

**ROSS ENVIRONMENTAL ASSOCIATES, INC.**

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



**Initial Site Investigation Report**

**Clegg Residence  
729 Corley Road  
Wolcott, Vermont 05661**

**SMS Site #: TBD  
Site Coordinates: 44° 33' 17.55" N, 72° 29' 80.60" W**

**30 September 2008**

**Prepared For:**

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## EXECUTIVE SUMMARY

Ross Environmental Associates, Inc. (**R.E.A.**) has conducted an initial site investigation (ISI) at the Clegg Residence, located at 729 Corley Road in Wolcott, Vermont. Field investigation included: installation of four monitoring wells, 5 soil borings, sampling and analysis of water from four on-site monitoring wells and the onsite supply well, and a receptor survey to identify potential risks to the environment and human health.

Four monitoring wells (MW-1, MW-2, MW-3, and MW-4) were installed on the property to evaluate the degree of subsurface contamination due to a #2 fuel oil above ground storage tank (AST) spill discovered in January of 2008. Available information indicates that groundwater beneath the site has been impacted by low concentrations of petroleum compounds; however, no Vermont Groundwater Enforcement Standards (VGESs) were exceeded from any of the groundwater samples collected at the site. Low concentrations of volatile organic compounds (VOCs) were detected in the groundwater sample collected from MW-4, which was installed on the opposing side of the basement wall where the AST spill occurred. No VOCs were detected in the groundwater samples collected from the other on-site monitoring wells (MW-1, MW-2, and MW-3), or in the drinking water samples collected from the onsite supply well. Available information indicates that spill response activities have greatly reduced the threat to nearby sensitive receptors. At this time, the overburden groundwater formation at the site has not been significantly impacted by petroleum. Based on available information, no receptors appear to be impacted; however, the on-site drinking water supply, which is located within 100 feet of the release area, is threatened by residual contamination.

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

1. Both expansion joints in the basement floor should be sealed to create a vapor barrier in order to reduce the threat of residual petroleum odors and impacts to the indoor air of the Clegg Residence.
2. Bi-Monthly free product checks should be performed in the four perimeter monitoring wells. During bi-monthly free product checks the curtain drain outfall absorbent sock should be examined for saturation and should be replaced as needed. Additionally, the basement and 1<sup>st</sup> floor air should be screened with a PID for possible volatile organic vapors (VOCs).
3. Removal of PCS from the vicinity of the curtain drain outfall will greatly reduce the threat to the underlying groundwater formation and other nearby sensitive receptors. PCS in the vicinity of the outfall pipe along the bank of the tributary to the Lamoille River should be excavated and disposed of in accordance with VT DEC guidelines.

## **EXECUTIVE SUMMARY**

4. The on-site monitoring wells should be sampled in Fall 2008 and analyzed for the possible presence of volatile petroleum compounds and total petroleum hydrocarbons (TPH) in accordance with EPA Methods 8021B and 8015DRO; respectively.
5. The on-site drinking water bedrock supply should be sampled in the Fall 2008 and analyzed for the possible presence of volatile organic compounds in accordance with EPA Method 524.2.
6. A summary report should be completed following the next groundwater sampling event, which should include recommendations for future monitoring, vapor recovery system installation or remediation activities.

## **SITE PROFILE**

### Site Information

Site Name: Clegg Residence  
SMS Site #: TBD  
Site Address: 729 Corley Road, Wolcott, VT 05661  
Mailing Address: 729 Corley Road, Wolcott, VT 05661  
Telephone: (802) 888-6186  
Contact/Owner: Mr. John Clegg  
Coordinates: latitude 44° 33' 17.55" N and longitude 72° 29' 80.60" W  
Contaminants of Concern: Petroleum compounds, characteristic of #2 Fuel Oil.  
Source: 275-gallon Above Ground Storage Tank located adjacent to the north wall in the basement of the residence.

### Aquifer Characteristics

Soil Type: The soils at the site consisted primarily of medium brown sand with a silty sand layer at approximately 10.0' bgs.  
Effective Porosity: 0.4  
Hydraulic conductivity: 0.5 to 5.7 ft/day  
Ground-water flow direction: northeast  
Horizontal hydraulic gradient: 3.4% (8/21/08)  
Average ground water velocity: 0.1 to 1.14 ft/day  
Ground-water depth bgs: 8.16 to 9.95 feet bgs  
Saturated thickness: 4 to 6 feet  
Depth to Bedrock: 15 feet bgs

### Receptors

Drinking water: Drinking water for the site and immediately surrounding properties is provided by private bedrock wells. The onsite drinking water well is located approximately 100 feet northeast of the release area. One private well (#15759) is located within 1,000' feet of the release area, up gradient and to the west. No VOCs were detected in either of the two samples collected from the onsite supply well in April and August 2008.

Ground water: No VGESs were exceeded from groundwater samples collected at the site; however, low concentrations of some VOCs were detected from MW-4, the monitoring well located on the opposing side of the basement wall where the AST spill occurred. No volatile organic compounds were detected from the other monitoring wells. (**Table 2**, Appendix A). Total petroleum hydrocarbons (TPH) were detected at 1.0 mg/L in the sample collected from MW-4.

Surface water: The nearest surface water feature is a tributary to the Lamoille River located approximately 130 feet west and slightly south of the release area, and drains into the Lamoille River, located approximately 1,000 feet to the north of the release area. PID readings on soils directly below the curtain drain outfall along the steep bank ranged from 2.7 to 770 ppm during the 13 May 2008 site visit. No visible signs of petroleum contamination were observed below the bank or along tributary of the Lamoille River during the site visit.

## SITE PROFILE

- Buildings:** The property is occupied by a single family home in a rural residential neighborhood. PID readings of the indoor air of the residence ranged from 0.0 to 0.9 ppm on the first floor and 4.6 to 5.8 ppm in the basement of the residence prior to *R.E.A's* cleaning of the basement floor and installation of the temporary carbon air treatment system. Following the cleaning of the basement floor all PID readings of ambient air throughout the basement and 1<sup>st</sup> and 2<sup>nd</sup> floors were 0.0 ppm during all subsequent site visits. Lite petroleum odors were noted in the basement only. PID readings from the northern concrete floor expansion joint ranged from 11.7 to 38.4 during the most recent site visit on 21 August 2008.
- Underground utilities:** The residence utilizes a conventional septic system consisting of a septic tank and leach field for wastewater disposal. The system is located approximately 150 feet northwest of the release area. The floor drain in the basement drains to a solid PVC pipe that exits the building underground and connects to the curtain drain system at the southeast corner of the building. A solid four inch PVC pipe drains the entire curtain drain system in a southwesterly direction and outfalls approximately 120 feet southwest from the southwest corner of the building about midway down a steep bank that borders the unnamed tributary to the Lamoille River.

## 1.0 INTRODUCTION

On 29 July 2008, Mr. John Clegg, retained the services of *Ross Environmental Associates, Inc. (R.E.A.)* to complete an initial site investigation (ISI) at his property in Wolcott, Vermont in accordance with Vermont Department of Environmental Conservation (VT DEC) guidelines. The ISI was completed to address the presence of petroleum contamination discovered after a petroleum release in January of 2008. The release is believed to have resulted from overfilling and malfunction of the 275-gallon AST located in the basement of the residence. This report has been prepared by *R.E.A.* under the direction of Mr. John Clegg and Peerless Insurance, unauthorized use or reproduction of this report is prohibited without written authorization from *R.E.A.*, Mr. John Clegg or Peerless Insurance.

### 1.1 Site Location and Setting

The Clegg Residence is located at 729 Corley Road in Wolcott, Vermont (**Figure 1**, Appendix A). The property is occupied by a single family residence, and is located in a rural residential neighborhood of Wolcott. Drinking water for the site and surrounding properties is provided by private supply wells. The on-site water supply well is located approximately 100 feet northeast of the release area. Based on review of the VT Agency of Natural Resources (ANR) Private Well GIS database the nearest neighboring drinking water supply is believed to be approximately 780 feet northwest of the release area. Wastewater disposal for the property is provided by an onsite septic system located approximately 150 feet to the northwest of the release area.

The ground surface in the immediate vicinity of the site slopes gently to the west-northwest, with an average elevation of approximately 958 feet above mean sea level (Maptech, Inc., 1998). The nearest surface water feature is an unnamed tributary to the Lamoille River located approximately 130 feet west and south of the release area, which drains into the Lamoille River, located approximately 1,000 feet to the north of the Clegg property. The geographic coordinates of the site are: latitude 44° 33' 17.55" N and longitude 72° 29' 80.60" W

The surficial geology in the vicinity of the site is mapped as glacial till mantling bedrock and reflecting topography of underlying bedrock (Stewart and MacClintock, 1970). Bedrock in the area is mapped as the Missisquoi formation, Moretown Member (Omm) consisting of quarzite and quartz-plagioclase granulite, in layers ½ to several inches thick, separated by "pinstripe" partings that contain muscovite, chlorite, epidote, biotite, and locally garnet. Also, greenish quartz-sericite-chlorite phyllite and schist, and minor carbonaceous phyllite of the Middle Ordovician age (Doll,

1961). No bedrock outcrops were observed on the site or adjacent properties; however, bedrock refusal was encountered at approximately 15 feet bgs during soil boring.

An orthophotograph showing the site and surrounding properties is included as **Figure 2** (Appendix A) and photographs of the site and surrounding area taken during the initial site investigation are included in Appendix B.

## **1.2 Site History**

On 13 May 2008, Ross Environmental Associates, Inc. (**R.E.A.**) was notified of a No. 2 fuel oil spill at the Clegg residence located in Wolcott, Vermont. Based on available information, it appears that the fuel spill occurred on 23 January 2008 and was related to an over-fill during a routine product delivery by County Oil of Morrisville, Vermont. At that time, it was estimated that approximately 50 gallons of No. 2 fuel oil may have been released through over-pressurization of the fitting and failure of the 275-gallon AST system that was used for storing #2 fuel oil for home heating purposes. Upon arrival at the site, obvious olfactory and visual evidence of petroleum staining were noted in the vicinity of the aboveground storage tank system. The concrete basement floor was observed to be in excellent condition with a radiant floor heating system installed beneath the concrete. Two expansion joints were noted; one located in the release area approximately ten feet east of the west wall, and one located outside the release area approximately ten feet east from the west wall. Photoionization detector (PID) readings from the expansion joint within the release area ranged from 132 to 658 parts per million-volume (ppmv). Based on available information provided by the homeowner, Mr. John Clegg, and representatives from the fuel delivery company (County Oil). The free product that had been released onto the basement floor was “washed” down the floor drain at the southwest corner of the basement floor and Speedy Dry® absorbent was applied to the floor and picked up prior to applying Simple Green® degreaser.

On 14 May 2008, **R.E.A.** personnel installed a temporary carbon air treatment system in the basement of the residence and also inspected the floor drain, which is, according the homeowner Mr. John Clegg, connected to the curtain drain that daylights adjacent to an unnamed tributary of the Lamoille River. Petroleum staining and odors were noted at the outfall of the curtain drain system. On 23 May 2008, **R.E.A.** removed approximately ½ cubic yard of petroleum contaminated soils (PCS) from the area directly below the drain outfall. The PCS was excavated by hand and placed into two 55-gallon DOT drums. PID readings on soils directly below the curtain drain outfall ranged from 2.7 to 770 ppm.

On 23 May 2008, *R.E.A.* personnel were onsite to clean up residual contamination related to the petroleum release on the concrete basement floor. Prior to cleaning, PID readings of the ambient air in the basement ranged from 4.6 to 5.8 ppm. PID readings from within the floor joint “crack” ranged from 132 to 658 ppm. The concrete basement floor was washed and brush scrubbed with Grease Magnet® industrial strength degreaser. Residual dirt, dust and absorbent compound were contained and removed with a shop vac. Following the cleaning of the concrete floor a vapor barrier was set up utilizing 6 milliliter poly and isolating the impacted area from the floor to the ceiling. The temporary carbon air treatment system remained in use. An absorbent boom was inserted into the end of the curtain drain effluent to contain any potential free product flow.

Because the extent of contamination was not defined during the initial site visits, four monitoring wells and five soils borings were installed on the site on 29 July 2008. Atlantis Drilling Services, LLC of Barrington, New Hampshire completed the soil borings and monitoring well installation under the direct supervision of an *R.E.A.* Field Scientist.

### **1.3 Land Use and Adjacent Property Ownership**

The subject property is located at 729 Corley Road in a rural residential area of Wolcott, Vermont. The adjacent properties to the north, south, east and west consist of primarily rural farm and woodlots and single family residential homes. An aerial photograph, taken in 2003, shows adjacent property site features (**Figure 2**, Appendix A).

## 2.0 Field Investigation Results and Procedures

*R.E.A.*'s field investigation included: the installation of four soil boring/monitoring wells (MW-1, MW-2, MW-3, and MW-4); five soil borings, field screening of subsurface soil samples and indoor air for the possible presence of volatile organic compounds (VOCs) using a portable photo-ionization detector (PID); collection and analysis of water samples from four on-site monitoring wells, and the onsite drinking water supply well 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 3** (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 contaminants of concern (COC) at the Clegg Residence appear to be volatile organic compounds (VOCs) including: benzene, toluene, ethylbenzene, 1,2,4-trimethylbenzene, 1,3,5-trimethylbenzene total xylenes, and naphthalene. All of these compounds are typically associated with petroleum products such as #2 fuel oil. A summary of various regulatory standards and chemical properties for these compounds is included on **Table 1**, Appendix A.

### 2.2 Source Area Evaluation

Based on the findings during the AST spill assessment and information collected during the Initial Site Investigation, the presence of the subsurface petroleum contamination discovered on-site is related to the AST release, which was discovered in January 2008. No other upgradient sources of petroleum contamination were identified during the Initial Site Investigation.

### 2.3 Soil Boring and Monitoring Well Installation

On 29 July 2008, *R.E.A.* provided oversight during the installation of four monitoring wells (MW-1 through MW-4) and five soil borings (SB-1, SB-2, SB-3, SB-4 and SB-5). MW-2 and MW-3 were set west and south of the release area, respectively, in the presumed downgradient direction.

MW-4 was installed within the vicinity of the AST spill area on the opposite side of the foundation wall from where the AST release occurred. MW-1 was installed south and west of the release area and adjacent to the curtain drain outfall pipe. Monitoring well/soil boring locations are shown on **Figure 3**, Appendix A.

Subsurface soils at the site consisted primarily of medium brown sand with a silty sand layer at approximately 10.0' bgs. Groundwater was encountered approximately eight feet below ground surface (bgs) at the time of drilling. All of the soil borings were advanced to refusal, presumably due to bedrock, which was encountered at approximately 12-15 feet bgs.

All of the monitoring wells were constructed using 1.0-inch-diameter schedule 40 polyvinyl chloride (PVC) with flush threaded joints and 0.01-inch factory-slotted well screens. All of the monitoring wells were completed with five-foot well screens. 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 a peristaltic pump. Soil descriptions and monitoring well construction details are included on the soil boring logs in **Appendix C**. Atlantis Drilling, LLC of Barrington, New Hampshire installed the soil borings and monitoring wells under direct supervision of **R.E.A.**

Photo-ionization detector (PID) readings on the soil samples collected from MW-1, MW-2, MW-3 and MW-4 were 0.0 ppmv, which are below the VT DEC action level of 10 ppmv for fuel oil contaminated soil. PID screening results are included on the soil boring logs in Appendix C. **R.E.A.**'s Field Scientist screened soil samples from the soil borings for the possible presence of volatile organic compounds (VOCs) using a RAE Systems mini-RAE 2000 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. Each boring/well was located in azimuth to an accuracy of  $\pm 1.0$  feet, and in elevation with an accuracy of  $\pm 0.01$  feet relative to an on-site benchmark of 100.00 feet.

## 2.4 Ground Water Elevations and Flow Direction

On 21 August 2008, ground-water flow in the unconfined surficial aquifer at the site was toward the northeast with an estimated hydraulic gradient of approximately 3.4 percent. Groundwater flow appears to be influenced by the curtain drain system. Water-level measurements and elevation calculations for 21 August 2008, are presented in **Table 2** 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.

The effective porosity of the predominantly clay encountered below the water-table is presumably around 0.4, with hydraulic conductivities of 0.5 to 5.7 feet per day (Freeze & Cherry, 1979). Assuming Darcian flow, these estimates combine with the calculated horizontal gradient of 8.0 percent to yield an estimated range of ground-water flow velocities of between 0.1 to 1.14 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 spill area/basement interior and the area below the curtain drain outfall. However, based on water quality data from four on-site monitoring wells, groundwater in the immediate vicinity of the release area has been impacted by low concentrations of petroleum contamination.

None of the Vermont Groundwater Enforcement Standards (VGESs)<sup>1</sup> for volatile petroleum compounds were exceeded in any of the groundwater samples collected during this sampling event. Low concentrations of 1,3,5-trimethylbenzene, 1,2,4-trimethylbenzene, ethylbenzene and total xylenes were detected in the groundwater samples collected from MW-4. Total petroleum hydrocarbons (TPH) were detected in the MW-4 sample at 1.0 milligrams per liter (mg/L). No VOC's or TPH were detected in the samples collected from MW-1, MW-2 or MW-3.

No petroleum compounds were detected in the trip-blank sample, and the duplicate sample results (MW-2) were within acceptable limits of the original. The analytical results are summarized on **Table 3** (Appendix A), and copies of the laboratory analytical reports are included as Appendix D.

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<sup>1</sup>The Vermont DEC has established groundwater enforcement standards for several petroleum related VOCs, as follows: benzene - 5 µg/L; toluene - 1,000 µg/L; ethylbenzene - 700 µg/L; xylenes - 10,000 µg/L; MTBE - 40 µg/L; naphthalene - 20 µg/L and 1,3,5-trimethyl benzene & 1,2,4-trimethyl benzene - 350 µg/L combined.

Contaminant distribution, based on samples collected on 21 August 2008, is shown on **Figure 5** 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 of the groundwater samples were collected using a peristaltic pump and dedicated clear flexible tubing. Groundwater was collected directly into 40-milliliter glass vials with teflon-lined septum lids. Each sample vial was preserved with hydrochloric acid to reduce the pH to less than 2 standard units.

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 4**, in Appendix A.

On 21 August 2008, groundwater samples were collected from four monitoring wells (MW-1, MW-2, MW-3, and MW-4). All groundwater samples were analyzed for the possible presence of volatile organic compounds (VOCs) and total petroleum hydrocarbons (TPH) in accordance with U.S. EPA Methods 8021B, and 8015 DRO (diesel-range organics), respectively. All samples were transported under chain-of-custody in an ice-filled cooler to ENDYNE, Inc. of Williston, Vermont for laboratory analysis.

## **2.6 Supply Well Sampling and Analysis**

No volatile organic compounds (VOCs) were detected in the drinking water samples collected from the on-site supply well, which is supplied by a bedrock well located approximately 100 feet northeast of the spill area and residence.

On 14 May 2008 and 21 August 2008, drinking water samples were collected from the exterior spigot of the residence. The samples were collected after allowing the water to run for at least ten minutes. Both samples were analyzed for the possible presence of volatile organic compounds in accordance with EPA Method 524.2. The samples were transported under chain-of-custody in an ice-filled cooler to Endyne Laboratory of Williston, Vermont.

According to the Well Completion Report submitted to the Vermont Water Supply Division, the drilled well (tag #26476) is comprised of a six-inch diameter steel casing that extends through the overburden into bedrock which was encountered at 42 feet bgs. The casing extends approximately 40 feet into bedrock. The total depth of the well is 360 feet. The well was drilled in September 2003 by H A Manosh Corp. (License # 256), and had an estimated yield of 1.5 gallons per minute during a one hour test.

## 2.7 Investigation Procedures

The procedures used during the initial site investigation at the Clegg Residence are consistent with the following guidance documents:

- *“Underground Storage Tank Closure and Site Assessment Requirements.”* Vermont Agency of Natural Resources, Waste Management Division. June 2003.
- *“Site Investigation Guidance.”* Vermont Agency of Natural Resources, Waste Management Division. June 2005.
- *“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

At this time, the overburden groundwater formation at the site has been impacted by low concentrations of petroleum. Based on available information, no receptors appear to be impacted; however, the on-site drinking water supply, which is located within 100 feet of the release area, is threatened by residual contamination. Removal of PCS from the vicinity of the curtain drain outfall will greatly reduce the threat to the underlying groundwater formation and other nearby sensitive receptors.

### 3.1 Receptor Identification

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

- Indoor air of the Clegg Residence.
- Soil and groundwater within the general vicinity of the release area.
- Drinking water supply wells (including the onsite supply well) located within 1,000 feet of the release area.

- An unnamed tributary to the Lamoille River located approximately 130 feet west and slightly south of the release area, and drains into the Lamoille River, located approximately 1,000 feet to the north of the release area.

### **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:

1. PID readings of indoor air within the basement and first floor of the Clegg Residence have been 0.0 ppmv since the concrete basement floor was cleaned on 23 May 2008.
2. The shallow overburden groundwater formation underlying the property has been impacted by low concentrations of volatile organic compounds (VOCs), based on the laboratory results of the groundwater sample collected from MW-4; however, no Vermont Groundwater Enforcement Standards (VGESs) were exceeded. Total petroleum hydrocarbons (TPH) were detected in the sample collected from MW-4 at 1.0 mg/L.
3. No VOCs were detected in either of the two samples collected from the onsite supply well in April and August 2008.
4. Based on review of the VT Agency of Natural Resources (ANR) Private Well GIS database, one drinking water supply well is located within 1,000 feet of the site; however, based on contaminant concentrations, this well is not likely to be affected by the release.
5. Inspection of the floor/curtain drain system revealed petroleum staining and odors at the outfall of the curtain drain. PID readings on soils directly below the curtain drain outfall ranged from 2.7 to 770 ppm. Removal of approximately ½ cubic yard of petroleum contaminated soils (PCS) from the area directly below the drain outfall has reduced the immediate threat to nearby sensitive receptors. However, based on proximity to the tributary further PCS removal will greatly reduce the threat to the underlying groundwater formation and other nearby sensitive receptors.

## **4.0 DATA EVALUATION AND CONCEPTUAL MODEL**

Information collected during the Initial Site Investigation indicates that the overburden groundwater formation at the site has been impacted by low concentrations of petroleum. However; none of the Vermont Groundwater Enforcement Standards were exceeded in groundwater samples collected beneath the release area. Based on available information, no receptors appear to be impacted; however, the on-site drinking water supply, which is located within 100 feet of the release area, is threatened by residual contamination.

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. Based on available information, active remediation is not likely to be required by the VT DEC at this time; however, additional PCS should be removed from the area below the curtain drain outfall and another round of groundwater monitoring is recommended as a precautionary measure.

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

- Low concentrations of 1,3,5-trimethylbenzene, 1,2,4-trimethylbenzene, ethylbenzene and total xylenes were detected in the groundwater samples collected from MW-4. Total petroleum hydrocarbons (TPH) were detected in the MW-4 sample at 1.0 milligrams per liter (mg/L).
- No volatile petroleum compounds were detected in any of the samples collected from the other on-site monitoring wells (MW-1, MW-2, and MW-3).
- Subsurface soils at the site consisted primarily of medium brown sand with a silty sand layer at approximately 10.0' bgs.
- Refusal, presumably at the top of bedrock, was encountered at approximately 12-15 feet below ground surface during the soil boring program.
- Photo-ionization detector (PID) readings on soil samples collected from the MW-1, MW-2, MW-3 and MW-4 soil borings were all 0.0 ppmv.

## 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. Both expansion joints in the basement floor should be sealed to create a vapor barrier in order to reduce the threat of residual petroleum odors and impacts to the indoor air of the Clegg Residence.
2. Bi-Monthly free product checks should be performed in the four perimeter monitoring wells. During bi-monthly free product checks the curtain drain outfall absorbent sock should be

examined for saturation and should be replaced as needed. Additionally, the basement and 1<sup>st</sup> floor air should be screened with a PID for possible volatile organic vapors (VOCs).

3. Removal of PCS from the vicinity of the curtain drain outfall will greatly reduce the threat to the underlying groundwater formation and other nearby sensitive receptors. PCS in the vicinity of the outfall pipe along the bank of the tributary to the Lamoille River should be excavated and disposed of in accordance with VT DEC guidelines.
4. The on-site monitoring wells should be sampled in Spring 2008 and analyzed for the possible presence of volatile petroleum compounds and total petroleum hydrocarbons (TPH) in accordance with EPA Methods 8021B and 8015DRO; respectively.
5. The on-site drinking water bedrock supply should be sampled in the Fall 2008 and analyzed for the possible presence of volatile organic compounds in accordance with EPA Method 524.2.
6. A summary report should be completed following the next groundwater sampling event, which should include recommendations for future monitoring, vapor recovery system installation or remediation activities.

## 6.0 LIMITATIONS

This report was completed by **Ross Environmental Associates, Inc. (R.E.A.)** for the sole use of Mr. John Clegg and Peerless Insurance in connection with an assessment of on-site environmental conditions. Use of this report by any other person or for any other use is not authorized except with prior written consent of **R.E.A.**, Mr. Clegg or Peerless Insurance.

The work was undertaken to assess environmental conditions specifically on the subject property in accordance with generally accepted engineering and hydrogeological practices. No other warranty, express or implied, is made. Absolute assurance that any and all possible contamination at the site was identified cannot be provided.

The report conclusions are based, in part, on information provided by the client, their agents, or third parties, including state or local officials. **R.E.A.** assumes no responsibility for the accuracy and completeness of the information. Where visual observations are included in the report, they represent conditions at the time of the inspection, and may not be indicative of past or future site conditions.

## 7.0 REFERENCES

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

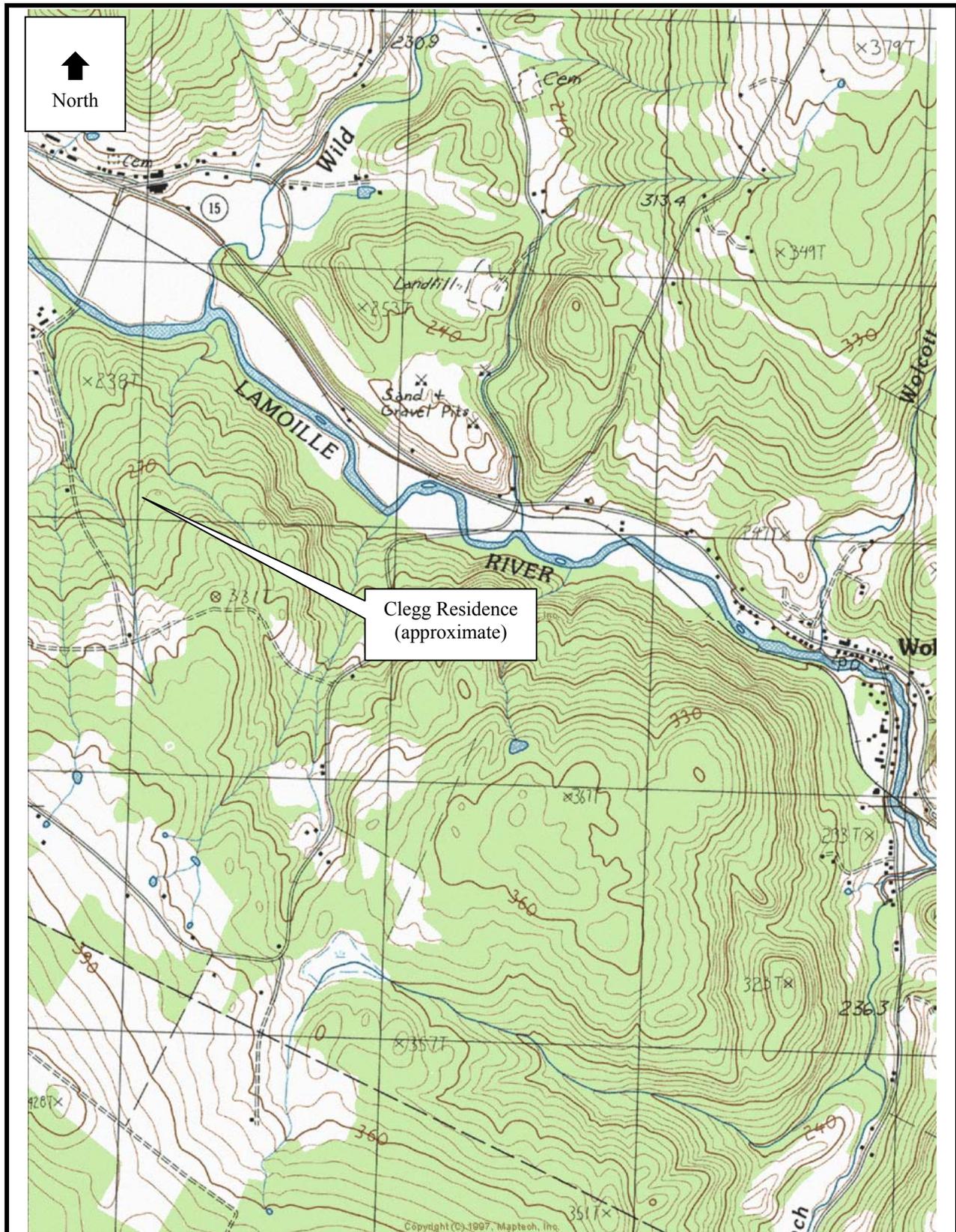
Freeze, R. A., and Cherry, J.A., 1976. *Groundwater*, Prentice-Hall, Inc., Englewood Cliffs, New Jersey, 29 p.

Fetter, C.W., 1994. *Applied Hydrogeology, 3rd Ed.*, Prentice Hall, Englewood Cliffs, New Jersey, 98 p.

Maptech Inc., 1998. "729 Corley Road, Wolcott, Vermont."

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

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Approximate Scale: 1 inch = 1,200 feet

Site Coordinates: 44° 33' 17.55" N, 72° 29' 80.60" W

Source: USGS 1986. Wolcott Quadrangle, VT.  
 Topographic map (7.5 minute series).  
 Provisional Edition 1986. Maptech, Inc. 1998.  
 R.E.A. Project No. 28-050

**Figure 1**  
 Site Location Map  
 Clegg Residence  
 Wolcott, Vermont



Site Coordinates: 44° 33' 17.55" N 72 ° 29' 80.60" W

**Legend**

- Private Wells
- Roads

Aerial Photo: NAIP 2003  
 Private Well Data: Extracted and downloaded from the State of Vermont ANR Well Locator.  
[http://maps.vermont.gov/imf/sites/ANR\\_WSWelldriller/jsp/launch.jsp](http://maps.vermont.gov/imf/sites/ANR_WSWelldriller/jsp/launch.jsp)

**Figure 2**  
**Private Wells within 1,000 Foot Radius**  
**Clegg Residence**  
**Wolcott, Vermont**

F:\Projects\28050\PDFs\Figure 2.pdf  
 F:\Projects\28050\GIS\_Wells\Map.mxd

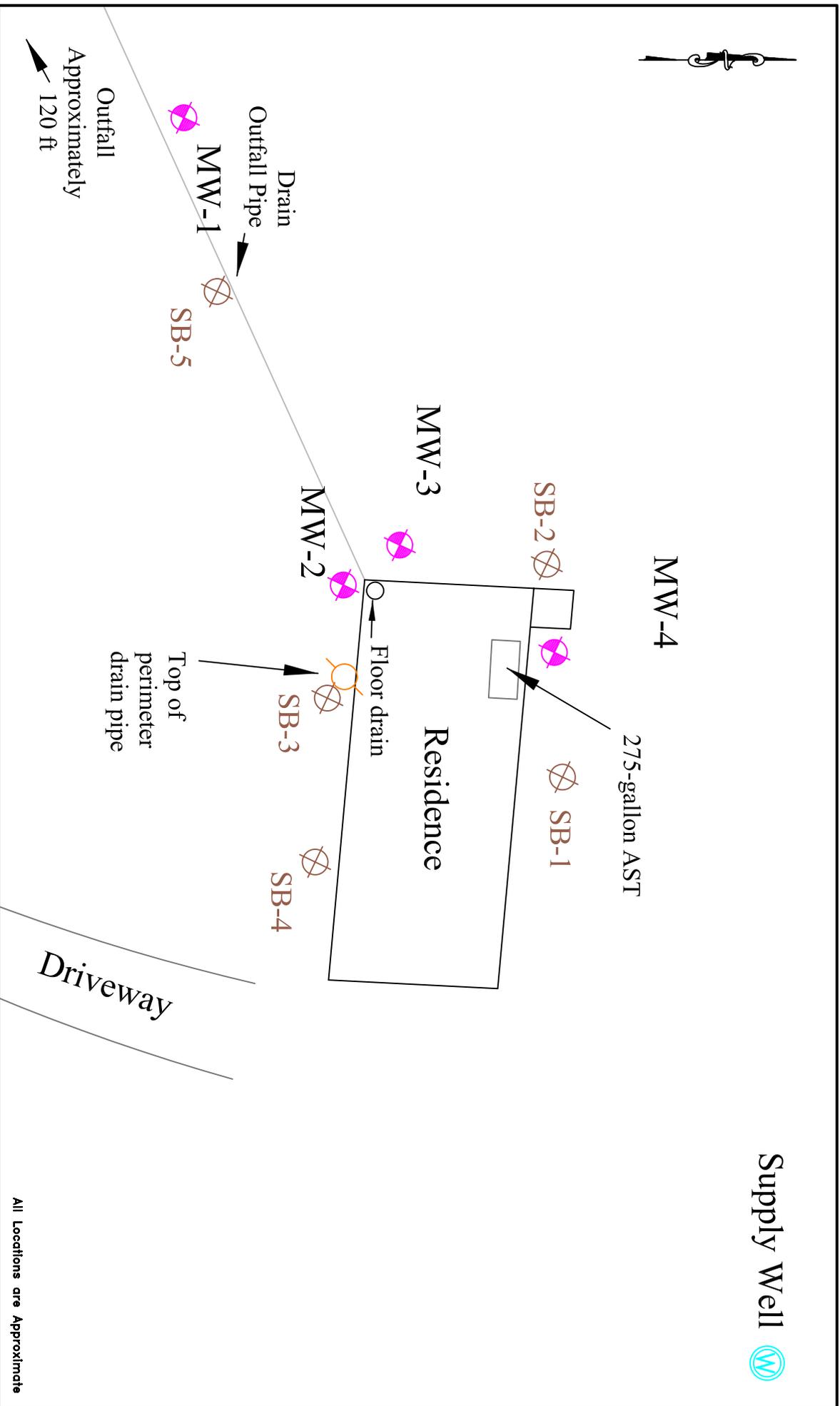
## Well Details

Date Completed 08/08/2001  
Date Received 10/26/2001  
Driller 8 H A Manosh Corporation  
Well Report Number 15759  
Tag 15759  
Comments  
Town Wolcott  
Map Cell  
Tax Map  
E911 Address 572 Corley Rd  
SubDivision  
Lot Number  
Owners First Name David & Debbie  
Owners Last Name Johnson  
Purchaser First Name  
Purchaser Last Name  
Well Use Domestic  
Well Reason Replace existing supply  
Drilling Method  
Well Depth 223.00 feet  
Yield Gallons Per Minute 4.00  
Yield Test Tested For Hours 0.50  
Static Water Level 0.00 feet  
Over Flowing 1  
OverBurden Thickness 2 feet  
Casing Length 20.00 feet  
Casing Diameter 6.00 inches  
Casing Length Below Land Surface 48.00 feet  
Casing Length Exposed 2.00  
Casing Material Steel  
Casing Weight 19.00 lbs/foot  
Casing Finish  
Liner Length 0.00 feet  
Liner Diameter 0.00 inches  
Liner Material  
Liner Weight 0.00 lbs/foot  
Grout Type  
Seal Type  
Diameter Drilled In Bedrock 0.00 inches  
Depth Drilled in Bedrock 0.00 feet  
Screen Make Type  
Screen Material  
Screen Length 0.00 feet  
Screen Diameter 0.00 inches

Screen Slot Size 0.000 inches  
Depth of Screen 0.00 feet  
Gravel Size Type  
Casing Sealing Method Drive shoe only  
Yield Test Method  
Well Development  
Not Steel Casing 0  
Water Analysis 0  
Well Screen 0  
AW Partial 0  
Unique GIS Name X515759  
Lat Degree 44  
Lat Minutes 33  
Lat Seconds 24.8401  
Long Degree 72  
Long Minutes 29  
Long Seconds 56.0400  
Location DeterminationMethod GPS location  
Well Type Bedrock  
Depth To Liner Top 0.00  
Hydro Fractured 0  
Hydro Fractured Resulting Flow 0.00  
Well Location Submitted As A Dot On A Map  
Starting Depth Ending Depth Water Bearing Lithology Code Lithology Description  
0.00 5.00 D  
5.00 45.00 R Light gray and white  
45.00 64.00 R Brown  
64.00 109.00 R Light gray  
109.00 110.00 1 R Brown Vein  
110.00 194.00 R Light gray  
194.00 195.00 3 R Brown Vein  
195.00 223.00 R Light gray

If you would like search for a well or wells in a specific area the following link will relocate you to the ANR GIS Internet Mapping Program.

<http://www.anr.state.vt.us/site/html/maps.htm>



All Locations are Approximate

**FIGURE 3.**

**SITE PLAN**

(with monitoring well locations)

Clegg Residence  
Wolcott, Vermont

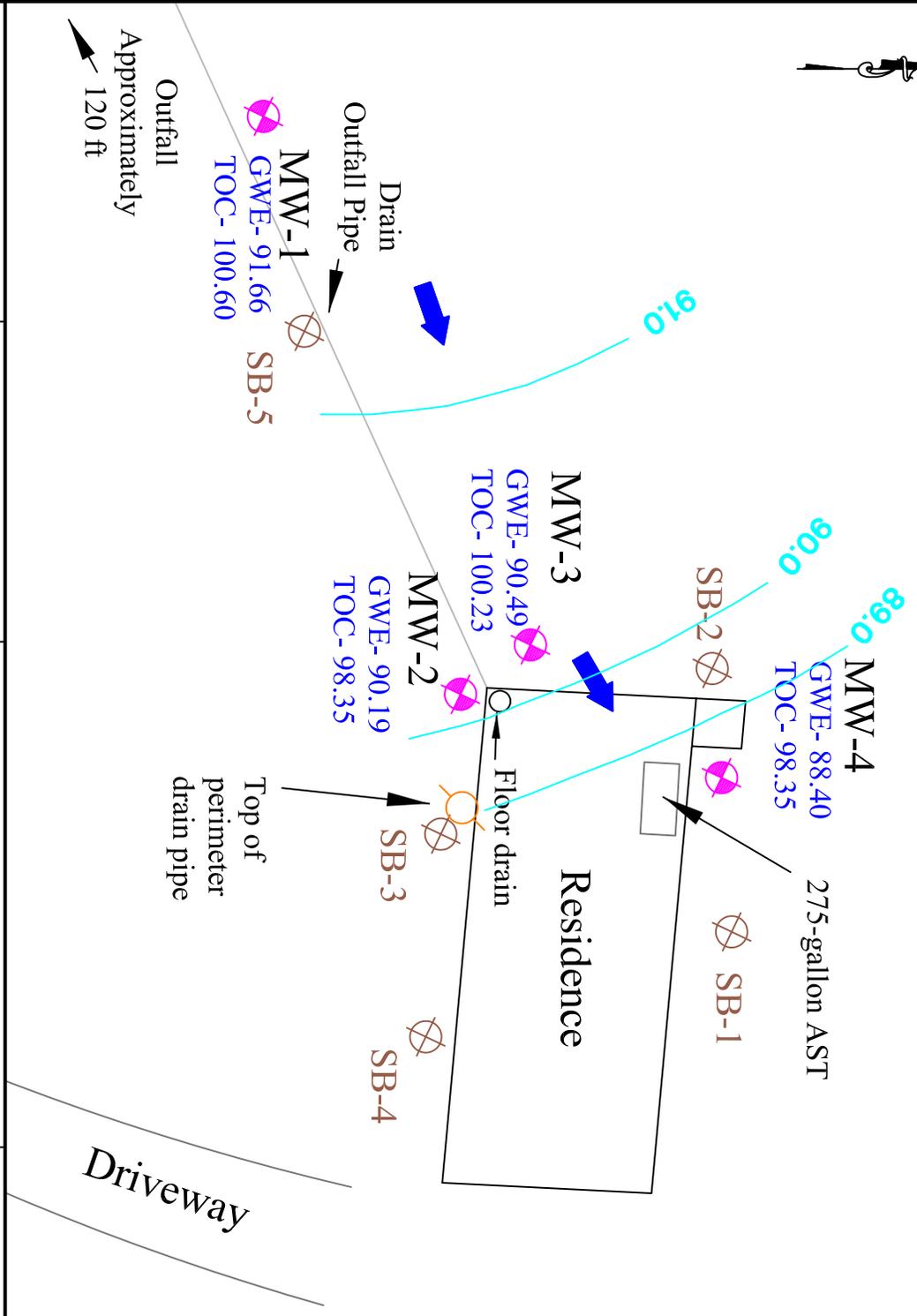
Scale: 1:20 Date: 29 July 2008

File Name: 28050ftg3 Drawn By: JAS

Ross Environmental Associates, Inc.  
P.O. Box 1533 Stowe, Vt 05672  
(802) 253-4280



- Legend.**
-  Monitoring Well Location
  -  Soil Boring Location
  -  Supply Well



GWE - Groundwater Elevation  
 TOC - Top of Well Casings  
 All Locations are Approximate

**FIGURE 4.**

**GROUNDWATER CONTOUR MAP**

(Monitoring Date: 21 August 2008)

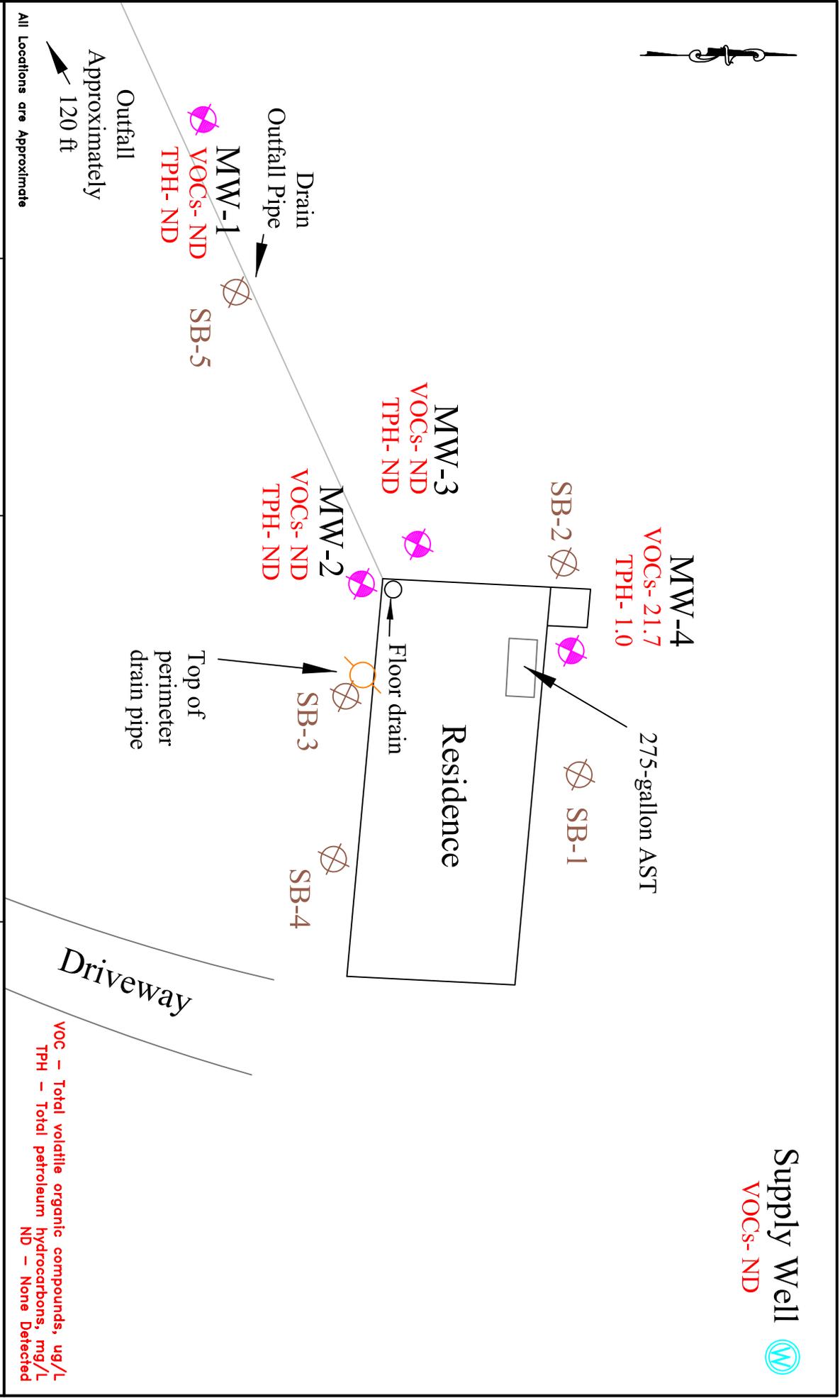
Clegg Residence  
 Wolcott, Vermont

<b>Scale:</b> 1:20	<b>Date:</b> 29 July 2008
<b>File Name:</b> 28050fig3	<b>Drawn By:</b> JAS

Ross Environmental Associates, Inc.  
 P.O. Box 1533 Stowe, Vt 05672  
 (802) 253-4280

Legend:	
	Monitoring Well Location
	Soil Boring Location
	Supply Well





**FIGURE 5.**

**CONTAMINANT DISTRIBUTION**

(Monitoring Date: 21 August 2008)

Clegg Residence  
Wolcott, Vermont

**TABLE 1**  
**Contaminants of Concern**

Clegg Residence  
Wolcott, Vermont

Parameter	CASN	EPA MCL (ug/L)	VGES (ug/L)	WQC (ug/L)	EPA Region IX PRGs - soil		density (g/cm <sup>3</sup> ) @ 20/4 °C	log K <sub>oc</sub>	log K <sub>ow</sub>	water solubility (mg/L)
					residential	Industrial				
Benzene	71-43-2	5.0	5.0	1.2	0.60	1.3	0.8789	1.69	2.13	1,820 @ 22 °C
Toluene	108-88-3	1,000	1,000	6,800	520	520	0.8669	2.06	2.65	519.5 @ 25 °C
Ethylbenzene	100-41-4	700	700	3,100	8.9	20	0.8670	2.22	3.13	187 @ 25 °C
Total Xylenes	95-47-6	10,000	10,000	--	270	420	0.8802	2.11	3.13	152 @ 20 °C
1,3,5-trimethylbenzene	526-73-8	--	350	--	21	70	0.8944	2.80	3.55	75.2 mg/kg @ 25°C
1,2,4-trimethylbenzene	95-63-6	--		--	52	170	0.8758	3.57	3.65	51.9 mg/kg @ 25 °C
Naphthalene	91-20-3	--	20	--	56	190	1.145	2.74	3.40	31.7 @ 25°C

Montgomery, J.H., 2000. "Groundwater Chemicals - Desk Reference" Third Edition. Lewis Publishers, Boca Raton, Florida.

EPA MCL. U.S. Environmental Protection Agency - Maximum Contaminant Level. In micrograms per liter (ug/L).

Vermont Groundwater Enforcement Standards (VGESs). In micrograms per liter (ug/L).

Vermont Water Quality Criteria (WQC) for the protection of human health in Class B waters. In micrograms per liter (ug/L).

PRG - U.S. EPA Region 9 Preliminary Remediation Goals (PRG) for soil. In milligrams per kilogram (mg/Kg)

Soil sorption coefficient, log K<sub>oc</sub>

Octanol/water partition coefficient, log K<sub>ow</sub>

**TABLE 2**  
**GROUND WATER ELEVATION CALCULATIONS**

Clegg Residence  
Wolcott, Vermont

Monitoring Date: 21 August 2008

Well I.D.	Top of Casing Elevation (ft)	Depth to Water (ft)	Water Table Elevation (ft)
MW-1	100.60	8.94	91.66
MW-2	98.35	8.16	90.19
MW-3	100.23	9.74	90.49
MW-4	98.35	9.95	88.40

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

**TABLE 3  
GROUND-WATER ANALYTICAL RESULTS**

Clegg Residence  
Wolcott, Vermont

Monitoring Date: 21 August 2008

Parameter	VGES	MW-1	MW-2	MW-3	MW-4	Dup (MW-2)	% Difference	Trip Blank
MtBE	40	ND<2.0	ND<2.0	ND<2.0	ND<2.0	ND<2.0	---	ND<2.0
Benzene	5.0	ND<1.0	ND<1.0	ND<1.0	ND<1.0	ND<1.0	---	ND<1.0
Toluene	1,000	ND<1.0	ND<1.0	ND<1.0	ND<2.0	ND<1.0	---	ND<1.0
Ethylbenzene	700	ND<1.0	ND<1.0	ND<1.0	2.3	ND<1.0	---	ND<1.0
Total Xylenes	10,000	ND<2.0	ND<2.0	ND<2.0	14.8	ND<2.0	---	ND<2.0
1,3,5-trimethylbenzene	350	ND<1.0	ND<1.0	ND<1.0	1.7	ND<1.0	---	ND<1.0
1,2,4-trimethylbenzene		ND<1.0	ND<1.0	ND<1.0	2.9	ND<1.0	---	ND<1.0
Naphthalene	20	ND<2.0	ND<2.0	ND<2.0	ND<2.0	ND<2.0	---	ND<2.0
Total VOCs*	--	ND	ND	ND	21.7	ND	---	ND
TPH (mg/L)	--	ND<0.40	ND<0.40	ND<0.40	1.0	ND<0.40	---	ND<0.40

Notes: All results reported as micrograms per liter (ug/L), unless indicated otherwise.  
 ND: None detected at indicated detection limit.  
 Shaded values indicate exceedance of Vermont Groundwater Enforcement standard (VGES)  
 UIP: Unidentified Peaks  
 TPH: Total Petroleum Hydrocarbons

**TABLE 4  
FIELD MEASUREMENT DATA**

Clegg Residence  
Wolcott, Vermont

Monitoring Date: 21 August 2008

Well ID	pH (su)	temperature (°C)	Specific conductivity (uS)	ORP (mV)	TDS (ppm)	Comments
MW-1	---	---	---	---	---	low recharge
MW-2	5.36	15.0	81.56	2.37	53.28	No odor
MW-3	5.84	14.1	102.1	240	66.64	No odor
MW-4	5.69	14.7	187.6	217	123.1	No odor

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.

PID = photoionization detector, reported in parts per million per volume (ppmv)

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Clegg Residence - Wolcott, VT  
Initial Site Investigation 29 July 2008



Photograph #1 - Installation of SB-1 - view to east



Photograph #2 - Installation of MW-4 - view to south



Photograph #3 - Installation of MW-2 - view to east



Photograph #4 - Installation of SB-3 - view to west

Clegg Residence - Wolcott, VT  
Initial Site Investigation 29 July 2008



Photograph #5 - Installation of SB-4 - view to east



Photograph #6 - Installation of MW-1 - view to west



Photograph #7 - Installation of SB-5 - view to west

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**BORING / WELL IDENTIFICATION: MW-1**

Site Name: Clegg Residence

Site Location: Wolcott, Vermont

Well Depth: 10.0'

Boring Depth: 11.5'

Installation Date: 29-Jul-08

Depth to Water (during drilling): 5.0'

Job Number: 28-050

Screen Diameter: 2"

Depth: 5.0-10.0'

REA Representative: Rose

Screen Type/Size: 0.01' slotted schedule 40 PVC

Drilling Company: Atlantis

Riser Diameter: 2"

Depth: 0-5.0'

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)	Well Profile	Legend
			organic matter, weathered rock, fine brown sand			Concrete Native Material Bentonite Filter Sand Riser Screen Water Level
	0-4'	50%		0.0		
5			fine brown silty sand, some gravel			
	4-8'	75%		0.0		
10			fine brown silty sand, some gravel. <b>Well set at 11.5' due to rock refusal</b>			
	8-12'	25%		0.0		
15						
20						
25						
PROPORTIONS USED		BLOW COUNT (COHESIVE SOILS)		BLOW COUNT (GRANULAR SOILS)		NOTES:
AND 33-50% SOME 20-33%	LITTLE 10-20% TRACE 0-10%	<2 VERY SOFT 2-4 SOFT 4-8 MEDIUM STIFF	8-15 STIFF 15-30 VERY STIFF >30 HARD	0-4 VERY LOOSE 4-10 LOOSE 10-30 MEDIUM DENSE	30-50 DENSE >50 VERY DENSE	miniRAE 2000



**BORING / WELL IDENTIFICATION: SB-1**

Site Name: Clegg Residence

Site Location: Wolcott, Vermont

Well Depth: N/A

Boring Depth: 12.0'

Installation Date: 29-Jul-08

Depth to Water (during drilling): 10.0'

Job Number: 28-050

Screen Diameter: N/A

Depth: N/A

REA Representative: Rose

Screen Type/Size: N/A

Drilling Company: Atlantis

Riser Diameter: N/A

Depth: N/A

Sampling Method: Geoprobe

Riser Type/Size: N/A

Reference Point (RP):

Depth (ft)	Sample Depth (ft)	Blows/6" and Recovery (in)	Sample Description / Notes	PID (ppm)	Well Profile	Legend	
			fine to medium brown sand			Concrete	
	0-4'	100%				0.0	Native Material
5							Bentonite
			fine to medium brown sand some gravel, gray schist@ 7.0'			Filter Sand	
	4-8'	100%			0.0	Riser	
10			medium brown sand with some gravel wet brown silt			Screen	
						Water Level	
	8-12'	100%		0.0			
15							
20							
25							
<b>PROPORTIONS USED</b>		<b>BLOW COUNT (COHESIVE SOILS)</b>		<b>BLOW COUNT (GRANULAR SOILS)</b>		<b>NOTES:</b>	
AND 33-50%	LITTLE 10-20%	<2 VERY SOFT	8-15 STIFF	0-4 VERY LOOSE	30-50 DENSE	miniRAE 2000	
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			



**BORING / WELL IDENTIFICATION: SB-2**

Site Name: Clegg Residence

Site Location: Wolcott, Vermont

Well Depth: N/A Boring Depth: 12.0' Installation Date: 29-Jul-08

Depth to Water (during drilling): 8.5' Job Number: 28-050

Screen Diameter: N/A Depth: N/A REA Representative: Rose

Screen Type/Size: N/A Drilling Company: Atlantis

Riser Diameter: N/A Depth: N/A Sampling Method: Geoprobe

Riser Type/Size: N/A Reference Point (RP):

Depth (ft)	Sample Depth (ft)	Blows/6" and Recovery (in)	Sample Description / Notes	PID (ppm)	Well Profile	Legend
			organic matter, fine to medium brown sand			Concrete
	0-4'	25%		0.0		Native Material
5			fine to medium brown sand some gravel			Bentonite
	4-8'	50%		0.0		Filter Sand
			wet brown silt			Riser
10						Screen
	8-12'	100%		0.0		Water Level
15						
20						
25						
<b>PROPORTIONS USED</b>		<b>BLOW COUNT (COHESIVE SOILS)</b>		<b>BLOW COUNT (GRANULAR SOILS)</b>		<b>NOTES:</b>
AND 33-50%	LITTLE 10-20%	<2 VERY SOFT	8-15 STIFF	0-4 VERY LOOSE	30-50 DENSE	miniRAE 2000
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		



**BORING / WELL IDENTIFICATION: MW-2**

Site Name: Clegg Residence

Site Location: Wolcott, Vermont

Well Depth: 12.0'

Boring Depth: 12.0'

Installation Date: 29-Jul-08

Depth to Water (during drilling): 8.0'

Job Number: 28-050

Screen Diameter: 2"

Depth: 7.0-12.0'

REA Representative: Rose

Screen Type/Size: 0.01' slotted schedule 40 PVC

Drilling Company: Atlantis

Riser Diameter: 2"

Depth: 0-7.0'

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)	Well Profile	Legend
			medium brown sand			Concrete
	0-4'	50%	gray schist rock some silt	0.0		Native Material
5			silty sand some gravel			Bentonite
	4-8'	50%	medium brown sand	0.0		Filter Sand
10			silty sand some clay. <b>Well set at 12.0' bgs due to refusal</b>			Riser
	8-12'	100%		0.0		Screen
						Water Level
15						
20						
25						
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	miniRAE 2000
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		



**BORING / WELL IDENTIFICATION: MW-3**

Site Name: Clegg Residence

Site Location: Wolcott, Vermont

Well Depth: 14.0'

Boring Depth: 14.0'

Installation Date: 29-Jul-08

Depth to Water (during drilling): 8.0'

Job Number: 28-050

Screen Diameter: 2"

Depth: 9.0-14.0'

REA Representative: Rose

Screen Type/Size: 0.01' slotted schedule 40 PVC

Drilling Company: Atlantis

Riser Diameter: 2"

Depth: 0-9.0'

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)	Well Profile	Legend
			fine to medium brown sand			Concrete Native Material Bentonite Filter Sand Riser Screen Water Level
5	0-4'	25%	wet brown silt	0.0		
	4-8'	50%	brown silt, some gravel	0.0		
10	8-12'	100%	wet brown silt	0.0		
	12-14'	100%	wet brown silt. Well set at 14.0' bgs due to refusal	0.0		
15						
20						
25						

**PROPORTIONS USED**

**BLOW COUNT (COHESIVE SOILS)**

**BLOW COUNT (GRANULAR SOILS)**

**NOTES:**

AND 33-50%  
SOME 20-33%

LITTLE 10-20%  
TRACE 0-10%

<2 VERY SOFT  
2-4 SOFT  
4-8 MEDIUM STIFF

8-15 STIFF  
15-30 VERY STIFF  
>30 HARD

0-4 VERY LOOSE  
4-10 LOOSE  
10-30 MEDIUM DENSE

30-50 DENSE  
>50 VERY DENSE

miniRAE 2000



**BORING / WELL IDENTIFICATION: SB-3**

Site Name: Clegg Residence

Site Location: Wolcott, Vermont

Well Depth: N/A Boring Depth: 12.0' Installation Date: 29-Jul-08

Depth to Water (during drilling): 7.0' Job Number: 28-050

Screen Diameter: N/A Depth: N/A REA Representative: Rose

Screen Type/Size: N/A Drilling Company: Atlantis

Riser Diameter: N/A Depth: N/A Sampling Method: Geoprobe

Riser Type/Size: N/A Reference Point (RP):

Depth (ft)	Sample Depth (ft)	Blows/6" and Recovery (in)	Sample Description / Notes	PID (ppm)	Well Profile	Legend
			no recovery			Concrete
	0-4'	0%		0.0		Native Material
5						Bentonite
			fine to medium brown sand some gravel, silty clay at 8.0'			Filter Sand
	4-8'	50%		0.0		Riser
			wet brown silt			Screen
10						Water Level
	8-12'	100%	medium brown/gray sand	0.0		
15						
20						
25						
<b>PROPORTIONS USED</b>		<b>BLOW COUNT (COHESIVE SOILS)</b>		<b>BLOW COUNT (GRANULAR SOILS)</b>		<b>NOTES:</b>
AND 33-50% SOME 20-33%	LITTLE 10-20% TRACE 0-10%	<2 VERY SOFT 2-4 SOFT 4-8 MEDIUM STIFF	8-15 STIFF 15-30 VERY STIFF >30 HARD	0-4 VERY LOOSE 4-10 LOOSE 10-30 MEDIUM DENSE	30-50 DENSE >50 VERY DENSE	miniRAE 2000



**BORING / WELL IDENTIFICATION: SB-4**

Site Name: Clegg Residence

Site Location: Wolcott, Vermont

Well Depth: N/A Boring Depth: 9.0' Installation Date: 29-Jul-08

Depth to Water (during drilling): 7.0' Job Number: 28-050

Screen Diameter: N/A Depth: N/A REA Representative: Rose

Screen Type/Size: N/A Drilling Company: Atlantis

Riser Diameter: N/A Depth: N/A Sampling Method: Geoprobe

Riser Type/Size: N/A Reference Point (RP):

Depth (ft)	Sample Depth (ft)	Blows/6" and Recovery (in)	Sample Description / Notes	PID (ppm)	Well Profile	Legend
			medium brown sand, some gravel, weathered rock at 3.0'			Concrete
	0-4'	50%		0.0		Native Material
5			medium brown sand, some gravel, weathered rock at 7.0'			Bentonite
						Filter Sand
	4-8'	75%		0.0		Riser
10			medium brown sand some gravel. Rock refusal at 9.0'			Screen
						Water Level
	8-12'	25%		0.0		
15						
20						
25						
<b>PROPORTIONS USED</b>		<b>BLOW COUNT (COHESIVE SOILS)</b>		<b>BLOW COUNT (GRANULAR SOILS)</b>		<b>NOTES:</b>
AND 33-50%	LITTLE 10-20%	<2 VERY SOFT	8-15 STIFF	0-4 VERY LOOSE	30-50 DENSE	miniRAE 2000
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		



**BORING / WELL IDENTIFICATION: MW-4**

Site Name: Clegg Residence

Site Location: Wolcott, Vermont

Well Depth: 14.0'

Boring Depth: 14.0'

Installation Date: 29-Jul-08

Depth to Water (during drilling): 8.0'

Job Number: 28-050

Screen Diameter: 2"

Depth: 9.0-14.0'

REA Representative: Rose

Screen Type/Size: 0.01' slotted schedule 40 PVC

Drilling Company: Atlantis

Riser Diameter: 2"

Depth: 0-9.0'

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)	Well Profile	Legend
			fine to medium brown sand some gravel			Concrete Native Material Bentonite Filter Sand Riser Screen Water Level
	0-4'	50%		0.0		
5			fine to medium brown sand some gravel, gray schist@ 7.0'			
	4-8'	100% ▼	fine brown sand	0.0		
10			brown silt			
	8-12'	100%	medium brown sand some gravel	0.0		
	12-14'	100%	wet brown silt. Well set at 14.0' bgs due to refusal	0.0		
15						
20						
25						
PROPORTIONS USED		BLOW COUNT (COHESIVE SOILS)		BLOW COUNT (GRANULAR SOILS)		NOTES:
AND 33-50% SOME 20-33%	LITTLE 10-20% TRACE 0-10%	<2 VERY SOFT 2-4 SOFT 4-8 MEDIUM STIFF	8-15 STIFF 15-30 VERY STIFF >30 HARD	0-4 VERY LOOSE 4-10 LOOSE 10-30 MEDIUM DENSE	30-50 DENSE >50 VERY DENSE	miniRAE 2000



**BORING / WELL IDENTIFICATION: SB-5**

Site Name: Clegg Residence

Site Location: Wolcott, Vermont

Well Depth: N/A Boring Depth: 10.0'

Installation Date: 29-Jul-08

Depth to Water (during drilling): 4.0'

Job Number: 28-050

Screen Diameter: N/A Depth: N/A

REA Representative: Rose

Screen Type/Size: N/A

Drilling Company: Atlantis

Riser Diameter: N/A Depth: N/A

Sampling Method: Geoprobe

Riser Type/Size: N/A

Reference Point (RP):

Depth (ft)	Sample Depth (ft)	Blows/6" and Recovery (in)	Sample Description / Notes	PID (ppm)	Well Profile	Legend
			fine to medium brown sand			Concrete
			gravel some fine to medium brown sand			Native Material
5	0-4'	100% ▼	gravel	0.0		Bentonite
			silty sand			Filter Sand
	4-8'	100%	fine to medium brown sand, some gravel. Rock refusal at 10.0'	0.0		Riser
10						Screen
	8-12'	100%		0.0		Water Level
15						
20						
25						
PROPORTIONS USED		BLOW COUNT (COHESIVE SOILS)		BLOW COUNT (GRANULAR SOILS)		NOTES:
AND 33-50% SOME 20-33%	LITTLE 10-20% TRACE 0-10%	<2 VERY SOFT 2-4 SOFT 4-8 MEDIUM STIFF	8-15 STIFF 15-30 VERY STIFF >30 HARD	0-4 VERY LOOSE 4-10 LOOSE 10-30 MEDIUM DENSE	30-50 DENSE >50 VERY DENSE	miniRAE 2000

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## Laboratory Report

Ross Environmental Associates	090219
PO Box 1533	
Stowe, VT 05672	
Atten: James Gascoyne	

PROJECT: Clegg 28-050  
WORK ORDER: **0808-12132**  
DATE RECEIVED: August 26, 2008  
DATE REPORTED: September 05, 2008  
SAMPLER: JG

Enclosed please find the results of the analyses performed for the samples referenced on the attached chain of custody located at the end of this report.

The column labeled Lab/Tech in the accompanying report denotes the laboratory facility where the testing was performed and the technician who conducted the assay. A "W" designates the Williston, VT lab under NELAC certification ELAP 11263; "R" designates the Randolph, VT facility under certification NH 2037 and "N" the Plattsburgh, NY lab under certification ELAP 11892. "Sub" indicates the testing was performed by a subcontracted laboratory. The accreditation status of the subcontracted lab is referenced in the corresponding NELAC and Qual fields.

This NELAC column also denotes the accreditation status of each laboratory for each reported parameter. "A" indicates the referenced laboratory is NELAC accredited for the parameter reported. "N" indicates the laboratory is not accredited. "U" indicates that NELAC does not offer accreditation for that parameter in that specific matrix. Test results denoted with an "A" meet all National Environmental Laboratory Accreditation Program requirements except where denoted by pertinent data qualifiers. Test results are representative of the samples as they were received at the laboratory.

Endyne, Inc. warrants, to the best of its knowledge and belief, the accuracy of the analytical test results contained in this report, but makes no other warranty, expressed or implied, especially no warranties of merchantability or fitness for a particular purpose.

Reviewed by:

Harry B. Locker, Ph.D.  
Laboratory Director

[www.endynelabs.com](http://www.endynelabs.com)



160 James Brown Dr., Williston, VT 05495  
Ph 802-879-4333 Fax 802-879-7103

405, Randolph, VT 05060  
Ph 802-728-6313 Fax 802-728-6044



### Laboratory Report

CLIENT: Ross Environmental Associates  
 PROJECT: Clegg 28-050  
 REPORT DATE: 9/5/2008

WORK ORDER: **0808-12132**  
 DATE RECEIVED: 08/26/2008

TEST METHOD: EPA 8015

001 Site: MW-1 Date Sampled: 8/21/08 18:20 Analysis Date: 8/27/08 W MDP

<u>Parameter</u>	<u>Result</u>	<u>Unit</u>	<u>Nelac</u>	<u>Qual</u>	<u>Parameter</u>	<u>Result</u>	<u>Unit</u>	<u>Nelac</u>	<u>Qual</u>
Extraction Mod. EPA 3510C	Completed			U	C7-C10 TPH	< 0.40	mg/L		U
C10-C26 TPH-DRO	< 0.40	mg/L		U	C26-C40 TPH	< 0.40	mg/L		U
Tot. Petroleum Hydrocarbons	< 0.40	mg/L		U	Hydrocarbon Window	NA			U

TEST METHOD: EPA 8021B

001 Site: MW-1 Date Sampled: 8/21/08 18:20 Analysis Date: 9/3/08 W EPG

<u>Parameter</u>	<u>Result</u>	<u>Unit</u>	<u>Nelac</u>	<u>Qual</u>	<u>Parameter</u>	<u>Result</u>	<u>Unit</u>	<u>Nelac</u>	<u>Qual</u>
Methyl-t-butyl ether (MTBE)	< 2.0	ug/L		N	Benzene	< 1.0	ug/L		N
Toluene	< 1.0	ug/L		N	Ethylbenzene	< 1.0	ug/L		N
Xylenes, Total	< 2.0	ug/L		N	1,3,5-Trimethylbenzene	< 1.0	ug/L		N
1,2,4-Trimethylbenzene	< 1.0	ug/L		N	Naphthalene	< 2.0	ug/L		N
Surr. 1 (Bromobenzene)	100	%		N	Unidentified Peaks	0			N

TEST METHOD: EPA 8015

002 Site: MW-2 Date Sampled: 8/21/08 17:45 Analysis Date: 8/27/08 W MDP

<u>Parameter</u>	<u>Result</u>	<u>Unit</u>	<u>Nelac</u>	<u>Qual</u>	<u>Parameter</u>	<u>Result</u>	<u>Unit</u>	<u>Nelac</u>	<u>Qual</u>
Extraction Mod. EPA 3510C	Completed			U	C7-C10 TPH	< 0.40	mg/L		U
C10-C26 TPH-DRO	< 0.40	mg/L		U	C26-C40 TPH	< 0.40	mg/L		U
Tot. Petroleum Hydrocarbons	< 0.40	mg/L		U	Hydrocarbon Window	NA			U

TEST METHOD: EPA 8021B

002 Site: MW-2 Date Sampled: 8/21/08 17:45 Analysis Date: 9/3/08 W EPG

<u>Parameter</u>	<u>Result</u>	<u>Unit</u>	<u>Nelac</u>	<u>Qual</u>	<u>Parameter</u>	<u>Result</u>	<u>Unit</u>	<u>Nelac</u>	<u>Qual</u>
Methyl-t-butyl ether (MTBE)	< 2.0	ug/L		N	Benzene	< 1.0	ug/L		N
Toluene	< 1.0	ug/L		N	Ethylbenzene	< 1.0	ug/L		N
Xylenes, Total	< 2.0	ug/L		N	1,3,5-Trimethylbenzene	< 1.0	ug/L		N
1,2,4-Trimethylbenzene	< 1.0	ug/L		N	Naphthalene	< 2.0	ug/L		N
Surr. 1 (Bromobenzene)	90	%		N	Unidentified Peaks	0			N

TEST METHOD: EPA 8015

003 Site: MW-3 Date Sampled: 8/21/08 18:00 Analysis Date: 8/27/08 W MDP

<u>Parameter</u>	<u>Result</u>	<u>Unit</u>	<u>Nelac</u>	<u>Qual</u>	<u>Parameter</u>	<u>Result</u>	<u>Unit</u>	<u>Nelac</u>	<u>Qual</u>
Extraction Mod. EPA 3510C	Completed			U	C7-C10 TPH	< 0.40	mg/L		U
C10-C26 TPH-DRO	< 0.40	mg/L		U	C26-C40 TPH	< 0.40	mg/L		U
Tot. Petroleum Hydrocarbons	< 0.40	mg/L		U	Hydrocarbon Window	NA			U

### Laboratory Report

CLIENT: Ross Environmental Associates  
 PROJECT: Clegg 28-050  
 REPORT DATE: 9/5/2008

WORK ORDER: **0808-12132**  
 DATE RECEIVED: 08/26/2008

#### TEST METHOD: EPA 8021B

003 Site: MW-3 Date Sampled: 8/21/08 18:00 Analysis Date: 9/3/08 W EPG

<u>Parameter</u>	<u>Result</u>	<u>Unit</u>	<u>Nelac</u>	<u>Qual</u>	<u>Parameter</u>	<u>Result</u>	<u>Unit</u>	<u>Nelac</u>	<u>Qual</u>
Methyl-t-butyl ether (MTBE)	< 2.0	ug/L	N		Benzene	< 1.0	ug/L	N	
Toluene	< 1.0	ug/L	N		Ethylbenzene	< 1.0	ug/L	N	
Xylenes, Total	< 2.0	ug/L	N		1,3,5-Trimethylbenzene	< 1.0	ug/L	N	
1,2,4-Trimethylbenzene	< 1.0	ug/L	N		Naphthalene	< 2.0	ug/L	N	
Surr. 1 (Bromobenzene)	94	%	N		Unidentified Peaks	0		N	

#### TEST METHOD: EPA 8015

004 Site: MW-4 Date Sampled: 8/21/08 18:10 Analysis Date: 8/27/08 W MDP

<u>Parameter</u>	<u>Result</u>	<u>Unit</u>	<u>Nelac</u>	<u>Qual</u>	<u>Parameter</u>	<u>Result</u>	<u>Unit</u>	<u>Nelac</u>	<u>Qual</u>
Extraction Mod. EPA 3510C	Completed		U		C7-C10 TPH	< 0.40	mg/L	U	
C10-C26 TPH-DRO	1.0	mg/L	U		C26-C40 TPH	< 0.40	mg/L	U	
Tot. Petroleum Hydrocarbons	1.0	mg/L	U		Hydrocarbon Window	C10 - C22		U	

#### TEST METHOD: EPA 8021B

004 Site: MW-4 Date Sampled: 8/21/08 18:10 Analysis Date: 9/3/08 W EPG

<u>Parameter</u>	<u>Result</u>	<u>Unit</u>	<u>Nelac</u>	<u>Qual</u>	<u>Parameter</u>	<u>Result</u>	<u>Unit</u>	<u>Nelac</u>	<u>Qual</u>
Methyl-t-butyl ether (MTBE)	< 2.0	ug/L	N		Benzene	< 1.0	ug/L	N	
Toluene	< 1.0	ug/L	N		Ethylbenzene	2.3	ug/L	N	
Xylenes, Total	14.8	ug/L	N		1,3,5-Trimethylbenzene	1.7	ug/L	N	
1,2,4-Trimethylbenzene	2.9	ug/L	N		Naphthalene	< 2.0	ug/L	N	
Surr. 1 (Bromobenzene)	97	%	N		Unidentified Peaks	> 10		N	

#### TEST METHOD: EPA 8021B

005 Site: Dup Date Sampled: 8/21/08 18:20 Analysis Date: 9/3/08 W EPG

<u>Parameter</u>	<u>Result</u>	<u>Unit</u>	<u>Nelac</u>	<u>Qual</u>	<u>Parameter</u>	<u>Result</u>	<u>Unit</u>	<u>Nelac</u>	<u>Qual</u>
Methyl-t-butyl ether (MTBE)	< 2.0	ug/L	N		Benzene	< 1.0	ug/L	N	
Toluene	< 1.0	ug/L	N		Ethylbenzene	< 1.0	ug/L	N	
Xylenes, Total	< 2.0	ug/L	N		1,3,5-Trimethylbenzene	< 1.0	ug/L	N	
1,2,4-Trimethylbenzene	< 1.0	ug/L	N		Naphthalene	< 2.0	ug/L	N	
Surr. 1 (Bromobenzene)	99	%	N		Unidentified Peaks	0		N	

### Laboratory Report

CLIENT: Ross Environmental Associates  
 PROJECT: Clegg 28-050  
 REPORT DATE: 9/5/2008

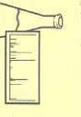
WORK ORDER: **0808-12132**  
 DATE RECEIVED: 08/26/2008

TEST METHOD: EPA 524.2

006	Site: Supply	Date Sampled: 8/21/08 18:45			Analysis Date: 8/29/08			W DAW	
<u>Parameter</u>	<u>Result</u>	<u>Unit</u>	<u>Nelac</u>	<u>Qual</u>	<u>Parameter</u>	<u>Result</u>	<u>Unit</u>	<u>Nelac</u>	<u>Qual</u>
Dichlorodifluoromethane	< 0.5	ug/L	A		Chloromethane	< 0.5	ug/L	A	
Vinyl chloride	< 0.5	ug/L	A		Bromomethane	< 0.5	ug/L	A	
Chloroethane	< 0.5	ug/L	A		Trichlorofluoromethane	< 0.5	ug/L	A	
1,1-Dichloroethene	< 0.5	ug/L	A		Methylene chloride	< 1.0	ug/L	A	
Methyl-t-butyl ether (MTBE)	< 0.5	ug/L	A		trans-1,2-Dichloroethene	< 0.5	ug/L	A	
1,1-Dichloroethane	< 0.5	ug/L	A		2,2-Dichloropropane	< 0.5	ug/L	A	
cis-1,2-Dichloroethene	< 0.5	ug/L	A		Bromochloromethane	< 0.5	ug/L	A	
Chloroform	< 0.5	ug/L	A		1,1,1-Trichloroethane	< 0.5	ug/L	A	
Carbon tetrachloride	< 0.5	ug/L	A		1,1-Dichloropropene	< 0.5	ug/L	A	
Benzene	< 0.5	ug/L	A		1,2-Dichloroethane	< 0.5	ug/L	A	
Trichloroethene	< 0.5	ug/L	A		1,2-Dichloropropane	< 0.5	ug/L	A	
Dibromomethane	< 0.5	ug/L	A		Bromodichloromethane	< 0.5	ug/L	A	
cis-1,3-Dichloropropene	< 0.5	ug/L	A		Toluene	< 0.5	ug/L	A	
trans-1,3-Dichloropropene	< 0.5	ug/L	A		1,1,2-Trichloroethane	< 0.5	ug/L	A	
Tetrachloroethene	< 0.5	ug/L	A		1,3-Dichloropropane	< 0.5	ug/L	A	
Dibromochloromethane	< 0.5	ug/L	A		Chlorobenzene	< 0.5	ug/L	A	
Ethylbenzene	< 0.5	ug/L	A		1,1,1,2-Tetrachloroethane	< 0.5	ug/L	A	
Xylenes, Total	< 1.0	ug/L	A		Styrene	< 0.5	ug/L	A	
Bromoform	< 0.5	ug/L	A		Isopropylbenzene	< 0.5	ug/L	A	
1,1,2,2-Tetrachloroethane	< 0.5	ug/L	A		Bromobenzene	< 0.5	ug/L	A	
n-Propylbenzene	< 0.5	ug/L	A		1,2,3-Trichloropropane	< 0.5	ug/L	A	
2-Chlorotoluene	< 0.5	ug/L	A		1,3,5-Trimethylbenzene	< 0.5	ug/L	A	
4-Chlorotoluene	< 0.5	ug/L	A		t-Butylbenzene	< 0.5	ug/L	A	
1,2,4-Trimethylbenzene	< 0.5	ug/L	A		s-Butylbenzene	< 0.5	ug/L	A	
4-Isopropyltoluene	< 0.5	ug/L	A		1,3-Dichlorobenzene	< 0.5	ug/L	A	
1,4-Dichlorobenzene	< 0.5	ug/L	A		n-Butylbenzene	< 0.5	ug/L	A	
1,2-Dichlorobenzene	< 0.5	ug/L	A		1,2,4-Trichlorobenzene	< 0.5	ug/L	A	
Hexachlorobutadiene	< 0.5	ug/L	A		Naphthalene	< 0.5	ug/L	U	
1,2,3-Trichlorobenzene	< 0.5	ug/L	A		Surr. 1 (4-Bromofluorobenzene)	97	%	A	
Surr. 2 (1,2-Dichlorobenzene d4)	91	%	A						

TEST METHOD: EPA 8021B

007	Site: TB	Date Sampled: 8/21/08 17:30			Analysis Date: 9/3/08			W EPG	
<u>Parameter</u>	<u>Result</u>	<u>Unit</u>	<u>Nelac</u>	<u>Qual</u>	<u>Parameter</u>	<u>Result</u>	<u>Unit</u>	<u>Nelac</u>	<u>Qual</u>
Methyl-t-butyl ether (MTBE)	< 2.0	ug/L	N		Benzene	< 1.0	ug/L	N	
Toluene	< 1.0	ug/L	N		Ethylbenzene	< 1.0	ug/L	N	
Xylenes, Total	< 2.0	ug/L	N		1,3,5-Trimethylbenzene	< 1.0	ug/L	N	
1,2,4-Trimethylbenzene	< 1.0	ug/L	N		Naphthalene	< 2.0	ug/L	N	
Surr. 1 (Bromobenzene)	96	%	N		Unidentified Peaks	0		N	



**ENDYNE, INC.**  
160 James Brown Drive  
Williston, Vermont 05495  
(802) 879-4333

**CHAIN-OF-CUSTODY-RECORD**

35962

Special Reporting Instructions:

Project Name: <b>Clegg</b>	Reporting Address: <b>REA</b>	Billing Address: <b>REA</b>
Endyne Order ID: <b>28-050</b>	Company: <b>REA</b>	Sampler Name: <b>James S (owner)</b>
(Lab Use Only)	Contact Name/Phone #: <b>Tom George (802) 253-4280</b>	Phone #:
	-0	
	-1	
	-S	

Ref # (Lab Use Only)	Sample Identification	Matrix	G R A B	G O M P	Date/Time	Sample Containers		Field Results/Remarks	Analysis Required	Sample Preservation	Rush
						No.	Type/Size				
	mw-1	H <sub>2</sub> O	X		8/21/08	2/2	40ml	100%	19, 23	Hd/Hd	
	mw-2				17:45						
	mw-3				18:00						
	mw-4				18:10						
	Deep Supply				18:45						
	Supply				17:30						

Relinquished by: **Tom George** Date/Time: **8/22/08 10:30**

Received by: **REA** Date/Time: **8/26/08 11:04**

New York State Project: Yes  No  Requested Analyses

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30
1	pH					TKN					Total Solids					Sulfate						1664 TPH/FOG				8270 PAH				
2	Chloride					Total P					TSS					Coliform (Specify)						8015 GRO				PP13 Metals				
3	Ammonia N					Total Diss. P					TDS					COD						8015 DRO				RCRA8 Metals				
4	Nitrite N					BOD					Turbidity					8021B						8260/8260B								
5	Nitrate N					Alkalinity					Conductivity					8010/8020						8270 B/N or Acid								
31	Metals (As, Is, Total, Diss.), Ag, Al, As, B, Ba, Be, Ca, Cd, Co, Cr, Cu, Fe, Hg, K, Mg, Mn, Mo, Na, Ni, Pb, Se, Ti, V, Zn																													
32	TCLP (Specify: volatiles, semi-volatiles, metals, pesticides, herbicides)																													
34	Other																													

Delivery: **pm** Temp: **pm** Comment: **LAB USE ONLY**