**State of Vermont**

Department of Fish and Wildlife
Department of Forests, Parks and Recreation
Department of Environmental Conservation
State Geologist
Natural Resources Conservation Council

**AGENCY OF NATURAL RESOURCES**
**103 SOUTH MAIN STREET**
**Waterbury, Vermont 05676**

**Department of Environmental Conservation**

May 22, 1989

Mr. Louis Gosselin
C/o Blue Seal Feeds, Inc.
Providence Road
Richford, Vermont 05476

RE: Petroleum Contamination, Richford Blue Seal Feeds Location

Dear Mr. Gosselin:

The Department has reviewed the reported titled, "Preliminary Investigation of Soil and Groundwater for Evidence of Oil and Hazardous Materials" prepared by Rizzo Associates, Inc. Although there were no hazardous materials in concentrations that would alert our hazardous sites section, the petroleum sites section is concerned with the concentrations of petroleum constituents detected near monitoring well RIZ-4. Following our program's protocol, site remediation and monitoring is governed by the impact the contamination has on adjacent receptors (i.e. drinking water supplies, residences or surface waters). This site does not appear to show any impact to any associated receptors, and therefore is classified as a low priority site, which means the Department requires a monitoring program to assure the contaminents do not migrate off site and impact downgradient receptors. Therefore, to satisfy this requirement, we would like to see Blue Seal Feeds collect and analyze groundwater samples on a quarterly basis for one year from monitoring wells RIZ 1, RIZ 2, RIZ 3, RIZ 4, RIZ 5 and RIZ 6. The analysis should be an EPA method 602 and 418.1 or equivalent. After six months monitoring, the Department will evaluate the site to determine the need to expand or reduce the monitoring.

If you have any questions, please feel free to call or write.

Sincerely,

Chuck Schwer

Chuck Schwer, Coordinator
LUST Program/Hydrogeologist

CS:njl106

# Preliminary Investigation of Soil and Groundwater for Evidence of Oil and Hazardous Materials

Intersection of Elevator Street
and Province Road
Richford, Vermont

April 4, 1989

SUBMITTED TO: VERMONT AEC

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## APPENDICES

## 1.0 PURPOSE AND SCOPE

The purpose of the subsurface investigation was to investigate the Site for evidence of significant contamination of the soil or groundwater with oil or hazardous materials (See Figure 1). Sources of contamination investigated include potential on and off-site releases which may have impacted the Site. The findings in this report are based on field-screening of soil samples collected during drilling, laboratory analyses of soil and groundwater samples from the borings and monitoring wells, and laboratory analysis of effluent from the drain outfall located on the Site.

Monitoring wells were installed on-site to assess the possibility of a release of oil or hazardous materials from the underground storage tanks, the engine maintenance facilities, or from the gasoline service station located upgradient from the Site. An additional well was installed to investigate the nature of the fill material used to raise the grade of the northern portion of the Site.

## 2.0 SUBSURFACE INVESTIGATION

### 2.1 Soil Borings and Monitoring Well Installations

Seven soil borings, five of which were completed as monitoring wells, were advanced on the Site on January 23, 24 and 25, 1989 by Green Mountain Boring Company, Inc. of Barre, Vermont. The drilling and well installations were completed under the supervision of Rizzo Associates personnel. The weather was clear on all three days with temperatures in the 40°s F on the 23rd, the 20°s F on the 24th, and 0 to 10° with strong winds on the 25th. Borings were advanced using steam-cleaned, hollow stem augers following the standard procedure described in Appendix B. Boring logs and well completion diagrams are included in Appendix C. A Site locus map is shown in Figure 1 and a Site plan with boring locations is included in the map pocket.

Well RIZ-1 was installed in the parking area east of the truck loading shed in an area of artificial fill material to determine the nature of the fill material. Boring RIZ-2 was advanced in the southern corner of the Site, downgradient from the Gulf gasoline station east of the Site. Monitoring well RIZ-3 was installed downgradient from shed #2 which is used as a garage and for the storage of engine maintenance products. Wells RIZ-4, RIZ-5 and RIZ-6 were installed downgradient from a 15,000-gallon No. 6 heating oil tank, four-4,000-gallon diesel tanks, and a gasoline tank area respectively. A test boring (RIZ-7) was advanced at the east wall of the maintenance building through a pit which formerly contained an underground waste oil tank.

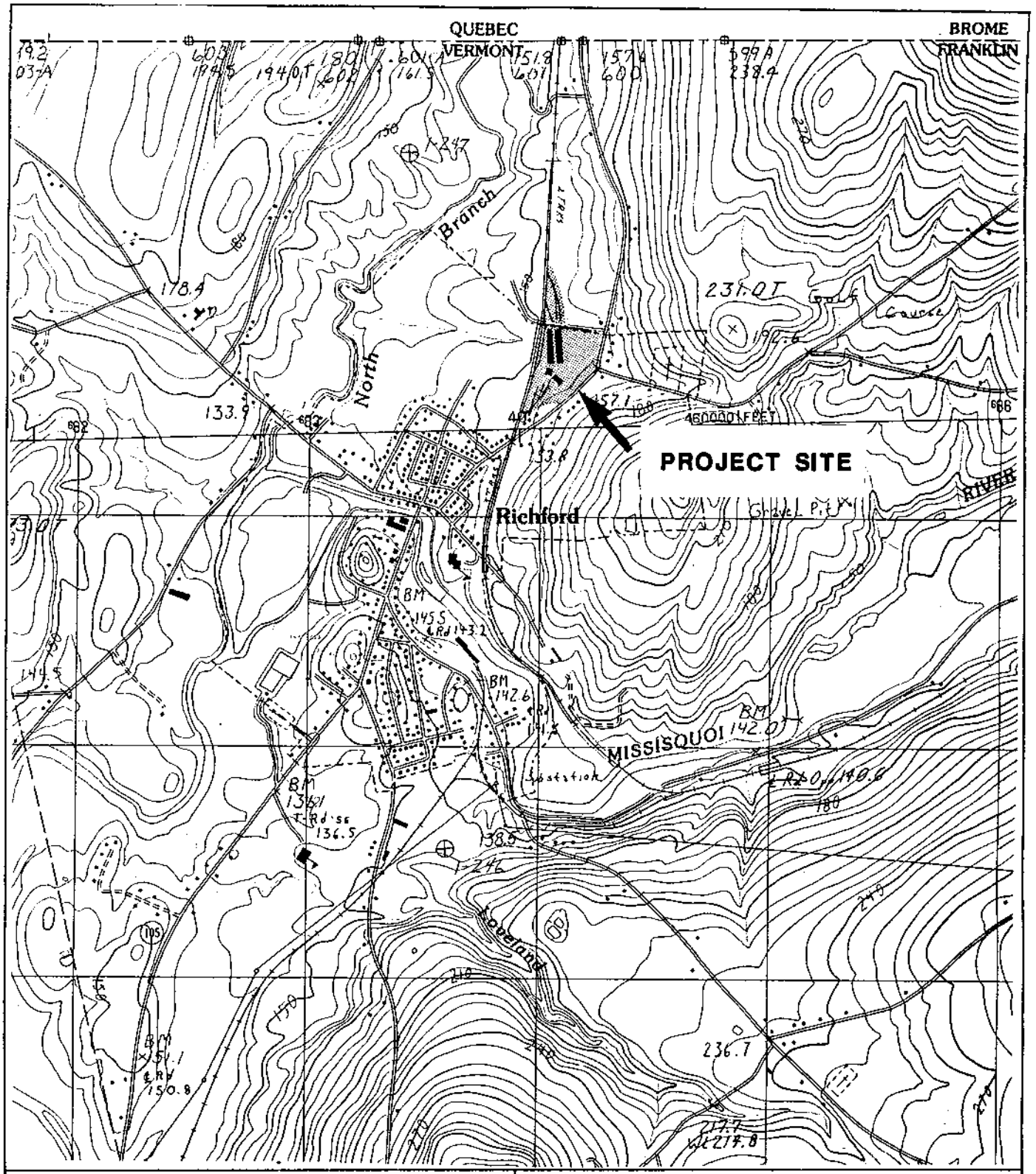



Figure 1:

Locus Map

Soil samples were collected from the borings and used to characterize the subsurface materials at the Site. Sand and gravel fill material were encountered at the surface in well borings RIZ-1, RIZ-3, RIZ-4, RIZ-6 and test boring RIZ-7. Fill extended to a depth of between 6.5 and 10 feet in RIZ-1; 5 feet 3 inches in RIZ-3, and 2 and 5 feet in RIZ-4 and RIZ-6. Boring RIZ-7 encountered fill and then natural material at approximately 5 feet.

Beneath the surficial fill deposits, if present, all of the borings encountered fine alluvial deposits. In each of the borings, except for RIZ-6, the alluvial material consisted of layered deposits of yellow or brown silt, clay and fine sand. RIZ-6 penetrated a brown clay to a depth of 20.5 feet. Borings RIZ-2, RIZ-3, RIZ-5 and RIZ-6 encountered coarse sand at depths of 21.5 to 24 feet, 20.5 feet, 16.5 to 20 feet and 20.5 feet, respectively. RIZ-1, RIZ-4 and RIZ-7 were terminated in the layered silt, clay and fine sand.

The soil samples were placed in jars and the headspace over each sample was field-screened using an HNu PI 101 photoionization detector (HNu) following the standard procedure described in Appendix B. The HNu was equipped with a 10.2 eV lamp and was calibrated to an isobutylene standard prior to screening. The HNu responds to the presence of volatile organic compounds (VOCs) with ionization potentials less than 10.2 eV. Concentrations are displayed in analog form in parts per million (ppm). Most priority pollutant VOCs are ionized at this potential and will generate a response on the HNu, however, the sensitivity of the instrument to VOCs with ionization potentials different from the calibration gas will vary. Positive HNu responses were observed in soil samples from RIZ-4, RIZ-5, RIZ-6 and RIZ-7. These responses are listed in Table 1.

Monitoring wells were installed in borings RIZ-1, RIZ-3, RIZ-4, RIZ-5 and RIZ-6. Well boring RIZ-2 was terminated at refusal on bedrock before groundwater was encountered.

## 2.2 Groundwater Flow Direction

The positions and elevations of the monitoring wells were surveyed on January 26, 1989 by Rizzo Associates personnel. The survey was conducted to determine an approximate potentiometric surface map and groundwater flow direction at the Site. An arbitrary elevation datum of 100 feet was established at the concrete sill at the southeast corner of the main office and well casing elevations were surveyed relative to this datum. The depth to groundwater from the top of the casings was measured by Rizzo Associates personnel on the date of the survey. The groundwater elevation was determined by subtracting the depth to groundwater from the casing elevation. The casing elevation, depth to groundwater and groundwater elevation data are listed in Table 2.

Table 1

POSITIVE HNu FIELD SCREENING RESULTS
(parts per million)

| Depth (feet) | Boring Number | | | |
|---|---|---|---|---|
| | RIZ-4 | RIZ-5 | RIZ-6 | RIZ-7 |
| 0 - 12" | 28 | 50 | 6.0 | 8.0 |
| 5 - 6.5 | 38 | 143.0 | 7.0 | 10.0 |
| 10 - 11.5 | 50 | 1.7 | 70.0 | NSR |
| 15 - 10.5 | 86 | NSR | NSR | ** |
| 20 - 21.5 | 74 | NSR | 2.0 | |
| 25 - 20.5 | NSR | NSR | NSR | |
| 30 - 31.5 | ** | ** | ** | |

** Boring terminated
NSR - No significant response = readings less than 1 ppm

Table 2

GROUNDWATER SURVEY DATA

| Well I.D. | Elevation * in feet Well Casting Elevation (feet) | Depth to Water Below Ground (feet) | Groundwater Elevation* (feet) |
|---|---|---|---|
| RIZ-1 | 96.18 | 20.49 | 75.69 |
| RIZ-2 | 100.74 | >31.50 | <69.0 |
| RIZ-3 | 103.38 | 30.14 | 73.24 |
| RIZ-4 | 100.44 | 25.38 | 75.06 |
| RIZ-5 | 107.77 | 25.89 | 81.88 |
| RIZ-6 | 100.53 | 21.96 | 78.57 |

* Measured relative to an arbitrary benchmark of 100.00 feet at the concrete sill at the southeast corner of main office.

The potentiometric surface indicates that groundwater flow on the northern half of the Site is generally to the west as the local topography would indicate. However, on the southern portion of the Site, groundwater flow is generally to the south-southwest.

## 2.3 Sample Collection and Analysis

### 2.3.1 Soil Sampling

Soil samples were collected from RIZ-4 and RIZ-7 on January 24 and 25, respectively. The samples were retained in appropriate glassware and stored in a cooler for delivery to Alpha Analytical Laboratories in Westborough, Massachusetts on January 27, 1989. The RIZ-4 soil sample was collected from the 20- to 21-foot depth interval. The sample, which was comprised of black oil-stained silt, was placed in a soil jar and submitted for total petroleum hydrocarbon (TPHs) analysis. The RIZ-7 sample was collected from the cutting head of the augers from a depth of 10 feet. This sample was submitted for TPH and Hazardous Substance List (HSL) VOC analysis by EPA Method 8240.

Laboratory analysis of soil samples revealed 120,000 milligrams per kilogram (mg/kg) of TPHs in the sample from RIZ-4 and 200 mg/kg TPHs in the sample from RIZ-7. No VOCs were detected in RIZ-7. Complete Laboratory Certificates of Analysis are included in Appendix D.

### 2.3.2 Groundwater Sampling and Analysis

Each of the monitoring wells were sampled on January 26, 1989 by Rizzo Associates personnel. The weather was overcast with rain, snow and temperatures were in the 30°s F. The wells were sampled according to the standard procedure presented in Appendix B. Sheens, oil droplets and oil odors were observed in the groundwater from monitoring well RIZ-4.

The samples were placed in appropriate glassware and transported to Alpha Analytical Laboratories in Westborough, Massachusetts, on January 27, 1989. Each of the samples were analyzed for TPH and VOCs, except for the sample from well RIZ-1. This sample, which was obtained from the monitoring well located in the filled area on the northern portion of the Site, was analyzed for 13 soluble priority pollutant 13 metals and hexavalent chromium. The groundwater samples from each well were also measured in the field for specific conductance and pH. The results, presented in Table 3, are within the range of normal values for New England groundwater.

Table 3

SPECIFIC CONDUCTANCE AND pH VALUES FOR WATER SAMPLES

| Well | Specific Conductance (umhos) | pH |
|---|---|---|
| RIZ-1 | 371 | 7.3 |
| RIZ-3 | 900 | 7.8 |
| RIZ-4 | 170 | -- |
| RIZ-5 | 219 | 8.0 |
| RIZ-6 | 650 | 8.1 |

Positive laboratory analysis results are listed in Table 4. Concentrations of benzene (16 ug/l) were detected at levels slightly above Environmental Protection Agency (EPA) Primary Drinking Water Standards in monitoring well RIZ-6. Toluene in RIZ-3 and RIZ-5, ethylbenzene and xylenes in RIZ-4, and concentrations of chloroform in wells RIZ-3, RIZ-4, RIZ-5 and RIZ-6 were each below their respective Federal drinking water standards. Benzene, toluene, ethylbenzene and xylenes are all solvents with various manufacturing uses and together are major constituents of gasoline. Chloroform is used as a refrigerant, a solvent, a fumigant and in plastics manufacturing, analytical chemistry, and insecticides. Groundwater from well RIZ-3 and RIZ-4 also contained 3.8 ug/l and 2,400 ug/l (3,100 ug/l duplicate analysis) of TPHs respectively. Zinc was detected in water from well RIZ-1 at 0.085 mg/l which is well below the EPA Secondary Drinking Water Standard of 5 mg/l established for that metal. Complete Laboratory Certificates of Analysis are included in Appendix D.

### 2.3.3 Drain Discharge Sampling

On January 26, 1989, the drain which receives discharge from the truck maintenance area floor drain and storm runoff from the parking lot, was sampled by Rizzo Associates personnel. The sample was collected from the drain outfall located west of the Site building at the location shown on the Site plan. At the time of sampling, the outfall was discharging an estimated 3 to 5 gallons per minute. The effluent temperature was 55° to 65° F, exhibited a strong molasses and grain odor, and had no visible sheen.

Table 4

POSITIVE LABORATORY ANALYSIS RESULTS FOR GROUNDWATER SAMPLES

| (Sample I.D.)<br>(Laboratory I.D.)<br>(Sample Location) | GRV-GW-RZ1-103<br>890208.3<br>RIZ-1* | GRV-GW-RZ3-104<br>890208.4<br>RIZ-3 | GRV-GW-RZ4-108<br>890208.8<br>RIZ-4 | GRV-GW-RZ4D-109<br>890208.9<br>RIZ-4<br>(duplicate) | GRV-GW-RZ5-105<br>890208.5<br>RIZ-5 | GRV-GW-RZ6-106<br>890208.6<br>RIZ-6 | GRV-GW-RZ6D-107<br>890208.7<br>RIZ-6<br>(duplicate) | Detection Limit | Standard Guideline (source) |
|---|---|---|---|---|---|---|---|---|---|
| Constituent | | | | | | | | | |
| HSL Volatile Organic Compounds (ug/l) | | | | | | | | | |
| chloroform | NA | 7.0 | 2.7 | NA | 6.6 | 4.8 | 5.6 | 1.6 | 100(1) |
| toluene | NA | 17.0 | ND | NA | 15.0 | ND | ND | 6.0 | 2,000(2) |
| benzene | NA | ND | ND | NA | ND | 16.0 | 18.0 | 6.0 | 5(3) |
| ethylbenzene | NA | ND | 11.0 | NA | ND | ND | ND | 7.2 | 680(2) |
| xylenes | NA | ND | 100.0 | NA | ND | ND | ND | 10.0 | 440(2) |
| Total Petroleum Hydrocarbons (mg/L) | NA | 3.8 | 2,400 | 3,100 | ND | ND | ND | 0.5 | -(4) |
| 13 Priority Pollutant Metals (mg/L) | | | | | | | | | |
| Zinc | 0.085 | NA | NA | NA | NA | NA | NA | 0.005 | 5(5) |

(1) U.S. EPA Promulgated Maximum Contaminant Level for trihalomethanes in drinking water
(2) U.S. EPA Recommended Maximum Contaminant Level for Drinking Water
(3) U.S. EPA Maximum Contaminant Level for Drinking Water
(4) No guideline established
(5) EPA Secondary Drinking Water Standard
NA = Not analyzed
ND = None detected
* = Not field filtered

The sample was submitted to Alpha Analytical Laboratories on January 27, 1989 for TPH and VOC analyses; 7.9 mg/l of petroleum hydrocarbons and 3.7 ug/l of chloroform were detected in the samples.

## 3.0 SUMMARY AND CONCLUSIONS

On January 23 through 26, 1989 a subsurface investigation was conducted at the Blue Seal Feeds facility located at the intersection of Elevator Street and Province Road in Richford, Vermont. The purpose of the investigation was to look for evidence of soil and groundwater contamination on the Site. Monitoring wells were installed downgradient from three underground storage tank areas, a garage shed, and into an area of fill material on the northern portion of the Site. A test boring (RIZ-7) was advanced at the location of a former underground waste oil tank.

Soil samples were collected for laboratory analyses from well boring RIZ-4 and test boring RIZ-7. Soils from RIZ-4 were collected from an oil-stained sample obtained from a depth of 20 feet. This sample was submitted for TPH analyses. The sample contained 120,000 mg/kg of TPHs. Boring RIZ-7 was advanced through the former waste oil tank location. The soil sample collected from RIZ-7, at a depth of 10 feet, contained 200 mg/kg of TPHs.

Groundwater samples were collected from the monitoring wells on January 26, 1989. The sample from RIZ-1, located in the fill material, was analyzed for 13 priority pollutant metals and hexavalent chromium. The sample contained 0.085 mg/l of zinc which is below EPA's Secondary Drinking Water Standard for zinc.

Samples from monitoring wells RIZ-3, RIZ-4, RIZ-5 and RIZ-6 were analyzed for TPHs and VOCs. Oil sheens, oil droplets and oil odors were observed in groundwater from well RIZ-4 during sampling. Laboratory analysis of a groundwater sample from the well revealed 2,400 mg/l (3,100 mg/l, duplicate) of TPHs. Groundwater from RIZ-3 contained 3.8 mg/l of TPHs. No TPHs were detected in RIZ-5 or RIZ-6.

A total of five VOCs were detected at low concentrations in monitoring wells RIZ-3, RIZ-4, RIZ-5 and RIZ-6. Chloroform was detected at levels from 2.7 to 7.0 ug/l in each of the wells. These levels are well below the EPA Primary Drinking Water Standard of 100 ug/l for total trihalomethane compounds. Benzene was detected in well RIZ-6 at 16 ug/l, which is slightly above the Federal standard of 5 ug/l. Toluene was detected in monitoring wells RIZ-3 and RIZ-5 at 17 and 15 ug/l, respectively. RIZ-4 contained 11 ug/l of ethylbenzene and 100 ug/l of xylenes. These levels are well below Federal standards for each of these constituents.

The drain outfall sampled on January 26, 1989, contained 3.7 ug/l of chloroform and 7.9 mg/l of TPHs. Conversations with Pam Quinn of the Vermont Department of Environmental Conservation, Permits, Compliance and Protection Division, indicated that allowable discharge concentrations for TPHs were not specifically defined but were generally covered under Chapter 3, Section 1 of Vermont Water Quality Standards. This standard states that discharges of oil to surface water bodies would not be allowed "in such concentration or combinations which would have an undue adverse affect on any beneficial value or uses." This standard was not being violated at the time of sampling.

Oil-stained soils were observed in soil samples obtained from the 15 and 20-foot sampling intervals in the vicinity of the No. 6 heating oil tank. This contamination appears to have extended down to the water table which was encountered at 25 feet at that location. Droplets of oil were observed in the groundwater sample obtained from the monitoring well (RIZ-4) at that location, and laboratory analysis results of the sample revealed 2,400 to 3,100 mg/l of TPHs.

It is our opinion that additional study is needed to define the extent of the contamination in the soil and groundwater. Following that, remedial activities should be undertaken to mitigate the soil and groundwater contamination, as required.

KBJ/lmt/3665H

**APPENDIX A**

## LIMITATIONS

1. The observations described in this report were made under the conditions stated therein. The conclusions presented in the report were based solely upon the services described therein, and not on scientific tasks or procedures beyond the scope of described services or the time and budgetary constraints imposed by Client. The work described in this report was carried out in accordance with the Terms and Conditions in our contract.

2. In preparing this report, Rizzo Associates has relied on certain information provided by State and local officials and other parties referenced therein, and on information contained in the files of State and/or local agencies available to Rizzo Associates at the time of the site assessment. Although there may have been some degree of overlap in the information provided by these various sources, Rizzo Associates did not attempt to independently verify the accuracy or completeness of all information reviewed or received during the course of this site assessment.

3. Observations were made of the Site and of structures on the Site as indicated within the report. Where access to portions of the Site or to structures on the Site was unavailable or limited, Rizzo Associates renders no opinion as to the presence of hazardous materials or oil, or to the presence of indirect evidence relating to hazardous material or oil, in that portion of the Site or structure. In addition, Rizzo Associates renders no opinion as to the presence of hazardous material or oil, or the presence of indirect evidence relating to hazardous material or oil, where direct observation of the interior walls, floor, or ceiling of a structure on a Site was obstructed by objects or coverings on or over these surfaces.

4. Rizzo Associates did not perform testing or analyses to determine the presence or concentration of asbestos at the Site or in the environment at the Site.

5. The purpose of this report is to assess the physical characteristics of the subject Site with respect to the presence in the environment of hazardous material or oil. No specific attempt was made to check on the compliance of present or past owners or operators of the Site with Federal, State, or local laws and regulations, environmental or otherwise.

6. The conclusions and recommendations contained in this report are based in part, where noted, upon the data obtained from a limited number of soil samples obtained from widely-spaced subsurface explorations. The nature and extent of variations between these explorations may not become evident until further exploration. If variations or other latent conditions then appear evident, it will be necessary to reevaluate the conclusions and recommendations of this report.

7. Any water level readings made in test pits, borings, and/or observation wells were made at the times and under the conditions stated on the report. However, it must be noted that fluctuations in the level of groundwater may occur due to variations in rainfall and other factors different from those prevailing at the time measurements were made.

8. Except as noted within the text of the report, no quantitative laboratory testing was performed as part of the site assessment. Where such analyses have been conducted by an outside laboratory, Rizzo Associates has relied upon the data provided, and has not conducted an independent evaluation of the reliability of these data.

9. The conclusions and recommendations contained in this report are based in part, where noted, upon various types of chemical data and are contingent upon their validity. These data have been reviewed and interpretations made in the report. As indicated within the report, some of these data may be preliminary "screening" level data, and should be confirmed with quantitative analyses if more specific information is necessary. Moreover, it should be noted that variations in the types and concentrations of contaminants and variations in their flow paths may occur due to seasonal water table fluctuations, past disposal practices, the passage of time, and other factors. Should additional chemical data become available in the future, these data should be reviewed, and the conclusions and recommendations presented herein modified accordingly.

10. Chemical analyses have been performed for specific constituents during the course of this site assessment, as described in the text. However, it should be noted that additional chemical constituents not searched for during the current study may be present in soil and/or groundwater at the Site.

**APPENDIX B**
STANDARD OPERATING
PROCEDURES

# STANDARD OPERATING PROTOCOL FOR CLEANING SAMPLING EQUIPMENT

1. Cleaning of the sampling equipment is performed immediately prior to sample collection.

2. Any portion of the sampling device or equipment that has contact with water or soil is cleaned, or disposed of and replaced, prior to re-use.

3. The following four-step procedure is followed for cleaning all sampling devices and related equipment:

   a. The item is washed with soap and water;

   b. The item is rinsed thoroughly with clean water;

   c. The item is rinsed with reagent methanol; and

   d. The item is given a final rinse with distilled water.

4. Steam cleaning may be substituted for Steps 3a and 3b when available.

STANDARD OPERATING PROTOCOL FOR
COMPLETING SOIL BORINGS AND MONITORING WELL BORINGS IN
UNCONSOLIDATED SURFICIAL DEPOSITS.

1. All drilling is inspected continuously by a staff Geologist or Inspector. The Geologist or Inspector is familiar with the particular drilling program and is responsible for ensuring that established procedures are followed. The Geologist or Inspector has the authority to modify the program and/or procedures when warranted by unanticipated field conditions.

2. The Geologist or Inspector is responsible for maintaining field notes and for keeping a well log independent of the driller.

3. All drilling equipment is steam cleaned prior to use at each boring or well location. Steam cleaning is performed on the augers and/or casing, drilling rods, samplers, auger forks, lifting hooks and other equipment needed for establishing the well. The working end of the drill rig is steam cleaned, and the rig is generally inspected by the Geologist or Inspector for evidence of leaks (i.e., gasoline or diesel fuel and hydraulic fluid). Finally, well construction materials including casing, screens, protective risers and/or roadway boxes are also steam cleaned prior to use.

4. Soil samples are collected at two-foot intervals unless otherwise specified, and/or at changes in strata, utilizing a clean split-spoon sampler. These soil samples are used for characterizing the physical nature of the subsurface sediments and may be collected for laboratory analyses. Similarly, spoon samples may be screened in the field for contamination utilizing appropriate field analytical devices. All such sample collection or field screening is conducted per appropriate standard operating protocols.

5. Sediments collected from the sampler or brought to the surface by the drilling process are left on-site, unless there are specific instructions to the contrary. Following completion of a boring into which no well is to be established, this material is utilized to back-fill the boring. The back-filled boring is compacted. Should compaction result in a depression, clean fill will be used to bring the land to grade. The material from the boring is not utilized for back-fill if a groundwater quality monitoring well is to be established in the boring.

SOIL AND MONITORING WELL BORINGS
(continued)

6. When installing a groundwater monitoring well in unconsolidated sedimentary deposits, the well boring is advanced a minimum of ten feet into the water table, or to refusal, unless otherwise specified. If groundwater is encountered at or near refusal, the hole may be advanced several feet into the rock utilizing a roller bit or diamond corer. By doing so, the well screen can be set to intercept groundwater flow at the refusal/overburden interface.

7. When installing a groundwater monitoring well, the well screen is set at a depth whereby it intercepts the surface of the water table, unless otherwise specified. The screen is set to extend above the highest anticipated groundwater levels, to a maximum of within three feet of the land surface. The annular space between the wall of the bore hole and the screen is then packed with clean silica sand to a level two feet above the screen (to allow for settling). A minimum one-foot bentonite seal is followed by clean backfill grout to within three feet of the surface. The final three feet are filled with a cement grout into which is set a protective riser with locking cap or a roadway box.

## STANDARD OPERATING PROTOCOL FOR FIELD SCREENING SOIL SAMPLES USING PHOTOIONIZATION AND FLAME IONIZATION DETECTORS

1. Prior to use, the detector is charged, calibrated and warmed up. Field calibrations and sample screening are performed under the same conditions, unless otherwise indicated.

2. The sample is collected in a clean 4- to 16-oz. glass jar. The sample container is approximately 3/4 filled, leaving a headspace volume of 25 percent in the sample container. Care is taken to collect representative soil samples. Soil that has been excavated, aerated or exposed to the atmosphere is likely to have a decreased volatile organic compound concentration. Exposed surface soils are therefore avoided unless otherwise indicated by the sampling plan.

3. Upon sample collection, the jar is immediately covered with fresh aluminum foil and the cap replaced.

4. The sample is shaken for approximately one minute and allowed to reach equilibrium.

5. The cap is removed and the aluminum cover punctured with the probe of the detector. Care is taken to prevent the probe from coming in contact with the sample.

6. The organic vapor concentration is read in accordance with the manufacturer's operating procedures. The meter usually peaks quickly and then steadily decreases as fresh air is drawn into the sample headspace. The maximum stable reading observed is recorded in the field logbook. The time, weather conditions, sample location and depth, and any other relevant field observations are also recorded in the field logbook.

## STANDARD OPERATING PROTOCOL FOR COLLECTING SURFACE WATER SAMPLES

1. Prior to initiating any work, the Health and Safety Plan developed for the specific site activities is reviewed by the Field Technician and the Project Manager. The indicated measures of the Plan are enacted prior to initiation of the sampling activities. Any concerns not addressed in the Health and Safety Plan document are to be brought immediately to the attention of the Health and Safety Officer.

2. Sterile sample containers are obtained from the laboratory at which the analyses are to be conducted as shortly before the field program is to commence as possible.

3. When possible, the sample container is utilized for sample collection, thereby eliminating an intermediate step and hence reducing the potential for cross contamination. If a bailer or similar device is utilized for sample collection, it is cleaned per the Standard Operating Protocol for Cleaning Sampling Equipment.

4. Care is taken when collecting surface water samples that the bottom sediments are not agitated and hence suspended in the water column being sampled. Every attempt is made to ensure that the water enters the sampling device or container with a minimum of turbulence.

5. Sample bottles are labeled with appropriate tags. Concurrently, chain-of-custody forms are prepared.

6. Samples are preserved according to guidelines obtained from the testing laboratory for the particular analysis parameters.

MONITORING WELL SAMPLING PROTOCOL
(continued)

3. Attach precleaned bailer to cable or line for lowering into the well.

4. Lower bailer slowly until it contacts water surface.

5. Allow bailer to sink and fill with a minimum of surface disturbance.

6. Slowly raise bailer to surface. Do not allow bailer line to contact ground.

7. Repeat Steps 3, 4 and 5 above until a minimum of three casing volumes have been removed from the well.

8. After a minimum of three casing volumes have been removed, allow the water level to return to a sufficient level to collect a complete sample and proceed with the sample collection as described below. Repeat Steps 3, 4 and 5 as needed to acquire sufficient sample volume.

9. When transferring the sample in the bailer to the sample container, tip the bailer to allow a slow discharge from the bailer top to flow gently down the side of the sample bottle with minimum entry turbulence.

10. Select sample bottles and preserve the sample, if necessary, according to the guidelines obtained from the laboratory.

11. Check that a Teflon liner is present in the cap if required. Secure the cap tightly.

12. Label the sample bottle with an appropriate tag. Be sure to complete the tag with all necessary information. Record the information in the field logbook and complete all chain-of-custody documents.

13. Thoroughly decontaminate the bailer after each use according to specific laboratory instructions or the general decontamination guidelines, and discard the bailer cable or line. In some cases, especially where trace analysis is desired, it may be prudent to use a separate bailer for each well.

Adapted From:

Characterization of Hazardous Waste Sites - A Methods Manual: Volume II, Available Sampling Methods, Second Edition EPA-600/14-84-076, December 1984.

# GUIDELINES FOR SAMPLING MONITORING WELLS WITH A BUCKET-TYPE BAILER

## Discussion

Bucket-type bailers are tall, narrow buckets equipped with a check valve on the bottom. This valve allows water to enter from the bottom as the bailer is lowered, then prevents the water's release as the bailer is raised. Top filling bailers are also available and may be useful for well purging, but generally result in increased sample turbulence and are not recommended for sample acquisition.

## Uses

This device is particularly useful when samples must be recovered from depths greater than the range (or capability) of suction lift pumps, when volatile stripping is of concern, or when well casing diameters are too narrow to accept submersible pumps. It is the method of choice for the collection of samples which are susceptible to volatile component stripping or degradation due to the aeration associated with most other recovery systems. Samples can be recovered with a minimum of aeration if care is taken to gradually lower the bailer until it contacts the water surface and is then allowed to sink as it fills. Teflon is generally the best construction material, but other materials (PVC, stainless steel, etc.) are acceptable if compatible with designated sample analysis. The primary disadvantages of bailers are their limited sample volume and inability to collect discrete samples from a depth below the water surface.

## Procedures for Use

1. Prior to initiating any work, the Health and Safety Plan developed for the specific site activities should be reviewed by the Field Technician and the Project Manager. The indicated measures of the Plan should be enacted prior to initiation of the sampling activities. Any concerns not addressed in the Health and Safety Plan document are to be brought immediately to the attention of the Health and Safety Officer.

2. Using clean, non-contaminating equipment [i.e., an electronic level indicator (avoid indicating paste)], determine and record in the field logbook the water level in the well, then calculate the fluid volume in casing.

## JAR HEADSPACE ANALYTICAL SCREENING PROCEDURE

The following procedures will be utilized when conducting analytical screening of gasoline contaminated soils utilizing a portable Photoionization Detector (PID) or Flame Ionization Detector (FID):

1. Half-fill two clean glass 16 oz. jars with the sample to be analyzed. Quickly cover each open top with one or two sheets of clean aluminum foil and subsequently apply screw caps to tightly seal the jars.

2. Allow headspace development for at least 10 minutes. Vigorously shake jars for 10 seconds both at the beginning and end of the headspace development period. Where ambient temperatures are below 32°F (0 C) headspace development will be done within a heated vehicle or building.

3. Subsequent to headspace development, remove screw lid/expose foil seal foil seal. Quickly puncture foil seal with instrument sampling probe, to a point about one-half of the headspace depth. Exercise care to avoid uptake of water droplets or soil particulates.

4. Following probe insertion through foil seal and/or sample injection to probe, record highest meter response as the jar headspace concentration. Using foil seal/probe insertion method, maximum response should occur between two and five seconds. Erratic meter response may occur at high organic vapor concentration or conditions of elevated headspace moisture, in which case headspace data will be discounted.

5. The headspace screening data from both jar samples will be recorded and compared; generally, replicate values should be consistent to plus or minus 20 percent.

6. PID and FID field instruments will be operated and calibrated to yield "total organic vapors" in ppm (v/v) as benzene. PID instruments will be operated with a 10.0 eV (+/-) lamp source. Operation, maintenance and calibration will be performed in accordance with the manufacturer's specifications. For jar headspace analysis, instrument calibration will be checked/adjusted no less than once every 10 analyses, or daily, whichever is greater.

# APPENDIX C

# Green Mountain Boring Co., Inc.

R. D. 2 — BARRE, VERMONT 05641

SHEET 1 OF 7

TO Rizzo Associates, Inc. ADDRESS Natick, Ma.

DATE 1/23/89

PROJECT NAME Blue Seal Feeds LOCATION Richford, Vt.

HOLE NO. RIZ-1

REPORT SENT TO Rizzo Associates, Inc. PROJ. NO.

LINE & STA.

SAMPLES SENT TO " " " OUR JOB NO. 89-107

OFFSET None

| GROUND WATER OBSERVATIONS | | CASING | SAMPLER | CORE BAR. |
|---|---|---|---|---|
| At 20' at 1 Hours | Type | AUGERS | SPLIT SPOON | |
| | Size I. D. | 4.25" | 1 3/8" | |
| At at Hours | Hammer Wt. | | 140# | |
| | Hammer Fall | | 30" | |

SURFACE ELEV.

DATE STARTED 1/23/89

DATE COMPL. 1/23/89

BORING FOREMAN Lawrence

INSPECTOR K. Jaeger

SOILS ENGR.

LOCATION OF BORING: East of truck shed

| DEPTH | Casing Blows per foot | Sample Depths From — To | Type of Sample | Blows per 6" on Sampler From 0-6 | 6-12 | To 12-18 | Moisture Density or Consist. | Strata Change Elev. | SOIL IDENTIFICATION Remarks include color, gradation, Type of soil etc. Rock-color, type, condition, hardness, Drilling time, seams and etc. | SAMPLE No. | Pen | Re |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | 0 - 2' | Dry | cuttings | | | Dry | | Fill material | 1 | cuttings | |
| | | 5' - 6.5' | " | 7 | 5 | 7 | " | | " " | 2 | 18" | 18' |
| | | 10' - 11.5' | " | 2 | 4 | 4 | " | | Fill material | 3 | 18" | 8" |
| | | 15' - 16.5' | | 6 | 7 | 7 | " | | Fine sand & some silt | 4 | 18" | 15' |
| | | 20' - 21.5' | " | 8 | 8 | 8 | Wet | | Fine sand, some silt | 5 | 18" | 18' |
| | | 24' - 25.5' | " | 2 | 3 | 5 | Wet | | Fine sand, some silt<br>Augered to 24' w/4:25" auger<br>set well at 24'<br>MATERIALS USED:<br>10' screen<br>15' riser<br>3 bags sand (100#)<br>½ pail bentonite (50#)<br>1 curb box<br>1 top wing cap<br>1 bottom push on cap<br>¼ bag cement | 6 | 18" | 24' |

GROUND SURFACE TO 24' USED 4:25" AUGERS: THEN split spoon

Sample Type
D = Dry C = Cored W = Washed
UP = Undisturbed Piston
TP = Test Pit A = Auger V = Vane Test
UT = Undisturbed Thinwall

Proportions Used
trace 0 to 10%
little 10 to 20%
some 20 to 35%
and 35 to 50%

140 lb. Wt. x 30" fall on 2" O. D. Sampler

| Cohesionless Density | | Cohesive Consistency | |
|---|---|---|---|
| 0-10 | Loose | 0-4 | Soft |
| 10-30 | Med. Dense | 4-8 | M/Stiff |
| 30-50 | Dense | 8-15 | Stiff |
| 50 + | Very Dense | 15-30 | V-Stiff |
| | | 30 + | Hard |

SUMMARY:
Earth Boring 25.5'
Rock Coring
Samples 6

HOLE NO RIZ-1

# Green Mountain Boring Co., Inc.

R. D. 2 — BARRE, VERMONT 05641

SHEET 2 OF 7

TO Rizzo Associates, Inc. ADDRESS Natick, Ma.

PROJECT NAME Blue Seal Feeds LOCATION Richford, Vt.

REPORT SENT TO Rizzo Associates, Inc. PROJ. NO. 110601

SAMPLES SENT TO " " " OUR JOB NO. 88-107

DATE 1/23/89

HOLE NO. RIZ 2

LINE & STA.

OFFSET None

GROUND WATER OBSERVATIONS

At ) at 15 Hours

At at Hours

| | CASING | SAMPLER | CORE BAR. |
|---|---|---|---|
| Type | AUGERS | SPLIT SPOON | |
| Size I. D. | 4:25" | 1 3/8" | |
| Hammer Wt. | | 140# | |
| Hammer Fall | | 30" | |

SURFACE ELEV.

DATE STARTED 1/23/89

DATE COMPL. 1/24/89

BORING FOREMAN Lawrence

INSPECTOR K. Jaeger

SOILS ENGR.

LOCATION OF BORING:

| DEPTH | Casing Blows per foot | Sample Depths From — To | Type of Sample | Blows per 6" on Sampler From 0-6 | 6-12 | To 12-18 | Moisture Density or Consist. | Strata Change Elev. | SOIL IDENTIFICATION Remarks include color, gradation, Type of soil etc. Rock-color, type, condition, hardness, Drilling time, seams and etc. | SAMPLE No. | Pen | Re |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | 0 - 2' | Dry | cuttings | | | Dry | | | 1 | cutting | |
| | | 5' - 6.5' | " | 2 | 3 | 5 | " | | Silty brown clay w/fine sand layers | 2 | 18" | 18" |
| | | 10' - 11.5' | " | 8 | 10 | 11 | Dry to wet | | Fine sand w/clayey silt layers -gravel layers | 3 | 18" | 18" |
| | | 15' - 16.5' | " | 13 | 24 | 15 | Dry | | Fine sand into a med. sand w/rock fragments | 4 | 18" | 14" |
| | | 20' - 21.5' | " | 6 | 7 | 10 | Dry | | Fine sand & silt | 5 | 18" | 15" |
| | | 25' - 26.5' | " | 8 | 12 | 24 | " | | Fine sand | 6 | 18" | 15" |
| | | 30' - 31.5' | " | 50 for 0" | | | " | | Auger & split spoon refusal Refusal on stone at 30' | 7 | 0 | 0 |

GROUND SURFACE TO 30' USED 4:25" AUGERS: THEN split spoon

Sample Type
D = Dry C = Cored W = Washed
UP = Undisturbed Piston
TP = Test Pit A = Auger V = Vane Test
UT = Undisturbed Thinwall

Proportions Used
trace 0 to 10%
little 10 to 20%
some 20 to 35%
and 35 to 50%

140 lb. Wt. x 30" fall an 2" O. D. Sampler

Cohesionless Density
0-10 Loose
10-30 Med. Dense
30-50 Dense
50 + Very Dense

Cohesive Consistency
0-4 Soft
4-8 M/Stiff
8-15 Stiff
15-30 V-Stiff
30 + Hard

SUMMARY:
Earth Boring 30'
Rock Coring
Samples 6

HOLE NO. RIZ 2

# Green Mountain Boring Co., Inc.

R. D. 2 — BARRE, VERMONT 05641

SHEET 3 OF 7

TO Rizzo Associates, Inc. ADDRESS Natick, Ma.

DATE 1/24/89

PROJECT NAME Blue Seal feeds LOCATION Richford, Vt.

HOLE NO. RIZ 3

REPORT SENT TO Rizzo Associates PROJ. NO. 110601

LINE & STA.

SAMPLES SENT TO " " OUR JOB NO. 89-107

OFFSET None

| GROUND WATER OBSERVATIONS | | CASING | SAMPLER | CORE BAR. |
|---|---|---|---|---|
| At 30' at 1 Hours | Type | AUGERS | SPLIT SPOON | |
| | Size I. D. | 4:25" | 1 3/8" | |
| At ... at ... Hours | Hammer Wt. | | 140# | |
| | Hammer Fall | | 30" | |

SURFACE ELEV.

DATE STARTED 1/24/89

DATE COMPL. 1/24/89

BORING FOREMAN Lawrence

INSPECTOR K. Jaegar

SOILS ENGR.

LOCATION OF BORING: Side of Railroad Tracks

| DEPTH | Casing Blows per foot | Sample Depths From — To | Type of Sample | Blows per 6" on Sampler From 0-6 | Blows per 6" on Sampler From 6-12 | Blows per 6" on Sampler To 12-18 | Moisture Density or Consist. | Strata Change Elev. | SOIL IDENTIFICATION Remarks include color, gradation, Type of soil etc. Rock-color, type, condition, hardness, Drilling time, seams and etc. | SAMPLE No. | SAMPLE Pen | SAMPLE Re |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | 0 - 2' | Dry | Cuttings | | | Moist | | | 1 | cuttings | |
| | | 5' - 6.5' | " | 3 | 4 | 5 | " | | Clayey brown silt w/fine layers | 2 | 18" | 18" |
| | | 10' - 11.5' | " | 4 | 10 | 10 | Dry | | Fine sand some silt | 3 | 18" | 12" |
| | | 15' - 16.5' | " | 18 | 11 | 10 | Dry | | Fine sand some silt w/layer of fine sand | 4 | 18" | 11" |
| | | 20' - 21.5' | " | 43 | 28 | 15 | Dry | | Fine sand some silt | 5 | 18" | 6" |
| | | 25' - 26.5' | " | 10 | 11 | 15 | " | | Fine sand some silt | 6 | 18" | |
| | | 30' - 31.5' | " | | | | Wet | | Fine sand some silt | | | |
| | | 30' - 31.5' | " | | | | Wet | | Fine sand, some silt | | | |
| | | 34' | " | | | | Wet | | Augered to 34' w/4:25" augers Set well at 34' | | | |

GROUND SURFACE TO 34' USED 4:25" AUGERS: THEN

Sample Type
D = Dry C = Cored W = Washed
UP = Undisturbed Piston
TP = Test Pit A = Auger V = Vane Test
UT = Undisturbed Thinwall

Proportions Used
trace 0 to 10%
little 10 to 20%
some 20 to 35%
and 35 to 50%

140 lb. Wt. x 30" fall on 2" O. D. Sampler

Cohesionless Density
0-10 Loose
10-30 Med. Dense
30-50 Dense
50 + Very Dense

Cohesive Consistency
0-4 Soft
4-8 M/Stiff
8-15 Stiff
15-30 V-Stiff
30 + Hard

SUMMARY:
Earth Boring 34'
Rock Coring
Samples 6

HOLE NO. RIZ 3

# Green Mountain Boring Co., Inc.

R. D. 2 — BARRE, VERMONT 05641

SHEET ..... OF 7

TO Rizzo Associates ADDRESS Natick, Ma.

PROJECT NAME ..... LOCATION .....

REPORT SENT TO ..... PROJ. NO. .....

SAMPLES SENT TO ..... OUR JOB NO. .....

DATE .....

HOLE NO. .....

LINE & STA. .....

OFFSET .....

| GROUND WATER OBSERVATIONS | | CASING | SAMPLER | CORE BAR. |
|---|---|---|---|---|
| At ..... at ..... Hours | Type | AUGERS | SPLIT SPOON | ..... |
| | Size I. D. | ..... | 1 3/8" | ..... |
| At ..... at ..... Hours | Hammer Wt. | ..... | 140# | ..... |
| | Hammer Fall | ..... | 30" | ..... |

SURFACE ELEV. .....

DATE STARTED .....

DATE COMPL. .....

BORING FOREMAN .....

INSPECTOR .....

SOILS ENGR. .....

LOCATION OF BORING: SHEET CONTINUATION OF HOLE # 3

| DEPTH | Casing Blows per foot | Sample Depths From — To | Type of Sample | Blows per 6" on Sampler From To 0-6 | 6-12 | 12-18 | Moisture Density or Consist. | Strata Change Elev. | SOIL IDENTIFICATION Remarks include color, gradation, Type of soil etc. Rock-color, type, condition, hardness, Drilling time, seams and etc. | SAMPLE No. | Pen | Re |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | CONTINUATION OF RIZ 3 | | | | | | | MATERIALS USED:<br>10' screen<br>25' riser<br>3 bags sand<br>½ pail bentonite - 50# pail<br>1 curb box<br>1 top wing nut<br>1 bottom push on cap<br>¼ bag cement | | | |

GROUND SURFACE TO ..... USED ..... AUGERS: THEN .....

Sample Type
D = Dry C = Cored W = Washed
UP = Undisturbed Piston
TP = Test Pit A = Auger V = Vane Test
UT = Undisturbed Thinwall

Proportions Used
trace 0 to 10%
little 10 to 20%
some 20 to 35%
and 35 to 50%

140 lb. Wt. x 30" fall on 2" O. D. Sampler

Cohesionless Density
0-10 Loose
10-30 Med. Dense
30-50 Dense
50 + Very Dense

Cohesive Consistency
0-4 Soft
4-8 M/Stiff
8-15 Stiff
15-30 V-Stiff
30 + Hard

SUMMARY:
Earth Boring
Rock Coring
Samples

HOLE NO

# Green Mountain Boring Co., Inc.

R. D. 2 — BARRE, VERMONT 05641

SHEET 4 OF 7

TO Rizzo Associates ADDRESS Natick, Ma.

PROJECT NAME Blue Seal Feeds LOCATION Richford, Vt.

REPORT SENT TO Rizzo Associates PROJ. NO. 110601

SAMPLES SENT TO " " OUR JOB NO. 89-107

DATE 1/24/89

HOLE NO. RIZ 4

LINE & STA.

OFFSET None

GROUND WATER OBSERVATIONS

At 26' at 1 Hours

At ..... at ..... Hours

| | CASING | AUGERS | SAMPLER SPLIT SPOON | CORE BAR. |
|---|---|---|---|---|
| Type | | | | |
| Size I. D. | | 4:25" | 1 3/8" | |
| Hammer Wt. | | | 140# | |
| Hammer Fall | | | 30" | |

SURFACE ELEV.

DATE STARTED 1/24/89

DATE COMPL. 1/24/89

BORING FOREMAN Lawrence

INSPECTOR K. Jaeger

SOILS ENGR.

LOCATION OF BORING: By Silo

| DEPTH | Casing Blows per foot | Sample Depths From — To | Type of Sample | Blows per 6" on Sampler From 0-6 | 6-12 | To 12-18 | Moisture Density or Consist. | Strata Change Elev. | SOIL IDENTIFICATION Remarks include color, gradation, Type of soil etc. Rock-color, type, condition, hardness, Drilling time, seams and etc. | SAMPLE No. | Pen | Re |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | 0 - 2' | Dry | cuttings | | | Dry | | Fine sand, some silt & few pebbles | 1 | cuttings | |
| | | 5' - 6.5' | " | 2 | 1 | 2 | " | | Fine sand, few pebbles | 2 | 18" | 14" |
| | | 10' - 11.5' | " | 4 | 2 | 2 | " | | Fine sand little silt | 3 | 18" | 14' |
| | | 15' - 16.5' | " | 6 | 6 | 6 | " | | Fine sand little silt product visible | 4 | 18" | 14' |
| | | 20' - 21.5' | " | 5 | 6 | 9 | " | | Fine sand little silt product visible | 5 | 18" | 12' |
| | | 25' - 26.5' | " | 2 | 1 | 2 | Wet | | Fine sand little silt | 6 | 18" | 18" |
| | | 30' | " | | | | " | | SET WELL AT 30' | | | |
| | | | | | | | | | MATERIALS USED: | | | |
| | | | | | | | | | 3 bags sand | | | |
| | | | | | | | | | 1 pail bentonite | | | |
| | | | | | | | | | 7' screen | | | |
| | | | | | | | | | 23' riser | | | |
| | | | | | | | | | 1 curb box | | | |
| | | | | | | | | | ¼ bag cement | | | |
| | | | | | | | | | 1 top wing type cap | | | |
| | | | | | | | | | Bottom push on cap | | | |

GROUND SURFACE TO 30' USED 4:25" AUGERS: - THEN .....

Sample Type

D = Dry C = Cored W = Washed

UP = Undisturbed Piston

TP = Test Pit A = Auger V = Vane Test

UT = Undisturbed Thinwall

Proportions Used

| | |
|---|---|
| trace | 0 to 10% |
| little | 10 to 20% |
| some | 20 to 35% |
| and | 35 to 50% |

140 lb. Wt. x 30" fall an 2" O. D. Sampler

Cohesionless Density

| | |
|---|---|
| 0-10 | Loose |
| 10-30 | Med. Dense |
| 30-50 | Dense |
| 50 + | Very Dense |

Cohesive Consistency

| | |
|---|---|
| 0-4 | Soft |
| 4-8 | M/Stiff |
| 8-15 | Stiff |
| 15-30 | V-Stiff |
| 30 + | Hard |

SUMMARY:

Earth Boring 30'

Rock Coring

Samples 6

HOLE NO RIZ 4

# Green Mountain Boring Co., Inc.

R. D. 2 — BARRE, VERMONT 05641

SHEET 5 OF 7

TO Rizzo Associates, Inc. ADDRESS Natick, Ma.

PROJECT NAME Blue Seal Feeds LOCATION Richford, Vt.

REPORT SENT TO Rizzo Associates PROJ. NO. 110601

SAMPLES SENT TO " " OUR JOB NO. 89-107

DATE 1/25/89

HOLE NO. RIZ 5

LINE & STA.

OFFSET None

| GROUND WATER OBSERVATIONS | | CASING | SAMPLER | CORE BAR. |
|---|---|---|---|---|
| At 26' at 1 Hours | Type | AUGERS | SPLIT SPOON | |
| | Size I. D. | 4.25" | 1 3/8" | |
| At at Hours | Hammer Wt. | | 140# | |
| | Hammer Fall | | 30" | |

SURFACE ELEV.

DATE STARTED 1/25/89

DATE COMPL. 1/25/89

BORING FOREMAN Lawrence

INSPECTOR K. Jaeger

SOILS ENGR.

LOCATION OF BORING: By Diesel Island

| DEPTH | Casing Blows per foot | Sample Depths From — To | Type of Sample | Blows per 6" on Sampler From 0-6 | 6-12 | To 12-18 | Moisture Density or Consist. | Strata Change Elev. | SOIL IDENTIFICATION Remarks include color, gradation, Type of soil etc. Rock-color, type, condition, hardness, Drilling time, seams and etc. | SAMPLE No. | Pen | Re |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | 0 - 2' | Dry | cuttings | | | Dry | | Clayey silt (brown) | 1 | cuttings | |
| | | 5' - 6.5' | " | 4 | 6 | 7 | " | | Silt w/sand layers | 2 | 18" | 17' |
| | | 10' - 11.5' | " | 7 | 11 | 11 | " | | Layered clayey silt& silt | 3 | 18" | 10' |
| | | 15' - 16.5' | " | 4 | 7 | 7 | " | | Brown silt | 4 | 18" | 15' |
| | | 20' - 21.5' | " | 8 | 12 | 14 | Dry | | Fine sand | 5 | 18" | 13' |
| | | 25' - 26.5' | " | 10 | 8 | 12 | Wet | | Coarse sand<br>Set well at 30' | 6 | 18" | 15 |
| | | 30' | | | | | " | | | | | |
| | | | | | | | | | MATERIALS USED:<br>3 bags sand<br>½ pail bentonite<br>10' screen<br>20' riser<br>1 curb box (4" style)<br>¼ bag cement<br>1 top wing type cap<br>1 bottom push on cap | | | |

GROUND SURFACE TO 30' USED 4.25" AUGERS: THEN

Sample Type
D = Dry C = Cored W = Washed
UP = Undisturbed Piston
TP = Test Pit A = Auger V = Vane Test
UT = Undisturbed Thinwall

Proportions Used
trace 0 to 10%
little 10 to 20%
some 20 to 35%
and 35 to 50%

140 lb. Wt. x 30" fall on 2" O. D. Sampler
Cohesionless Density: 0-10 Loose; 10-30 Med. Dense; 30-50 Dense; 50 + Very Dense
Cohesive Consistency: 0-4 Soft; 4-8 M/Stiff; 8-15 Stiff; 15-30 V-Stiff; 30 + Hard

SUMMARY:
Earth Boring
Rock Coring 30
Samples 6

HOLE NO RIZ 5

# Green Mountain Boring Co., Inc.

R. D. 2 — BARRE, VERMONT 05641

SHEET 1 OF 1

TO Rizzo Associates, Inc. ADDRESS Natick, Ma.

PROJECT NAME Blue Seal Feeds LOCATION Richford, Vt.

REPORT SENT TO Rizzo Associates PROJ. NO. 110601

SAMPLES SENT TO " " OUR JOB NO. 89-107

DATE 1/25/89

HOLE NO. RIZ-1

LINE & STA.

OFFSET None

| GROUND WATER OBSERVATIONS | | CASING | SAMPLER | CORE BAR. |
|---|---|---|---|---|
| At 0 at 1 Hours | Type | AUGERS | SPLIT SPOON | |
| | Size I. D. | 2:50" | 1⅜" | |
| At at Hours | Hammer Wt. | | 140# | |
| | Hammer Fall | | 30" | |

SURFACE ELEV.

DATE STARTED 1/25/89

DATE COMPL. 1/25/89

BORING FOREMAN Lawrence

INSPECTOR K. Jaeger

SOILS ENGR.

LOCATION OF BORING: Former Waste Oil Tank

| DEPTH | Casing Blows per foot | Sample Depths From — To | Type of Sample | Blows per 6" on Sampler From 0-6 | 6-12 | To 12-18 | Moisture Density or Consist. | Strata Change Elev. | SOIL IDENTIFICATION Remarks include color, gradation, Type of soil etc. Rock-color, type, condition, hardness, Drilling time, seams and etc. | SAMPLE No. | Pen | Re |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | 0 - 2' | | Off | augers | | Dry | | Sand & gravel fill | 1 | cuttings | |
| | | 5' | | Off | cutting head | | Dry | | Sand & gravel | 2 | cuttings | |
| | | 10' | | Off | cutting head | | " | | Sand, silt & clay | 3 | cuttings | |

GROUND SURFACE TO 10' USED 2:50" AUGERS: THEN

Sample Type
D = Dry C = Cored W = Washed
UP = Undisturbed Piston
TP = Test Pit A = Auger V = Vane Test
UT = Undisturbed Thinwall

Proportions Used
trace 0 to 10%
little 10 to 20%
some 20 to 35%
and 35 to 50%

140 lb. Wt. x 30" fall an 2" O. D. Sampler

Cohesionless Density
0-10 Loose
10-30 Med. Dense
30-50 Dense
50 + Very Dense

Cohesive Consistency
0-4 Soft
4-8 M/Stiff
8-15 Stiff
15-30 V-Stiff
30 + Hard

SUMMARY:
Earth Boring 10'
Rock Coring
Samples 3

HOLE NO. RIZ 1

# GROUNDWATER MONITORING WELL REPORT

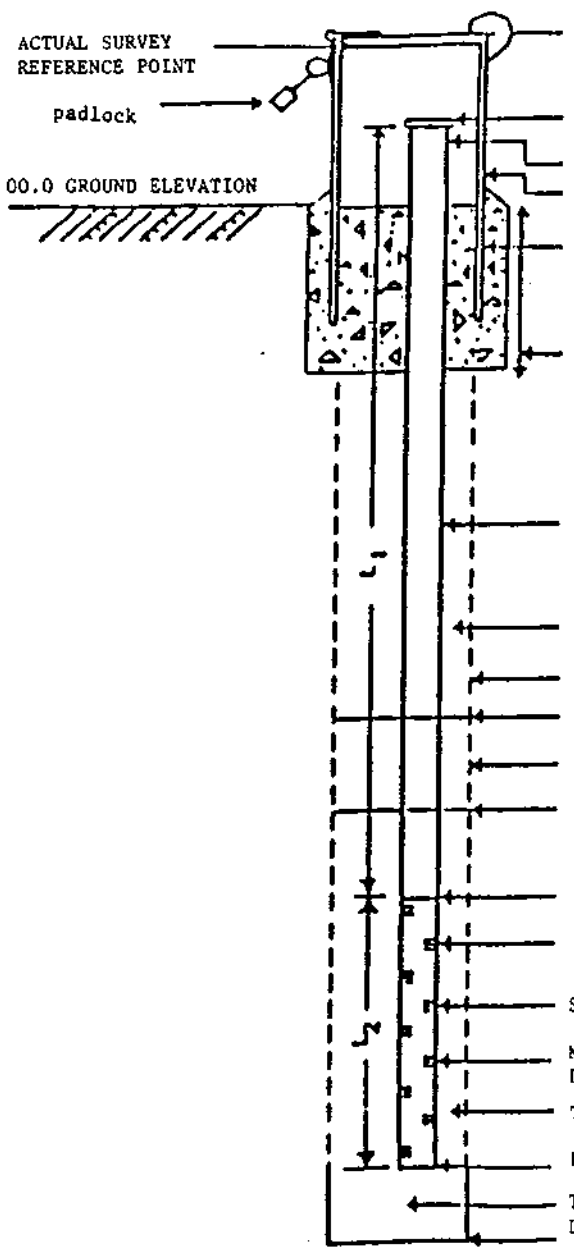
SITE: Grain Proc. Corp./Richford, VT LOCATION: east of truck shed PROJECT NO.: 1106-01

CONTRACTOR: Green Mountain Boring, Co., Inc. DRILLER: Steve Lawrence

INSPECTOR: Ken Jaeger INSTALLATION DATE: 1/23/89 WELL NO.: RIZ-1

Note: Unless otherwise designated all depths are based on a 0.00 ground elevation

SUMMARIZE SOIL CONDITIONS (NOT TO SCALE)




| | |
|---|---|
| Drilling Method | hollow stem auger |
| Elevation or Stickup Above /Below Ground Surface of Casing of Road Box (2'-0" unless otherwise noted) | flush |
| Elevation or Stickup Above /Below Ground Surface of Riser Pipe. | 1 below |
| Vent Hole | |
| Weep Hole | |
| Protective Casing | 4" Diameter (I.D.) / 2' Length |
| Thickness of Surface Seal/concrete | 6" |
| [Indicate all seals Showing Depth, Thickness and Type] | |
| Material of Manufacture and Inside Diameter of Riser Pipe | PVC / 2" (Material / Diameter (I.D.)) |
| Type of Backfill around Riser | native material |
| Diameter of Borehole | 8 inches |
| Depth of Top of Subsurface Seal-Note NA if coincides with screen backfill | 12' |
| Type of Subsurface seal/grout | bentonite |
| Depth of Top of Backfill Around Point/Screen | 13' |
| Depth of Bottom of Riser | 14' |
| Type of Point or Screen (pipe size, telescoping) and Manufacture | slotted |
| Screen Gage or size of Openings | .010 |
| Material of Manufacture and Diameter of Wellpoint/Screen | PVC / 2 inches |
| Type of Backfill Around Point/Screen | sand |
| Depth of Bottom of Screen | 24' |
| Type of Backfill Under Point/Screen | -- |
| Depth of Bottom of Borehole | 24' |

(L1)Length of Riser (ft) 14 (L2)Length of Screen (ft) 10 Reference Point -- Ground Elev. --

Actual Elevations-where available

# GROUNDWATER MONITORING WELL REPORT

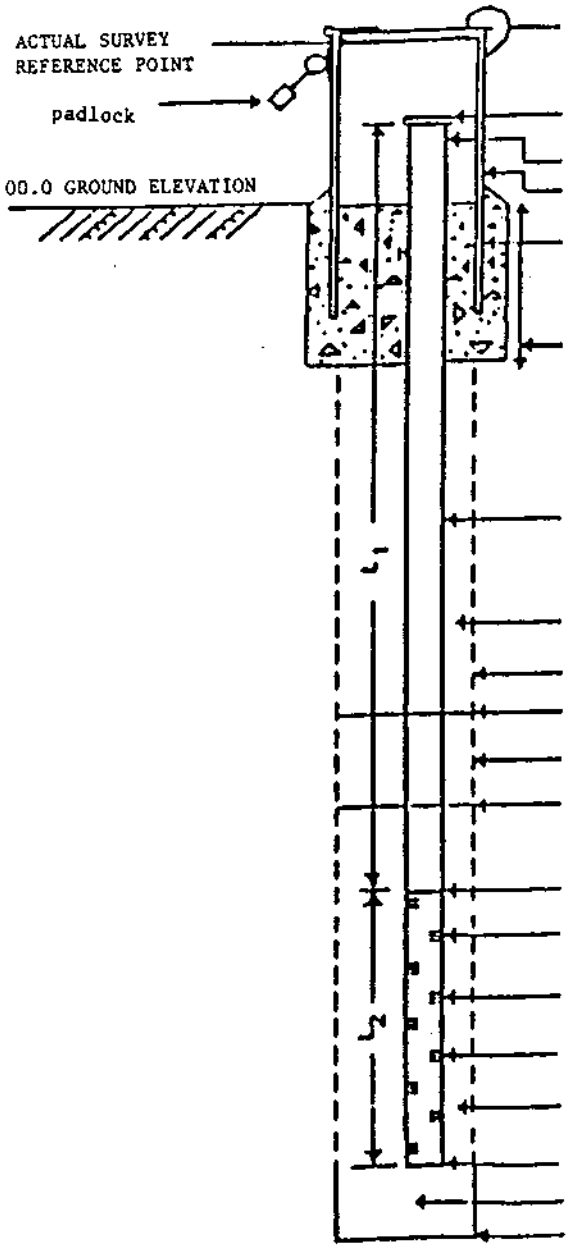
SITE: Grain Proc. Corp./Richford, VT LOCATION: west of south shed #3 PROJECT NO.: 1106-01

CONTRACTOR: Green Mountain Boring, Co., Inc. DRILLER: Steve Lawrence

INSPECTOR: Ken Jaeger INSTALLATION DATE: 1/24/89 WELL NO.: RIZ-3

Note: Unless otherwise designated all depths are based on a 0.00 ground elevation

SUMMARIZE SOIL CONDITIONS (NOT TO SCALE)




| | |
|---|---|
| Drilling Method | hollow stem auger |
| Elevation or Stickup Above /Below Ground Surface of Casing of Road Box (2'-0" unless otherwise noted) | flush |
| Elevation or Stickup Above /Below Ground Surface of Riser Pipe. | 1 below |
| Vent Hole | |
| Weep Hole | |
| Protective Casing | 4" Diameter (I.D.) / 2' Length |
| Thickness of Surface Seal/concrete | 6" |
| [Indicate all seals Showing Depth, Thickness and Type] | |
| Material of Manufacture and Inside Diameter of Riser Pipe | PVC / 2" (Material / Diameter (I.D.)) |
| Type of Backfill around Riser | native material |
| Diameter of Borehole | 8 inches |
| Depth of Top of Subsurface Seal-Note NA if coincides with screen backfill | 20' |
| Type of Subsurface seal/grout | bentonite |
| Depth of Top of Backfill Around Point/Screen | 21' |
| Depth of Bottom of Riser | 23' |
| Type of Point or Screen (pipe size, telescoping) and Manufacture | slotted |
| Screen Gage or size of Openings | .010 |
| Material of Manufacture and Diameter of Wellpoint/Screen | PVC / 2 inches |
| Type of Backfill Around Point/Screen | sand |
| Depth of Bottom of Screen | 34' |
| Type of Backfill Under Point/Screen | -- |
| Depth of Bottom of Borehole | 34' |

(L1)Length of Riser (ft) 24 (L2)Length of Screen (ft) 10 Reference Point -- Ground Elev. --

Actual Elevations-where available

# GROUNDWATER MONITORING WELL REPORT

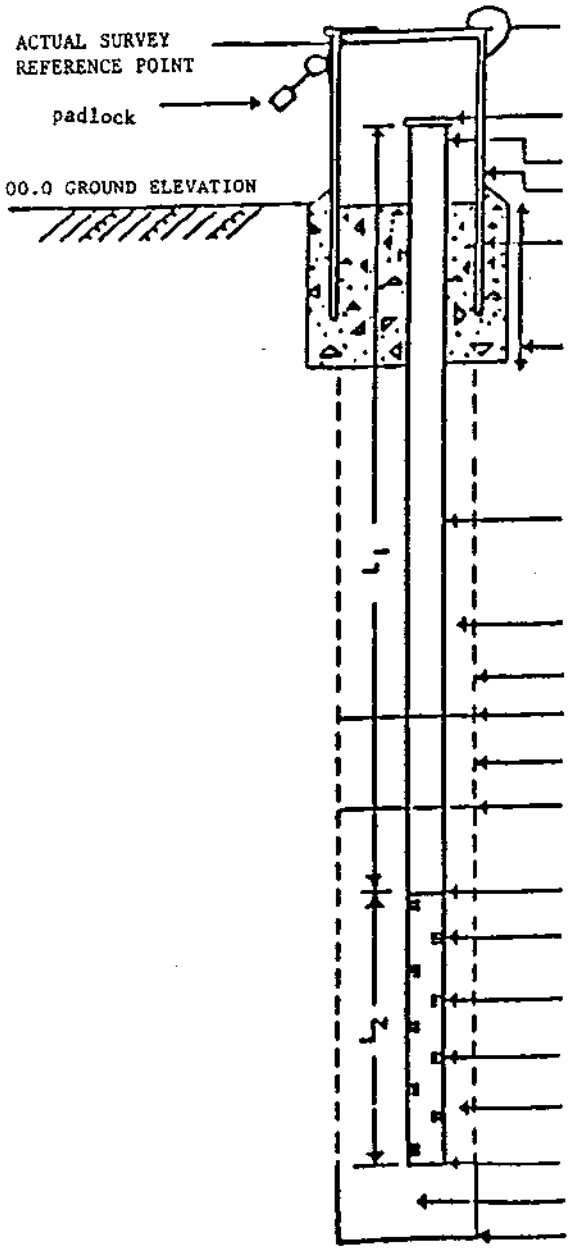
SITE: Grain Proc. Corp./Richford, VT LOCATION: near animal fat silos PROJECT NO.: 1106-01

CONTRACTOR: Green Mountain Boring, Co., Inc. DRILLER: Steve Lawrence

INSPECTOR: Ken Jaeger INSTALLATION DATE: 1/24/89 WELL NO.: RIZ-4

Note: Unless otherwise designated all depths are based on a 0.00 ground elevation

SUMMARIZE SOIL CONDITIONS (NOT TO SCALE)




| | |
|---|---|
| Drilling Method | hollow stem auger |
| Elevation or Stickup Above /Below Ground Surface of Casing of Road Box (2'-0" unless otherwise noted) | flush |
| Elevation or Stickup Above /Below Ground Surface of Riser Pipe. | 2 below |
| Vent Hole | |
| Weep Hole | |
| Protective Casing | 4" Diameter (I.D.) 2' Length |
| Thickness of Surface Seal/concrete | 6" |
| [Indicate all seals Showing Depth, Thickness and Type] | |
| Material of Manufacture and Inside Diameter of Riser Pipe | PVC / 2" Material Diameter (I.D.) |
| Type of Backfill around Riser | local sand |
| Diameter of Borehole | 8 inches |
| Depth of Top of Subsurface Seal-Note NA if coincides with screen backfill | 21' |
| Type of Subsurface seal/grout | bentonite |
| Depth of Top of Backfill Around Point/Screen | 23' |
| Depth of Bottom of Riser | 23' |
| Type of Point or Screen (pipe size, telescoping) and Manufacture | slotted |
| Screen Gage or size of Openings | .010 |
| Material of Manufacture and Diameter of Wellpoint/Screen | PVC / 2 inches |
| Type of Backfill Around Point/Screen | sand |
| Depth of Bottom of Screen | 30' |
| Type of Backfill Under Point/Screen | -- |
| Depth of Bottom of Borehole | 30' |

(L1)Length of Riser (ft) 23' (L2)Length of Screen (ft) 7' Reference Point -- Ground Elev. --

Actual Elevations-where available

# GROUNDWATER MONITORING WELL REPORT

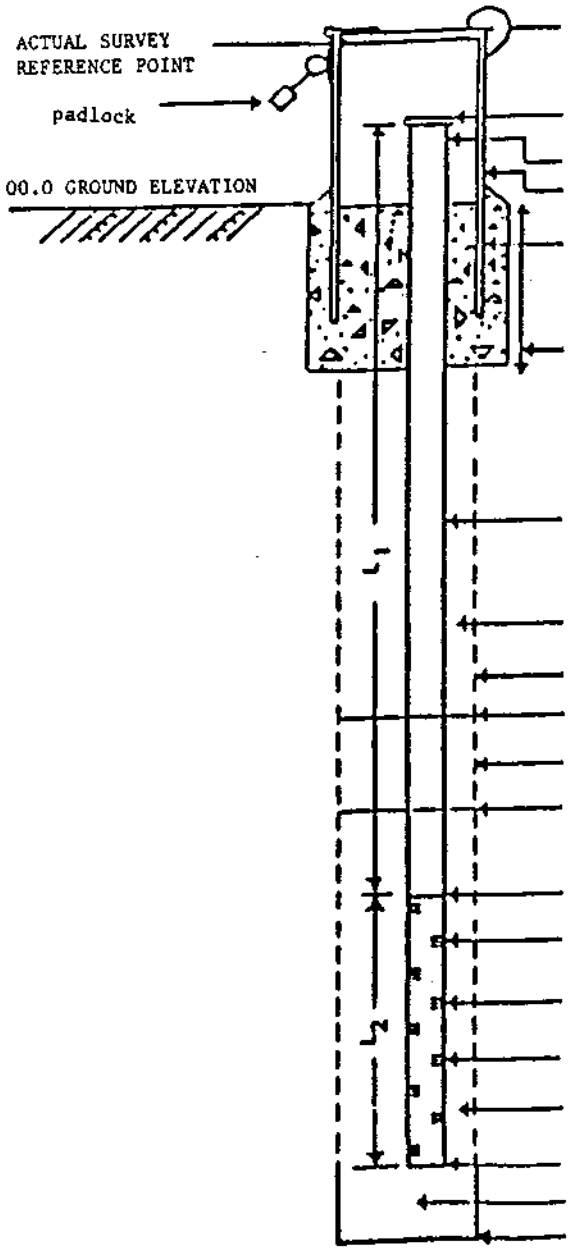
SITE: Grain Proc. Corp./Richford, VT LOCATION: near diesel pumps PROJECT NO.: 1106-01

CONTRACTOR: Green Mountain Boring, Co., Inc. DRILLER: Steve Lawrence

INSPECTOR: Ken Jaeger INSTALLATION DATE: 1/25/89 WELL NO.: RIZ-5

Note: Unless otherwise designated all depths are based on a 0.00 ground elevation

SUMMARIZE SOIL CONDITIONS (NOT TO SCALE)




| | |
|---|---|
| Drilling Method | hollow stem auger |
| Elevation or Stickup Above /Below Ground Surface of Casing of Road Box (2'-0" unless otherwise noted) | flush |
| Elevation or Stickup Above /Below Ground Surface of Riser Pipe. | 2" below |
| Vent Hole | |
| Weep Hole | |
| Protective Casing | 6" Diameter (I.D.) / 18" Length |
| Thickness of Surface Seal/concrete | 1 foot |
| [Indicate all seals Showing Depth, Thickness and Type] | |
| Material of Manufacture and Inside Diameter of Riser Pipe | PVC / 2" (Material / Diameter (I.D.)) |
| Type of Backfill around Riser | native material |
| Diameter of Borehole | 8 inches |
| Depth of Top of Subsurface Seal-Note NA if coincides with screen backfill | 18' |
| Type of Subsurface seal/grout | bentonite |
| Depth of Top of Backfill Around Point/Screen | 19' |
| Depth of Bottom of Riser | 20' |
| Type of Point or Screen (pipe size, telescoping) and Manufacture | slotted |
| Screen Gage or size of Openings | .010 |
| Material of Manufacture and Diameter of Wellpoint/Screen | PVC / 2 inches |
| Type of Backfill Around Point/Screen | sand |
| Depth of Bottom of Screen | 30' |
| Type of Backfill Under Point/Screen | -- |
| Depth of Bottom of Borehole | 30' |

(L1)Length of Riser (ft) 20 (L2)Length of Screen (ft) 10 Reference Point -- Ground Elev. --

Actual Elevations-where available

# GROUNDWATER MONITORING WELL REPORT

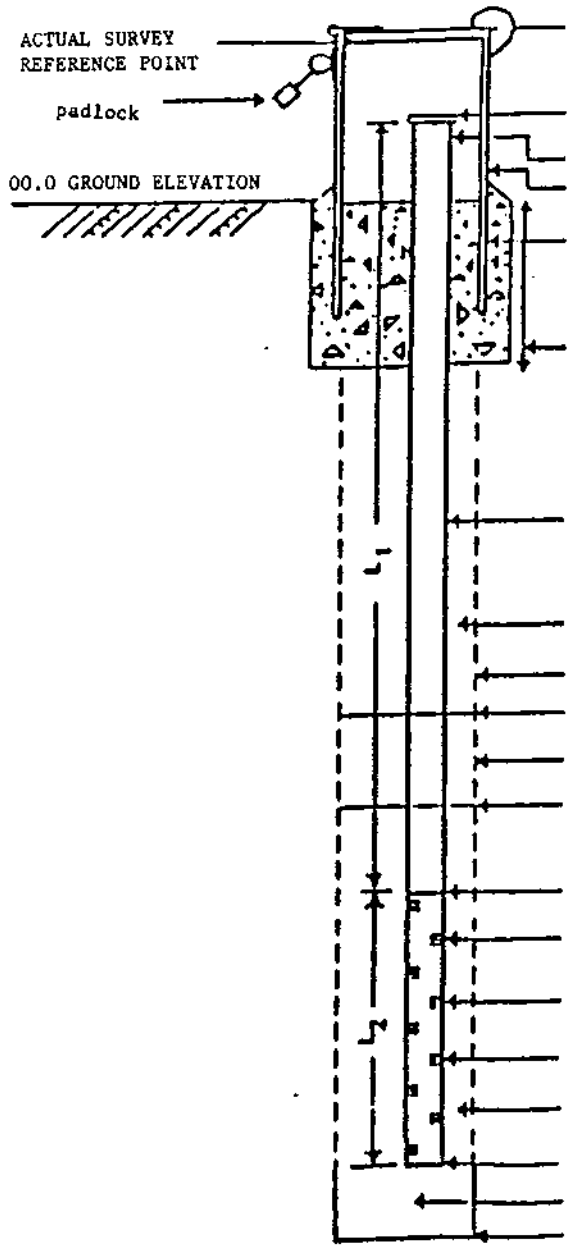
SITE: Grain Proc. Corp./Richford, VT LOCATION: near gas pump PROJECT NO.: 1106-01

CONTRACTOR: Green Mountain Boring, Co., Inc. DRILLER: Steve Lawrence

INSPECTOR: Ken Jaeger INSTALLATION DATE: 1/25/89 WELL NO.: RIZ-6

Note: Unless otherwise designated all depths are based on a 0.00 ground elevation

SUMMARIZE SOIL CONDITIONS (NOT TO SCALE)




| | |
|---|---|
| Drilling Method | hollow stem auger |
| Elevation or Stickup Above /Below Ground Surface of Casing of Road Box (2'-0" unless otherwise noted) | flush |
| Elevation or Stickup Above /Below Ground Surface of Riser Pipe. | 2" below |
| Vent Hole | |
| Weep Hole | |
| Protective Casing | 4 Diameter (I.D.) / 2' Length |
| Thickness of Surface Seal/concrete | 6" |
| [Indicate all seals Showing Depth, Thickness and Type] | |
| Material of Manufacture and Inside Diameter of Riser Pipe | PVC / 2" Material / Diameter (I.D.) |
| Type of Backfill around Riser | native material |
| Diameter of Borehole | 8 inches |
| Depth of Top of Subsurface Seal-Note NA if coincides with screen backfill | 17' |
| Type of Subsurface seal/grout | bentonite |
| Depth of Top of Backfill Around Point/Screen | 18' |
| Depth of Bottom of Riser | 19' |
| Type of Point or Screen (pipe size, telescoping) and Manufacture | slotted |
| Screen Gage or size of Openings | .010 |
| Material of Manufacture and Diameter of Wellpoint/Screen | PVC / 2 inches |
| Type of Backfill Around Point/Screen | sand |
| Depth of Bottom of Screen | 29' |
| Type of Backfill Under Point/Screen | -- |
| Depth of Bottom of Borehole | 29' |

(L1)Length of Riser (ft) 19 (L2)Length of Screen (ft) 10 Reference Point -- Ground Elev. --

Actual Elevations-where available

**APPENDIX D**

ALPHA ANALYTICAL LABORATORIES
Eight Walkup Drive
Westborough, Massachusetts 01581-1019
(508) 898-9220

# CERTIFICATE OF ANALYSIS

| | | | |
|---|---|---|---|
| **Client:** | Rizzo Associates | **Job Number:** | 890208 |
| **Address:** | 235 West Central Street | **Invoice Number:** | 6657 |
| | Natick, MA 01760 | **Date In:** | 01/27/89 |
| **Attn:** | Rick Hughto | **Date Reported:** | 02/10/89 |

**Sample Description:** Two soil samples and eight water samples

**Rizzo Job #1106-01**

REFERENCES:

1. Test Methods for Evaluating Solid Waste: Physical/Chemical Methods. EPA SW-846. 1986.

2. Standard Methods for Examination of Water and Waste Water. APHA-AWWA-WPCF. 16th Edition. 1985.

3. Methods for Chemical Analysis of Water and Wastes. EPA 600/4-82-055. 1983.

4. Oil Spill Identification System. CG-D-52-77 U. S. Coast Guard. 1977.

Authorized by: Scott McLean

Scott McLean--Laboratory Director

ALPHA ANALYTICAL LABORATORIES
CERTIFICATE OF ANALYSIS

**Client:** Rizzo Associates

**Sample Number:** 890208.1

**Analysis Requested:** Total Petroleum Hydrocarbons (IR)

**Date Received:** 01/27/89

**Date Reported:** 02/10/89

**Client Ident:** GRV-SS-RZ4-101
**Sample Location:**
**Sample Description:** Soil
**Sample Container:** Glass jar
**Field Prep:** None

**# of Containers:** 1

| PARAMETER | RESULT | UNITS | MDL* | INST | REF** | METHOD | EXTRACT | ANALYSIS |
|---|---|---|---|---|---|---|---|---|
| Total Hydrocarbons | 120,000 | mg/Kg | 40 | IR | 2 | 503BCE | ----- | 02/09/89 |

* MDL--Method Detection Limits (same units as the Results)
** REF--Reference as cited on the cover (first) page of this report.

ALPHA ANALYTICAL LABORATORIES
CERTIFICATE OF ANALYSIS

**Client:** Rizzo Associates

**Sample Number:** 890208.2

**Analysis Requested:** Total Petroleum Hydrocarbons (IR) and HSL Volatile Organics

**Date Received:** 01/27/89

**Date Reported:** 02/10/89

**Client Ident:** GRV-SS-RZ7-102
**Sample Location:**
**Sample Description:** Soil
**Sample Container:** Glass jar, VOA vials
**Field Prep:** None

**# of Containers:** 2

| PARAMETER | RESULT | UNITS | MDL* | INST | REF** | METHOD | EXTRACT | ANALYSIS |
|---|---|---|---|---|---|---|---|---|
| Total Hydrocarbons | 200 | mg/Kg | 40 | IR | 2 | 503BCE | ----- | 02/09/89 |
| HSL Volatile Organics ** | ND | ug/Kg | 1* | GC/MS | 1 | 8240 | ----- | 02/10/89 |

Please Note: One of the VOA vials was received broken.

** Note: All compounds were below the detection limits except those listed above.

1* A list of HSL volatile organics analyzed for and their detection limits accompanies this report.

* MDL--Method Detection Limits (same units as the Results)
** REF--Reference as cited on the cover (first) page of this report.

ALPHA ANALYTICAL LABORATORIES
CERTIFICATE OF ANALYSIS

**Client:** Rizzo Associates

**Sample Number:** 890208.2D

**Analysis Requested:** Total Petroleum Hydrocarbons (IR)

**Date Received:** 01/27/89

**Date Reported:** 02/10/89

**Client Ident:** GRV-SS-RZ7-102 (duplicate)
**Sample Location:**
**Sample Description:** Soil
**Sample Container:** Glass jar
**Field Prep:** None

**# of Containers:** 1

| PARAMETER | RESULT | UNITS | MDL* | INST | REF** | METHOD | EXTRACT | ANALYSIS |
|---|---|---|---|---|---|---|---|---|
| Total Hydrocarbons | 240 | mg/Kg | 40 | IR | 2 | 503BCE | ----- | 02/09/89 |

* MDL--Method Detection Limits (same units as the Results)
** REF--Reference as cited on the cover (first) page of this report.

ALPHA ANALYTICAL LABORATORIES
CERTIFICATE OF ANALYSIS

**Client:** Rizzo Associates

**Sample Number:** 890208.3

**Analysis Requested:** Soluble Priority Pollutant 13 Metals and Hexavalent Chromium

**Date Received:** 01/27/89

**Date Reported:** 02/10/89

**Client Ident:** GRV-GW-RZ1-103
**Sample Location:**
**Sample Description:** Water
**Sample Container:** Plastic bottle
**Field Prep:** None

**# of Containers:** 1

| PARAMETER | RESULT | UNITS | MDL* | INST | REF** | METHOD | EXTRACT | ANALYSIS |
|---|---|---|---|---|---|---|---|---|
| Soluble PP 13 Metals | | | | | | | | |
| Antimony | ND | mg/L | 0.2 | AA | 2 | 303A | ----- | 02/09/89 |
| Arsenic | ND | mg/L | 0.003 | HGA | 2 | 304 | ----- | 02/09/89 |
| Beryllium | ND | mg/L | 0.005 | AA | 2 | 303C | ----- | 02/09/89 |
| Cadmium | ND | mg/L | 0.02 | AA | 2 | 303A | ----- | 02/09/89 |
| Chromium | ND | mg/L | 0.05 | AA | 2 | 303A | ----- | 02/09/89 |
| Copper | ND | mg/L | 0.02 | AA | 2 | 303A | ----- | 02/09/89 |
| Lead | ND | mg/L | 0.05 | AA | 2 | 303A | ----- | 02/09/89 |
| Mercury | ND | mg/L | 0.0005 | CV | 2 | 303F | ----- | 02/09/89 |
| Nickel | ND | mg/L | 0.04 | AA | 2 | 303A | ----- | 02/09/89 |
| Selenium | ND | mg/L | 0.005 | HGA | 2 | 304 | ----- | 02/09/89 |
| Silver | ND | mg/L | 0.01 | HGA | 2 | 303A | ----- | 02/09/89 |
| Thallium | ND | mg/L | 0.1 | AA | 2 | 303A | ----- | 02/09/89 |
| Zinc | 0.085 | mg/L | 0.005 | AA | 2 | 303A | ----- | 02/09/89 |
| Hexavalent Chromium | ND | mg/L | 0.05 | Spect | 2 | 312B | ----- | 01/27/89 |

* MDL--Method Detection Limits (same units as the Results)
** REF--Reference as cited on the cover (first) page of this report.

ALPHA ANALYTICAL LABORATORIES
CERTIFICATE OF ANALYSIS

**Client:** Rizzo Associates

**Sample Number:** 890208.3S

**Analysis Requested:** Soluble Priority Pollutant 13 Metals (spike recovery)

**Date Received:** 01/27/89

**Date Reported:** 02/10/89

**Client Ident:** GRV-GW-RZ1-103
**Sample Location:**
**Sample Description:** Water
**Sample Container:** Plastic bottle
**Field Prep:** None

**# of Containers:** 1

| PARAMETER | %RECOVERY |
|---|---|
| Soluble PP 13 Metals | |
| Antimony | 100% |
| Arsenic | 101% |
| Beryllium | 94% |
| Cadmium | 98% |
| Chromium | 102% |
| Copper | 100% |
| Lead | 90% |
| Mercury | 100% |
| Nickel | 100% |
| Selenium | 130% |
| Silver | 80% |
| Thallium | 110% |
| Zinc | 104% |

* MDL--Method Detection Limits (same units as the Results)
** REF--Reference as cited on the cover (first) page of this report.

ALPHA ANALYTICAL LABORATORIES
CERTIFICATE OF ANALYSIS

**Client:** Rizzo Associates

**Sample Number:** 890208.4

**Analysis Requested:** Total Petroleum Hydrocarbons (IR) and HSL Volatile Organics

**Date Received:** 01/27/89

**Date Reported:** 02/10/89

**Client Ident:** GRV-GW-RZ3-104
**Sample Location:**
**Sample Description:** Water
**Sample Container:** Glass bottle, VOA vials

**# of Containers:** 3

**Field Prep:** None

| PARAMETER | RESULT | UNITS | MDL* | INST | REF** | METHOD | EXTRACT | ANALYSIS |
|---|---|---|---|---|---|---|---|---|
| Total Hydrocarbons | 3.8 | mg/L | 0.5 | IR | 2 | 503BE | ----- | 02/07/89 |
| HSL Volatile Organics ** | | | | | | | | |
| Chloroform | 7.0 | ug/L | 1* | GC/MS | 1 | 8240 | ----- | 02/10/89 |
| Toluene | 17 | ug/L | 1* | GC/MS | 1 | 8240 | ----- | 02/10/89 |

** Note: All compounds were below the detection limits except those listed above.

1* A list of HSL volatile organics analyzed for and their detection limits accompanies this report.

* MDL--Method Detection Limits (same units as the Results)
** REF--Reference as cited on the cover (first) page of this report.

ALPHA ANALYTICAL LABORATORIES
CERTIFICATE OF ANALYSIS

**Client:** Rizzo Associates

**Sample Number:** 890208.5

**Analysis Requested:** Total Petroleum Hydrocarbons (IR) and HSL Volatile Organics

**Date Received:** 01/27/89

**Date Reported:** 02/10/89

**Client Ident:** GRV-GW-RZ5-105
**Sample Location:**
**Sample Description:** Water
**Sample Container:** Glass bottle, VOA vials

**# of Containers:** 3

**Field Prep:** None

| PARAMETER | RESULT | UNITS | MDL* | INST | REF** | METHOD | EXTRACT | ANALYSIS |
|---|---|---|---|---|---|---|---|---|
| Total Hydrocarbons | ND | mg/L | 0.5 | IR | 2 | 503BE | ----- | 02/07/89 |
| HSL Volatile Organics ** | | | | | | | | |
| Chloroform | 6.6 | ug/L | 1* | GC/MS | 1 | 8240 | ----- | 02/10/89 |
| Toluene | 15 | ug/L | 1* | GC/MS | 1 | 8240 | ----- | 02/10/89 |

** Note: All compounds were below the detection limits except those listed above.

1* A list of HSL volatile organics analyzed for and their detection limits accompanies this report.

* MDL--Method Detection Limits (same units as the Results)
** REF--Reference as cited on the cover (first) page of this report.

ALPHA ANALYTICAL LABORATORIES
CERTIFICATE OF ANALYSIS

**Client:** Rizzo Associates

**Sample Number:** 890208.6

**Analysis Requested:** Total Petroleum Hydrocarbons (IR) and HSL Volatile Organics

**Date Received:** 01/27/89

**Date Reported:** 02/10/89

**Client Ident:** GRV-GW-RZ6-106
**Sample Location:**
**Sample Description:** Water
**Sample Container:** Glass bottle, VOA vials
**Field Prep:** None

**# of Containers:** 3

| PARAMETER | RESULT | UNITS | MDL* | INST | REF** | METHOD | EXTRACT | ANALYSIS |
|---|---|---|---|---|---|---|---|---|
| Total Hydrocarbons | ND | mg/L | 0.5 | IR | 2 | 503BE | ----- | 02/07/89 |
| HSL Volatile Organics ** | | | | | | | | |
| Chloroform | 4.8 | ug/L | 1* | GC/MS | 1 | 8240 | ----- | 02/10/89 |
| Benzene | 16 | ug/L | 1* | GC/MS | 1 | 8240 | ----- | 02/10/89 |

** Note: All compounds were below the detection limits except those listed above.

1* A list of HSL volatile organics analyzed for and their detection limits accompanies this report.

* MDL--Method Detection Limits (same units as the Results)
** REF--Reference as cited on the cover (first) page of this report.

ALPHA ANALYTICAL LABORATORIES
CERTIFICATE OF ANALYSIS

**Client:** Rizzo Associates

**Sample Number:** 890208.7

**Analysis Requested:** HSL Volatile Organics

**Date Received:** 01/27/89

**Date Reported:** 02/10/89

**Client Ident:** GRV-GW-RZ6D-107
**Sample Location:**
**Sample Description:** Water
**Sample Container:** VOA vials
**Field Prep:** None

**# of Containers:** 2

| PARAMETER | RESULT | UNITS | MDL* | INST | REF** | METHOD | EXTRACT | ANALYSIS |
|---|---|---|---|---|---|---|---|---|
| HSL Volatile Organics ** | | | | | | | | |
| Chloroform | 5.6 | ug/L | 1* | GC/MS | 1 | 8240 | ----- | 02/10/89 |
| Benzene | 18 | ug/L | 1* | GC/MS | 1 | 8240 | ----- | 02/10/89 |

** Note: All compounds were below the detection limits except those listed above.

1* A list of HSL volatile organics analyzed for and their detection limits accompanies this report.

* MDL--Method Detection Limits (same units as the Results)
** REF--Reference as cited on the cover (first) page of this report.

ALPHA ANALYTICAL LABORATORIES
CERTIFICATE OF ANALYSIS

**Client:** Rizzo Associates

**Sample Number:** 890208.8

**Analysis Requested:** Total Petroleum Hydrocarbons (IR) and HSL Volatile Organics

**Date Received:** 01/27/89

**Date Reported:** 02/10/89

**Client Ident:** GRV-GW-RZ4-108
**Sample Location:**
**Sample Description:** Water
**Sample Container:** Glass bottle, VOA vials
**Field Prep:** None

**# of Containers:** 3

| PARAMETER | RESULT | UNITS | MDL* | INST | REF** | METHOD | EXTRACT | ANALYSIS |
|---|---|---|---|---|---|---|---|---|
| Total Hydrocarbons | 2,400 | mg/L | 0.5 | IR | 2 | 503BE | ----- | 02/07/89 |
| HSL Volatile Organics ** | | | | | | | | |
| Chloroform | 2.7 | ug/L | 1* | GC/MS | 1 | 8240 | ----- | 02/10/89 |
| Ethylbenzene | 11 | ug/L | 1* | GC/MS | 1 | 8240 | ----- | 02/10/89 |
| Xylenes | 100 | ug/L | 1* | GC/MS | 1 | 8240 | ----- | 02/10/89 |

** Note: All compounds were below the detection limits except those listed above.

1* A list of HSL volatile organics analyzed for and their detection limits accompanies this report.

* MDL--Method Detection Limits (same units as the Results)
** REF--Reference as cited on the cover (first) page of this report.

ALPHA ANALYTICAL LABORATORIES
CERTIFICATE OF ANALYSIS

**Client:** Rizzo Associates

**Sample Number:** 890208.9

**Analysis Requested:** Total Petroleum Hydrocarbons (IR)

**Date Received:** 01/27/89

**Date Reported:** 02/10/89

**Client Ident:** GRV-GW-RZ4D-109
**Sample Location:**
**Sample Description:** Water
**Sample Container:** Glass bottle
**Field Prep:** None

**# of Containers:** 1

| PARAMETER | RESULT | UNITS | MDL* | INST | REF** | METHOD | EXTRACT | ANALYSIS |
|---|---|---|---|---|---|---|---|---|
| Total Hydrocarbons | 3,100 | mg/L | 0.5 | IR | 2 | 503BE | ----- | 02/07/89 |

* MDL--Method Detection Limits (same units as the Results)
** REF--Reference as cited on the cover (first) page of this report.

ALPHA ANALYTICAL LABORATORIES
CERTIFICATE OF ANALYSIS

**Client:** Rizzo Associates

**Sample Number:** 890208.10

**Analysis Requested:** Total Petroleum Hydrocarbons (IR) and HSL Volatile Organics

**Date Received:** 01/27/89

**Date Reported:** 02/10/89

**Client Ident:** GRV-OF-DRN-110
**Sample Location:**
**Sample Description:** Water
**Sample Container:** Glass bottle, VOA vials

**# of Containers:** 3

**Field Prep:** None

| PARAMETER | RESULT | UNITS | MDL* | INST | REF** | METHOD | EXTRACT | ANALYSIS |
|---|---|---|---|---|---|---|---|---|
| Total Hydrocarbons | 7.9 | mg/L | 0.5 | IR | 2 | 503BE | ----- | 02/07/89 |
| HSL Volatile Organics ** | | | | | | | | |
| Chloroform | 3.7 | ug/L | 1* | GC/MS | 1 | 8240 | ----- | 02/10/89 |

** Note: All compounds were below the detection limits except those listed above.

1* A list of HSL volatile organics analyzed for and their detection limits accompanies this report.

* MDL--Method Detection Limits (same units as the Results)
** REF--Reference as cited on the cover (first) page of this report.

HSL VOLATILE ORGANICS BY GC/MS
METHOD 624

| PARAMETER | METHOD DETECTION LIMIT |
|---|---|
| Methylene chloride | 2.8 ug/L |
| 1,1-Dichloroethane | 4.7 ug/L |
| Chloroform | 1.6 ug/L |
| Carbon tetrachloride | 2.8 ug/L |
| 1,2-Dichloropropane | 6.0 ug/L |
| Dibromochloromethane | 3.1 ug/L |
| 1,1,2-Trichloroethane | 5.0 ug/L |
| 2-Chloroethylvinyl ether | 10.0 ug/L |
| Tetrachloroethene | 4.1 ug/L |
| Chlorobenzene | 6.0 ug/L |
| Trichlorofluoromethane | 5.0 ug/L |
| 1,2-Dichloroethane | 2.8 ug/L |
| 1,1,1-Trichloroethane | 3.8 ug/L |
| Bromodichloromethane | 2.2 ug/L |
| Trans-1,3-Dichloropropene | 5.0 ug/L |
| Cis-1,3-Dichloropropene | 5.0 ug/L |
| Bromoform | 4.7 ug/L |
| 1,1,2,2-Tetrachloroethane | 6.9 ug/L |
| Benzene | 6.0 ug/L |
| Toluene | 6.0 ug/L |
| Ethyl benzene | 7.2 ug/L |
| Xylenes | 10.0 ug/L |
| Chloromethane | 8.0 ug/L |
| Bromomethane | 7.0 ug/L |
| Vinyl chloride | 6.5 ug/L |
| Chloroethane | 7.5 ug/L |
| 1,1-Dichloroethene | 2.8 ug/L |
| 1,2-Dichloroethene | 1.6 ug/L |
| Trichloroethene | 1.9 ug/L |
| 1,2-Dichlorobenzene | 10.0 ug/L |
| 1,3-Dichlorobenzene | 10.0 ug/L |
| 1,4-Dichlorobenzene | 10.0 ug/L |
| Acetone | 500.0 ug/L |
| Carbon disulfide | 20.0 ug/L |
| 2-Butanone | 30.0 ug/L |
| Vinyl acetate | 30.0 ug/L |
| 4-Methyl-2-pentanone | 20.0 ug/L |
| 2-Hexanone | 20.0 ug/L |
| Styrene | 10.0 ug/L |
| o-Xylene | 10.0 ug/L |

NOTE: Detection limits in soil and sediment are 50X higher.