Jul 8 4 27 PM '03

WASTE MANAGEMENT
DIVISION

# Initial Site Investigation

# Expressway Report

**PREPARED FOR:**

**Walker Motors**
**Montpelier, Vermont**

**File No. VTA3-0026**
**Document No. A30026isir**
**Date: July 2003**

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# EXECUTIVE SUMMARY

ECSMarin has conducted an initial site investigation (ISI) at Walker Motors, located at 265 River Street in Montpelier, Vermont. The ISI was performed via the Expressway Model following the discovery of petroleum contamination during the removal of one 4,000 gallon #2 fuel oil underground storage tank (UST) adjacent to the auto body shop in April 2003. The #2 fuel oil was used to fuel a furnace inside the auto body shop and was removed due to a suspected leak discovered when water was detected in the furnace and UST. The ISI included the drilling of seven soil borings, the installation of two monitoring wells, and an evaluation of potential threats to nearby receptors. ECSMarin's findings related to this work are summarized as follows:

Based on the results of the ISIdescribed above, ECSMarin concludes the following:

- Free-phase floating petroleum product was detected at approximately four feet below ground surface (ftbgs) in monitoring wells MW-1 (located within the UST excavation) and eight ftbgs in MW-2 (located outside the UST excavation). Approximately 0.23 inches and one foot of floating product were measured in MW-1 and MW-2, respectively. The extent of free-phase product has not been fully characterized.

- Additional monitoring wells could not be installed due to auger refusal on suspected shallow bedrock and unknown underground utility layout. Auger refusal was encountered at depths ranging from five to 12 feet. Several attempts were made to install additional borings down gradient of the UST area. Evidence of petroleum impact was observed (both olfactory and Photoionization detector (PID) screening) at the bottom of soil borings SB-6 and SB-7, located approximately 30 to 60 feet downgradient of the free product area. This data suggests that the #2 fuel oil may be migrating along the bedrock surface.

- Soils generally consist of sand and gravel fill material from zero to four feet underlain by glacial till and then bedrock. Groundwater, if present, is generally encountered in the glacial till. PID soil headspace readings ranged from non detect to 328 parts per million (ppm). The highest PID reading was detected in soils at a depth of approximately four feet in MW-1.

- Visual (oil sheen), olfactory, and PID readings were observed within several downgradient onsite storm water catch basins suggesting that the # 2 fuel oil may be infiltrating the catch basins. Furthermore, visual (oil sheen), olfactory, and PID readings of petroleum impact was observed on surface water and soil in a swale at the storm water outfall across Route 2. Several of the onsite petroleum impacted storm water catch basins discharge to the swale located across Route 2 from the site. Oil booms were installed within one onsite catch basin.

- The Winooski River is located 750 feet north-northeast of the former UST area. Since the drainage swale ultimately discharges to the Winooski River, a risk of impact to the River exists. However, no petroleum discharge (i.e., oil sheen) was visually observed in the swale at locations further downgradient near the Winooski River. Oil booms were installed within the swale at the storm water outfall as a precautionary measure.

- The site and surrounding properties are serviced by municipal water. No public supply wells are known to be within the site vicinity.

# EXECUTIVE SUMMARY

- The relatively shallow depth-to-ground water at the former UST area and the observed free-phase petroleum product in groundwater at this area suggest that underground utility corridors (water and sewer lines) at the site may potentially be threatened.

- Two supply wells are located within ½-mile of the site. Based on the relative locations of the supply wells to the former UST area, impact to these wells in unlikely. The site and surrounding facilities are served by the municipal water supply system.

- Based on local topography, the horizontal groundwater flow is presumed to be to the northeast, toward the Winooski River. The vertical groundwater flow components at the site, and the hydraulic relationship between the shallow unconfined aquifer and the bedrock aquifer, are currently unknown.

On the basis of the results of this investigation and the conclusions stated above, ECSMarin recommends the following:

1. A site investigation should be performed that includes the installation of additional soil borings/monitoring wells to further define the limits of #2 fuel oil contamination. The installation of soil borings/monitoring wells should be installed at both onsite and offsite (area of drainage swale) locations. Concurrent with the site investigation, a Corrective Action Feasibility Investigation (CAFI) should be performed. The CAFI is warranted based on the presence of free-phase floating petroleum product, petroleum impact to onsite storm water catch basins, and petroleum impact to the off-site storm water.

2. An underground utility survey should be conducted prior to drilling activities to determine the exact location of underground utility lines. The underground lines should be marked and surveyed relative to the buildings and other prevalent site features and included on a site plan. The results of the survey should be used in determining the locations of additional soil borings and to evaluate likelihood of petroleum impact to the lines. The onsite storm water lines should also be included on a site plan.

3. Water levels should be obtained from the two existing monitoring wells (MW-1 and MW-2) and the newly installed monitoring wells to confirm groundwater flow direction at the site. Groundwater samples should be collected from all wells and analyzed for VOCs by EPA Method 8021B and TPH by EPA Method 8015.

4. Water samples should be collected from the downgradient storm water catch basins and off-site drainage swale and submitted for laboratory analysis for VOCs by EPA Method 8021B and for TPH using EPA Method 8015 (fingerprint) to confirm that the contamination is #2 fuel oil from the former UST. The onsite storm water catch basins and off-site drainage swale should be inspected on a regular basis and oil booms replaced as needed.

5. The free phase #2 fuel oil in MW-1 and MW-2 should be recovered manually on a regular basis until the site investigation is completed and a long-term solution can be established.

6. Upon completion of the additional work, a summary report should be prepared which includes water-quality analytical results; figures showing groundwater flow direction and contaminant distribution; relevant tables; and recommendations for further action.

# 1.0 INTRODUCTION

This report details the results of an Initial Site Investigation (ISI) performed by ECSMarin at Walker Motors, located at 265 River Street in Montpelier, Vermont (Figure 1). The ISI was performed via the Expressway Model following the discovery of petroleum contamination during the removal of one 4,000 gallon #2 fuel oil underground storage tank (UST) adjacent to the auto body shop in April 2003 (Figure 2). The #2 fuel oil was used to fuel a boiler inside the auto body shop and was removed due to a suspected leak discovered when water was detected in the boiler and UST. The ISI included the drilling of seven soil borings, the installation of two monitoring wells, and an evaluation of potential threats to nearby receptors. This work was completed under the Expressway Model following the Site Investigation Notification Form, which was signed by Andrew Shively on 8 May 2003 (Appendix A).

## 1.1 SITE DESCRIPTION AND PHYSICAL SETTING

The site currently houses an automobile dealership. The main showroom and repair shop is located near Route 2. The auto body shop is located at a higher elevation (approximately 30 feet) behind the showroom. The majority of the new cars and trucks for sale are parked northwest of the main showroom and additional vehicle parking is east of the building. A second 4,000-gallon #2 fuel oil UST is registered with the VT DEC and is located east of the showroom/repair shop. This second UST was installed in 1976.

The surrounding areas are primarily commercial properties located off Routes 2 and 302. The ground surface at the property slopes to the north, toward the Winooski River. The former Grossman's Lumber building (now vacant) is located east and downgradient of the site.

According to the Vermont Agency of Natural Resources Internet Mapping Site of Private Wells, at least two private water supply wells are located with a ½-mile of the site. Both wells are approximately 2000 feet away downgradient from the former UST location and are 348 and 445 feet in depth.

## 1.2 SITE HISTORY

On 23 April 2003, ECSMarin inspected the removal of a 4,000 gallon #2 fuel UST at Walker Motors, Inc. Prior to its removal, the UST was positioned under asphalt approximately 10 feet from the auto body shop building. The UST was installed in 1963 and was registered with the State of Vermont UST Program. Calkins Oil & Excavating from Danville, Vermont, provided the excavation services and Ostrout Petroleum provided UST-cleaning services. The UST was transported offsite to All Cycle Metals located off Route 15 in Hardwick, Vermont, to be used as scrap metal. Documentation of the removal activities are summarized in the UST Closures Assessment Report for Walker Motors dated 25 April 2003. An area map showing site wide features is included in Appendix B.

In general, soils in the excavation area consisted of brown, damp to saturated, coarse to medium-grained sands and gravel. Native glacial till soils were encountered at approximately 4.5 feet below ground surface (bgs) that included greenish-gray, fine sand and clay. Groundwater entered the excavation from various seeps in the sidewalls of the excavation; however, no accumulation of groundwater was observed during the three hours that the excavation was open. No bedrock was encountered in the excavation; however, bedrock outcrops were noted on the northwestern portion of the site.

Oil sheening and olfactory evidence of petroleum impact was observed on the groundwater entering the excavation. The heating oil UST was found to be in poor condition upon removal, with some rusting and

pitting and several holes observed at both ends of the UST. The fill, suction, return, and vent lines for the UST were in fair condition with some minor rusting, but no pitting or holes.

Photoionization detector (PID) headspace readings taken of soils in the excavation ranged from five parts per million (ppm) collected from a soil sample approximately five feet bgs in the greenish-gray fine sand and clay layer, to a high of 123 ppm collected from same general area, approximately three feet bgs in the brownish coarser sands and gravel. The average PID reading throughout the excavation was 83 ppm. All stockpiled soils originating from the excavation were backfilled into the excavation following the soil screening activities. Clean sand was imported to bring the excavated site up to grade.

The site and surrounding properties are serviced by municipal water and sewer system. The Winooski River is located approximately 750 feet north-northeast east of the site. No public supply wells are known to be within the site vicinity. Two private wells are within a ½-mile of the site. The adjacent service building does not have a basement or crawlspace.

## 1.3 Objectives and Scope of Work

The objectives of this initial site investigation were to:

- Evaluate the degree and extent of petroleum contamination in soil and groundwater;
- Qualitatively assess the risks to environmental and public health via relevant sensitive receptors and potential contaminant migration pathways; and,
- Identify appropriate monitoring and/or remedial actions based on the site conditions.

To accomplish these objectives, ECSMarin has:

- Supervised the advancement of seven soil borings and subsequent installation of water-table monitoring wells in two borings (MW-1 and MW-2);
- Screened subsurface soils from the soil borings for the possible presence of volatile organic compounds (VOCs) using a PID;
- Recovered free product from both monitoring wells;
- Identified sensitive receptors in the area, and assessed the risk posed by the contamination to these potential receptors; and,
- Prepared this summary report, which details the work performed, qualitatively assesses risks, provides conclusions, and offers recommendations for further action.

# 2.0 INVESTIGATIVE PROCEDURES AND RESULTS

## 2.1 SOIL BORING / MONITORING WELL INSTALLATION

On 9 June 2003, ECSMarin supervised the completion of seven soil borings and subsequent installation of two monitoring wells (MW-1 and MW-2) to initially characterize contaminant and hydrogeologic conditions at the site.

During drilling activities, the native soils generally consisted of olive gray fine sand and silt with some gravel and pieces of bedrock were encountered in all soil borings to a depth of no more than 12 feet before meeting refusal on presumed bedrock. In MW-1 was installed in the source area of the former UST. Soils consisted of olive gray to light gray medium sand with some silt and gravel (fill material) was encountered until approximately 6 feet where the native soils were encountered. Groundwater was encountered at 4 to 6 feet bgs. Evidence of the groundwater table was observed at 8 feet in MW-2. Refusal was met at approximately 12 feet in both MW-1 and MW-2.

Soil boring #2 (SB-2) met refusal on presumed bedrock at five feet. Groundwater was not encountered in this boring. Soils consisted of light gray, fine sand with some silt and gravel. MW-2 was installed in SB-3. Soils consisted of olive gray fine sand and silt with several inches of weathered bedrock ledge (dark gray weathered slate) penetrated by the split spoon. Evidence of the groundwater table was observed at 10 feet where there was an odor and visible sheen on the split spoon. Refusal was met at approximately 12 feet.

SB-4 was installed up-gradient of the UST location. Soils consisted of olive gray, medium to course sand and gravel. Evidence of the groundwater table was observed at approximately 8 feet bgs. Refusal on presumed bedrock was met at 10 feet. A monitoring well was not installed in this location.

SB-5, SB-6, and SB-7 were installed downgradient of the excavation area along the steeply sloped paved driveway leading to the auto body shop. The soils consisted of fine sand and silt with some course gravel and pieces of bedrock ledge. Refusal on presumed bedrock was encountered at 5 feet bgs in SB-5, 8.5 feet bgs in SB-6, and 6 feet bgs in SB-7. The water table was not encountered in these downgradient borings.

ECSMarin Drilling of Agawam, Massachusetts, installed the soil borings using rotary drilling methods. Soil samples were collected at five-foot intervals from each boring using a two-foot long, split-spoon sampler, with the exception of MW-1 where soil samples were collected continuously. Soil recovery was generally fair to excellent, ranging from 38 to 92 percent. All downhole drilling and sampling equipment was decontaminated during use, as appropriate. Impacted drill cuttings, generated from MW-1 and MW-2, were stockpiled on site and fully encapsulated with polypropylene sheeting.

The monitoring wells were constructed with two-inch diameter polyvinyl chloride (PVC) casing and factory-slotted 0.010-inch slot screen. The tops of the screen sections were set between 3 and 5 feet above the presumed groundwater level. Sections of solid PVC riser were added to bring the tops of the well casings to approximately 0.5 feet bgs. Clean silica #1 filter sand was placed in the borehole annulus around each well approximately two feet above the slotted interval. A granular bentonite seal, approximately one to two-foot thick, was set above the sand pack and the remainder of the annular space was backfilled with native material.

Each well casing was topped with a watertight compression cap. Each completed monitoring well was protected by a flush-mounted steel roadbox cemented into place. The wells were developed using pre-cleaned bailers and dropline after installation was complete.

On 16 June 2003, the monitoring wells and soil boring locations were surveyed relative to existing site features, with an azimuth accuracy of ± 1.0 feet and an elevation accuracy of ± 0.01 feet. Monitoring-well construction details are included on the soil-boring and well-construction logs in Appendix C.

## 2.2 SOIL-SCREENING RESULTS

During the soil-boring program on 9 June 2003, elevated PID readings were obtained from soil samples collected from all borings except SB-5. The highest PID reading was 328 ppm, which was recorded on a soil sample collected just above the groundwater in MW-1. At the water table (8-10 feet), PID readings were 264 ppm and 257 ppm, respectively. PID readings in SB-2 were 12 ppm at 0 to 2 feet bgs and 7 ppm at 5 to 7 feet bgs. PID readings in MW-2 were 115 ppm and 187 ppm, with the later occurring at the observed water table. A PID reading of 9.2 was recorded at 0 to 2 feet bgs in SB-4 with readings of zero obtained for the remaining sample depths.

In SB-6 and SB-7, PID readings ranged from 0.0 to 0.6 throughout the sampling procedure; however, soil obtained from the bottom of each hole (presumably on the bedrock surface) contained olfactory and visual evidence of contamination. PID readings were 25 ppm in SB-6 and 32 ppm in SB-7.

An ECSMarin hydrogeologist screened soil samples from discrete intervals in each soil boring for the possible presence of VOCs using a Thermo 580B portable PID. The PID was calibrated in the field with an isobutylene standard gas to a benzene reference. Soil samples were placed into a polyethylene bag, which was then sealed, agitated, and allowed to equilibrate. The PID probe was inserted into the headspace, and the highest reading was recorded. PID screening results are included on the boring logs in Appendix C.

## 2.3 GROUNDWATER CHARACTERISTICS

Based on local topography, the horizontal groundwater flow is presumed to be to the northeast, toward the Winooski River. The vertical groundwater flow components at the site, and the hydraulic relationship between the shallow unconfined aquifer and the bedrock aquifer, are currently unknown. Fluid levels were measured in both monitoring wells on 16 June 2003. Depth to free-phase floating product ranged from 3.94 feet in MW-1, to an estimated 8.50 feet in MW-2 measured from below top-of-casing.

## 2.4 SAMPLING AND ANALYSIS

Groundwater samples were not obtained from MW-1 and MW-2 due to the presence of free product.

## 2.5 FREE PRODUCT RECOVERY

ECSMarin conducted free product recovery in MW-1 and MW-2 on 16 June 2003. Approximately 0.23 inches and one foot of floating product were measured in MW-1 and MW-2, respectively, prior to purging. Approximately 25 milliliters and two gallons of free-phase petroleum product were recovered from MW-1 and MW-2, respectively. The recovered product was containerized onsite for eventual offsite disposal.

# 3.0 SENSITIVE RECEPTOR SURVEY AND RISK ASSESSMENT

## 3.1 SENSITIVE RECEPTOR SURVEY

ECSMarin conducted a survey to identify sensitive receptors in the vicinity of Walker Motors that could potentially be impacted by contamination associated with the site. The following sensitive receptors were identified in the vicinity of the property.

- The soils beneath the former UST excavation area;
- The shallow overburden aquifer in the vicinity of the former UST area;
- Stormwater Drainage System;
- The Winooski River, located 750 feet east-northeast of the auto body shop;
- Underground utilities located off of the northeast corner of the auto body shop; and
- Two water supply wells, located within a ½-mile radius of the site.

ECSMarin screened the ambient air within the catch basins designated CB-1, CB-2, and CB-3 on Figure 2. PID readings were 6 ppm and 1,300 ppm, respectively. A petroleum odor was noted in each catch basin. No flowing water was observed in CB-1 or CB-2. A slow flow of groundwater with oily sheens was observed entering the bottom of CB-3 (along cinderblocks below concrete tile). Oil booms were installed to minimize contaminant discharge to downstream catch basin designated CB-5 which eventually discharges to the drainage swale across Route 2.

ECSMarin observed soil staining and an oily sheen on surface water near the outfall at the stormwater swale east of US Route 2. This swale receives discharge from the petroleum impacted onsite storm water catch basins. Soil staining and olfactory evidence of petroleum impact was observed in an area measuring approximately 100 feet in length adjacent to the swale. An oily sheen was observed on water at the outfall location. PID headspace readings of soils within the swale ranged from non-detect to 135 ppm. Oil booms were installed within the swale as a precautionary measure. A surface water sample was collected and submitted for laboratory analysis for petroleum VOCs by EPA 8021B and TPH diesel-ranges organics (DRO) by 8015B. Pending results of the analytical data will be forwarded in an amendment to this ISI.

## 3.2 RISK ASSESSMENT

ECSMarin qualitatively assessed the risks that the residual soil, dissolved-phase, and free-phase subsurface contamination poses to the receptors identified above. In general, human exposure to petroleum related contamination is possible through inhalation, ingestion, or direct contact while impacts to environmental receptors are due either to a direct release or contaminant migration through one receptor to another or along a preferential pathway.

- Soil Beneath the Former UST Excavation - Elevated VOCs were detected in soil samples collected during closure of the former UST. All soils including impacted soils were returned to the excavation. The former excavation area is presently not paved-over or otherwise capped; however, this area is scheduled to be paved in the near future. Because this area is used as a parking area, access to impacted soils in this area is limited and the risk to human exposure is low. Once the area is paved, the risk to human exposure will be further reduced.

- Shallow Overburden Aquifer – The shallow overburden aquifer and perched water table in the vicinity of the former UST is impacted by petroleum hydrocarbons. The depth to groundwater in the vicinity of the former UST was measured at 3.94 feet to approximately 8.5 feet bgs. Because the depth of the perched water table in the former UST area is within the range of any future subsurface utility or trenching activities, a risk of exposure to the impacted groundwater is present. Groundwater was either absent or encountered immediately above bedrock approximately 20 feet to 80 feet northeast of the former UST area. Risk to exposure in these areas in low.

- Stormwater Drainage System – Evidence of petroleum impact was observed within a stormwater swale in the vicinity of one of the discharge outfalls connected to an onsite stormwater system. Likewise, olfactory and PID indications of petroleum impact within catch basins CB-1, CB-2, and CB-3 suggest impact to these basins. Due to elevated PID headspace readings in the saturated soils in downgradient soil borings (SB-6 and SB-7) suggesting contaminant plume migration in these areas--it is likely that the source of the petroleum evidence observed in the stormwater basin and swale is from the former UST.

- Winooski River – The Winooski River is located 750 feet north-northeast of the former UST area. Evidence of petroleum impact was observed within a stormwater swale east of US Route 2. Since the drainage swale ultimately discharges to the Winooski River, a risk of impact to the River exists. However, no petroleum discharge was visually observed to the river. Oil booms were installed in the swale as a precautionary measure.

- Underground Utilities - Due to the relatively shallow depth-to-ground water at the former UST area and the observed free-phase petroleum in groundwater at this area --underground utility corridors (water and sewer lines) near the auto body shop may potentially be threatened.

  Elevated PID headspace readings in the saturated soils in downgradient soil borings (SB-6 and SB-7) suggest contaminant plume migration in these areas; therefore, impact to underground utilities in these downgradient areas also exists.

- Water Supply Wells - Based on the relative location of the water supply wells and the former UST location, the likelihood of petroleum-related VOCs reaching the supply wells are unlikely.

# 4.0 CONCLUSIONS

Based on the results of the site investigation described above, ECSMarin concludes the following:

- Free-phase floating petroleum product was detected at approximately four ftbgs in monitoring wells MW-1 (located within the UST excavation) and eight ftbgs in MW-2 (located outside the UST excavation). Approximately 0.23 inches and one foot of floating product were measured in MW-1 and MW-2, respectively. The extent of free-phase product has not been fully characterized.

- Additional monitoring wells could not be installed due to auger refusal on suspected shallow bedrock and unknown underground utility layout. Auger refusal was encountered at depths ranging from five to 12 feet. Several attempts were made to install additional borings down gradient of the UST area. Evidence of petroleum impact was observed (both olfactory and PID screening) at the bottom of soil borings SB-6 and SB-7, located approximately 30 to 60 feet downgradient of the free product area. This data suggests that the #2 fuel oil may be migrating along the bedrock surface.

- Soils generally consist of sand and gravel fill material from zero to four feet underlain by glacial till. Groundwater, if present, is generally encountered in the glacial till. PID soil headspace readings ranged from non detect to 328 ppm. The highest PID reading was detected in soils at a depth of approximately four feet in MW-1.

- Visual (oil sheen), olfactory, and PID readings were observed within several downgradient onsite storm water catch basins suggest that the # 2 fuel oil may be infiltrating the catch basins. Furthermore, visual (oil sheen), olfactory, and PID readings of petroleum impact was observed in a swale at the storm water outfall across Route 2. Several of the onsite petroleum impacted storm water catch basins discharge to the swale located across Route 2 from the site. Oil booms were installed within one onsite catch basin.

- The Winooski River is located 750 feet north-northeast of the former UST area. Since the drainage swale ultimately discharges to the Winooski River, a risk of impact to the River exists. However, no petroleum discharge (i.e., oil sheen) was visually observed in the swale at locations further downgradient near the Winooski River. Oil booms were installed within the swale at the storm water outfall as a precautionary measure.

- The site and surrounding properties are serviced by municipal water. No public supply wells are known to be within the site vicinity.

- The relatively shallow depth-to-ground water at the former UST area and the observed free-phase petroleum product in groundwater at this area suggest that underground utility corridors (water and sewer lines) at the site may potentially be threatened.

- Two supply wells are located within ½-mile of the site. Based on the relative locations of the supply wells to the former UST area, impact to these wells in unlikely. The site and surrounding facilities are served by the municipal water supply system.

- Based on local topography, the horizontal groundwater flow is presumed to be to the northeast, toward the Winooski River. The vertical groundwater flow components at the site, and the hydraulic relationship between the shallow unconfined aquifer and the bedrock aquifer, are currently unknown.

# 5.0 RECOMMENDATIONS

On the basis of the results of this investigation and the conclusions stated above, ECSMarin recommends the following:

1. A site investigation should be performed that includes the installation of additional soil borings/monitoring wells to further define the limits of #2 fuel oil contamination. The installation of soil borings/monitoring wells should be installed at both onsite and offsite (area of drainage swale) locations. Concurrent with the site investigation, a Corrective Action Feasibility Investigation (CAFI) should be performed. The CAFI is warranted based on the presence of free-phase floating petroleum product, petroleum impact to onsite storm water catch basins, and petroleum impact to the off-site storm water.

2. An underground utility survey should be conducted prior to drilling activities to determine the exact location of underground utility lines. The underground lines should be marked and surveyed relative to the buildings and other prevalent site features and included on a site plan. The results of the survey should be used in determining the locations of additional soil borings and to evaluate likelihood of petroleum impact to the lines. The onsite storm water lines should also be included on a site plan.

3. Water levels should be obtained from the two existing monitoring wells (MW-1 and MW-2) and the newly installed monitoring wells to confirm groundwater flow direction at the site. Groundwater samples should be collected from all wells and analyzed for VOCs by EPA Method 8021B and TPH by EPA Method 8015.

4. Water samples should be collected from the downgradient storm water catch basins and off-site drainage swale and submitted for laboratory analysis for VOCs by EPA Method 8021B and for TPH using EPA Method 8015 (fingerprint) to confirm that the contamination is #2 fuel oil from the former UST and determine the extent of contaminant migration. The onsite storm water catch basins and off-site drainage swale should be inspected on a regular basis and oil booms replaced as needed.

5. The free phase #2 fuel oil in MW-1 and MW-2 should be recovered manually on a regular basis until the site investigation is completed and a long-term solution can be established.

6. Upon completion of the additional work, a summary report should be prepared which includes water-quality analytical results; figures showing groundwater flow direction and contaminant distribution; relevant tables; and recommendations for further action.

# FIGURES

ecs MARIN

TITLE: FIGURE 1. SITE LOCATION MAP

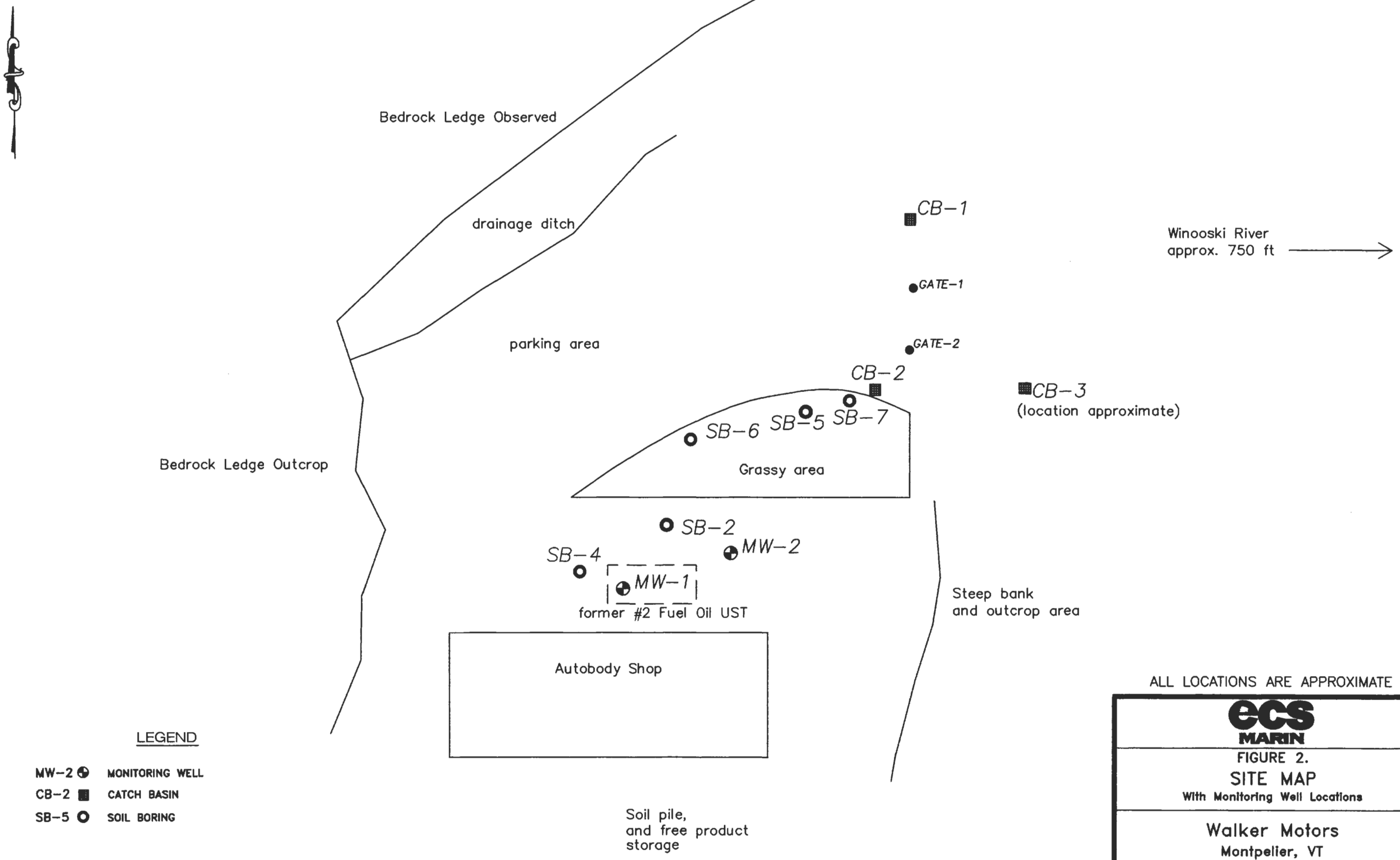
Source: USGS Topographic Map
Barre West Quadrangle (last revised: 1988)

SITE: Walker Motors, Inc.
Montpelier, Vermont
Site Lat/Lon NAD83: 44.2473, -72.5504

QUADRANGLE LOCATION

N

| DRAWN BY: DH | DATE: 07/08/03 | SCALE: 1in = 2000ft |
|---|---|---|
| APPROVED BY: LW | FILE: 30026SLOC.PLT | |




ALL LOCATIONS ARE APPROXIMATE

ecs MARIN

FIGURE 2.

SITE MAP

With Monitoring Well Locations

Walker Motors

Montpelier, VT

| | | |
|---|---|---|
| DRAWN BY: DH | DATE: 6/30/03 | SCALE: 1"= 30' |
| APPROVED BY: KL | FILE No.: VTA30026R01 | |

# APPENDIX C

## BORING LOGS/MONITORING WELL CONSTRUCTION DIAGRAMS

APR 25 2003

VT-WMD-SMS
August 1996

**Figure 2: Notification figure**

Waste Management Division
103 South Main Street/West Office
Waterbury, Vermont 05671-0404
(802) 241-3888, FAX (802) 241-3296

SITE INVESTIGATION EXPRESSWAY NOTIFICATION FORM

Site Owner: Wade Walker

Site Name, Town: Walker Motors

✓ Yes, this site will participate in the Site Investigation Expressway Process.

___ No, this site will not participate in the Site Investigation Expressway Process.

If yes, please complete the checklist below:

✓ Contamination present in soils above action levels ✓ Yes ___ No

If yes, summarize levels:
PID soil headspace levels ranged from 5 to 123 ppm
average soil headspace PID 23 ppm

✓ Free product observed ✓ Yes ___ No

✓ Groundwater contamination observed ✓ Yes ___ No small amount of perched water entering excavation from gravel backfill around UST

✓ Surface water contamination observed ___ Yes ✓ No

✓ Suspected release of hazardous substances ✓ Yes ___ No

If yes, please explain:
No. 2 fuel oil from underground storage tank
UST size: 4,000 gallon. Holes observed in UST

✓ Affected receptors ___ Yes ✓ No None identified at this time.

If yes, please identify receptors including names and addresses of third party receptors:

Please provide an estimated date of when you expect to submit Site Investigation Report: June 27, 2003

Owner's Signature/Date: [signature] Consultant's Signature/Date: [signature] 4-24-03 ECS Marin

The SMS has reviewed this expressway notification form and approves / disapproves of this action.

SMS Signature/Date: [signature] 5/8/03.

ecs MARIN
65 Millet Street
Richmond, Vermont 05477
(802) 434-4500
(802) 434-6076 - fax

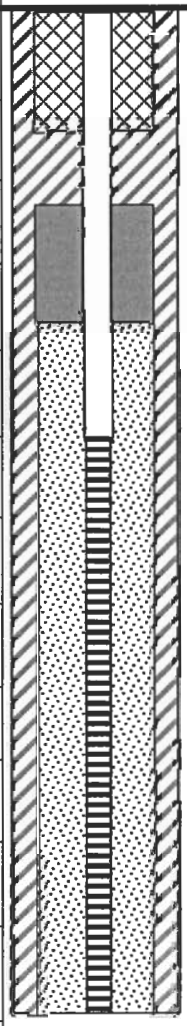
# BORING / WELL IDENTIFICATION: MW-1

| | |
|---|---|
| *Site Name:* | **Walker Motors** |
| *Site Location:* | **Montpelier, Vermont** |
| *Installation Date:* | **9 June 2003** |
| *Job Number:* | **VTA3-0026c** |

| | | | | | |
|---|---|---|---|---|---|
| *Well Depth:* | **12 ft bgs** | *Boring Depth:* | **12 ft bgs** | *Marin Representative:* | **Laura Woodard/Kim Lockard** |
| *Depth to Water (during drilling):* | **approximately 8 ft bgs** | | | *Drilling Company:* | **ECSMarin Agawam, MA** |
| *Screen Diameter:* | **2-inch** | *Depth:* | **5 -12 ft bgs** | | |
| *Screen Type/Size:* | **0.010 slot schedule 40 PVC** | | | *Sampling Method:* | **Hollow Stem Auger** |
| *Riser Diameter:* | **2-inch** | *Depth:* | **0 – 5 ft bgs** | *Reference Point (RP):* | **Grade** |
| *Riser Type/Size:* | **Schedule 40 PVC** | | | *Elevation of RP:* | **not measured** |
| *Remarks:* | Well was completed with sand backfill to 4.0 feet below grade. Bentonite seal between 2 and 4 feet, native material fill to grade, finished with road box flush-mounted and cemented into place. | | | | |

| Depth (in feet) | Sample Depth (ft) | Blows/6" and Recovery | Sample Description and Notes | PID (ppm) |
|---|---|---|---|---|
| 0 | 0-2 | 10-22-24-26<br>12" | 0'-2': Olive gray, medium sand with some silt, trace gravel, moist, odor. | 84 |
| 1 | | | | |
| 2 | 2-4 | 11-17-16-14<br>12" | 2'-4': Dark gray, medium sand with some silt, trace gravel, moist, odor. | 328 |
| 3 | | | | |
| 4 | 4-6 | 13-17-21-29<br>10" | 4'-6': Dark gray, fine to coarse sand, some silt and fine to medium gravel (fill with rounded gravel), moist, possible perched zone. | 264 |
| 5 | | | | |
| 6 | 6-8 | 21-22-13-17<br>6" | 6'-8': Light gray, silt and fine sand, trace fine to medium gravel, less moist, pieces of bedrock ledge. | 106 |
| 7 | ▼ | | | |
| 8 | 8-10 | 11-12-34-22<br>8" | 8'-10': Same as above, wet, oily sheen, odor. | 257 |
| 9 | | | | |
| 10 | 10-12 | 6-9-22-100 (4")<br>16" | 10'-12': Same as above, piece of possible ledge in tip of spoon, oxidized pieces, wet, odor. | 162 |
| 11 | | | | |
| 12 | 12-14 | 100<br>2.5" | End of Sampling = 12.0 feet<br>Well set @ 12.0 feet | |

Well Profile



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

| Proportions used | | Blow count (cohesive soils) | | Blow count (granular soils) | |
|---|---|---|---|---|---|
| and | 33-50% | <2 | very soft | 0-4 | very loose |
| some | 20-33% | 2-4 | soft | 4-10 | loose |
| little | 10-20% | 4-8 | medium stiff | 10-30 | medium dense |
| trace | 0-10% | 8-15 | stiff | 30-50 | dense |
| | | 15-30 | very stiff | >50 | very dense |
| | | >30 | hard | | |

Notes:

PID used: Thermo Model 580B

Well located east of Route 5
See figure 2 for monitoring well location.

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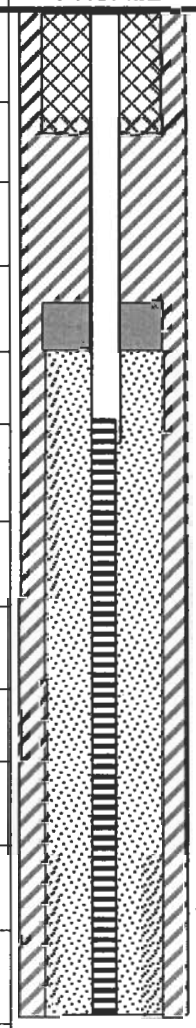
# BORING/WELL IDENTIFICATION: MW-2/SB-3

| | |
|---|---|
| *Site Name:* | **Walker Motors** |
| *Site Location:* | **Montpelier, Vermont** |
| *Installation Date:* | **9 June 2003** |
| *Job Number:* | **VTA3-0026c** |

| | | | | | |
|---|---|---|---|---|---|
| *Well Depth:* | **12 ft bgs** | *Boring Depth:* | **12 ft bgs** | *Marin Representative:* | **Laura Woodard/Kim Lockard** |
| *Depth to Water (during drilling):* | **approximately 11 ft bgs** | | | *Drilling Company:* | **ECSMarin Agawam, MA** |
| *Screen Diameter:* | **2-inch** | *Depth:* | **5 -12 ft bgs** | | |
| *Screen Type/Size:* | **0.010 slot schedule 40 PVC** | | | *Sampling Method:* | **Hollow Stem Auger** |
| *Riser Diameter:* | **2-inch** | *Depth:* | **0 – 5 ft bgs** | *Reference Point (RP):* | **Grade** |
| *Riser Type/Size:* | **Schedule 40 PVC** | | | *Elevation of RP:* | **not measured** |
| *Remarks:* | Well was completed with sand backfill to 4.0 feet below grade. Bentonite seal to 3.5 feet, native material fill to grade, finished with road box flush-mounted and cemented into place. | | | | |

| Depth (in feet) | Sample Depth (ft) | Blows/6" and Recovery | Sample Description and Notes | PID (ppm) |
|---|---|---|---|---|
| 0 | 0-2 | | Hand-dug with a post-hole digger due to uncertainly of water lines. | |
| 1 | | | | |
| 2 | | | | |
| 3 | | | | |
| 4 | | | | |
| 5 | 5-7 | 4-54-19-22 12" | 5'-7': olive gray fine sand and silt, some large rock fragments, three inches of bedrock ledge in the middle of the spoon, dark gray (slate-like with orange mottling - Fe), damp at bottom 6 inches. | 115 |
| 6 | | | | |
| 7 | | | | |
| 8 | | | | |
| 9 | ▼ | | | |
| 10 | 10-12 | 13-16-24-100 (3") 18" | 10'-12': Olive gray, fine sand and silt, 1" of weathered bedrock (same as above), wet on the bottom, fine sand, trace silt last 4 inches. Odor, visible sheen | 187 |
| 11 | | | REFUSAL at 12' | |
| 12 | | | End of Sampling = 12.0 feet<br>Well set @ 12.0 feet | |



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

| Proportions used | | Blow count (cohesive soils) | | Blow count (granular soils) | | Notes: |
|---|---|---|---|---|---|---|
| and | 33-50% | <2 | very soft | 0-4 | very loose | |
| some | 20-33% | 2-4 | soft | 4-10 | loose | PID used: Thermo Model 580B |
| little | 10-20% | 4-8 | medium stiff | 10-30 | medium dense | |
| trace | 0-10% | 8-15 | stiff | 30-50 | dense | Well located east of Route 5 |
| | | 15-30 | very stiff | >50 | very dense | See figure 2 for monitoring well location. |
| | | >30 | hard | | | |

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# BORING/WELL IDENTIFICATION: SB-2

| | |
|---|---|
| *SITE NAME:* | **Walker Motors** |
| *SITE LOCATION:* | **Montpelier, Vermont** |
| *INSTALLATION DATE:* | **9 June 2003** |
| *JOB NUMBER:* | **VTA3-0026c** |

| | | | | | |
|---|---|---|---|---|---|
| *WELL DEPTH:* | **NA** | *BORING DEPTH:* | **5 ft bgs** | *MARIN REPRESENTATIVE:* | **Laura Woodard/Kim Lockard** |
| *DEPTH TO WATER (DURING DRILLING):* | **Not encountered** | | | *DRILLING COMPANY:* | **ECSMarin Agawam, MA** |
| *SCREEN DIAMETER:* | **NA** | *DEPTH:* | **NA** | | |
| *SCREEN TYPE/SIZE:* | **NA** | | | *SAMPLING METHOD:* | **Hollow Stem Auger** |
| *RISER DIAMETER:* | **NA** | *DEPTH:* | **NA** | *REFERENCE POINT (RP):* | **Grade** |
| *RISER TYPE/SIZE:* | **NA** | | | *ELEVATION OF RP:* | **not measured** |
| *REMARKS:* | | | | | |

| DEPTH (IN FEET) | SAMPLE DEPTH (FT) | BLOWS/6" AND RECOVERY | SAMPLE DESCRIPTION AND NOTES | PID (PPM) | WELL PROFILE | LEGEND |
|---|---|---|---|---|---|---|
| 0 | 0-2 | 16-11-9-8<br>12" | 0"-5": medium to coarse sand with gravel, rounded<br>5"-12": fine sand and silt with pieces of bedrock ledge, light gray, moist | 12 | | |
| 1 | | | | | | |
| 2 | | | | | | |
| 3 | | | | | | |
| 4 | | | | | | |
| 5 | 5-7 | 100<br>1.5" | 5'-7': fine sand with some silt, moist, odor, mottled, some rounded gravel. | 7 | | |
| 6 | | | REFUSAL at 5' | | | |
| 7 | | | | | | |
| 8 | | | | | | |
| 9 | | | | | | |
| 10 | | | | | | |
| 11 | | | | | | |
| 12 | | | | | | |

| PROPORTIONS USED | | BLOW COUNT (COHESIVE SOILS) | | BLOW COUNT (GRANULAR SOILS) | | Notes: |
|---|---|---|---|---|---|---|
| AND | 33-50% | <2 | VERY SOFT | 0-4 | VERY LOOSE | |
| SOME | 20-33% | 2-4 | SOFT | 4-10 | LOOSE | PID used: Thermo Model 580B |
| LITTLE | 10-20% | 4-8 | MEDIUM STIFF | 10-30 | MEDIUM DENSE | |
| TRACE | 0-10% | 8-15 | STIFF | 30-50 | DENSE | Well located east of Route 5 |
| | | 15-30 | VERY STIFF | >50 | VERY DENSE | See figure 2 for monitoring well location. |
| | | >30 | HARD | | | |

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# BORING/WELL IDENTIFICATION: SB-4

| | |
|---|---|
| *SITE NAME:* | **Walker Motors** |
| *SITE LOCATION:* | **Montpelier, Vermont** |
| *INSTALLATION DATE:* | **9 June 2003** |
| *JOB NUMBER:* | **VTA3-0026c** |

| | | | | | |
|---|---|---|---|---|---|
| *WELL DEPTH:* | **NA** | *BORING DEPTH:* | **10 ft bgs** | *MARIN REPRESENTATIVE:* | **Laura Woodard/Kim Lockard** |
| *DEPTH TO WATER (DURING DRILLING):* | **Approximately 7 feet** | | | *DRILLING COMPANY:* | **ECSMarin Agawam, MA** |
| *SCREEN DIAMETER:* | **NA** | *DEPTH:* | **NA** | | |
| *SCREEN TYPE/SIZE:* | **NA** | | | *SAMPLING METHOD:* | **Hollow Stem Auger** |
| *RISER DIAMETER:* | **NA** | *DEPTH:* | **NA** | *REFERENCE POINT (RP):* | **Grade** |
| *RISER TYPE/SIZE:* | **NA** | | | *ELEVATION OF RP:* | **not measured** |
| *REMARKS:* | PID readings 0.0 at the water table and no olfactory evidence of VOCs. Monitoring well was not installed. | | | | |

| DEPTH (IN FEET) | SAMPLE DEPTH (FT) | BLOWS/6" AND RECOVERY | SAMPLE DESCRIPTION AND NOTES | PID (PPM) | WELL PROFILE | LEGEND |
|---|---|---|---|---|---|---|
| 0 | 0-2 | 22-31-38-45<br>12" | 0'-2': Medium to fine sand, olive gray, some silt and some gravel, rounded to subangular, damp. | 9.2 | | |
| 1 | | | | | | |
| 2 | | | | | | |
| 3 | | | | | | |
| 4 | | | | | | |
| 5 | 5-7 | 36-27-19-18<br>12" | 5'-7': Olive gray, medium to coarse sand and gravel grading into fine sand and silt, trace gravel, subangular to subrounded, wet at the tip of the spoon, no odor. | 0.0 | | |
| 6 | ▼ | | | | | |
| 7 | | | | | | |
| 8 | | | | | | |
| 9 | | | | | | |
| 10 | 10-12 | 100<br>2" | 10'-12': Olive gray, medium to coarse gravel and silt, subangular, wet, no odor. | 0.0 | | |
| 11 | | | REFUSAL at10 feet – No well installed | | | |
| 12 | | | | | | |

| PROPORTIONS USED | | BLOW COUNT (COHESIVE SOILS) | | BLOW COUNT (GRANULAR SOILS) | | Notes: |
|---|---|---|---|---|---|---|
| AND | 33-50% | <2 | VERY SOFT | 0-4 | VERY LOOSE | |
| SOME | 20-33% | 2-4 | SOFT | 4-10 | LOOSE | PID used: Thermo Model 580B |
| LITTLE | 10-20% | 4-8 | MEDIUM STIFF | 10-30 | MEDIUM DENSE | |
| TRACE | 0-10% | 8-15 | STIFF | 30-50 | DENSE | Well located east of Route 5 |
| | | 15-30 | VERY STIFF | >50 | VERY DENSE | See figure 2 for monitoring well location. |
| | | >30 | HARD | | | |

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# BORING/WELL IDENTIFICATION: SB-5

| | |
|---|---|
| *Site Name:* | **Walker Motors** |
| *Site Location:* | **Montpelier, Vermont** |
| *Installation Date:* | **9 June 2003** |
| *Job Number:* | **VTA3-0026c** |

| | | | | | |
|---|---|---|---|---|---|
| *Well Depth:* | **NA** | *Boring Depth:* | **5 ft bgs** | *Marin Representative:* | **Laura Woodard/Kim Lockard** |
| *Depth to Water (during drilling):* | **Not encountered** | | | *Drilling Company:* | **ECSMarin Agawam, MA** |
| *Screen Diameter:* | **NA** | *Depth:* | **NA** | | |
| *Screen Type/Size:* | **NA** | | | *Sampling Method:* | **Hollow Stem Auger** |
| *Riser Diameter:* | **NA** | *Depth:* | **NA** | *Reference Point (RP):* | **Grade** |
| *Riser Type/Size:* | **NA** | | | *Elevation of RP:* | **not measured** |
| *Remarks:* | | | | | |

| Depth (in feet) | Sample Depth (ft) | Blows/6" and Recovery | Sample Description and Notes | PID (ppm) | Well Profile | Legend |
|---|---|---|---|---|---|---|
| 0 | 0-2 | 5-8-10-14<br>18" | 0-6": Soil, roots, organics, light brown<br>6"-18": Fine sand and silt, some coarse gravel, damp, no odor (recalibrated PID 51 cal. at t=1430) | 0.0 | | |
| 1 | | | | | | |
| 2 | | | | | | |
| 3 | | | | | | |
| 4 | | | | | | |
| 5 | 5-7 | 25-100 (2")<br>2" | 5'-7': same as above with some dark gray bedrock ledge, that are mottled with roots, wet at the tip, no odor or sheen observed. | 0.0 | | |
| 6 | | | REFUSAL at ~5 ft – no well installed | | | |
| 7 | | | | | | |
| 8 | | | | | | |
| 9 | | | | | | |
| 10 | | | | | | |
| 11 | | | | | | |
| 12 | | | | | | |

| Proportions used | | Blow count (cohesive soils) | | Blow count (granular soils) | | Notes: |
|---|---|---|---|---|---|---|
| AND | 33-50% | <2 | Very soft | 0-4 | Very loose | |
| SOME | 20-33% | 2-4 | Soft | 4-10 | Loose | PID used: Thermo Model 580B |
| LITTLE | 10-20% | 4-8 | Medium stiff | 10-30 | Medium dense | |
| TRACE | 0-10% | 8-15 | Stiff | 30-50 | Dense | Well located east of Route 5 |
| | | 15-30 | Very stiff | >50 | Very dense | See figure 2 for monitoring well location. |
| | | >30 | Hard | | | |

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# BORING/WELL IDENTIFICATION: SB-6

| | |
|---|---|
| *Site Name:* | **Walker Motors** |
| *Site Location:* | **Montpelier, Vermont** |
| *Installation Date:* | **9 June 2003** |
| *Job Number:* | **VTA3-0026c** |

| | | | | | |
|---|---|---|---|---|---|
| *Well Depth:* | **NA** | *Boring Depth:* | **8.5 ft bgs** | *Marin Representative:* | **Laura Woodard/Kim Lockard** |
| *Depth to Water (during drilling):* | **Not encountered** | | | *Drilling Company:* | **ECSMarin Agawam, MA** |
| *Screen Diameter:* | **NA** | *Depth:* | **NA** | | |
| *Screen Type/Size:* | **NA** | | | *Sampling Method:* | **Hollow Stem Auger** |
| *Riser Diameter:* | **NA** | *Depth:* | **NA** | *Reference Point (RP):* | **Grade** |
| *Riser Type/Size:* | **NA** | | | *Elevation of RP:* | **not measured** |
| *Remarks:* | | | | | |

| Depth (in feet) | Sample Depth (ft) | Blows/6" and Recovery | Sample Description and Notes | PID (ppm) | Well Profile | Legend |
|---|---|---|---|---|---|---|
| 0 | | | | | | |
| 1 | | | | | | |
| 2 | | | | | | |
| 3 | | | | | | |
| 4 | | | | | | |
| 5 | 5-7 | 13-19-14-16<br>22" | 5'-7': Fine sand and silt, trace gravel, coarse sand layer (about ¾" thick), mottled, damp, organics, no odor. | 0.0 | | |
| 6 | | | | | | |
| 7 | | | | | | |
| 8 | 8-8.5 | 100 (5") | 8'-8.5': same as above, damp.<br>8.5': Refusal – bottom of the auger was a piece of bedrock ledge with some soil on it, wet, odor. | 0.0<br>25 | | |
| 9 | | | | | | |
| 10 | | | REFUSAL at 8.5 ft – no well installed. | | | |
| 11 | | | | | | |
| 12 | | | | | | |

| Proportions used | | Blow count (cohesive soils) | | Blow count (granular soils) | | Notes: |
|---|---|---|---|---|---|---|
| and | 33-50% | <2 | very soft | 0-4 | very loose | |
| some | 20-33% | 2-4 | soft | 4-10 | loose | PID used: Thermo Model 580B |
| little | 10-20% | 4-8 | medium stiff | 10-30 | medium dense | |
| trace | 0-10% | 8-15 | stiff | 30-50 | dense | Well located east of Route 5 |
| | | 15-30 | very stiff | >50 | very dense | See figure 2 for monitoring well location. |
| | | >30 | hard | | | |

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# BORING/WELL IDENTIFICATION: SB-7

| | |
|---|---|
| *SITE NAME:* | **Walker Motors** |
| *SITE LOCATION:* | **Montpelier, Vermont** |
| *INSTALLATION DATE:* | **9 June 2003** |
| *JOB NUMBER:* | **VTA3-0026c** |

| | | | | | |
|---|---|---|---|---|---|
| *WELL DEPTH:* | **NA** | *BORING DEPTH:* | **6 ft bgs** | *MARIN REPRESENTATIVE:* | **Laura Woodard/Kim Lockard** |
| *DEPTH TO WATER (DURING DRILLING):* | **Not encountered** | | | *DRILLING COMPANY:* | **ECSMarin Agawam, MA** |
| *SCREEN DIAMETER:* | **NA** | *DEPTH:* | **NA** | | |
| *SCREEN TYPE/SIZE:* | **NA** | | | *SAMPLING METHOD:* | **Hollow Stem Auger** |
| *RISER DIAMETER:* | **NA** | *DEPTH:* | **NA** | *REFERENCE POINT (RP):* | **Grade** |
| *RISER TYPE/SIZE:* | **NA** | | | *ELEVATION OF RP:* | **not measured** |
| *REMARKS:* | | | | | |

| DEPTH (IN FEET) | SAMPLE DEPTH (FT) | BLOWS/6" AND RECOVERY | SAMPLE DESCRIPTION AND NOTES | PID (PPM) | WELL PROFILE | LEGEND |
|---|---|---|---|---|---|---|
| 0 | | | | | | |
| 1 | | | | | | |
| 2 | | | | | | |
| 3 | | | | | | |
| 4 | | | | | | |
| 5 | 5' | 13-17-16-20 2" | 5'-7': Olive gray, fine sand and silt, some gravel, subrounded, damp, no odor. | 0.6 | | |
| 6 | 6' | auger | 6': soil plug from the bottom of the auger at refusal, damp, odor. REFUSAL at 6 ft – no well installed. | 32 | | |
| 7 | | | | | | |
| 8 | | | | | | |
| 9 | | | | | | |
| 10 | | | | | | |
| 11 | | | | | | |
| 12 | | | | | | |

| PROPORTIONS USED | | BLOW COUNT (COHESIVE SOILS) | | BLOW COUNT (GRANULAR SOILS) | | Notes: |
|---|---|---|---|---|---|---|
| AND | 33-50% | <2 | VERY SOFT | 0-4 | VERY LOOSE | |
| SOME | 20-33% | 2-4 | SOFT | 4-10 | LOOSE | PID used: Thermo Model 580B |
| LITTLE | 10-20% | 4-8 | MEDIUM STIFF | 10-30 | MEDIUM DENSE | |
| TRACE | 0-10% | 8-15 | STIFF | 30-50 | DENSE | Well located east of Route 5 |
| | | 15-30 | VERY STIFF | >50 | VERY DENSE | See figure 2 for monitoring well location. |
| | | >30 | HARD | | | |