ROSS ENVIRONMENTAL ASSOCIATES, INC.

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

20 December 2004



Mr. Chuck Schwer
Dept. of Environmental Conservation
103 South Main Street – West Building
Waterbury, Vermont 05671-0404

*RE: Initial Site Investigation*
*Ten Acres Lodge, Stowe, Vermont - (SMS site # 2004-3263)*

Dear Chuck:

Enclosed is a copy of the Initial Site Investigation Report for the Ten Acres Lodge located on Barrows Road in Stowe, VT (SMS Site # 2004-3263).

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

Sincerely,

Juliette R. Hancock
Geologist

enclosure

Jrh/ref: 24072CL02

P.O. Box 1533 Stowe, Vermont 05672
phone 802.253.4280 fax 802.253.4829

ROSS ENVIRONMENTAL ASSOCIATES, INC.

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

# Initial Site Investigation Report

**Ten Acres Lodge**
**14 Barrows Road**
**Stowe, Vermont 05672**

**SMS Site #: 2004-3263**

**17 November 2004**

**Prepared For:**

**Mr. Frank Wilson**
**14 Barrows Road**
**Stowe, Vermont 05672**

***Phone:*** **(802) 253-7638**

**Prepared By:**

**Juliette R. Hancock, Geologist**
**Ross Environmental Associates, Inc.**
**P.O. Box 1533**
**Stowe, Vermont 05672**

***Phone:*** **(802) 253-4280**
***Fax:*** **(802) 253-4258**

***R.E.A.*** **Project No. 24-072**
***R.E.A.*** **Document #: 24072ISI**

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## EXECUTIVE SUMMARY

Ross Environmental Associates, Inc. (***R.E.A.***) has conducted an initial site investigation (ISI) at the Ten Acres Lodge, located on Barrows Road in Stowe, Vermont. Field investigation included: installation of three soil boring/monitoring wells, field screening of subsurface soil samples for the possible presence of volatile organic compounds (VOCs), sampling and analysis of water from three on-site monitoring wells and the onsite supply bedrock well and drinking water supply spring, and a receptor survey to identify potential risks to the environment and human health.

Three monitoring wells (MW-1, MW-2, and MW-3) were installed on the southeastern and southern sides of the red cottage, downgradient from the former 500-gallon fuel-oil underground storage tank (UST), which was removed in August 2004. No petroleum contamination was detected in the samples collected from the on-site monitoring wells or the two on-site drinking water supply wells. Available information indicates that residual petroleum contamination is limited to the soil in the immediate vicinity of the former UST system, and no sensitive receptors appear to be threatened or impacted at this time.

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

1. The on-site monitoring wells (MW-1, MW-2, and MW-3) should be re-sampled to confirm the findings of the initial sampling event. All samples should be analyzed for the possible presence of volatile organic compounds (VOCs) and total petroleum hydrocarbons (TPH) in accordance with U.S. EPA Methods 8021B and 8015DRO, respectively.
2. The two supply wells should be re-sampled to confirm the findings of the initial sampling event. The samples should be analyzed for the possible presence of volatile organic compounds by drinking water standards in accordance with U.S. EPA Method 524.2.
3. A summary report should be submitted following the completion of the additional work, which should include recommendations for possible long-term monitoring or site closure.

## SITE PROFILE

Site Information

| | |
|---|---|
| Site Name: | Ten Acres Lodge |
| SMS Site #: | 2004-3263 |
| Site Address: | 14 Barrows Road, Stowe, VT |
| Mailing Address**:** | 14 Barrows Road, Stowe, VT |
| Telephone: | (802) 253-7638 |
| Contact/Owner: | Mr. Frank Wilson |
| Coordinates: | latitude 44$^{o}$ 28' 18.62" N, and longitude 72$^{o}$ 43' 38.79"W. |
| Contaminants of Concern: | Petroleum, characteristic of fuel-oil |
| Source: | Leaking underground storage tank, removed in August 2004 |

**Aquifer Characteristics**

| | |
|---|---|
| Soil Type: | The soils at the site consisted primarily of fine sand and clay |
| Effective Porosity: | 0.4 |
| Hydraulic conductivity: | 0.5 to 57 ft/day |
| Ground-water flow direction: | southeast |
| Horizontal hydraulic gradient: | 5 % (10/20/04) |
| Average ground water velocity: | 0.063 to 7.125 ft/day |
| Ground-water depth bgs: | 6 to 9 feet bgs |
| Saturated thickness: | >9 feet |
| Depth to Bedrock: | >17 feet bgs |

**Receptors**

| | |
|---|---|
| Drinking water: | The Main Lodge is served by a private bedrock supply well located approximately 250 feet east of the former UST, and the Red Cottage is served by a private shallow dug well, located approximately ten feet west of the former UST. According to Mr. Frank Wilson, it is unclear if water is pumped from the bedrock well into the spring tile, or if the groundwater sources are separate. Both supply wells were sampled on 20 October 2004, and no volatile organic compounds were detected. |
| Ground water: | No VOCs were detected in the samples collected from any of the onsite monitoring wells; see Table 2, Appendix A. |
| Surface water: | A swimming pool is located approximately 75 feet east of the former UST, and an unnamed tributary of the West Branch, located approximately 80 feet north of the former UST. |
| Buildings: | The Red Cottage is constructed on a crawl space. |
| Underground utilities: | The private septic system is located on the northern side of the Red Cottage. No other underground utilities are located in the vicinity of the former UST. |

## 1.0 INTRODUCTION

Immediately following the closure of the UST, Mr. Albert Obarzanek, the owner of Ten Acres Lodge at the time, retained the services of ***R.E.A.*** to complete an initial site investigation (ISI) at the Ten Acres Lodge in Stowe, Vermont in accordance with Vermont Department of Environmental Conservation (VT DEC) guidelines. Since the UST closure, the Ten Acres Lodge has been sold and is now owned by Mr. Frank Wilson. This report has been prepared by ***R.E.A.*** under the direction of Mr. Frank Wilson; unauthorized use or reproduction of this report is prohibited, without written authorization from ***R.E.A.,*** or Mr. Frank Wilson.

### 1.1 Site Location and Setting

The subject property, which is currently owned by Mr. Frank Wilson, is occupied by a bed and breakfast and two small cottages. The property is located on Barrows Road in Stowe, Vermont (Figure 1, Appendix A). Drinking water for the Ten Acres Lodge is provided by a private bedrock supply well, located on the west side of the Main Lodge, approximately 250 feet east of the former UST. Also, drinking water for the Red Cottage is provided by a shallow dug spring, located ten feet west of the former UST. According to Mr. Wilson, it is unclear if water from the bedrock well is pumped into the concrete well tile, or if the spring is supplied by a separate groundwater source. Wastewater disposal for the Red Cottage is provided by a private septic system located on the north side of the cottage.

The ground surface slopes gently to the east, with an average elevation of 820 feet above mean sea level (Maptech, 1998). An unnamed tributary of the West Branch River is located approximately 80 feet north of the former UST. The geographic coordinates of the site are: latitude 44$^{o}$ 28’ 18.62” N, and longitude 72$^{o}$ 43’ 38.79” W.

The surficial geology in the vicinity of the site is mapped as glacial till (Stewart and MacClintock, 1970). Bedrock in the area is mapped as the Hazens Notch formation, which consists of interbedded carbonaceous and noncarbonaceous quartz-sericite-albite-chlorite schist, which grades to quartzite and gneiss (Doll, 1961). No bedrock outcrops were observed on the site or adjacent properties.

An orthophotograph from 1999 showing the site and surrounding properties and photographs of the site and surrounding area taken during the initial site investigation are included in Appendix B.

### 1.2 Site History

On 9 August 2004, ***R.E.A.*** provided oversight for the removal of a 500-gallon fuel-oil underground storage tank (UST) located on the southwestern side of the Red Cottage. The UST was found to be in poor condition, with widespread rust, severe pitting, and two holes on the bottom of the tank.

Soils in the excavation consisted of medium brown sand from ground surface to three feet bgs, and coarse gravel with unconsolidated cobbles and trace clay to the bottom of the excavation, which extended to approximately five feet bgs. PID readings on soil samples collected from the UST excavation ranged from 8.2 to 1,001 ppmv, which are above the VT DEC action level of 10 ppmv for fuel-oil/diesel contaminated soil. Groundwater was encountered at approximately five feet bgs, and strong petroleum odors and slight sheens were noted within the excavation. Due to visible impacts to the groundwater formation, the vertical and lateral extent of contamination could not be defined and all petroleum contaminated soils were backfilled into the UST excavation. Based on the findings of the UST closure, the subsurface petroleum contamination is most likely due to the two holes found in the bottom of the former tank.

### 1.3 Land Use and Adjacent Property Ownership

The subject property is located in a rural residential area of Stowe. The adjacent property to the north is Luce Hill Road, to the east is Barrows Road, and to the south and west are private residences.

## 2.0 Field Investigation Results and Procedures

***R.E.A.'s*** field investigation included: the installation of three soil boring/monitoring wells (MW-1, MW-2, and MW-3); field screening of subsurface soil samples for the possible presence of volatile organic compounds (VOCs) using a portable photo-ionization detector (PID); collection and analysis of water samples from three on-site monitoring wells and the two onsite drinking water supply wells, and a receptor survey to identify potential risks to the environment and human health. Approximate monitoring well/soil boring 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 soils and ground water;
- Qualitatively assess the risks to environmental and public health via relevant sensitive receptors and potential contaminant migration pathways.
- Identify the need for further site characterization, appropriate monitoring, and/or remedial actions based on the site conditions.

### 2.1 Contaminants of Concern

Based on available information, the contaminant of concern (COC) at Ten Acres Lodge appears to be no. 2 fuel oil.

### 2.2 Source Area Evaluation

Based on available information, the source of petroleum contamination discovered at Ten Acres Lodge is the former UST system serving the Red Cottage, which was removed in August 2004. The UST was found to be in poor condition, with widespread rust and severe pitting, and two holes in the bottom of the former tank. No other potential sources of petroleum contamination were identified on an adjacent property.

### 2.3 Soil Boring and Monitoring Well Installation

On 7 October 2004, ***R.E.A.*** provided oversight during the installation of three monitoring wells; MW-1 was installed in the former UST excavation, and MW-2 and MW-3 were installed in the presumed downgradient direction from the former UST system. Based on the site setting and field observations during soil boring, ***R.E.A.***'s geologist determined that three monitoring wells were sufficient for the initial site characterization. The soils at the site consisted primarily of fine sand and clay. The soil borings for the monitoring wells were extended to at least eight feet below the water table, which was encountered between approximately 6 and 9 feet bgs at the time of drilling.

Each monitoring well was constructed using 2.0-inch-diameter schedule 40 polyvinyl chloride (PVC) with flush threaded joints, with a ten-foot section of 0.01-inch factory-slotted well screen installed at the bottom. Solid PVC risers, extending to ground surface, were used to complete each well. A clean sand pack was placed around the screened section of each monitoring well extending one to two feet above the top of the screen, with a bentonite seal placed above the sand pack. Flush-mounted road-box protective casings were installed over each monitoring well. Each well was developed after installation by removing eight to ten standing volumes of water using disposable hand bailers. Soil descriptions and monitoring well construction details are included on the soil boring logs in Appendix C. Technical Drilling Services, Inc. of Sterling, MA installed the soil borings and monitoring wells under direct supervision of ***R.E.A.***

Photo-ionization detector (PID) readings on soil samples collected from MW-1 ranged between 0.6 and 260 ppmv, which are above the VT DEC action level of 10 ppmv for fuel-oil/diesel contaminated soils. PID readings on soil samples collected from MW-2 and MW-3 ranged between 0.0 and 5.0 ppmv. PID screening results are included on the soil boring logs in Appendix C. ***R.E.A.'s*** geologist screened soil samples from the soil borings for the possible presence of volatile organic compounds

(VOCs) using a Photovac PE2020 portable PID. The PID was calibrated with an isobutylene standard gas to a benzene reference on the day of drilling.

After installation of the soil boring/monitoring wells, ***R.E.A.*** surveyed the locations of the boring/wells in relation to existing site features and roadways. Each boring/well was located in azimuth to an accuracy of ± 1.0 feet, and in elevation with an accuracy of ± 0.01 feet relative to an on-site benchmark of 100.00 feet (MW-1).

### 2.4 Ground Water Elevations and Flow Direction

On 20 October 2004, ground-water flow in the unconfined surficial aquifer at the site was toward the east with an estimated hydraulic gradient of approximately five percent. Water-level measurements and elevation calculations for 20 October 2004, are presented in Table 1 and the ground-water contour map prepared using this data is presented as Figure 4, Appendix A.

Static water-table elevations were computed for each monitoring well by subtracting 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 (MW-1).

The effective porosity of the predominantly fine sand and clay encountered below the water-table is presumably around 0.4, with hydraulic conductivities of 0.5 to 57 feet per day (Freeze & Cherry, 1979). Assuming Darcian flow, these estimates combine with the calculated horizontal gradient of five percent to yield an estimated range of ground-water flow velocities of between 0.063 to 7.125 feet per day. Contaminant migration would be less accounting for retardation and dispersion of the contaminants.

### 2.5 Ground Water Sampling and Analysis

At this time, petroleum contamination appears to be limited to the immediate vicinity of the former UST, based on water quality data from three onsite monitoring wells and two supply wells. No downgradient sensitive receptors appear to be impacted or threatened by residual petroleum contamination.

No volatile petroleum compounds or total petroleum hydrocarbons were detected in water samples collected from three on-site monitoring wells (MW-1, MW-2, MW-3), or the drinking water supply wells.

No petroleum compounds were detected in the trip-blank sample, and the duplicate sample results (MW-1) were the same as the original. The analytical results are summarized on Table 2, and copies

of the laboratory analytical reports are included as Appendix D. Contaminant distribution, based on samples collected on 20 October 2004, is shown on Figure 4 in Appendix A.

Prior to sample collection, ***R.E.A*** field personnel measured the water level in each monitoring well and purged approximately three to five standing volumes of water from each well. All monitoring well samples were collected by pouring water from the bailer directly into 40-milliliter glass vials with teflon-lined septum lids. The drinking water samples were collected by filling 40-milliliter glass vials directly from indoor faucets after allowing the water to run for approximately 10 minutes. Each sample vial was preserved with hydrochloric acid to reduce e the pH to less than 2 standard units (su).

Immediately after sample collection, field measurements were obtained for pH, specific conductivity, temperature, total dissolved solids (TDS), and oxygen reduction potential (ORP). A summary of the field measurement data is included on Table 3, in Appendix A.

On 20 October 2004, the two drinking water supply wells were sampled and analyzed for the possible presence of volatile organic compounds in accordance with U.S. EPA Method 524.2. Also on 20 October 2004, ground water samples were collected from three monitoring wells (MW-1, MW-2, and MW-3). Ground water samples from monitoring wells were analyzed for the possible presence of volatile petroleum compounds and total petroleum hydrocarbons (TPH) in accordance with U.S. EPA Methods 8021B and 8015-diesel range organics (DRO), respectively. Drinking water supply samples were analyzed for the possible presence of volatile organic compounds in accordance with U.S. EPA Method 524.2. All samples were transported under chain-of-custody in an ice-filled cooler to Endyne, Inc. of Williston, Vermont for laboratory analysis.

### 2.6 Investigation Procedures

The procedures used during the initial site investigation at Ten Acres Lodge 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 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

Based on available information, no sensitive receptors appear to be threatened or impacted by the residual petroleum contamination located in the vicinity of the former UST system that served the Red Cottage at Ten Acres Lodge.

### 3.1 Receptor Identification

The following sensitive receptors were identified in the vicinity of the subject property.

- Soils and groundwater within the general vicinity of the former UST;
- The drinking water spring serving the Red Cottage, located approximately 10 feet west of the former UST system;
- The bedrock drinking water supply well, located approximately 250 feet east of the former UST.

### 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:

- No volatile petroleum compounds or total petroleum hydrocarbons were detected in any of the groundwater samples collected from MW-1, MW-2, or MW-3 on 20 October 2004.
- No volatile organic compounds were detected in the bedrock supply well or the drinking water spring serving Ten Acres Lodge.

## 4.0 DATA EVALUATION AND REGULATORY STATUS

Groundwater sampling results from 20 October 2004 indicate that petroleum contamination remains within the immediate vicinity of the former UST. No sensitive receptors appear to be impacted by residual contamination at this time.

Based on available information, active remediation at the site is not likely to be required by the VT DEC. Generally, the VT DEC requires active remediation when greater than 1/8" of free-product is present, or when human health or a sensitive receptor is impacted or threatened by contamination. The VT DEC may require periodic monitoring of ground water beneath the site; however the frequency of future sampling events should be determined after confirmation of the initial results.

A summary of the significant findings of the ISI is outlined below:

- No volatile petroleum compounds were detected in the groundwater samples collected from MW-1, MW-2, and MW-3 on 20 October 2004;
- No total petroleum hydrocarbons were detected in the groundwater samples collected from MW-1, MW-2, and MW-3.
- No volatile organic compounds were detected in the two supply well samples collected on 20 October 2004.
- Ground water in the shallow overburden formation appears to flow primarily toward the east, which is consistent with site topography and the location of surface water features.

## 5.0 RECOMMENDATIONS

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

4. The on-site monitoring wells (MW-1, MW-2, and MW-3) should be re-sampled to confirm the findings of the initial sampling event. All samples should be analyzed for the possible presence of volatile organic compounds (VOCs) and total petroleum hydrocarbons (TPH) in accordance with U.S. EPA Methods 8021B and 8015DRO, respectively.

5. The two supply wells should be re-sampled to confirm the findings of the initial sampling event. The samples should be analyzed for the possible presence of volatile organic compounds by drinking water standards in accordance with U.S. EPA Method 524.2.

6. A summary report should be submitted following the completion of the additional work, which should include recommendations for possible long-term monitoring or site closure.

## 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, 98 p.

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

Maptech, 1968. Stowe Quadrangle Vermont. U.S. Geological Survey. 7.5 minute series (topographic), Provisional Edition., 1968. Maptech, Inc. Greenland, NH. 1998.

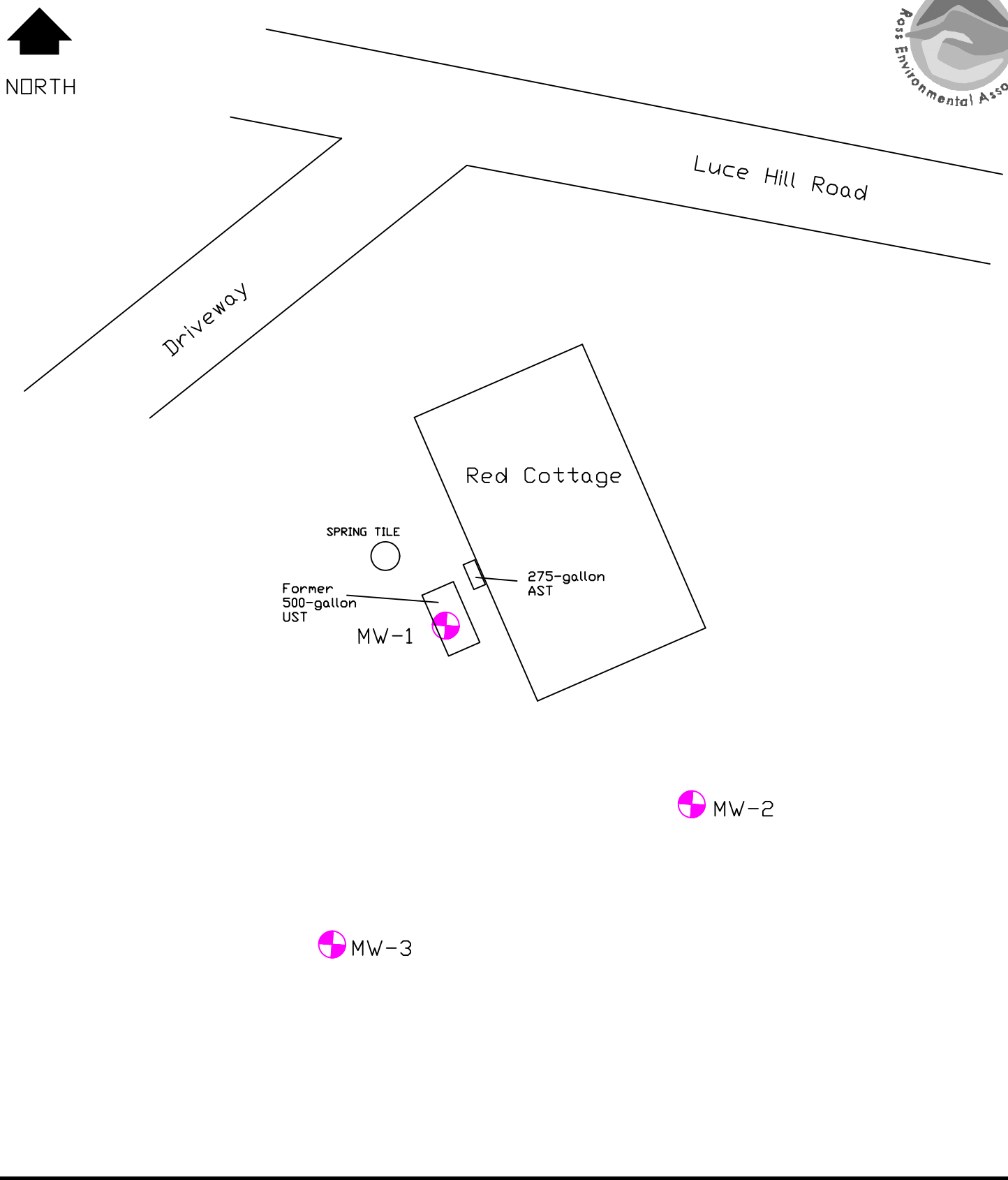
# ATTACHMENT A


Approximate Scale: 1 inch = 1,400 feet

Site Coordinates: 44° 28' 18.62" N, 72° 43' 38.79" W

Source: USGS 1968. STOWE QUADRANGLE. 1968. Topographic map (7.5 minute series).Maptech, Inc. 1998.
***R.E.A.*** Project No 24-072

**Figure 1**
Site Location Map
Ten Acres Lodge
Stowe, Vermont




**Legend**

Monitoring Well Location

All locations are approximate

# SITE PLAN

(with Monitoring Well Locations)

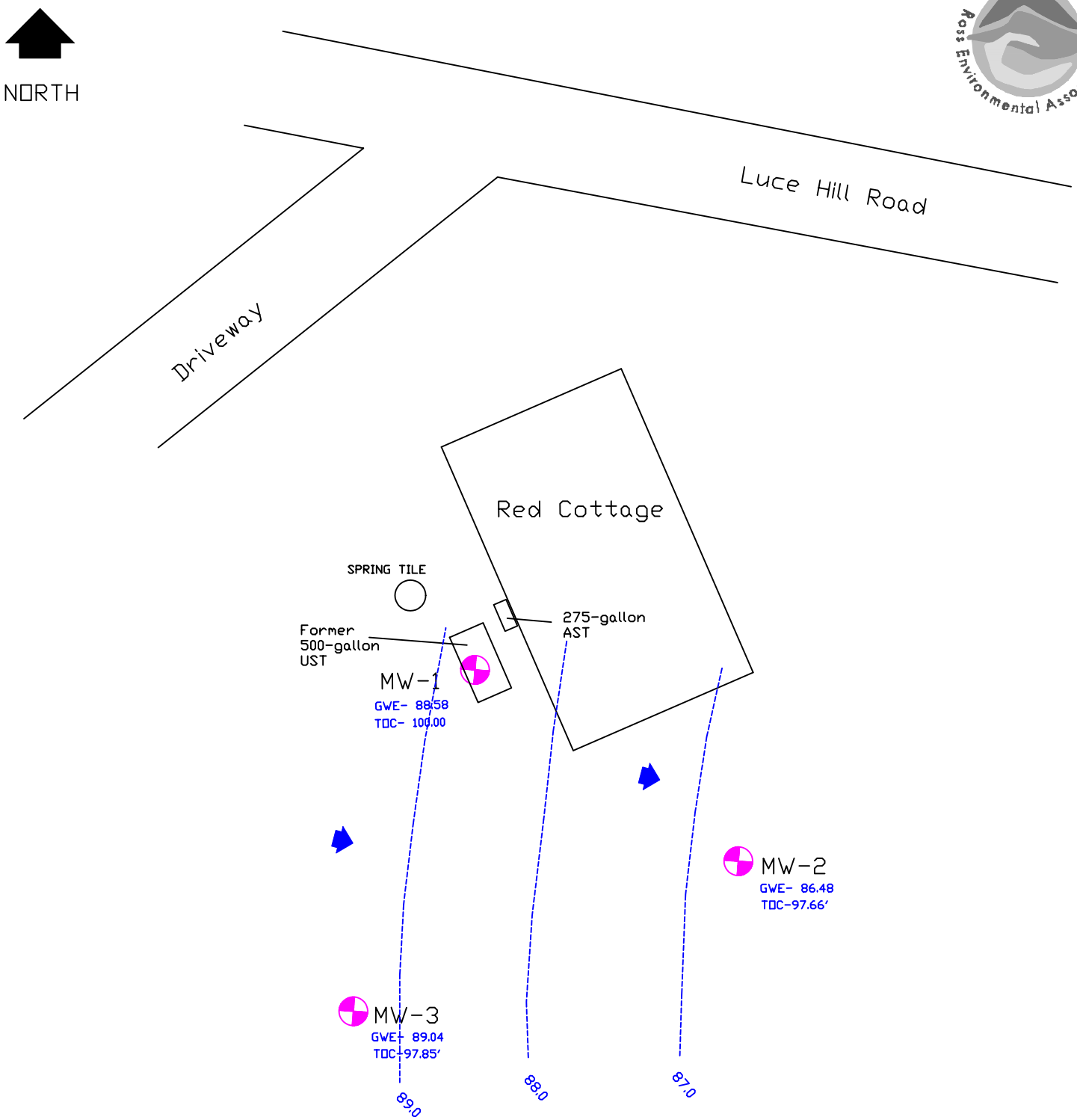
Ten Acres Lodge

Stowe, Vermont

| Scale | Date | Drawn By |
|---|---|---|
| 1"=20' | 11/06/04 | MH |
| Project Num: 24-072 | | |

*Ross Environmental Associates, Inc.*
Stowe, Vermont (802) 253-4280

Figure 2




GWE- Ground Water Elevation
TOC- Top of Casing Elevation
All elevations relative to an arbitrary site datum of 100.00 feet.

**Legend**

Monitoring Well Location

---- Ground Water Contour

All locations are approximate

# GROUND WATER CONTOUR MAP

(Monitoring Date: 20 October 2004)

Ten Acres Lodge

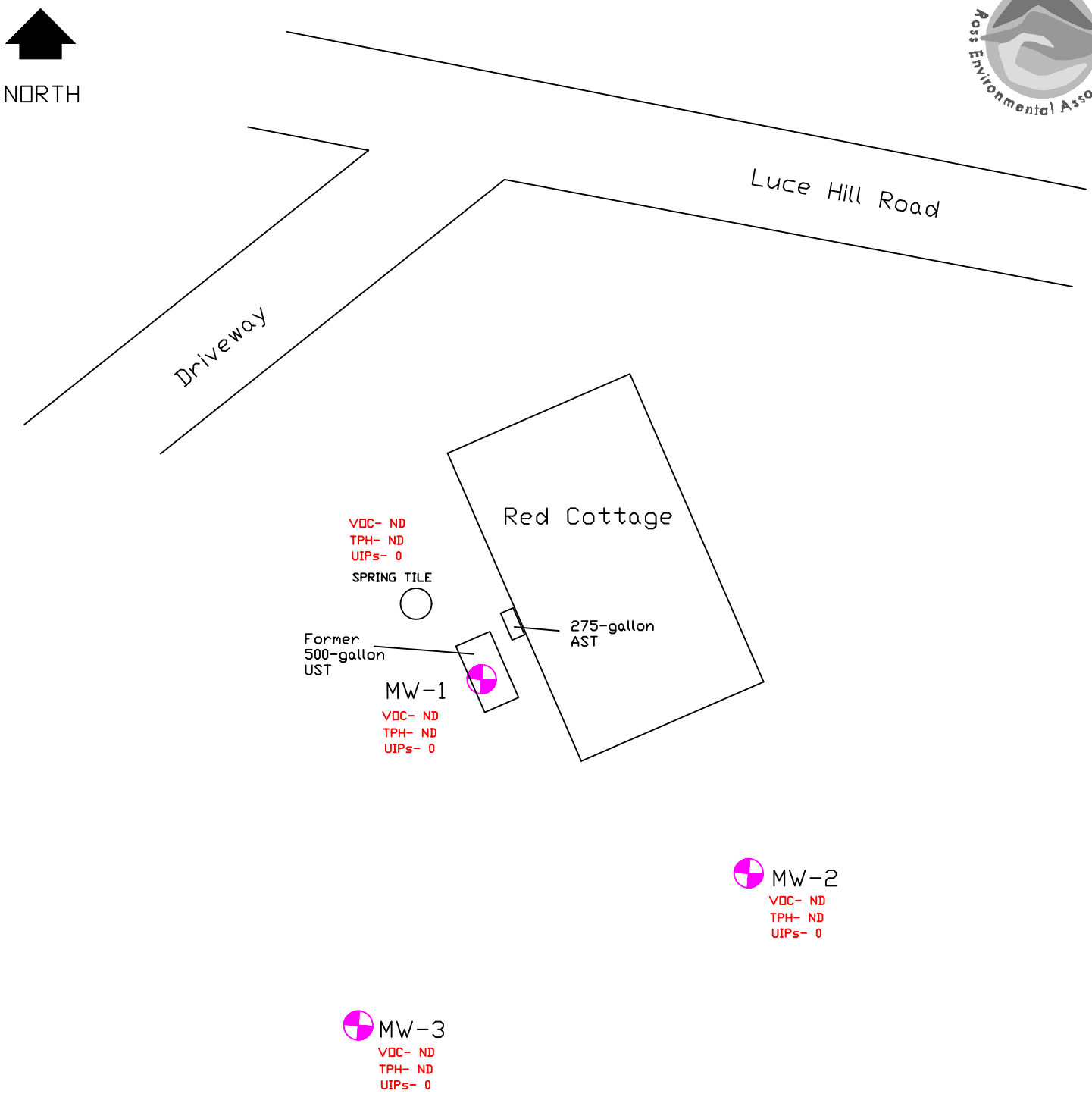
Stowe, Vermont

| Scale | Date | Drawn By |
|---|---|---|
| 1"=20' | 11/06/04 | MH |

Project Num: 24-072

*Ross Environmental Associates, Inc.*
Stowe, Vermont (802) 253-4280

Figure 3




VOC- total volatile petroleum compounds, reported in ug/L.
TPH- Total petroleum Hydrocarbons, reported in mg/L.
UIPs- Unidentified peaks.

**Legend**

Monitoring Well Location

All locations are approximate

# CONTAMINANT DISTRIBUTION

(Monitoring Date: 20 October 2004)

Ten Acres Lodge

Stowe, Vermont

| Scale | Date | Drawn By |
|---|---|---|
| 1"=20' | 11/06/04 | MH |

Project Num: 24-072

*Ross Environmental Associates, Inc.*
Stowe, Vermont (802) 253-4280

Figure 4


**Ten Acres Lodge Site Locator**

0 30 60 120 180 240 Meters

1 inch equals 245 feet

Map Source: Orthophoto # 132216
Photo Date 1996. Parcel Data from
Town of Stowe Digital Parcel Map.
Roads from E-911 Database 2000.

**TABLE 1**
**GROUND WATER ELEVATION CALCULATIONS**

Ten Acres Lodge
Stowe, Vermont

Monitoring Date: 20 October 2004

| Well I.D. | Top of Casing Elevation (ft) | Depth to Water (ft) | Water Table Elevation (ft) |
|---|---|---|---|
| MW-1 | 100.00 | 11.42 | 88.58 |
| MW-2 | 97.66 | 11.18 | 86.48 |
| MW-3 | 97.85 | 8.81 | 89.04 |

All values reported in feet relative to arbitrary site datum of 100.00 feet

# TABLE 2
# GROUND-WATER ANALYTICAL RESULTS

Ten Acres Lodge
Stowe, VT

Monitoring Date: 20 October 2004

| Sample ID | MTBE | Benzene | Toluene | Ethyl benzene | Total Xylenes | 1,3,5 TMB | 1,2,4 TMB | Napthalene | Total VOCs | UIP's |
|---|---|---|---|---|---|---|---|---|---|---|
| MW-1 | ND<2.0 | ND<1.0 | ND<1.0 | ND<1.0 | ND<2.0 | ND<1.0 | ND<1.0 | ND<1.0 | ND | **0** |
| MW-2 | ND<2.0 | ND<1.0 | ND<1.0 | ND<1.0 | ND<2.0 | ND<1.0 | ND<1.0 | ND<1.0 | ND | **0** |
| MW-3 | ND<2.0 | ND<1.0 | ND<1.0 | ND<1.0 | ND<2.0 | ND<1.0 | ND<1.0 | ND<1.0 | ND | **0** |
| ***VGES*** | ***40*** | ***5.0*** | ***1,000*** | ***700*** | ***10,000*** | ***4.0*** | ***5.0*** | ***20*** | **--** | **--** |

| Sample ID | MTBE | Benzene | Toluene | Ethyl benzene | Total Xylenes | 1,3,5 TMB | 1,2,4 TMB | Napthalene | Total VOCs | UIPs |
|---|---|---|---|---|---|---|---|---|---|---|
| MW-1 | ND<2.0 | ND<1.0 | ND<1.0 | ND<1.0 | ND<2.0 | ND<1.0 | ND<1.0 | ND<1.0 | ND | **0** |
| Dup, MW-1 | ND<2.0 | ND<1.0 | ND<1.0 | ND<1.0 | ND<2.0 | ND<1.0 | ND<1.0 | ND<1.0 | ND | **0** |
| % Difference | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Trip Blank | ND<2.0 | ND<1.0 | ND<1.0 | ND<1.0 | ND<2.0 | ND<1.0 | ND<1.0 | ND<1.0 | ND | **0** |

Notes: All results reported as micrograms per liter (ug/L).
ND: Not detected at indicated detection limit. TBQ: Trace below quantitation limit
UIP: Unidentified Peaks.
Shaded values indicate exceedance of Vermont Groundwater Enforcement Standards (VGESs).
1,3,5-TMB = 1,3,5-trimethylbenzene and 1,2,4-TMB = 1,2,4-trimethylbenzene

**TABLE 3**
**FIELD MEASUREMENT DATA**

Ten Acres Lodge
Stowe, Vermont

Monitoring Date: 20 October 2004

| Well ID | pH (su) | temperature ($^{o}$C) | Specific conductivity ($u$S) | ORP (mV) | TDS (ppm) | Comments |
|---|---|---|---|---|---|---|
| MW-1 | 6.08 | 9.5 | 467 | 97.0 | 309.3 | silty, slow recharge, Dup-1 taken |
| MW-2 | 11.18 | 9.6 | 328.9 | 95 | 214.6 | silty, purged until dry |
| MW-3 | 8.81 | 10.9 | 285.6 | 94 | 184.1 | silty, purged until dry |
| Sup-Main | 6.37 | 14.1 | 325.4 | 173 | 212.7 | |

pH reported in standard units (s.u.).
Specific conductivity reported in microsiemens (uS) or millisiemens (mS).
Oxidation-reduction potential (ORP) reported in millivolts (mV).
Total dissolved solids (TDS) reported in parts per million (ppm) or parts per (ppt) thousand.

# ATTACHMENT B

TEN ACRES LODGE – STOWE, VERMONT
(Installation of MW-1 and Location of MW-2, and MW-3 – View Toward East)

TEN ACRES LODGE – STOWE, VERMONT
(Installation of MW-2 – View Toward North)

TEN ACRES LODGE – STOWE, VERMONT
(Installation of MW-3 – View Toward North)

# ATTACHMENT C

## BORING / WELL IDENTIFICATION: MW-1

| | | | |
|---|---|---|---|
| *Site Name:* | **Ten Acres Lodge** | | |
| *Site Location:* | **Stowe, Vermont** | | |
| *Well Depth:* | **17'** | *Boring Depth:* | |
| *Installation Date:* | **7-Oct-04** | | |
| *Depth to Water (during drilling):* | **9'** | *Job Number:* | **24-072** |
| *Screen Diameter:* | **2"** | *Depth:* | **7-17'** |
| *REA Representative:* | **Juliette Hancock** | | |
| *Screen Type/Size:* | **0.01 slot schedule 40 PVC** | *Drilling Company:* | **Technical Drilling Services** |
| *Riser Diameter:* | **2"** | *Depth:* | **0-7'** |
| *Sampling Method:* | **Geoprobe** | | |
| *Riser Type/Size:* | **Schedule 40 PVC** | *Reference Point (RP):* | |

| Depth (ft) | Sample Depth (ft) | Blows/6" and Recovery (in) | Sample Description / Notes | PID (ppm) |
|---|---|---|---|---|
| 0 | 0-5 | | Dark brown fine to medium sand with some interbedded weathered schist. | |
| 1 | | | | |
| 2 | | | | |
| 3 | | | | 4.4 |
| 4 | | | | |
| 5 | 5-10 | | Brown fine sand, odors. | |
| 6 | | | | |
| 7 | | | | 198 |
| 8 | ▼ | | Same as above, wet. | |
| 9 | | | | 0.6 |
| 10 | 10-15 | | Brown silt and clay, wet. | |
| 11 | | | | 260 |
| 12 | | | | |
| 13 | | | | |
| 14 | | | | 8.8 |
| 15 | 15-20 | | sample not recovered | |
| 16 | | | | |
| 17 | | | Well set at 17' bgs | |
| 18 | | | | |
| 19 | | | | |
| 20 | 20-25 | | | |
| 21 | | | | |
| 22 | | | | |
| 23 | | | | |
| 24 | | | | |
| 25 | | | | |

Well Profile

Legend: Concrete; Native Material; Bentonite; Filter Sand; Riser; Screen; Water Level

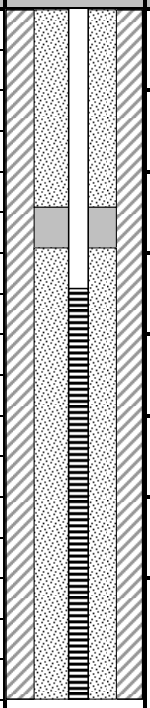
| PROPORTIONS USED | | BLOW COUNT (COHESIVE SOILS) | | BLOW COUNT (GRANULAR SOILS) | | NOTES: |
|---|---|---|---|---|---|---|
| AND 33-50% | LITTLE 10-20% | <2 VERY SOFT | 8-15 STIFF | 0-4 VERY LOOSE | 30-50 DENSE | PE2020 |
| SOME 20-33% | TRACE 0-10% | 2-4 SOFT | 15-30 VERY STIFF | 4-10 LOOSE | >50 VERY DENSE | |
| | | 4-8 MEDIUM STIFF | >30 HARD | 10-30 MEDIUM DENSE | | |

***ROSS ENVIRONMENTAL ASSOCIATES***
PHONE: (802) 253-4280 FAX: (802) 253-4829
73 School Street P.O. Box 1533
Stowe, VT 05672

## BORING / WELL IDENTIFICATION: MW-2

| | | | |
|---|---|---|---|
| *Site Name:* | **Ten Acres Lodge** | | |
| *Site Location:* | **Stowe, Vermont** | | |
| *Well Depth:* | **17'** | *Boring Depth:* | |
| *Installation Date:* | **7-Oct-04** | | |
| *Depth to Water (during drilling):* | **9'** | *Job Number:* | **24-072** |
| *Screen Diameter:* | **2"** | *Depth:* | **7-17'** |
| *REA Representative:* | **Juliette Hancock** | | |
| *Screen Type/Size:* | **0.01 slot schedule 40 PVC** | *Drilling Company:* | **Technical Drilling Services** |
| *Riser Diameter:* | **2"** | *Depth:* | **0-7'** |
| *Sampling Method:* | **Geoprobe** | | |
| *Riser Type/Size:* | **Schedule 40 PVC** | *Reference Point (RP):* | |

| Depth (ft) | Sample Depth (ft) | Blows/6" and Recovery (in) | Sample Description / Notes | PID (ppm) |
|---|---|---|---|---|
| 0 | 0-5 | | Brown medium to coarse sand | |
| 1 | | | | |
| 2 | | | | |
| 3 | | | | |
| 4 | | | | 5.0 |
| 5 | 5-10 | | brown coarse sand | |
| 6 | | | | 4.1 |
| 7 | | | | |
| 8 | ▼ | | Brown silt and clay, wet. | 4.0 |
| 9 | | | | |
| 10 | 10-15 | | Same as above. | |
| 11 | | | | |
| 12 | | | | |
| 13 | | | | |
| 14 | | | | 3.4 |
| 15 | 15-20 | | sample not recovered | |
| 16 | | | | |
| 17 | | | Well set at 17' bgs | |
| 18 | | | | |
| 19 | | | | |
| 20 | 20-25 | | | |
| 21 | | | | |
| 22 | | | | |
| 23 | | | | |
| 24 | | | | |
| 25 | | | | |



Legend: Concrete; Native Material; Bentonite; Filter Sand; Riser; Screen; Water Level

| PROPORTIONS USED | | BLOW COUNT (COHESIVE SOILS) | | BLOW COUNT (GRANULAR SOILS) | | NOTES: |
|---|---|---|---|---|---|---|
| AND 33-50% | LITTLE 10-20% | <2 VERY SOFT | 8-15 STIFF | 0-4 VERY LOOSE | 30-50 DENSE | PE2020 |
| SOME 20-33% | TRACE 0-10% | 2-4 SOFT | 15-30 VERY STIFF | 4-10 LOOSE | >50 VERY DENSE | |
| | | 4-8 MEDIUM STIFF | >30 HARD | 10-30 MEDIUM DENSE | | |

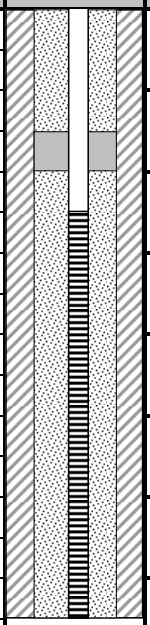
***ROSS ENVIRONMENTAL ASSOCIATES***
PHONE: (802) 253-4280 FAX: (802) 253-4829
73 School Street P.O. Box 1533
Stowe, VT 05672

## BORING / WELL IDENTIFICATION: MW-3

| | | | |
|---|---|---|---|
| *Site Name:* | **Ten Acres Lodge** | | |
| *Site Location:* | **Stowe, Vermont** | | |
| *Well Depth:* | **15'** | *Boring Depth:* | |
| *Installation Date:* | **7-Oct-04** | | |
| *Depth to Water (during drilling):* | **6'** | *Job Number:* | **24-072** |
| *Screen Diameter:* | **2"** | *Depth:* | **5-15'** |
| *REA Representative:* | **Juliette Hancock** | | |
| *Screen Type/Size:* | **0.01 slot schedule 40 PVC** | *Drilling Company:* | **Technical Drilling Services** |
| *Riser Diameter:* | **2"** | *Depth:* | **0-5'** |
| *Sampling Method:* | **Geoprobe** | | |
| *Riser Type/Size:* | **Schedule 40 PVC** | *Reference Point (RP):* | |

| Depth (ft) | Sample Depth (ft) | Blows/6" and Recovery (in) | Sample Description / Notes | PID (ppm) |
|---|---|---|---|---|
| 0 | 0-5 | | Brown medium to coarse sand with interbedded weathered schist. | |
| 1 | | | | |
| 2 | | | | |
| 3 | | | | |
| 4 | | | | 2.2 |
| 5 | 5-10 ▼ | | Brown silt and clay, wet at 6', no odors | |
| 6 | | | | |
| 7 | | | | |
| 8 | | | | |
| 9 | | | | 0.0 |
| 10 | 10-15 | | Same as above. | |
| 11 | | | | |
| 12 | | | | |
| 13 | | | | |
| 14 | | | | 1.3 |
| 15 | 15-20 | | Well set at 15' bgs | |
| 16 | | | | |
| 17 | | | | |
| 18 | | | | |
| 19 | | | | |
| 20 | 20-25 | | | |
| 21 | | | | |
| 22 | | | | |
| 23 | | | | |
| 24 | | | | |
| 25 | | | | |

Well Profile



Legend

- Concrete
- Native Material
- Bentonite
- Filter Sand
- Riser
- Screen
- Water Level

| PROPORTIONS USED | | BLOW COUNT (COHESIVE SOILS) | | BLOW COUNT (GRANULAR SOILS) | | NOTES: |
|---|---|---|---|---|---|---|
| AND 33-50% | LITTLE 10-20% | <2 VERY SOFT | 8-15 STIFF | 0-4 VERY LOOSE | 30-50 DENSE | PE2020 |
| SOME 20-33% | TRACE 0-10% | 2-4 SOFT | 15-30 VERY STIFF | 4-10 LOOSE | >50 VERY DENSE | |
| | | 4-8 MEDIUM STIFF | >30 HARD | 10-30 MEDIUM DENSE | | |

***ROSS ENVIRONMENTAL ASSOCIATES***
PHONE: (802) 253-4280 FAX: (802) 253-4829

73 School Street P.O. Box 1533
Stowe, VT 05672

# ATTACHMENT D

ENDYNE, INC

Laboratory Services

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

# LABORATORY REPORT

CLIENT: Ross Environ. Assoc., Inc.
PROJECT: Ten Acres
REPORT DATE: November 5, 2004

ORDER ID: 33253
DATE RECEIVED: October 21, 2004
SAMPLER: JP

Site: MW-1
Ref. Number: 241216
Anal. Method: SW 8021B
Date Sampled: 10/20/04
Time Sampled: 11:16 AM
Analysis Date: 11/1/04
Analyst: 101

| Parameter | Results ug/L |
|---|---|
| MTBE | < 2.0 |
| Benzene | < 1.0 |
| Toluene | < 1.0 |
| Ethylbenzene | < 1.0 |
| Xylenes, Total | < 2.0 |
| 1,3,5 Trimethyl Benzene | < 1.0 |
| 1,2,4 Trimethyl Benzene | < 1.0 |
| Naphthalene | < 1.0 |
| UIP's | 0. |
| Surrogate 1 | 100.% |

Site: MW-3
Ref. Number: 241218
Anal. Method: SW 8021B
Date Sampled: 10/20/04
Time Sampled: 11:52 AM
Analysis Date: 11/1/04
Analyst: 101

| Parameter | Results ug/L |
|---|---|
| MTBE | < 2.0 |
| Benzene | < 1.0 |
| Toluene | < 1.0 |
| Ethylbenzene | < 1.0 |
| Xylenes, Total | < 2.0 |
| 1,3,5 Trimethyl Benzene | < 1.0 |
| 1,2,4 Trimethyl Benzene | < 1.0 |
| Naphthalene | < 1.0 |
| UIP's | 0. |
| Surrogate 1 | 100.% |

Site: TB-1
Ref. Number: 241222
Anal. Method: SW 8021B
Date Sampled: 10/20/04
Time Sampled: 1:42 PM
Analysis Date: 10/29/04
Analyst: 101

| Parameter | Results ug/L |
|---|---|
| MTBE | < 2.0 |
| Benzene | < 1.0 |
| Toluene | < 1.0 |
| Ethylbenzene | < 1.0 |
| Xylenes, Total | < 2.0 |
| 1,3,5 Trimethyl Benzene | < 1.0 |
| 1,2,4 Trimethyl Benzene | < 1.0 |
| Naphthalene | < 1.0 |
| UIP's | 0. |
| Surrogate 1 | 102.% |

Site: MW-2
Ref. Number: 241217
Anal. Method: SW 8021B
Date Sampled: 10/20/04
Time Sampled: 11:42 AM
Analysis Date: 11/1/04
Analyst: 101

| Parameter | Results ug/L |
|---|---|
| MTBE | < 2.0 |
| Benzene | < 1.0 |
| Toluene | < 1.0 |
| Ethylbenzene | < 1.0 |
| Xylenes, Total | < 2.0 |
| 1,3,5 Trimethyl Benzene | < 1.0 |
| 1,2,4 Trimethyl Benzene | < 1.0 |
| Naphthalene | < 1.0 |
| UIP's | 0. |
| Surrogate 1 | 98.% |

Site: Dup-1
Ref. Number: 241219
Anal. Method: SW 8021B
Date Sampled: 10/20/04
Time Sampled: NI
Analysis Date: 11/1/04
Analyst: 101

| Parameter | Results ug/L |
|---|---|
| MTBE | < 2.0 |
| Benzene | < 1.0 |
| Toluene | < 1.0 |
| Ethylbenzene | < 1.0 |
| Xylenes, Total | < 2.0 |
| 1,3,5 Trimethyl Benzene | < 1.0 |
| 1,2,4 Trimethyl Benzene | < 1.0 |
| Naphthalene | < 1.0 |
| UIP's | 0. |
| Surrogate 1 | 100.% |

ENDYNE, INC.

Laboratory Services

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

# LABORATORY REPORT

CLIENT: Ross Environ. Assoc., Inc.
PROJECT: Ten Acres
REPORT DATE: October 28, 2004

ORDER ID: 33253
DATE RECEIVED: October 21, 2004
SAMPLER: JP

Ref. Number: 241216 **Site: MW-1** Date Sampled: October 20, 2004 Time: 11:16 AM

| Parameter | Result | Unit | Method | Analysis Date | Analyst |
|---|---|---|---|---|---|
| TPH 8015 DRO | < 0.40 | mg/L | SW 8015B | 10/26/04 | 333 |

Ref. Number: 241217 **Site: MW-2** Date Sampled: October 20, 2004 Time: 11:42 AM

| Parameter | Result | Unit | Method | Analysis Date | Analyst |
|---|---|---|---|---|---|
| TPH 8015 DRO | < 0.40 | mg/L | SW 8015B | 10/26/04 | 333 |

Ref. Number: 241218 Site: MW-3 Date Sampled: October 20, 2004 Time: 11:52 AM

| Parameter | Result | Unit | Method | Analysis Date | Analyst |
|---|---|---|---|---|---|
| TPH 8015 DRO | < 0.40 | mg/L | SW 8015B | 10/26/04 | 333 |

Ref. Number: 241219 Site: Dup-1 Date Sampled: October 20, 2004 Time: NI

| Parameter | Result | Unit | Method | Analysis Date | Analyst |
|---|---|---|---|---|---|
| TPH 8015 DRO | < 0.40 | mg/L | SW 8015B | 10/26/04 | 333 |

ACCREDITED IN ACCORDANCE WITH nelac ELAP 11263

ENDYNE, INC.

Laboratory Services

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

# LABORATORY REPORT

## EPA 524.2

CLIENT: Ross Environ. Assoc., Inc.
PROJECT: Ten Acres
SITE: Sup-Main
DATE RECEIVED: October 21, 2004
REPORT DATE: November 3, 2004
ANALYSIS DATE: October 29, 2004

ORDER ID: 33253
REFERENCE NUMBER: 241220
DATE SAMPLED: October 20, 2004
TIME SAMPLED: 11:59 AM
SAMPLER: JP
ANALYST: 725

| Parameter | Result ug/L |
|---|---|
| Benzene | < 0.5 |
| Bromobenzene | < 0.5 |
| Bromochloromethane | < 0.5 |
| Bromomethane | < 0.5 |
| n-Butylbenzene | < 0.5 |
| sec-Butylbenzene | < 0.5 |
| tert-Butylbenzene | < 0.5 |
| Carbon tetrachloride | < 0.5 |
| Chlorobenzene | < 0.5 |
| Chloroethane | < 0.5 |
| Chloromethane | < 0.5 |
| 2-Chlorotoluene | < 0.5 |
| 4-Chlorotoluene | < 0.5 |
| Dibromomethane | < 1.0 |
| 1,2-Dichlorobenzene | < 0.5 |
| 1,3-Dichlorobenzene | < 0.5 |
| 1,4-Dichlorobenzene | < 0.5 |
| Dichlorodifluoromethane | < 0.5 |
| 1,1-Dichloroethane | < 0.5 |
| 1,2-Dichloroethane | < 0.5 |
| 1,1-Dichloroethene | < 0.5 |
| cis-1,2-Dichloroethene | < 0.5 |
| trans-1,2-Dichloroethene | < 0.5 |
| Dichloromethane | < 1.0 |
| 1,2-Dichloropropane | < 0.5 |
| 1,3-Dichloropropane | < 0.5 |
| 2,2-Dichloropropane | < 0.5 |
| 1,1-Dichloropropene | < 0.5 |
| cis-1,3-Dichloropropene | < 0.5 |
| trans-1,3-Dichloropropene | < 0.5 |
| Ethylbenzene | < 0.5 |

| Parameter | Result ug/L |
|---|---|
| Hexachlorobutadiene | < 0.5 |
| Isopropylbenzene | < 0.5 |
| 4-Isopropyltoluene | < 0.5 |
| MTBE | < 1.0 |
| Naphthalene | < 1.0 |
| n-Propylbenzene | < 0.5 |
| Styrene | < 0.5 |
| 1,1,1,2-Tetrachloroethane | < 0.5 |
| 1,1,2,2-Tetrachloroethane | < 1.0 |
| Tetrachloroethene | < 0.5 |
| Toluene | < 0.5 |
| 1,2,3-Trichlorobenzene | < 0.5 |
| 1,2,4-Trichlorobenzene | < 0.5 |
| 1,1,1-Trichloroethane | < 0.5 |
| 1,1,2-Trichloroethane | < 0.5 |
| Trichloroethene | < 0.5 |
| Trichlorofluoromethane | < 1.0 |
| 1,2,3-Trichloropropane | < 0.5 |
| 1,2,4-Trimethylbenzene | < 0.5 |
| 1,3,5-Trimethylbenzene | < 0.5 |
| Vinyl Chloride | < 0.5 |
| Xylenes, Total | < 1.0 |
| Bromodichloromethane | < 0.5 |
| Bromoform | < 0.5 |
| Chloroform | < 0.5 |
| Dibromochloromethane | < 0.5 |
| Total Trihalomethanes | < 0.5 |
| Surrogate 1 | 100.% |
| Surrogate 2 | 96.% |
| UIP's | 0. |

ENDYNE, INC

Laboratory Services

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

# LABORATORY REPORT

## EPA 524.2

CLIENT: Ross Environ. Assoc., Inc.
PROJECT: Ten Acres
SITE: Sup-Cottage
DATE RECEIVED: October 21, 2004
REPORT DATE: November 3, 2004
ANALYSIS DATE: October 29, 2004

ORDER ID: 33253
REFERENCE NUMBER: 241221
DATE SAMPLED: October 20, 2004
TIME SAMPLED: 11:52 AM
SAMPLER: JP
ANALYST: 725

| Parameter | Result ug/L |
|---|---|
| Benzene | < 0.5 |
| Bromobenzene | < 0.5 |
| Bromochloromethane | < 0.5 |
| Bromomethane | < 0.5 |
| n-Butylbenzene | < 0.5 |
| sec-Butylbenzene | < 0.5 |
| tert-Butylbenzene | < 0.5 |
| Carbon tetrachloride | < 0.5 |
| Chlorobenzene | < 0.5 |
| Chloroethane | < 0.5 |
| Chloromethane | < 0.5 |
| 2-Chlorotoluene | < 0.5 |
| 4-Chlorotoluene | < 0.5 |
| Dibromomethane | < 1.0 |
| 1,2-Dichlorobenzene | < 0.5 |
| 1,3-Dichlorobenzene | < 0.5 |
| 1,4-Dichlorobenzene | < 0.5 |
| Dichlorodifluoromethane | < 0.5 |
| 1,1-Dichloroethane | < 0.5 |
| 1,2-Dichloroethane | < 0.5 |
| 1,1-Dichloroethene | < 0.5 |
| cis-1,2-Dichloroethene | < 0.5 |
| trans-1,2-Dichloroethene | < 0.5 |
| Dichloromethane | < 1.0 |
| 1,2-Dichloropropane | < 0.5 |
| 1,3-Dichloropropane | < 0.5 |
| 2,2-Dichloropropane | < 0.5 |
| 1,1-Dichloropropene | < 0.5 |
| cis-1,3-Dichloropropene | < 0.5 |
| trans-1,3-Dichloropropene | < 0.5 |
| Ethylbenzene | < 0.5 |

| Parameter | Result ug/L |
|---|---|
| Hexachlorobutadiene | < 0.5 |
| Isopropylbenzene | < 0.5 |
| 4-Isopropyltoluene | < 0.5 |
| MTBE | < 1.0 |
| Naphthalene | < 1.0 |
| n-Propylbenzene | < 0.5 |
| Styrene | < 0.5 |
| 1,1,1,2-Tetrachloroethane | < 0.5 |
| 1,1,2,2-Tetrachloroethane | < 1.0 |
| Tetrachloroethene | < 0.5 |
| Toluene | < 0.5 |
| 1,2,3-Trichlorobenzene | < 0.5 |
| 1,2,4-Trichlorobenzene | < 0.5 |
| 1,1,1-Trichloroethane | < 0.5 |
| 1,1,2-Trichloroethane | < 0.5 |
| Trichloroethene | < 0.5 |
| Trichlorofluoromethane | < 1.0 |
| 1,2,3-Trichloropropane | < 0.5 |
| 1,2,4-Trimethylbenzene | < 0.5 |
| 1,3,5-Trimethylbenzene | < 0.5 |
| Vinyl Chloride | < 0.5 |
| Xylenes, Total | < 1.0 |
| Bromodichloromethane | < 0.5 |
| Bromoform | < 0.5 |
| Chloroform | < 0.5 |
| Dibromochloromethane | < 0.5 |
| Total Trihalomethanes | < 0.5 |
| Surrogate 1 | 103.% |
| Surrogate 2 | 100.% |
| UIP's | 0. |