

**SUPPLEMENTAL SITE INVESTIGATION
FORMER PATCH'S PETROLEUM SITE
RUTLAND, VERMONT
(VTDEC SITE NO. 96-1973)**

Longitude 72°-59'-08.908"
Latitude 43°-35'-56.560"

Facility Owner:
Laurel Patch
Woodland Drive
Rutland, Vermont

Prepared for:
Mr. Stephen Singiser
Vermont National Bank
P.O. Box 831
Rutland, Vermont

December 14, 1998

Prepared by
EMCON
Chace Mill E-2, 1 Mill Street
Burlington, VT 05401

Project 84794-010.001

WASTE MANAGEMENT
DIVISION

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CONTENTS

LIST OF TABLES AND ILLUSTRATIONS	iv
1 INTRODUCTION	1-1
1.1 Purpose and Scope of Work	1-1
1.2 Site Description	1-1
1.3 Site History	1-2
2 METHODOLOGY AND RESULTS	2-1
2.1 Soil Borings and Monitoring Well Installations	2-1
2.2 Monitoring Well Development	2-3
2.3 Soil Borings and Monitoring Well Survey	2-3
2.4 Water Level Measurements and Groundwater Flow	2-4
2.5 Separate Phase Hydrocarbon Removal and Gauging	2-4
2.6 Separate Phase Hydrocarbon Volume Estimate	2-5
2.7 In-Situ Hydraulic Conductivity Testing	2-5
2.8 Groundwater Sampling	2-6
3 CORRECTIVE ACTION	3-1
4 CONCLUSIONS	4-1
5 RECOMMENDATIONS	5-1
LIMITATIONS	
REFERENCES	
APPENDIX A VTDEC CORRESPONDENCE	
APPENDIX B HISTORICAL GROUNDWATER MAPS	
APPENDIX C HISTORICAL LABORATORY DATA	
APPENDIX D BORING LOGS AND WELL CONSTRUCTION DIAGRAMS	

CONTENTS (Continued)

**APPENDIX E SEPARATE PHASE HYDROCARBON VOLUME
CALCULATIONS**

APPENDIX F HYDRAULIC CONDUCTIVITY DATA

APPENDIX G LABORATORY ANALYTICAL RESULTS

TABLES

FIGURES

TABLES AND ILLUSTRATIONS

Follows Text

Tables

- 1 Monitoring Well, Groundwater, Free Product Elevation Data
- 2 Groundwater Analytical Results
- 3 Separate Phase Hydrocarbon Recovery Data

Figures

- 1 Site Location Map
- 2 Site Plan with Monitoring Well and Soil Boring Locations
- 3 Site Plan Showing Groundwater Contours with Dissolved BTEX and TPH Concentrations
- 4 Site Plan Showing Extent of Separate Phase Product
- 5 Geological Cross Section A-A'

1 INTRODUCTION

This report presents the results of Supplemental Site Investigation (SSI) activities performed at the site formerly operated by Owner Services, Inc. (a.k.a. Patch's Petroleum) at 102 Meadow Street in Rutland, Vermont (Figure 1). The SSI activities were requested by Mr. John Schmeltzer of the Vermont Department of Environmental Conservation, Waste Management Division (VTDEC WMD).

1.1 Purpose and Scope of Work

In order to be responsive to the VTDEC WMD's request, Malter Consulting Inc. (MCI) retained EMCON to perform SSI activities. The purpose of the SSI is to: 1) define the source(s), degree and extent of petroleum hydrocarbon contamination at both onsite and off-site locations; 2) estimate the volume of soil and groundwater petroleum hydrocarbon contamination including separate phase hydrocarbon (SPH) both onsite and off-site; 3) identify potential remedial alternatives; and 4) collect sufficient data to evaluate remedial alternatives.

Malter Consulting, Inc. and EMCON submitted a Work Plan, dated July 31, 1998, to conduct the activities, as requested by the VTDEC WMD. The work plan outlined the scope of services, methodologies, project schedule and budget. The work plan was approved by the VTDEC WMD in a letter, dated August 27, 1998 (Appendix A).

The scope of work completed during the SSI consisted of the following activities: 1) the advancement of 18 soil borings and the installation of 6 monitoring wells; 2) the collection of 7 groundwater samples for laboratory analysis for volatile organic compounds (VOCs) by USEPA Method 8020 and total petroleum hydrocarbons (TPHs) by USEPA Method 8100M; 3) in-situ hydraulic conductivity testing of 3 wells; 4) SPH removal and gauging of six wells; 5) surveying of the new monitoring wells and soil borings onto the existing site map; and 6) data evaluation and preparation of a report.

1.2 Site Description

The site consists of a one story, slab on grade, masonry garage and office building located on approximately 1.8 acres. The office is serviced by Rutland municipal water and sewer and the garage is serviced by an onsite septic system, located east of the building. The topography of the site is nearly level. The facility is presently not occupied.

The site is located at the end of a residential street and is bounded by single and multi-family residences to the north and east, Morse Concrete Block, Inc., abutting the site to the southeast; an out of service spur of the Clarendon and Pittsford Railroad and undeveloped woodlands to the south owned by the Cole Family Enterprises, Inc., and the Calvary Cemetery to the west across Meadow Street (Figure 2).

1.3 Site History

The site has been used as a petroleum storage facility since 1925. Petroleum was off-loaded by rail to the facility until the mid 1900s. Petroleum was also off-loaded by tank truck until the facility ceased operation in 1997. Petroleum stored at the facility has included various grades of gasoline, kerosene, No. 2 fuel oil and diesel fuel. Several tenants have occupied the property since 1925. Owner Services, Inc. (a.k.a. Patch's Petroleum), the most recent occupant of the property ceased operations onsite in 1997. All petroleum storage tanks have been removed from the property. Former petroleum storage tanks included a gasoline underground storage tank (UST), located near the southwest corner of the garage, eleven above ground storage tanks (ASTs), located near the southeast corner of the garage along the southern property line, and one fuel additive UST, located immediately south of the garage (Figure 2). The gasoline UST was reported to be leaking at the time of removal. No data is available documenting the soil and groundwater conditions beneath any of the other tanks. An above ground piping system delivered petroleum products for the ASTs from an off-loading station located southwest of the office building. Underground piping delivered petroleum product from the ASTs via the above ground piping system to the delivery truck loading rack located west of the office building.

A Limited Phase II Site Assessment was performed by Malter Consulting, Inc. in 1996, during which five monitoring wells (MW-1, MW-2, MW-3, MW-5, and MW-6) were installed to depths of approximately 20 feet with a drill rig, and five soil borings (SB-1, SB-2, SB-3, SB-4, and SB-5) were installed using a hand auger. The location of the soil borings and monitoring wells is shown on Figure 2. Soils consisted predominantly of non-native fill and stratified glacial lacustrine deposits. The fill consisted of sand, silt and clay with pieces of concrete, bricks, wood and other debris from ground surface to approximately five feet below ground surface. The native soils were encountered at a depth of approximately five feet, but depths varied over the site. These soils consisted of fine sand and silt to a depth of approximately eight feet where a transition to a silty clay was observed and clay content increased with depth. Groundwater was encountered within 10 to 12 feet of the ground surface.

Water level data recorded from the monitoring wells indicates that groundwater flows to the southwest across the site toward the railroad tracks and the woodland area. Groundwater contour maps of numerous water level monitoring events are provided in Appendix B. No petroleum hydrocarbons were detected in upgradient wells MW-5 and

MW-6. Floating SPHs was detected in monitoring well MW-2, which is located downgradient of the truck loading rack and in monitoring well MW-3, located at the southwest corner of the property near the former railroad petroleum off-loading area. SPH removal activities are currently being performed manually for all wells containing SPHs. The SPH was identified by the laboratory as a mixture of diesel fuel, gasoline and No. 2 fuel oil. No petroleum hydrocarbon contamination was observed with field PID screening methods for soil borings SB-3 and SB-5. However, elevated PID readings were recorded at shallow soil borings SB-1, SB-2 and SB-4 located along the southern property line along the above ground piping system that transferred product from the ASTs to the loading rack area.

In December 1997, MCI installed six additional monitoring wells (MW-7, MW-8, MW-9, MW-10, MW-11, and MW-12) to a depth of 20 feet both at onsite and at off-site locations (Figure 3). Monitoring wells MW-7, MW-8, and MW-9 were installed along Meadow Street between the property and the cemetery. Monitoring wells MW-10 and MW-11 were installed off-site along the railroad right-of-way near the former rail off-loading area. Monitoring well MW-12 was installed on the property adjacent to the AST and pump station (Figure 3). No petroleum hydrocarbon contamination was detected in monitoring well MW-7. Low level petroleum hydrocarbon contamination was detected in groundwater in monitoring well MW-8 and in soil and groundwater in MW-9, located off-site along Meadow Street. Elevated petroleum hydrocarbon contamination was detected in soil and groundwater at monitoring wells MW-10 and MW-11. A tabulation of historical laboratory analytical results are provided in Appendix C. MW-12 was dry the day sampling was performed, but elevated petroleum hydrocarbons were observed in the soil during well installation. SPHs were detected in monitoring wells MW-10 and MW-11, which are located on the abutting property. June 1998 SPH thickness' ranged from 2 feet in MW-10 to 8 feet in MW-11. The SPH was identified by laboratory analysis as a low boiling point fuel, possibly a mixture of diesel fuel additives and weathered gasoline. Manual bailing of SPH was being performed on these wells.

The detection of SPH at off site locations MW-10 and MW-11 in December 1997, and the need to more fully assess the area near the former ASTs has prompted further investigation activities to delineate the full extent of both dissolved phase and separate phase petroleum hydrocarbons.

2 METHODOLOGY AND RESULTS

Prior to initiating investigation and remediation activities, a site specific Health & Safety Plan (HASP) was prepared by EMCON. Additionally, EMCON personnel, Mr. Joseph Hayes and Mr. Eugene Martin, and Mr. John Malter of MCI, met with Mr. John Schmeltzer and Mr. Stanley Corneille of the VTDEC WMD, Charlie Bischoff of the Vermont Railroad and David Taggart of the Calvary Cemetery to: 1) confirm that the proposed drilling and sampling locations were adequate to investigate former petroleum storage areas at the site and 2) determine if underground utilities were near proposed drilling locations. The locations were marked in the field by MCI personnel. Dig Safe was contacted to obtain a permit and document buried utility locations.

Field activities were conducted in accordance with EMCON's and MCI's Work Plan, dated July 31, 1998.

2.1 Soil Borings and Monitoring Well Installations

On August 24, 25, and 26, 1998, six monitoring wells (GP-4, GP-6, GP-7, GP-8, GP-12 and GP-16), and 12 soil borings (GP-1, GP-2, GP-3, GP-5, GP-9, GP-10, GP-11, GP-13, GP-14, GP-15, GP-17 and GP-18), were installed at both onsite and off-site locations. The soil borings and monitoring wells were installed with a geoprobe vibratory truck mounted drill rig operated by New Hampshire Boring of Londonderry, New Hampshire. The monitoring well and soil boring locations are summarized below and presented on Figure 2.

- Two borings, GP-1 and GP-2, were installed in the area of the former ASTs to determine if soil and groundwater have been impacted from releases associated with the ASTs. The ASTs were recently removed and no groundwater data exists for this area of the site.
- One boring, GP-3, was installed west of monitoring well MW-2 and the former delivery truck loading rack where LNAPL is present to determine the lateral extent of the LNAPL in this area of the site.
- One soil boring, GP-4, was installed east of existing soil boring SB-1 near the above ground transfer piping to determine if this is a suitable free product collection point.

- Fourteen soil borings, GP-5 through GP-18, at off-site locations south of the property line. Most of the borings were installed at 50 foot intervals with the exception of borings installed in the vicinity of monitoring wells MW-10 and MW-11 where LNAPL is present. The borings were installed to determine the extent of LNAPL and dissolved phase petroleum hydrocarbons.
- Six monitoring wells, GP-4, GP-6, GP-7, GP-8, GP-12, and GP-16, were installed in the borings depending upon the degree of contamination detected by PID soil screening methods and if LNAPL is detected.

During boring advancement, soil was collected continuously to the bottom of the borehole and screened with a photoionization detector (PID). Geologic descriptions of the soil were made in the field in order to prepare detailed geologic logs and to assist in determining optimal monitoring well installation depth. Soil samples were collected at two foot increments from the drill casing and placed directly into 8 oz. glass jars for headspace measurements. The PID headspace readings were used as a basis for selecting monitoring well installation locations.

All excess soil with PID readings above 10 parts per million (ppm) was placed on the existing petroleum contaminated soil stockpile located on the east side of the site and covered with polyethylene sheeting (Figure 2). All excess soil with PID readings below 10 ppm was returned to the surface in the immediate vicinity of the soil boring.

The monitoring wells were constructed of 0.010-inch slot, 0.75 inch inside diameter (ID), Schedule 40 PVC screen with 0.75 inch ID Schedule 40 flush-joint, threaded PVC casing to surface. A 10 foot length of well screen was installed 5 to 7 feet below the water table. Attempts were made to pack the annulus between the screen and borehole with clean silica sand to approximately two feet above the top of the screen. Native collapse of the formation around the lower well screen sections occurred at several locations during the installation process. Two of the wells (GP-6 and GP-16) were completed with flush-mounted protective steel road boxes. The remaining wells were completed with stick up steel protective casings. Locks were installed on the protective casings to secure the wells.

The geology encountered at soil boring and monitoring well locations consisted predominantly of fine to medium Sand and Silt from 0 to 5 feet grading into a Clayey Silt at a depth of approximately 5 feet. However, the Clayey Silt was observed at a greater depth of 14 to 18 feet at locations GP-5 and GP-6, located along Meadow Street. The Clayey Silt was generally encountered from a depth of approximately 5 feet to the bottom of each boring (approximately 20 feet). This is generally consistent with soil descriptions described in previous investigations at the site. Groundwater was encountered at depths ranging from approximately 6 to 24 feet. The soil boring logs with monitoring well construction diagrams are included in Appendix D.

PID headspace measurements taken on soil samples collected from soil borings ranged from non-detect to 192 parts per million (ppm). Borings exhibiting the highest PID readings were completed as monitoring wells. The soil samples exhibiting the highest PID headspace measurements were recorded at depths of 10 to 12 feet (water table) or at the first encounter of the Clayey Silt and exhibited a strong petroleum odor. Soil PID headspace measurements for all soil boring locations are presented on the soil boring logs in Appendix B.

PID soil headspace readings ranged from 0 to 185 ppm at soil borings GP-1 and GP-2, installed at the former ASTs. The highest PID readings were recorded in shallow soils from 0 to 6 feet and generally decreased to below 10 ppm at a depth of 20 feet.

PID soil headspace readings ranged from 0 to 13 ppm at soil boring GP-3, located west of the delivery truck loading rack where SPHs are present in MW-2. The highest PID readings were recorded at 12 to 14 feet at the approximate depth of the water table and decreased to below 1.0 ppm at the bottom of the boring at a depth of 20 feet.

PID soil headspace readings ranged from 0 to 162 ppm at soil boring locations GP-4, GP-5, GP-6, GP-7, GP-8, GP-9, GP-10 and GP-11, installed along the railroad tracks near monitoring wells MW-10 and MW-11, which contain SPHs. These soil borings generally delineate the extent of SPHs.

PID soil headspace readings ranged from 0 to 32 ppm at soil boring locations GP-14, GP-15, GP-16, GP-17 and GP-18, located to the south of the SPH area. The highest PID readings were generally recorded at depths of 6 to 16 feet.

2.2 Monitoring Well Development

On August 27 and 28, 1998, the newly installed monitoring wells were developed by EMCON using a peristaltic pump. The wells were developed to remove drill cuttings, clean the well, and improve the hydraulic connection between the well and the water bearing strata. Well development water from wells containing SPH (GP-6, GP-7 and GP-12) was placed in a 55-gallon drum, provided by MCI, and stored onsite. No groundwater or SPH was encountered in monitoring wells GP-4 and GP- 8.

2.3 Soil Borings and Monitoring Well Survey

The elevations of the top of all newly installed monitoring wells and soil borings were determined to the nearest 0.01 feet by differential leveling methods utilizing an automatic level and referencing the existing site vertical datum (assumed). Differential level loops were closed, balanced and adjusted. The horizontal locations of the monitoring wells and soil borings were obtained with a global positioning system (GPS) with sub-meter

accuracy. The horizontal datum referenced was the Vermont State Plane Coordinate System, North American Datum of 1983 (NAD83).

The survey elevation data was reduced and elevations for the monitoring wells was generated (Table 2). The GPS data was differentially corrected using the Vermont Agency of Transportation Continuing Operating Reference Station (CORS), located in Montpelier, Vermont. Horizontal coordinates for the monitoring wells and soil borings were computed and plotted on the site plan (Figure 2).

2.4 Water Level Measurements and Groundwater Flow

On August 31, 1998, the water levels from all monitoring wells were measured to the nearest 0.01 foot, using an ORS electronic interface probe. The water levels were converted to elevations using survey data from the site and were then used to determine groundwater flow direction and to generate a groundwater contour map. Water level elevations for selected wells (MW-5, MW-6, MW-7, MW-8, MW-9 and GP-16) were contoured in one foot intervals. Wells containing SPHs were not used for groundwater contouring. The contours indicate that groundwater flow at that time was from east to west across the site toward the cemetery and Otter Creek (Figure 3).

2.5 Separate Phase Hydrocarbon Removal and Gauging

At the time of water level measurements, all wells were checked for SPHs. SPHs were detected in three of the newly installed monitoring which wells include GP-6, GP-7 and GP-8. SPHs were also detected in monitoring wells MW-2, MW-3, MW-10, MW-11, RW-2 and RW-3 which were previously installed at the site. SPH thickness' ranged from 0.08 feet at RW-2, which is located between the former delivery truck loading rack and the tank truck off-loading point, to 5.69 feet at MW-11, which is located along the railroad tracks. SPH thickness values and elevations for the wells is included in Table 2. The estimated thickness and lateral extent of SPHs is shown on Figure 4.

On August 31, 1998, SPHs were pumped or bailed from monitoring wells MW-2, MW-3, MW-10, MW-11, GP-6, GP-7 and GP-12. Following measurement of the initial hydrocarbon layer, the hydrocarbon layer was removed as quickly as possible by bailer or peristaltic pump. Once the thickness of the hydrocarbon layer was reduced to approximately 0.01 foot, recharge rates of the hydrocarbon layer were measured, at two minute intervals, with an electronic interface probe for up to 30 minutes and recorded in the field notebook. A measurement was recorded at the end of the day to determine if the SPH layers had reached pre-pumping or bailing levels. No recovery of SPHs were observed in GP-6. The SPHs removed from each well was stored in a 55 gallon drum located at the site.

Approximately 11.5 gallons of SPHs were removed from the monitoring wells. The color of the SPHs varied from a rust color to dark brown to black. SPH recovery data is presented in Table 3. Percent recovery of SPHs, approximately 30 minutes after pumping or bailing stopped, ranged from 0.0 percent in GP-6 to 54 percent in GP-7. Percent recovery of SPHs approximately 660 minutes after pumping or bailing stopped ranged from 0.0 percent in GP-6 to 85 percent in GP-12.

2.6 Separate Phase Hydrocarbon Volume Estimate

As indicated previously, SPHs were detected on August 31, 1998, in nine monitoring wells (MW-2, MW-3, MW-10, MW-11, RW-2, RW-3, GP-6, GP-7, and GP-12) ranging in thickness from 0.8 feet at RW-2 to 5.69 feet at MW-11 (Figure 4). The SPH area is elongated in a north-south orientation from the former loading rack area to beyond the property boundary along the abandoned railroad tracks. The SPHs encompass an area of approximately 9,150 square feet. The SPH area was contoured in one foot intervals for estimating the volume of SPHs. Calculations for estimating the volume of SPHs are provided in Appendix E. Assuming a range of porosity from 35 to 70 percent (Freeze and Cherry, 1979) for the Silty Clay unit and an average SPH thickness for each of the contoured intervals (see Appendix E for calculations), a range of 47,000 to 94,000 gallons of SPHs is estimated. However, this volume estimate is based on the apparent SPH thicknesses as measured in monitoring wells. Researchers have concluded because of capillary fringe effects that the actual SPH thickness or true formation thickness is reduced by approximately 70 to 95 percent. Assuming that the apparent SPH thickness is 90 percent greater than the actual SPH thickness, the true SPH volume ranges from approximately 24,000 to 50,000 gallons.

2.7 In-Situ Hydraulic Conductivity Testing

On August 28, 1998, in situ hydraulic conductivity tests were conducted in monitoring wells MW-6, MW-8 and MW-9 using the rising head method. These tests were conducted to provide an evaluation of the hydraulic conductivity of the strata in which the well screens are installed. The soil types surrounding the screened intervals for MW-6 and MW-8 consisted predominately of a Silty Clay. The soil type surrounding the screened interval of MW-9 consisted of a fine Sand. Geologic cross-section A-A' (Figure 5) illustrates the various soil types and depth to groundwater across the Patch's Petroleum site. The hydraulic conductivity values are used to aid in the evaluation of groundwater flow and the ability of contaminants to migrate via groundwater.

Water in the three wells was evacuated using a bailer or a pump. Water was removed as quickly as possible and the water level recovery measured with a water level probe. The elapsed time and water level was recorded. The water level recovery data was entered into a computer software program (Aqtesolv™) for analysis and was plotted on graphs

with semi-logarithmic axes (Appendix D). Hydraulic conductivity values were 4.5×10^{-3} feet per minute (ft/min) for MW-6, 2.0×10^{-4} ft/min for MW-8 and 1.8×10^{-3} ft/min for MW-9.

2.8 Groundwater Sampling

On September 1, 1998, groundwater samples from the newly installed monitoring well (GP-16) and the six existing monitoring wells (MW-1, MW-5, MW-6, MW-7, MW-8, and MW-9) were sampled with dedicated bailers with the exception of GP-16, which was sampled with a peristaltic pump and new polyethylene tubing because of its smaller diameter. Groundwater results were not collected from MW-2, MW-3, MW-10, MW-11, RW-2, GP-6, GP-7, and GP-12, because SPHs were present. Wells GP-6 and GP-8 were dry. To assure that representative formation water was being sampled, the monitoring wells were purged until the pH, specific conductance, and temperature values of the discharged water stabilized to within 10 percent variation. A minimum of three well volumes was evacuated from each well. All well purge water was disposed of to the ground surface in the immediate vicinity of the monitoring wells.

Groundwater was transferred directly from the bailer or tubing into the appropriate laboratory supplied containers. The samples were packed on ice in a shipping cooler and accompanied by a completed chain of custody from the time of sample collection to the time of delivery to the laboratory. The analytical testing was performed by SCITEST of Randolph, Vermont. All groundwater samples were analyzed for VOCs by USEPA Method 8020. At monitoring well GP-16, a groundwater sample was also analyzed for TPHs by USEPA Method 8100M.

Groundwater analytical results of VOCs for monitoring wells MW-1, MW-5, MW-6, MW-7, MW-8, MW-9, and GP-16 are presented in Table 2 and in plan view on Figure 3. VOCs detected above the method reporting limit (MRL) in the monitoring wells sampled included benzene at 3.0 micrograms per liter (ug/L), toluene at 1.0 to 5.0 ug/L, ethylbenzene at 1.0 to 7.0 ug/L, total xylenes at 5.0 to 68.0 ug/L, and methyl-tertiary-butylether (MTBE) at 4.0 ug/L. TPHs were not detected in GP-16. No VOCs exceeded the Vermont Groundwater Enforcement Standard (VGWES) at the monitoring wells sampled.

Similar VOC concentrations were detected in sample GP-16 and duplicate sample MW-A. No VOCs were detected in the trip blank sample. The results of the trip blank sample indicate that there was no introduction of outside contamination during sampling and transport to the laboratory. The complete analytical results, MRLs and a copy of the chain of custody documentation is included in Appendix G.

3 CORRECTIVE ACTION

Remediation activities have occurred at the facility which have included source excavation and removal of petroleum contaminated soils during removals of petroleum storage tanks and piping, as well as passive and automated SPH recovery. The petroleum contaminated soils are currently stockpiled on and covered with polyethylene at two locations at the eastern edge of the property in a secure area. Soil stockpile No. 1 was constructed with soils excavated on April 2, 1996, and consists of approximately 40 cubic yards. Soil stockpile No. 2 was constructed with soils excavated on October 6, 1997 (approximately 10 cubic yards ranging in concentrations from 100 to 1,000 ppm based on PID measurements) and on October 29, 1997 (approximately 15 cubic yards ranging in concentrations from 100 to 1,300 ppm based on PID measurements). The excavation and stockpiling of petroleum contaminated soils have been documented in previous submittals to the VTDEC, WMD. The soils are being monitored with a PID by MCI. On May 30, 1998, PID headspace measurements recorded at soil stockpile No. 1 were non-detect to 171 ppm and at soil stockpile No. 2 were 33 to 36 ppm. On September 1, 1998, PID headspace measurements recorded at soil stockpile No. 1 were non-detect to 19 ppm and at soil stockpile No. 2 were 18 to 134 ppm.

Because of the low permeability soils and the limited effectiveness of pump and treat technology, an automated SPH recovery system was proposed and consisted of a Magnum Spill Buster product recovery manufactured by Clean Earth Technology. The system was approved for installation in October 1998, by Mr. John Schmeltzer of the VTDEC, WMD. The system was installed in two monitoring wells MW-10 and MW-11, which contained the greatest thickness of SPHs. SPHs in other wells are manually bailed.

4 CONCLUSIONS

A SSI has been performed at the site formerly operated by Owner Services, Inc. (a.k.a Patch's Petroleum) located at 102 Meadow Street in Rutland, Vermont. Based on the distribution and type of petroleum hydrocarbon contamination detected in groundwater, PID soil headspace measurements collected during drilling activities, and visual and olfactory observations of soil samples logged during drilling activities, there appears to be no new sources of soil or groundwater petroleum contamination identified on or off the property. The results of this SSI has confirmed that the majority of groundwater contamination is located on the abutting Vermont Agency of Transportation (VTAOT) rail road right-of-way and undeveloped property south of the VTAOT right-of-way owned by Cole Family Enterprises, Inc. An area of lesser petroleum contamination is located in the area of the former ASTs on southeast corner of the Patch's Petroleum site. The highest levels of petroleum contamination in the area of the ASTs is generally associated with shallow soils (0 to 6 feet bgs). Based on soil boring data, there is circumstantial evidence that petroleum releases at the former AST locations have impacted groundwater which has migrated onto the abutting VTAOT right-of-way. However, there is no indication of floating SPHs in this area.

The SSI delineated an area of floating SPHs encompassing approximately 9,200 square feet ranging in thickness from 0.10 to 5.7 feet on August 31, 1998. SPH area is elongated in a north-south orientation from the former loading rack area on the Patch's Petroleum site to beyond the southwest corner of the property line onto the abutting Vermont Agency of Transportation (VTAOT) right-of-way and undeveloped land owned by Cole Family Enterprises, Inc. The majority of the SPHs are located on the abutting VTAOT right-of-way and Cole Family Enterprises, Inc. property. A small area of SPH may extend onto the abutting Calvary Cemetery property to the southwest of the Patch's Petroleum site, however, access was not granted to investigate this area. The SPHs have been identified as a mixture of diesel fuel and weathered gasoline and has been estimated at 24,000 to 50,000 gallons. Shallow soil contamination is generally associated with the area of SPHs.

It is evident from the data collected to date, that operations involving transfer of fuel from the railroad tanker cars, trucks and tank/piping leakage to the Patch's Petroleum site contributed to the release of SPHs which have been detected on the VTAOT right-of-way and the abutting Cole Family Enterprises, Inc. property. An underground piping system delivered petroleum products from the tanker rail cars to ASTs located on the Patch's Petroleum site. Shallow soil contamination detected during SSI activities along the

VTAOT right-of-way confirms that petroleum off loading activities contributed to the off-site contamination. The groundwater contaminant distribution is generally consistent with the direction of groundwater flow which is to the west-southwest towards the cemetery and the Otter Creek.

Based on the network of monitoring points installed to date, the dissolved phase hydrocarbon groundwater plume is limited in aerial extent and has not migrated significantly downgradient of the area of SPHs. This is documented from several downgradient monitoring points (MW-7, MW-8, MW-9, and GP-16) where non detect to low level concentrations of BTEX compounds have been detected within 50 feet of the SPHs. The low permeability silt and clay soils beneath the site and the abutting VTAOT right-of-way and Cole Family Enterprises, Inc. property has probably slowed the migration of the contamination in the soil and groundwater.

Because the dissolved phase contamination does not appear to be migrating significantly at this time and no sensitive receptors have been impacted, the major remedial efforts should be focused on SPH recovery, primarily in the area of the VTAOT right-of-way, and on the abutting Cole Family Enterprises, Inc. property. At this time an automated SPH recovery system is operating in two wells (MW-10 and MW-11) located on the VTAOT right-of-way. An evaluation of the automated SPH recovery system is being performed to determine its effectiveness and to determine if other remedial efforts are needed. Furthermore, ongoing manual bailing of SPHs is being performed on all other wells containing SPHs.

5 RECOMMENDATIONS

Based on the above conclusions, it is EMCON's opinion that historical releases of petroleum products have occurred at both onsite and off site locations and that there does not appear to be indications of any ongoing releases since the facility was decommissioned. Because sensitive receptors have not been impacted, dissolved phase petroleum contamination has not migrated, and SPH recovery efforts have been initiated, EMCON does not recommend that a CAFI be performed at this time. However, EMCON does recommend that the following activities be performed:

1. SPHs should continue to be removed on a regular schedule from all wells with SPHs.
2. The existing automated SPH recovery system in monitoring wells MW-10 and MW-11 should be monitored on a regular basis and moved to other locations as necessary which would require installation of additional recovery wells. The volume of SPHs recovered from the monitoring wells should be documented to evaluate its effectiveness.
3. Quarterly groundwater sampling activities should be discontinued. Groundwater sampling activities should continue on a semi-annual basis and should include monitoring wells MW-1, MW-5, MW-6, MW-7, MW-8, MW-9, and GP-16. Samples should be analyzed for VOCs (USEPA Method 8021B) to determine if concentrations are increasing or decreasing.
4. Continue to monitor the two onsite soil stockpiles for VOCs with a PID.
5. All abutting downgradient property owners should be notified of the petroleum contamination and any planned intrusive activities either on or off the Patch's Petroleum site should include necessary health and safety precautions.

REFERENCES

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- Gruszczenski, T.S. 1987. *Determination of a Realistic Estimate of Actual Formation Product Thickness Using Monitoring Wells: A field bailout test.* In Proceedings of Petroleum Hydrocarbons and Organic Chemicals in Groundwater: Prevention, Detection and Restoration. NWWA, Houston, TX.

LIMITATIONS

The services described in this report were performed consistent with generally accepted professional consulting principles and practices. No other warranty, express or implied, is made. These services were performed consistent with our agreement with our client. This report is solely for the use and information of our client unless otherwise noted. Any reliance on this report by a third party is at such party's sole risk.

Opinions and recommendations contained in this report apply to conditions existing when services were performed and are intended only for the client, purposes, locations, time frames, and project parameters indicated. We are not responsible for the impacts of any changes in environmental standards, practices, or regulations subsequent to performance of services. We do not warrant the accuracy of information supplied by others, nor the use of segregated portions of this report.

The purpose of a geologic/hydrogeologic study is to reasonably characterize existing site conditions based on the geology/hydrogeology of the area. In performing such a study, it is understood that a balance must be struck between a reasonable inquiry into the site conditions and an exhaustive analysis of each conceivable environmental characteristic. The following paragraphs discuss the assumptions and parameters under which such an opinion is rendered.

No investigation is thorough enough to describe all geologic/ hydrogeologic conditions of interest at a given site. If conditions have not been identified during the study, such a finding should not therefore be construed as a guarantee of the absence of such conditions at the site, but rather as the result of the services performed within the scope, limitations, and cost of the work performed.

We are unable to report on or accurately predict events that may change the site conditions after the described services are performed, whether occurring naturally or caused by external forces. We assume no responsibility for conditions we were not authorized to evaluate, or conditions not generally recognized as predictable when services were performed.

Geologic/hydrogeologic conditions may exist at the site that cannot be identified solely by visual observation. Where subsurface exploratory work was performed, our professional opinions are based in part on interpretation of data from discrete sampling locations that may not represent actual conditions at unsampled locations.

TABLES

Table 1

**Monitoring Well, Groundwater, Free Product Elevation Data
Malter Consulting, Inc. - Patch's Petroleum, Inc., Rutland, Vermont**

Monitoring Well Data	Ground	Top of PVC	Top of Casing	Description/Comment	Groundwater Elevation 8/31/98	Depth to Groundwater	Depth to Product	Product Elevation 8/31/98	Product Thickness 8/31/98
MW-1	99.73	99.52	99.73	1-1/2 inch PVC with flush mounted roadbox	92.62	6.9	ND	ND	ND
MW-2	99.19	98.93	99.19	1-1/2 inch PVC with flush mounted roadbox	85.85	13.08	12.55	86.38	0.53
MW-3	97.45	97.29	97.45	1-1/2 inch PVC with flush mounted roadbox	83.12	14.17	12.64	84.65	1.53
MW-4	NA	NA	NA	No well installed, no water to 22 feet	NA	NA	NA	NA	NA
MW-5	99.63	99.32	99.63	1-1/2 inch PVC with flush mounted roadbox	94.84	4.48	ND	ND	ND
MW-6	98.58	98.25	98.58	1-1/2 inch PVC with flush mounted roadbox	95.11	3.14	ND	ND	ND
MW-7	98.33	97.7	98.33	2-inch PVC with flush mounted roadbox	84.08	13.62	ND	ND	ND
MW-8	96.85	96.58	96.85	2-inch PVC with flush mounted roadbox	81.35	15.23	ND	ND	ND
MW-9	95.81	95.32	95.81	2-inch PVC with flush mounted roadbox	80.81	14.51	ND	ND	ND
MW-10	96.02	99.03	99.18	2-inch PVC with stick up protective casing	79.04	19.99	15.79	83.24	4.20
MW-11	95.21	98.33	98.57	2-inch PVC with stick up protective casing	74.42	23.91	18.22	80.11	5.69
MW-12	97.16	96.57	97.16	2-inch PVC with flush mounted roadbox	78.06	18.51	ND	ND	ND
RW-1	99.40	98.98	99.40	4-inch PVC with flush mounted roadbox	NR	NR	NR	NR	NR
RW-2	97.78	97.5	97.78	4-inch PVC with flush mounted roadbox	84.81	12.35	12.27	84.39	0.08
RW-3	97.59	97.16	97.59	4-inch PVC with flush mounted roadbox	83.71	13.62	12.25	85.11	1.37
GP-4	97.28	99.04	100.64	3/4-inch PVC with stickup steel protective casing	ND	ND	ND	ND	ND
GP-6	95.87	95.54	95.87	3/4-inch PVC with flush mounted road box	79.81	15.73	15.32	80.22	0.41
GP-7	95.12	98.25	98.84	3/4-inch PVC with stickup steel protective casing	79.92	18.33	13.69	84.56	4.64
GP-8	95.04	98.43	98.68	3/4-inch PVC with stickup steel protective casing	NA	DRY	NA	NA	NA
GP-12	93.89	97.24	97.68	3/4-inch PVC with stickup steel protective casing	ND	ND	15.97	81.27	5.15
GP-16	93.67	93.43	93.67	4-inch PVC with flush mounted roadbox	85.04	8.39	ND	ND	ND

NOTE:

- NA = Not applicable
- ND = Not detected
- NR = No reading

1. Elevations expressed in feet. Based upon an assumed datum of 100.00 feet at the northeast top of the first concrete step at the northeast entrance to building.
2. Monitoring well elevations obtained through differential leveling survey conducted by EMCON on July 2, 1996, February 26, 1998 and August 31, 1998.
3. Depth to groundwater and depth to product taken on August 31, 1998.

Table 2

**Groundwater Analytical Results
Malter Consulting, Inc. - Patch's Petroleum, Inc., Rutland, Vermont**

Analyte	Enforcement Standard (ug/L)	MW-1	MW-5	MW-6	MW-7	MW-8	MW-9	GP-16
Benzene	5					3.0		
Toluene	1,000.00					5.0		1
Ethylbenzene	700					7.0		1
Total Xylenes	10,000.00					68.0		5
Chlorobenzene	100							
1,3-Dichlorobenzene	NS							
1,4-Dichlorobenzene	NS							
1,2-Dichlorobenzene	NS							
MTBE	40	40						
TPH	NS							

NOTES:

NS = None Set

1. All concentrations in micrograms per liter (ug/L), equivalent to parts per billion (ppb), except TPH reported in milligrams per liter, equivalent to parts per million.
2. Blanks indicate below practical quantitation limit (BPQL).
3. Analytical testing for all compounds performed by USEPA 8020 except TPH, performed by USEPA Method 8100M at GP-16 only.
4. Enforcement standards are from the Vermont Groundwater Protection Rule and Strategy, 1997.
5. Similar compounds and concentrations were detected in the duplicate sample for GP-16 (designated MW-1).
6. Samples collected on September 1, 1998, by EMCON and MCI.
7. Samples analyzed by SciTest Laboratory Services of Randolph, Vermont.
8. All trip blank sample concentrations were BPQL.
9. Samples collected from MW-5, MW-6, MW-7 and MW-9 were BPQL.

Table 3

**Separate Phase Hydrocarbon Recovery Data
Malter Consulting, Inc., - Patch's Petroleum, Rutland, Vermont**

Well Designation	Pre-Pumping Product Thickness (ft)	Product Thickness Approximately 30 Minutes After Pumping Stopped (ft)	Percent Recovery after 30 Minutes	Product Thickness Approximately 660 Minutes After Pumping Stopped (ft)	Product Recovered (gal)	Percent Recovery after 660 Minutes	Comments
MW-3	1.53	0.14	9	0.17	0.25	11	1.5-inch diameter well
MW-10	4.20	0.10	26	1.32	5.0	31.0	2-inch diameter well
MW-11	5.69	1.63	18	3.55	5.0	62.0	2-inch diameter well
GP-7	4.58	2.56	54	3.76	0.25	82	3/4-inch diameter well
GP-12	5.15	2.1	40	4.39	0.75	85	3/4-inch diameter well
GP-6	0.41	0.0	0	0.000	0.10	0.00	3/4-inch diameter well
RW-3	NM	NM	NM	NM	0.10	NM	Product removed from Model 14 Zorbo passive recovery system. No test run.

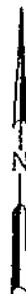
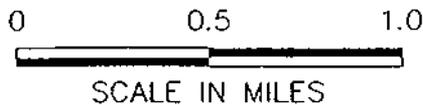
NOTE:
 NM = Not measured
 1. All measurements from top of PVC with electronic oil/water interface probe.
 2. All free product removed placed in 55 gallon drum onsite provided by MCI.

FIGURES

Burlington, VT/DWG D:\DWG\84794\010.000\SITELOC.dwg Xrefs: <NONE>
 Scale: 1 = 1.00 DimScale: 1 = 1.00 Date: 10/19/98 Time: 4:40 PM Operator: EMARTIN



BASE MAP TAKEN FROM USGS QUADRANGLE
 RUTLAND, VERMONT



DATE 10-14-98
 DWN EJM
 APP JH
 REV
 PROJECT NO.
 84794-010.001

FIGURE 1
 MALTER CONSULTING INC.
 PATCH'S PETROLEUM
 RUTLAND, VERMONT
 SITE LOCATION MAP

E 4900 + N 5200

E 5000 +

E 5100 +

E 5200 +

E 5300 +

E 5400 +

E 5500 +

E 5600 +

E 5700 +

E 5800 +

E 5900 +

E 6000 +

E 6100 +

E 6200 +

E 6300 +

E 6400 +

E 6500 +

E 6600 +

E 6700 +

E 6800 +

E 6900 +

E 7000 +

E 7100 +

E 7200 +

E 7300 +

E 7400 +

E 7500 +

E 7600 +

E 7700 +

E 7800 +

E 7900 +

E 8000 +

E 8100 +

E 8200 +

E 8300 +

E 8400 +

E 8500 +

E 8600 +

E 8700 +

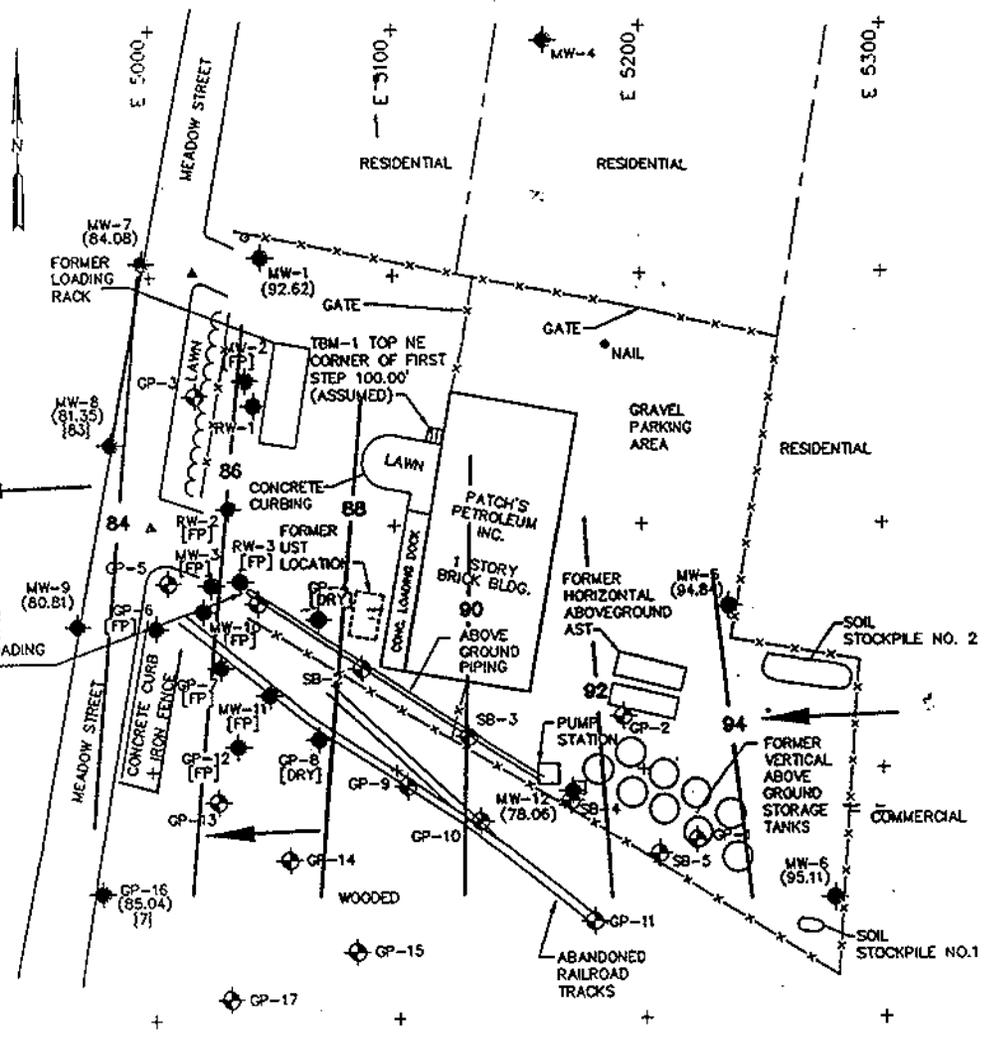
E 8800 +

E 8900 +

E 9000 +

E 9100 +

E 9200 +



LEGEND

△	SURVEY CONTROL P.K. NAIL
□	SURVEY CONTROL HUB AND TACK
•	SURVEY NAIL
○	IRON PIPE FOUND
MW-5	MONITORING WELL
SB-1	SOIL BORING
---x---x---	CHAIN LINK FENCE/APPROXIMATE PATCH'S PETROLEUM PROPERTY BOUNDARY
---	EDGE OF PAVEMENT/BUILDING LINE
N 5000 +	HORIZONTAL GRID SYSTEM TICK WITH COORDINATE VALUE
---	APPROXIMATE PROPERTY BOUNDARIES
85	GROUNDWATER CONTOUR
---	GROUNDWATER FLOW DIRECTION
(95.11)	GROUNDWATER ELEVATION MEASURED ON 8-31-98
[FP]	FREE PRODUCT DETECTED
[DRY]	GROUNDWATER NOT DETECTED
[7]	BTEX CONCENTRATION IN PARTS PER BILLION

- NOTES
1. THE PLANNING FEATURES SHOWN BASED ON FIELD SURVEYS CONDUCTED BY EMCON PERSONNEL ON JULY 2, 1996 AND FEBRUARY 2, 1998.
 2. THE HORIZONTAL GRID SYSTEM AS SHOWN BASED UPON OBSERVED MAGNETIC NORTH JULY, 1996 AND ESTABLISHED BY A CLOSED TRAVERSE FIELD SURVEY CONDUCTED BY EMCON. THE GRID SYSTEM IS THE "EMCON" SITE GRID SYSTEM AND HAS NOT BEEN RELATED TO ANY OTHER GRID SYSTEM.
 3. THE VERTICAL DATUM IS EXPRESSED IN FEET AND IS BASED UPON AN ASSUMED ELEVATION OF 100.00 AT THE TOP NORTHEAST CORNER OF THE BOTTOM CONCRETE STEP OF STAIR AT THE NORTHWEST ENTRANCE TO THE PATCH'S PETROLEUM BUILDING AS SHOWN.
 4. THE HORIZONTAL AND VERTICAL SURVEY CONTROL AS SHOWN ON THIS PLAN WAS BELIEVED TO BE CORRECT AT THE TIME THIS PLAN WAS PRODUCED. SURVEY CONTROL DATA IS SUBJECT TO CHANGE WITH TIME. EMCON ASSUMES NO RESPONSIBILITY FOR THE USE OF INCORRECT OR OUTDATED INFORMATION.
 5. A PROPERTY BOUNDARY SURVEY OR RECORD SEARCH HAS NOT BEEN CONDUCTED BY EMCON.
 6. MW-4 WAS A DRY BORING, NO WELL WAS INSTALLED.
 7. THE LOCATIONS OF MW-4, APPROXIMATE PROPERTY BOUNDARIES, LOADING RACK AND ABOVE GROUND PIPING WERE PROVIDED BY WALTER CONSULTING, INC.
 8. GEOPROBE LOCATIONS OBTAINED BY EMCON PERSONNEL ON SEPTEMBER 1, 1998 USING A TRIMBLE PRO XR GLOBAL POSITIONING SYSTEM.



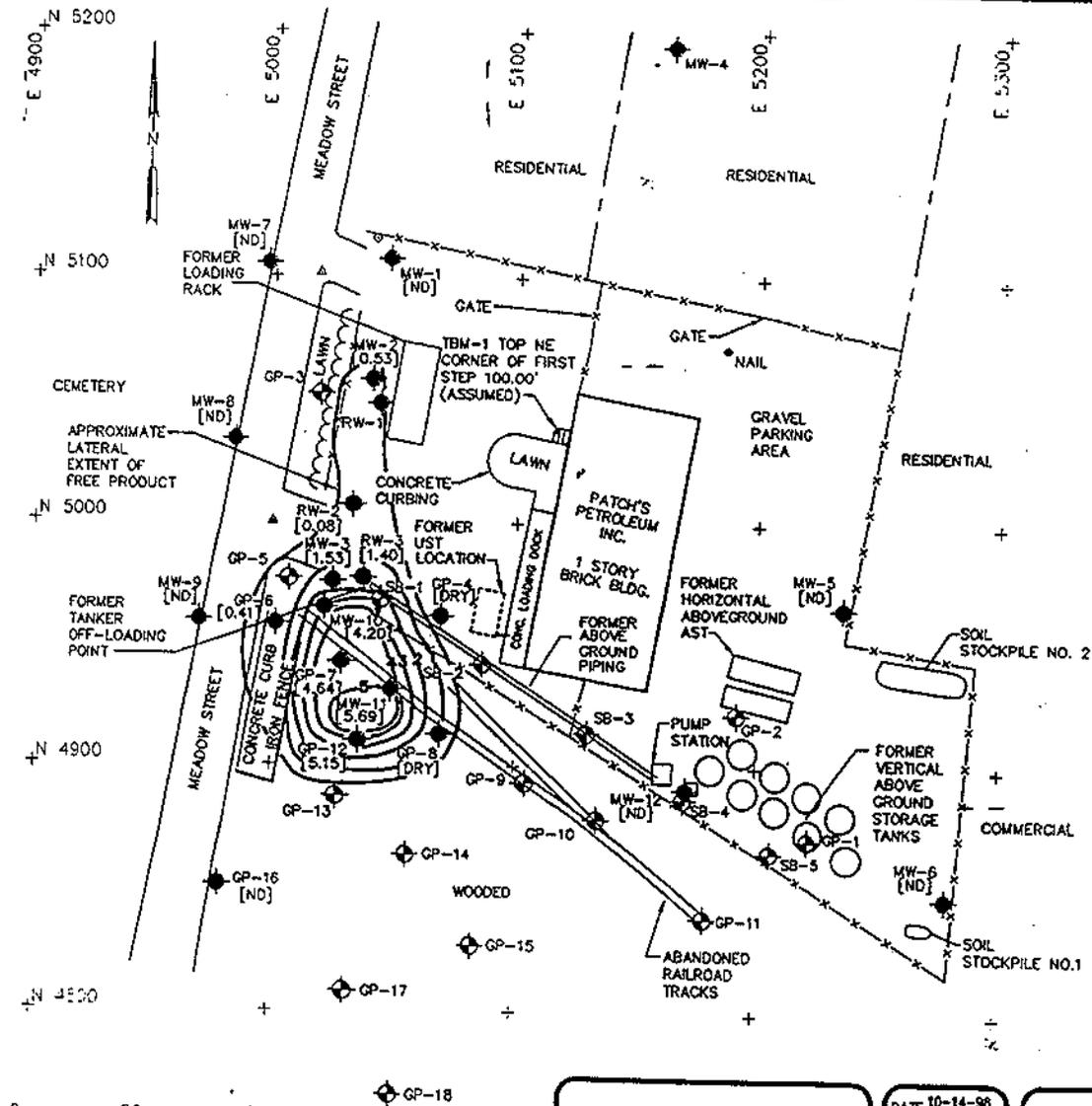
DATE 10-19-98
 DWN CM
 APP JJK
 REV

WALTER CONSULTING INC.
 FORMER PATCH'S PETROLEUM INC. FACILITY
 RUTLAND, VERMONT
 SITE PLAN SHOWING
 GROUNDWATER CONTOURS AND BTEX

FIGURE
 3
 PROJECT NO.
 84794-010.001

Rutland, VT 05703 D:\DWG\84794\010.001\MAP0107.dwg
 User: JJK Date: 11/27/98 Time: 2:11:48 PM
 Plot: 1 to 50.00 D:\DWG\84794\010.001\MAP0107.dwg

84794-010.001 V:\0700 04\0700\84794\010.001\EMCON\Site\Site.dwg Scale: 1:50.00 Date: 11/22/98 Time: 2:30 PM Operator: ELM/RTM



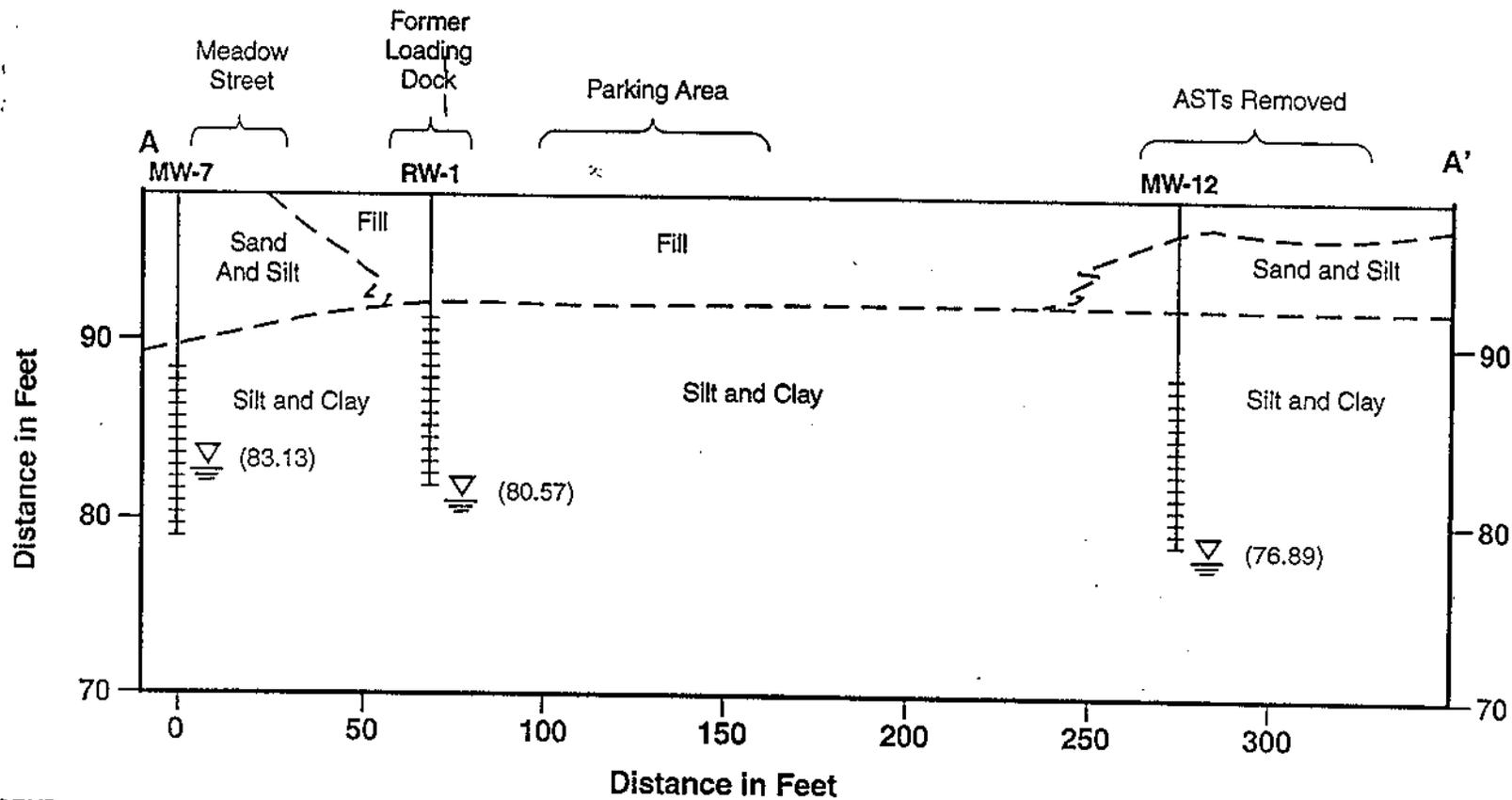
DATE 10-14-98
 DWN EJM
 APP JH
 REV

MALTER CONSULTING INC.
 FORMER PATCH'S PETROLEUM INC. FACILITY
 RUTLAND, VERMONT
 SITE PLAN SHOWING
 EXTENT OF FREE PRODUCT

FIGURE
 4
 PROJECT NO.
 84794-010.001

- LEGEND**
- ▲ SURVEY CONTROL P.K. NAIL
 - SURVEY CONTROL HUB AND TACK
 - SURVEY NAIL
 - IRON PIPE FOUND
 - MW-5 ● MONITORING WELL
 - SB-4 ◆ SOIL BORING
 - GP-1 ◆
 - - - - CHAIN LINK FENCE/APPROXIMATE PATCH'S PETROLEUM PROPERTY LINE
 - EDGE OF PAVEMENT/BUILDING LINE
 - + HORIZONTAL GRID SYSTEM TACK WITH COORDINATE VALUE
 - - - - APPROXIMATE PROPERTY BOUNDARIES
 - APPROXIMATE LATERAL EXTENT OF FREE PRODUCT
 - - - - APPROXIMATE FREE PRODUCT ONE FOOT CONTOUR INTERVAL
 - [1.36] FREE PRODUCT THICKNESS ON B-31-98
 - [ND] FREE PRODUCT NOT DETECTED

- NOTES**
1. THE PLANIMETRIC FEATURES SHOWN BASED ON FIELD SURVEYS CONDUCTED BY EMCON PERSONNEL ON JULY 2, 1996 AND FEBRUARY 2, 1998.
 2. THE HORIZONTAL GRID SYSTEM AS SHOWN BASED UPON OBSERVED MAGNETIC NORTH JULY, 1996 AND ESTABLISHED BY A CLOSED TRAVERSE FIELD SURVEY CONDUCTED BY EMCON. THE GRID SYSTEM IS THE "EMCON" SITE GRID SYSTEM AND HAS NOT BEEN RELATED TO ANY OTHER GRID SYSTEM.
 3. THE VERTICAL DATUM IS EXPRESSED IN FEET AND IS BASED UPON AN ASSUMED ELEVATION OF 100.00 AT THE TOP NORTHEAST CORNER OF THE BOTTOM CONCRETE STEP OF STAIR AT THE NORTHWEST ENTRANCE TO THE PATCH'S PETROLEUM BUILDING AS SHOWN.
 4. THE HORIZONTAL AND VERTICAL SURVEY CONTROL AS SHOWN ON THIS PLAN WAS BELIEVED TO BE CORRECT AT THE TIME THIS PLAN WAS PRODUCED. SURVEY CONTROL DATA IS SUBJECT TO CHANGE WITH TIME. EMCON ASSUMES NO RESPONSIBILITY FOR THE USE OF INCORRECT OR OUTDATED INFORMATION.
 5. A PROPERTY BOUNDARY SURVEY OR RECORD SEARCH HAS NOT BEEN CONDUCTED BY EMCON.
 6. MW-4 WAS A DRY BORING, NO WELL WAS INSTALLED.
 7. THE LOCATIONS OF MW-4, APPROXIMATE PROPERTY BOUNDARIES, LOADING RACK AND ABOVE GROUND PIPING WERE PROVIDED BY MALTER CONSULTING, INC.
 8. GEOPROBE LOCATIONS OBTAINED BY EMCON PERSONNEL ON SEPTEMBER 1, 1998 USING A TRIMBLE PRO XR GLOBAL POSITIONING SYSTEM.



LEGEND:

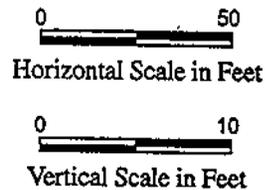
--- Geological Contact

▽ Water Elevation
Measured on 2/26/98

Fill - Generally consists of silt, sand and Gravel, with occasional pieces of wood, brick, and concrete.

Sand and Silt - Generally consists of fine sand and silt.

Silt and Clay - Generally consists of silty clay to clayey silt with occasional fine sand layers (<0.10 inch thick).



DATE 8/13/98
DWN EN
APPR JJH
REV
PROJECT NO.
84794-008.000

FIGURE 5
MALTER CONSULTING, INC.
FORMER PATCH'S PETROLEUM SITE
RUTLAND, VERMONT
GEOLOGICAL CROSS SECTION A-A'

APPENDIX A
VTDEC CORRESPONDENCE



State of Vermont

Department of Fish and Wildlife
Department of Forests, Parks and Recreation
Department of Environmental Conservation
State Geologist
RELAY SERVICE FOR THE HEARING IMPAIRED
1-800-253-0191 TDD>Voice
1-800-253-0195 Voice>TDD

AGENCY OF NATURAL RESOURCES
Department of Environmental Conservation
Waste Management Division
103 South Main Street / West Building
Waterbury, Vermont 05671-0404
802-241-3888
FAX 802-241-3296

August 27, 1998

MR STEPHEN SINGISER
VERMONT NATIONAL BANK
PO BOX 831
RUTLAND VT 05702

RE: Work Plan/Cost Estimate dated July 31, 1998, and letter report dated July 9, 1998, for the former Patch's Petroleum Facility, Rutland (Site #96-1973)

Dear Mr. Singiser:

The Sites Management Section (SMS) has reviewed the above work plan/cost estimate by Malter Consulting, Inc. and EMCON and the letter report by Malter Consulting, Inc. Below are the SMS comments on these submittals.

Work Plan/Cost Estimate

On August 21, 1998, the SMS gave verbal approval of the work plan dated July 31, 1998. The purpose of this work is to further define the degree and extent of the free-product petroleum plume. The work plan proposes that EMCON will install up to eighteen soil borings and six monitoring wells with a geoprobe. Soil samples from the borings will be screened with a photoionization detector (PID). Groundwater samples from thirteen monitoring wells (including the six newly installed wells) will be analyzed for volatile organic compounds (VOCs) and using EPA Method 8020 and total petroleum hydrocarbons (TPH) using modified EPA Method 8100. Hydraulic conductivity tests will be completed for three wells. On the same day as the hydraulic conductivity testing, free-product from the monitoring wells will be gauged and removed. A report will be completed summarizing the results of the above tasks. In addition, the report will identify potential remedial options and provide recommendations for subsequent work. Based on discussions with Joe Hayes of EMCON and John Malter, the cost estimate was revised to \$15,436.00. The SMS approves the revised cost estimate. EMCON plans to drill on August 25, 1998 and complete the summary report by October 2, 1998. If there is a change in this schedule, please notify me immediately.

Several of the proposed boreholes will be placed beyond the property of Patch's petroleum. Verbal permission to place the borings in the railroad right-of-way was given by Charlie Bischoff from the Vermont Railway on August 20, 1998 and Nancy Rice of the Vermont Agency of Transportation on August 24, 1998. Based on a letter dated April 15, 1998, from Malter Consulting, permission to install wells on the property south of the site and railroad right-of-way was given by the President of the corporation, Cole Family Enterprise, Inc., who owns the property.

Mr. Stephen Singiser
August 24, 1998
Page 2 of 3

A portion of the cleanup and site investigation costs associated with Patch's Petroleum, including the above tasks, is likely eligible for reimbursement under the Petroleum Cleanup Fund (PCF) as set forth in 10 V.S.A. Section 1941. However, the PCF only reimburses uninsured costs. To make this determination, the SMS must receive a copy of the liability insurance policies from the last operator and the owner of the property.

Based on previous investigations at the site, petroleum contamination was found during the removal of a 550-gallon underground storage tank (UST) and underground piping that connected the load rack to the above ground piping on the southwest side of the property. These underground lines are considered part of the above ground tank (AST) system because they conveyed fuel from ten large ASTs in the back of the facility to the loading doc and because the pipe volume was less than ten percent of the total volume of the AST system. Fuels within the AST system included kerosene, heating oil, and gasoline. A free-product sample was collected from MW-11 on February 26, 1998. The analytical results of the sample showed two types of petroleum products: weathered gasoline (50% to 80%) and diesel fuel (20% to 50%). These results suggest that releases from the gasoline UST may have contributed to the contamination. However, gasoline was also stored in ASTs at the site.

As of April 28, 1998, the PCF includes coverage to reimburse site investigation/cleanup costs associated with AST petroleum releases as well as UST releases. However, the PCF will only reimburse reasonable and uninsured cleanup/site investigation costs associated with AST petroleum releases up to \$25,000 per site, with a \$1,000 deductible. On the other hand, the PCF will reimburse cleanup/site investigation costs associated with UST releases up to a \$1,000,000, with a \$10,000 deductible. Before the PCF can reimburse eligible costs, the split between costs associated with the two types of coverage (AST and UST) must be established.

Because there were at least ten ASTs to one UST at the site, the SMS proposes that 90 percent of the contribution of the contamination was from the AST system and 10 percent was from the UST. For cleanup/site investigation work that took place before April 28, 1998, ten percent of reasonable and uninsured cleanup/site investigation costs will apply to the \$10,000 PCF deductible. The remaining costs are attributed to the AST releases, which were not eligible for PCF reimbursement before April 28, 1998. For work after April 28, 1998, the PCF, under the AST coverage, would reimburse 90 percent of the eligible cleanup/site investigation costs up to \$26,000, minus the \$1,000 deductible. The remaining 10 percent would either apply to the \$10,000 PCF deductible for UST coverage or be reimbursed by the PCF if the deductible was met. After \$25,000 has applied to the AST coverage and the \$10,000 PCF deductible for UST coverage is reached, then the PCF will reimburse ten percent of additional cleanup/site investigation costs up to \$1,000,000. Please respond to this proposal in writing within 15 days of receiving this letter. If you do not agree with this proposal, please provide your rationale and a counter proposal.

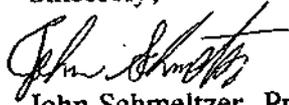
Mr. Stephen Singiser
August 24, 1998
Page 3 of 3

Letter Report dated July 9, 1998

This letter report provided a good summary of site investigation activities since October 1996. However, the SMS is not clear whether this letter report is the deliverable identified in the approved scope of work dated December 15, 1997. If this is the case, then the site investigation data collected since October 1996 must be organized in tables and figures so trends over time at each well can be evaluated. Data to be organized includes water level and free-product measurements, dissolved contaminant concentrations, volume of free-product removed, groundwater contours, and laboratory results. These tables and figures can be submitted as an addendum to the letter report within 30 days of receiving this letter. However, the SMS will not require this addendum if the above information is planned to be included in the EMCON report. Please have your consultant clarify this with me as soon as possible.

If you have any questions or comments, please do not hesitate to contact me at 241-3886.

Sincerely,



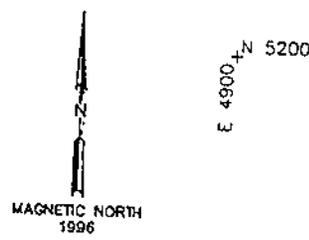
John Schmeltzer, Project Manager
Sites Management Section

CC: Ms. Laurel V. Patch
Mr. John Malter, Malter Consulting, Inc.
Mr. Joe Hayes, EMCON
Ms. Nancy Rice, Agency of Transportation
Mr. Charlie Bischoff, Vermont Railway

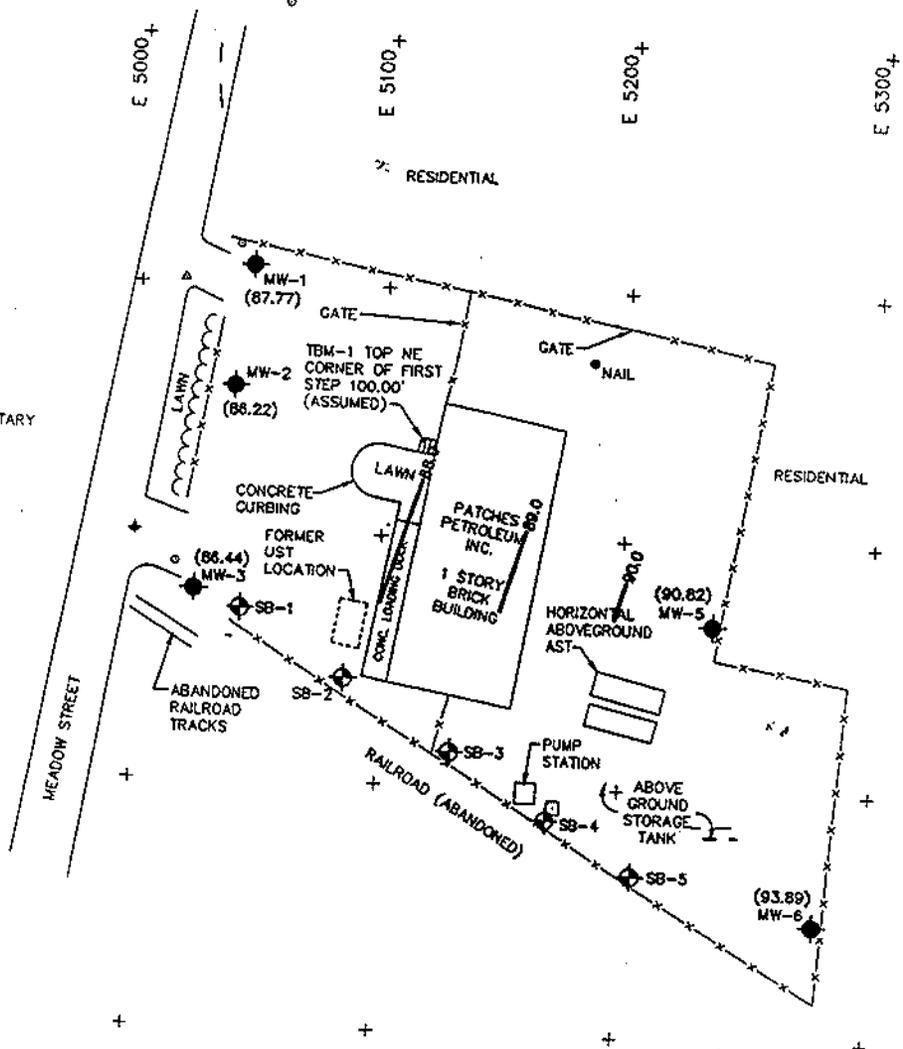
JSS:wp51/sites/961973/patch2.ltr

APPENDIX B
HISTORICAL GROUNDWATER MAPS

11
 emcon.dwg (p1) 11: 5A:00:00 8/1/96 00:00:00 00:00:00 00:00:00 00:00:00 00:00:00 00:00:00 00:00:00
 Date: 8/1/96 Time: 3:18 PM Operator: scapin



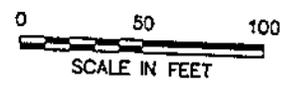
E 4900+
 N 5200
 E 5000+
 N 5100
 CEMETARY
 N 5000
 N 4900
 MEADOW STREET
 N 4800



LEGEND

- ▲ SURVEY CONTROL P.K. NAIL
- SURVEY CONTROL HUB AND TACK
- SURVEY NAIL
- IRON PIPE FOUND
- MW-5 ◆ MONITORING WELL
- SB-4 ◆ SOIL BORING
- x-x-x- CHAIN LINK FENCE
- EDGE OF PAVEMENT/BUILDING LINE
- N 5000+ HORIZONTAL GRID SYSTEM TICK WITH COORDINATE VALUE
- (86.44) GROUNDWATER ELEVATION MEASURED ON 7-2-96
- 87.0— GROUNDWATER CONTOUR

- NOTES**
1. THE PLANIMETRIC FEATURES SHOWN BASED ON A FIELD SURVEY CONDUCTED BY EMCON PERSONNEL ON JULY 2, 1996.
 2. THE HORIZONTAL GRID SYSTEM AS SHOWN BASED UPON OBSERVED MAGNETIC NORTH JULY, 1996 AND ESTABLISHED BY A CLOSED TRAVERSE FIELD SURVEY CONDUCTED BY EMCON. THE GRID SYSTEM IS THE "EMCON" SITE GRID SYSTEM AND HAS NOT BEEN RELATED TO ANY OTHER GRID SYSTEM.
 3. THE VERTICAL DATUM IS EXPRESSED IN FEET AND IS BASED UPON AN ASSUMED ELEVATION OF 100.00 AT THE TOP NORTHEAST CORNER OF THE BOTTOM CONCRETE STEP OF STAIR AT THE NORTHWEST ENTRANCE TO THE PATCHES PETROLEUM BUILDING AS SHOWN ON THIS PLAN.
 4. THE HORIZONTAL AND VERTICAL SURVEY CONTROL AS SHOWN ON THIS PLAN WAS BELIEVED TO BE CORRECT AT THE TIME THIS PLAN WAS PRODUCED. ANY AND ALL DATA IS SUBJECT TO CHANGE WITH TIME. EMCON ASSUMES NO RESPONSIBILITY FOR THE USE OF INCORRECT OR OUTDATED INFORMATION.
 5. A PROPERTY BOUNDARY SURVEY OR RECORD SEARCH HAS NOT BEEN CONDUCTED BY EMCON. PROPERTY BOUNDARIES AND EASEMENTS EXPRESSED OR IMPLIED ARE NOT SHOWN ON THIS PLAN.



DATE 8/1/96
 DWN SHB
 APP _____
 REV _____

MALTE CONSULTING INC.
 PATCHES PETROLEUM INC.
 RUTLAND, VERMONT
SITE PLAN WITH GROUNDWATER CONTOURS
JULY 2, 1996

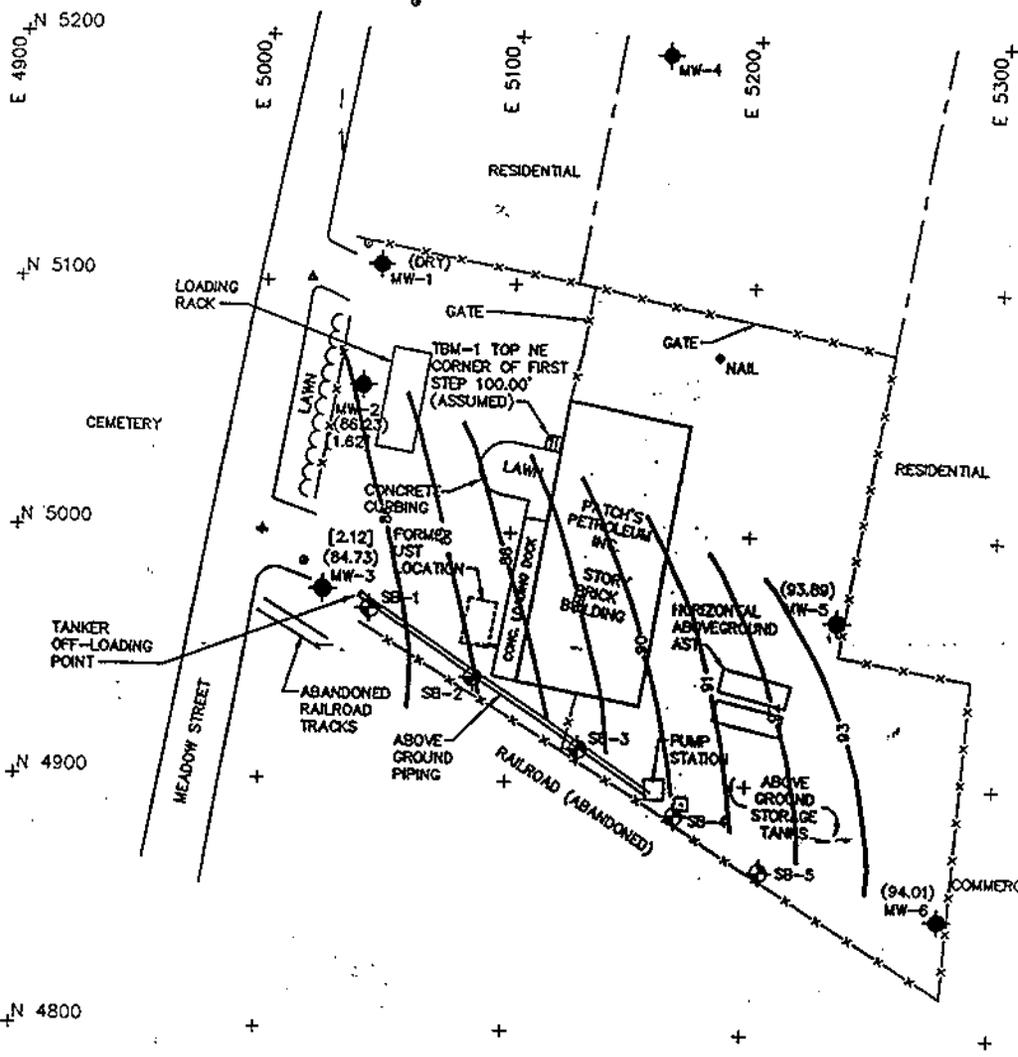
FIGURE
2
 PROJECT NO.
 84794-003.000

LEGEND

- ▲ SURVEY CONTROL P.K. NAIL
- SURVEY CONTROL HUB AND TACK
- SURVEY NAIL
- IRON PIPE FOUND
- MW-5 ◆ MONITORING WELL
- SB-4 ◆ SOIL BORING
- x-x-x- CHAIN LINK FENCE
- EDGE OF PAVEMENT/BUILDING LINE
- N 5000 + HORIZONTAL GRID SYSTEM TICK WITH COORDINATE VALUE
- (93.89) GROUNDWATER ELEVATION MEASURED ON 11-5-96
- [1.62] PRODUCT THICKNESS IN FEET MEASURED ON 11-5-96
- 87.0— GROUNDWATER CONTOUR
- - - APPROXIMATE PROPERTY BOUNDARIES

NOTES

1. THE PLANIMETRIC FEATURES SHOWN BASED ON A FIELD SURVEY CONDUCTED BY EMCON PERSONNEL ON JULY 2, 1996.
2. THE HORIZONTAL GRID SYSTEM AS SHOWN BASED UPON OBSERVED MAGNETIC NORTH JULY, 1996 AND ESTABLISHED BY A CLOSED TRAVERSE FIELD SURVEY CONDUCTED BY EMCON. THE GRID SYSTEM IS THE "EMCON" SITE GRID SYSTEM AND HAS NOT BEEN RELATED TO ANY OTHER GRID SYSTEM.
3. THE VERTICAL DATUM IS EXPRESSED IN FEET AND IS BASED UPON AN ASSUMED ELEVATION OF 100.00 AT THE TOP NORTHEAST CORNER OF THE BOTTOM CONCRETE STEP OF STAIR AT THE NORTHWEST ENTRANCE TO THE PATCH'S PETROLEUM BUILDING AS SHOWN ON THIS PLAN.
4. THE HORIZONTAL AND VERTICAL SURVEY CONTROL AS SHOWN ON THIS PLAN WAS BELIEVED TO BE CORRECT AT THE TIME THIS PLAN WAS PRODUCED. ANY AND ALL DATA IS SUBJECT TO CHANGE WITH TIME. EMCON ASSUMES NO RESPONSIBILITY FOR THE USE OF INCORRECT OR OUTDATED INFORMATION.
5. A PROPERTY BOUNDARY SURVEY OR RECORD SEARCH HAS NOT BEEN CONDUCTED BY EMCON.
6. MW-4 WAS A DRY BORING, NO WELL WAS INSTALLED.
7. THE LOCATIONS OF MW-4, APPROXIMATE PROPERTY BOUNDARIES, LOADING RACK AND ABOVE GROUND PIPING WERE PROVIDED BY MALTER CONSULTING, INC.
8. GROUND WATER ELEVATION AND PRODUCT THICKNESS MEASUREMENTS PROVIDED BY MALTER CONSULTING, INC.

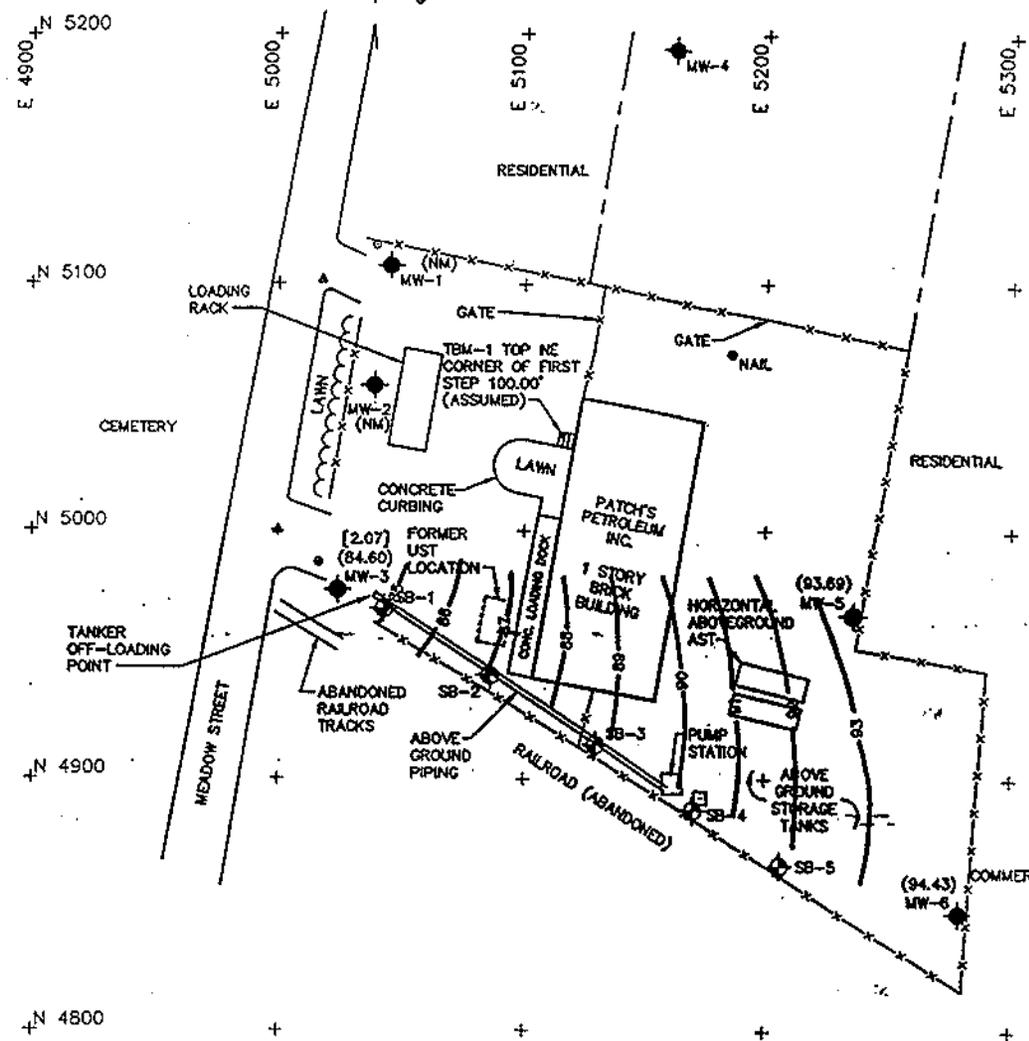
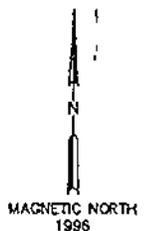


DATE 10/14/97
 DWN EVR
 APP JUM
 REV

MALTER CONSULTING INC.
 PATCH'S PETROLEUM INC.
 RUTLAND, VERMONT
**SITE PLAN WITH GROUNDWATER CONTOURS
 NOVEMBER 5, 1996**

FIGURE
1
 PROJECT NO.
 64734-007.000

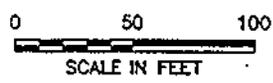
ENG: [unreadable] DATE: 11/7/97 TIME: 3:23 PM OPERATOR: [unreadable]



LEGEND

▲	SURVEY CONTROL P.K. NAIL
⊠	SURVEY CONTROL HUB AND TACK
•	SURVEY NAIL
○	IRON PIPE FOUND
MW-5	MONITORING WELL
SB-4	SOIL BORING
-x-x-x-	CHAIN LINK FENCE
—	EDGE OF PAVEMENT/BUILDING LINE
N 5000 +	HORIZONTAL GRID SYSTEM TICK WITH COORDINATE VALUE
(83.69)	GROUNDWATER ELEVATION MEASURED ON 2-11-97
[2.07]	PRODUCT THICKNESS IN FEET MEASURED ON 2-11-97
—87.0—	GROUNDWATER CONTOUR
- - -	APPROXIMATE PROPERTY BOUNDARIES
NK	NOT MEASURED

- NOTES**
1. THE PLANIMETRIC FEATURES SHOWN BASED ON A FIELD SURVEY CONDUCTED BY EMCON PERSONNEL ON JULY 2, 1996.
 2. THE HORIZONTAL GRID SYSTEM AS SHOWN BASED UPON OBSERVED MAGNETIC NORTH JULY, 1996 AND ESTABLISHED BY A CLOSED TRAVERSE FIELD SURVEY CONDUCTED BY EMCON. THE GRID SYSTEM IS THE "EMCON" SITE GRID SYSTEM AND HAS NOT BEEN RELATED TO ANY OTHER GRID SYSTEM.
 3. THE VERTICAL DATUM IS EXPRESSED IN FEET AND IS BASED UPON AN ASSUMED ELEVATION OF 100.00 AT THE TOP NORTHEAST CORNER OF THE BOTTOM CONCRETE STEP OF STAIR AT THE NORTHWEST ENTRANCE TO THE PATCH'S PETROLEUM BUILDING AS SHOWN ON THIS PLAN.
 4. THE HORIZONTAL AND VERTICAL SURVEY CONTROL AS SHOWN ON THIS PLAN WAS BELIEVED TO BE CORRECT AT THE TIME THIS PLAN WAS PRODUCED. ANY AND ALL DATA IS SUBJECT TO CHANGE WITH TIME. EMCON ASSUMES NO RESPONSIBILITY FOR THE USE OF INCORRECT OR OUTDATED INFORMATION.
 5. A PROPERTY BOUNDARY SURVEY OR RECORD SEARCH HAS NOT BEEN CONDUCTED BY EMCON.
 6. MW-4 WAS A DRY BORING, NO WELL WAS INSTALLED.
 7. THE LOCATIONS OF MW-4, APPROXIMATE PROPERTY BOUNDARIES, LOADING RACK, AND ABOVE GROUND PIPING WERE PROVIDED BY MALTER CONSULTING, INC.
 8. GROUND WATER ELEVATION AND PRODUCT THICKNESS MEASUREMENTS PROVIDED BY MALTER CONSULTING, INC.

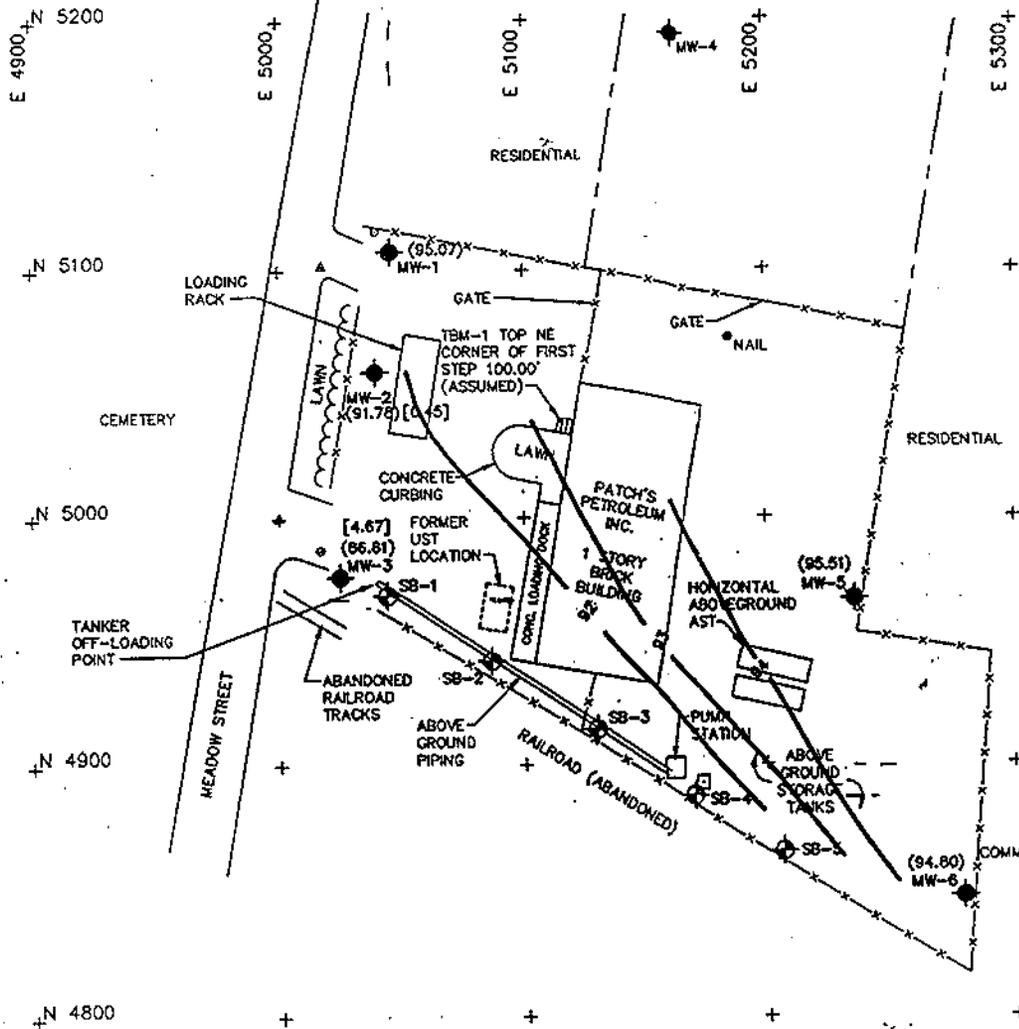


DATE	10/14/97
DWN	ER
APP	JM
REV	

MALTER CONSULTING INC.
PATCH'S PETROLEUM INC.
 RUTLAND, VERMONT
SITE PLAN WITH GROUNDWATER CONTOURS
FEBRUARY 11, 1997

FIGURE
2
 PROJECT NO.
 84784-007.000

SHEET NO. 2 OF 2
 DATE: 10/14/97
 SCALE: 1" = 50'
 DRAWN BY: ER
 CHECKED BY: JM
 PROJECT NO.: 84784-007.000

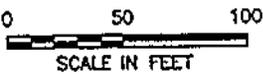


LEGEND

- ▲ SURVEY CONTROL P.K. NAIL
- SURVEY CONTROL HUB AND TACK
- SURVEY NAIL
- IRON PIPE FOUND
- MW-5 ◆ MONITORING WELL
- SB-4 ⊕ SOIL BORING
- x-x-x- CHAIN LINK FENCE
- EDGE OF PAVEMENT/BUILDING LINE
- N 5000 + HORIZONTAL GRID SYSTEM TICK WITH COORDINATE VALUE
- (95.51) GROUNDWATER ELEVATION MEASURED 5-21-97
- [4.67] PRODUCT THICKNESS IN FEET MEASURED ON 5-21-97
- 87.0 — GROUNDWATER CONTOUR
- - - - - APPROXIMATE PROPERTY BOUNDARIES

NOTES

1. THE PLANIMETRIC FEATURES SHOWN BASED ON A FIELD SURVEY CONDUCTED BY EMCON PERSONNEL ON JULY 2, 1996.
2. THE HORIZONTAL GRID SYSTEM AS SHOWN BASED UPON OBSERVED MAGNETIC NORTH JULY, 1996 AND ESTABLISHED BY A CLOSED TRAVERSE FIELD SURVEY CONDUCTED BY EMCON. THE GRID SYSTEM IS THE "EMCON" SITE GRID SYSTEM AND HAS NOT BEEN RELATED TO ANY OTHER GRID SYSTEM.
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4. THE HORIZONTAL AND VERTICAL SURVEY CONTROL AS SHOWN ON THIS PLAN WAS BELIEVED TO BE CORRECT AT THE TIME THIS PLAN WAS PRODUCED. ANY AND ALL DATA IS SUBJECT TO CHANGE WITH TIME. EMCON ASSUMES NO RESPONSIBILITY FOR THE USE OF INCORRECT OR OUTDATED INFORMATION.
5. A PROPERTY BOUNDARY SURVEY OR RECORD SEARCH HAS NOT BEEN CONDUCTED BY EMCON.
6. MW-4 WAS A DRY BORING, NO WELL WAS INSTALLED.
7. THE LOCATIONS OF MW-4, APPROXIMATE PROPERTY BOUNDARIES, LOADING RACK AND ABOVE GROUND PIPING WERE PROVIDED BY MALTER CONSULTING, INC.
8. GROUND WATER ELEVATION AND PRODUCT THICKNESS MEASUREMENTS PROVIDED BY MALTER CONSULTING, INC.



DATE	10/14/97
DWN	JVR
APP	JRH
REV	

MALTER CONSULTING INC.
 PATCH'S PETROLEUM INC.
 RUTLAND, VERMONT
SITE PLAN WITH GROUNDWATER CONTOURS
 MAY 21, 1997

FIGURE
3
 PROJECT NO.
 84794-007.000

D:\emcon\proj\84794\84794.dwg Plot Date: 10/14/97 11:53 AM
 Scale: 1" = 50' Plotter: 11/17/97 Third Size Plot System
 Plot Date: 10/14/97 11:53 AM

APPENDIX C
HISTORICAL LABORATORY DATA

WATER QUALITY RESULTS
7/2/96

PARAMETER	MW-1	MW-5	MW-6
Methyl tertiary Butyl Ether	<1	<1	<1
Benzene	<1	<1	<1
Toluene	<1	<1	<1
Ethylbenzene	<1	<1	<1
Total Xylenes	<1	<1	<1
Tetrachloroethene	<1	0.8*	<1

EPA Method 8260

All results are in Parts Per Billion(ug/L)

*Contamination related to dumpster in area

11/6/96

PARAMETER	MW-1	MW-5	MW-6
Methyl tertiary Butyl Ether	DRY	<1	<1
Benzene	DRY	<1	<1
Toluene	DRY	<1	<1
Ethylbenzene	DRY	<1	<1
Total Xylenes	DRY	<1	<1
2-Chlorotoluene	DRY	3.2*	---

EPA Method 8020 for MW-6

EPA Method 8260 for MW-5

*Contamination related to dumpster

2/11/97

PARAMETER	MW-1	MW-5	MW-6
Methyl tertiary Butyl Ether	DRY	BPQL	BPQL
Benzene	DRY	BPQL	BPQL
Toluene	DRY	BPQL	BPQL
Ethylbenzene	DRY	BPQL	BPQL
Total Xylenes	DRY	BPQL	BPQL

EPA Method 8020

BPQL=Below Practical Quantitation Limit; 1 ug/L

5/21/97

PARAMETER	MW-1	MW-5	MW-6
Methyl tertiary Butyl Ether	3	BPQL	BPQL
Benzene	BPQL	BPQL	BPQL
Toluene	BPQL	BPQL	BPQL
Ethylbenzene	BPQL	BPQL	BPQL
Total Xylenes	BPQL	BPQL	BPQL

EPA Method 8020

BPQL=Below Practical Quantitation Limit; 1 ug/L

8/29/97

PARAMETER	MW-1	MW-5	MW-6
Methyl tertiary Butyl Ether	DRY	BPQL	BPQL
Benzene	DRY	BPQL	BPQL
Toluene	DRY	BPQL	BPQL
Ethylbenzene	DRY	BPQL	BPQL
Total Xylenes	DRY	BPQL	BPQL

EPA Method 8020

BPQL=Below Practical Quantitation Limit; 1 ug/L

11/19/97

PARAMETER	MW-1	MW-5	MW-6
Methyl tertiary Butyl Ether	DRY	BPQL	BPQL
Benzene	DRY	BPQL	BPQL
Toluene	DRY	BPQL	BPQL
Ethylbenzene	DRY	BPQL	BPQL
Total Xylenes	DRY	BPQL	BPQL

EPA Method 8020

BPQL=Below Practical Quantitation Limit; 1 ug/L

2/27/98

PARAMETER	MW-1	MW-5	MW-6	MW-7	MW-8	MW-9
Methyl tertiary Butyl Ether	6	BPQL	BPQL	BPQL	BPQL	BPQL
Benzene	BPQL	BPQL	BPQL	BPQL	BPQL	20
Toluene	BPQL	BPQL	BPQL	BPQL	TRACE	49
Ethylbenzene	BPQL	BPQL	BPQL	BPQL	TRACE	50
Total Xylenes	BPQL	BPQL	BPQL	BPQL	1	118

EPA Method 8020

BPQL=Below Practical Quantitation Limit; 1 ug/L

All results are in Parts Per Billion(ug/L)

5/29/98

PARAMETER	MW-1	MW-5	MW-6	MW-7	MW-8	MW-9
Methyl tertiary Butyl Ether	DRY	BPQL	BPQL	DRY	BPQL	BPQL
Benzene	DRY	BPQL	BPQL	DRY	2	1
Toluene	DRY	BPQL	BPQL	DRY	12	4
Ethylbenzene	DRY	BPQL	BPQL	DRY	34	4
Total Xylenes	DRY	BPQL	BPQL	DRY	141	7

EPA Method 8020

BPQL=Below Practical Quantitation Limit; 1 ug/L

All results are in Parts Per Billion(ug/L)

APPENDIX D

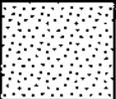
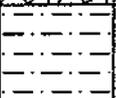
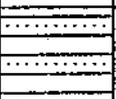
BORING LOGS AND WELL CONSTRUCTION DIAGRAMS

LEGEND FOR BORING LOGS

PROJECT: Patch's Petroleum Supplemental Site Investigation

PROJECT NO.: 84794-010.001

BORING NO.: GP-1 through GP-18

GRAPHIC SYMBOL	SOIL/ROCK CODE	DESCRIPTION OF SYMBOLS USED IN LITHOLOGIC LOG COLUMN	SYMBOL or PATTERN	DESCRIPTION OF SYMBOLS USED IN WELL CONSTRUCTION AND SAMPLE SYMBOLS
		SAND		Cement Grout
		SAND AND GRAVEL		Bentonite Seal
		SILT		Filter Sand Pack
		SILTY CLAY		3/4-inch ID, Sched. 40 PVC Riser Pipe
				3/4-inch ID, 0.010 Slot, Sched. 40 PVC Well Screen
				Cover
				Split Spoon Sample
		<p>NOTE:</p> <ol style="list-style-type: none"> 1. Borings installed with truck mounted vibratory drill rig. 2. Coordinate values based on Vermont State Plane 1983 (NAD83) as established with a Trimble Pro XR Global Positioning System. 3. Water level reference is top of PVC. 4. Elevations based on assumed vertical site datum, measured in feet. 5. Monitoring wells completed with PVC slip cap and locking steel protective casings. 		

BORING/WELL NO. GP-1

SHEET 1 of 1

PROJECT: Patch's Petroleum Supplemental Site Investigation
 CLIENT: Malter Consulting Inc.
 CONTRACTOR: New Hampshire Boring, Inc.

PROJECT NO: 84794-010.001

RIG: Geoprobe

GS ELEV: 97.42ft.
 N-S COORD: 400869.993
 E-W COORD: 1511976.698
 WL REF ELEV: N/Aft.
 DATE STARTED: 08/24/98
 DATE FINISHED: 08/25/98
 OPERATOR: D. Thompson
 GEOLOGIST: E. Martin

GROUNDWATER DATA (feet)				CASING	SAMPLE	TUBE	CORE
DATE	GW DEPTH	GW ELEV	INTAKE	TYPE	Steel	Macro	NA
N/A	N/A	N/A	N/A	DIAM.	2"	2"	NA
				WEIGHT	NA	NA	NA
				FALL	NA	NA	NA

WELL CONSTRUCT	DEPTH (feet)	SAMPLE NUMBER	SAMPLE & TYPE	RECOVERY (inches)	N-VALUE	LOG	HNu	FIELD DESCRIPTION (Modified Burmister Methodology)	REMARKS
		S-1	X			○	0.0	Reddish-brown, fine to medium GRAVEL (sub-rounded), little coarse Gravel, trace Silt, damp.	
		S-2	X			○	108	Reddish-brown, fine to medium GRAVEL (sub-rounded), little coarse Gravel, trace Silt, damp, petroleum odor.	
		S-2A	X			○	0.0	Grayish, fine SAND, some Silt.	
	5	S-3	X			○	185	Gray, fine SAND, some Silt, damp to moist.	
		S-4	X			○	5.2	Gray, CLAYEY SILT, saturated.	▽
		S-4A	X			○	5.2	Brown, CLAYEY SILT, saturated.	
		S-5	X			○	6	Brown, SILTY CLAY, saturated.	
	10	S-6	X			○	17	Grayish-brown SILTY CLAY, saturated.	
		S-7	X			○	22	Brownish, fine to medium SAND, little sub-rounded Gravel, saturated.	
	15	S-8	X			○	3	Brownish, CLAYEY SILT, saturated.	
		S-9	X			○	9.8	CLAYEY SILT to SILT and CLAY, saturated.	
		S-10	X			○	5.4	CLAYEY SILT to SILT and CLAY, saturated.	
	20	END OF BORING AT 20 FEET							
	25								

BORING/WELL NO. GP-7

SHEET 1 of 1

PROJECT: Patch's Petroleum Supplemental Site Investigation
 CLIENT: Matter Consulting Inc.
 CONTRACTOR: New Hampshire Boring, Inc.

PROJECT NO: 84794-010.001

RIG: Geoprobe

GS ELEV: 95.1211.
 N-S COORD: 400892.642
 E-W COORD: 1511770.960
 WL REF ELEV: 98.2511.
 DATE STARTED: 08/25/98
 DATE FINISHED: 08/25/98
 OPERATOR: D. Thompson
 GEOLOGIST: E. Martin

GROUNDWATER DATA (feet)				CASING	SAMPLE	TUBE	CORE	
DATE	GW DEPTH	GW ELEV	INTAKE	TYPE	Steel	Macro	NA	NA
8/31/98	18.33	79.92	10 - 20	DIAM.	2"	2"	NA	NA
				WEIGHT	NA	NA	NA	NA
				FALL	NA	NA	NA	NA

WELL CONSTRUCT	DEPTH (feet)	SAMPLE NUMBER	SAMPLE TYPE & RECOVERY (inches)	N-VALUE	LOG	HNU	FIELD DESCRIPTION (Modified Burmister Methodology)	REMARKS
		S-1				0.0	Medium to dark brown, fine to coarse SAND, little fine to medium Gravel, little Silt, trace organic material, dry to damp.	
		S-2				7	Light brown, fine SAND and SILT, dry to damp.	
	5	S-3				118	Light brown, fine SAND and SILT, dry to damp.	
		S-4				122	Medium gray, fine SAND and SILT, damp, strong petroleum odor, staining.	
		S-5				120	Brownish-gray SILT, damp to moist, strong petroleum odor, rust stained.	
	10	S-6				114	Brown CLAYEY SILT to SILT and CLAY, moist to wet, strong petroleum odor, oily sheen.	
		S-7				108	Brown to gray CLAYEY SILT to SILT and CLAY, saturated, strong petroleum odor, oily sheen, stained.	
	15	S-8				138	Brown to gray CLAYEY SILT to SILT and CLAY, saturated, strong petroleum odor, oily sheen, stained.	
		S-9				150	Gray CLAYEY SILT to SILT and CLAY, saturated, strong petroleum odor, oily sheen, stained.	
	20	S-10				70	Gray CLAYEY SILT to SILT and CLAY, saturated, strong petroleum odor, oily sheen, stained.	
							END OF BORING AT 20 FEET	

BORING/WELL NO. GP-8

SHEET 1 of 1

PROJECT: Patch's Petroleum Supplemental Site Investigation
 CLIENT: Maller Consulting Inc.
 CONTRACTOR: New Hampshire Boring, Inc.

PROJECT NO: 84794-010.001

RIG: Geoprobe

GS ELEV: 95.04ft.
 N-S COORD: 400873.564
 E-W COORD: 1511817.561
 WL REF ELEV: 98.43ft.
 DATE STARTED: 08/26/98
 DATE FINISHED: 08/26/98
 OPERATOR: D. Thompson
 GEOLOGIST: E. Martin

GROUNDWATER DATA (feet)				CASING	SAMPLE	TUBE	CORE
DATE	GW DEPTH	GW ELEV	INTAKE	TYPE	Steel	Macro	NA
8/31/98	ND	ND	6.0 - 16.0	DIAM.	2"	NA	NA
				WEIGHT	NA	NA	NA
				FALL	NA	NA	NA

WELL CONSTRUCT	DEPTH (feet)	SAMPLE NUMBER	SAMPLE TYPE	RECOVERY (inches)	N-VALUE	LOG	LN	FIELD DESCRIPTION (Modified Burmister Methodology)	REMARKS
		S-1	X				4	Medium brown, fine to medium SAND, little coarse Sand, trace fine to medium Gravel, trace Silt, dry to damp.	
		S-2	X				2.2	Light brown, fine SAND and SILT, dry to damp.	
	5	S-3	X				110	Gray SILT, some to little Clay, damp to moist, strong petroleum odor.	
		S-4	X				120	Gray to olive green CLAYEY SILT to SILT and CLAY, moist to wet, strong petroleum odor.	
	10	S-5	X				94	Gray to olive green CLAYEY SILT to SILT and CLAY, saturated, strong petroleum odor, oily sheen.	▽
		S-6	X				22	Medium brown CLAYEY SILT, saturated, strong petroleum odor, less sheen.	
		S-7	X				38	Gray to olive green CLAYEY SILT, saturated, strong petroleum odor, oily sheen.	
	15	S-8	X				75	Medium brown CLAYEY SILT to SILT and CLAY, strong petroleum odor, slight sheen.	
		S-9	X				52	Gray to olive green CLAYEY SILT, saturated, strong petroleum odor and oily sheen.	
	20	S-10	X				18	Medium brown to olive green CLAYEY SILT to SILT and CLAY, moist to wet, petroleum odor, no sheen.	
		S-11	X				50	Medium brown to gray CLAYEY SILT to SILT and CLAY, moist to wet, petroleum odor, slight sheen.	
		S-12	X				6.8	Light brown to medium brown CLAYEY SILT to SILT and CLAY, moist to wet, slight petroleum odor. Dense, light gray SILT, damp to moist.	
25	END OF BORING AT 24 FEET								

BORING/WELL NO. GP-9

SHEET 1 of 1

PROJECT: Patch's Petroleum Supplemental Site Investigation
 CLIENT: Matter Consulting Inc.
 CONTRACTOR: New Hampshire Boring, Inc.

PROJECT NO: 84794-010.001
 RIG: Geoprobe

GS ELEV: 94.77ft.
 N-S COORD: 400862.897
 E-W COORD: 1511856.911
 WL REF ELEV: N/Aft.
 DATE STARTED: 08/26/98
 DATE FINISHED: 08/26/98
 OPERATOR: D. Thompson
 GEOLOGIST: E. Martin

GROUNDWATER DATA (feet)				CASING	SAMPLE	TUBE	CORE	
DATE	GW DEPTH	GW ELEV	INTAKE	TYPE	Steel	Macro	NA	NA
N/A	N/A	N/A	N/A	DIA.	2"	2"	NA	NA
				WEIGHT	NA	NA	NA	NA
				FALL	NA	NA	NA	NA

WELL CONSTRUCT	DEPTH (feet)	SAMPLE NUMBER	SAMPLE & TYPE	RECOVERY (inches)	N-VALUE	LOG	HNu	FIELD DESCRIPTION (Modified Burmister Methodology)	REMARKS
		S-1	X				0.8	From 0 to .5 foot: black, fine to coarse SAND, some fine to medium Gravel, dry.	
		S-2	X				0.0	From .5 to 2 feet: medium brown, fine SAND and SILT, little fine Gravel (sub-angular), trace organic material, damp to moist.	
	5	S-3	X				8.8	Medium to light brown SILT, some fine Sand, little Clay, trace fine Sand, damp to moist.	
		S-4	X				5.7	Brownish-gray to olive green CLAYEY SILT to SILT and CLAY, moist to wet, slight odor, oily sheen.	
	10	S-5	X				10.4	Brownish-gray to olive green CLAYEY SILT to SILT and CLAY, wet to saturated, slight odor.	▽
		S-6	X				16	Brown to gray CLAYEY SILT to SILTY CLAY, wet to saturated, petroleum odor.	
		S-7	X				34	Brown SILT and CLAY, lenses of iron staining, saturated, slight petroleum odor.	
	15	S-8	X				128	Brown-gray to olive green CLAYEY SILT, lenses of iron staining, saturated, slight petroleum odor.	
		S-9	X				80	Brown-gray to olive green CLAYEY SILT, lenses of iron staining, saturated, slight petroleum odor.	
	20	S-10	X				14.6	Dense, brownish-gray to olive green SILT, trace Clay, moist to wet.	
								END OF BORING AT 20 FEET	
	25								

BORING/WELL NO. GP-10

SHEET 1 of 1

PROJECT: *Patch's Petroleum Supplemental Site Investigation*
 CLIENT: *Malter Consulting Inc.*
 CONTRACTOR: *New Hampshire Boring, Inc.*

PROJECT NO: *84794-010.001*

RIG: *Geoprobe*

GS ELEV: *94.841f.*
 N-S COORD: *400914.549*
 E-W COORD: *1511758.353*
 WL REF ELEV: *N/Aff.*

GROUNDWATER DATA (feet)				CASING	SAMPLE	TUBE	CORE
DATE	GW DEPTH	GW ELEV	INTAKE	TYPE	<i>Steel</i>	<i>Macro</i>	<i>NA</i>
<i>N/A</i>	<i>N/A</i>	<i>N/A</i>	<i>N/A</i>	DIAH.	<i>2"</i>	<i>2"</i>	<i>NA</i>
				WEIGHT	<i>NA</i>	<i>NA</i>	<i>NA</i>
				FALL	<i>NA</i>	<i>NA</i>	<i>NA</i>

DATE STARTED: *08/26/98*
 DATE FINISHED: *08/26/98*
 OPERATOR: *D. Thompson*
 GEOLOGIST: *E. Martin*

WELL CONSTRUCT	DEPTH (feet)	SAMPLE NUMBER	SAMPLE & TYPE	RECOVERY (inches)	N-VALUE	LOG	HNU	FIELD DESCRIPTION (Modified Burmister Methodology)	REMARKS
		S-1	X				52	From 0 to .5 foot: brown, medium to coarse SAND, some fine Sand, little Silt, trace fine to medium Gravel, dry.	
		S-2	X				24	From .5 to 2 feet: medium brown SILT, some fine Sand, little Clay, trace medium Sand, trace Gravel, damp to dry.	
	5	S-3	X				100	Medium brown SILT, some fine Sand, little Clay, trace medium Sand, trace Gravel, damp to dry.	
		S-4	X				20	Brownish-gray to olive green, fine SAND and SILT to CLAYEY SILT, moist to wet, petroleum odor.	
	10	S-5	X				80	Brown to gray CLAYEY SILT, moist to wet, slight petroleum odor.	
		S-6	X				18	Brownish gray to olive green CLAYEY SILT, wet to saturated, petroleum odor.	∇
	15	S-7	X				14	Medium brown CLAYEY SILT, wet to saturated, petroleum odor.	
		S-8	X				1.0	Medium brown CLAYEY SILT to SILT and CLAY, saturated, petroleum odor.	
		S-9	X				0.0	Brown to gray, fine SAND and SILT, trace Clay, damp to moist.	
		S-10	X				0.2	Medium brown CLAYEY SILT, saturated.	
	20						0.2	Light brown, fine SAND, some Silt, trace clay, moist to wet.	
								END OF BORING AT 20 FEET	
	25								

PROJECT: Patch's Petroleum Supplemental Site Investigation
 CLIENT: Matter Consulting Inc.
 CONTRACTOR: New Hampshire Boring, Inc.

PROJECT NO: 84794-010.001
 RIG: Geoprobe

GS ELEV: 93.89ft.
 N-S COORD: 400862.739
 E-W COORD: 1511785.490
 WL REF ELEV: 97.24ft.
 DATE STARTED: 08/26/98
 DATE FINISHED: 08/26/98
 OPERATOR: D. Thompson
 GEOLOGIST: E. Martin

GROUNDWATER DATA (feet)				CASING	SAMPLE	TUBE	CORE
DATE	GW DEPTH	GW ELEV.	INTAKE	TYPE	Steel	Macro	NA
8/31/98	>21.12	>76.12	8.0 - 18.0	DIAM.	2"	2"	NA
				HEIGHT	NA	NA	NA
				FALL	NA	NA	NA

WELL CONSTRUCT	DEPTH (feet)	SAMPLE NUMBER	SAMPLE & TYPE	RECOVERY (inches)	N-VALUE	LOG	HN	FIELD DESCRIPTION (Modified Burmister Methodology)	REMARKS
		S-1	X				0.0	From 0 to .5 foot: dark brown, fine to medium SAND, some coarse Sand, little fine Gravel, trace Silt, trace organic material, dry.	
		S-2	X				0.0	From .5 to 2 feet: medium brown, fine to medium SAND, some Silt, trace coarse Sand, trace organic material, dry to damp.	
	5	S-3	X				82	Light brown SILT, little Clay, dry to damp.	
		S-4	X				102	Gray to olive green CLAYEY SILT to SILT and CLAY, moist to wet, strong petroleum odor, oily sheen.	
	10	S-5	X				162	Gray to olive green CLAYEY SILT to SILT and CLAY, saturated, very strong petroleum odor, stained.	7
		S-6	X				158	Gray to olive green CLAYEY SILT to SILT and CLAY, very strong petroleum odor, saturated with product.	
		S-7	X				175	Gray to olive green CLAYEY SILT to SILT and CLAY, very strong petroleum odor, saturated with product.	
	15	S-8	X				156	Gray to olive green CLAYEY SILT to SILT and CLAY, very strong petroleum odor, saturated with product.	
		S-9	X				192	Olive green to gray CLAYEY SILT, saturated, strong petroleum odor, oily sheen, staining.	
	20	S-10	X				32	Brown CLAYEY SILT, moist to wet, petroleum odor. From 19.5 to 20 feet: gray SILT, damp to moist.	
								END OF BORING AT 20 FEET	

BORING/WELL NO. GP-14

SHEET 1 of 1

PROJECT: Patch's Petroleum Supplemental Site Investigation
 CLIENT: Matter Consulting Inc.
 CONTRACTOR: New Hampshire Boring, Inc.

PROJECT NO: 84794-010.001
 RIG: Geoprobe

GS ELEV: 92.61ft
 N-S COORD: 400822.492
 E-W COORD: 1511816.568
 WL REF ELEV: N/A ft.
 DATE STARTED: 08/26/98
 DATE FINISHED: 08/26/98
 OPERATOR: D. Thompson
 GEOLOGIST: E. Martin

GROUNDWATER DATA (feet)				CASING	SAMPLE	TUBE	CORE
DATE	GM DEPTH	GM ELEV	INTAKE	TYPE	Steel	Macro	NA
N/A	N/A	N/A	N/A	DIAM.	2"	2"	NA
				WEIGHT	NA	NA	NA
				FALL	NA	NA	NA

WELL CONSTRUCT	DEPTH (feet)	SAMPLE NUMBER	SAMPLE & TYPE	RECOVERY (inches)	N-VALUE	LOG	HNu	FIELD DESCRIPTION (Modified Burmister Methodology)	REMARKS
		S-1	X				0.0	From 0 to .5 foot: topsoil, dry to damp.	
		S-2	X				0.0	Medium brown SILT, little Clay, trace fine SAND, damp to moist.	
	5	S-3	X				0.0	Medium brown SILT and CLAY to CLAYEY SILT, damp to moist.	
		S-4	X				25	Medium brown CLAYEY SILT to SILT and CLAY, moist to wet.	
	10	S-5	X				10.8	Medium brown CLAYEY SILT to SILT and CLAY, saturated, slight petroleum odor.	▽
		S-6	X				30	Brown to gray CLAYEY SILT to SILT and CLAY, petroleum odor, discoloration, staining.	
		S-7	X				32	Brown CLAYEY SILT to SILT and CLAY, saturated, slight petroleum odor, gray staining.	
	15	S-8	X				3.6	Brown CLAYEY SILT to SILT and CLAY, saturated, slight petroleum odor, gray staining.	
		S-9	X				0.2	Brownish gray to olive green CLAYEY SILT to SILT and CLAY, saturated, slight odor.	
	20	S-10	X				18.2	Brownish gray to olive green CLAYEY SILT to SILT and CLAY, saturated, slight odor.	
								From 19.5 to 20 feet: gray staining and petroleum odor.	
								END OF BORING AT 20 FEET	
	25								

PROJECT: Patch's Petroleum Supplemental Site Investigation
 CLIENT: Matter Consulting Inc.
 CONTRACTOR: New Hampshire Boring, Inc.

PROJECT NO: 84794-010.001

RIG: Geoprobe

GS ELEV: 93.67ft.
 N-S COORD: 400791.743
 E-W COORD: 1511745.397
 WL REF ELEV: 93.43ft.
 DATE STARTED: 08/26/98
 DATE FINISHED: 08/26/98
 OPERATOR: D. Thompson
 GEOLOGIST: E. Martin

GROUNDWATER DATA (feet)				CASING	SAMPLE	TUBE	CORE	
DATE	GW DEPTH	GW ELEV	INTAKE	TYPE	Steel	Macro	NA	NA
8/31/98	8.39	85.04	5.0 - 15.0	DIAM.	2"	2"	NA	NA
				WEIGHT	NA	NA	NA	NA
				FALL	NA	NA	NA	NA

WELL CONSTRUCT	DEPTH (feet)	SAMPLE NUMBER	SAMPLE & TYPE	RECOVERY (inches)	N-VALUE	LOG	HNU	FIELD DESCRIPTION (Modified Burmister Methodology)	REMARKS	
	0	S-1					0.0	From 0 to .5 foot: dark brown to black, fine to medium SAND, some coarse Sand, little Silt, little organic material, trace fine to medium Gravel, dry to damp.		
	0.5	S-2					0.0	medium Sand, trace coarse Sand, trace clay, damp to moist.		
	5	S-3					0.2	Medium brown SILT and CLAY to CLAYEY SILT, moist to wet, gray silty mottling.		
	10	S-4					0.0	Medium brown SILT and CLAY to CLAYEY SILT, moist to wet, gray silty mottling.		
	10	S-5					0.0	Medium brown CLAYEY SILT to SILT and CLAY, wet to saturated.		
	15	S-6					0.0	Medium brown CLAYEY SILT to SILT and CLAY, wet to saturated.		
	15	S-7					0.0	Medium brown to light brown CLAYEY SILT to SILT and CLAY, saturated.		
	15	S-8					0.0	Medium brown to light brown CLAYEY SILT to SILT and CLAY, saturated.		
	20	S-9					NR	No recovery		
	20	S-10					NR	No recovery		
	20	END OF BORING AT 20 FEET								

APPENDIX E

SEPARATE PHASE HYDROCARBON VOLUME CALCULATIONS

COMPUTATION SHEET

PROJECT TITLE: Patche Petroleum SSI PROJECT NO: 84794-0002
DESCRIPTION: SPT area calculations SHEET 1 OF 2
PREP. BY: JSH DATE: 10/30/88 CHKD BY: NPN DATE: _____

Area of Separate Phase Hydrocarbon contours calculated by planimeter from Figure 4 of Supplemental Site Invest. Report. Separate phase hydrocarbon areal extent estimated based on thickness measurements collected on 8-31-98.

Area One foot Contour interval:

$$\begin{array}{r} 9,150 \text{ ft}^2 \\ - 5,390 \text{ ft}^2 \\ \hline 3,760 \text{ ft}^2 \end{array}$$

Two foot Contour interval:

$$\begin{array}{r} 5,390 \text{ ft}^2 \\ - 3,418 \text{ ft}^2 \\ \hline 1,972 \text{ ft}^2 \end{array}$$

Three foot Contour interval:

$$\begin{array}{r} 3,418 \text{ ft}^2 \\ - 2,629 \text{ ft}^2 \\ \hline 789 \text{ ft}^2 \end{array}$$

COMPUTATION SHEET

PROJECT TITLE: Patchi Petroleum SSI PROJECT NO: 84794-00-01
DESCRIPTION: SPH area calculations SHEET 1 OF 2
PREP. BY: JJH DATE: 10/30/98 CHKD BY: NPN DATE: _____

Four foot Contour interval:

$$\begin{array}{r} 2,629 \text{ ft}^2 \\ - 1,862 \text{ ft}^2 \\ \hline 767 \text{ ft}^2 \end{array}$$

Five foot Contour interval:

$$\begin{array}{r} 1,862 \text{ ft}^2 \\ - 798 \text{ ft}^2 \\ \hline 1,064 \text{ ft}^2 \end{array}$$

Six foot Contour interval:

$$798 \text{ ft}^2$$

--

COMPUTATION SHEET

PROJECT TITLE: Patch's Petroleum SSI

PROJECT NO: 84794-010-001

DESCRIPTION: SPT volume Calculations

SHEET 1 OF 3

PREP. BY: JJH

DATE: 10/3/98

CHKD BY: NW

DATE: _____

Area 1	Well No.	SPT (ft)
	MW-2	0.53
	RW-2	0.08
	GR-6	0.41
Ave thickness	$3 \sqrt{1.02} = 0.34$	

proximity values from
Frecze & Cherry 1979
silt 35 - 50 %
clay 40 - 70 %

At 35% porosity: $3,760 \text{ ft}^2 \times .35 \times .34 \times 7.48 = 3,346 \text{ gallons}$

At 70% porosity: $3,760 \text{ ft}^2 \times .70 \times .34 \times 7.48 = 6,693 \text{ gallons}$

Area 2	Well No.	SPT (ft)
	RW-3	1.40 ft
	MW-3	1.53
	$2 \sqrt{2.93} = 1.47$	

At 35% porosity: $1,972 \text{ ft}^2 \times .35 \times 1.47 \times 7.48 = 7,589 \text{ gallons}$

At 70% porosity: $1,972 \text{ ft}^2 \times .70 \times 1.47 \times 7.48 = 15,178 \text{ gallons}$

COMPUTATION SHEET

PROJECT TITLE: Patch's Patch SST PROJECT NO: 84794-010-001
DESCRIPTION: SPT volume Calcs SHEET 2 OF 3
PREP. BY: JSH DATE: 10/30/98 CHKD BY: NSW DATE: _____

Area 3 \approx 2.5 ft

$$\text{At } 35\% \text{ porosity } 789 \text{ ft}^2 \times .35 \times 2.5 \times 7.48 = ~~5,164~~ \text{ gal.}$$

$$\text{At } 70\% \text{ porosity } 789 \text{ ft}^2 \times .70 \times 2.5 \times 7.48 = 10,328 \text{ gal.}$$

Area 4 \approx 3.5 ft

$$\text{At } 35\% \text{ porosity } 767 \text{ ft}^2 \times .35 \times 3.5 \times 7.48 = 7,029.00 \text{ gal}$$

$$\text{At } 70\% \text{ porosity } 767 \text{ ft}^2 \times .70 \times 3.5 \times 7.48 = 14,056 \text{ gallons}$$

Area 5 MW-10 4.20

6P-~~107~~ 4.64

$$2 \sqrt{8.84} = 4.42$$

12,312 gallons

$$\text{At } 35\% \text{ } 1,064 \text{ ft}^2 \times .35 \times 4.42 \times 7.48 = ~~1,2312~~$$

$$\text{At } 70\% \text{ } 1,064 \text{ ft}^2 \times .70 \times 4.42 \times 7.48 = 24,624 \text{ gallons}$$

COMPUTATION SHEET

PROJECT TITLE: Patche Petroleum SSI PROJECT NO: 84794 C10.00
 DESCRIPTION: SPH volume calcs SHEET 3 OF 3
 PREP. BY: JJH DATE: 10/30/88 CHKD BY: LNU DATE: _____

Area 1e MW-11 5.69
 GP-12 5.15

$$2 \sqrt{10.84} = 5.42$$

11,323

At 35% porosity $798 \text{ ft}^2 \times .35 \times 5.42 \times 7.48 = \text{~~11,323~~}$

$$798 \text{ ft}^2 \times .70 \times 5.42 \times 7.48 = 22,646$$

SPH * Volume Range - (Gallons)

	<u>Low</u>	<u>High</u>	
Area 1	3,346	6,693	
Area 2	7,589	15,178	
Area 3	5,164	10,328	
Area 4	7,029	14,056	
Area 5	12,312	24,624	
Area 6	<u>11,323</u>	<u>22,646</u>	
	46,763	93,525	gallons

APPENDIX F
HYDRAULIC CONDUCTIVITY DATA

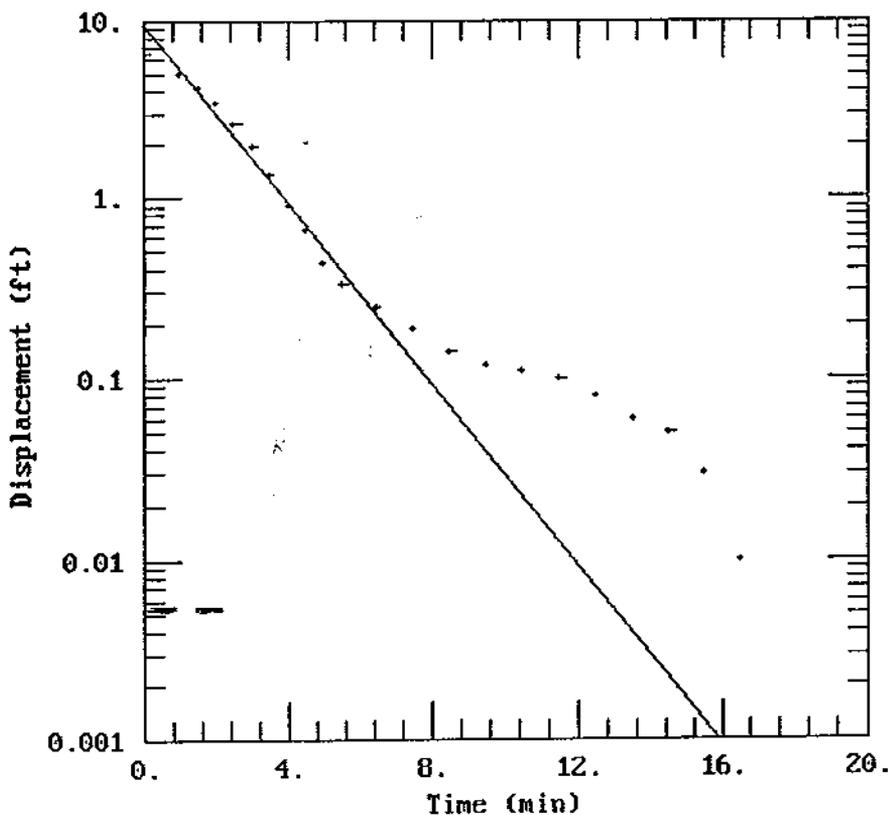
CLIENT: Malter Consulting Engineers

COMPANY: EMCON

LOCATION: Patch's Petroleum Bulk Plant

PROJECT: 84784-010.001

Slug Test MW-6



DATA SET:
MW6.AQT
10/21/98

AQUIFER MODEL:
Unconfined

SOLUTION METHOD:
Bouwer-Rice

TEST DATA:
 $H_0 = 6.45$ ft
 $r_c = 0.0833$ ft
 $r_w = 0.3333$ ft
 $L = 7.33$ ft
 $b = 8.6$ ft
 $H = 7.33$ ft

PARAMETER ESTIMATES:
 $K = 0.0045$ ft/min
 $y_0 = 9.5$ ft

AQTESOLU

A Q T E S O L V R E S U L T S
Version 2.0

Developed by Glenn M. Duffield
(c) 1993, 1994 Geraghty & Miller, Inc.

10/21/98

15:03:10

=====

TEST DESCRIPTION

- Data set..... MW6A.AQT
Output file..... MW6.OUT
Data set title..... Slug Test MW-6
- Company..... EMCON
Project..... 84784-010.001
Client..... Malter Consulting Engineers
Location..... Patch's Petroleum Bulk Plant
- Test date..... August 28, 1998
Test well..... MW-6

- Units of Measurement
 Length.....: ft
 Time..... min

- Test Well Data
 Initial displacement in well..... 6.45
 Radius of well casing..... 0.0833
- Radius of wellbore..... 0.3333
 Aquifer saturated thickness..... 1.98
 Well screen length..... 1.98
- Static height of water in well... 1.98
 Gravel pack porosity..... 0.3
 Effective well casing radius..... 0.1954
 Effective wellbore radius..... 0.3333
- Log(Re/Rw)..... 1.279
 Constants A, B and C..... 0.000 , 0.000, 0.976
 No. of observations..... 21

*Assumes
contribution only
from sand unit
(Depth of 3.75 feet
and above)*

=====

ANALYTICAL METHOD

- Bower-Rice (Unconfined Aquifer Slug Test)

=====

RESULTS FROM VISUAL CURVE MATCHING

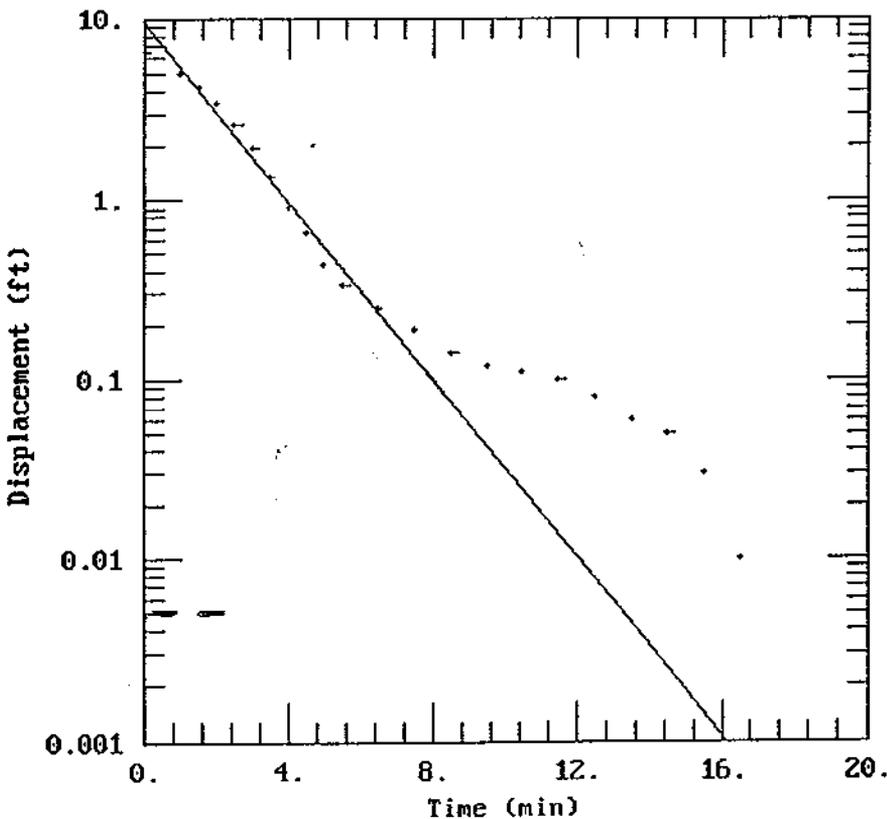
- VISUAL MATCH PARAMETER ESTIMATES

 Estimate
- K = 7.0000E-003 ft/min
 y0 = 9.5000E+000 ft

CLIENT: Malter Consulting Engineers COMPANY: EMCON

LOCATION: Patch's Petroleum Bulk Plant PROJECT: 84784-010.001

Slug Test MW-6



DATA SET:
MW6A.AQT
10/21/98

AQUIFER MODEL:
Unconfined

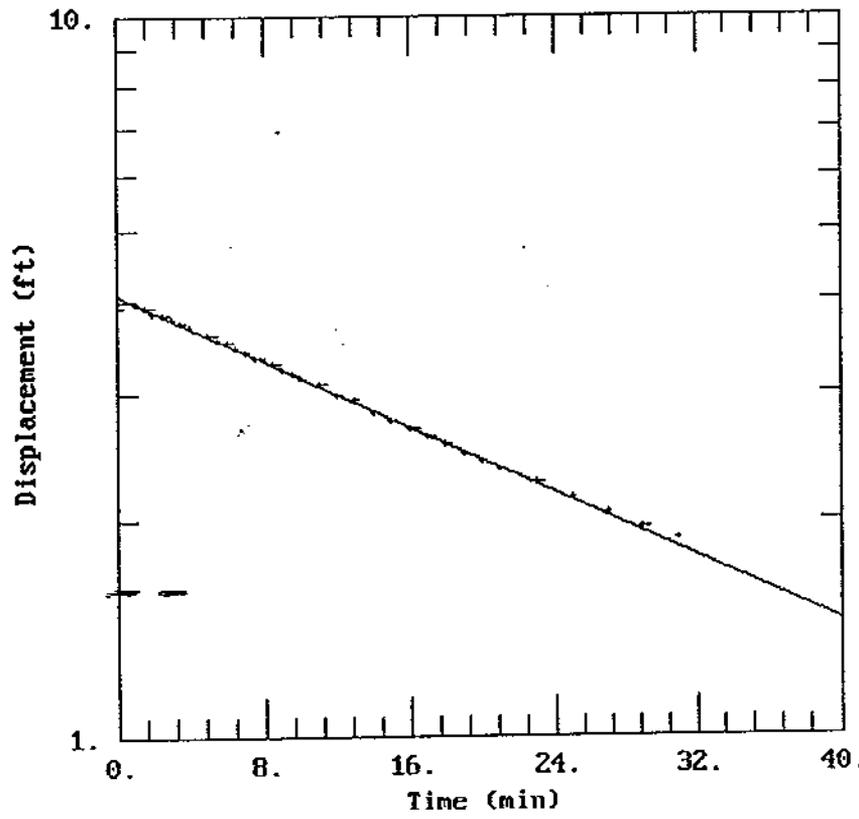
SOLUTION METHOD:
Bouwer-Rice

TEST DATA:
 $H_0 = 6.45$ ft
 $r_c = 0.0833$ ft
 $r_w = 0.3333$ ft
 $L = 1.98$ ft
 $b = 1.98$ ft
 $H = 1.98$ ft

PARAMETER ESTIMATES:
 $K = 0.007$ ft/min
 $y_0 = 9.5$ ft

CLIENT: Malter Consulting Engineers	COMPANY: EMCON
LOCATION: Patch Petroleum Bulk Plant	PROJECT: 84794-010.001

Slug Test MW-8



DATA SET:
MW8.AQT
10/21/98

AQUIFER MODEL:
Unconfined
SOLUTION METHOD:
Bower-Rice

TEST DATA:
H0 = 3.93 ft
rc = 0.0833 ft
rw = 0.3333 ft
L = 4.64 ft
b = 4.64 ft
H = 4.64 ft

PARAMETER ESTIMATES:
K = 0.000205 ft/min
y0 = 4.08 ft

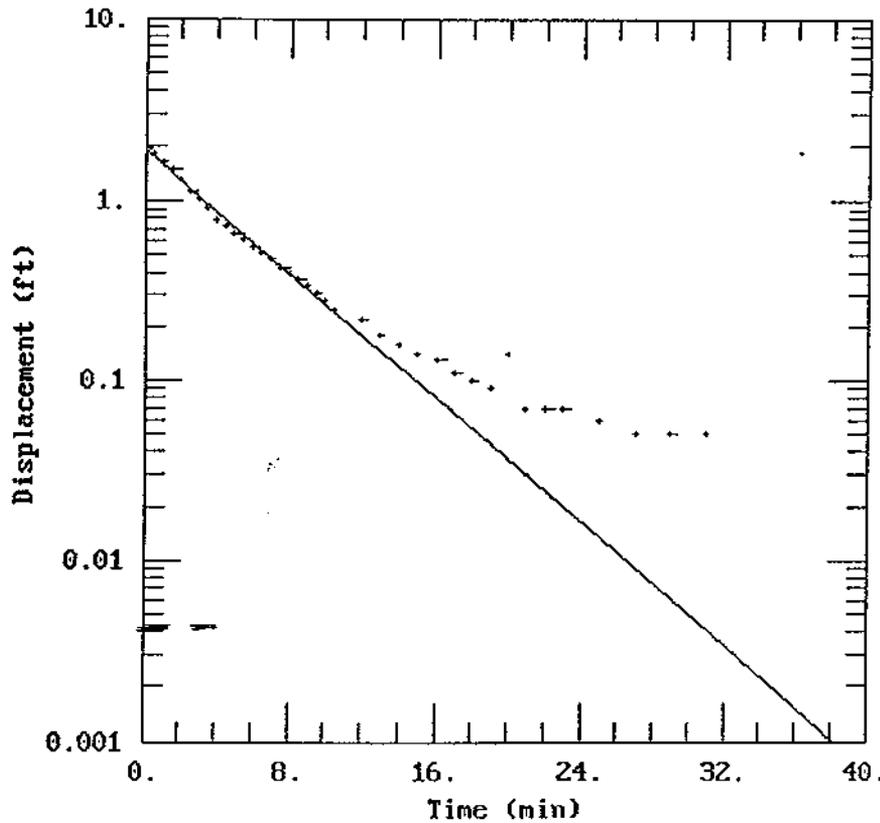
CLIENT: Malter Consulting Engineers

COMPANY: EMCON

LOCATION: Patch's Petroleum Bulk Plant

PROJECT: 84784-010.001

Slug Test MW-9



DATA SET:
MW9.AQT
10/21/98

AQUIFER MODEL:
Unconfined
SOLUTION METHOD:
Bouwer-Rice

TEST DATA:
H0 = 1.97 ft
 $r_c = 0.0833$ ft
 $r_w = 0.3333$ ft
L = 3.57 ft
b = 3.57 ft
H = 3.57 ft

PARAMETER ESTIMATES:
K = 0.0018 ft/min
 $y_0 = 1.9$ ft

AQTESOLV

APPENDIX G
LABORATORY ANALYTICAL RESULTS



ANALYTICAL REPORT

P.O. Box 339
Randolph, Vermont 05060-0339
(802) 728-6313
(802) 728-6044 (fax)
<http://www.scitestlabs.com>

Malter Consulting Inc.
Thatcher Brook Road
Waterbury Center, VT 05677

Mr. John Malter

Work Order No.: 9809-03186

Project Name: Patch's
Customer Nos.: 070321

Date Received: 9/02/98
Date Reported: 9/29/98

Sample Desc.:	GP-16	Sample Date:	9/01/98		
Sample Nos:	001	Collection Time:	13:28		
Test Performed	Method	Results	Units	Analyst	Analysis Date
Aromatic Volatile Organics	EPA 8020/602			JPM	9/10/98
Methyl Tertiary Butyl Ether	EPA 602/8020	BPQL	ug/L	JPM	9/10/98
Benzene	EPA 602/8020	BPQL	ug/L	JPM	9/10/98
Toluene	EPA 602/8020	1	ug/L	JPM	9/10/98
Ethyl Benzene	EPA 602/8020	1	ug/L	JPM	9/10/98
Total Xylenes	EPA 602/8020	5	ug/L	JPM	9/10/98
Chlorobenzene	EPA 602/8020	BPQL	ug/L	JPM	9/10/98
1,2-Dichlorobenzene	EPA 602/8020	BPQL	ug/L	JPM	9/10/98
1,3-Dichlorobenzene	EPA 602/8020	BPQL	ug/L	JPM	9/10/98
1,4-Dichlorobenzene	EPA 602/8020	BPQL	ug/L	JPM	9/10/98
Surrogate: 8020				JPM	9/10/98
***Bromofluorobenzene-8020		98	% Recovery	JPM	9/10/98
TPH by GCMS	EPA 8100 MODIFIED	< 2.0	mg/L	RJS	9/28/98

Sample Desc.:	MW-6	Sample Date:	9/01/98		
Sample Nos:	002	Collection Time:	10:05		
Test Performed	Method	Results	Units	Analyst	Analysis Date
Aromatic Volatile Organics	EPA 8020/602			JPM	9/10/98
Methyl Tertiary Butyl Ether	EPA 602/8020	BPQL	ug/L	JPM	9/10/98
Benzene	EPA 602/8020	BPQL	ug/L	JPM	9/10/98
Toluene	EPA 602/8020	BPQL	ug/L	JPM	9/10/98
Ethyl Benzene	EPA 602/8020	BPQL	ug/L	JPM	9/10/98
Total Xylenes	EPA 602/8020	BPQL	ug/L	JPM	9/10/98
Chlorobenzene	EPA 602/8020	BPQL	ug/L	JPM	9/10/98
1,2-Dichlorobenzene	EPA 602/8020	BPQL	ug/L	JPM	9/10/98
1,3-Dichlorobenzene	EPA 602/8020	BPQL	ug/L	JPM	9/10/98
1,4-Dichlorobenzene	EPA 602/8020	BPQL	ug/L	JPM	9/10/98
Surrogate: 8020				JPM	9/10/98
***Bromofluorobenzene-8020		98	% Recovery	JPM	9/10/98

ANALYTICAL REPORT

Project Name: Patch's
Project No.: 070321

Work Order No.: 9809-03186

				Sample Date: 9/01/98		
				Collection Time: 10:47		
Sample Desc.: MW-5	Method	Results	Units	Analyst	Analysis Date	
Sample Nos: 003				JPM	9/10/98	
Test Performed	EPA 8020/602			JPM	9/10/98	
Aromatic Volatile Organics	EPA 602/8020	BPQL	ug/L	JPM	9/10/98	
Methyl Tertiary Butyl Ether	EPA 602/8020	BPQL	ug/L	JPM	9/10/98	
Benzene	EPA 602/8020	BPQL	ug/L	JPM	9/10/98	
Toluene	EPA 602/8020	BPQL	ug/L	JPM	9/10/98	
Ethyl Benzene	EPA 602/8020	BPQL	ug/L	JPM	9/10/98	
Total Xylenes	EPA 602/8020	BPQL	ug/L	JPM	9/10/98	
Chlorobenzene	EPA 602/8020	BPQL	ug/L	JPM	9/10/98	
1,2-Dichlorobenzene	EPA 602/8020	BPQL	ug/L	JPM	9/10/98	
1,3-Dichlorobenzene	EPA 602/8020	BPQL	ug/L	JPM	9/10/98	
1,4-Dichlorobenzene	EPA 602/8020	BPQL	ug/L	JPM	9/10/98	
Surrogate: 8020		101	% Recovery	JPM	9/10/98	
***Bromofluorobenzene-8020						

				Sample Date: 9/01/98		
				Collection Time: 11:26		
Sample Desc.: MW-1	Method	Results	Units	Analyst	Analysis Date	
Sample Nos: 004				JPM	9/10/98	
Test Performed	EPA 8020/602			JPM	9/10/98	
Aromatic Volatile Organics	EPA 602/8020	4	ug/L	JPM	9/10/98	
Methyl Tertiary Butyl Ether	EPA 602/8020	BPQL	ug/L	JPM	9/10/98	
Benzene	EPA 602/8020	BPQL	ug/L	JPM	9/10/98	
Toluene	EPA 602/8020	BPQL	ug/L	JPM	9/10/98	
Ethyl Benzene	EPA 602/8020	BPQL	ug/L	JPM	9/10/98	
Total Xylenes	EPA 602/8020	BPQL	ug/L	JPM	9/10/98	
Chlorobenzene	EPA 602/8020	BPQL	ug/L	JPM	9/10/98	
1,2-Dichlorobenzene	EPA 602/8020	BPQL	ug/L	JPM	9/10/98	
1,3-Dichlorobenzene	EPA 602/8020	BPQL	ug/L	JPM	9/10/98	
1,4-Dichlorobenzene	EPA 602/8020	BPQL	ug/L	JPM	9/10/98	
Surrogate: 8020		97	% Recovery	JPM	9/10/98	
***Bromofluorobenzene-8020						

				Sample Date: 9/01/98		
				Collection Time: 12:00		
Sample Desc.: MW-7	Method	Results	Units	Analyst	Analysis Date	
Sample Nos: 005				JPM	9/10/98	
Test Performed	EPA 8020/602			JPM	9/10/98	
Aromatic Volatile Organics	EPA 602/8020	BPQL	ug/L	JPM	9/10/98	
Methyl Tertiary Butyl Ether	EPA 602/8020	BPQL	ug/L	JPM	9/10/98	
Benzene	EPA 602/8020	BPQL	ug/L	JPM	9/10/98	
Toluene	EPA 602/8020	BPQL	ug/L	JPM	9/10/98	
Ethyl Benzene	EPA 602/8020	BPQL	ug/L	JPM	9/10/98	
Total Xylenes	EPA 602/8020	BPQL	ug/L	JPM	9/10/98	

ANALYTICAL REPORT

Project Name: Patch's
Project No.: 070321

Work Order No.: 9809-03186

Sample Desc.:	Method	Results	Units	Analyst	Analysis Date
MW-7					
Sample Nos: 005					
Test Performed					
Chlorobenzene	EPA 602/8020	BPQL	ug/L	JPM	9/10/98
1,2-Dichlorobenzene	EPA 602/8020	BPQL	ug/L	JPM	9/10/98
1,3-Dichlorobenzene	EPA 602/8020	BPQL	ug/L	JPM	9/10/98
1,4-Dichlorobenzene	EPA 602/8020	BPQL	ug/L	JPM	9/10/98
Surrogate: 8020				JPM	9/10/98
***Bromofluorobenzene-8020		98	% Recovery	JPM	9/10/98

Sample Date: 9/01/98
Collection Time: 12:00

Sample Desc.:	Method	Results	Units	Analyst	Analysis Date
MW-8					
Sample Nos: 006					
Test Performed					
Aromatic Volatile Organics	EPA 8020/602			JPM	9/10/98
Methyl Tertiary Butyl Ether	EPA 602/8020	BPQL	ug/L	JPM	9/10/98
Benzene	EPA 602/8020	3	ug/L	JPM	9/10/98
Toluene	EPA 602/8020	5	ug/L	JPM	9/10/98
Ethyl Benzene	EPA 602/8020	7	ug/L	JPM	9/10/98
Total Xylenes	EPA 602/8020	68	ug/L	JPM	9/10/98
Chlorobenzene	EPA 602/8020	BPQL	ug/L	JPM	9/10/98
1,2-Dichlorobenzene	EPA 602/8020	BPQL	ug/L	JPM	9/10/98
1,3-Dichlorobenzene	EPA 602/8020	BPQL	ug/L	JPM	9/10/98
1,4-Dichlorobenzene	EPA 602/8020	BPQL	ug/L	JPM	9/10/98
Surrogate: 8020				JPM	9/10/98
***Bromofluorobenzene-8020		106	% Recovery	JPM	9/10/98

Sample Date: 9/01/98
Collection Time: 12:24

Sample Desc.:	Method	Results	Units	Analyst	Analysis Date
MW-9					
Sample Nos: 007					
Test Performed					
Aromatic Volatile Organics	EPA 8020/602			JPM	9/10/98
Methyl Tertiary Butyl Ether	EPA 602/8020	BPQL	ug/L	JPM	9/10/98
Benzene	EPA 602/8020	BPQL	ug/L	JPM	9/10/98
Toluene	EPA 602/8020	BPQL	ug/L	JPM	9/10/98
Ethyl Benzene	EPA 602/8020	BPQL	ug/L	JPM	9/10/98
Total Xylenes	EPA 602/8020	BPQL	ug/L	JPM	9/10/98
Chlorobenzene	EPA 602/8020	BPQL	ug/L	JPM	9/10/98
1,2-Dichlorobenzene	EPA 602/8020	BPQL	ug/L	JPM	9/10/98
1,3-Dichlorobenzene	EPA 602/8020	BPQL	ug/L	JPM	9/10/98
1,4-Dichlorobenzene	EPA 602/8020	BPQL	ug/L	JPM	9/10/98
Surrogate: 8020				JPM	9/10/98
***Bromofluorobenzene-8020		99	% Recovery	JPM	9/10/98

Sample Date: 9/01/98
Collection Time: 12:54

ANALYTICAL REPORT

Project Name: Patch's
Project No.: 070321

Work Order No.: 9809-03186

Sample Desc.:	Method	Results	Units	Analyst	Analysis Date
Sample Desc.: MW-A					
Sample Nos: 008					
Test Performed					
Aromatic Volatile Organics	EPA 8020/602			JPM	9/10/98
Methyl Tertiary Butyl Ether	EPA 602/8020	BPQL	ug/L	JPM	9/10/98
Benzene	EPA 602/8020	BPQL	ug/L	JPM	9/10/98
Toluene	EPA 602/8020	1	ug/L	JPM	9/10/98
Ethyl Benzene	EPA 602/8020	1	ug/L	JPM	9/10/98
Total Xylenes	EPA 602/8020	6	ug/L	JPM	9/10/98
Chlorobenzene	EPA 602/8020	BPQL	ug/L	JPM	9/10/98
1,2-Dichlorobenzene	EPA 602/8020	BPQL	ug/L	JPM	9/10/98
1,3-Dichlorobenzene	EPA 602/8020	BPQL	ug/L	JPM	9/10/98
1,4-Dichlorobenzene	EPA 602/8020	BPQL	ug/L	JPM	9/10/98
Surrogate: 8020				JPM	9/10/98
***Bromofluorobenzene-8020		97	% Recovery	JPM	9/10/98

Sample Desc.:	Method	Results	Units	Analyst	Analysis Date
Sample Desc.: Trip Blank					
Sample Nos: 009					
Test Performed					
Aromatic Volatile Organics	EPA 8020/602			JPM	9/10/98
Methyl Tertiary Butyl Ether	EPA 602/8020	BPQL	ug/L	JPM	9/10/98
Benzene	EPA 602/8020	BPQL	ug/L	JPM	9/10/98
Toluene	EPA 602/8020	BPQL	ug/L	JPM	9/10/98
Ethyl Benzene	EPA 602/8020	BPQL	ug/L	JPM	9/10/98
Total Xylenes	EPA 602/8020	BPQL	ug/L	JPM	9/10/98
Chlorobenzene	EPA 602/8020	BPQL	ug/L	JPM	9/10/98
1,2-Dichlorobenzene	EPA 602/8020	BPQL	ug/L	JPM	9/10/98
1,3-Dichlorobenzene	EPA 602/8020	BPQL	ug/L	JPM	9/10/98
1,4-Dichlorobenzene	EPA 602/8020	BPQL	ug/L	JPM	9/10/98
Surrogate: 8020				JPM	9/10/98
***Bromofluorobenzene-8020		98	% Recovery	JPM	9/10/98

Modified EPA 8100 method was used and the quantitation performed as fresh diesel fuel.

BPQL = Below Practical Quantitation Limit; 1 ug/L