

COPY

Nov 6 10 23 AM '98

WASTE MANAGEMENT

Phase (check one)		Type (check one)
<input checked="" type="checkbox"/>	Initial Site Investigation	Work Scope
	Corrective Action Feasibility Investigation	<input checked="" type="checkbox"/> Technical Report
	Corrective Action Plan	PCF Reimbursement Request
	Corrective Action Summary Report	General Correspondence
	Operations and Monitoring Report	

A PHASE II HYDROGEOLOGIC INVESTIGATION
of
Robinson's, Inc.
33-35 Park Street
Essex Junction, Vermont
44° 29' 20" North Latitude, 73° 07' 03" West Longitude

KSKGeoTM Project #: 98016
DEC Spill #: 982473
UST Facility ID #: 3004

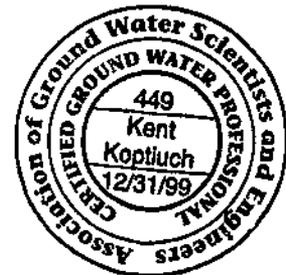
Prepared For:

Mr. Jim Robinson
Post Office Box 405
Essex Junction, Vermont 05453

Submitted by:

KENT S. KOPTIUCH, Inc.
Geo-Environmental Services
164 Osgood Hill
Essex, Vermont 05452

Date: November 4, 1998



Prepared By:

John C. Roman

John C. Roman
Project Manager
Environmental Scientist

Reviewed By:

Kent S. Koptiuch

Kent S. Koptiuch, CGWP #449
President
Principal Hydrogeologist

KSKGeoTM

EXECUTIVE SUMMARY

KENT S. KOPTIUCH, Inc. (KSKGeoS™), under the authorization of Mr. Jim Robinson and the Vermont Department of Environmental Conservation (VT DEC), conducted a Phase II hydrogeologic investigation of the Robinson's, Inc. bulk fuel storage facility located on Park Street in Essex Junction, Vermont.

- KSKGeoS™ completed the installation, development, and sampling of four (4) groundwater monitoring wells. Each of the water samples was analyzed under EPA method 8021B for BTEX and MTBE (purgeable aromatics) and under EPA modified Method 8015 for total petroleum hydrocarbons (TPH).
- Groundwater exhibits a northeasterly flow direction across the site. Gradient is approximately 4.8%. The rate of groundwater travel through the aquifer is approximately 2.38×10^{-2} gpd/ft².
- No separate-phase petroleum hydrocarbon products were observed during soil boring, well installation, or groundwater sampling activities.
- Based upon groundwater laboratory chemical analytical results, two (2) distinct dissolved-phase contaminant plumes appear to be present in the overburden aquifer; the primary plume appears to be associated with the former UST systems, while the secondary plume may have a source in the vicinity of the AST farm.
- Contaminants present in groundwater in excess of the Vermont Groundwater Enforcement Standards include methyl-tert butyl ether (MTBE), benzene, 1,3,5-trimethylbenzene, 1,2,4-trimethylbenzene, and naphthalene.
- There is no evidence to indicate that off-site migration has occurred at this time.
- A tight clay horizon below the eight (8) -foot depth at the site should serve as an effective aquitard to minimize down-ward migration and bedrock infiltration of the contaminant plumes.
- There are no identified potential receptors impacted by the contaminant plumes beyond the site perimeter.
- There is no evidence to indicate the presence of any immediate threat to human life, health, or safety at the site.
- No further investigative measures are recommended for the site at this time, however, KSKGeoS™ does recommend semi-annual sampling, analyses, and reporting of the monitoring well network for water quality tracking.

TABLE OF CONTENTS

	DESCRIPTION	PAGE
	EXECUTIVE SUMMARY	
1.0	INTRODUCTION	1
1.1	Authorization and Site Description	1
1.2	Historical Background	1
1.3	Goals	3
1.4	Scope of Work	3
2.0	INVESTIGATIVE METHODOLOGY	4
2.1	Soil Boring & Groundwater Monitoring Well Installation	4
2.2	Soil Sampling and Field Analysis	4
2.3	Groundwater Monitoring, Sampling, and Analysis	4
2.4	Potential Receptor Survey	5
3.0	RESULTS	5
3.1	Geologic, Overburden Lithologic, Geomorphologic, and Hydrogeologic Summary	5
3.2	Specific Hydrogeological Characteristics	7
3.3	Groundwater Laboratory Chemical Analytical Results	8
3.4	Potential Environmental Concerns	8
3.4.1	Site Specific Concerns	8
3.4.2	Surrounding Land Uses	9
3.4.3	Potable Water Sources - 1 mile Radius of Site	9
3.4.4	Other Identified Sensitive Receptors - 1 Mile Radius of Site	9
3.4.5	Hazardous Sites Review/Identification	9
4.0	FINDINGS	9
5.0	RECOMMENDATIONS	10
6.0	LIMITATIONS	10
7.0	REFERENCES	11

FIGURES

1	Site Location Map	2
2	Groundwater Contour Map with BTEX and MTBE Isocons	6

SUMMARY TABLES

1	Groundwater Elevations - August 24, 1998	5
2	Laboratory Chemical Analytical Results -August 24, 1998	7

ATTACHMENTS

1	Boring and Well Completion Logs	
2	Laboratory Chemical Analytical Results - August 24, 1998 Groundwater Sampling Event	

1.0 INTRODUCTION

1.1 Authorization and Site Description

On August 13, 1998, KENT S. KOPTIUCH, Inc. Geo-Environmental Services (KSKGeoS™) was authorized by Mr. Jim Robinson to conduct a phase II subsurface hydrogeologic investigation upon property he owns located on 33-35 Park Street in Essex Junction, Vermont. This property is referred to as Robinsons, Inc. (*the Site*). KSKGeoS™ investigation was performed under the Vermont Agency of Natural Resources (ANR) Department of Environmental Conservation (DEC) Waste Management Division's Sites Management Section (SMS) expressway site investigation format with notification filed on August 3, 1998.

The site is located on the west side of Route 2A approximately 2/10 of a mile south of the "five corners" intersection in the village of Essex Jct., Vermont. The area surrounding the site is comprised of mixed commercial, industrial and residential land use. **Figure 1** is a *Site Location Map* depicting the facility's relative geographic location and its topographic setting. The lot size is approximately 1.0 acre ± and is primarily rectangular in shape.

The site is currently occupied by Robinson's, Inc. and is operated as a bulk fuel oil storage facility (Facility ID #3004) for fuel oil #2, diesel, and kerosene. Gasoline products are no longer stored at the site but were up until recently. The site includes a single story building with warehouse loft which serves as an office and garage, a detached storage shed, and a bermed tank farm in which there are currently four (4) above-ground petroleum storage tanks (ASTs). There is a fuel dispenser rack at the facility for the filling of delivery trucks. There are no longer any known underground storage tanks (USTs) on site.

This investigation was initiated following the closure by removal of three (3) USTs completed in July of 1998 to address concerns of possible groundwater and/or soils impact at the site by petroleum hydrocarbons associated with the former UST systems.

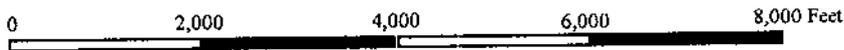
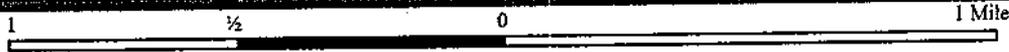
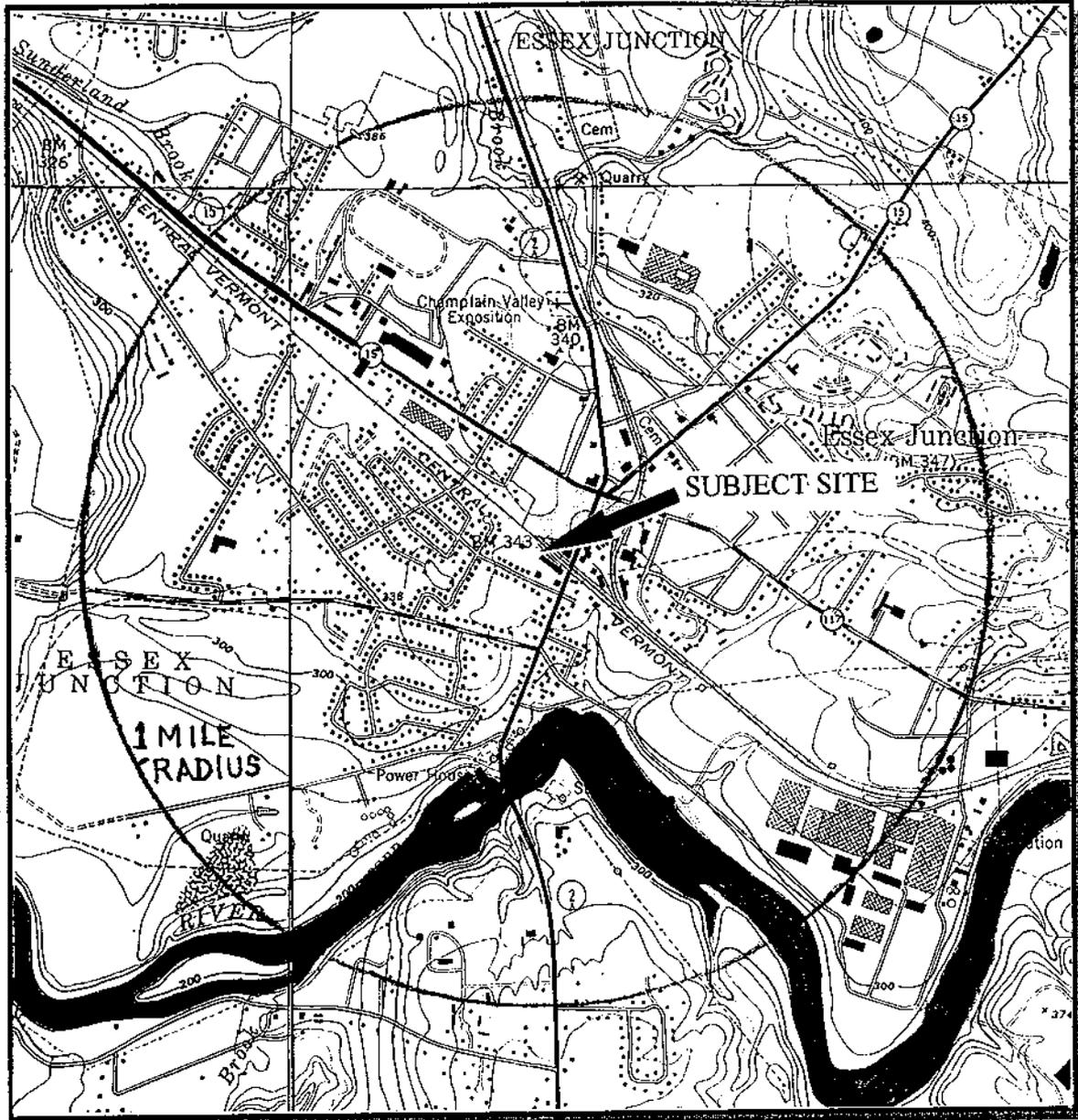
1.2 Historical Background

According to Mr. Robinson, the site was developed initially specifically as a bulk petroleum storage facility approximately 50 years ago. During the 1970's, two 30,000 gallon USTs were placed in service on the eastern side of the site. In the mid 1980's, a 10,000 gallon UST was also placed in service next to the larger USTs. These tanks stored gasoline and kerosene (K-1) fuel oil. Surface-mounted transfer pumps were utilized to transfer fuel from these tanks to delivery trucks.

On July 29 through 31, 1998, in order to meet the 1998 deadline for upgrading this tank system, Mr. Robinson elected to close these UST systems by removal. In our Underground Storage Tank Closure Report, dated August 3, 1998, KSKGeoS™ noted a maximum petroleum impact to soils of 360 ppm by photoionization detector (PID). Ground water was encountered at approximately 7.5 feet below ground surface (BG) during the removal of the USTs. The ground water in the UST excavation exhibited "coalesced", but un-measurable, separate-phase liquid petroleum droplets and globules floating upon it.

Field inspection of the USTs, following their removal from the ground, did not reveal any apparent holes or failures in the tanks. Soils removed from the excavation for the tank closure were placed back into the pit and a phase II hydrogeologic investigation was initiated by KSKGeoS™ on August 17, 1998.

Figure 1
Site Location Map



SCALE: 1" = 2,000 Feet

SOURCES:

- Burlington Quadrangle, Vermont 7.5 Minute Series (Topographic) U.S.G.S. Reston, VA 1987
- Colchester Quadrangle, Vermont 7.5 Minute Series (Topographic) U.S.G.S. Reston, VA 1972
- Essex Center Quadrangle, Vermont 7.5 Minute Series (Topographic) U.S.G.S. Reston, VA 1987
- Essex Junction Quadrangle, Vermont 7.5 Minute Series (Topographic) U.S.G.S. Reston, VA 1987



1.3 Goals

KSKGeoS™ developed this investigation to meet the following goals:

- To assess the current environmental conditions in the overburden soils and in the unconsolidated groundwater aquifer by defining the extent and concentrations (if any) of separate-phase and/or dissolved-phase petroleum hydrocarbon product plume(s).
- To identify and evaluate the impacts (if any) to identified potential receptors in the vicinity of the site, and;
- To identify a potential remedial action program or future monitoring program suitable to address identified impacts (if any) revealed through the course of this investigation.

1.4 Scope of Work

KSKGeoS™'s scope of work on this site included the completion of the following tasks:

- A file search of Vermont Agency of Natural Resources Department of Environmental Conservation (DEC) records at the Waste Management Division's Sites Management Section in Waterbury, Vermont.
- Preparation of a site-specific health and safety plan (HASP) in accord with OSHA 29 CFR 1910.120.
- Field identification of potential receptors proximal to the site, including but not limited to: potable water supply sources, surface waterbodies and waterways, sensitive environmental areas, basement and crawl-space air quality in on-site and adjacent buildings, and possible preferential subsurface migratory pathways.
- Completion with professional oversight of four (4) soil borings by hollow stem auger drilling methods with each of these borings finished as two (2) -inch diameter groundwater monitoring wells (MW-1, MW-2, MW-3, and MW-4).
- Split-barreled (split spoon) sampling of the overburden soils during soil boring activities in accord with ASTM standard D1586. All samples were screened for VOCs, using jarred head-space methodology, with an H-Nu PI-101, 10.2 electron-volt (eV) lamp, photoionization detector (PID).
- Survey of groundwater monitoring well locations and elevations to an assumed datum of 100.00 -feet. Elevational accuracy is $\pm 0.01'$; spatial accuracy is $\pm 1.0'$.
- Gauging of groundwater elevations of all wells in the monitoring well network.
- Sampling of groundwater from wells MW-1, MW-2, MW-3, and MW-4 under chain-of-custody protocol. Field blank samples were also secured.
- Laboratory chemical analysis of groundwater samples for benzene, toluene, ethylbenzene, and total xylenes (BTEX); methyl tert-butyl ether (MTBE); 1,3,5-trimethylbenzene; 1,2,4 trimethylbenzene; and naphthalene by EPA method 8021b.
- Laboratory chemical analysis of groundwater samples for total petroleum hydrocarbons (TPH) by modified EPA Method 8015.
- Data evaluation, interpretation, and mapping.
- Summary report preparation including all investigative results, documentation, interpretation, and findings and recommendations.

Figure 2 is a site map showing property layout, with groundwater monitoring well locations, and groundwater contours on August 24, 1998.

2.0 INVESTIGATIVE METHODOLOGY

2.1 Soil Boring & Groundwater Monitoring Well Installation

Boring and well installations at the site were completed on August 17, 1998. All monitoring well locations were selected by KSKGeoS™ supervising scientist, John Roman. Monitoring well locations were sited to best represent the overburden and groundwater conditions on a site-wide basis. Soil borings and wells were completed by Tri-State Drilling & Boring of West Burke, Vermont under the direct supervision of Mr. Roman.

A Mobile, B-57, truck-mounted, drill rig, equipped with 4¾" inside diameter (ID), hollow-stem augers was utilized for boring and well installations. The wells are constructed of two-inch (2") diameter, flush-threaded PVC screening and casing. Screening is factory slotted to 0.010' (an equivalent of 0.010 -feet of opening per running foot of screen); or, at locations where separate-phase petroleum might be encountered, monitoring wells were constructed using a screen slot of 0.020' (an equivalent of 0.020 -feet of opening per running foot of screen). The screened interval for each well was determined by the supervising scientist to extend at least five (5) -feet above and five (5) -feet below the groundwater table, where possible, to allow for seasonal fluctuations.

The annulus of each borehole was then filter-packed with washed, #1 Morie sand to a depth at least one (1) foot above the top of the screened interval. A one (1) -foot (or greater) hydrated bentonite seal was emplaced above the filter-pack. The remainder of the annular space was then backfilled with clean cuttings from each borehole. The top of each well casing was secured with a gripper-type cap. All four (4) wells were completed with flush-mounted, steel manholes set in concrete pads. Boring and well completion logs are included as **Attachment 1**.

Upon completion, each well was developed by hand through repetitive bailing. Well top-of-casing elevations were surveyed in on August 19, 1998 by Mr. Roman and Mr. Kent Koptiuch to an assumed datum of 100.00 -feet. The top of the concrete slab on the western end of the rack dispenser island was used as a benchmark.

2.2 Soil Sampling and Field Analysis

Soil boring samples were secured with a two-inch (2") outside diameter split-barreled sampler (split-spoon), advanced with the aid of a 140 -pound drop hammer, in conformance with ASTM Standard D-1586. Sampling was conducted at continuous intervals beginning at-grade for initial boring activities to characterize the soils and to establish the groundwater table elevation, and then, on average, at every 5.0 -foot interval.

Split-spoons were decontaminated after each sample was collected with a double-rinse, liquinox-clean water solution and clean water. All samples were classified by the supervising scientist using the Unified Soil Classification System.

Each soil sample was screened for the presence of VOCs by PID using bagged, head-space methodology. The PID employed was an H-Nu PI-101 with a 10.2 eV lamp. The unit was calibrated on-site for benzene in calibration gas equivalents (CGEs) of 100% isobutylene at 70 parts per million (ppm).

2.3 Groundwater Monitoring, Sampling, and Analysis

Following the survey, on August 24, 1998, an optical interface probe, capable of determining groundwater and separate-phase hydrocarbon petroleum product presence and thickness to within 0.01', was utilized to profile the elevations and the VOC characteristics of the overburden aquifer within each well. The probe was decontaminated between each well measurement following the method described in **Section 2.2**. **Table 1** is a summary of groundwater elevations for the August 24, 1998 gauging event.

Water volumes were then calculated for each of the four (4) wells to be sampled, and the equivalent of

SUMMARY TABLE 1: GROUNDWATER ELEVATIONS (in feet) - August 24, 1998						
WELL	GRADE	TOP-OF-CASING	SCREENED INTERVAL	DEPTH-TO-BOTTOM (BG)	DEPTH-TO-WATER	WATER ELEVATION
MW-1	101.43	101.20	82.23-97.23'	19.20	11.25	89.95
MW-2	97.93	97.54	84.50-94.50'	13.43	3.80	93.74
MW-3	100.10	99.85	85.32-95.32'	14.78	5.85	94.00
MW-4	99.72	99.60	80.50-95.50'	19.22	5.74	93.86

Table 1 Notes:

- 1) Benchmark: Top of concrete slab for fuel loading rack.

three (3) well volumes were purged, by bailing, prior to sampling. Groundwater samples and a field blank were then secured under chain-of-custody protocol.

The sampling bailer was decontaminated between each well utilizing a liquinox-distilled water solution followed by a distilled water rinse. All samples were packed on ice and hand-delivered to Endyne, Inc. Laboratory Services (Endyne) in Williston, Vermont that afternoon. Table 2 is a summary of the laboratory chemical analytical results for ground water samples obtained on August 24, 1998. The actual laboratory chemical analytical reports prepared by Endyne is included as Attachment 2.

Laboratory chemical analyses was completed by Endyne in accordance with EPA Method 8021B and with modified EPA method 8015. Method 8021B is utilized to identify benzene, toluene, ethylbenzene, and total xylene constituents (BTEX); 1,2,4 Tri-methylbenzene; 1,3,5 Tri-methylbenzene; Naphthalene; and Methyl-tert butyl ether (MTBE) in micrograms per liter (µg/L). The modified EPA Method 8015 is utilized for total petroleum hydrocarbon (TPH) concentrations in milligrams per liter (mg/L).

2.4 Potential Receptor Survey

A physical survey was conducted to identify potential receptors, including surface waterbodies, potable water sources, neighboring or on-site basements and/or crawl-spaces, sensitive environmental areas, and likely routes of subsurface conductance.

In addition, a review of the SMS' Vermont Hazardous Sites List was completed to identify any known spill sites in close proximity to the study site.

3.0 RESULTS

3.1 Geologic, Overburden Lithologic, Geomorphologic, and Hydrogeologic Summary

The site is located in the village of Essex Junction, Vermont in the Winooski River basin; the river is located approximately ¼ -mile to the south. The site is situated at approximately 340-feet above mean sea level. The topography at the site is relatively flat; the apparent surficial drainage is to the east with a gradient of less than 1%. Overall regional surficial drainage is generally to the south and southwest towards the Winooski River. The Winooski River drains into Lake Champlain approximately eight (8) miles north-northwest of the site.

According to the *Surficial Geologic Map of Vermont*, the site is situated upon pebbly marine sand deposits remnant of the former Champlain Sea with subsequent, post-glacial, fluvial sand scour and deposition associated with the modern actions of the Winooski River. An underlying clay horizon encountered at the site appears similar to glacial, lake-bottom silts and silt-clays mapped approximately 1½ -miles south of the site in North Williston, beyond the opposite bank of the Winooski River. Split - spoon samples obtained for this investigation revealed a gravelly sand horizon 3.0 feet BG, over a fine sand-to-silt matrix that extended to 8.0 feet BG. This changed gradually to a silt-clay to clay matrix.

During drilling, groundwater was encountered between 6.25-feet BG through 9.25-feet BG. Bedrock was

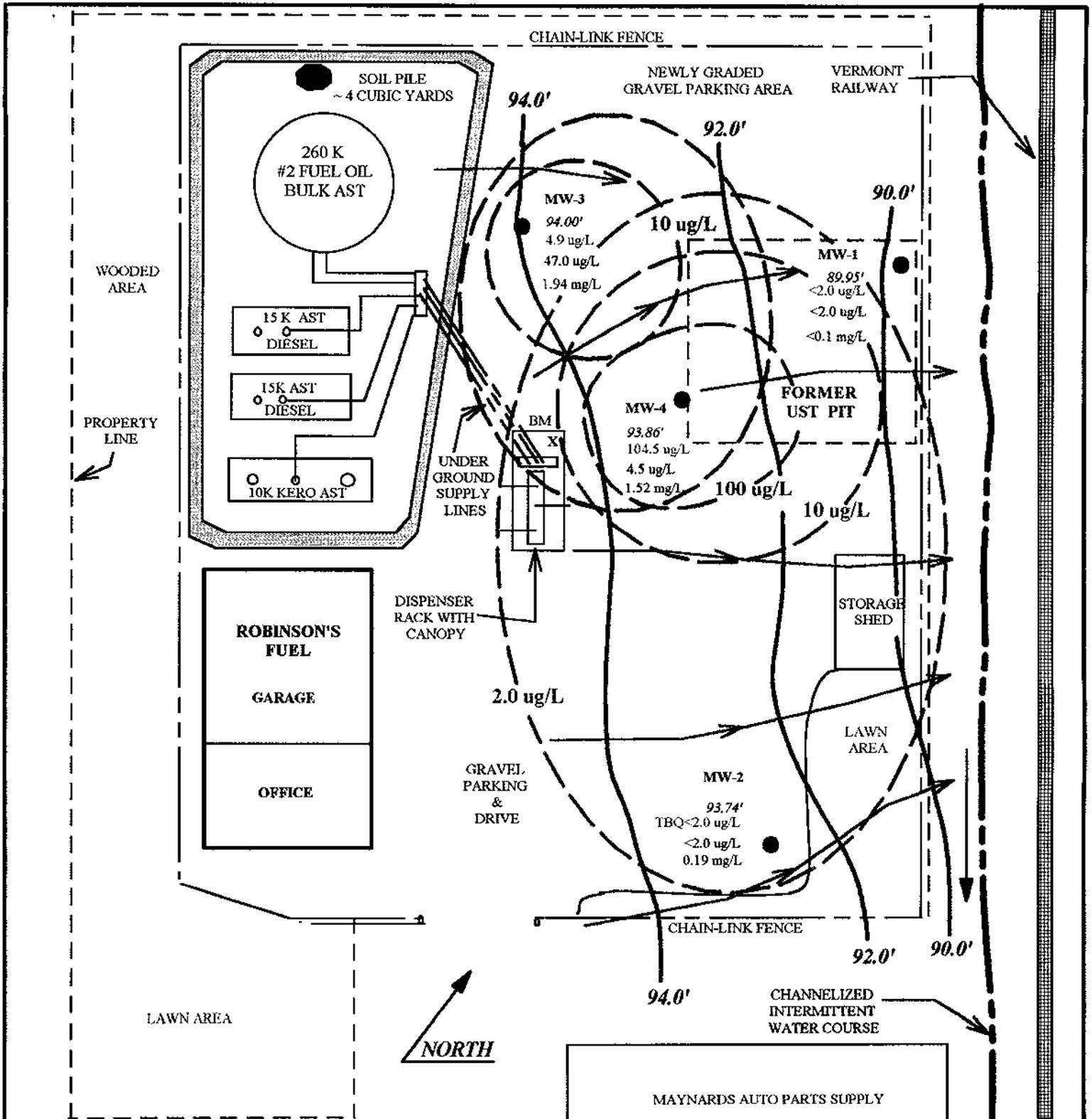


FIGURE 2 GROUNDWATER CONTOUR MAP with BTEX & MTBE ISOCONS	PROJECT INFORMATION		EXPLANATION	
KENT S. KOPTIUCH, INC. Geo-Environmental Services 164 Osgood Hill Essex, Vermont 05452 (802) 878-1620	CUSTOMER: MR. JIM ROBINSON PROJECT: ROBINSON'S, INC. PROJECT #: 98016 LOCATION: ESSEX JCT. VERMONT DEC SPILL #: 98-2473 DATE: AUGUST 24, 1998 DRAWN BY: JOHN C. ROMAN SCALE: 1" = 30' (APPROX.)		MONITORING WELL: MW-3 ● BENCHMARK: X BM (Assumed 100') WATER ELEVATION: 94.00' GROUNDWATER CONTOUR (2' Interval): 94.0' ——— DISSOLVED BTEX: 24.9 ug/L DISSOLVED MTBE: 47.0 ug/L TPH CONCENTRATION: 1.94 mg/L FLOW-NET LINE: ———→	

SUMMARY TABLE 2 - 8/24/98 LABORATORY CHEMICAL ANALYTICAL RESULTS										
WELL	MTBE µg/L	Benzene µg/L	Toluene µg/L	Ethyl- benzene µg/L	Xylenes µg/L	Total BTEX µg/L	1,3,5 Tri- Methylbenzene µg/L	1,2,4 Tri- Methylbenzene µg/L	Naphthalene µg/L	TPH mg/L
MW-1	<2.0	<1.0	<1.0	<1.0	<2.0	<2.0	<1.0	<1.0	<5.0	<0.10
MW-2	<2.0	<1.0	<1.0	TBQ <1.0	<2.0	TBQ <2.0	<1.0	1.2	<5.0	0.19
MW-3	47.0	2.2	<1.0	<1.0	2.9	55.1	5.1	3.1	<5.0	1.94
MW-4	4.5	7.5	<1.0	20.6	76.4	104.5	13.4	53.0	26.3	1.52

Table 2 Notes: 40 5 1000 700 10,000 — 4 5 20 —

- 1) Volatiles analyzed by EPA Method 8021B.
- 2) Total Petroleum Hydrocarbons (TPH) analyzed by modified EPA Method 8015 quantitated based upon the response of gasoline.
- 3) TBQ; Trace Below Quantitation Limit.
- 4) Concentrations in bold type represent levels which exceed Vermont Groundwater enforcement standards (VT ANR DEC, November 1997)

VGES

not encountered during this subsurface investigation. According to the *Bedrock Geologic Map of Vermont*, the underlying bedrock consists of the Upper Cambrian Gorge Formation of the Beekmantown Group of Rock River Dolomites. This formation is generally characterized as a fairly uniform, smooth, massive gray dolomite.

Split-spoon samples from MW-1 revealed only trace detectable VOCs by PID ranging from 0.2 ppm to 0.6 ppm in the 0.0 to 11.0 -foot depths; the water table was intersected in the 9.0 to 11.0 -foot depth BG sample. Samples obtained from 13.0 to 15.0 feet BG and at 18 to 20- feet BG did not yield any detectable VOCs by PID head-space analyses.

The boring completed for MW-2 yielded a peak concentration of 3.2 ppm from a split-spoon sample obtained for the 5.0 to 7.0-foot BG sample; this sample intersected the groundwater table.

Soil samples obtained from the boring for MW-3 yielded a peak concentration of 30.0 ppm from split-spoons obtained at the 8.0 to 10.0 -foot depth BG; this sample intersected the groundwater table. A distinct petroleum-type odor was noted during the boring and sampling of MW-3.

Soil samples obtained from the boring completed for MW-4 yielded a peak concentration of 52.0 ppm from split-spoons obtained at the 8.0 to 10.0 -foot depth BG; again this sample intersected the groundwater table. A distinct petroleum odor was noted during the boring and sampling of MW-4, and a petroleum-type sheen was observed on soils recovered at the 8.0 to 10.0 -foot depth BG, and at the 18.0 to 20.0 -foot depth BG, however, PID head-spacing yielded no detectable VOCs in the deeper sample.

3.2 Specific Hydrogeological Characteristics

Groundwater beneath the site was gauged at depths ranging from 4.19 to 11.48 -feet BG on the August 24, 1998 sampling date. Groundwater flow direction is to the northeast across the site with an approximate gradient of 4.8% (MW-3 to MW-1). An approximate rate-of-travel (V_a) in the overburden aquifer was calculated through the application of Darcy's Law utilizing typical constants for horizontal hydraulic conductivity (K_H) and porosity (n) of the observed aquifer matrix (Driscoll, 1986):

$$V_a = \{ [K_H (h_1 - h_2)] \div L \} \div n$$

where $(h_1 - h_2)$ is the difference in hydraulic head, and L is the distance along the flow-path for which the difference in hydraulic head is measured. When all known and assumed aquifer characteristics are entered

into the above equation, the resulting rate-of-travel from MW-3 to MW-1 on August 24, 1998 is:

$$V_a = \{[10 \text{ gpd/ft}^2 (94.00' - 89.95')] \div 85'\} \div 20\% = 2.38 \times 10^2 \text{ gpd/ft}^2$$

Table 1 is the groundwater elevation data calculated from the gauging of the monitoring well network on August 24, 1998. Figure 2 depicts groundwater contours of the overburden aquifer based upon this data.

3.3 Groundwater Laboratory Chemical Analytical Results

Actual laboratory chemical analytical results for all analytes are included as Attachment 2 of this report. Table 2 summarizes the results of these analyses. Samples were secured from the four (4) monitoring wells along with a field blank for quality control purposes.

- The groundwater sample secured from well MW-1 yielded no detectable analytes above the method detection limits (MDLs).
- The groundwater sample secured from well MW-2 yielded a trace (TBQ) of ethylbenzene below the MDL of 1.0 micrograms per liter ($\mu\text{g/L}$), and 1.2 $\mu\text{g/L}$ of 1,2,4 trimethylbenzene. The total dissolved BTEX concentration was a TBQ $< 2.0 \mu\text{g/L}$. The total petroleum hydrocarbon (TPH) concentration was 0.19 milligrams per liter (mg/L).
- The groundwater sample secured from MW-3 yielded 47.0 $\mu\text{g/L}$ of MTBE, 2.2 $\mu\text{g/L}$ of benzene, 2.9 $\mu\text{g/L}$ of total xylenes, 5.1 $\mu\text{g/L}$ of 1,3,5 trimethylbenzene, and a TPH concentration of 1.94 mg/L. The total dissolved BTEX concentration was 4.9 $\mu\text{g/L}$.
- The groundwater sample secured from MW-4 yielded 45.0 $\mu\text{g/L}$ of MTBE, 7.5 $\mu\text{g/L}$ of benzene, 20.6 $\mu\text{g/L}$ of ethylbenzene, 76.4 $\mu\text{g/L}$ of total xylenes, 13.4 $\mu\text{g/L}$ of 1,3,5 trimethylbenzene, 53.0 $\mu\text{g/L}$ of 1,2,4 trimethylbenzene, 26.3 $\mu\text{g/L}$ of naphthalene, and a TPH concentration of 1.52 mg/L. The total dissolved BTEX concentration was 104.5 $\mu\text{g/L}$.
- The field blank samples yielded no analyte concentrations above the MDLs.

3.4 Potential Environmental Concerns

3.4.1 Site Specific Concerns

General house-keeping practices involving the storage of bulk fuel products at the Robinson's, Inc. facility appear appropriate for the site; the facility is well-kept and both employees and drivers are well-versed in fuel handling procedures, and in the containment and clean-up of minor surface spills, should they occur. Emergency spill kits, fire extinguishers, and first aid kits are situated at key locations in the shop and at the loading rack. There are no floor drains or mechanic pits in the shop. The facility is serviced by a municipal water supply (Champlain Water District), and by municipal wastewater service (Village of Essex Junction POTW). Electrical service at the site is overhead.

The intermittent drainage swale that parallels the northeastern property line along the rail bed flows to the southeast and disappears in a culvert beneath Route 2A (Park Street) approximately 300 -feet from the site. The culvert does not re-emerge on the opposite side of the road; KSKGeoS™ was not able to readily identify its ultimate discharge location. This swale was not flowing at the time of the investigation, however, it had been observed as flowing during UST closure activities in July, 1998; no sheens, odors, or apparent contamination were observed in the watercourse at any time during UST closure, or during this investigation.

In plotting dissolved-phase isoconcentrations for BTEX and MTBE constituents (Figure 2), it appears that two (2) distinct, overlapping plumes may be present in the overburden aquifer. The BTEX plume exhibits a distribution that indicates the former UST systems as a source area. The MTBE plume,

L Sample?

however, appears more central to the MW-3 area, just down-gradient of the AST farm; this may be indicative of a separate release incident.

?

3.4.2 Surrounding Land Uses

Land uses on properties surrounding the site were noted as follows:

- Northwest -Wooded
- Northeast -(across the Vermont Railway bed) vacant, undeveloped, wood & shrublands
- Southeast -Maynard's Auto Parts Supply store and warehouse
- Southwest -Residential

3.4.3 Potable Water Sources - 1 Mile Radius of Site

There are no identified public or private water supply sources within a one (1) -mile radius of the study site; the entire area is serviced by the Champlain Water District.

3.4.4 Other Identified Sensitive Receptors - 1 Mile Radius of Site

Sensitive receptors within a one (1) -mile radius include soils, bedrock, and groundwater beneath and down-gradient of the site, the intermittent drainage swale along the site's northeastern margin, as well as the Winooski River.

3.4.5 Hazardous Sites Review/Identification

A review of the Vermont WMD *Hazardous Sites List* identified seven (7) sites within one (1) -mile of the study site. These sites are all hydraulically down- or cross-gradient of the study site and/or are associated with drainage basins that are not likely hydrogeologically connected to that of the site. The list of identified hazardous sites within the one (1) -mile radius is as follows:

Site #	ID	Location	Town	Action
1)	770012	IBM	Maple St/River Rd	Essex RCRA-CORRACTS ongoing
2)	900593	Fairgrounds Beverage	Rte 15/Pearl St	Essex LUST-Invest & Monitoring
3)	931476	McEwing Fuels	Rte 15/143 Main St	Essex LUST-Investigation needed
4)	961961	Agway (now a Mobil)	Rte 2A/2 Park St	Essex LUST-Monitoring ongoing
5)	961993	Road Res-Q	Rte 15/1 Main St	Essex LUST-Monitoring ongoing
6)	982365	Corner gas Store	Rte 15/141 Pearl St	Essex LUST-Investigation needed
7)	982430	Bushey's Sunoco	Rte 117/16 Maple St	Essex LUST-Investigation needed

4.0 FINDINGS

KENT S. KOPTIUCH, Inc. Geo-Environmental Services' phase II subsurface investigation at the Robinson's Inc. property, located on Route 100 in Warren, Vermont yielded the following results and findings:

- The overburden aquifer is comprised primarily of post-glacially, fluviually re-worked, gravelly-sands grading finer with depth to sandy-silts to silty-clays of marine depositional origin. The groundwater table was noted at depths ranging from 4.19 to 11.48 -feet below grade at the time of this investigation. Bedrock was not encountered.
- Groundwater flow conditions in the overburden aquifer exhibit a northeasterly flow direction across the site. Gradient is approximately 4.8% with a rate-of-travel through the overburden aquifer of approximately 2.38×10^2 gpd/ft².
- Soil sampling during boring activities revealed VOC impact in MW-1 to depths of 11.0 -feet with a maximum concentration of 0.2 ppm. Laboratory chemical analytical results of the groundwater

0.6

KSKGeoSTM

samples secured from monitoring well MW-1 yielded no detectable analyte concentrations. This well is the furthest down-gradient and is situated on the property boundary.

- Soil sampling during boring activities revealed VOC impact in MW-2 at the 5.0 to 7.0 -foot depth with a concentration of 3.2 ppm. Laboratory chemical analytical results of the groundwater sample from MW-2 yielded no detectable analyte concentrations above the Groundwater Enforcement Standards (GES), or the Preventive Action Standards (PES).
- Soil sampling during boring activities revealed VOC impact in MW-3 at the 8.0 to 10.0 -foot depth with a concentration of 30 ppm. Laboratory chemical analytical results of the groundwater sample from MW-3 yielded dissolved concentrations of MTBE and of 1,3,5-trimethylbenzene in excess of the GES.
- Soil sampling during boring activities revealed VOC impact in MW-4 at the 8.0 to 10.0 -foot depth with a concentration of 52 ppm. Laboratory chemical analytical results of the groundwater sample from MW-4 yielded dissolved concentrations of benzene, 1,3,5-trimethylbenzene, 1,2,4-trimethylbenzene, and naphthalene in excess of the GES.
- A review of the VT DEC Hazardous Sites List yielded seven (7) identified spill sites within a one (1) -mile radius of the study site. None of these other sites appear to exhibit any hydraulic influence or risk upon the Robinson's, Inc. site.
- Based upon the distribution of BTEX and MTBE isocons, two (2) distinct, but overlapping, release areas have been tentatively identified on the site; both plumes appear to be moving in a northeasterly direction towards the Vermont Railway property. Off-site migration of these dissolved-phase, petroleum hydrocarbon contaminant plumes has not yet occurred.
- The tighter silty-clay and clay overburden horizons at depths below 8.0 -feet will serve favorably as an aquitard to effectively minimize the potential for the down-ward migration of dissolved-phase petroleum hydrocarbon contaminants at the site.
- The results of this investigation suggest that the site poses no immediate threat to human health, life, or safety.

5.0 RECOMMENDATIONS

Based upon the findings of this subsurface investigation, KSKGeoS™ offers the following recommendations regarding future monitoring and/or remedial options for the Robinson's, Inc. property in Essex Junction:

- The groundwater monitoring wells at the site should be sampled by a qualified consultant and laboratory analyzed on a semi-annual basis to track the disposition of dissolved-phase contaminants in the overburden aquifer.
- The results of semi-annual groundwater sampling should be evaluated by a Certified Ground Water Professional and submitted in report-format, with findings and recommendations, to the Vermont Sites Management Section.

6.0 LIMITATIONS

This report is based upon limited physical investigation of the site and vicinity, samples from a fixed number of groundwater monitoring wells and sampling points, laboratory chemical analyses, and research of materials and files available at the time of the investigation. The findings presented in this report are based only on the observations drawn during this investigation, and upon data provided by others. This report presents a description of the subsurface conditions, in the overburden lithology at each sampling

and/or well location, that were prevalent at the time of KSKGeoS™ investigation.

Subsurface conditions can vary significantly over time, particularly with respect to groundwater elevations and groundwater and soil quality. Findings and recommendations presented in this document are applicable only to the facts and conditions described at the time of this investigation.

In performing its professional services, KSKGeoS™ employs the degree of care and skill exercised under similar circumstances by members of the environmental profession practicing in the same or similar locality under similar conditions. The standard of care shall be judged exclusively as of the time these services are rendered, and not according to later standards. KSKGeoS™ makes no express or implied warranty beyond its conformance to this standard.

KSKGeoS™ shall not be responsible for conditions or consequences arising from relevant facts that were concealed, withheld, or not fully disclosed for the preparation of this document. KSKGeoS™ believes that all information contained in this document is factual, but no guarantee is made or implied.

7.0 REFERENCES

- Department of Environmental Conservation, **Chapter 12 - Groundwater Protection Rule and Strategy**, Vermont Agency of Natural Resources, Rule #97-P14, effective November 15, 1997.
- Driscoll, Fletcher G., Ph.D., **Groundwater and Wells, 2nd ed.**, Johnson Division, St. Paul, MN., 1986.
- Doll, Charles G., ed., **Centennial Geologic Map of Vermont**, Vermont Geological Survey, Montpelier, VT, 1961.
- Stewart, David P. and Paul MacClintock, **The Surficial Geology and Pleistocene History of Vermont**, Vermont Geological Survey and Vermont Water Resources Department, Montpelier, VT, Bulletin No. 31, 1969.
- Stewart, David P. and Paul MacClintock, **The Surficial Geologic Map of Vermont**, Vermont Geological Survey, Montpelier, VT, 1970.
- United States Geological Survey, **Burlington Quadrangle, Vermont 7.5 Minute Series (Topographic)**, Reston, VA., 1987.
- United States Geological Survey, **Colchester Quadrangle, Vermont 7.5 Minute Series (Topographic)**, Reston, VA., 1972.
- United States Geological Survey, **Essex Center Quadrangle, Vermont 7.5 Minute Series (Topographic)**, Reston, VA., 1987.
- United States Geological Survey, **Essex Junction Quadrangle, Vermont 7.5 Minute Series (Topographic)**, Reston, VA., 1987.
- Waste Management Division, **Third Quarter 1998 Update, Vermont Hazardous Sites List**, Vermont Agency of Natural Resources Department of Environmental Conservation, Waterbury, VT., October 9, 1998.

Attachment 1

Soil Boring and Well Completion Logs



KENT S. KOPTIUCH, INC.
 Geo-Environmental Services
 164 OSGOOD HILL • ESSEX, VERMONT 05452
 TELE/FAX (802) 878-1620

WELL LOG MW -1(PG. 1 OF 2)
 INSTALLED: AUGUST 17, 1998
 LOGGED BY: JOHN C. ROMAN
 ENVIRONMENTAL SCIENTIST

PROJECT # 98016 ROBINSONS, INC.	DRILLING COMPANY TRI-STATE DRILLING	DRILL RIG: MOBILE B-57, 4 1/4" ID HSA	SAMPLING METHOD: SPLIT-SPOON & GRAB
---	---	---	---

BENTONITE WELL SEAL
 NATIVE BACKFILL
 #1 MORIE SAND PACK
 CASING: 2" DIAM., FLUSH-THREADED PVC
 CONCRETE SURFACE SEAL
 SCREEN: 2" DIAM., FLUSH-THREADED, 0.10" SLOT PVC
 SCREENED INTERVAL: 82.23' - 97.23'

DEPTH (ft)	CONSTRUCTION	SAMPLE #	BLOWS/ft	RECOVERY	VOCs In ppm	SOILS/LITHOLOGY	COMMENTS
0.0							GRADE @ 101.43'
							TOC @ 101.20'
0.0 - 2.0		GRAB			0.4	DRY, BROWN SAND AND FINE PEA GRAVEL, SOME LOAM	0.0' - 2.0'
3.0 - 4.0		GRAB			0.6	DRY, OLIVE FINE SAND, TRACE MEDIUM SAND AND SILT	3.0' - 4.0'
5.0 - 5.83		SS-1 (5-7')	13-12-9-11	1.66'	0.2	DRY, OLIVE-BROWN VF SAND WITH SOME SILT	5.0' - 5.83'
5.83 - 6.49						S. MOIST, OLIVE SILT, TRACE CLAY	5.83' - 6.49'
6.49 - 6.66						S. MOIST, OLIVE TO GRAY, CLAY-SILT, FIRM	6.49' - 6.66'
9.0 - 9.16		SS-2 (9.0-11.0')	3-2-1-1	2.0'	0.2	V. MOIST GRAY-BROWN SILT AND VERY FINE SAND	9.0' - 9.16'
9.16 - 11.0						WET, OLIVE CLAY, TRACE SILT, STICKEY (9.16' - 11.0')	WT @ 9.25'
13.0 - 15.0		SS-3 (13-15')	2-2-1-1	2.0'	0.0	WET, GRAY CLAY, STICKEY	13.0' - 15.0'



KENT S. KOPTIUCH, INC.
 Geo-Environmental Services
 164 OSGOOD HILL • ESSEX, VERMONT 05452
 TELE/FAX (802) 878-1620

WELL LOG MW -1(PG. 2 OF 2)
 INSTALLED: AUGUST 17, 1998
 LOGGED BY: JOHN C. ROMAN
 ENVIRONMENTAL SCIENTIST

PROJECT # 98016

ROBINSONS, INC.

DRILLING COMPANY

TRI-STATE DRILLING

DRILL RIG:

MOBILE B-57, 4 1/4 ID HSA

SAMPLING METHOD:

SPLIT-SPOON & GRAB

BENTONITE WELL SEAL

NATIVE BACKFILL

#1 MORIE SAND PACK

CASING: 2" DIAM., FLUSH-THREADED PVC

SCREEN: 2" DIAM., FLUSH-THREADED, 0.10" SLOT PVC

CONCRETE SURFACE SEAL

DEPTH (ft)	CONSTRUCTION	SAMPLE #	BLOWS/ft	RECOVERY	VOCs in ppm	SOILS/LITHOLOGY	COMMENTS
17.0		SS-4(18-20')	3-2-1-1	2.0'	0.0	SATURATED GRAY CLAY, STICKY.	18.0' - 20.0'
18.0							
19.0							SET WELL 19.0'
20.0							E.O.B. 20.0'
21.0							
22.0							
23.0							
24.0							
25.0							
26.0							
27.0							
28.0							
29.0							
30.0							
31.0							
32.0							
33.0							



KENT S. KOPTIUCH, INC.
 Geo-Environmental Services
 164 OSGOOD HILL • ESSEX, VERMONT 05452
 TELE/FAX (802) 878-1620

WELL LOG MW -4(PG. 2 OF 2)
 INSTALLED: AUGUST 17, 1998
 LOGGED BY: JOHN C. ROMAN
 ENVIRONMENTAL SCIENTIST

PROJECT # 98016

ROBINSONS, INC.

DRILLING COMPANY

TRI-STATE DRILLING

DRILL RIG:

MOBILE B-57, 4 1/4 ID HSA

SAMPLING METHOD:

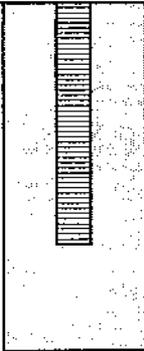
SPLIT-SPOON & GRAB

 BENTONITE WELL SEAL
 CONCRETE SURFACE SEAL

 NATIVE BACKFILL

 #1 MORIE SAND PACK

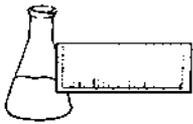
CASING: 2" DIAM., FLUSH-THREADED PVC
 SCREEN: 2" DIAM., FLUSH-THREADED, 0.20' SLOT PVC

DEPTH (ft)	CONSTRUCTION	SAMPLE #	BLOWS/ft	RECOVERY	VOCs (n ppm)	SOILS/LITHOLOGY	COMMENTS
17.0		SS-4 (18-20')	1-1-2-2	2.0'	0.0	SATURATED GRAY & OLIVE GRAY CLAY, STICKY (SHEEN)	18.0' - 20.0'
18.0							
19.0							
20.0							
21.0							
22.0							
23.0							
24.0							
25.0							
26.0							
27.0							
28.0							
29.0							
30.0							
31.0							
32.0							
33.0							

SET WELL 19.0'-
 EOB

Attachment 2

- Laboratory Chemical Analytical Results:
August 24, 1998 Groundwater Sampling Event
Monitoring Wells MW-1, MW-2, MW-3, & MW-4**
- **TPH by Modified EPA Method 8015**
 - **EPA Method 8021B Compounds by EPA Method 8260**



ENDYNE, INC.

Laboratory Services

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

RECEIVED SEP 12 1998

REPORT OF LABORATORY ANALYSIS

CLIENT: KSK GeoS.
PROJECT NAME: Robinsons Oil/#98016
DATE REPORTED: September 10, 1998
DATE SAMPLED: August 24, 1998

PROJECT CODE: KSKG1386
REF. #: 125,983 - 125,987

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

Chain of custody indicated sample preservation with HCl.

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

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

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

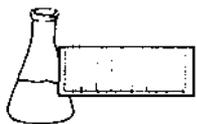
Analytical method precision and accuracy were monitored by laboratory control standards which included matrix spike, duplicate and quality control analyses. These standards were determined to be within established laboratory method acceptance limits.

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

Reviewed by,

Harry B. Locker, Ph.D.
Laboratory Director

enclosures



ENDYNE, INC.

Laboratory Services

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

LABORATORY REPORT

TOTAL PETROLEUM HYDROCARBONS (TPH) BY MODIFIED EPA METHOD 8015

DATE: September 10, 1998
CLIENT: KSK GeoS.
PROJECT: Robinsons Oil/#98016
PROJECT CODE: KSKG1387
COLLECTED BY: John Roman
DATE SAMPLED: August 24, 1998
DATE RECEIVED: August 24, 1998

Reference #	Sample ID	Concentration (mg/L) ¹
125,988	MW-1; 1115	ND ²
125,989	MW-2; 1145	0.19
125,990	MW-3; 1215	1.94
125,991	MW-4; 1245	1.52

Notes:

- 1 Values quantitated based on the response of Gasoline. Method detection limit is 0.1 mg/L.
- 2 None detected

CHAIN-OF-CUSTODY RECORD

KSK Geos Proj # 98016 2333.0

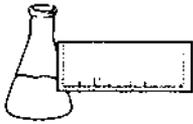
Project Name: <i>Robinson Oil</i>	Reporting Address: <i>KSK Geos</i> <i>164 OSWOOD HILL RD ESSEX VT 05452</i>	Billing Address: <i>KSK Geos</i> <i>164 OSWOOD Hill Rd. Essex VT 05452</i>
Site Location: <i>Essex Vt VT</i>		
Endyne Project Number: <i>RSKG1387</i>	Company: <i>KSK Geos Attn: Kent Koptuch</i> Contact Name/Phone #: <i>(802) 878-1620</i>	Sampler Name: <i>John Roman</i> Phone #: <i>802 878-1620</i>

Lab #	Sample Location	Matrix	G R A B	C O M P	Date/Time	Sample Containers		Field Results/Remarks	Analysis Required	Sample Preservation	Rush
						No.	Type/Size				
	<i>MW-1</i>	<i>GW</i>	<i>X</i>		<i>8/24 1100</i>	<i>2</i>	<i>40 ML</i>		<i>8021B</i>	<i>HCL</i>	
<i>125,988</i>	<i>MW-1</i>	<i>GW</i>	<i>X</i>		<i>8/24 1115</i>	<i>2</i>	<i>40 ML</i>		<i>MOD 8015</i>	<i>HCL</i>	
	<i>MW-2</i>	<i>GW</i>	<i>X</i>		<i>8/24 1130</i>	<i>2</i>	<i>40 ML</i>		<i>8021B</i>	<i>HCL</i>	
<i>125,989</i>	<i>MW-2</i>	<i>GW</i>	<i>X</i>		<i>8/24 1145</i>	<i>2</i>	<i>40 ML</i>		<i>MOD 8015</i>	<i>HCL</i>	
	<i>MW-3</i>	<i>GW</i>	<i>X</i>		<i>8/24 1200</i>	<i>2</i>	<i>40 ML</i>		<i>8021B</i>	<i>HCL</i>	
<i>125,990</i>	<i>MW-3</i>	<i>GW</i>	<i>X</i>		<i>8/24 1215</i>	<i>2</i>	<i>40 ML</i>		<i>MOD 8015</i>	<i>HCL</i>	
	<i>MW-4</i>	<i>GW</i>	<i>X</i>		<i>8/24 1230</i>	<i>2</i>	<i>40 ML</i>		<i>8021B</i>	<i>HCL</i>	
<i>125,991</i>	<i>MW-4</i>	<i>GW</i>	<i>X</i>		<i>8/24 1245</i>	<i>2</i>	<i>40 ML</i>		<i>MOD 8015</i>	<i>HCL</i>	
	<i>FIELD BLANK</i>	<i>WATER</i>	<i>X</i>		<i>8/24 1300</i>	<i>2</i>	<i>40 ML</i>		<i>8021B</i>	<i>HCL</i>	

Relinquished by: Signature <i>John C. Roman</i>	Received by: Signature <i>M. [Signature]</i>	Date/Time <i>8-24-98 1:10</i>
Relinquished by: Signature	Received by: Signature	Date/Time

New York State Project: Yes No Requested Analyses *EPA 8021B w/MTBE + MOD EPA 8015 TPH*

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



ENDYNE, INC.

Laboratory Services

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

RECEIVED SEP 12 1998

REPORT OF LABORATORY ANALYSIS

CLIENT: KSK GeoS.
PROJECT NAME: Robinsons Oil/#98016
DATE REPORTED: September 10, 1998
DATE SAMPLED: August 24, 1998

PROJECT CODE: KSKG1387
REF. #: 125,988 - 125,991

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

Chain of custody indicated sample preservation with HCl.

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

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

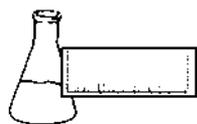
Blank contamination was not observed at levels affecting the analytical results.

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

Reviewed by,

Harry B. Locker, Ph.D.
Laboratory Director

enclosures



ENDYNE, INC.

Laboratory Services

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

LABORATORY REPORT

EPA METHOD 8021B COMPOUNDS BY EPA METHOD 8260

CLIENT: KSK GeoS.
PROJECT NAME: Robinsons Oil/#98016
REPORT DATE: September 10, 1998
SAMPLER: John Roman
DATE SAMPLED: August 24, 1998
DATE RECEIVED: August 24, 1998

PROJECT CODE: KSKG1386
ANALYSIS DATE: September 4, 1998
STATION: MW-1
REF.#: 125,983
TIME SAMPLED: 1100

<u>Parameter</u>	<u>Detection Limit ($\mu\text{g/L}$)</u>	<u>Concentration ($\mu\text{g/L}$)</u>
Benzene	1	ND ¹
Naphthalene	5	ND
1,3,5-Trimethylbenzene	1	ND
1,2,4-Trimethylbenzene	1	ND
Ethylbenzene	1	ND
Toluene	1	ND
Xylene	2	ND
MTBE	2	ND

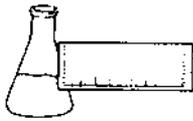
NUMBER OF UNIDENTIFIED PEAKS FOUND: 0

ANALYTICAL SURROGATE RECOVERY:

Dibromofluoromethane: 99.%
Toluene-d8: 98.%
4-Bromofluorobenzene: 96.%

NOTES:

1 None detected



ENDYNE, INC.

Laboratory Services

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

LABORATORY REPORT

EPA METHOD 8021B COMPOUNDS BY EPA METHOD 8260

CLIENT: KSK GeoS.
PROJECT NAME: Robinsons Oil/#98016
REPORT DATE: September 10, 1998
SAMPLER: John Roman
DATE SAMPLED: August 24, 1998
DATE RECEIVED: August 24, 1998

PROJECT CODE: KSKG1386
ANALYSIS DATE: September 4, 1998
STATION: MW-2
REF.#: 125,984
TIME SAMPLED: 1130

<u>Parameter</u>	<u>Detection Limit ($\mu\text{g/L}$)</u>	<u>Concentration ($\mu\text{g/L}$)</u>
Benzene	1	ND ¹
Naphthalene	5	ND
1,3,5-Trimethylbenzene	1	ND
1,2,4-Trimethylbenzene	1	1.2
Ethylbenzene	1	TBQ ²
Toluene	1	ND
Xylene	2	ND
MTBE	2	ND

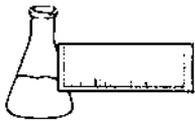
NUMBER OF UNIDENTIFIED PEAKS FOUND: >10

ANALYTICAL SURROGATE RECOVERY:

Dibromofluoromethane: 100.%
Toluene-d8: 104.%
4-Bromofluorobenzene: 102.%

NOTES:

- 1 None detected
- 2 Trace below quantitation limit



ENDYNE, INC.

Laboratory Services

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

LABORATORY REPORT

EPA METHOD 8021B COMPOUNDS BY EPA METHOD 8260

CLIENT: KSK GeoS.
PROJECT NAME: Robinsons Oil/#98016
REPORT DATE: September 10, 1998
SAMPLER: John Roman
DATE SAMPLED: August 24, 1998
DATE RECEIVED: August 24, 1998

PROJECT CODE: KSKG1386
ANALYSIS DATE: September 4, 1998
STATION: MW-3
REF.#: 125,985
TIME SAMPLED: 1200

<u>Parameter</u>	<u>Detection Limit ($\mu\text{g/L}$)</u>	<u>Concentration ($\mu\text{g/L}$)</u>
Benzene	1	2.2
Naphthalene	5	ND ¹
1,3,5-Trimethylbenzene	1	5.1
1,2,4-Trimethylbenzene	1	3.1
Ethylbenzene	1	ND
Toluene	1	ND
Xylene	2	2.9
MTBE	2	47.0

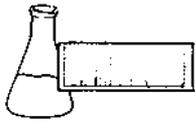
NUMBER OF UNIDENTIFIED PEAKS FOUND: >10

ANALYTICAL SURROGATE RECOVERY:

Dibromofluoromethane: 98.%
Toluene-d8: 100.%
4-Bromofluorobenzene: 95.%

NOTES:

1 None detected



ENDYNE, INC.

Laboratory Services

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

LABORATORY REPORT

EPA METHOD 8021B COMPOUNDS BY EPA METHOD 8260

CLIENT: KSK GeoS.
PROJECT NAME: Robinsons Oil/#98016
REPORT DATE: September 10, 1998
SAMPLER: John Roman
DATE SAMPLED: August 24, 1998
DATE RECEIVED: August 24, 1998

PROJECT CODE: KSKG1386
ANALYSIS DATE: September 4, 1998
STATION: MW-4
REF.#: 125,986
TIME SAMPLED: 1230

<u>Parameter</u>	<u>Detection Limit ($\mu\text{g/L}$)</u>	<u>Concentration ($\mu\text{g/L}$)</u>
Benzene	1	7.5
Naphthalene	5	26.3
1,3,5-Trimethylbenzene	1	13.4
1,2,4-Trimethylbenzene	1	53.0
Ethylbenzene	1	20.6
Toluene	1	ND ¹
Xylene	2	76.4
MTBE	2	4.5

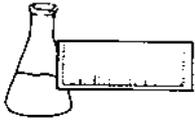
NUMBER OF UNIDENTIFIED PEAKS FOUND: >10

ANALYTICAL SURROGATE RECOVERY:

Dibromofluoromethane: 100.%
Toluene-d8: 102.%
4-Bromofluorobenzene: 97.%

NOTES:

1 None detected



ENDYNE, INC.

Laboratory Services

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

LABORATORY REPORT

EPA METHOD 8021B COMPOUNDS BY EPA METHOD 8260

CLIENT: KSK GeoS.
PROJECT NAME: Robinsons Oil/#98016
REPORT DATE: September 10, 1998
SAMPLER: John Roman
DATE SAMPLED: August 24, 1998
DATE RECEIVED: August 24, 1998

PROJECT CODE: KSKG1386
ANALYSIS DATE: September 4, 1998
STATION: Field Blank
REF.#: 125,987
TIME SAMPLED: 1300

<u>Parameter</u>	<u>Detection Limit ($\mu\text{g/L}$)</u>	<u>Concentration ($\mu\text{g/L}$)</u>
Benzene	1	ND ¹
Naphthalene	5	ND
1,3,5-Trimethylbenzene	1	ND
1,2,4-Trimethylbenzene	1	ND
Ethylbenzene	1	ND
Toluene	1	ND
Xylene	2	ND
MTBE	2	ND

NUMBER OF UNIDENTIFIED PEAKS FOUND: 0

ANALYTICAL SURROGATE RECOVERY:

Dibromofluoromethane: 106.0%
Toluene-d8: 99.0%
4-Bromofluorobenzene: 100.0%

NOTES:

1 None detected

CHAIN-OF-CUSTODY RECORD

125,983 - 125,991

Project Name: <i>Robinsons Oil</i>	Reporting Address: <i>KSK Geos</i> <i>164 OSLOOD HILL RD ESSEX VT 05452</i>	Billing Address: <i>KSK Geos</i> <i>164 OSLOOD HILL Rd ESSEX VT 05452</i>
Site Location: <i>Essex Vt VT</i>		
Endyne Project Number: <i>KSKG.1386</i>	Company: <i>KSK Geos Attn: Kent Koptuch</i>	Sampler Name: <i>John Roman</i>
	Contact Name/Phone #: <i>(802) 878-1620</i>	Phone #: <i>802 878-1620</i>

Lab #	Sample Location	Matrix	G R A B	C O M P	Date/Time	Sample Containers		Field Results/Remarks	Analysis Required	Sample Preservation	Rush
						No.	Type/Size				
<i>125,983</i>	<i>MW-1</i>	<i>GW</i>	<i>X</i>		<i>8/24 1100</i>	<i>2</i>	<i>40 ML</i>		<i>8021B</i>	<i>HCL</i>	
	<i>MW-1</i>	<i>GW</i>	<i>X</i>		<i>8/24 1115</i>	<i>2</i>	<i>40 ML</i>		<i>MUD 8015</i>	<i>HCL</i>	
<i>125,984</i>	<i>MW-2</i>	<i>GW</i>	<i>X</i>		<i>8/24 1130</i>	<i>2</i>	<i>40 ML</i>		<i>8021B</i>	<i>HCL</i>	
	<i>MW-2</i>	<i>GW</i>	<i>X</i>		<i>8/24 1145</i>	<i>2</i>	<i>40 ML</i>		<i>MUD 8015</i>	<i>HCL</i>	
<i>125,985</i>	<i>MW-3</i>	<i>GW</i>	<i>X</i>		<i>8/24 1200</i>	<i>2</i>	<i>40 ML</i>		<i>8021B</i>	<i>HCL</i>	
	<i>MW-3</i>	<i>GW</i>	<i>X</i>		<i>8/24 1215</i>	<i>2</i>	<i>40 ML</i>		<i>MUD 8015</i>	<i>HCL</i>	
<i>125,986</i>	<i>MW-4</i>	<i>GW</i>	<i>X</i>		<i>8/24 1230</i>	<i>2</i>	<i>40 ML</i>		<i>8021B</i>	<i>HCL</i>	
	<i>MW-4</i>	<i>GW</i>	<i>X</i>		<i>8/24 1245</i>	<i>2</i>	<i>40 ML</i>		<i>MUD 8015</i>	<i>HCL</i>	
<i>125,987</i>	<i>FIELD BLANK</i>	<i>WATER</i>	<i>X</i>		<i>8/24 1300</i>	<i>2</i>	<i>40 ML</i>		<i>8021B</i>	<i>HCL</i>	

Relinquished by Signature: <i>John C. Roman</i>	Received by Signature: <i>M. [Signature]</i>	Date/Time: <i>8-24-98</i> <i>1:10</i>
Relinquished by Signature:	Received by Signature:	Date/Time:

New York State Project: Yes No Requested Analyses *EPA 801B W/MTBE + MUD EPA 8015 TPH*

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