conservation
Waste Management Division
103 South Main Street, West Building
Waterbury, Vermont 05671-0404

RE: *Initial Site Investigation Report, Danville Town Garage*

Dear Ms. Elliot:

Enclosed is one bound copy of the final report for the Initial Site Investigation completed at the Danville Town Garage located on Peacham Road in Danville, Vermont.

Please feel free to call me, if you have any questions regarding the investigation findings or recommendations.

Sincerely,

Robert J. Ross, CGWP
Principal Hydrogeologist

cc. Mr. Stephen Parker, Town of Danville

enclosure

Rjr/ref 99008CL02

Apr 5 10:04 AM '99

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Hydrogeology, Water Quality,
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Initial Site Investigation Report

**Danville Town Garage
Peacham Road
Danville, Vermont**

SMS Site No. 98-2557

2 April 1998

APR 5 10 50 AM '98

Prepared For:

**Mr. Stephen Parker
Town of Danville
P.O. Box 183
Danville, Vermont 05828**

Phone: (802) 684-3352

Prepared By:

**Robert J. Ross, CGWP
Ross Environmental Associates, Inc.
P.O. Box 1533
Stowe, Vermont 05672**

Phone: (802) 253-4280

Fax: (802) 253-4829

**R.E.A. Project No. 99-008
R.E.A. Document #: 99008ISI**

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Executive Summary

Ross Environmental Associates, Inc. (R.E.A.) has conducted an initial site investigation at the Danville Town Garage, located on Peacham Road in Danville, Vermont. Field investigations included: installation of three soil borings/monitoring wells; field screening of subsurface soil samples for the possible presence of volatile organic compounds (VOCs); sampling and analysis of ground water from on-site monitoring wells; and a receptor survey to identify potential risks to the environment and human health.

Ground water beneath the site in the vicinity of the former UST system has been impacted by petroleum. The likely source of this petroleum contamination is the former gasoline and diesel UST systems, which have been properly removed from the ground in accordance with VT DEC guidelines. At this time, subsurface petroleum contamination appears to be confined to the property owned by the Town of Danville and no nearby sensitive receptors appear to be threatened or impacted. However, residual soil contamination remains on site in the former UST excavation, which will continue to act as a secondary contaminant source impacting the underlying ground water formation.

A summary of the significant findings are outlined below:

- The Vermont Groundwater Enforcement Standards (VGESs) for methyl-tertiary butyl ether (MTBE), benzene, 1,3,5-trimethyl benzene, 1,2,4-trimethyl benzene, and naphthalene were exceeded in the ground water sample collected from MW-2, located in the excavation of the former USTs.
- The VGES for 1,2,4-trimethyl benzene was exceeded in the sample collected from MW-3, which is located approximately 40 feet downgradient of the former USTs.
- No VGESs were exceeded in the upgradient monitoring well (MW-1) or in the downgradient monitoring well (MW-4), located approximately 40 feet east of the former USTs.
- No free-phase gasoline or diesel fuel was observed on the water-table beneath the site.
- The extent of dissolved-phase contamination in the shallow ground water formation has been reasonably well defined and does not appear to have migrated off-site.
- None of the identified receptors are likely to be impacted by petroleum contamination originating from the site.

Executive Summary

On the basis of the results of this investigation and the conclusions stated above, *R.E.A.* makes the following recommendations.

1. Ground water samples should be collected from the on-site monitoring wells in May 1999 to confirm the findings of the initial sampling event. The ground water samples should be analyzed for the possible presence of volatile organic compounds (VOCs) and total petroleum hydrocarbons (TPH) by U.S. EPA Methods 8021B and 8015B, respectively.
2. Petroleum contaminated soils (PCS) at the former UST location should be removed to reduce the long-term impact to the underlying ground water formation. Excavation and stockpiling of the PCS should be performed in accordance with procedures outlined in the "*Agency Guidelines for Petroleum Contaminated Soil and Debris.*" dated August 1996. At this time, it is estimated that less than 100 cubic yards of PCS will need to be excavated and poly-encapsulated on-site.
3. A summary report should be completed following the completion of the ground water sampling and soil excavation activities.

Site Profile

Site Information

Site Name: Danville Town Garage
SMS Site #: 98-2557
Site Address: Peacham Road Danville, VT
Mailing Address: P.O. Box 138 Danville, VT 05828
Telephone: (802) 684-3352
Contact: Stephen Parker

Coordinates: 44° 24' 20" N, 72° 08' 40" W

Contaminants of Concern: Petroleum – gasoline and diesel

Source: Suspected release from piping system of former gasoline and diesel USTs. Both tanks were in excellent condition upon removal; no reported fuel loss based on inventory records.

Aquifer Characteristics

Soil Type: Predominantly very fine SAND, some silt
Effective Porosity: 0.3 to 0.4
Hydraulic conductivity: 0.3 to 2.8 ft/day
Ground-water flow direction: southwest (3/18/99)
Horizontal hydraulic gradient: 1.5% (3/18/99)
Average ground water velocity: 0.1 to 1.4 ft/day
Depth below ground surface: 8 – 9 feet
Saturated thickness: > 5 feet
Depth to Bedrock: refusal at 12.5 feet at MW-3, > 15.5 feet at MW-2

Receptors

Drinking water: No public or private water supplies are located on-site or on adjacent properties. All adjacent properties are served by a municipal system.
Ground water: Impacted by petroleum contamination; see Table 2, Appendix A.
Surface water: No surface water bodies threatened by on-site contamination. The closest surface water body is located approximately 700 feet to the east.
Buildings: No buildings are threatened by on-site contamination. All on-site buildings constructed on at-grade slab foundation and the closest downgradient building is over 500 feet to the east.
Underground utilities: No underground utilities are located in the area of dissolved-phase contamination.

1.0 INTRODUCTION

R.E.A. was retained by the Town of Danville to complete an initial site investigation at the town's garage in accordance with Vermont Department of Environmental Conservation (VT DEC) guidelines. The site investigation was initiated following the discovery of subsurface petroleum contamination during the closure and removal of two underground storage tanks (USTs) in 21 December 1998. The initial site investigation was designed to address the concerns outlined in the VT DEC letter to the town dated 14 January 1999. This report has been prepared by *R.E.A.* for the Town of Danville; unauthorized use or reproduction of this report is prohibited, without written authorization from *R.E.A.* or the Town of Danville.

1.1 Site Location and Setting

The Danville Town Garage is located on Peacham Road, approximately 0.4 miles south of the intersection of Route 2 and Peacham Road (Figure 1, Appendix A). The site encompasses approximately 7 acres, which is occupied by five buildings: a two-bay garage, a four-bay garage, a salt storage shed, and two utility storage sheds. The former USTs were located approximately 50 feet north of the two-bay garage. The former pump-island for the former USTs was situated over the southern end of the tanks. Photographs of the site and surrounding area are included in Appendix B.

The ground surface slopes gently to the east-southeast in the vicinity of the former USTs, with an average elevation of 1,270 feet above mean sea level. The closest surface water body is an unnamed tributary to Brown Brook, which is located approximately 700 feet to the east. A small wetland area is located approximately 1,000 feet to the southwest and a pond is located approximately 1,100 feet to the southeast (Maptech, 1997).

The surficial geology in the vicinity of the site is mapped as a frontal moraine till deposit, with isolated deposits of pluvial peat or swamp muck (Stewart and MacClintock, 1970). Bedrock in the Danville area is mapped as the Waits River Formation, which consists of gray quartzose and micaceous crystalline limestone of lower Devonian age (Doll, 1961). No bedrock outcrops were observed on site or adjacent properties.

1.2 Site History

In the early to mid 1900's, the subject property was occupied by the C.H. Davis Bobbin Mill, which operated a saw mill and bobbin manufacturing facility. According to Mr. Stephen Parker, the bobbin mill went out of business sometime in the 1940's. The Town of Danville purchased the property in the mid-1950's for a town garage. In 1996, the town constructed a new 5,200 square-foot four-bay garage on the property.

On 21 December 1998, two 4,000-gallon underground storage tanks (USTs) were removed from the site following VT DEC closure procedures. One tank reportedly contained gasoline and the other stored diesel fuel. The UST closure report indicated that both tanks were in excellent condition upon removal from the ground, but that the piping for both tanks was in fair condition. Photoionization detector (PID) readings on soils from the UST excavation ranged between 0.0 and 7.1 parts per million (ppm) adjacent to the gasoline tank, and between 0.4 and 301 ppm adjacent to the diesel tank. The UST closure report also stated that subsurface contamination appeared to extend into the ground water, which was encountered at 13.5 feet below ground surface (bgs). One monitoring well (MW-2) was installed in the excavation, near the former fuel pump at the southern end of the tanks.

Based on the findings of the UST closure assessment, the VT DEC determined that additional work was necessary to determine the severity of the contamination. Subsequently, the Town of Danville retained the services of Ross Environmental Associates, Inc. (R.E.A.) to complete an initial site investigation at the site.

1.3 Land Use and Adjacent Property Ownership

The Danville Town Garage is situated in an area of mixed land use, which includes commercial, agricultural, recreational and residential uses. The garage is located on the northern portion of a 7 acre parcel owned by the town; the southern portion of the property is occupied by an athletic field. The abutting property to the north, which was occupied by railroad tracks operated by the former Lamoille Valley railroad, is currently owned by the State of Vermont and is used for recreation (snow mobiling, walking, etc.). Residential and commercial properties, located along Peacham Road, abut the town property to the east; Farr's Antique Shop and private residence, the Blanchard residence, and the Vohnden residence. Agricultural and undeveloped parcels of land are located to the south and west of the town's property, and north of the former railroad tracks.

2.0 FIELD INVESTIGATION RESULTS AND PROCEDURES

R.E.A.'s field investigation included: the installation of three soil borings/monitoring wells (MW-1, MW-3, and MW-4); field screening of subsurface soil samples for the possible presence of volatile organic compounds (VOCs); sampling and analysis of ground water from four on-site monitoring wells, including the existing monitoring well (MW-2) installed during the UST closure; and a receptor survey to identify potential risks to the environment and human health. Approximate monitoring well locations and significant site features are shown on Figure 2 in Appendix A.

The objectives of this initial site investigation were to:

- Evaluate the degree and extent of petroleum contamination in soil and ground water;
- Qualitatively assess the risks to environmental and public health via relevant sensitive receptors and potential contaminant migration pathways; and
- Identify potentially appropriate monitoring and/or remedial actions based on the site conditions.

2.1 Contaminants of Concern

Based on available information, the contaminants of concern (COC) at the Danville Town Garage appear to include: benzene, toluene, ethylbenzene, total xylenes (collectively referred to as BTEX), 1,3,5-trimethyl benzene, 1,2,4-trimethyl benzene, naphthalene, and methyl-tertiary butyl ether (MTBE). All of these contaminants are typically associated with petroleum products such as gasoline or diesel fuel; MTBE is a gasoline additive used since the early 1980's to improve combustion and reduce carbon monoxide emissions.

2.2 Source Area Evaluation

Based on available information the likely source of petroleum released at the Danville Town Garage was the piping system for the former USTs. Removal of the UST system, which included a 4,000-gallon gasoline tank, a 4,000-gallon diesel tank, associated piping, and a fuel pump, has significantly reduced the long-term threat to the environment.

According to Ms. Virginia Morse, Danville Town Clerk, inventory records for fuel purchased and used at the town garage do not indicate a loss of gasoline or diesel fuel. Also, information included in the UST closure report indicated that both USTs were in excellent condition, but that the piping systems were in fair condition.

No USTs are currently located on site and according to Mr. Reg Gurtin, Director of Public Works, the USTs removed in December 1998 were the only USTs used at the site. A 1,000-gallon aboveground tank was installed in one of the storage sheds after the USTs were removed from the ground. Also, no potential upgradient sources of petroleum contamination were identified at the garage, although sheens were noted on standing water in the parking lot in the vicinity of the former USTs during the site visit conducted on 18 March 1999.

2.3 Soil Boring and Soil-Screening Results

On 12 March 1999, *R.E.A.* provided oversight during the installation of three soil/monitoring wells (MW-1, MW-3, and MW-4). The soils consisted primarily of two to three feet of fill overlying very fine sand and silt. The borings extended at least five feet below the water table, which was encountered between 8 and 9 feet below ground surface (bgs). The soil borings for MW-1 and MW-4 extended to 15 and 14 feet bgs, respectively. MW-3 was completed to auger refusal at 12.5 feet bgs, presumably at the top of bedrock. The well installed during the UST closure (MW-2) was determined to extend approximately 15.5 feet bgs. Soil boring equipment was decontaminated between each location to minimize possible cross-contamination. Monitoring wells were constructed using 2-inch-diameter schedule 40 polyvinyl chloride (PVC), with flush-threaded joints. Soil descriptions and monitoring well construction details are included on the soil boring logs in Appendix C. Soil boring and monitoring well installation was completed by Tri-State Drilling and Boring, Inc. of West Burke, Vermont.

Photoionization detector (PID) field-screening results of soil samples collected during the completion of three soil borings indicate that low levels of residual petroleum contamination extends below the water table in the vicinity of the former USTs. PID readings on soils from the upgradient soil boring (MW-1) were between 12.3 and 24.4 parts per million (ppm) and ranged from 29.5 to 47.8 ppm in the two downgradient soil borings (MW-3 and MW-4). The presence of PID readings on subsurface soil collected from the upgradient boring may be due to previous operations at the site or related to minor spills from vehicles in the parking lot. PID screening results are included on the soil boring logs in Appendix C.

R.E.A.'s hydrogeologist screened soil samples from each soil boring for the possible presence of volatile organic compounds (VOCs) using a PE PhotoVac model 2020 portable PID. The PID was calibrated with an isobutylene standard gas to a benzene reference.

2.4 Ground Water Elevations and Flow Direction

On 18 March 1999, ground-water flow in the unconfined surficial aquifer at the site was toward the south-southeast, with an estimated hydraulic gradient of approximately 1.5 percent. Water-level measurements and elevation calculations for 18 March 1999 are presented in Table 1 and the ground-water contour map prepared using this data is presented as Figure 3, Appendix A.

No free-phase petroleum was observed in any of the wells; however, MW-2 exhibited a strong petroleum odor. Static water-table elevations were computed for each monitoring well by subtracting the measured depth-to-water readings from the surveyed top-of-casing (TOC) elevations, which are relative to an arbitrary site datum of 100.00 feet.

The effective porosity of very fine sand and silt encountered below the water-table is presumably between 0.3 and 0.4, with hydraulic conductivities ranging between 0.30 and 2.8 feet per day (Freeze & Cherry, 1979). Assuming Darcian flow, these estimates combine with the calculated horizontal gradient of 1.5 percent to yield an estimated range of ground-water flow velocities of between 0.1 and 1.4 feet per day. Contaminant migration would be considerably less accounting for retardation and dispersion of the contaminants.

2.5 Ground-Water Sampling and Analysis

Low concentrations of petroleum compounds were detected in each monitoring well sampled on 18 March 1999. The Vermont Groundwater Enforcement Standards (VGESs)¹ for MTBE, benzene, 1,3,5-trimethyl benzene, 1,2,4-trimethyl benzene, and naphthalene were exceeded in the sample collected from MW-2, which was installed at the former UST location. The VGES for 1,2,4-trimethyl benzene was exceeded in the sample collected from MW-3, which is located approximately 40 feet downgradient of the former USTs. None of the VGESs were exceeded in the samples collected from MW-1 and MW-4. Total petroleum hydrocarbons (TPH) were detected in the samples collected from MW-2, MW-3, and MW-4 at 1.43, 0.13, and 0.14 milligrams per liter (mg/L), respectively. No petroleum compounds were detected in the trip-blank sample, and analytical results for the blind field duplicate, collected from MW-2, were within 86 to 98 percent of the original sample results. The

¹The Vermont DEC has established groundwater enforcement standards for eight petroleum related VOCs, as follows: benzene - 5 ug/L; toluene - 1,000 ug/L; ethylbenzene - 700 ug/L; xylenes - 10,000 ug/L; MTBE - 40 ug/L; 1,3,5-trimethyl benzene - 4 ug/L; 1,2,4-trimethyl benzene - 5 ug/L; and naphthalene - 20 ug/L. The VT DEC has not established an enforcement standard for total petroleum hydrocarbons (TPH).

analytical results are summarized on Table 2, and copies of the laboratory analytical reports are included as Appendix D.

The ground-water samples were analyzed for the possible presence of volatile organic compounds (VOCs), and total petroleum hydrocarbons (TPH) by U.S. EPA Methods 8021B and 8015B, respectively. The trip blank was analyzed for possible presence of VOCs only. All samples were transported under chain-of-custody in an ice-filled cooler to Endyne, Inc. of Williston, Vermont.

2.6 Investigation Procedures

The procedures used during the initial site investigation at the Danville Town Garage are consistent with the following guidance documents:

- *"Underground Storage Tank Closure and Site Assessment Requirements."* Vermont Agency of Natural Resources, Waste Management Division. November 1997.
- *"Site Investigation Guidance."* Vermont Agency of Natural Resources, Waste Management Division. August 1996.
- *"Corrective Action Guidance."* Vermont Agency of Natural Resources, Waste Management Division. November 1997.
- *"Agency Guidelines for Petroleum Contaminated Soil and Debris."* Vermont Agency of Natural Resources, Waste Management Division. August 1996.
- ASTM D 2488-93. *"Standard Practice for Description and Identification of Soils (Visual-Manual Procedure)."* American Society for Testing and Materials.
- ASTM D 1586-84 (1992). *"Standard Test Method for Penetration Test and Split-Barrel Sampling of Soils."* American Society for Testing and Materials.
- ASTM D 5092-90. *"Standard Practice for Design and Installation of Ground Water Monitoring Wells in Aquifers."* American Society for Testing and Materials.
- ASTM D 4750-87. *"Standard Test Method for Determining Subsurface Liquid Levels in a Borehole or Monitoring Well."* American Society for Testing and Materials.
- ASTM D 4448-85a. *"Standard Guide for Sampling Ground Water Monitoring Wells."* American Society for Testing and Materials.

3.0 SENSITIVE RECEPTOR IDENTIFICATION AND RISK ASSESSMENT

At this time, none of the identified sensitive receptors appear to be impacted by residual petroleum contamination at the site. The site and the majority of adjacent properties are supplied with municipal water and sewer services; no private or public sources of drinking water are located in the immediate vicinity of the site.

3.1 Receptor Identification

The following sensitive receptors were identified in the vicinity of the Danville Town Garage:

- Two off-site buildings located on Peacham Road, approximately 500 feet east-southeast of the garage; the Blanchard and the Vohden residences.
- An unnamed tributary of Brown Brook, whose closest point to the site is approximately 700 feet to the east.
- A wetland area located approximately 1,000 feet to the southwest.
- A pond located approximately 1,100 feet to the southeast.

The on-site buildings are not considered sensitive receptors since they are constructed on at-grade slab foundations and are not likely to be impacted by residual petroleum contamination. Also, no underground utilities are located within the area of identified petroleum contamination.

3.2 Risk Assessment

On the basis of the information obtained during this investigation, *R.E.A.* has qualitatively assessed the risks that the subsurface contamination poses to human health and the environment. The findings are summarized as follows:

- None of the identified receptors are likely to be impacted by residual petroleum contamination located at the site.
- The two off-site buildings are not likely to be impacted by residual petroleum contamination due to the distance between the buildings and leading edge of the dissolved-phase contaminant plume.
- The three near-by surface water bodies are also not likely to be impacted by residual petroleum contamination due to the distance between the water bodies and leading edge of the dissolved-phase contaminant plume.

4.0 DATA EVALUATION AND REGULATORY STATUS

Ground water beneath the site in the vicinity of the former UST system has been impacted by petroleum. The likely source of this petroleum contamination is the former gasoline and diesel UST systems, which have been properly removed from the ground in accordance with VT DEC guidelines. At this time, subsurface petroleum contamination appears to be confined to the property owned by the Town of Danville and no nearby sensitive receptors appear to be threatened or impacted. However, residual soil contamination remains on site in the former UST excavation, which will continue to act as a secondary contaminant source impacting the underlying ground water formation.

A summary of the significant findings are outlined below:

- The VGESs for MTBE, benzene, 1,3,5-trimethyl benzene, 1,2,4-trimethyl benzene, and naphthalene were exceeded in the ground water sample collected from MW-2, located in the excavation of the former USTs.
- The VGES for 1,2,4-trimethyl benzene was exceeded in the sample collected from MW-3, which is located approximately 40 feet downgradient of the former USTs.
- No VGESs were exceeded in the upgradient monitoring well (MW-1) or in the downgradient monitoring well (MW-4), located approximately 40 feet east of the former USTs.
- No free-phase gasoline or diesel fuel was observed on the water-table beneath the site.
- The extent of dissolved-phase contamination in the shallow ground water formation has been reasonably well defined and does not appear to have migrated off-site.
- None of the identified receptors are likely to be impacted by petroleum contamination originating from the site.

5.0 RECOMMENDATIONS

On the basis of the results of this investigation and the conclusions stated above, *R.E.A.* makes the following recommendations.

1. Ground water samples should be collected from the on-site monitoring wells in May 1999 to confirm the findings of the initial sampling event. The samples should be analyzed for the possible presence of volatile organic compounds (VOCs) and total petroleum hydrocarbons (TPH) by U.S. EPA Methods 8021B and 8015B, respectively.

2. Petroleum contaminated soils (PCS) at the former UST location should be removed to reduce the long-term impact to the underlying ground water formation. Excavation and stockpiling of the PCS should be performed in accordance with procedures outlined in the "Agency Guidelines for Petroleum Contaminated Soil and Debris." Vermont Agency of Natural Resources, Waste Management Division. August 1996. At this time, it is estimated that less than 100 cubic yards of PCS will need to be excavated and poly-encapsulated on-site.
3. A summary report should be completed following the completion of the ground water sampling and soil excavation activities.

6.0 REFERENCES

Doll, C.G. and others, 1961. "Geologic Map of Vermont", Office of the State Geologist.

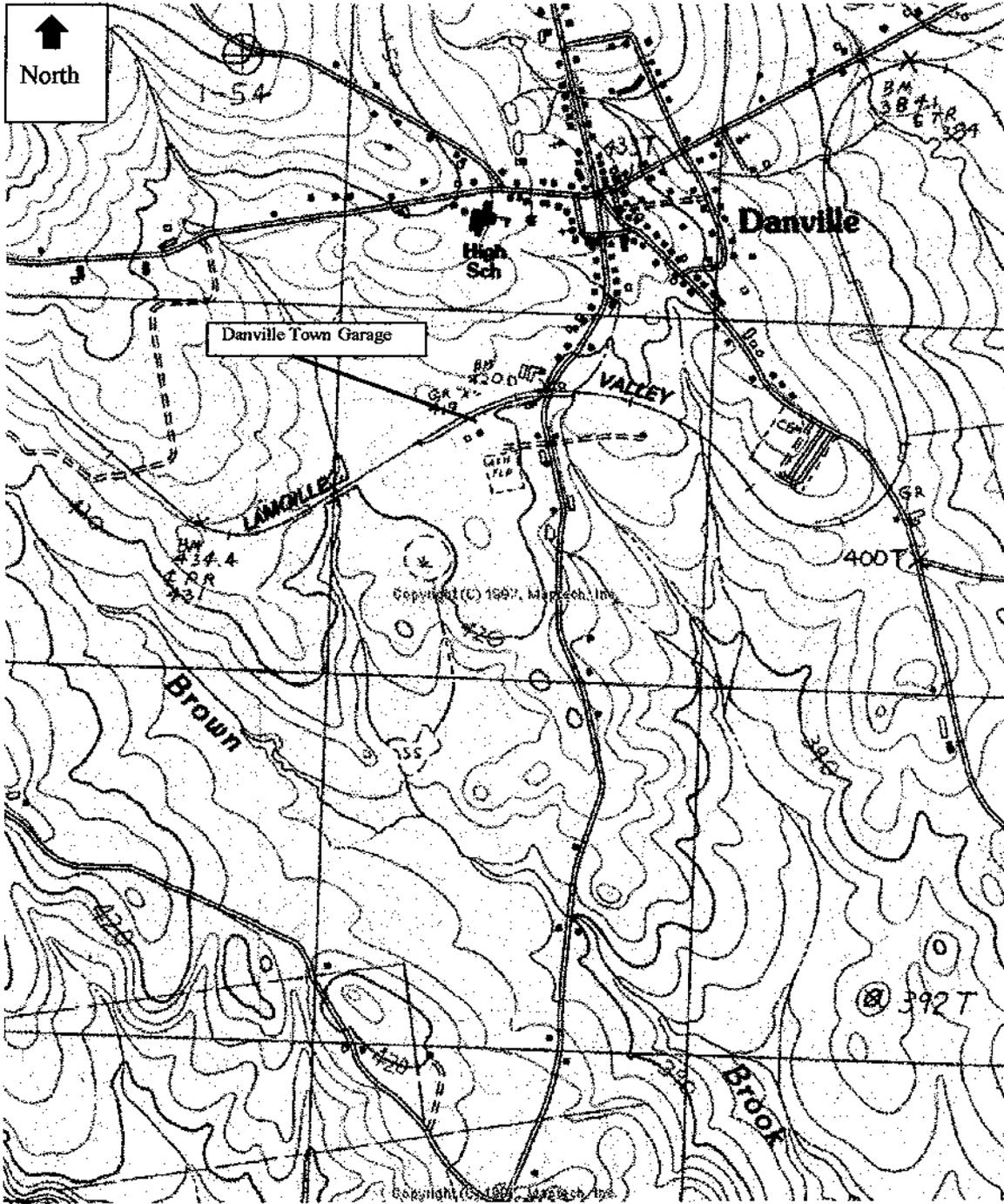
Freeze, R. A., and Cherry, J.A., 1976. *Groundwater*, Prentice-Hall, Inc., Englewood Cliffs, New Jersey, 29 p.

Fetter, C.W., 1994. *Applied Hydrogeology, 3rd Ed.*, Prentice Hall, Englewood Cliffs, New Jersey, 691 p.

Stewart, D.P. and MacClintock, P., 1970. "Surficial Geologic Map of Vermont", Office of the State Geologist.

Maptech, 1997. St. Johnsbury Quadrangle, Vermont. U.S. Geological Survey. 7.5 x 15 minute series (topographic). Provisional Edition, 1983. Maptech, Inc. Greenland, NH. 1997.

APPENDIX A

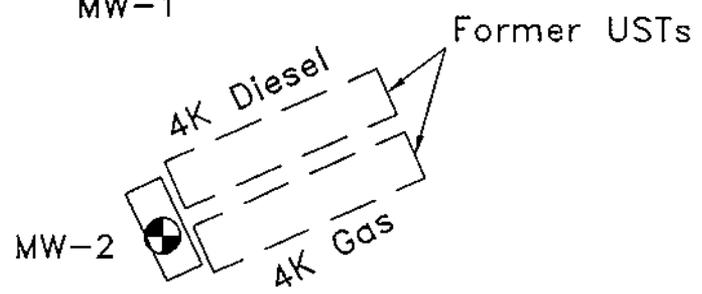


Scale: 1:25,000
 Source: USGS 1983. St. Johnsbury, VT
 Topographic map, (7.5 x 15 min. series)
 Provisional Edition. 1983. Maptech, Inc.
 R.E.A. Project No. 99-008

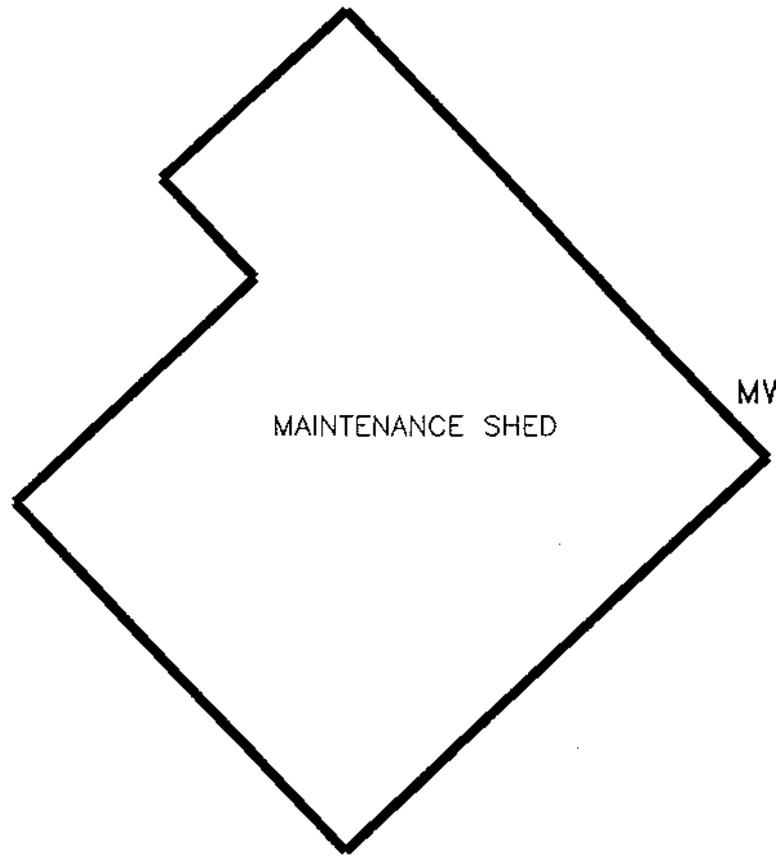
Figure 1
 Site Location Map
 Danville Town Garage
 Danville, Vermont



MW-1



MW-4



MW-3

MAINTENANCE SHED



ALL LOCATIONS ARE APPROXIMATE

Ross Environmental Associates, Inc.

P.O. Box 1533
Stowe, VT 05672
(802) 253-4280

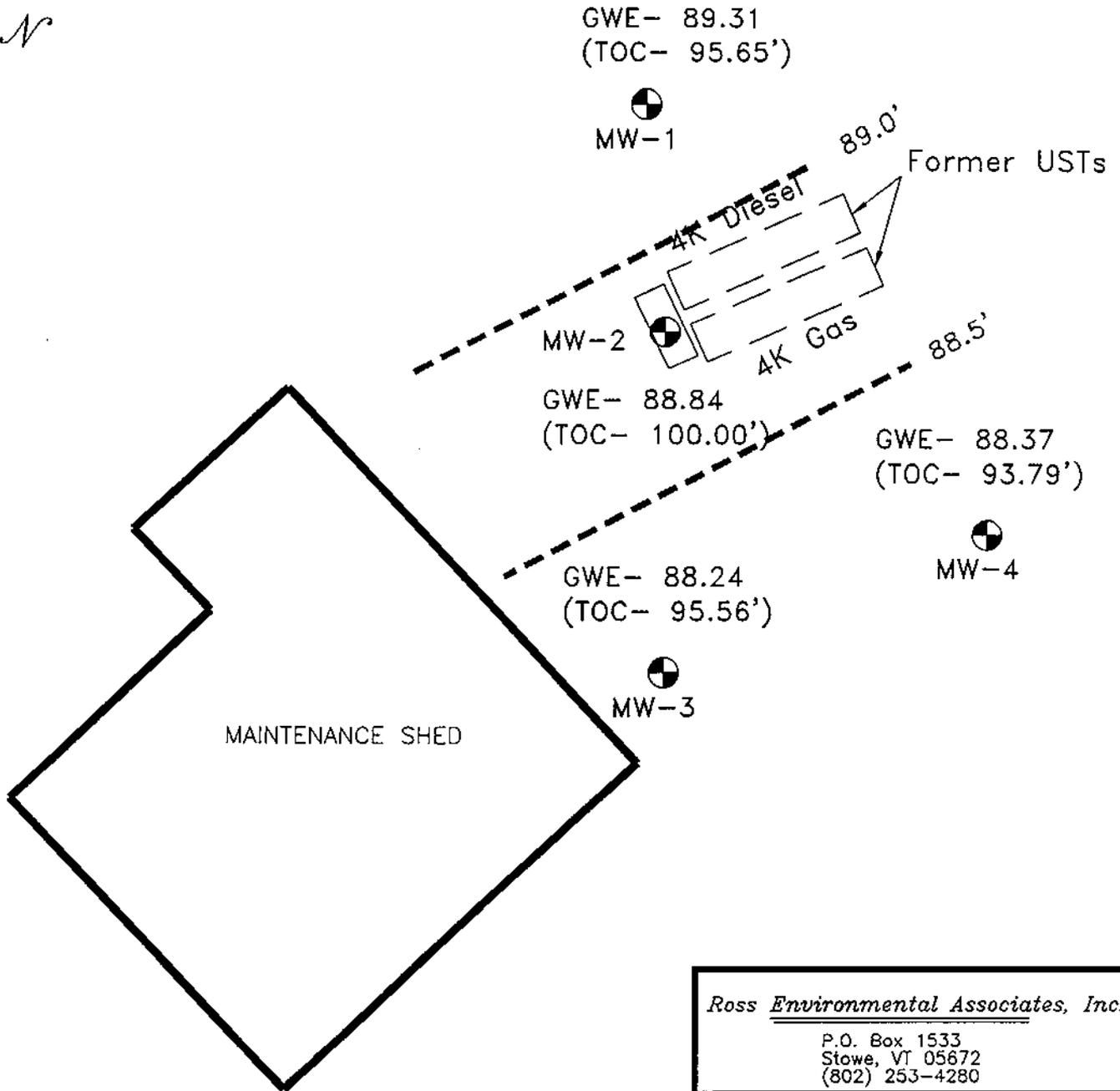
DANVILLE TOWN GARAGE
DANVILLE, VT

FIGURE 2.
SITE MAP

With Monitoring Well Locations

LEGEND: ● Monitoring Well Location

DRAWN BY:	BWH	DATE:	MARCH 99
APPROVED BY:	BR	FILE No.:	DANVILLE



ALL LOCATIONS ARE APPROXIMATE

Ross Environmental Associates, Inc.

P.O. Box 1533
Stowe, VT 05672
(802) 253-4280

DANVILLE TOWN GARAGE
DANVILLE, VT

FIGURE 3.
GROUND-WATER CONTOUR MAP
MONITORING DATE: 9 JULY 1996

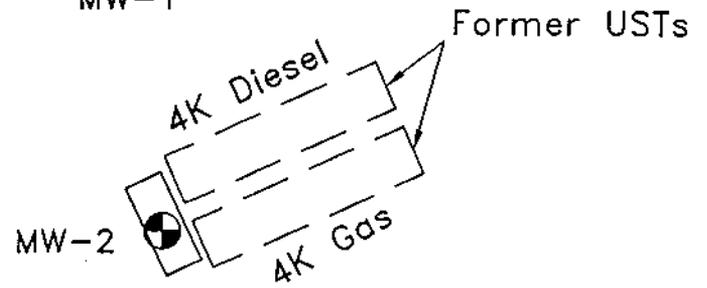
LEGEND:  Monitoring Well Location
 GROUND-WATER CONTOUR

DRAWN BY:	BWH	DATE:	MARCH 99
APPROVED BY:	BR	FILE No.:	DANVILLE



2.5 ppb BTEX
ND<2 ppb MTBE
ND<0.10 ppm TPH

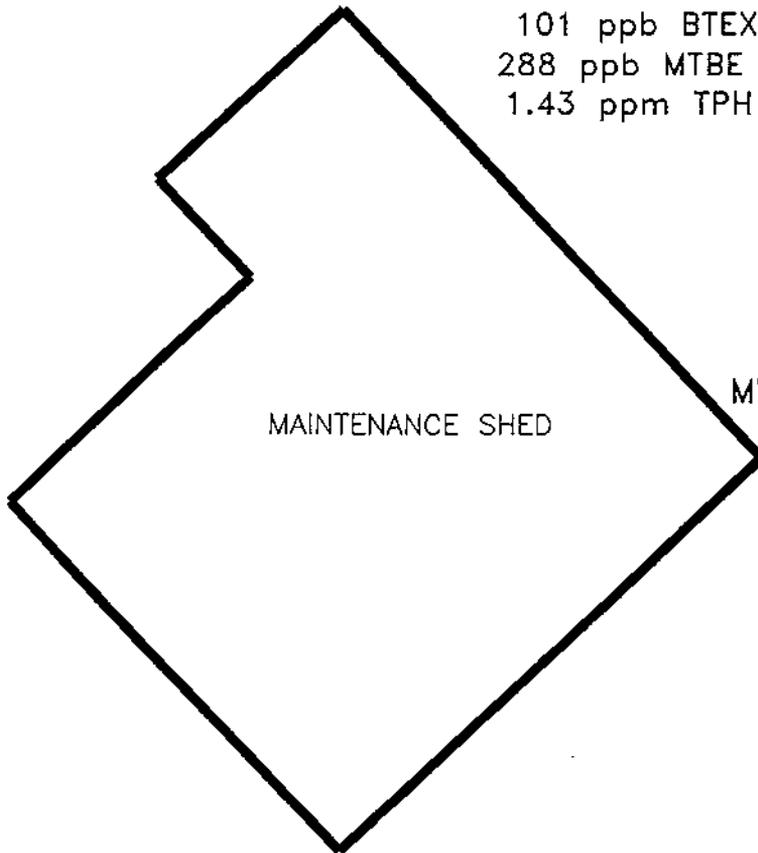
MW-1



101 ppb BTEX
288 ppb MTBE
1.43 ppm TPH

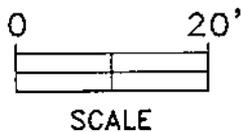
5.4 ppb BTEX
9.3 ppb MTBE
0.14 ppm TPH

MW-4



MW-3

25.7 ppb BTEX
ND<2 ppb MTBE
0.13 ppm TPH



ALL LOCATIONS ARE APPROXIMATE

Ross Environmental Associates, Inc.

P.O. Box 1533
Stowe, VT 05672
(802) 253-4280

DANVILLE TOWN GARAGE
DANVILLE, VT

FIGURE 4.
CONTAMINANT DISTRIBUTION MAP
MONITORING DATE: 18 MARCH 1999

LEGEND: Monitoring Well Location
ND NONE DETECTED

DRAWN BY:	BWH	DATE:	MARCH 99
APPROVED BY:	BR	FILE No.:	DANVILLE

TABLE 1.
Ground-Water Elevation Calculations

Danville Town Garage
Danville, Vermont

Monitoring Date: 18 March 1999

Well I. D.	Top of Casing Elevation *	Depth to Water (feet, TOC)	Ground Water Elevation
MW-1	95.65	6.34	89.31
MW-2	100.00	11.16	88.84
MW-3	95.56	7.32	88.24
MW-4	93.79	5.42	88.37

*Top of casing (TOC) and ground water elevations are relative to an arbitrary site datum of 100.00 feet.

TABLE 2.
Summary of Ground-Water Analytical Results

Danville Town Garage
Danville, Vermont

Monitoring Date: 18 March 1999

Well I.D.	MTBE	benzene	toluene	ethyl benzene	total xylenes	1,3,5-TMB	1,2,4-TMB	naphthalene	TPH (mg/L)
MW-1	ND <2	ND <1	ND <1	ND <1	2.5	ND <1	2.0	ND <5	ND <0.10
MW-2	288	32.2	10.6	11.2	47.1	11.9	23.6	31.0	1.43
MW-3	ND <2	ND <1	4.4	3.0	18.3	2.1	5.5	ND <5	0.13
MW-4	9.3	ND <1	1.1	ND <1	4.3	ND <1	3.6	5.2	0.14
dup. MW-2	317	31.8	10.5	11.6	47.5	11.9	22.0	36.0	1.43
trip blank	ND <2	ND <1	ND <1	ND <1	ND <2	ND <1	ND <1	ND <5	---
VGES	40	5	1,000	700	10,000	4	5	20	---

Notes:

Results reported as micrograms per liter (ug/L), unless noted otherwise.

mg/L = milligrams per liter

ND = Not detected above indicated detection limit.

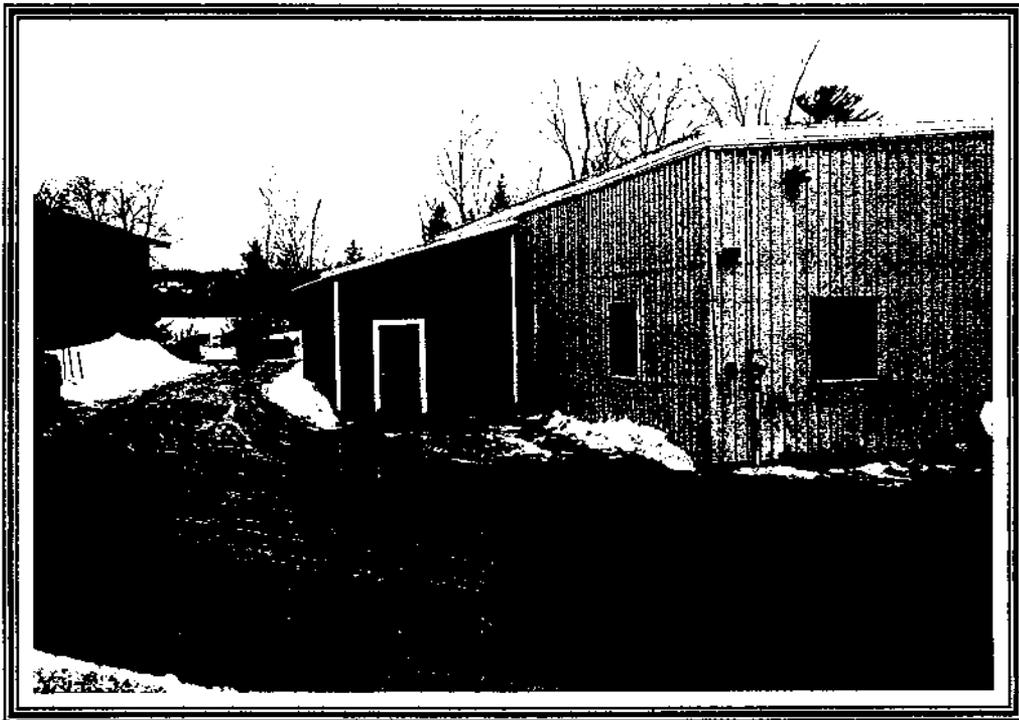
MTBE = methyl-tertiary butyl ether; 1,3,5-TMB = 1,3,5-trimethylbenzene; 1,2,4-TMB = 1,2,4-trimethylbenzene

VGES = Vermont Groundwater Enforcement Standard.

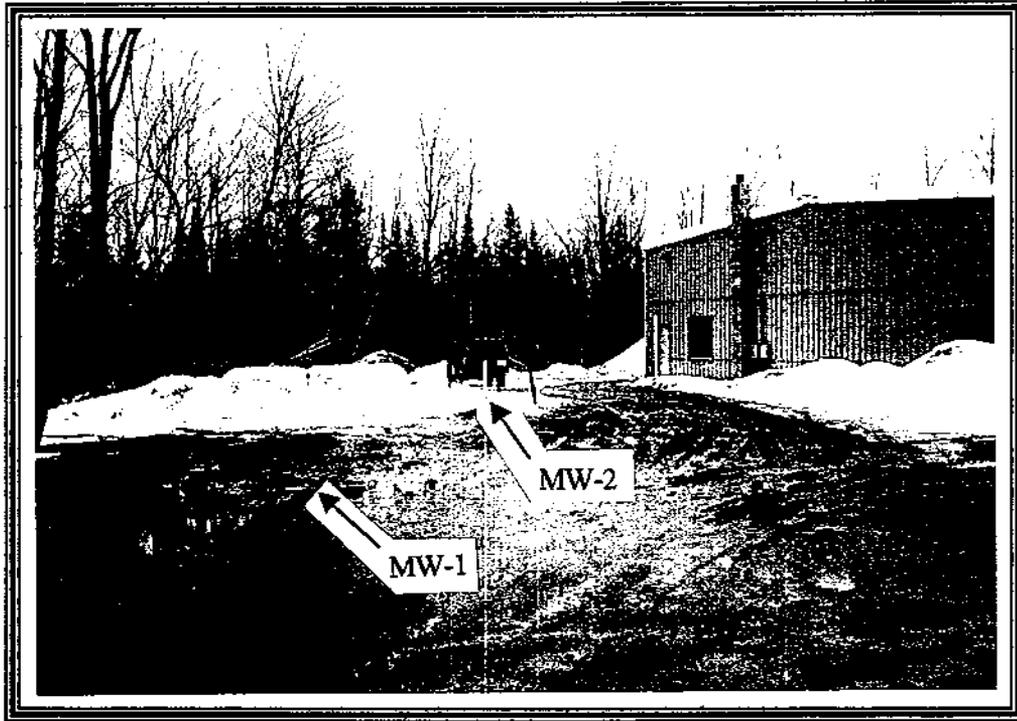
APPENDIX B



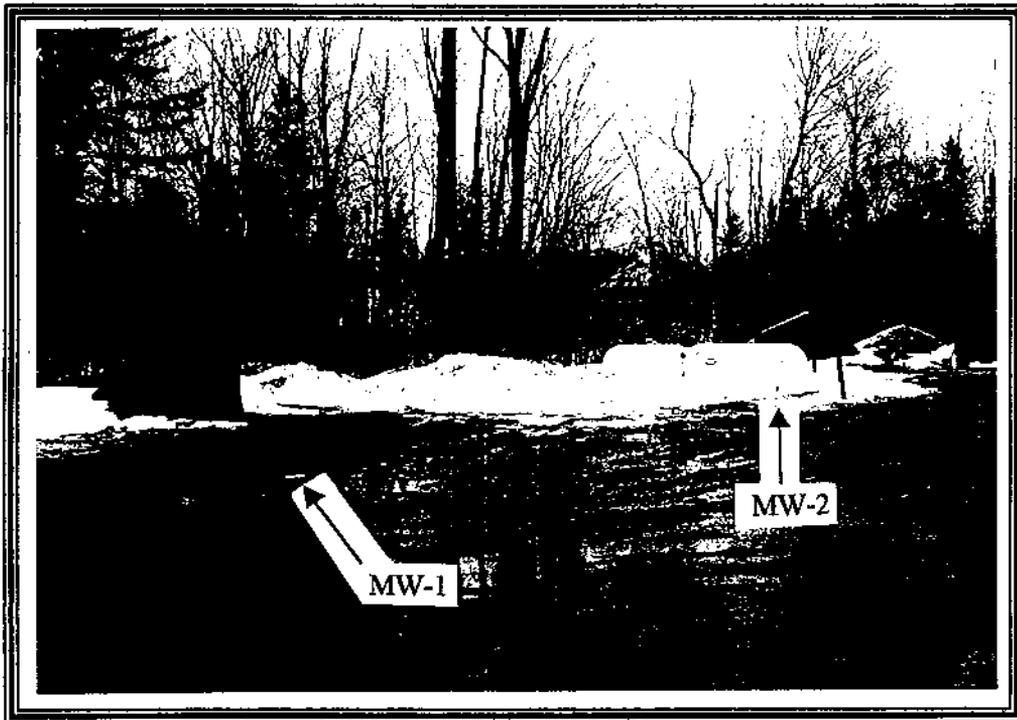
DANVILLE TOWN GARAGE
(Entrance - View Toward Northwest)



DANVILLE TOWN GARAGE
(View Toward North)



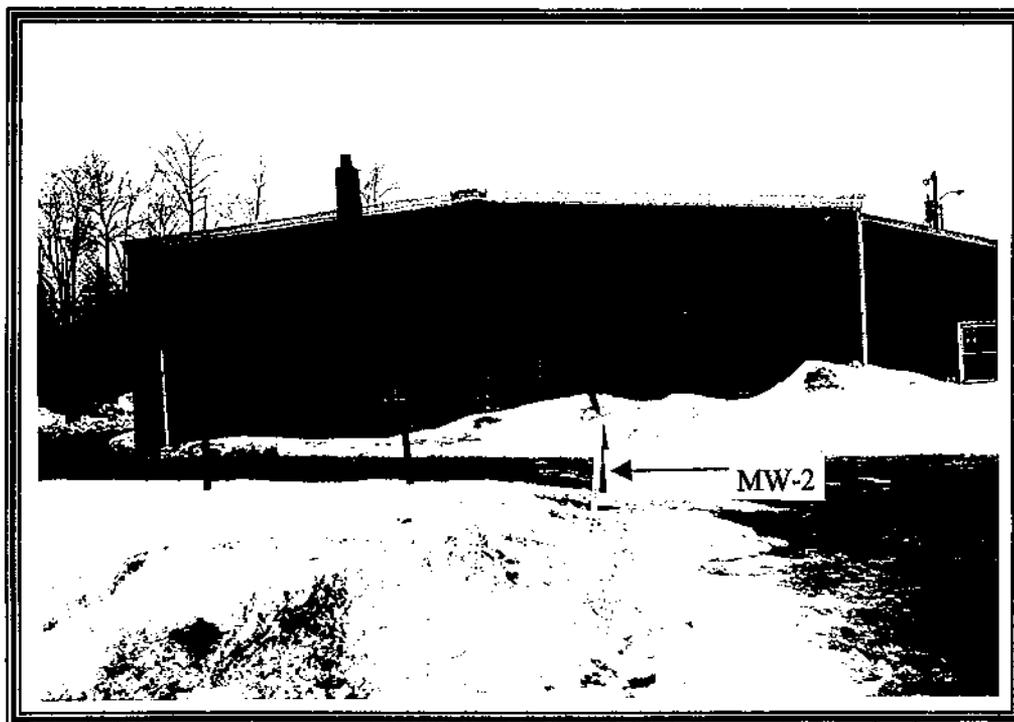
DANVILLE TOWN GARAGE
(Overview Former UST Location - View Toward East)



DANVILLE TOWN GARAGE
(Overview Former UST Location - View Toward East)



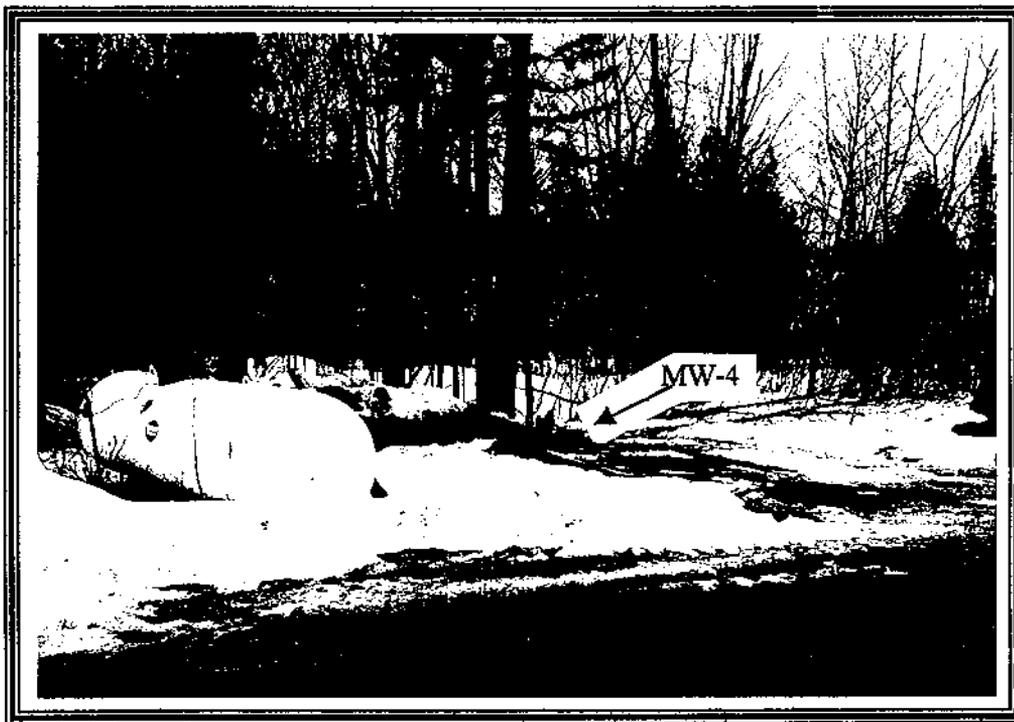
DANVILLE TOWN GARAGE
(MW-1 - View Toward Southwest)



DANVILLE TOWN GARAGE
(MW-2 - View Toward South)



DANVILLE TOWN GARAGE
(MW-3 - View Toward West)



DANVILLE TOWN GARAGE
(MW-4 - View Toward Northeast)

APPENDIX C

Monitoring Well Log

SITE NAME: Danville Town Garage		BORING NO: MW-1		<p>North</p> <p>MW-1</p> <p>Former USTs</p> <p>Diesel</p> <p>Gas</p> <p>~33'</p> <p>MW-2</p> <p>Not to Scale</p>	
ADDRESS: Peacham Rd Danville, VT		TOTAL DEPTH: 14 ft			
JOB NO: 99-008		DEPTH TO WATER: 9 ft ATD			
DATE: 3/12/99		DEPTH TO BEDROCK: > 14 ft			
WEATHER: overcast 20-25°F		FIELD SUPERVISOR: B. Ross			
DRILLING METHOD/BORING DIAMETER 4 1/4" HSA		CONTRACTOR: Tri-State			
		DRILLERS: Nest Faulkner			

Depth (ft)	Sample No.	BLOW COUNTS PER 6"					Rec. (ft)	SAMPLE DESCRIPTION	WELL DETAIL	PID (ppm)
		0-6	6-12	12-18	18-24	24-30				
							Fill			
							dark brown SAND slight odor	bentinit seal		
5'	SS-1	11	14			4/24	dark brown very fine SAND and SILT, Trace rock chips (dry) No odor	Pack Sand	12.3	
				10	7					
10'	SS-2	7	8			8/24	lt brown/tan very fine SAND, some silt oxidized layer w/ coarse sand & weathered rock		24.4	
				24	29					
15'							BoB at 14'			
20'										
25'										

		BLOW COUNT		MATERIALS USED		SIZE/TYPE/QUANTITY		COMMENTS	
AND	33-50%	0-4	VERY LOSE	WELL SCREEN		10' PVC		Road box Protective casing	
SOME	20-33%	4-10	LOOSE	SLOT SIZE		10 slot			
LITTLE	10-20%	10-30	MEDIUM	RISER		4' PVC			
TRACE	0-10%	30-50	DENSE	GRADED SAND		3-14'			
		> 50	VERY DENSE	BENTONITE PELLETS		1.5-3'			
				BENTONITE GROUT					

Monitoring Well Log

SITE NAME: Danville Town Garage		BORING NO: MW-2								
ADDRESS: Peacham Rd Danville, VT		TOTAL DEPTH: 15.5'								
JOB NO: 99-008		DEPTH TO WATER: 8 ft		Former USTs Diesel Gas MW-1 MW-2 ~33' Not to Scale						
DATE: 3/12/99		DEPTH TO BEDROCK: —								
WEATHER: overcast 20-25°F		FIELD SUPERVISOR: B. Ross		Boring/Well Location PID (ppm)						
DRILLING METHOD/BORING DIAMETER 4 1/4 HSA		CONTRACTOR: Tri-State								
		DRILLERS: Neal Faulkner								
Depth (ft)	Sample No.	BLOW COUNTS PER 6"					Rec. (ft)	SAMPLE DESCRIPTION	WELL DETAIL	PID (ppm)
		0	6	12	18	24				
5							Installed in UST excavation during UST closure - south end of diesel Tank near former Pump Island			
10										
15										
20										
25										
		BLOW COUNT		MATERIALS USED		SIZE/TYPE/QUANTITY		COMMENTS		
AND	33-50%	0-4	VERY LOSE	WELL SCREEN	10' PVC	Stickup casing -				
SOME	20-33%	4-10	LOOSE	SLOT SIZE	10 slot					
LITTLE	10-20%	10-30	MEDIUM	RISER	5' PVC					
TRACE	0-10%	30-50	DENSE	GRADED SAND	—					
		> 50	VERY DENSE	BENTONITE PELLETS						
				BENTONITE GROUT						

Monitoring Well Log

SITE NAME: Danville Town Garage		BORING NO: MW-3			
ADDRESS: Peacham Rd Danville, VT		TOTAL DEPTH: 12.5'			
JOB NO: 99-008		DEPTH TO WATER: ~9.5' ATD		Former USTs old Garage Not to scale Boring/Well Location	
DATE: 3/12/99		DEPTH TO BEDROCK: refusal			
WEATHER: Overcast 20-25°F		FIELD SUPERVISOR: B. Ross		MW-2 ← 45' → MW-3	
DRILLING METHOD/BORING DIAMETER 4 1/4 HSA		CONTRACTOR: Tristate			
DRILLERS: Neal Faulkner					

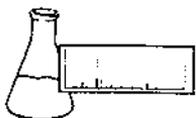
Depth (ft)	Sample No.	BLOW COUNTS PER 6"					Rec. (ft)	SAMPLE DESCRIPTION	WELL DETAIL	PID (ppm)
		0-6	6-12	12-18	18-24	24-30				
5	SS-1	5	6				14/24	dark brown fine SAND, Some silt - bottom 2" oxidized No odor		47.8
10	SS-2	3	8				2/24	brown very fine SAND and silt, trace rock chips (saturated) No odor		30.9
12.5								refusal at 12.5' Possible bedrock		

		BLOW COUNT		MATERIALS USED		SIZE/TYPE/QUANTITY		COMMENTS	
AND	33-50%	0-4	VERY LOSE	WELL SCREEN		8' PVC		Road box Protective casing	
SOME	20-33%	4-10	LOOSE	SLOT SIZE		10 slot			
LITTLE	10-20%	10-30	MEDIUM	RISER		4' PVC			
TRACE	0-10%	30-50	DENSE	GRADED SAND		2.5-12.5'			
		>50	VERY DENSE	BENTONITE PELLETS		1.0-2.5'			
				BENTONITE GROUT					

Monitoring Well Log

SITE NAME: Danville Town Garage		BORING NO: MW-4		Former USTs		North			
ADDRESS: Peacham Rd Danville, VT		TOTAL DEPTH: 14 ft		13310 Gas		MW-4			
JOB NO. 99-008		DEPTH TO WATER: 10 ft ATD		MW-2		55'			
DATE: 3/12/99		DEPTH TO BEDROCK: > 14 ft		FIELD SUPERVISOR: B. ROSS		45'			
WEATHER: overcast 20-25°F		DRILLING METHOD/BORING DIAMETER: 4 1/4" HSA		CONTRACTOR: Tri-state		MW-3			
DRILLERS: Neal Faulkner		REC. (ft)		SAMPLE DESCRIPTION		WELL DETAIL			
Depth (ft)	Sample No.	BLOW COUNTS PER 6"				Rec. (ft)	SAMPLE DESCRIPTION	WELL DETAIL	PID (ppm)
		0	6	12	18	24			
5	SS-1	5	7			12/24	brown fine SAND, little silt, trace rock chips bottom 2" dark brown fine SAND and SILT (no odor)	bentone seal Sand pack	36.9
10	SS-2	4	5			18/24	brown very fine SAND and SILT, trace coarse sand & rock chips (fill) (saturated)		29.5
15							BOB at 14'		
20									
25									
AND		BLOW COUNT		MATERIALS USED		SIZE/TYPE/QUANTITY		COMMENTS	
33-50%		0-4 VERY LOSE		WELL SCREEN		10' PVC		Road box Protective casing	
20-33%		4-10 LOOSE		SLOT SIZE		10 slot			
10-20%		10-30 MEDIUM		RISER		4' PVC			
0-10%		30-50 DENSE		GRADED SAND		2-13'			
		>50 VERY DENSE		BENTONITE PELLETS		1-2'			
				BENTONITE GROUT					

APPENDIX D



LABORATORY REPORT

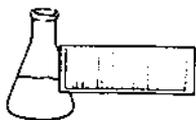
CLIENT: Ross Environ. Assoc., Inc.
PROJECT: Danville Town Gar./REA.99-008
REPORT DATE: March 24, 1999ORDER ID: 1664
DATE RECEIVED: March 19, 1999
SAMPLER: BR
ANALYST: 725

Ref. Number: 135719 Site: MW-4 Date Sampled: March 18, 1999 Time: 10:38 AM

<u>Parameter</u>	<u>Result</u>	<u>Unit</u>	<u>Method</u>	<u>Analysis Date</u>
MTBE	9.3	ug/L	SW 8021B	3/23/99
Benzene	< 1.0	ug/L	SW 8021B	3/23/99
Toluene	1.1	ug/L	SW 8021B	3/23/99
Ethylbenzene	< 1.0	ug/L	SW 8021B	3/23/99
Xylenes, Total	4.3	ug/L	SW 8021B	3/23/99
1,3,5 Trimethyl Benzene	< 1.0	ug/L	SW 8021B	3/23/99
1,2,4 Trimethyl Benzene	3.6	ug/L	SW 8021B	3/23/99
Naphthalene	5.2	ug/L	SW 8021B	3/23/99
UIP's	> 10.		SW 8021B	3/23/99
Surrogate 1	106.0%	%	SW 8021B	3/23/99

Ref. Number: 135720 Site: MW-3 Date Sampled: March 18, 1999 Time: 10:47 AM

<u>Parameter</u>	<u>Result</u>	<u>Unit</u>	<u>Method</u>	<u>Analysis Date</u>
MTBE	< 2.0	ug/L	SW 8021B	3/23/99
Benzene	< 1.0	ug/L	SW 8021B	3/23/99
Toluene	4.4	ug/L	SW 8021B	3/23/99
Ethylbenzene	3.0	ug/L	SW 8021B	3/23/99
Xylenes, Total	18.3	ug/L	SW 8021B	3/23/99
1,3,5 Trimethyl Benzene	2.1	ug/L	SW 8021B	3/23/99
1,2,4 Trimethyl Benzene	5.5	ug/L	SW 8021B	3/23/99
Naphthalene	< 5.0	ug/L	SW 8021B	3/23/99
UIP's	> 10.		SW 8021B	3/23/99
Surrogate 1	105.0%	%	SW 8021B	3/23/99



Ref. Number: 135721

Site: MW-2

Date Sampled: March 18, 1999

Time: 11:02 AM

<u>Parameter</u>	<u>Result</u>	<u>Unit</u>	<u>Method</u>	<u>Analysis Date</u>
MTBE	288.	ug/L	SW 8021B	3/24/99
Benzene	32.2	ug/L	SW 8021B	3/24/99
Toluene	10.6	ug/L	SW 8021B	3/24/99
Ethylbenzene	11.2	ug/L	SW 8021B	3/24/99
Xylenes, Total	47.1	ug/L	SW 8021B	3/24/99
1,3,5 Trimethyl Benzene	11.9	ug/L	SW 8021B	3/24/99
1,2,4 Trimethyl Benzene	23.6	ug/L	SW 8021B	3/24/99
Naphthalene	31.0	ug/L	SW 8021B	3/24/99
UIP's	> 10.		SW 8021B	3/24/99
Surrogate 1	103.%	%	SW 8021B	3/24/99

Ref. Number: 135722

Site: MW-1

Date Sampled: March 18, 1999

Time: 11:35 AM

<u>Parameter</u>	<u>Result</u>	<u>Unit</u>	<u>Method</u>	<u>Analysis Date</u>
MTBE	< 2.0	ug/L	SW 8021B	3/24/99
Benzene	< 1.0	ug/L	SW 8021B	3/24/99
Toluene	< 1.0	ug/L	SW 8021B	3/24/99
Ethylbenzene	< 1.0	ug/L	SW 8021B	3/24/99
Xylenes, Total	2.5	ug/L	SW 8021B	3/24/99
1,3,5 Trimethyl Benzene	< 1.0	ug/L	SW 8021B	3/24/99
1,2,4 Trimethyl Benzene	2.0	ug/L	SW 8021B	3/24/99
Naphthalene	< 5.0	ug/L	SW 8021B	3/24/99
UIP's	5.		SW 8021B	3/24/99
Surrogate 1	105.%	%	SW 8021B	3/24/99



Ref. Number: 135723

Site: Duplicate

Date Sampled: March 18, 1999

Time: NI

<u>Parameter</u>	<u>Result</u>	<u>Unit</u>	<u>Method</u>	<u>Analysis Date</u>
MTBE	317.	ug/L	SW 8021B	3/24/99
Benzene	31.8	ug/L	SW 8021B	3/24/99
Toluene	10.5	ug/L	SW 8021B	3/24/99
Ethylbenzene	11.6	ug/L	SW 8021B	3/24/99
Xylenes, Total	47.5	ug/L	SW 8021B	3/24/99
1,3,5 Trimethyl Benzene	11.9	ug/L	SW 8021B	3/24/99
1,2,4 Trimethyl Benzene	22.0	ug/L	SW 8021B	3/24/99
Naphthalene	36.0	ug/L	SW 8021B	3/24/99
UIP's	> 10.		SW 8021B	3/24/99
Surrogate 1	106.0%	%	SW 8021B	3/24/99

Ref. Number: 135724

Site: Trip Blank

Date Sampled: March 17, 1999

Time: 8:25 PM

<u>Parameter</u>	<u>Result</u>	<u>Unit</u>	<u>Method</u>	<u>Analysis Date</u>
MTBE	< 2.0	ug/L	SW 8021B	3/24/99
Benzene	< 1.0	ug/L	SW 8021B	3/24/99
Toluene	< 1.0	ug/L	SW 8021B	3/24/99
Ethylbenzene	< 1.0	ug/L	SW 8021B	3/24/99
Xylenes, Total	< 2.0	ug/L	SW 8021B	3/24/99
1,3,5 Trimethyl Benzene	< 1.0	ug/L	SW 8021B	3/24/99
1,2,4 Trimethyl Benzene	< 1.0	ug/L	SW 8021B	3/24/99
Naphthalene	< 5.0	ug/L	SW 8021B	3/24/99
UIP's	0.		SW 8021B	3/24/99
Surrogate 1	105.0%	%	SW 8021B	3/24/99



LABORATORY REPORT

CLIENT: Ross Environ. Assoc., Inc.
PROJECT: Danville Town Gar./REA.99-008
REPORT DATE: March 24, 1999

ORDER ID: 1664
DATE RECEIVED: March 19, 1999
SAMPLER: BR
ANALYST: 725

Ref. Number: 135719 Site: MW-4 Date Sampled: March 18, 1999 Time: 10:38 AM

<u>Parameter</u>	<u>Result</u>	<u>Unit</u>	<u>Method</u>	<u>Analysis Date</u>
TPH 8015 GRO	0.14	mg/L	SW 8015B	3/23/99

Ref. Number: 135720 Site: MW-3 Date Sampled: March 18, 1999 Time: 10:47 AM

<u>Parameter</u>	<u>Result</u>	<u>Unit</u>	<u>Method</u>	<u>Analysis Date</u>
TPH 8015 GRO	0.13	mg/L	SW 8015B	3/23/99

Ref. Number: 135721 Site: MW-2 Date Sampled: March 18, 1999 Time: 11:02 AM

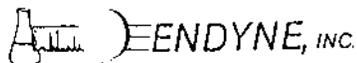
<u>Parameter</u>	<u>Result</u>	<u>Unit</u>	<u>Method</u>	<u>Analysis Date</u>
TPH 8015 GRO	1.43	mg/L	SW 8015B	3/24/99

Ref. Number: 135722 Site: MW-1 Date Sampled: March 18, 1999 Time: 11:35 AM

<u>Parameter</u>	<u>Result</u>	<u>Unit</u>	<u>Method</u>	<u>Analysis Date</u>
TPH 8015 GRO	< 0.10	mg/L	SW 8015B	3/24/99

Ref. Number: 135723 Site: Duplicate Date Sampled: March 18, 1999 Time: NI

<u>Parameter</u>	<u>Result</u>	<u>Unit</u>	<u>Method</u>	<u>Analysis Date</u>
TPH 8015 GRO	1.43	mg/L	SW 8015B	3/24/99



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

REA 99-008

CHAIN-OF-CUSTODY RECORD

2 Drg
28013

Project Name: <u>Dunville Town Garage</u> Site Location: <u>Dunville, VT</u>	Reporting Address: <u>PO Box 1533</u> <u>Stowe, VT 05612</u>	Billing Address: <u>Ross Environmental Associates</u> <u>PO Box 1533 Stowe, VT 05612</u>
Endyne Project Number: <u>1664</u>	Company: <u>Ross Environmental Associates</u> Contact Name/Phone #: <u>B. Ross 253-4280</u>	Sampler Name: <u>B. Ross</u> Phone #: <u>(802) 253-4280</u>

Lab #	Sample Location	Matrix	G R A B	C O M P	Date/Time	Sample Containers		Field Results/Remarks	Analysis Required	Sample Preservation	Rush
						No.	Type/Size				
135719	MW-4	water	X		3/18/99 1038	4	40ml		19/30	HCE	
135720	mw-3	↓	↓		3/18 1047	↓	↓		↓	↓	
135721	mw-2	↓	↓		3/18 1102	↓	↓		↓	↓	
135722	mw-1	↓	↓		3/18 1135	↓	↓		↓	↓	
135723	duplicate	↓	↓		3/18 -	4	40ml		19/30	HCE	
135724	Tr. p Blank	↓	↓		3/17/99 2015 3/17/99 2015	2	40ml		19	HCE	

Relinquished by: Signature <u>[Signature]</u>	Received by: Signature <u>[Signature]</u>	Date/Time <u>3/19/99 5:24pm</u>
Relinquished by: Signature	Received by: Signature	Date/Time

New York State Project: Yes No

Requested Analyses

1	pH	6	TKN	11	Total Solids	16	Metals (Specify)	21	EPA 624	26	EPA 8270 B/N or Acid
2	Chloride	7	Total P	12	TSS	17	Coliform (Specify)	22	EPA 625 B/N or A	27	EPA 8010/8020
3	Ammonia N	8	Total Diss. P	13	TDS	18	COD	23	EPA 418.1	28	EPA 8080 Pest/PCB
4	Nitrite N	9	BOD ₅	14	Turbidity	19	BTEX 8021B	24	EPA 608 Pest/PCB		
5	Nitrate N	10	Alkalinity	15	Conductivity	20	EPA 601/602	25	EPA 8240		
29	TCLP (Specify: volatiles, semi-volatiles, metals, pesticides, herbicides)										
30	Other (Specify): <u>TPH. 8015B</u>										