CORRECTIVE ACTION FEASIBILITY INVESTIGATION FOR CAPITAL DELI

FEBRUARY 2012

Site Location:

Capital Deli
108 State Street
Montpelier, Vermont

KAS Project # 411040130

VTDEC # 92-1277

Prepared for:

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EXECUTIVE SUMMARY

A Corrective Action Feasibility Investigation (CAFI) has been developed for the Capital Deli property ("Site") in Montpelier, Vermont to address remediation of subsurface petroleum contamination at the site. Several cleanup technologies and approaches were examined and compared. The CAFI was recommended by KAS and approved by Mr. Ashley Desmond of the Vermont Department of Environmental Conservation (VTDEC) in a letter dated March 22, 2011.

The objectives of this investigation were to determine the most technically feasible and cost-effective remedial approach to address subsurface petroleum contamination at the Site. In order to assess the feasibility of remedial alternatives at the Capital Deli property, the following investigative tasks were undertaken as per the December 2011 workscope: installation of an additional groundwater monitoring well; installation of one air sparge (AS) well; installation of one soil vapor extraction (SVE) well; site survey; the completion of a soil vapor extraction and air sparge (SVE/AS) pilot test; and an enhanced fluid recovery (EFR) event.

The source area targeted for corrective action is primarily in the vicinity between the Capital Deli building and pumping island, more specifically where the presence of LNAPL is being observed. The goals of remediation at this Site are to reduce the absorbed concentrations of petroleum compounds in the vadose zone, reduce the dissolved concentrations of petroleum compounds in the saturated zone and remove LNAPL from the subsurface.

The remediation targets at this Site include silty sands with gravel, silts, and some clays within the vadose and saturated zones. The remedial methods considered (soil vapor extraction (SVE), soil vapor extraction with air sparging (AS), Enhanced Fluid Recovery (EFR), Matrix™ Oxygen Injection, Geotech Plume Eater® and surfactant soil flushing) were identified as possible candidates for implementation at the Site. Screening of these remedial alternatives has indicated that SVE and EFR technologies would be the most viable alternative for the remediation of petroleum contamination beneath the Site.

Corrective action appears warranted at the Site due to the fact that significant subsurface contamination is present and natural attenuation is not effectively remediating the contaminant plume within remediation goals. In addition, possible sensitive receptor impacts are present in the vicinity of the Site.

Two remedial alternatives were identified (SVE and EFR) as being the most technically feasible approach to remediation at the Capital Deli. Both of these remedial technologies are similar in capabilities. Based on the data collected during this investigation KAS believes that additional characterization is needed off site in the vicinity of the Capital Plaza building to determine if sensitive receptors are present and to collect additional soil and groundwater data. Based on the additional data collected a determination can be made on whether SVE and/or EFR is the most feasible approach to remediation at the Capital Deli property. The additional data would also be used and incorporated into the final remedial design and corrective action plan.

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1.0. INTRODUCTION

A Corrective Action Feasibility Investigation (CAFI) has been conducted at the Capital Deli property (herein referred to as "Site") in Montpelier, Vermont to address remediation of subsurface petroleum contamination. Petroleum contamination was initially identified at the Site in August 1992. The Site, identified as VTDEC Site #92-1277, has been on an irregular groundwater monitoring schedule since 1993. Recovery of light non-aqueous phase liquid (LNAPL) has been conducted at this Site at frequencies ranging from twice per month to quarterly from April 1994 to December 2011.

KAS, Inc. (KAS) has conducted this investigation for Premium Petroleum, Inc., the owner of the subject property. The Vermont Department of Environmental Conservation (VTDEC) initially requested a CAFI be completed in a March 22, 2011 letter from Mr. Ashley Desmond of the VTDEC to Premium Petroleum, Inc. [1]. Approval to proceed with the CAFI was given by Mr. Dave McQuade of Premium Petroleum, Inc. in an electronic mail message (email) sent to KAS on May 26, 2011 [2]. KAS presented a work plan/cost estimate to Mr. Ashley Desmond of the VTDEC on May 26, 2011, which was approved on October 24, 2011 [3].

2.0. OBJECTIVES OF THE CAFI

The objective of this investigation was to collect data necessary to adequately determine what corrective action approach would be most technically feasible and cost effective to address subsurface petroleum contamination at the Site. The source area to be targeted for additional characterization and corrective action is in the vicinity between the Capital Deli building and pumping island, more specifically where the presence of LNAPL is being observed.

In order to determine the most technically feasible and cost effective remedial alternative(s) for the Site, pilot testing was conducted to collect site-specific parameters and aquifer characteristics sufficient to evaluate various remedial alternatives.

Based on the data collected during this investigation a determination has been made as to the feasibility of remediating the Site through several different technologies. Alternatives for remediation of subsurface contamination are dependent on the nature of the identified contaminant(s), the types and natures of media impacted (e.g., soil, groundwater, surface water), and the degree and extent of contamination in the impacted media. Remedial alternatives which have been considered for resolution of soil and groundwater contamination by gasoline at this Site include soil vapor extraction (SVE), air sparging (AS) with SVE, enhanced fluid recovery (EFR), "Matrix™ Oxygen Injection System (Matrix), Geotech Plume Eater, and surfactant soil flushing.

3.0. SITE BAC GROUND

Initially, Site assessment work was conducted at the Capital Deli by Griffin International, Inc. due to the detection of residual petroleum impact to soils during a routine Underground Storage Tank (UST) removal in 1992 [4]. Groundwater monitoring was conducted semi-annually from April 1993 to April 1994, quarterly from April 1994 through November 1995, and semi-annually from November 1995 to the present. Recovery of LNAPL was conducted at this Site at frequencies ranging from twice per month to quarterly from April 1994 to December 2011. A

heating oil UST was removed from the Taylor Street parking lot, which is downgradient of the Capitol Deli monitoring well MW-6, in June 2007. The Site, designated SMS Site #2007-3677, was investigated and designated Sites Management Activity Completed (SMAC) as of July 31, 2008 [5]. In November 2010 a Supplemental Site Investigation (SSI) was initiated to further define the degree and extent of soil and groundwater contamination that may be present cross-gradient and downgradient from the Site and to install soil vapor points to assess the potential for vapor intrusion from subsurface soils in the Vermont Department of Personnel building [6]. Copies of the Site investigation reports and groundwater monitoring reports are on file at the offices of the VTDEC in Waterbury, Vermont.

4.0 INVESTIGATIVE PROCEDURES

Tasks conducted during this investigation consisted of the following: installation of an AS and SVE point, a SVE/AS pilot test study, installation of an additional monitoring well to further characterize the extent and degree of contamination beneath the basement of the Capital Plaza Ballroom and an EFR event.

4.1 Well Installation

On December 9, 2012, KAS installed a single one-inch diameter monitoring well in the basement of the Capital Plaza Hotel (basement well); a single two-inch diameter sparge point (AS-1); and a single four-inch diameter soil vapor extraction point (SVE-1) north of the building. These soil borings were installed by T&K Drilling of Troy, NH, under the direct supervision of a KAS scientist. The soil borings for the newly installed SVE/AS points were advanced with a truck mounted hollow stem auger and the basement well was installed using a portable pneumatic soil boring apparatus. Soil samples collected from the borings were logged by the scientist and screened for the presence of volatile organic compounds (VOCs) with a calibrated Ion Science Phocheck Photoionization Detector (PID) equipped with a 10.6 eV UV lamp. Soils were screened using the KAS Jar/Polyethylene Bag Headspace Screening Protocol. Soil characteristics and contaminant concentrations were recorded by the scientist in detailed well logs, which are included in Appendix D. The soil borings were advanced according to the KAS Soil Boring protocol and the monitoring well was installed according to the KAS Monitoring Well Installation protocol. The soil borings are indicated on the Site Map (Appendix A).

The boring locations were pre-marked for Digsafe by KAS personnel on December 6, 2011. Digsafe was then contacted prior to the drilling activities, and Digsafe number 2011-500-2981 was assigned. KAS received approval to install a monitoring well beneath the basement of the Capital Plaza Ballroom during a phone conversation with Mr. Fred Bashara, owner of the Capital Plaza Hotel on November 29, 2011.

Basement Well

The basement well is located in the northwest corner of the basement of the Capital Plaza Ballroom and was installed to better define the degree and extent of petroleum contamination at this location. This monitoring well was constructed of 1-inch diameter Schedule 40 PVC riser and 0.010-inch factory slotted well screen. The length of the riser is approximately 0-2 feet and the screened section of the well is approximately 7 feet in length. The annulus space between the well screen and the borehole was filled with a sand pack to approximately 1 foot above the well screen. One bentonite seal was installed above the well screen up to ½ foot below grade. The remaining ½ foot was filled with protective hydraulic cement and set flush with the existing grade. In addition, a locking well cap was placed on the monitoring well.

Soils from this boring consisted primarily of sand with silt. VOC concentrations measured with PID exceeded 100 ppm directly beneath the concrete to the extent of the boring. The well was set at 9.5 ft below surface grade (bsg). A maximum VOC concentration of 851.7 ppm was measured in the sample collected from 6-9 ft bsg. Specific well construction details are displayed in the detailed well construction diagrams included in Appendix D.

Air Sparge Point

This point, designated AS-1, was installed for use in the soil vapor extraction and air sparge pilot test and is located directly north of the Capital Deli building. AS-1 was advanced to approximately 24 feet below grade, approximately ten feet below the water table at the Site. The location of the sparge point is shown on the Site Map in Appendix A.

The sparge point was constructed of a two-foot section of a 1.5-inch diameter, 60-micron pore, PVC piezometer tube which was set below the water table at the bottom of the boring. The riser pipe was extended to grade using 2-inch diameter, schedule 40 PVC riser pipe. The annulus space between the piezometer and the borehole wall was filled with a silica sandpack extending to one foot above and below the piezometer. A grout mixture was placed from just above the sandpack to approximately 1 foot below grade to maximize the effectiveness of the sparge point and prevent short-circuiting of air flow along the borehole wall. The boring was completed with a locking cap and metal roadbox set in concrete flush with existing grade.

Soils from this boring consisted primarily of silty sands with gravel overlying silts with an underlying layer of sandy lean clay. VOC concentrations measured with a PID exceeded 100 ppm from approximately 9 feet below grade to the extent of the boring. No recovery took place from beyond 15 feet below grade and samples were continuously collected from the auger flight. A maximum VOC concentration of 1,251 ppm was measured in the sample collected approximately between 19 and 21 feet below grade. Specific well construction details are displayed in the detailed well construction diagrams included in Appendix D.

Soil Vapor Extraction Point

This point, designated as SVE-1, was also installed for use in the soil vapor extraction and air sparge pilot test and is located directly north of the Capital Deli building. SVE-1 was advanced to approximately 8.5 feet below grade, approximately 2-3 feet above the water table at the Site. The location of the soil vapor extraction point is shown on Site Map in Appendix A.

The vapor point was constructed of 4” schedule 40 PVC riser pipe and 0.010-inch five foot factory slotted well screen. The annulus space between the screen section of the well and borehole was filled with clean, washed, sand silica sand pack extending to one foot above and one foot below the well screen. One bentonite seal was installed above the sandpack up to ½ foot below grade. The remaining ½ foot was filled with cement and set flush with the existing grade.

Soils from this boring consisted primarily of silty sands with varying amounts of gravel. VOC concentrations measured with a PID exceeded 100 ppm from approximately 8 feet bsg to the extent of the boring. Soil samples were continuously collected from the augur flights. A maximum VOC concentration of 458.6 ppm was measured in the sample collected approximately between 8 and 9.5 feet below grade. Specific well construction details are displayed in the detailed well construction diagrams included in Appendix D

4.2 Site Survey

The newly installed sparge and vapor point was located in azimuth and elevation, relative to prominent Site and vicinity features on December 9. 2011. A Site Map (See Site Map, Appendix A) was prepared utilizing the survey data, field observations, and other sources. Elevations were determined relative to monitoring well MW-7 which was arbitrarily set at 100.12 feet.

4.3 Determination of Groundwater Flow Direction and Gradient

Prior to sample collections on December 15, 2011 eleven Site-related monitoring wells were monitored for depths-to-liquid with a KeckTM interface probe. Monitoring wells MW-5 and MW-8 were not accessible during this visit. Depth-to-liquid measurements were collected using the KAS Water/Product Level Measurement protocol. The groundwater elevations were determined by subtracting depth to water measurements from the well casing elevations which were surveyed to an elevation of 100.00 feet on the top of the PVC casing in MW-2. Results are tabulated as Liquid Level Data in Appendix E. The groundwater elevations calculated for December 2011 were plotted on the Site Map to generate the Groundwater Contour Map in Appendix A.

The depth to groundwater corrected for the presence of LNAPL ranged from 12.04 feet below top of casing (btoc) in MW-3 to 15.05 feet btoc in JC-03 on December 15, 2011. Approximately 0.01 foot of LNAPL was measured in MW-2, MW-3, MW-4 and the basement well; approximately 0.02 foot of LNAPL was measured in MW10-09 on this date.

As displayed on the Groundwater Contour Map included in Appendix A, the groundwater flow direction for the December 15, 2011 sampling event was generally directed to the southwest towards the Winooski River with an estimated average hydraulic gradient of 6.4%. The December 15, 2011 measured flow direction and hydraulic gradient are generally consistent with previous data collected at the Site.

4.4 Groundwater Sample Collection and Analysis

On December 15, 2011 KAS collected groundwater samples from MW-1, MW-6, MW-7, MW10-10, MW10-11 and JC-03. No groundwater samples were collected from MW-2 through MW-4, MW10-09 and the basement well due to the presence of LNAPL in these wells. Monitoring wells MW-5 and MW-8 were not accessible during the Site visit. The samples were collected according to the KAS Monitoring Well Sampling Protocol. The groundwater samples were stored on ice in the field and submitted to Endyne, Inc., Laboratory Services (Endyne) of Williston, Vermont under proper chain-of-custody procedures. The groundwater samples were analyzed for the Vermont PCF list volatile organic compounds (VOCs) via EPA Method 8021B. The analytical results are summarized in Table 1. A copy of the laboratory analysis report is in Appendix G.

TABLE 1: SUMMARY OF GROUNDWATER QUALITY RESULTS, DECEMBER 2011 CAPITAL DELI, MONTEPLIER, VERMONT(all concentrations reported in micrograms per liter (ug/l))

Sample Date: **12/15/2011**

PARAMETER	MW-1	MW-2	MW3	MW-4	MW-5	VGES (ppb)
MTBE	**3.2**	No	No	No	No	40.
Benzene	**48.1**	Sample	Sample	Sample	Sample	5.
Toluene	**2.4**	Collected	Collected	Collected	Collected	1,000.
Ethylbenzene	**1.8**	0.01'	0.01'	0.01'	Well	700.
Xylenes	**15.3**	LNAPL	LNAPL	LNAPL	Not	10,000.
1,3,5-TMB	**3.9**	Observed	Measured	Measured	Accessible	350.
1,2,4-TMB	**13.3**	in Well	in Well	in Well	in Well	
Naphthalene	**7.2**					20.
Total Targeted VOCs	**95.2**					-

PARAMETER	MW-6	MW-7	MW-8	MW10-09	MW10-10	VGES (ppb)
MTBE	ND<2.0	**317**	No	No	**12.7**	40.
Benzene	ND<1.0	**336**	Sample	Sample	**1.6**	5.
Toluene	ND<1.0	ND<5.0	Collected	Collected	ND<1.0	1,000.
Ethylbenzene	ND<1.0	**21.6**	Car	0.02'	ND<1.0	700.
Xylenes	**3.2**	ND<10.0	Over	LNAPL	ND<1.0	10,000.
1,3,5-TMB	ND<1.0	ND<5.0	Well	Observed	ND<1.0	350.
1,2,4-TMB	**2.3**	ND<5.0		in Well	ND<1.0	
Naphthalene	ND<2.0	**11.7**			ND<1.0	20.
Total Targeted VOCs	**5.5**	**687.**			**14.3**	-

PARAMETER	MW10-11	JC-03	Basement Well			VGES (ppb)
MTBE	ND<1.0	ND<2.0	No			40.
Benzene	ND<1.0	**2.9**	Sample			5.
Toluene	ND<1.0	**12.7**	Collected			1,000.
Ethylbenzene	ND<1.0	**10.6**	0.01'			700.
Xylenes	ND<2.0	**51.7**	LNAPL			10,000.
1,3,5-TMB	ND<1.0	**10.9**	Measured			350.
1,2,4-TMB	ND<1.0	**35.1**	in Well			
Naphthalene	ND<2.0	**6.8**				20.
Total Targeted VOCs	ND	**130.7**				-

Results reported by Endyne, Inc., Williston, Vermont; Report date December 20, 2011 (Appendix D)
ND means that the compound was not reported present at or above the listed concentration.
VGES - Vermont Groundwater Enforcement Standard (February 26, 2007).
Bold values indicate detections. Shaded values indicate concentrations at or above the VGES.
MTBE = Methyl-tert-butyl Ether; TMB = Trimethylbenzene

Analytical Results

Dissolved petroleum constituents were reported at concentrations above the Vermont Groundwater Enforcement Standards (VGES) in the samples collected from MW-1 and MW-7 on December 15, 2011. VOCs were reported in the samples collected from MW-6, MW10-10 and JC-03 but below their respective VGES. No VOCs were reported above laboratory reporting limit in the sample collected from MW10-11 on this date. Analytical results of the groundwater samples are included in Appendix F. The laboratory analytical report is included in Appendix G.

Contaminant Concentration Trends

The concentration data have been graphed for trend analysis. The following observations were made:

- Petroleum-related VOC concentrations in MW-1 have increased as compared to the July 2011 sampling event, but remain within historic range. Benzene was the only compound detected above its respective VGES;
- Petroleum-related VOC concentrations in MW-7 have decreased as compared to the July 2011 sampling event. Only two compounds (Benzene and Methy-t-butyl ether (MTBE)) were reported above their respective VGES;
- Petroleum-related VOC concentrations in JC-03 have increased since the July 2011 sampling event and levels are the highest reported since KAS began sampling this well in November 2011. However, no compounds were reported above their respective VGES;
- Petroleum-related VOC concentrations in MW-6 and MW10-10 were below their respective VGESs; and
- Petroleum-related VOC concentrations in MW10-11 were non-detectable for the first time since sampling began.

The Contaminant Distribution Map in Appendix A indicates that the maximum petroleum impact in shallow groundwater is in the vicinity of MW-2, MW-3, MW-4, MW10-09 and the basement well. The plume extends from the vicinity of the Capitol Deli property across Taylor Street. Based on the current and historic data, the extent of the petroleum plume has not been fully defined to the south but likely does not extend much beyond the most downgradient well JC-03. The petroleum plume is not fully defined to the east and southeast at this time.

4.5 Soil Vapor E traction/Air Sparging Pilot Test

To determine if a soil vapor extraction system can effectively control the subsurface vapor plume and if air sparging can effectively treat the dissolved phase contamination, a combined pilot test was conducted at the Site with both the SVE and AS pilot systems in operation independently first and then in operation simultaneously.

4.5.1 Soil Vapor E traction Pilot Test

On January 5, 2012, KAS conducted a SVE pilot test at the Site to determine the feasibility of using SVE as a method of remediating adsorbed petroleum contamination. The test was conducted by applying a measured vacuum to monitoring well SVE-1 using a regenerative blower, and measuring the induced vacuum created in other monitoring wells at the Site. Three negative pressures were applied at the test well: low (5” water), moderate (20” water) and maximum (31” water).

The blower effluent generated during the pilot test was measured to determine (1) total VOC concentrations with a Ion Science Phocheck PID; (2) air flow rates with a thermal anemometer; and (3) vacuum with a magnehelic gauge.

The radius of influence for the tested point was calculated from the induced vacuum measured in surrounding monitoring wells. The radius of influence is defined as the furthest distance from the tested point at which a minimum induced vacuum of 0.10 inch of water can be measured. Subsurface vacuums away from the point of applied vacuum were estimated based on the assumption that the magnitude of a vacuum in the subsurface decreases logarithmically as the distance from the point of applied vacuum increases. The estimated subsurface vacuums for the test are presented in spreadsheet form in Appendix I. From these estimated values, the radius of influence in the direction of the tested point was determined by finding the average maximum distance from the test point at which a vacuum of at least 0.10 inch of water could be measured. These calculations are based on the following assumptions:

- the aquifer materials are homogeneous and isotropic
- there are no barriers (e.g., building foundations) serving to reduce subsurface air flow and radii of influence
- there are no zones of enhanced permeability (e.g., fill material surrounding utility lines) serving to increase subsurface air flow rates and radii of influence

Test Results
The calculated radius of influence observed from a 5" vacuum applied at SVE-1 ranged from approximately 59 feet in a southeasterly direction to approximately 36 feet in a northwesterly direction. The calculated radius of influence observed from a 20" vacuum applied at SVE-1 ranged from approximately 45 feet in a southeasterly direction to approximately 48 feet in an easterly direction. A similar radius of influence was observed from a 31" vacuum applied at SVE-1 ranging from approximately 49 feet in southeasterly direction to approximately 52 feet in an easterly direction. Negative pressure readings from each observation well were recorded after 25, 50, and 75 minutes had passed. Data collected during the SVE pilot test are included in Appendix H.

The VOC concentration of the effluent air evacuated from SVE-1 ranged from 930 ppm when applying a low vacuum (5" water) to 1,112 ppm when applying the maximum vacuum (31" water). Data collected during the SVE pilot test are included in Appendix H. Graphs indicating the induced vacuum versus the distance to a given point are also located in Appendix I.

4.5.2 Air Sparge Pilot Test

On January 5, 2012, an AS pilot test was conducted to determine if this remediation technology is applicable for this Site and to provide design data which will be required if sparging is selected as the preferred remediation method. The pilot test was conducted using the newly installed sparge point (AS-1). One of the goals of the pilot test was to estimate the radius of the "cone of influence." Parameters used to estimate the radius of influence (ROI) included:

- measurement of the lateral extent of potential groundwater mounding,
- the potential increase in positive pressure within the cone of influence, and
- the potential increase in VOC concentrations in the vadose zone due to sparging.

Based on Site specific testing, positive pressure measurements appeared to be the most reliable method of estimating the ROI since it directly measures the forced displacement of water in the pore spaces of the saturated zone. Prior to the initiation of the sparge test, KAS made the following measurements in the surrounding monitoring wells:

- Water levels (using an interface probe); and
- Headspace readings (using a PID);

After the readings were collected, air was injected into the sparge point using a 7.5-hp air compressor. Three positive pressures were applied at the test well: low (2 psi), moderate (6 psi) and maximum (10 psi). The test was run long enough to equilibrate prior to collecting measurements. Pressure readings, vapor concentrations and water level measurements from each observation well were recorded after 12, 25, and 20 minutes had passed. Data collected during the AS pilot test are included in Appendix H.

Test Results
The calculated minimum radius of influence observed from an air pressure of 6 psi (approximately 166.02 in. water) applied at AS-1 varied from approximately 25 feet in an easterly direction and 20 feet in a westerly direction. Groundwater mounding was not noted during the pilot test. As compared to initial readings, no significant increases in headspace VOC vapor readings were noted in any of the observation wells after 12, 25, and 20 minutes had elapsed. Data collected during the AS pilot test are included in Appendix H. Graphs indicating the air pressure versus the distance to a given point are also located in Appendix J.

4.5.3 Soil Vapor E traction in Con unction with Air Sparging Pilot Test

To determine if a soil vapor extraction system can effectively control the subsurface vapor plume enhanced by operation of the air sparging system, a combined pilot test was conducted on January 5, 2012 with both the SVE and AS pilot systems in operation simultaneously. Air flow was applied to the sparge point (AS-1) while vacuum was applied to vent point (SVE-1). The air flow to the sparge was applied at approximately 5 psi, while the vacuum was applied in three different steps (low, moderate, and maximum). The combined test was run for approximately 60 minutes. VOC emissions from the vapor extraction point were monitored during the test and sparge system discharge pressure and SVE system flow rates and vacuums were monitored simultaneously to ensure negative pressures in surrounding monitoring wells.

Test Results
The combined SVE/AS pilot test results indicated that the SVE system could effectively control the subsurface vapor plume enhanced by operation of the air sparging system. A negative vacuum reading was obtained in six of the nine tested wells at a flowrate of 6000+ cfm and 31” water at SVE-1 and 5 psi pressure at AS-1. The VOC concentration of the effluent air evacuated from SVE-1 ranged from 631 ppm when applying a low vacuum (5” water) to 964 ppm when applying the maximum vacuum (31” water). Data collected during the SVE/AS pilot test are included in Appendix H.

4.6 Enhanced Fluid Recovery (EFR) Feasibility Study

On January 30 and 31, 2012, a KAS scientist coordinated and directed an EFR pilot test on monitoring wells MW-2, MW-4 and MW-5. A vacuum of 48” to 177” of water were applied to the well using an 8-cylinder internal combustion, propane co-fired engine operated by

Groundwater Environmental Services, Inc. (GSE) of Windsor, CT. Approximately 6.5 gallons of liquid phase gasoline were extracted by GSE. The EFR data collected by GSE on these dates have been tabulated and included in Appendix K. The fluids extracted were collected and subsequently disposed by Environmental Products and Services (EP&S) of Burlington, VT, a licensed transport/disposal contractor.

Air flow and volatile concentration readings were collected approximately every 30 minutes over an eight-hour period to determine the quantity of gasoline recovered in the vapor phase. A total of 138.16 pounds of gasoline vapors were recovered during the 8-hour pilot test (Appendix K). With a density of approximately 6.17 pounds per gallon, this is equivalent to approximately 22.39 gallons vapor phase gasoline.

Water table elevations and the presence LNAPL were gauged in MW-2, MW-4 and MW-5 before and after the EFR event conducted on January 30 and 31, 2012. An average of 0.02 ft of LNAPL was measured prior to the event and no LNAPL was measured after the EFR event.

5.0. SITE CONCEPTUAL MODEL

The Capital Deli is located in the City of Montpelier on the south side of State Street at the corner of Taylor Street. The Capital Deli station is located approximately 400 feet to the north of the westerly-flowing Winooski River. Ground surface is mostly level in the immediate vicinity of the store. The Capital Deli property is elevated higher than the properties to the south and southwest where monitoring wells MW-7, MW10-11, MW-6, JC-O3 and the basement well are located. Land use in the area of the Site is predominantly commercial. The entire area surrounding the Capital Deli is served by a municipal water and sewer system.

Groundwater has consistently been documented to flow towards the southwest under a moderate gradient. Depth to groundwater ranges from 10 to 15 feet below grade in the vicinity of the Capital Deli station. Since December 1995, the average groundwater elevation in the vicinity of the Capital Deli has fluctuated ranging from 89.05 to 85.54 feet. Groundwater elevations were determined relative to the top of casing of MW-2 which was arbitrarily set at 100 feet.

5.1 Geologic Setting

Bedrock in the area is mapped as quartzite of the Moretown member of the Ordovician Mississquoi formation, quartzose limestone of the Silurian Shaw Mountain formation, and possibly schist / phyllite of the Siluro-Devonian Northfield formation according to the Centennial Geological Map of the State of Vermont [7]. Surficial deposits in the vicinity of the Site are mapped as Pleistocene silt, silty clay, and clay as well as recent fluvial sand and gravels according to the Surficial Geologic Map of Vermont [8]. The soils observed in previously advanced soil borings (silt, sand and gravel) are consistent with the current advanced soil borings installed on December 9, 2011. Bedrock has been reported at a depth of approximately 16 feet below grade in MW-5, though it has not been observed in the other Site-related borings.

Based on the historic and current soil boring logs for Site monitoring wells, saturated and unsaturated soils beneath the Site consist mostly of silty sands with varying amounts of gravel, silts, and some clays.

The general stratigraphy of the unconsolidated sediments in the Site vicinity consists of silty sand and gravel fill to approximately 5 ft below grade, well-graded sand with silt and gravel from 5 ft

to approximately 10 ft below grade, silty sands with varying amounts of gravel from 10 ft to approximately 20 ft below grade. Lean clay was observed in the AS-1 boring at a depth of 17 ft to 24 ft below grade.

Soil boring logs recorded during the installation of Site monitoring wells were utilized to construct a geologic cross section along transects A-A' (southwest to northeast), and B-B' (northwest to southeast) illustrated on the Geologic Cross-Section Maps (see Appendix B). Historic and current boring logs are included in Appendix C and D, respectively.

5.2 Sensitive Receptor Survey

5.2.1 Buildings in the Vicinity

Two commercial buildings (Vermont Department of Personal and Capital Plaza Hotel) are present downgradient of the source area. During a Supplemental Site Investigation conducted in November 2010 it was determined through soil gas samples that indoor air in the Vermont Department of Personnel building was not likely at risk to vapor intrusion. KAS also screened the indoor air in the basements of the Vermont Department of Personnel and Capitol Plaza buildings for VOCs with a Mini Rae Classic PID. No VOCs were measured in either building basement on this date. However, the recent discovery of contamination beneath the basement of the Capital Plaza Hotel could suggest that there is a potential for vapor intrusion within this building at this time. More data is needed to evaluate this possibility.

5.2.2 Utility Corridors

The municipal water line runs along Taylor Street in a downgradient and cross-gradient location, of the core contamination area. Based on the local depth to groundwater downgradient of the core contamination area (12-15 feet) and the assumed depth of the regional water lines (up to 8 feet), the municipal water line utility corridor in the vicinity of the Site is not believed to be at potential risk from dissolved petroleum constituents originating from the Capital Deli property.

5.2.3 Supply Wells

No supply wells have been observed in the immediate vicinity of the Site. Information available online via the Vermont Department of Environmental Conservation, Water Supply Division (viewed on line at http://maps.vermont. gov/?site=ANR_wswelldriller) indicates the presence of eight private wells within 0.5 mile of the Site, several of which, including the closest, are across the drainage boundaries of the Winooski and Dog Rivers.

5.2.4 Surface Water Bodies

No potential jurisdictional wetlands were observed in the immediate vicinity (Site and abutters) of the Site. The Winooski River and Dog River are located approximately 400 feet and 650 feet southwest and east of the source area, respectively. Based on the data collected during this investigation and historical data both rivers are not believed to be at potential risk from dissolved petroleum constituents originating from the source area.

6.0 FEASIBILITY STUDY OF REMEDIAL ALTERNATIVES

The feasibility of employing remedial alternatives was evaluated for the Capital Deli Site. The alternatives considered included: soil vapor extraction, soil vapor extraction with air sparging, enhanced fluid recovery, "matrix oxygen injection system, geotech plume eater® and surfactant soil flushing. KAS considered the following additional remedial alternatives, however, these were not further evaluated per the request of the VTDEC: natural attenuation, soil excavation, oxygen release compound (ORC) and pump and treat. The alternatives that were evaluated in detail are discussed below.

6.1 Soil Vapor E traction

SVE can reduce the volume of petroleum hydrocarbons in the vadose zone, thereby reducing the continued source of petroleum hydrocarbons to the groundwater. Success of soil venting is dependent on the vapor transmission capacity of the soils, the volatility and sorption tendencies of the subject contaminants, and the thickness of the vadose zone.

Soil vapor extraction was considered and may be feasible at the Capital Deli Site for the following reasons:

- Based on soil borings silts and sands with varying amounts of gravel observed within the vadose zone which has an intrinsic permeability value of 10^{-6} cm² indicating marginal effectiveness to effectiveness for SVE treatment; [9]
- The SVE pilot test conducted in January 2012 demonstrated adequate airflow rates through the Site subsurface sediments for effective SVE treatment;
- The adsorbed contamination at the Site predominately consists of the BTEX compounds whose vapor pressure (6 to 76 mm Hg at 20ºC), boiling points (40 to 225ºC), and Henry's Law constants (217 to 359 atm) generally are considered to be open to extraction via SVE treatment [10];
- Based on soil borings and associated VOC concentrations, the vadose zone contaminated soils beneath the Site lie from approximately 0-12' bsg, which is a large portion of the petroleum contamination at the Site;
- Low fluctuations in the groundwater table have been observed at the Site. High fluctuations sometimes submerge the contaminated soil or some of the well screen, making it unavailable for air flow;
- Radius of influence calculations indicates an average 31-foot area of influence is produced, indicating adequate permeability of subsurface sediments through which air can travel and strip adsorbed contamination from the soils. Most of the Site is sealed at the surface with an asphalt cap which is useful with minimizing short circuiting; and,
- SVE has the ability to remove LNAPL from the subsurface when present in small amounts via vaporization and removal, all of which exist at the Site.

6.2 Air Sparging with SVE

Air sparging can reduce concentrations of volatile constituents in petroleum products that are dissolved in groundwater [11]. An adequate permeability of subsurface sediments is necessary for optimum operation of a sparge system. In addition, a sufficient thickness of aquifer is required to permit placement of the sparge points below the water table to achieve an acceptable radius of influence for each sparge point.

Air sparging was considered but does not appear to be feasible for use at the Capital Deli Site for the following reasons:

- Based on soil borings sandy lean clay to lean clay was observed within the saturated zone which has an intrinsic permeability value of 10^{-14} cm² indicating marginal effectiveness to ineffectiveness for AS treatment; [11]
- Radius of influence calculations indicates an average 16-foot area of influence is produced, indicating inadequate permeability of the subsurface sediments;
- No increases in PID readings or groundwater elevations were observed in any nearby wells at an air pressure set above 6 psi during the AS pilot test and the combined SVE/AS pilot test; and
- Air sparging can create groundwater mounding which could potentially cause the LNAPL that is present beneath the Site to further migrate and continue spreading beneath the Capital Plaza Hotel and nearby utilities if contamination exceeds the radius of influence of a SVE system.

6.3 Enhanced Fluid Recovery

Enhanced Fluid Recovery (EFR) can treat all phases of VOC's in both the unsaturated and saturated soils. Specifically, it can reduce the volume of petroleum hydrocarbons in the vadose zone and remove LNAPL thereby reducing the continued source of petroleum hydrocarbons to the groundwater. Similar to a SVE system, EFR volatiles absorbed and free phase VOCs at a significantly higher vacuum and flow rate. Success of EFR is dependent on the vapor transmission capacity of the soils, the volatility and sorption tendencies of the subject contaminants.

Enhanced fluid recovery was considered and may be feasible for use at the Capital Deli Site for the following reasons:

- Based on soil borings well graded gravel/sand with silt were observed within the vadose zone of the source area which have an intrinsic permeability value of 10^{-6} cm² indicating marginal effectiveness to effectiveness for EFR technology; [12]
- EFR technology has the ability to treat vapor contamination in the vadose zone, dissolved contamination in groundwater, and LNAPL, all of which exist at the site;
- Approximately 22.39 gallons of gasoline vapors and 6.5 gallons of liquid phase gasoline were recovered from the subsurface during the EFR pilot test;
- The level of vapor-phase gasoline recorded near the end of the product extraction event indicates that additional EFR events at the Site are likely to continue to be effective and productive in the extraction of LNAPL from the vicinity of these wells; and
- The EFR system used for the pilot test was entirely portable; it was brought to the Site on the evening of testing and was removed from the Site upon completion of the test. This system does not require excavation of any kind, which is a noted benefit at this Site because of the limited space between the on-Site building, roads and adjacent buildings.

6.4 Matri O ygen In ection System

Matrix™ Oxygen Injection system is an aerobic bioremedial attenuation enhancement system that produces pure oxygen from compressed air for pulse injection into groundwater at controlled rates, resulting in high transfer efficiency to groundwater and dissolved oxygen saturated levels up to 40 mg/L. Because the resultant oxygen supply is greater than the total oxygen demand, this

system creates optimal conditions for native bacteria to break down petroleum hydrocarbons and gasoline oxygenates in the saturated zone.

Matrix™ Oxygen Injection system was considered but does not appear to be feasible for use at the Capital Deli Site for the following reasons:

- This system requires the injection wells to be installed at least six feet into the saturated zone. Because the soils within the saturated zone contain tightly cohesive soils such as lean clay and silt this would result in a low oxygen transfer prohibiting the oxygen to effectively be introduced and distributed; [13] and
- Enhanced aerobic bioremediation will not effectively address the LNAPL that will serve as an on-going source of dissolved phase contamination beneath the Site. The presence of LNAPL will severely limit the rate of hydrocarbon and gasoline oxygenates to breakdown and consequently will likely extend beyond the remediation timeline for successful remediation of sensitive receptor(s) [13].

6.5 Geotech Plume Eater

The Plume Eater® creates a circulation pattern in the aquifer by drawing contaminated water into well and through the Plume Eater. The oxygenated water is reintroduced into the aquifer without ever being brought to the surface; throughout the process. The system uses similar technology as in-well air stripping while emphasizing the enhancement of bio-remediation. The process involves the discharge of extracted vapors into the vadose zone for degradation by naturally occurring microorganisms or removal by soil vapor extraction. Oxygen is supplied to both the saturated zone and the vadose zone to promote and enhance the natural aerobic degradation processes.

The Plume Eater® was considered but does not appear to be feasible for use at the Capital Deli Site for the following reasons:

- Because the Plume Eater® reinjects water from the top of the water column into the deeper portion of the formation, this technology has the ability to cause vertical migration of contaminants, and in particular, LNAPL; and
- The fact that it is a new technology with few case studies available for comparison does not make it feasible for the Site at this time. This technology would be best applied in a small scale pilot test situation to provide results for future installations.

6.6 Surfactant Soil Flushing

Surfactant soil flushing involves the injection of an aqueous solution (flushing agent) into the subsurface in order to achieve the effect of increasing contaminant mobility for a more effective removal of absorbed contamination. For petroleum contaminations, a suitable flushing agent would be a surfactant as it would emulsify the relatively insoluble petroleum contamination adhered to the soil particles and make it more soluble in water. Recovery is completed using automatic pumps installed in an interception trench or recovery wells. Recovered water would then be treated in an above ground treatment compound. The treated water would then be discharged into a nearby surface water source under a Site discharge permit.

Surfactant soil flushing was considered but does not appear to be feasible for use at the Capital Deli Site for the following reasons:

- Adding surfactants to the contaminated groundwater beneath the Site would increase the amount of contamination leaving the subsurface via possible seeps downgradient toward the southern edge of the Site and toward the Capital Plaza Hotel; and
- Due to the limited space on Site and the extensive excavation procedures associated with installation and maintenance of the system this technology it does not seem feasible at this time.

7.0 COST EFFECTIVENESS ANALYSIS

Based on the available data collected to date at the Site, costs for each remedial alternative determined to be feasible for the Site were developed from conceptual estimates based on KAS' experience constructing and operating remedial systems and approximate current price structures for materials and subcontractor labor. Estimated costs were projected to the expected clean-up date. These estimates were created for comparison only and are not presented as price quotations. These budgetary estimates assume year 2012 dollars (not taking into account inflation) and are based on a traditional time and materials contract (Appendix M).

7.1 Weighing Of Feasibility Parameters

The cost effectiveness of the alternatives was analyzed using four parameters: effectiveness in accomplishing clean-up goals, feasibility of implementation, treatment time, and cost. Each parameter was assigned a weight in determining the overall score. Effectiveness and cost were each assigned a weight of 30%; cost and effectiveness were considered equally the two most important factors in accomplishing Site clean-up because of the need to eliminate potential contaminant influx downgradient efficiently. Feasibility and treatment time were considered to be of lower priority and weighted at 20% each. Each alternative is rated on a scale from 1 to 3, in each parameter category; 3 being the highest and best score (see Cost-Effectiveness Analysis, Appendix L).

SOIL VAPOR EXTRACTION (SVE)

SVE scored moderate in cost and effectiveness but lower in feasibility and treatment time as compared to EFR technology. The costs for this system were based on the installation of three SVE points and the installation of a remediation shed on the eastern portion of the Site. The number of SVE wells was determined by using the estimated minimum radius of influence obtained from the SVE pilot test at maximum vacuum of 31" with an estimated 31 foot radius of influence. SVE scored moderate in effectiveness as compared to EFR due to the inability of this type of remediation technology to reduce absorbed phase contaminant migration towards the southwest edge of the Site. The SVE system also scored moderate in effectiveness as the system would also be in operation thus continuously removing the absorbed phase contaminants within the vadose zone. Because the SVE points would be installed mainly in the paved portion of the Site and avoiding such on-Site features as the pumping island and USTs, and installation of an on-Site remediation shed would be difficult, the SVE was rated low in feasibility. Because SVE targets only adsorbed phase contamination in the vadose zone, this system scored lower in treatment time, as dissolved phase contamination in the saturated zone would primarily remain untreated via this method.

ENHANCED FLUID RECOVERY (EFR)

EFR technology scored high in cost, effectiveness, and treatment time but moderate in feasibility as compared to the SVE system. The costs of EFR were based on conducting events on three wells within the source area during a single 8-hour shift. Due to the limited space on-Site and because multiple subcontractors are needed to conduct a single EFR event the feasibility scored moderate as the Site would have to be shut down during nightly events. The effectiveness of the EFR technology scored high because it can easily be modified to capture different sections of the source area. Because the EFR technology would target both the adsorbed phase contamination in the vodose zone and removal of LNAPL the treatment time scored high.

7.2 Recommended Alternative

Based on a review of the above alternatives, it appears that both soil vapor extraction and enhanced fluid recovery are feasible approaches to remediation at the Capital Deli property. A SVE system would be useful in decreasing the time it takes to reduce adsorbed contaminant concentrations at the Site. Because the EFR technology is entirely mobile it would be useful in targeting the LNAPL that continues to act as a potential source of contamination on a Site with such limited space.

Based on the data collected during this investigation KAS believes that additional characterization is needed off Site prior to finalizing a remedial plan. The additional data obtained off Site will supply more information which can be used to adequately determine whether SVE and/or EFR are the best remedial approach for the Site.

8.0 SUMMARY OF FINDINGS AND CONCLUSION

Based on the results of this corrective action feasibility investigation, a review of historical data, and the December 2011 groundwater monitoring data, the following findings and conclusions are presented:

1. A single air sparge point, soil vapor extraction point and monitoring well was installed on December 9, 2011;

2. Subsurface soil contamination was encountered during installation of each of the new soil borings installed on December 9, 2011, with contamination noted both above and below the water table;

3. Historic Site monitoring data indicate that groundwater flow beneath the Site is typically directed to the southwest towards the Winooski river at a hydraulic gradient of approximately 6.4%;

4. On December 15, 2011 dissolved petroleum constituents were reported at concentrations above the VGES in the samples collected from MW-1 and MW-7 and VOCs were reported in the samples collected from MW-6, MW10-10 and JC-03 but below their respective VGES. No VOCs were reported above laboratory reporting limit in the sample collected from MW10-11 on this date;

5. On December 15, 2011 approximately 0.01 foot of LNAPL was measured in MW-2, MW-3, MW-4 and the basement well; approximately 0.02 foot of LNAPL was measured in MW10-09 on this date;

6. Based on the historic and current soil boring logs for Site monitoring wells unsaturated soils beneath the Site consist primarily of silty sands with varying amounts of gravel and silts, while the saturated soils consisted primarily of silty sand and lean clay;

7. A soil vapor extraction pilot test indicated that this remediation technique would be effective for the remediation of petroleum contamination within the vadose zone beneath the Site. Soils beneath the Site are moderately effective for soil vapor extraction technology and an adequate radius of influence was observed during the pilot test;

8. An air sparge pilot test indicates that air sparging in conjunction with an SVE system would be not be effective in the remediation of petroleum contaminated groundwater beneath the Site. Soils beneath the Site within the saturated zone indicate marginal effectiveness to ineffectiveness for air sparge treatment;

9. Approximately 22.39 gallons of gasoline vapors and 6.5 gallons of liquid phase gasoline were recovered on January 30 and 31, 2012;

10. The EFR pilot test indicated that this remediation technology would be effective for the remediation of petroleum contamination within the vodose zone and removal of LNAPL that is present beneath the Site. This system does not require excavation of any kind, which is a noted benefit at this Site because of the limited space between the on-Site building, roads and adjacent buildings;

11. The following technologies were determined to not be feasible at the Site: Matrix™ Oxygen Injection System because soil characteristics are not favorable for this type of technology; Geotech Plume Eater® has the ability to cause vertical migration of contaminants, and in particular, LNAPL; and surfactant soil flushing because adding surfactants to the contaminated groundwater beneath the Site would increase the amount of contamination leaving the subsurface;

12. The recent discovery of contamination beneath the basement of the Capital Plaza Ballroom indicates there is a potential for vapor intrusion within the basement of this building. More data is needed to evaluate this possibility. No other potential sensitive receptors have been identified at this time;

13. Corrective action appears warranted at the Site due to the fact that significant subsurface contamination is present at the Site and natural attenuation is not effectively remediating the contaminant plume within remediation goals. In addition, possible sensitive receptors impacts are present in the vicinity of the Site; and

14. Two remedial alternatives were identified (SVE and EFR) as the most technically feasible approach to remediation at the Capital Deli. Both remedial technologies identified as possible candidates for implementation at the Site are similar in capabilities.

9.0 OPINION and RECOMMENDATIONS

KAS believes that prior to successfully determining the most technically feasible approach to remediation at the Capital Deli property additional off-Site characterization of potential sensitive receptor impacts are needed. Specifically, the area south of the Capital Deli property and adjacent to the Capital Plaza Ballroom. Upon evaluation of the data gathered during the additional investigation a determination can be made on whether SVE and/or EFR is the most feasible approach to remediation at the Capital Deli Site. Also, the additional data could be used and incorporated into a final remedial design and corrective action plan. A work plan and cost estimate can be prepared upon approval to proceed.

Based upon the above statements, KAS recommends the following;

1. To better assess the potential for vapor intrusion from the subsurface soils into the vicinity of the Capital Plaza Hotel, KAS recommends the installation of up to three gas points in the alley way south of the Capital Deli adjacent to the Capital Plaza Ballroom;

2. To the west and south of the Capital Plaza ballroom several soil borings/monitoring wells should be installed to better characterize the contaminant plume; and

3. The current semi-annual sampling schedule should continue. All thirteen monitoring wells should be gauged and sampled during the June 2012 sampling event. Groundwater samples should be analyzed for VOCs in the Vermont PCF list.

10.0 REFERENCES

1. Vermont Department of Environmental Conservation, March 22, 2011. Letter from Mr. Ashley Desmond, VTDEC to Mr. David McQuade, Premium Petroleum, Inc., regarding a *Corrective Action Feasibility Investigation and Semi-Annual Monitoring Report.*

2. Email correspondence from Premium Petroleum, Inc., to KAS, Inc. May 26, 2011. Approval to proceed with the *Corrective Action Feasibility Investigation*.

3. KAS, Inc. October 2011. *Work Plan and Cost Estimate for a Corrective Action Feasibility Investigation.*

4. Griffin International, Inc., May 1993, *Investigative Report on Subsurface Petroleum Contamination at Capital Mobil.*

5. Vermont Department of Environmental Conservation, July 2008. Letter from George Desch, VTDEC to Mr. Vincent Blaisdell, State of Vermont Department Building and General Services, regarding *Site Management Activity Completed (SMAC) Designation.*

6. KAS, Inc. January 2011. *Supplemental Site Investigation (SSI) at the Capital Deli facility.*

7. Doll, Charles G., ed., 1961, *Centennial Geologic Map of Vermont*, State of Vermont.

8. Doll, Charles G., ed., 1970, *Surficial Geologic Map of Vermont*, State of Vermont.

9. Environmental Protection Agency, October 1994, *How to Evaluate Alternative Cleanup Technologies for Underground Storage Tank Sites*, Chapter II, Soil Vapor Extraction.

10. Environmental Protection Agency, How to Evaluate Alternative Cleanup Technologies for Underground Storage Tank Sites: A Guide for Corrective Action Plan Reviewers. October 1994 and May 1995.

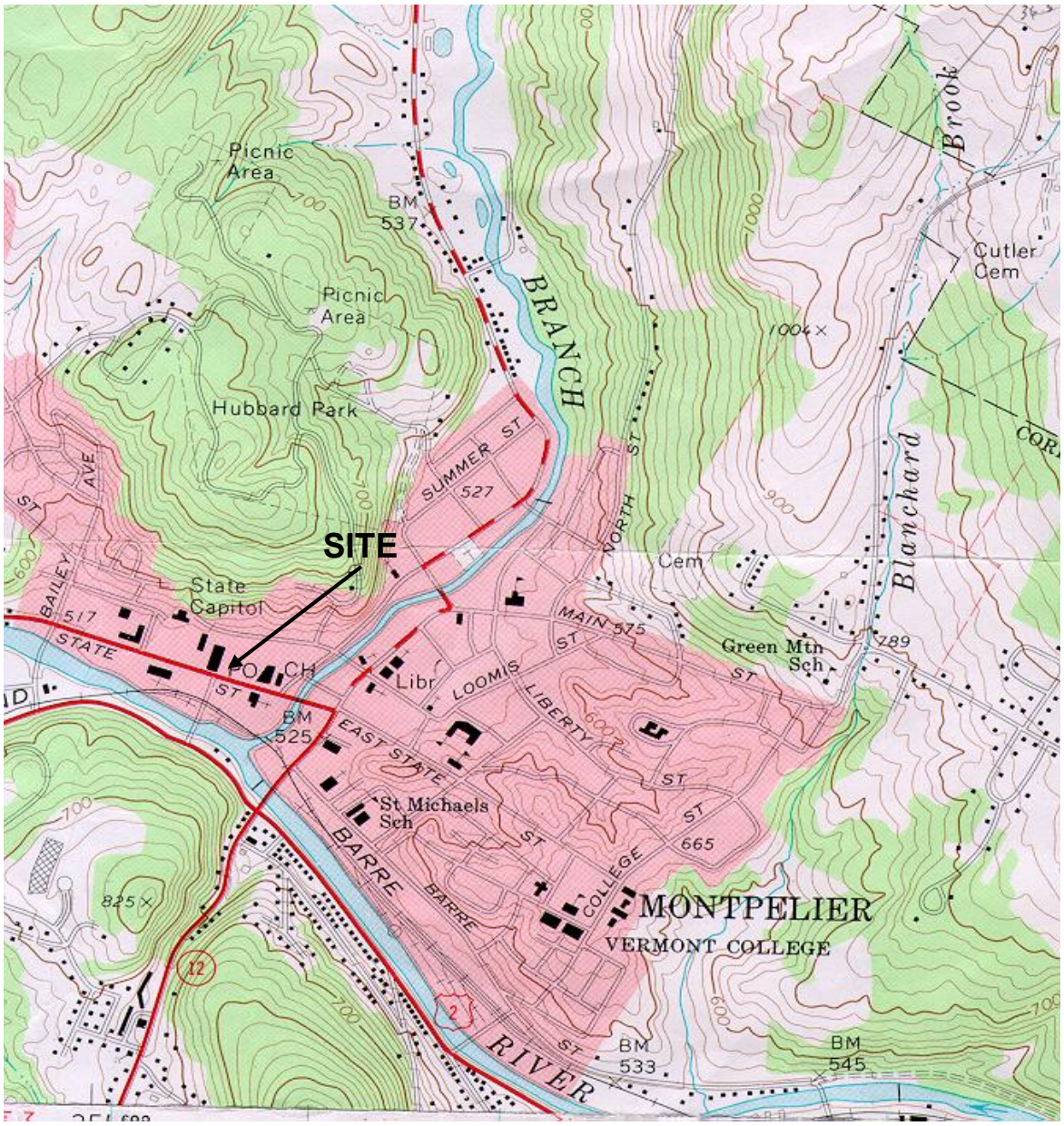
11. Environmental Protection Agency, October 1994, *How to Evaluate Alternative Cleanup Technologies for Underground Storage Tank Sites*, Chapter VII, Air Sparging.

12. Environmental Protection Agency, October 1994, *How to Evaluate Alternative Cleanup Technologies for Underground Storage Tank Sites*, Chapter XI, Dual-Phase Extraction.

13. Environmental Protection Agency, May 2004, *How to Evaluate Alternative Cleanup Technologies for Underground Storage Tank Sites*, Chapter XII, Enhanced Aerobic Bioremediation.

Appendix A

Site Location Map
Site Map
Groundwater Contour Map (12/15/11)
Contaminant Distribution Map (12/15/11)



KAS Job Number: *411040130* VTDEC #93-1277

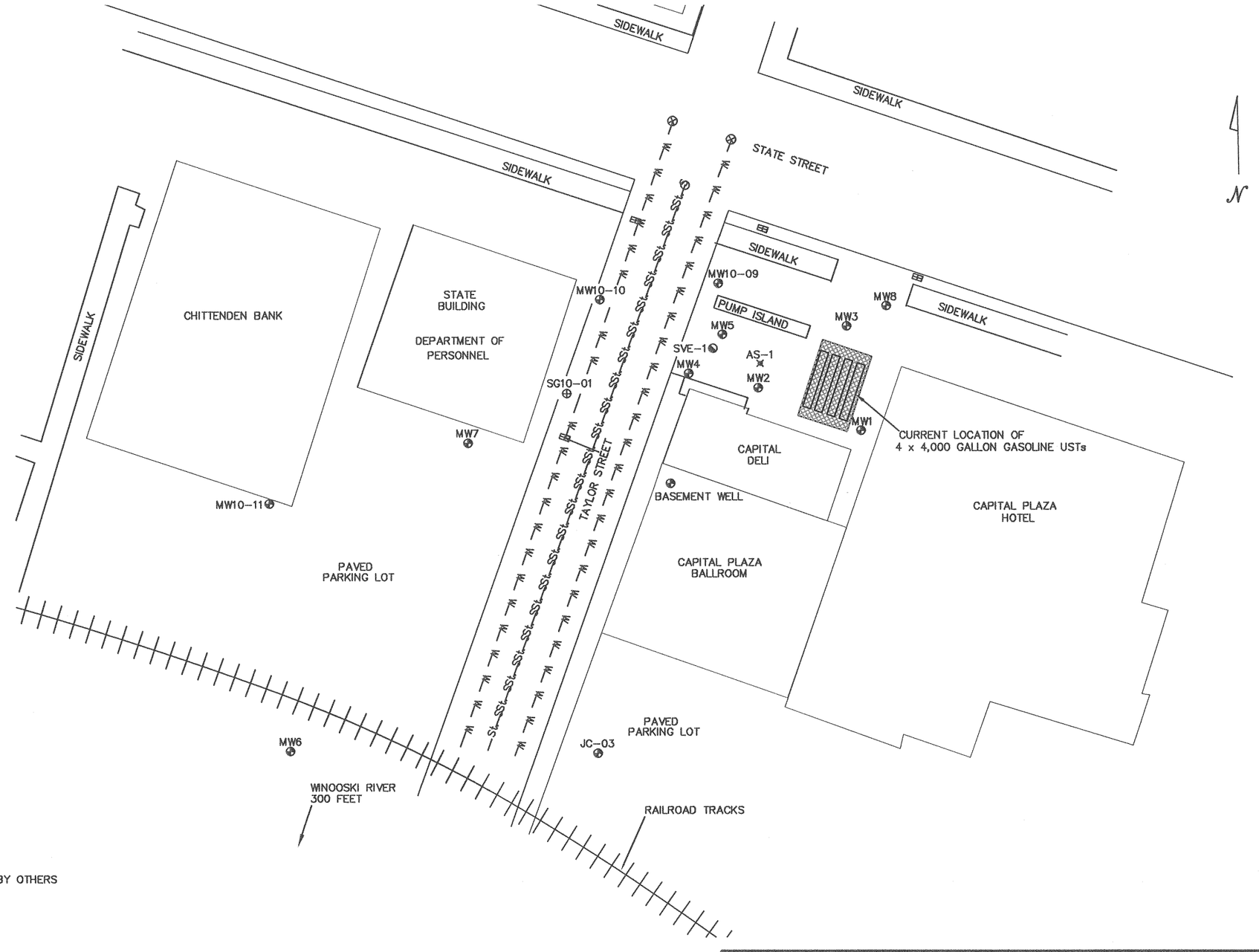
Source: *USGS 1968 Mapping Montpelier Quadrangle*

KAS INC

Capital Deli
Montpelier, Vermont

Site Location Map
USGS Mapping

Date: 07/12/10	Drawing No. 0	Scale: 1:24,000	By: JR



LEGEND

MW7	MONITORING WELL
JC-3	MONITORING WELL INSTALLED BY OTHERS
	LOCATION OF EXISTING UST's
	CATCH BASIN
St. S	STORM DRAIN SEWER LINE
W	WATER MAIN
SG10-01	SOIL GAS WELL
SVE-1	SOIL VAPOR EXTRACTION POINT
AS-1	AIR SPARGE POINT

SOURCE: GRIFFIN INTERNATIONAL "SITE MAP" 9/10/04.

KAS #: 411040130
VTDEC#: 93-1277

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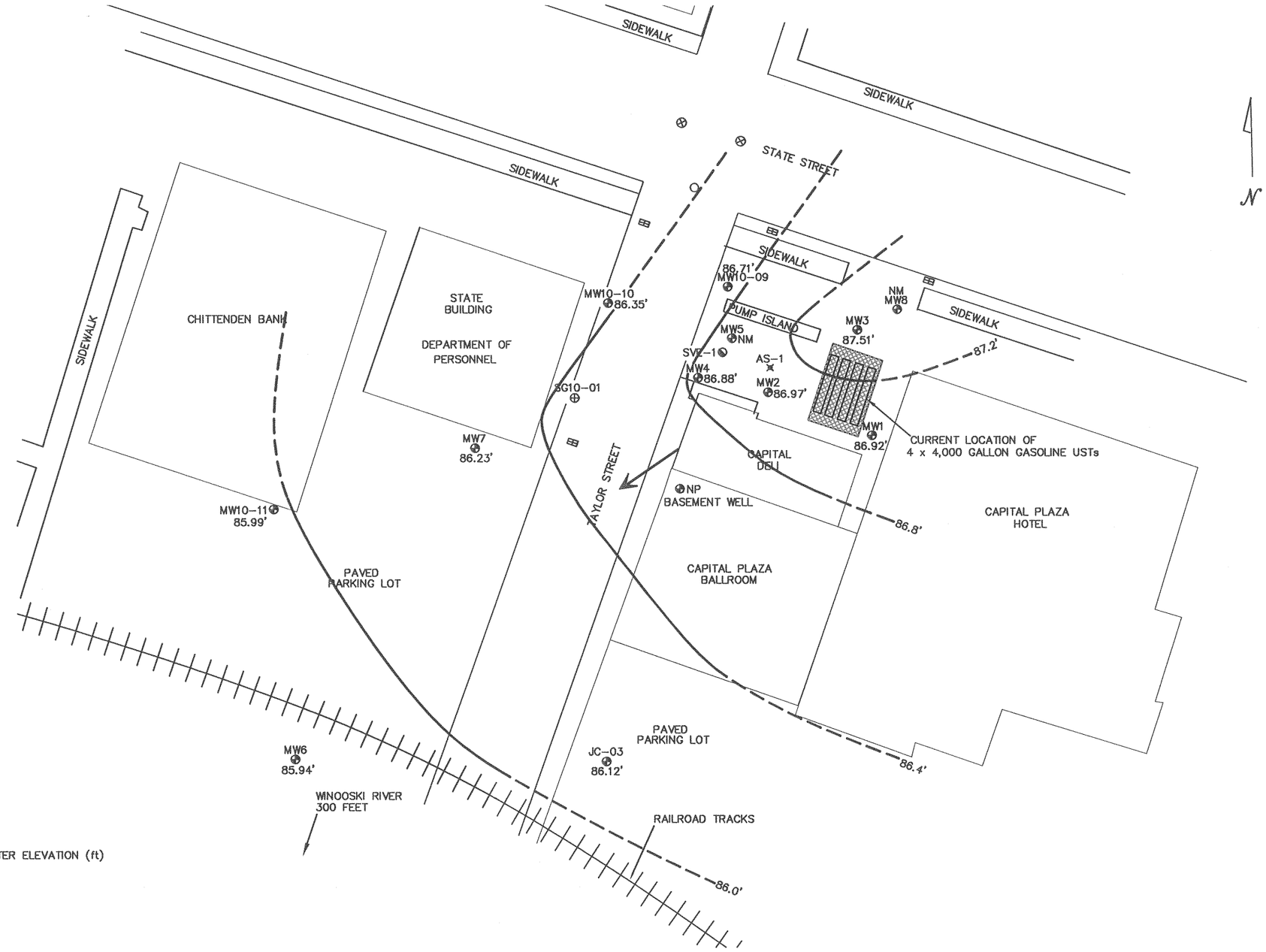
CAPITAL DELI

STATE ST.,MONTPELIER,VERMONT

SITE MAP

DATE: 1/4/12	DWG.#: 1	SCALE: 1"= 40'	DRN.: DM	APP.: SD



LEGEND

MW1 86.92'	MONITORING WELL WITH GROUNDWATER ELEVATION (ft)
	LOCATION OF EXISTING UST's
	CATCH BASIN
86.8'	GROUNDWATER ELEVATION CONTOUR (ft) (DASHED WHERE INFERRED)
	APPROXIMATE GROUNDWATER FLOW DIRECTION
SG10-01	SOIL GAS WELL
SVE-1	SOIL VAPOR EXTRACTION POINT
AS-1	AIR SPARGE POINT
NP	NOT PLOTTED

SOURCE: GRIFFIN INTERNATIONAL "SITE MAP" 9/10/04.

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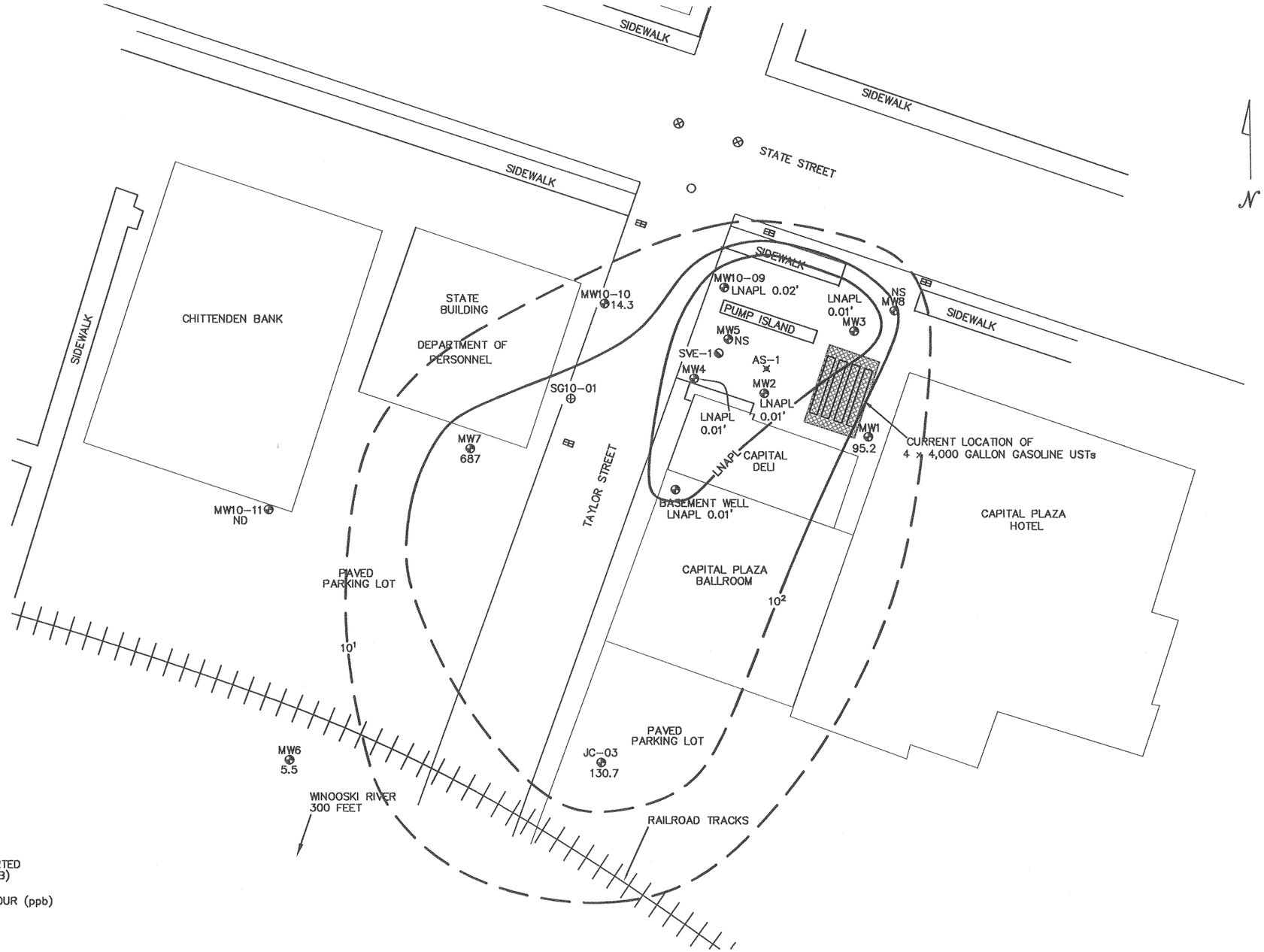
CAPITAL DELI

STATE ST.,MONTPELIER,VERMONT

GROUNDWATER CONTOUR MAP

MEASURED: 12/15/11

DATE: 1/4/12	DWG.#: 2	SCALE: 1"= 40'	DRN.: DM	APP.: SD



LEGEND

MW7 686	MONITORING WELL WITH TOTAL REPORTED VOC CONCENTRATION (ppb) (M=8021B)
10^1	CONTAMINANT CONCENTRATION CONTOUR (ppb) (DASHED WHERE INFERRED)
	LOCATION OF EXISTING UST's
	CATCH BASIN
ND	NONE DETECTED
NS	NOT SAMPLED
LNAPL (FT)	LIGHT NON AQUEOUS PHASE LIQUID
SG10-01	SOIL GAS WELL
SVE-1	SOIL VAPOR EXTRACTION POINT
AS-1	AIR SPARGE POINT

SOURCE: GRIFFIN INTERNATIONAL "SITE MAP" 9/10/04.

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CAPITAL DELI

STATE ST.,MONTPELIER,VERMONT

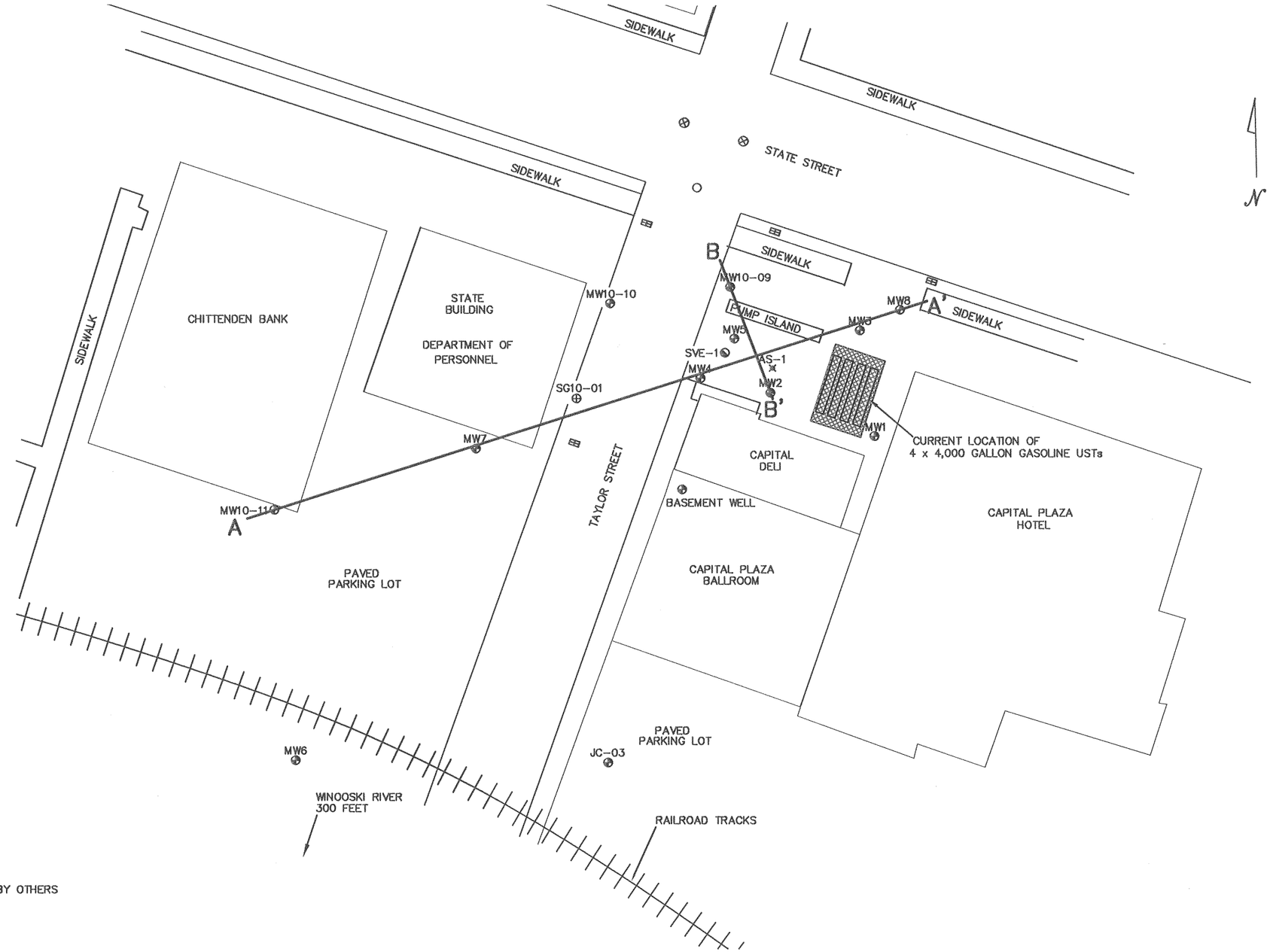
CONTAMINANT DISTRIBUTION MAP

SAMPLED: 12/15/11

DATE: 1/4/12	DWG.#: 3	SCALE: 1"= 40'	DRN.: DM	APP.: SD

Appendix B

Soil Cross Section Location Map
Soil Cross Section A-A'
Soil Cross Section B-B'
PID Contaminant Distribution Map
PID Contaminant Distribution – Cross Section A-A'
PID Contaminant Distribution – Cross Section B-B'



LEGEND

MW7	MONITORING WELL
JC-3	MONITORING WELL INSTALLED BY OTHERS
	LOCATION OF EXISTING UST's
	CATCH BASIN
St. S	STORM DRAIN SEWER LINE
W	WATER MAIN
SG10-01	SOIL GAS WELL
SVE-1	SOIL VENT EXTRACTION POINT
AS-1	AIR SPARGE POINT

SOURCE: GRIFFIN INTERNATIONAL "SITE MAP" 9/10/04.

KAS #: 411040130
VTDEC#: 93-1277

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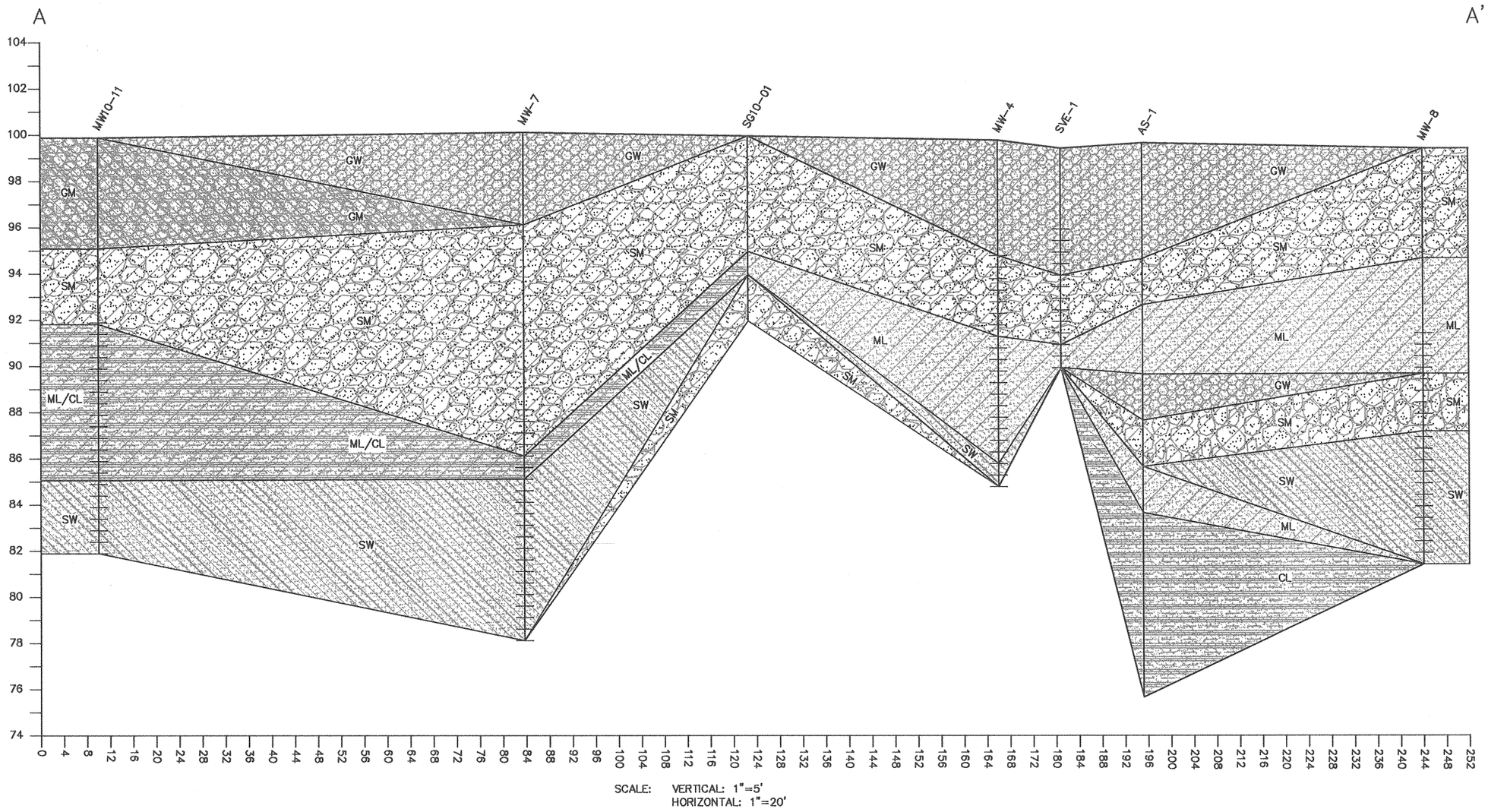
CAPITAL DELI

STATE ST.,MONTPELIER,VERMONT

CROSS SECTION LOCATION MAP

DATE: 2/22/12	DWG.#: CS1	SCALE: AS NOTED	DRN.: DM	APP.: SD



LEGEND

GM	SILTY GRAVEL WITH SAND
GW	WELL GRADED GRAVEL WITH SILT/SAND
ML	SILT WITH SAND
CL	LEAN CLAY WITH SAND
SM	WELL GRADED SAND WITH SILT/GRAVEL
SW	SILTY SAND
ML/CL	LEAN CLAY WITH SAND AND SILT
MW10-11	MONITORING WELL WITH WELL SCREEN

KAS #: 411040130
VTDEC#: 93-1277

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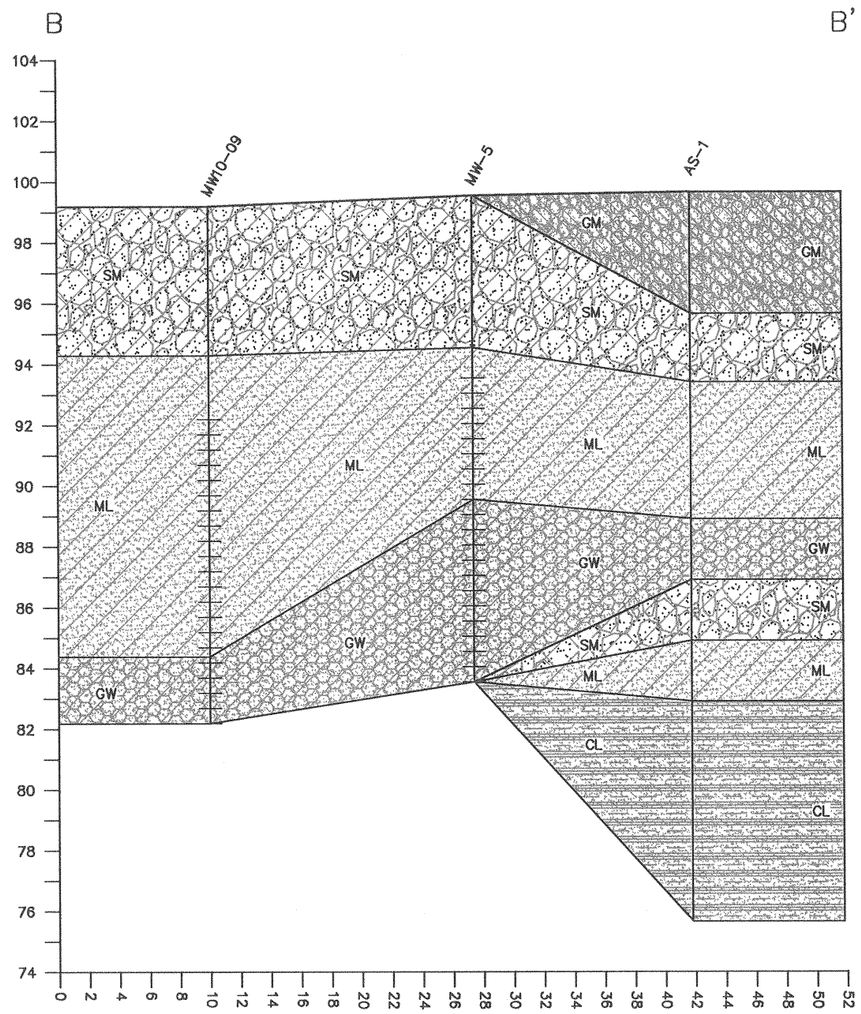
CAPITAL DELI

STATE ST.,MONTPELIER,VERMONT

CROSS SECTION A-A'

DATE: 2/22/12	DWG.#: CS2	SCALE: AS NOTED	DRN.: DM	APP.: SD



SCALE: VERTICAL: 1"=5'
HORIZONTAL: 1"=10'

LEGEND

GM	SILTY GRAVEL WITH SAND	CL	LEAN CLAY WITH SAND	ML/CL	LEAN CLAY WITH SAND AND SILT
GW	WELL GRADED GRAVEL WITH SILT/SAND	SM	WELL GRADED SAND WITH SILT/GRAVEL	MW10-11	MONITORING WELL WITH WELL SCREEN
ML	SILT WITH SAND	SW	SILTY SAND		

KAS #: 411040130
VTDEC#: 93-1277

KAS

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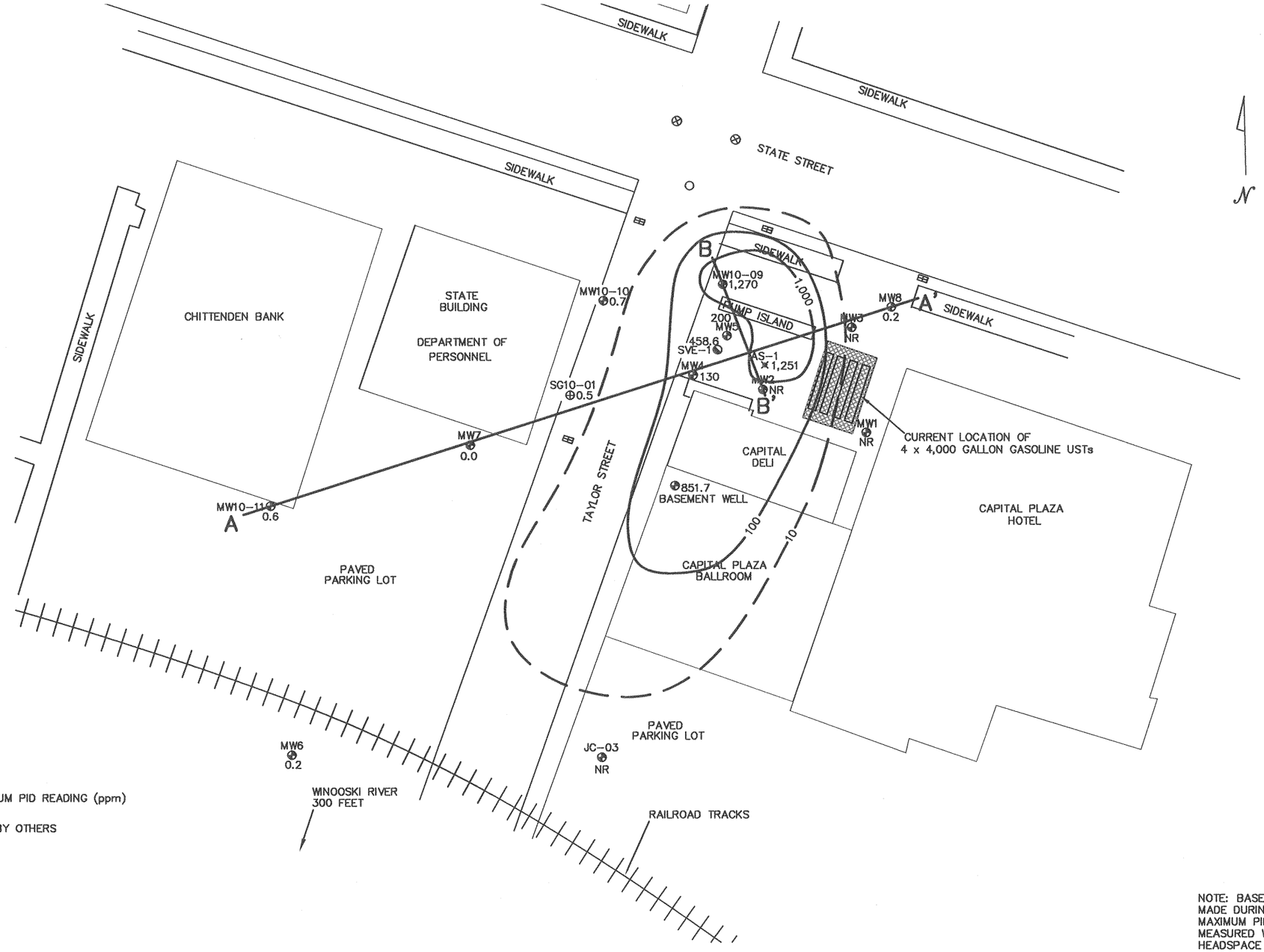
CAPITAL DELI

STATE ST.,MONTPELIER,VERMONT

CROSS SECTION B-B'

DATE: 2/22/12	DWG.#: CS3	SCALE: AS NOTED	DRN.: DM	APP.: SD



LEGEND

MW7 / MW7 ⊕	MONITORING WELL WITH MAXIMUM PID READING (ppm)
JC-3 ⊕	MONITORING WELL INSTALLED BY OTHERS
▩	LOCATION OF EXISTING UST's
⊞	CATCH BASIN
—St. S—	STORM DRAIN SEWER LINE
—W—	WATER MAIN
SG10-01 0.5⊕	SOIL GAS WELL WITH MAXIMUM PID READING (ppm)
SVE-1 458.6	SOIL VAPOR EXTRACTION POINT WITH MAXIMUM PID READING (ppm)
AS-1 1,251	AIR SPARGE POINT WITH MAXIMUM PID READING (ppm)
—100—	PID CONTAMINANT CONCENTRATION CONTOUR (ppm) (DASHED WHERE INFFERED)
NR	NOT RECORDED

NOTE: BASED ON FIELD OBSERVATIONS MADE DURING ACTIVITIES SPECIFICALLY MAXIMUM PID READINGS IN SOIL AS MEASURED WITH PID USING BAG HEADSPACE SCREENING PROCEDURES

SOURCE: GRIFFIN INTERNATIONAL "SITE MAP" 9/10/04.

KAS #: 411040130
VTDEC#: 93-1277

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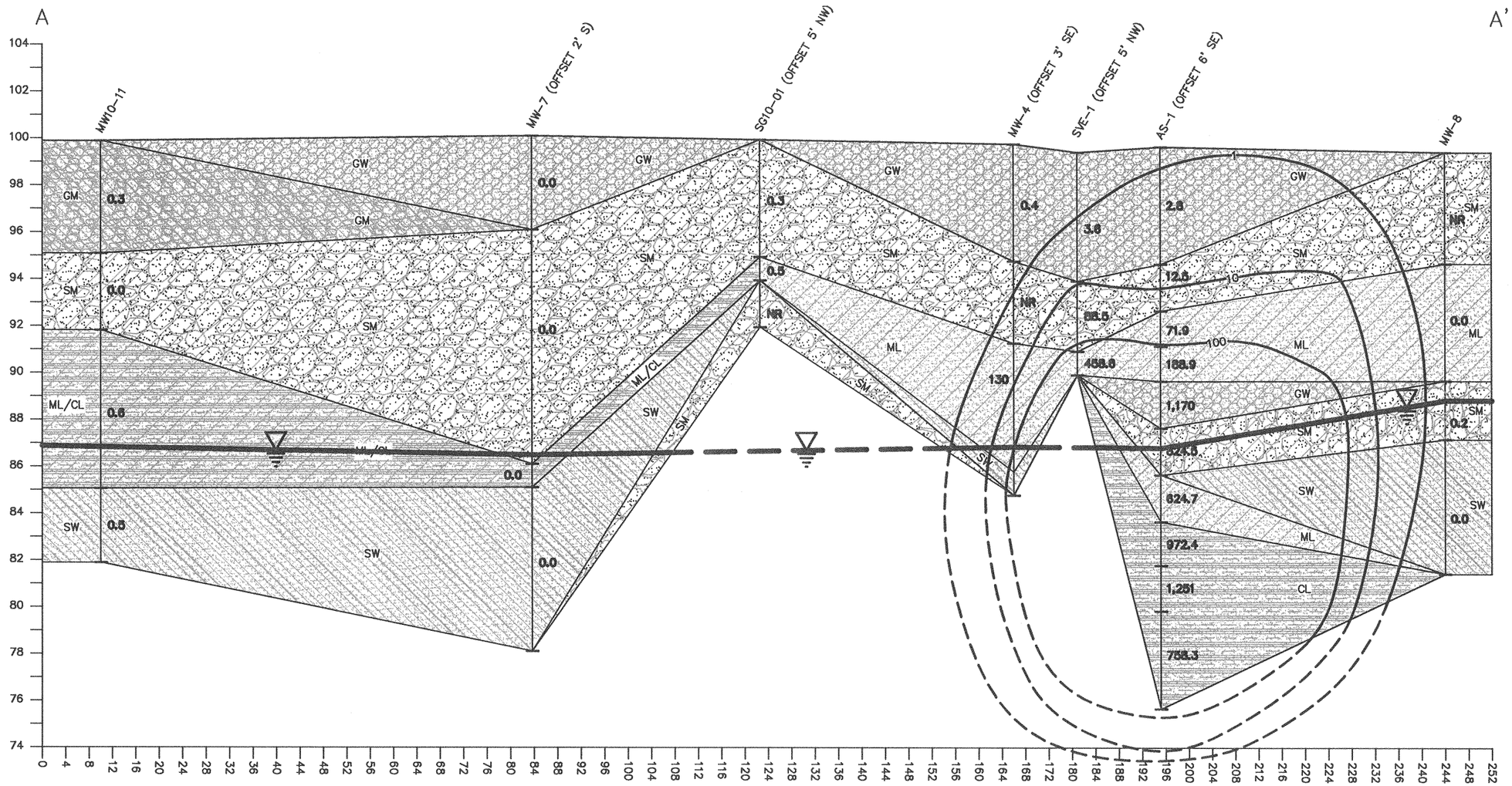
CAPITAL DELI

STATE ST.,MONTPELIER,VERMONT

PID CONTAMINANT DISTRIBUTION MAP

DATE: 2/22/12	DWG.#: CS1	SCALE: AS NOTED	DRN.: DM	APP.: SD



SCALE: VERTICAL: 1"=5'
HORIZONTAL: 1"=20'

LEGEND

GM	SILTY GRAVEL WITH SAND
GW	WELL GRADED GRAVEL WITH SILT/SAND
ML	SILT WITH SAND
	GROUNDWATER ELEVATION (DASHED WHERE INFFERRED)
CL	LEAN CLAY WITH SAND
SM	WELL GRADED SAND WITH SILT/GRAVEL
SW	SILTY SAND
—100—	VOC CONTAMINANT CONCENTRATION (ppb) (DASHED WHERE INFFERRED)
ML/CL	LEAN CLAY WITH SAND AND SILT
MW10-11 / 0.3	MONITORING WELL WITH VOC CONCENTRATION MEASURED WITH PID (ppm)
NR	NOT RECORDED

KAS #: 411040130
VTDEC#: 93-1277

KAS

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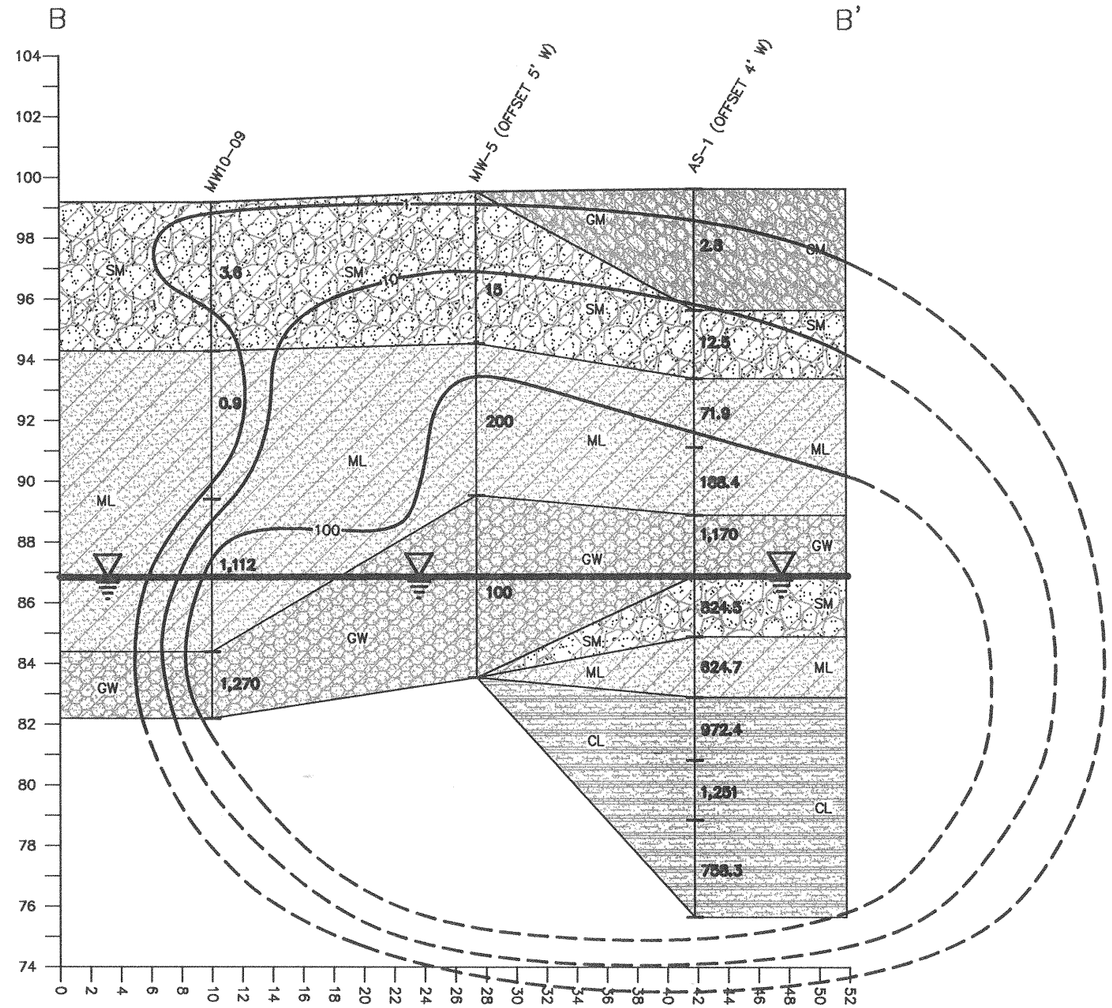
CAPITAL DELI

STATE ST.,MONTPELIER,VERMONT

PID CONTAMINANT DISTRIBUTION CROSS SECTION A-A'

DATE: 2/22/12	DWG.#: CS2	SCALE: AS NOTED	DRN.: DM	APP.: SD



SCALE: VERTICAL: 1"=5'
HORIZONTAL: 1"=10'

LEGEND

GM	SILTY GRAVEL WITH SAND
GW	WELL GRADED GRAVEL WITH SILT/SAND
ML	SILT WITH SAND
	GROUNDWATER ELEVATION (DASHED WHERE INFERRED)
CL	LEAN CLAY WITH SAND
SM	WELL GRADED SAND WITH SILT/GRAVEL
SW	SILTY SAND
—100—	VOC CONTAMINANT CONCENTRATION (ppb) (DASHED WHERE INFERRED)
ML/CL	LEAN CLAY WITH SAND AND SILT
MW10-11 / 0.3	MONITORING WELL WITH VOC CONCENTRATION MEASURED WITH PID (ppm)
NR	NOT RECORDED

KAS #: 411040130
VTDEC#: 93-1277

KAS

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CAPITAL DELI

STATE ST.,MONTPELIER,VERMONT

PID CONTAMINANT DISTRIBTUION CROSS SECTION B-B'

DATE: 2/22/12	DWG.#: CS3	SCALE: AS NOTED	DRN.: DM	APP.: SD

Appendix C

Historical Soil Boring Logs and Well Construction Diagrams

ROJECT CAPITAL MOBIL

OCATION MONTPELIER,VT

ATE DRILLED 4/13/93 TOTAL DEPTH OF HOLE 15'

IAMETER 6"

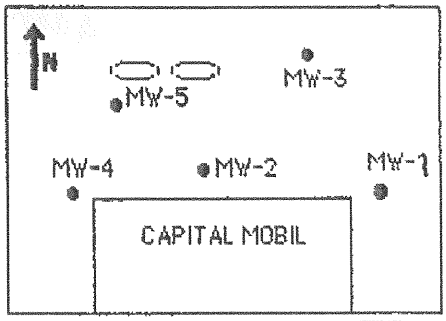
CREEN DIA. 2" LENGTH 10' SLOT SIZE .010"

ASING DIA. 2" LENGTH 5' TYPE PVC

RILLING CO. GRN MT BORING DRILLING METHOD HOLLOW STEM AUGER

RILLER MIKE, BOB LOG BY P HACK

WELL NUMBER MW-4



DEPTH IN FEET	WELL CONSTRUCTION	NOTES	BLOWS PER 6" of SPOON and PID readings	DESCRIPTION / SOIL CLASSIFICATION (COLOR, TEXTURE, STRUCTURES)
0		ROAD BOX		
		WELL CAP		
1		NATIVE FILL		LIGHT BROWN,DRY,SAND
2		BENTONITE		
3				
4		RISER	4'-6':10,6,3 PID=0.4PPM	BROWN,MOIST,FINE SAND AND SILT SOME STAINING
5				
6		GRAVEL PACK		
7				
8				
9			9'-11':2,2,2,5	
10		WELL SCREEN		WATER TABLE
11				GOLD-BROWN,MOIST, SILT, STAINS, ODORS
12				
13				
14			14'-16':7,5,10,5 PID=130PPM	BLACK,WET,COARSE SAND TO GRAVEL STRONG ODORS AND SHEENS
15				
16				BASE OF EXPLORATION @ 16'
17				
18				
19				
20				
21				
22				
23				
24				
25				
26				

PIDE ?

REF:PAINT50

PROJECT CAPITAL MOBIL

LOCATION MONTPELIER,VT

DATE DRILLED 4/13/93 TOTAL DEPTH OF HOLE 15'

DIAMETER 6"

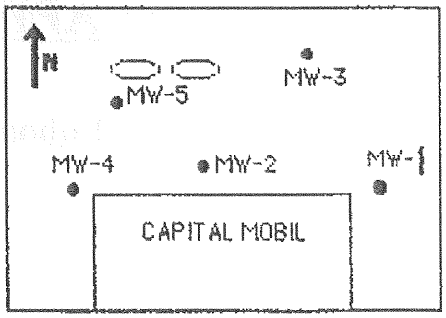
SCREEN DIA. 2" LENGTH 10' SLOT SIZE .010"

CASING DIA. 2" LENGTH 5' TYPE PVC

DRILLING CO. GRN MT BORING DRILLING METHOD HOLLOW STEM AUGER

DRILLER MIKE, BOB LOG BY **P HACK**

WELL NUMBER MW-5



DEPTH IN FEET	WELL CONSTRUCTION	NOTES	BLOWS PER 6" of SPOON and PID readings	DESCRIPTION / SOIL CLASSIFICATION (COLOR, TEXTURE, STRUCTURES)
0		ROAD BOX		ASPHALT
1		WELL CAP		
		NATIVE FILL		
2		BENTONITE		
3				
4		RISER	4'-6':11,8,7,9 PID=15PPM	DARK BROWN,DAMP,SAND AND GRAVEL SOME FILL DEBRIS,
5				
6		GRAVEL PACK		
7				
8				GRAY/GREEN,DAMP,SILT
9			9'-11':3,1,1,2 PID=200PPM	SOME BLACK STAINS,SOME ODORS
10		WELL SCREEN		WATER TABLE ▼
11				
12				
13				
14			14'-16':4,5,13,17 PID=100PPM	BLACK,WET,COARSE SAND AND GRAVEL, STRONG ODOR ,SHEENS BEDROCK @ 16'
15				
16				BOTTOM OF EXPLORATION @ 16'
17				
18				
19				
20				
21				
22				
23				
24				
25				
26				

REF :PAINT50

PROJECT Capital Mobil

LOCATION Montpelier, Vermont

DATE DRILLED 9/29/93 TOTAL DEPTH OF HOLE 16'

DIAMETER

SCREEN DIA. 2" LENGTH 10' SLOT SIZE 0.010"

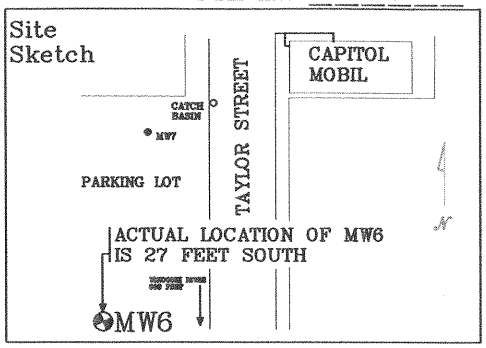
CASING DIA. 2" LENGTH 6' TYPE sch 40 pvc

DRILLING CO. GMB DRILLING METHOD HSA

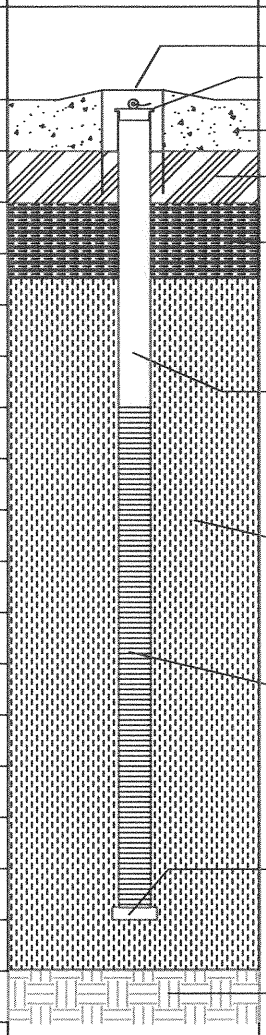
DRILLER STEVE LOG BY K. MCGRAW

WELL NUMBER MW6

Site Sketch



GRIFFIN INTERNATIONAL, INC

DEPTH IN FEET	WELL CONSTRUCTION	NOTES	BLOWS PER 6" OF SPOON & PID READINGS	DESCRIPTION/SOIL CLASSIFICATION (COLOR, TEXTURE, STRUCTURES)	DEPTH IN FEET
0		ROAD BOX LOCKING WELL CAP CONCRETE			0
1		NATIVE BACKFILL	1'–2' 0.2 ppm	Dark brown fine SAND, trace of silt, loose, no odor, damp	1
2					2
3		BENTONITE			3
4					4
5		WELL RISER		Light brown fine SAND and SILT, some thin gravel layers, shale/schist fragments quartz fragments, max. gravel size was 1" diameter, no odor	5
6			5'–7'– 15,8,8,7 0 ppm		6
7					7
8		SAND PACK			8
9					9
10					10
11		WELL SCREEN	10'–12'– 6,6,4,2 0 ppm	Olive brown fine SAND and SILT, little gravel, saturated at 11.5' , no odor	11
12					12
13					13
14				14.70' WATER TABLE	14
15		BOTTOM CAP			15
16			15'–17'– 7,5,8,13 0 ppm	Varying colors of fine to coarse SAND and GRAVEL, trace silt, wide range of particle sizes, wet , no odor	16
17		UNDISTURBED NATIVE SOIL		BASE OF WELL AT 16' END OF EXPLORATION AT 17'	17
18					18
19					19
20					20
21					21
22					22
23					23
24					24
25					25

PROJECT Capital Mobil

LOCATION Montpelier, Vermont

DATE DRILLED 9/29/93 TOTAL DEPTH OF HOLE 20'

DIAMETER

SCREEN DIA. 2" LENGTH 10' SLOT SIZE 0.010"

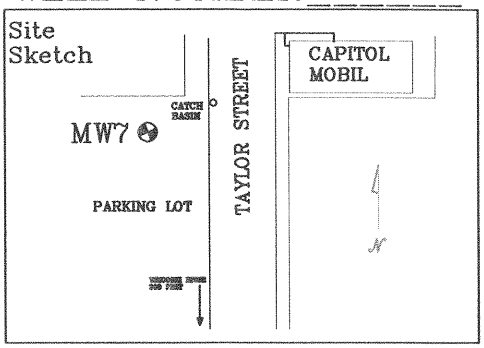
CASING DIA. 2" LENGTH 9' TYPE sch 40 pvc

DRILLING CO. GMB DRILLING METHOD HSA

DRILLER STEVE LOG BY K. MCGRAW

WELL NUMBER MW7

Site Sketch



GRIFFIN INTERNATIONAL, INC

DEPTH IN FEET	WELL CONSTRUCTION	NOTES	BLOWS PER 6" OF SPOON & PID READINGS	DESCRIPTION/SOIL CLASSIFICATION (COLOR, TEXTURE, STRUCTURES)	DEPTH IN FEET
0–1		ROAD BOX; LOCKING WELL CAP; CONCRETE			0–1
1–3		NATIVE BACKFILL	1'–3.5'	CONCRETE/ CONSTRUCTION DEBRIS	1–3
3–5					3–5
5–6		BENTONITE	5'–7'– 3,3,2,1 0 ppm	Brown fine SAND, some silt, concrete fragments, no odor	5–6
6–8		WELL RISER			6–8
8–10					8–10
10–12			10'–12'– 16,11,10,11 0 ppm	Brown medium to coarse SAND and GRAVEL, (max. size 1/2"), dry, no odor	10–12
12–14		WELL SCREEN			12–14
14–15				Brown silty fine SAND and GRAVEL max. size 1"	14–15
15–16		SAND PACK	13'–15' – 70,48,23,12 0 ppm	14.64' WATER TABLE	15–16
16–18		BOTTOM CAP	15'–17'– 33,10,10,13 0 ppm	Black silty fine to med. SAND, little gravel, damp, (1' recovery), several large pieces of gravel,some quartz moist, no odor	16–18
18–20				Brown and gray silty fine SAND, some gravel, moist, no odor	18–20
20–22			20'–22' – 28,25,20,21 0 ppm	Brown silty fine SAND, some gravel saturated, no odor	20–22
22–25		UNDISTURBED NATIVE SOIL		BASE OF WELL AT 19' END OF EXPLORATION AT 22'	22–25

PROJECT Capital Mobil

LOCATION Montpelier, Vermont

DATE DRILLED 9/29/93 TOTAL DEPTH OF HOLE 18'

DIAMETER

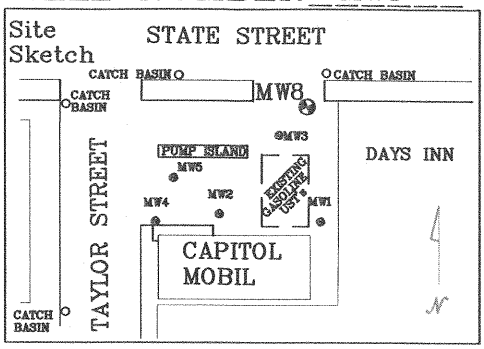
SCREEN DIA. 2" LENGTH 10' SLOT SIZE 0.010"

CASING DIA. 2" LENGTH 8' TYPE sch 40 pvc

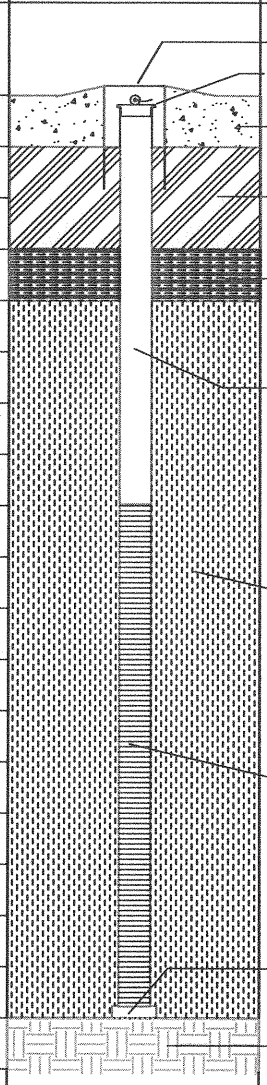
DRILLING CO. GMB DRILLING METHOD HSA

DRILLER STEVE LOG BY K. MCGRAW

WELL NUMBER MW8



GRIFFIN INTERNATIONAL, INC



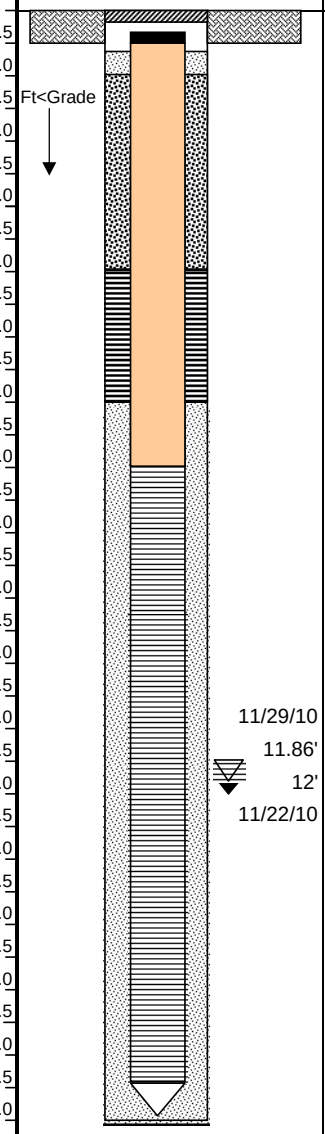
DEPTH IN FEET	WELL CONSTRUCTION	NOTES	BLOWS PER 6" OF SPOON & PID READINGS	DESCRIPTION/SOIL CLASSIFICATION (COLOR, TEXTURE, STRUCTURES)	DEPTH IN FEET
0				pavement	0
1			0'–1'	Light brown silty fine SAND, little gravel	1
2					2
3					3
4					4
5					5
6			5' – 6'–8"	Brown SILT, little fine sand, dry	6
7			6'–8" – 7', 9,7,7,7 0 ppm	Gray SILT trace of fine sand, dry no odor	7
8					8
9					9
10					10
11			10'–12' – 11,6,6,6 0.2 ppm	Dark brown fine to medium SAND, trace silt, dry, no odor	11
12					12
13				12.78' WATER TABLE	13
14					14
15					15
16			15'–17'– 13,14,14,11 0 ppm	Brown medium to coarse SAND and GRAVEL, saturated gravel max. size 1", no odor	16
17					17
18				BASE OF WELL AT 18' END OF EXPLORATION AT 18'	18
19					19
20					20
21					21
22					22
23					23
24					24
25					25

BORING LOG AND WELL CONSTRUCTION DIAGRAM

Well No: MW10-09

CAPITOL DELI
MONTPELIER, VT

KAS Project #:	411040130	Date Installed:	11/22/10
Drilled by :	T&K Drilling	Drilling Method:	HSA
Driller:	Sean McGarry and Kevin Singleton	Boring Diameter.:	8"
Supervised by:	TK	Development Method:	Disposable Bailer
Logged by:	TK	Screened Length:	10 feet



Grade = 0	Pen/Rec (") / Blow Count	Interval (') / PID (ppm)	Soil Characteristics	Letter Symbol
			Asphalt	
	N/A	1'-2'	SILTY SAND WITH GRAVEL (SM) --	SM
	N/A	3.6	moist, olive	
			sampled off auger flight (AF)	
	24"/2"	5'-7'	SILT WITH GRAVEL (ML/CL) --	ML/
	2-1-1-1	0.9	moist, olive	CL
	24"/16"	10'-12'	SILT (ML/CL) --	ML/
	1-1-2-3	1112	moist, olive, gasoline odor, black irregular stains	CL
	24"/7"	15'-17'	WELL-GRADED GRAVEL WITH SAND (GW) --	GW
	5-17-14-5	1270	wet, dark olive, gasoline odor, sheen on water	
	17'		End of Exploration	

Graphic Symbol

Legend

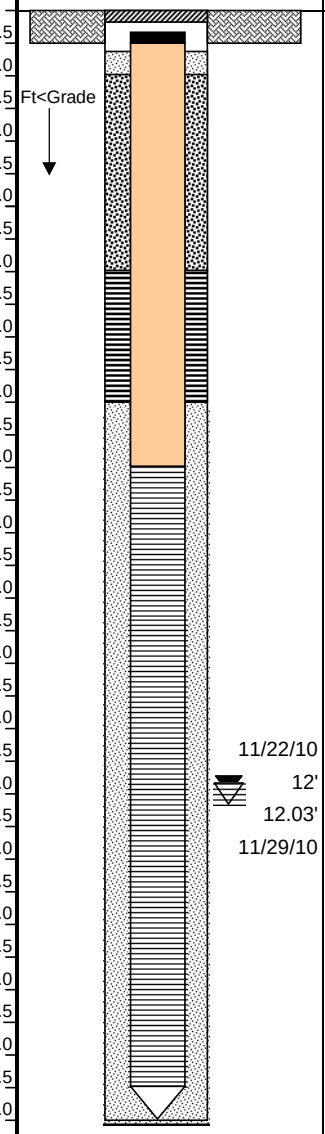
- Road Box with Bolt Down Cover, Set in Cement.
- Existing Surface.
- Bentonite Seal Placed in Annulus.
- Drill Cuttings Placed in Annulus.
- Grade #1 Silica Sand Pack Placed in Annulus.
- **LNAPL** light non-aqueous phase liquid
- NM - Not Measured N/A - Not Applicable
- Locking Plug.
- 4" ID, Schedule 40 PVC Riser.
- 4" ID, Schedule 40 PVC, 0.010"-Slotted Well Screen
- Plug Point
- Static Water Level
- Approximate Water Level During Drilling

BORING LOG AND WELL CONSTRUCTION DIAGRAM

Well No: MW10-10

CAPITOL DELI
MONTPELIER, VT

KAS Project #:	411040130	Date Installed:	11/22/10
Drilled by :	T&K Drilling	Drilling Method:	HSA
Driller:	Sean McGarry and Kevin Singleton	Boring Diameter.:	6"
Supervised by:	TK	Development Method:	Disposable Bailer
Logged by:	TK	Screened Length:	10 feet



Grade = 0	Pen/Rec (") / Blow Count	Interval (') / PID (ppm)	Soil Characteristics	Letter Symbol
			Asphalt	
0.5				
1.0				
1.5	N/A	1'-2'	SILTY SAND WITH GRAVEL (SM) --	SM
2.0	N/A	0.0	moist, olive	
2.5			sampled off auger flight (AF)	
3.0				
3.5				
4.0				
4.5	24"/18"	4'-6'	SANDY SILT (ML/CL) --	ML/
5.0	2-2-1-2	0.5	moist, light brown	CL
5.5				
6.0				
6.5				
7.0				
7.5				
8.0				
8.5				
9.0				
9.5	24"/18"	9'-11'	SANDY SILT (ML/CL) --	ML/
10.0	1-1-3-3	0.7	moist, light olive brown	CL
10.5				
11.0				
11.5				
12.0				
12.5				
13.0				
13.5				
14.0				
14.5	24"/24"	14'-16'	LEAN CLAY (CL) --	CL
15.0	NR	0.5	wet, gray	
15.5				
16.0				
16.5				
17.0	17'		End of Exploration	
17.5				
18.0				

Graphic Symbol

Legend

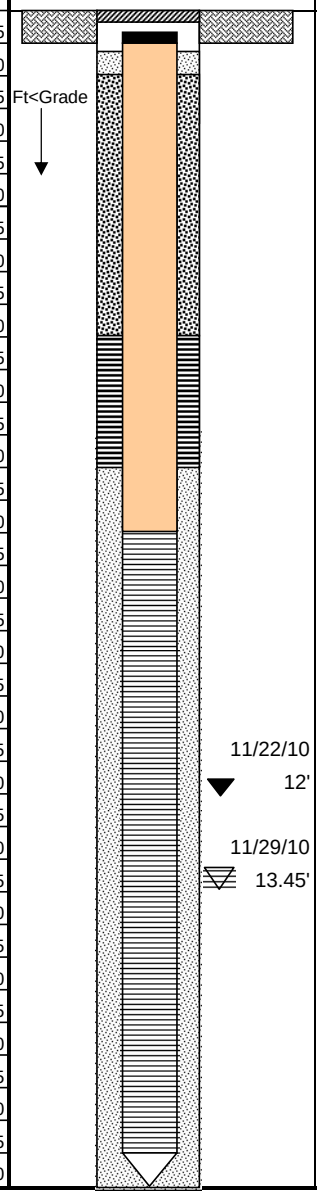
- Road Box with Bolt Down Cover, Set in Cement.
- Existing Surface.
- Bentonite Seal Placed in Annulus.
- Drill Cuttings Placed in Annulus.
- Grade #1 Silica Sand Pack Placed in Annulus.
- **LNAPL** light non-aqueous phase liquid
- NM - Not Measured N/A - Not Applicable
- Locking Plug.
- 2" ID, Schedule 40 PVC Riser.
- 2" ID, Schedule 40 PVC, 0.010"-Slotted Well Screen
- Plug Point
- Static Water Level
- Approximate Water Level During Drilling

BORING LOG AND WELL CONSTRUCTION DIAGRAM

Well No: MW10-11

CAPITOL DELI
MONTPELIER, VT

KAS Project #:	411040130	Date Installed:	11/22/10
Drilled by :	T&K Drilling	Drilling Method:	HSA
Driller:	Sean McGarry and Kevin Singleton	Boring Diameter.:	6"
Supervised by:	TK	Development Method:	Disposable Bailer
Logged by:	TK	Screened Length:	10 feet



Grade = 0	Pen/Rec (") / Blow Count	Interval (') / PID (ppm)	Soil Characteristics	Letter Symbol
			Asphalt	
1.5	N/A	1'-2'	SILTY GRAVEL WITH SAND (GM) --	GM
2.0	N/A	0.3	moist, olive	
2.5			sampled off auger flight (AF)	
5.5	24"/14"	5'-7'	SILTY SAND (SM) --	SM
6.0	7-4-4-3	0.0	moist, medium olive brown	
10.5	24"/17"	10'-12'	SILT WITH SAND (ML/CL) --	ML/
11.0	3-3-3-3	0.6	moist, light brown to olive, mottled	CL
15.5	24"/14"	15'-17'	WELL-GRADED SAND (SW) --	SW
16.0	2-2-1-2	0.5	wet, dark brown	
18.0	18'		End of Exploration	

Legend

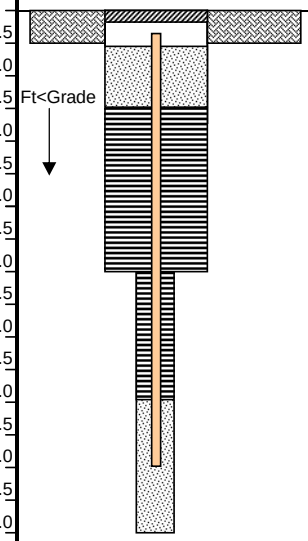
- Road Box with Bolt Down Cover, Set in Cement.
- Existing Surface.
- Bentonite Seal Placed in Annulus.
- Drill Cuttings Placed in Annulus.
- Grade #1 Silica Sand Pack Placed in Annulus.
- **LNAPL** light non-aqueous phase liquid
- NM - Not Measured N/A - Not Applicable
- Locking Plug.
- 2" ID, Schedule 40 PVC Riser.
- 2" ID, Schedule 40 PVC, 0.010"-Slotted Well Screen
- Plug Point
- Static Water Level
- Approximate Water Level During Drilling

BORING LOG AND WELL CONSTRUCTION DIAGRAM

Well No: SG10-01

CAPITOL DELI
MONTPELIER, VT

KAS Project #:	411040130	Date Installed:	11/22/10
Drilled by :	T&K Drilling	Drilling Method:	HSA
Driller:	Sean McGarry and Kevin Singleton	Boring Diameter.:	2" - 6"
Supervised by:	TK	Development Method:	N/A
Logged by:	TK	Screened Length:	N/A



Grade = 0	Pen/Rec (") / Blow Count	Interval (') / PID (ppm)	Soil Characteristics	Letter Symbol
			Asphalt	
1.5	N/A	1'-2'	SILTY SAND (SM) --	SM
2.0	N/A	0.3	moist, olive	
2.5			sampled off auger flight (AF)	
4.5	24"/16"	4'-6'	SANDY SILT (ML/CL) --	ML/
5.0	NR	0.5	moist, light brown	CL
6.5	24"/16"	6'-8'	SILTY SAND (SM) --	SM
7.0	NR	NR	wet, light brown,micaceous	
8.5	8'		End of Exploration	

Graphic Symbol

Legend

- Road Box with Bolt Down Cover, Set in Cement.
- Existing Surface.
- Bentonite Seal Placed in Annulus.
- Drill Cuttings Placed in Annulus.
- Grade #1 Silica Sand Pack Placed in Annulus.
- **LNAPL** light non-aqueous phase liquid
- NM - Not Measured N/A - Not Applicable
- 1/4" OD stainless steel tubing
- Static Water Level
- Approximate Water Level During Drilling

Appendix D

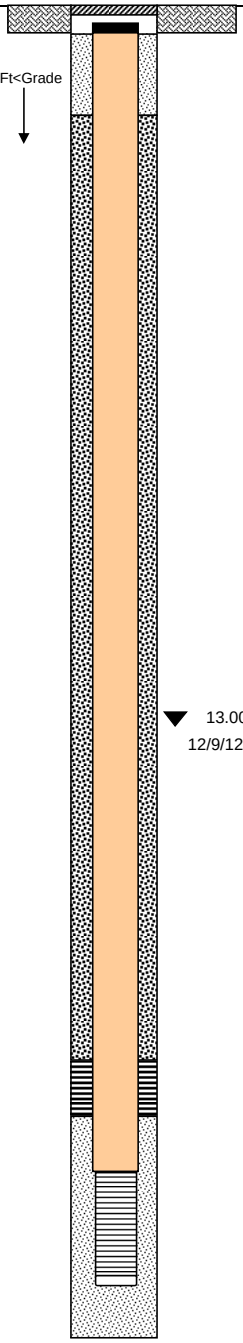
Soil Boring Logs and Well Construction Diagrams-2011 Drilling Event

BORING LOG AND WELL CONSTRUCTION DIAGRAM

Well No: AS-1

CAPITOL DELI
MONTPELIER, VT

KAS Project #:	411040130	Date Installed:	12/09/11
Drilled by :	T&K Drilling	Drilling Method:	HSA
Driller:	Sean McGarry and Kevin Singleton	Boring Diameter.:	8.25"
Supervised by:	SD	Development Method:	NA
Logged by:	SD	Screened Length:	NA



Pen/Rec (") / Blow Count	Interval (') / PID (ppm)	Soil Characteristics	Letter Symbol
		Asphalt	
N/A N/A	0'-2' 2.8	WELL GRADED GRAVEL WITH SILT AND SAND (GW) -- dry, olive	GW
24/12 2-1-1-1	5'-7' 12.5	WELL GRADED SAND WITH SILT AND GRAVEL (SM) dry, light brown, minor odor	SM
24/18 2-3-2-2	7'-9' 71.9	SILT WITH SAND (ML) dry, olive green, minor odor	ML
24/12 2-3-3-3	9'-11' 188.4	SILT WITH SAND (ML) dry to moist, olive green, strong odor	ML
24/12 4-3-2-2	11'-13' 1,170	WELL GRADED GRAVEL (GW) -- moist to wet, dark gray, strong odor, sheen	GW
24/12 10-9-6-6	13'-15' 824.5	SILTY SAND WITH GRAVEL (SM) wet, dark gray, strong odor, sheen	SM
NR NR	15'-17' 624.7	SILT WITH SAND (ML) wet, olive, petroleum odor sampled off auger flight (AF)	ML/ CL
NR NR	17'-19' 972.4	SANDY LEAN CLAY (CL) wet, gray, petroleum odor sampled off auger flight (AF)	CL
NR NR	19'-21' 1,251	SANDY LEAN CLAY (CL) wet, gray, petroleum odor sampled off auger flight (AF)	CL
NR	21'-23' 758.3	LEAN CLAY (CL) wet, gray, petroleum odor sampled off auger flight (AF)	CL
	24'	End of exploration	

Legend

- Road Box with Bolt Down Cover, Set in Cement.
- Existing Surface.
- Bentonite Seal Placed in Annulus.
- Grout Seal
- Grade #1 Silica Sand Pack Placed in Annulus.
- Locking Plug.
- 2" ID, Schedule 40 PVC Riser.
- 1.5" ID, 60 Micron, Porous Piezometer

NM - Not Measured N/A - Not Applicable

Approximate Water Level During Drilling

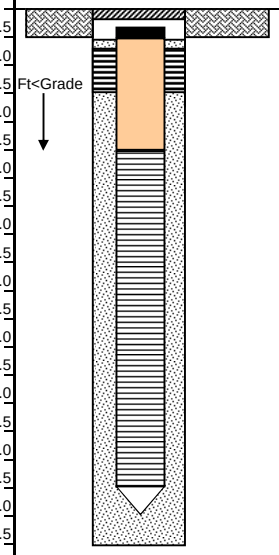
BORING LOG AND WELL CONSTRUCTION DIAGRAM

Well No: SVE-1

CAPITOL DELI
MONTPELIER, VT

KAS Project #:	411040130	Date Installed:	12/09/11
Drilled by :	T&K Drilling	Drilling Method:	HSA
Driller:	Sean McGarry and Kevin Singleton	Boring Diameter.:	8.25"
Supervised by:	SD	Development Method:	Disposable Bailer
Logged by:	SD	Screened Length:	6 feet

Grade = 0



Depth (ft)	Pen/Rec (") / Blow Count	Interval (') / PID (ppm)	Soil Characteristics (Asphalt)	Letter Symbol
0.5–4.5	N/A N/A	0'-2' 3.6	WELL GRADED GRAVEL WITH SILT AND SAND (GW) dry, light brown sampled off auger flight (AF)	GW
5.0–6.0	N/A N/A	5' - 6' 88.5	WELL-GRADED SAND WITH SILT AND GRAVEL (SM) dry, olive, odor sampled off auger flight (AF)	SM
8.0–9.5	N/A N/A	8' - 9.5' 458.6	SILT WITH SAND (ML) -- dry to moist, olive sampled off auger flight (AF)	ML
10.0	9.5'		End of Exploration	

Graphic Symbol

Legend

- Road Box with Bolt Down Cover, Set in Cement.
- Existing Surface.
- Bentonite Seal Placed in Annulus.
- Drill Cuttings Placed in Annulus.
- Grade #1 Silica Sand Pack Placed in Annulus.
- Locking Plug.
- 4" ID, Schedule 40 PVC Riser.
- 4" ID, Schedule 40 PVC, 0.010"-Slotted Well Screen
- Plug Point

NM - Not Measured N/A - Not Applicable

BORING LOG AND WELL CONSTRUCTION DIAGRAM

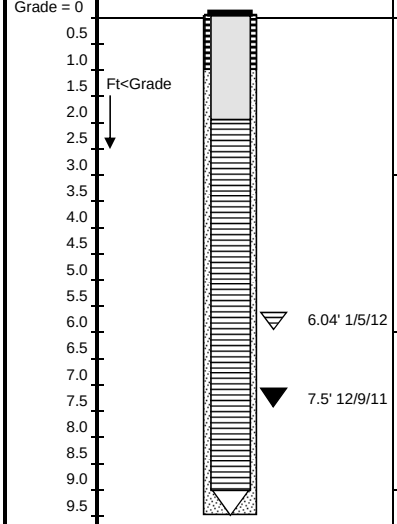
Well No: Basement Well

CAPITAL DELI

MONTPELIER, VT

KAS Project #:	411040130	Date Installed:	12/9/2011
Drilled by :	T & K Drilling	Drilling Method:	Portable Pneumatic Geo-probe
Driller:	SeanMcGarry/KevinSingleton	Boring Diameter.:	1"
Supervised by:	Sam Driver	Development Method:	Disposable Bailer
Logged by:	Sam Driver	Screened Length:	13 feet

Well Construction



Pen/Rec(') BlowCounts	Interval (') PID (ppm)	Soil Characteristics	Letter Symbol	Graphic Symbol
48/32 NA	0'-3' 680.4	SAND (SW) dry, greenish gray, strong petroluem odor	SW	
48/40 NA	3'-6' 382.4	SILTY SAND (SW) dry to moist, greenish gray, strong petroluem odor	SW	
48/42 NA	6'-9' 851.7	SILTY SAND (SW) wet, dark gray, strong petroleum odor, visible sheen	SW	
	9.5'	End of Exploration		

Legend

- Road Box with Bolt Down Cover, Set in Cement.
- Existing Surface.
- Bentonite Seal Placed in Annulus.
- Grade #1 Silica Sand Pack Placed in Annulus.
- Drill Cuttings Placed in Annulus.
- NR No Recovery
- Locking Plug.
- 1" ID, Schedule 40 PVC Riser.
- 1" ID, Schedule 40 PVC, 0.010"-Slotted Well Screen
- Plug Point
- Approximate Water Level During Drilling, below grade
- Static Water Level, below top of casing

Appendix E

Liquid Level Data

GROUNDWATER ELEVATION DATA

Monitoring Date:
12/15/2011

Well I.D.	Well Depth	Top of Casing Elevation	Depth to Product	Depth to Water	Product Thickness	Specific Gravity of Product	Hydraulic Equivalent	Corrected Depth to Water	Corrected Water Table Elevation
MW-1	**17.00**	**99.90**		**12.98**	**-**	**-**	**-**	**12.98**	**86.92**
MW-2	**14.05**	**100.00**	**13.03**	**13.04**	**0.01**	**0.88**	**0.01**	**13.03**	**86.97**
MW-3	**17.00**	**99.55**	**12.04**	**12.05**	**0.01**	**0.88**	**0.01**	**12.04**	**87.51**
MW-4	**15.00**	**99.78**	**12.90**	**12.91**	**0.01**	**0.88**	**0.01**	**12.90**	**86.88**
MW-5	**15.00**	**99.55**	**-**	**NM**	**-**	**-**	**-**	**-**	**NM**
MW-6	**16.00**	**100.15**	**-**	**14.21**	**-**	**-**	**-**	**14.21**	**85.94**
MW-7	**19.00**	**100.12**	**-**	**13.89**	**-**	**-**	**-**	**13.89**	**86.23**
MW-8	**18.00**	**99.43**	**-**	**NM**	**-**	**-**	**-**	**-**	**NM**
MW10-09	**17.00**	**99.19**	**12.48**	**12.50**	**0.02**	**0.88**	**0.02**	**12.48**	**86.71**
MW10-10	**17.00**	**98.83**	**-**	**12.48**	**-**	**-**	**-**	**12.48**	**86.35**
MW10-11	**18.00**	**99.89**	**-**	**13.90**	**-**	**-**	**-**	**13.90**	**85.99**
JC-03	**17.45**	**101.17**	**-**	**15.05**	**-**	**-**	**-**	**15.05**	**86.12**
Basement Well	**9.00**	**-**	**6.29**	**6.30**	**0.01**	**0.88**	**0.01**	-	-

All Values Reported in Feet
Elevations determined relative to top of casing of MW-2, which was arbitrarily set at 100'
Site surveyed on September 10, 2004
NM = Not Measured

Historic Groundwater Elevation Data

Well No.	1/5/95	1/13/95	1/31/95	4/11/95	6/27/95	7/31/95	11/8/95	3/27/96	11/6/96	4/17/97	10/27/97	4/20/98
MW-1		86.31		87.35		86.04	87.57	87.51	86.63	88.50	86.13	88.47
MW-2	86.32	86.23	87.22	87.29	86.12	86.00	87.50	87.41	86.56	88.41	86.13	88.41
MW-3	86.28	86.24	87.30	87.35	86.09	86.00	87.52		86.55	88.46	86.09	88.85
MW-4		86.11	87.16	87.17	85.98	85.90	87.41	87.34	86.44	88.32	85.98	88.30
MW-5		86.26		87.28		85.99	87.50	87.40	86.58	88.43	86.07	88.42
MW-6		85.58		85.88		84.89	86.40	86.72	85.55	87.24	84.88	86.72
MW-7		85.92		86.78		85.51	87.11	87.06	86.17	87.94	85.59	87.80
MW-8		86.30		87.35		86.04	87.57	87.48	86.62	88.44	86.11	88.47
Average	86.30	86.22	87.23	87.29	86.06	85.98	87.50	87.42	86.54	88.42	86.08	88.51

	10/9/98	4/21/99	10/15/99	5/18/00	10/12/00	3/15/01	9/5/01	11/6/01	1/7/02	3/15/02	9/4/02	10/21/02
MW-1	86.83	88.36	86.52	89.11	86.12	86.66	85.13	85.55	85.52	86.46	85.54	85.73
MW-2	86.73	88.23	86.44	89.05	86.03	86.59	86.10			86.64	86.15	85.98
MW-3	86.71	88.39	86.36	89.11	85.99	86.48	85.18	85.52	85.48		85.51	85.74
MW-4	86.66	88.15	86.32	89.99	86.00	86.56	85.54	dry	85.66	86.36	85.63	85.78
MW-5	86.73	88.26	86.44		86.07	86.57	85.59	dry	dry	frozen	85.66	NM
MW-6	85.54	86.67	85.50	87.30	85.04	85.56	dry			86.76	84.68	NM
MW-7	86.31	87.76	86.06	88.58	85.68	86.27	84.93			86.42	85.28	NM
MW-8	86.78	88.26	86.43	89.08	86.07	86.53	85.20			86.50	85.60	NM
Average	86.73	88.28	86.41	89.32	86.04	86.57	85.49	85.54	85.55	86.49	85.71	**85.81**

	11/19/02	12/11/02	12/30/02	2/6/03	3/6/03	6/17/03	7/18/03	9/19/03	10/21/03	11/20/03	12/22/03	1/22/04
MW-1	86.20	86.48	NM	86.25	86.16	87.11	86.02	85.69	86.17	87.62	88.63	88.42
MW-2	86.41	86.74	86.53	86.19	86.15	87.31	86.30	86.15	86.35	87.82	88.86	88.60
MW-3	86.30	86.36	85.86	86.10	86.01	87.09	85.99	85.73	86.10	86.80	88.16	87.96
MW-4	86.12	86.48	86.34	NM	86.21	87.05	86.03	85.75	86.04	87.58	88.64	NM
MW-5	NM	NM	NM	NM	NM	NM	NM	NM	NM	87.60	88.75	88.44
MW-6	NM	NM	NM	NM	85.45	NM	NM	84.78	NM	NM	NM	NM
MW-7	NM	NM	NM	NM	86.06	NM	NM	85.44	NM	NM	NM	NM
MW-8	NM	NM	NM	NM	86.45	NM	NM	85.74	NM	NM	NM	NM
Average	**86.26**	**86.52**	**86.24**	**86.18**	**86.07**	**87.14**	**86.09**	**85.61**	**86.17**	**87.48**	**88.61**	**88.36**

	2/18/04	3/18/04	4/13/04	6/22/04	8/20/04	9/10/04	11/15/04	1/24/05	3/16/05	6/9/05	9/14/05	12/15/05
MW-1	87.27	87.27	NM	86.92	86.43	86.81	85.88	87.37	86.79	87.38	86.38	NM
MW-2	87.47	87.50	88.42	87.17	86.67	86.78	86.31	87.66	87.19	87.36	86.40	87.70
MW-3	87.09	87.05	87.52	86.66	86.87	86.78	86.04	87.42	86.88	87.40	86.36	87.93
MW-4	NM	87.29	NM	86.89	86.37	86.67	85.91	NM		87.25	86.33	85.59
MW-5	NM	87.30	88.23	86.96	86.50	86.75	NM	NM	87.07	NM	86.37	NM
MW-6	NM	85.84	NM	NM	NM	86.28	NM	NM	86.06	NM	85.25	NM
MW-7	NM	87.00	NM	NM	NM	86.12	NM	NM	86.78	NM	85.65	NM
MW-8	NM	87.25	NM	NM	NM	86.84	NM	NM	86.77	NM	86.40	NM
Average	**87.28**	**87.06**	**88.06**	**86.92**	**86.57**	**86.63**	**86.04**	**87.48**	**86.79**	**87.35**	**86.14**	**87.07**

	2/20/06	4/12/06	6/11/06	8/15/06	10/9/06	12/6/06	2/8/07	4/11/07	7/30/07	10/15/07	4/9/08	10/14/08
MW-1	87.87	87.12	88.85	87.29	86.77	88.37	89.11	89.01	87.81	86.32	89.41	86.41
MW-2	88.23	88.10	88.84	87.30	86.74	88.30	89.15	88.95	87.79	86.22	89.45	86.49
MW-3	88.05	88.15	88.92	87.28	86.68	87.64	89.11	88.93	87.80	86.23	89.48	86.34
MW-4	87.84	88.03	88.74	87.20	86.62	88.23	89.10	88.74	87.69	86.15	89.31	86.37
MW-5	NM	88.13	NM	NM	86.74	NM	NM	88.95	NM	86.25	89.46	86.98
MW-6	NM	NM	NM	NM	NM	NM	NM	87.19	NM	85.42	89.07	85.29
MW-7	NM	87.38	NM	NM	86.06	NM	NM	88.27	NM	85.64	88.85	85.70
MW-8	NM	88.16	NM	NM	86.77	NM	NM	88.95	NM	86.24	89.41	86.42
Average	**88.00**	**87.87**	**88.84**	**87.27**	**86.63**	**88.14**	**89.12**	**88.62**	**87.77**	**86.06**	**89.31**	**86.25**

	4/29/09	10/7/09	4/22/10	7/14/10	11/29/10	6/15/11	12/15/11					
MW-1	88.39	86.45	88.46		87.32	89.19	86.92					
MW-2	88.37	86.51	89.54	86.74	87.31	89.14	86.97					
MW-3	88.60	86.38	88.74	86.68	87.26	89.44	87.51					
MW-4	88.24	86.18	88.41	86.60	87.22	89.11	86.88					
MW-5	88.42	86.44	88.65	86.68	87.32	89.13	NM					
MW-6	85.84	85.56	87.18		86.19	NM	85.94					
MW-7	87.60	85.86	87.75		86.68	88.55	86.23					
MW-8	88.38	86.40	88.49		87.29	89.21	NM					
MW10-09					87.33	89.18	86.71					
MW10-10					86.80	88.88	86.35					
MW10-11					86.44	88.28	85.99					
JC-03					86.37	87.81	86.12					
Average	**87.98**	**86.22**	**88.40**	**86.68**	**86.96**	**88.90**	**86.56**					

NOTE: All values reported in feet.
NM - Not Measured

Appendix F

Groundwater Quality Summary

GROUNDWATER QUALITY DATA SUMMARY

Monitoring Well 1

Sample Date	4/20/93	10/8/93	4/19/94	7/27/94	10/24/94	1/13/95	4/11/95	7/31/95	11/8/95	3/27/96	11/6/96	
EPA Analysis Method	602	602	602	602	602	602	602	602	602	602	602	VGES
PARAMETER												(ppb)
Benzene	ND	ND	ND	ND	**56.6**	**16.5**	**1.4**	**3.9**	**2.2**	**TBQ**	**10.4**	5.
Toluene	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	**TBQ<5**	1,000.
Ethylbenzene	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND<5	700.
Xylenes	ND	ND	ND	ND	**1.7**	ND	ND	ND	ND	ND	ND<5	10,000.
Total BTEX	ND	ND	ND	ND	**58.3**	**16.5**	**1.4**	**3.9**	**2.2**	**TBQ**	**10.4**	-
MTBE	ND	ND	ND	ND	**44.5**	**45.6**	ND	**169.**	**30.2**	**96.4**	**333.**	40.
BTEX+MTBE	ND	ND	ND	ND	**102.8**	**62.1**	**1.4**	**172.9**	**32.4**	**96.4**	**343.4**	-
Groundwater Elevation (ft.)						86.31	87.35	86.04	87.57	87.51	86.63	-

Sample Date	4/17/97	10/27/97	4/20/98	10/9/98	4/21/99	10/15/99	5/18/00	10/12/00	3/15/01	9/5/01	3/11/02	
EPA Analysis Method	602	602	-	-	-	-	-	-	-	-	-	VGES
PARAMETER												(ppb)
Benzene	**2.4**	**8.5**										5.
Toluene	ND<1	**22.9**	No	No	No	No	No	No	No	No	No	1,000.
Ethylbenzene	**1.5**	**30.9**	Sample	Sample	Sample	Sample	Sample	Sample	Sample	Sample	Sample	700.
Xylenes	**1.5**	**198.**	Collected	Collected	Collected	Collected	Collected	Collected	Collected	Collected	Collected	10,000.
Total BTEX	**5.4**	**260.**										-
MTBE	**61.7**	**189.**	0.91'	1.55'	1.37'	0.15'	0.01'	0.33'	0.11'	0.18'	0.05'	40.
1,3,5-Trimethylbenzene	NA	NA	NAPL	NAPL	NAPL	NAPL	NAPL	NAPL	NAPL	NAPL	NAPL	4.
1,2,4-Trimethylbenzene	NA	NA	Observed	Observed	Observed	Observed	Observed	Observed	Observed	Observed	Observed	5.
Naphthalene	NA	NA	in Well	in Well	in Well	in Well	in Well	in Well	in Well	in Well	in Well	20.
Total Targeted VOCs	**67.**	**449.**										-
Groundwater Elevation (ft.)	88.50	86.13	88.47	86.83	88.36	86.52	89.11	86.12	86.66	85.13	86.46	-

GROUNDWATER QUALITY DATA SUMMARY

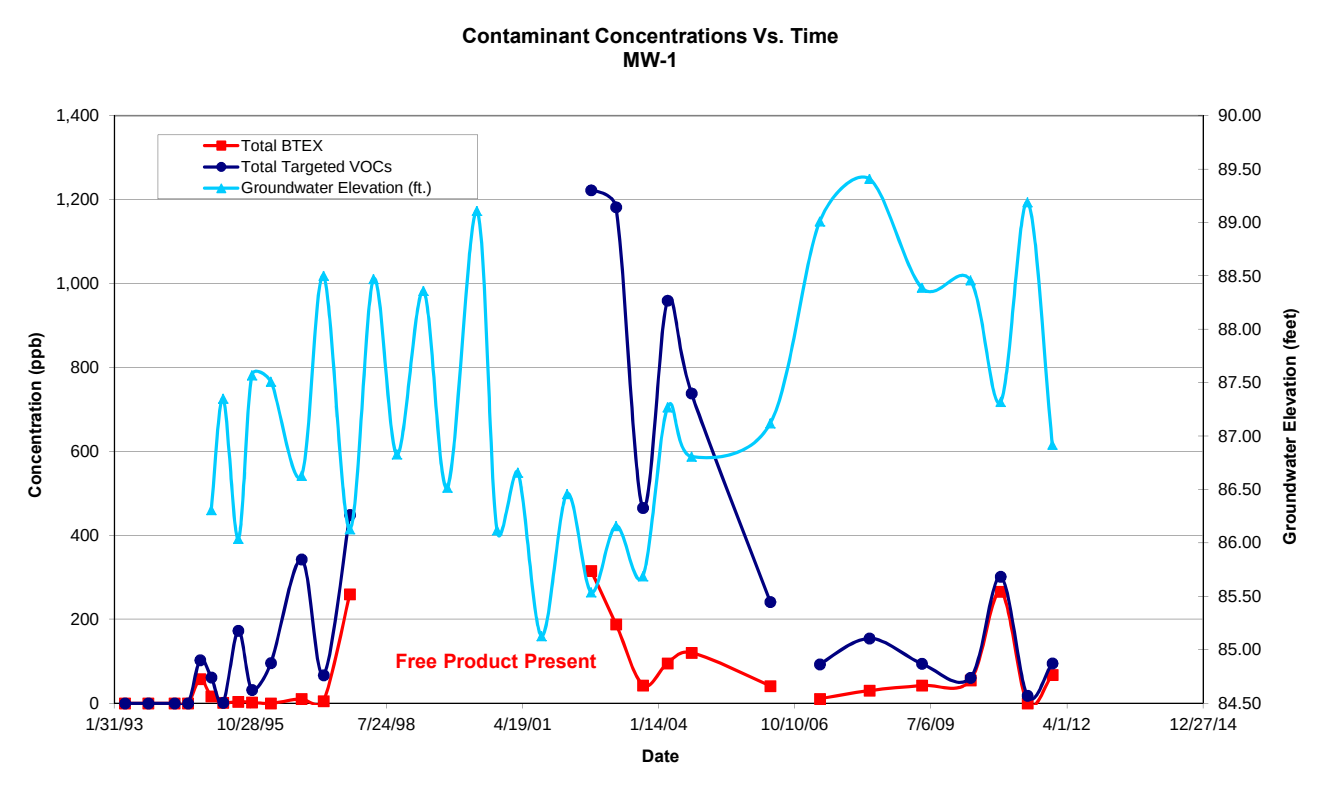
Monitoring Well 1 (continued)

Sample Date	9/4/02	3/6/03	9/19/03	3/18/04	9/10/04	4/12/06	10/9/06	4/11/07	4/9/08	4/29/09	4/22/2010	
EPA Analysis Method	8021B	8021B	8021B	8021B	8021B	8021B		8021B	8021B	8021B	VT PCF	VGES
PARAMETER												(ppb)
Benzene	**219.**	**147.**	**43.0**	**47.2**	**106.**	**22.2**		**5.4**	ND <5.0	ND <20.0	**8.3**	5.
Toluene	**15.0**	**13.0**	ND<10.0	ND<10.0	ND<10.0	**2.0**	No	ND <2.0	ND <5.0	ND <20.0	**21.4**	1,000.
Ethylbenzene	**39.6**	**15.8**	ND<10.0	**23.1**	**14.8**	**7.2**	Sample	**5.3**	ND <5.0	ND <20.0	**3.7**	700.
Xylenes	**42.9**	**12.3**	ND<20.0	**25.1**	ND<20.0	**10.0**	Collected	ND <4.0	**30.2**	**42.4**	**21.3**	10,000.
Total BTEX	**316.**	**188.**	**43.0**	**95.4**	**121.**	**41.4**		**10.7**	**30.2**	**42.4**	**54.7**	-
MTBE	**600.**	**899.**	**389.**	**589.**	**595.**	**44.9**		ND<4.0	ND<10.0	ND <40.0	ND <4.0	40.
1,3,5-Trimethylbenzene	**29.3**	**12.5**	ND<10.0	**28.6**	ND<10.0	**11.3**		**10.2**	**10.4**	**24.0**	ND<2.0	350.
1,2,4-Trimethylbenzene	**187.**	**67.3**	**22.1**	**159.**	**23.2**	**90.9**		**58.8**	**71.9**	**28.1**	**6.5**	
Naphthalene	**90.9**	**15.2**	**11.8**	**88.1**	ND<10.0	**53.5**		**13.2**	**42.1**	ND <40.0	ND<4.0	20.
Total Targeted VOCs	**1,223.**	**1,182.**	**466.**	**960.**	**739.**	**242.0**		**92.9**	**154.6**	**94.5**	**61.2**	-
Groundwater Elevation (ft.)	85.54	86.16	85.69	87.27	86.81	87.12		89.01	89.41	88.39	88.46	-

Sample Date	11/29/10	6/15/11	12/15/11									
EPA Analysis Method	VT PCF	VT PCF	VT PCF									VGES
PARAMETER												(ppb)
Benzene	**71.2**	ND <5.0	**48.1**									5.
Toluene	ND<20.0	ND<10.0	**2.4**									1,000.
Ethylbenzene	**29.1**	ND<10.0	**1.8**									700.
Xylenes	**166.**	ND <20.0	**15.3**									10,000.
Total BTEX	**266.3**	ND	**67.6**									-
MTBE	ND <40.0	ND <20.0	**3.2**									40.
1,3,5-Trimethylbenzene	ND<20.0	ND<10.0	**3.9**									350.
1,2,4-Trimethylbenzene	**35.3**	**18.1**	**13.3**									
Naphthalene	ND <40.0	ND <20.0	**7.2**									20.
Total Targeted VOCs	**301.6**	**18.1**	**95.2**									-
Groundwater Elevation (ft.)	87.32	89.19	86.92									-

All values reported in ug/L (ppb)
ND - None Detected
NA - Not Analyzed
VGES - Vermont Groundwater Enforcement Standard (February 26, 2007). Detections prior to that date are compared to previously applicable standards.
TBQ - Trace Below Quantitation Limit
Chlorobenzene isomers removed from table due to non-detect results.
Bold values indicate detections. Shaded values indicate concentrations at or above the VGES.

GROUNDWATER QUALITY DATA SUMMARY



GROUNDWATER QUALITY DATA SUMMARY

Monitoring Well 5

Sample Date	4/20/93	10/8/93	4/19/94	7/27/94	10/24/94	1/13/95	4/11/95	7/31/95	11/8/95	3/27/96	11/6/96	
EPA Analysis Method	-	-	602	602	602	602	602	-	602	602	602	VGES
PARAMETER												(ppb)
Benzene			ND	**144.**	**918.**	**935.**	**859.**		**1,850.**	**705.**	**TBQ<2500**	5.
Toluene	0.01'	No	**194.**	**163.**	**416.**	**760.**	**826.**	0.08'	**2,380.**	**1,450.**	**2,810.**	1,000.
Ethylbenzene	Free	Sample	**348.**	**154.**	**194.**	**268.**	**196.**	Free	**437.**	**365.**	ND<2500	700.
Xylenes	Product	Collected	**1,530.**	**993.**	**1,220.**	**1,640.**	**1,290.**	Product	**2,770.**	**1,730.**	**4,950.**	10,000.
Total BTEX			**2,072.**	**1,454.**	**2,748.**	**3,603.**	**3,171.**		**7,437.**	**4,250.**	**7,760.**	-
MTBE			ND	**611.**	**4,140.**	**2,050.**	ND		ND	ND	ND<25K	40.
BTEX+MTBE			**2,072.**	**2,065.**	**6,888.**	**5,653.**	**3,171.**		**7,437.**	**4,250.**	**7,760.**	-
GW Elevation (ft.)						86.26	87.28	85.99	87.50	87.40	86.58	-

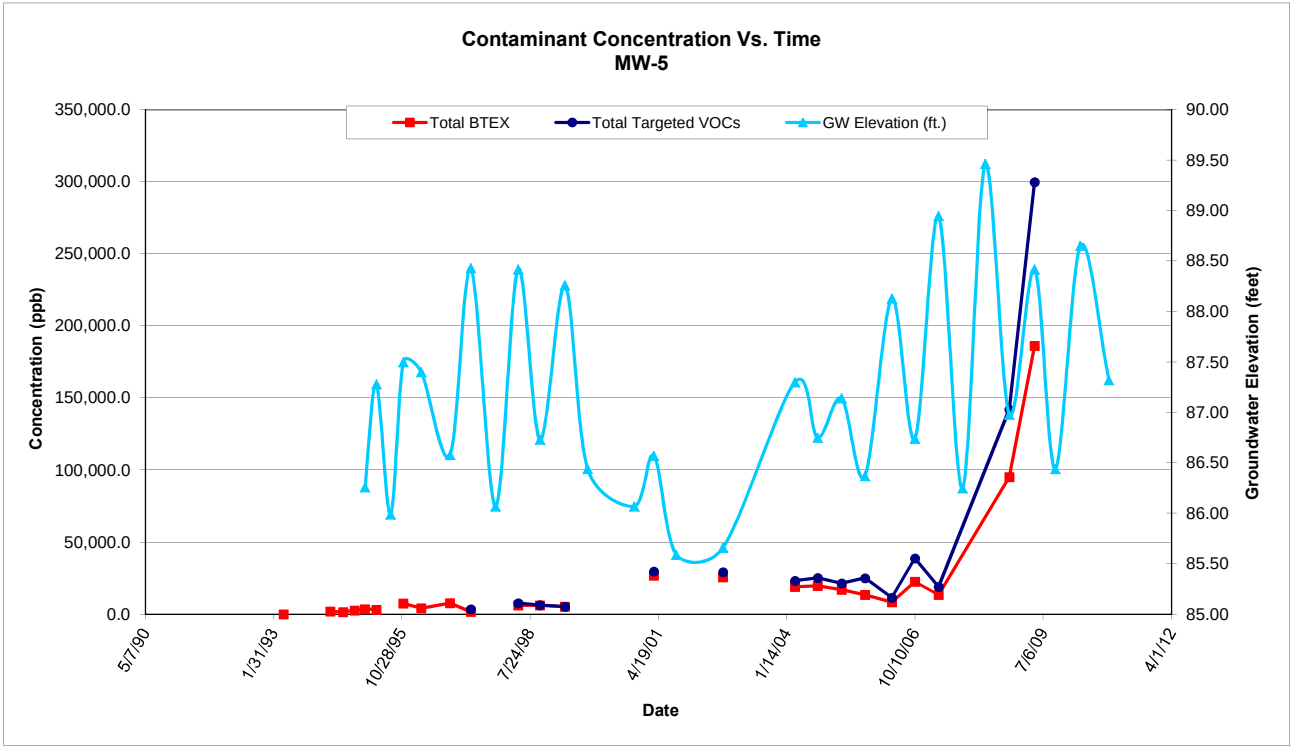
Sample Date	4/17/97	10/27/97	4/20/98	10/9/98	4/21/99	10/15/99	5/18/00	10/12/00	3/15/01	9/5/01	3/11/02	
EPA Analysis Method	602	-	602	602	602	-	-	-	8021 B	-	-	VGES
PARAMETER												(ppb)
Benzene	**411.**		**821.**	**939.**	**626.**				**3,670.**			5.
Toluene	**354.**	No	**1,400.**	**913.**	**668.**	No	No	No	**11,400.**	No	No	1,000.
Ethylbenzene	ND<50	Sample	**566.**	**1,100.**	**695.**	Sample	Sample	Sample	**1,740.**	Sample	Sample	700.
Xylenes	**989.**	Collected	**3,450.**	**3,200.**	**3,230.**	Collected	Collected	Collected	**9,980.**	Collected	Collected	10,000.
Total BTEX	**1,754.**		**6,237.**	**6,152.**	**5,219.**				**26,790.**			-
MTBE	**1,710.**	0.06'	**1,420.**	**286.**	**TBQ<200**	0.12'	Heavy	0.04'	ND<1,000.	Not		40.
1,3,5-Trimethylbenzene	NA	NAPL	NA	NA	NA	NAPL	Petroleum	NAPL	**546.**	Enough	Well	4.
1,2,4-Trimethylbenzene	NA	Observed	NA	NA	NA	Observed	Sheen	Observed	**1,890.**	Water to	Frozen	5.
Naphthalene	NA	in Well	NA	NA	NA	in Well	Observed	in Well	**435.**	Sample		20.
Total Targeted VOCs	**3,464.**		**7,657.**	**6,438.**	**5,219.**				**29,661.**			-
GW Elevation (ft.)	88.43	86.07	88.42	86.73	88.26	86.44		86.07	86.57	85.59		-

Sample Date	9/4/02	3/6/03	9/19/03	3/18/04	9/10/04	3/16/05	9/14/05	4/12/06	10/9/06	4/11/07	10/15/07	
EPA Analysis Method	8021B	-	-	8021B	8021B	8021B	8021B	8021B	8021B	8021B		VGES
PARAMETER												(ppb)
Benzene	**2,080.**			**1,340.**	**1,470.**	**660.**	**2,320.**	**381.**	**3,290.**	**1,160.**		5.
Toluene	**10,900.**			**6,310.**	**6,660.**	**5,400.**	**4,470.**	**2,630.**	**5,820.**	**4,830.**	No	1,000.
Ethylbenzene	**1,610.**	Well	Well	**944.**	**1,310.**	**1,510.**	**825.**	**711.**	**1,410.**	**799.**	Sample	700.
Xylenes	**11,100.**	Paved	Paved	**10,500.**	**10,300.**	**9,460.**	**5,870.**	**4,610.**	**12,100.**	**6,790.**	Collected	10,000.
Total BTEX	**25,690.**			**19,094.**	**19,740.**	**17,030.**	**13,485.**	**8,332.**	**22,620.**	**13,579.**		-
MTBE	**723.**	Over	Over	**693.**	**1,120.**	**1,290.**	**9,460.**	**1,360.**	**8,040.**	**2,780.**	0.01'	40.
1,3,5-Trimethylbenzene	**566.**			**704.**	**872.**	**664.**	**509.**	**366.**	**2,580.**	**588.**	NAPL	350.
1,2,4-Trimethylbenzene	**1,900.**			**2,060.**	**2,460.**	**2,000.**	**1,390.**	**1,180.**	**4,720.**	**1,640.**	Observed	
Naphthalene	**458.**			**707.**	**1,060.**	**478.**	**327.**	**271.**	**831.**	**425.**	in Well	20.
Total Targeted VOCs	**29,337.**			**23,258.**	**25,252.**	**21,462.**	**25,171.**	**11,509.**	**38,791.**	**19,012.**		-
GW Elevation (ft.)	85.66			87.30	86.75	87.14	86.37	88.13	86.74	88.95	86.25	-

Sample Date	4/9/08	10/14/08	4/29/09	10/7/2009	4/22/10	11/29/10	6/15/11	12/15/2011				
EPA Analysis Method	-	8021B	8021B	-								VGES
PARAMETER												(ppb)
MTBE	No	**2,620**	ND <2000.	No	No	No	No	No				40.
Benzene	Sample	**6,690.**	**9,220.**	Sample	Sample	Sample	Sample	Sample				5.
Toluene	Collected	**24,700**	**43,700.**	Collected	Collected	Collected	Collected	Collected				1,000.
Ethylbenzene	0.21'	**12,100**	**15,300.**	0.11'	0.15'	0.24'	0.13'	Well				700.
Xylenes	LNAPL	**51,800**	**118,000.**	LNAPL	LNAPL	LNAPL	LNAPL	Not				10,000.
Total BTEX	Observed	**95,290.**	**186,220.**	Measured	Measured	Measured	Measured	Accessible				-
1,3,5-Trimethylbenzene	in Well	**14,100.**	**32,400.**	in Well	in Well	in Well	in Well					350.
1,2,4-Trimethylbenzene		**24,000**	**69,100.**									
Naphthalene		**6,170**	**12,200.**									20.
Total Targeted VOCs		**142,180.**	**299,920.**									-
GW Elevation (ft.)	89.46	86.98	88.42	86.44	88.65	87.32	89.13	NM				-

All values reported in ug/L (ppb)
Bold values indicate detections. Shaded values indicate concentrations at or above the VGES.
Chlorobenzene isomers removed from table due to non-detect results.
VGES - Vermont Groundwater Enforcement Standard (February 26, 2007). Detections prior to that date are compared to previously applicable standards.

TBQ - Trace Below Quantitation Limit
NA - Not Analyzed
ND - None Detected


Contaminant Concentration Vs. Time
MW-5
Total BTEX
Total Targeted VOCs
GW Elevation (ft.)
Concentration (ppb)
350,000.0
300,000.0
250,000.0
200,000.0
150,000.0
100,000.0
50,000.0
0.0
Groundwater Elevation (feet)
90.00
89.50
89.00
88.50
88.00
87.50
87.00
86.50
86.00
85.50
85.00
5/7/90
1/31/93
10/28/95
7/24/98
4/19/01
1/14/04
10/10/06
7/6/09
4/1/12
Date

GROUNDWATER QUALITY DATA SUMMARY

Monitoring Well 6

Sample Date		10/8/93	4/19/94	7/27/94	10/24/94	1/13/95	4/11/95	7/31/95	11/8/95	3/27/96	11/6/96	
EPA Analysis Method		602	602	-	602	602	602	602	602	602	602	VGES
PARAMETER												(ppb)
Benzene		ND	ND	No	ND	ND	ND	**5.3**	ND	**1.1**	ND<1	5.
Toluene		ND	ND	Sample	ND	ND	ND	ND	ND	ND	ND<1	1,000.
Ethylbenzene		ND	ND	Collected	ND	ND	ND	ND	ND	ND	ND<1	700.
Xylenes		ND	ND	Well	ND	ND	ND	ND	ND	ND	ND<1	10,000.
Total BTEX		ND	ND	Dry	ND	ND	ND	**5.3**	ND	**1.1**	ND	-
MTBE		ND	ND		ND	ND	ND	**11.7**	ND	**TBQ**	ND<10	40.
BTEX+MTBE		ND	ND		ND	ND	ND	**17.0**	ND	**1.1**	ND	-
GW Elevation (ft.)						85.58	85.88	84.89	86.40	86.72	85.55	-

Sample Date	4/17/97	10/27/97	4/20/98	10/9/98	4/21/99	10/15/99	5/18/00	10/12/00	3/15/01	9/5/01	3/11/02	
EPA Analysis Method	602	-	602	602	602	8021B	8021B	8021B	8021B	-	8021B	VGES
PARAMETER												(ppb)
Benzene	ND<1		ND<1	ND<1	ND<1	ND<1	ND<1.0	ND<1.0	**38.9**		ND<1.0	5.
Toluene	ND<1	No	ND<1	ND<1	ND<1	ND<1	ND<1.0	ND<1.0	ND<1.0	No	ND<1.0	1,000.
Ethylbenzene	ND<1	Sample	ND<1	ND<1	ND<1	ND<1	ND<1.0	ND<1.0	ND<1.0	Sample	ND<1.0	700.
Xylenes	ND<1	Collected	ND<1	ND<1	ND<1	ND<1	ND<1.0	ND<1.0	ND<1.0	Collected	ND<1.0	10,000.
Total BTEX	ND		ND	ND	ND	ND	ND	ND	**38.9**		ND	-
MTBE	**14.2**		ND<10	ND<10	ND<10	ND<10	**11.6**	ND<10	**211.**		**8.0**	40.
1,3,5-Trimethylbenzene	NA	Well	NA	NA	NA	ND<1	ND<1.0	ND<1.0	ND<1.0	Well	ND<1.0	4.
1,2,4-Trimethylbenzene	NA	Dry	NA	NA	NA	ND<1	ND<1.0	ND<1.0	ND<1.0	Dry	ND<1.0	5.
Naphthalene	NA		NA	NA	NA	ND<1	ND<1.0	ND<1.0	ND<1.0		ND<1.0	20.
Total Targeted VOCs	**14.2**		ND	ND	ND	ND	**11.6**	ND	**250.**		**8.0**	-
GW Elevation (ft.)	87.24	84.88	86.72	85.54	86.67	85.50	87.30	85.04	85.56		86.76	-

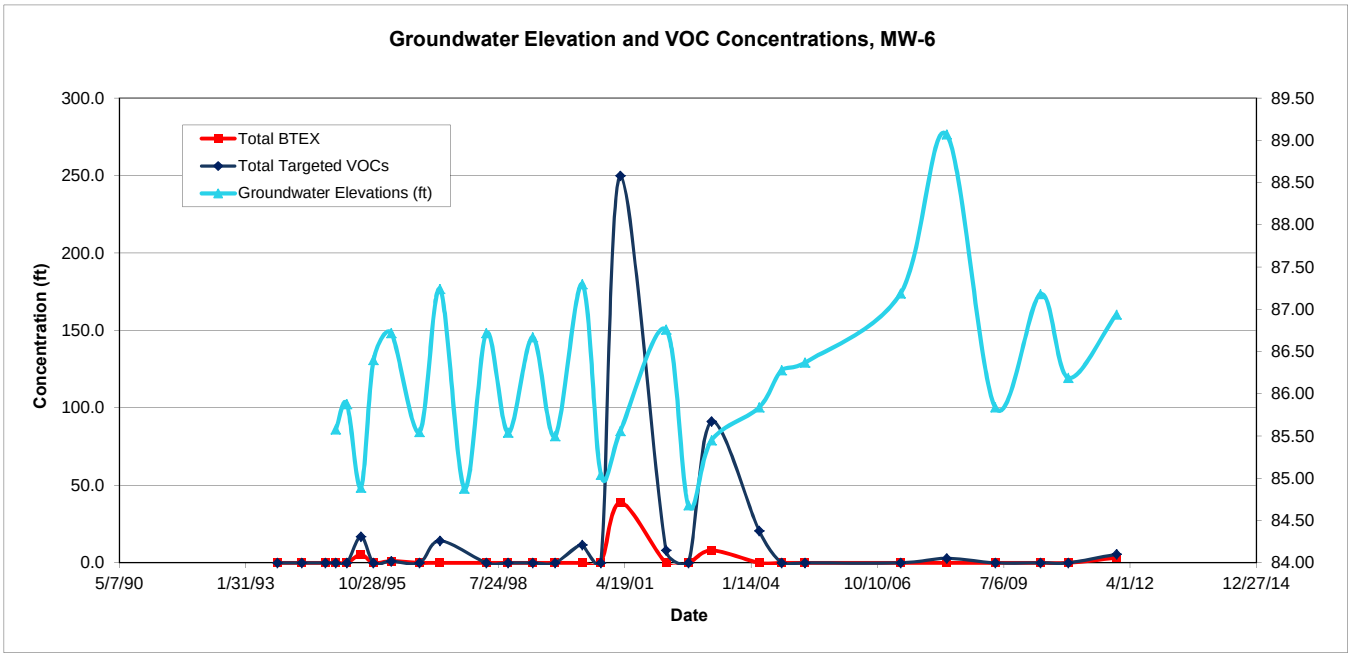
Sample Date	9/4/02	3/6/03	9/19/03	3/18/04	9/10/04	3/16/05	4/12/06	10/9/06	4/11/07	4/9/08	4/29/09	
EPA Analysis Method	8021B	8021B	-	8021B	8021B	8021B	-	8021B	8021B	8021B	8021B	VGES
PARAMETER												(ppb)
Benzene	ND<1.0	**8.0**		ND<1.0	ND<1.0	ND<1.0			ND <1.0	ND <1.0	ND <1.0	5.
Toluene	ND<1.0	ND<1.0		ND<1.0	ND<1.0	ND<1.0	No	No	ND <1.0	ND <1.0	ND <1.0	1,000.
Ethylbenzene	ND<1.0	ND<1.0	Insufficient	ND<1.0	ND<1.0	ND<1.0	Sample	Sample	ND <1.0	ND <1.0	ND <1.0	700.
Xylenes	ND<2.0	ND<2.0	Water	ND<2.0	ND<2.0	ND<2.0	Collected	Collected	ND <2.0	ND <2.0	ND <2.0	10,000.
Total BTEX	ND	**8.0**	To	ND	ND	ND			ND	ND	ND	-
MTBE	ND<2.0	**83.2**	Sample	**20.6**	ND<2.0	ND<2.0			ND <2.0	**2.9**	ND <2.0	40.
1,3,5-Trimethylbenzene	ND<1.0	ND<1.0		ND<1.0	ND<1.0	ND<1.0	Well	Well	ND <1.0	ND <1.0	ND <1.0	350.
1,2,4-Trimethylbenzene	ND<1.0	ND<1.0		ND<1.0	ND<1.0	ND<1.0	not	not	ND <1.0	ND <1.0	ND <1.0	
Naphthalene	ND<1.0	ND<1.0		ND<1.0	ND<1.0	ND<1.0	Accessed	Accessed	ND <2.0	ND <2.0	ND <2.0	20.
Total Targeted VOCs	ND	**91.2**		**20.6**	ND	ND			ND	**2.9**	ND	-
GW Elevation (ft.)	84.68	85.45		85.84	86.28	86.37			87.19	89.07	85.84	-

Sample Date	4/22/10	11/29/10	6/15/11	12/15/11								
EPA Analysis Method	VT PCF	VT PCF	VT PCF	VT PCF								VGES
PARAMETER												(ppb)
Benzene	ND <1.0	ND <1.0	No	ND <1.0								5.
Toluene	ND <1.0	ND <1.0	Sample	ND <1.0								1,000.
Ethylbenzene	ND <1.0	ND <1.0	Collected	ND <1.0								700.
Xylenes	ND <2.0	ND <2.0		**3.2**								10,000.
Total BTEX	ND	ND		**3.2**								-
MTBE	ND <2.0	ND <2.0		ND <2.0								40.
1,3,5-Trimethylbenzene	ND <1.0	ND <1.0		ND <1.0								350.
1,2,4-Trimethylbenzene	ND <1.0	ND <1.0		**2.3**								
Naphthalene	ND <2.0	ND <2.0		ND <2.0								20.
Total Targeted VOCs	ND	ND		**5.5**								-
GW Elevation (ft.)	87.18	86.19		86.94								-

All values reported in ug/L (ppb) ND - None Detected NA - Not Analyzed
VGES - Vermont Groundwater Enforcement Standard (February 26, 2007). Detections prior to that date are compared to previously applicable standards.
Chlorobenzene isomers removed from table due to non-detect results.
Bold values indicate detections. Shaded values indicate concentrations at or above the VGES.

GROUNDWATER QUALITY DATA SUMMARY

Monitoring Well 6



GROUNDWATER QUALITY DATA SUMMARY

Monitoring Well 7

Sample Date		10/8/93	4/19/94	7/27/94	10/24/94	1/13/95	4/11/95	7/31/95	11/8/95	3/27/96	11/6/96	
EPA Analysis Method		602	602	602	602	602	602	602	602	602	602	VGES
PARAMETER												(ppb)
Benzene		ND	**27.**	**931.**	**1,050.**	**728.**	**849.**	**283.**	ND	**2,150.**	**2,260.**	5.
Toluene		ND	ND	ND	ND	ND	ND	ND	ND	ND	ND<50	1,000.
Ethylbenzene		ND	ND	ND	ND	ND	ND	ND	ND	ND	ND<50	700.
Xylenes		ND	ND	**TBQ**	ND	ND	ND	ND	ND	ND	TBQ<50	10,000.
Total BTEX		ND	**27.**	**931.**	**1,050.**	**728.**	**849.**	**283.**	ND	**2,150.**	**2,260.**	-
MTBE		**553.**	**2,850.**	**3,360.**	**3,150.**	**3,280.**	**5,080.**	**2,040.**	**27.**	**7,040.**	**3,870.**	40.
BTEX+MTBE		**553.**	**2,877.**	**4,291.**	**4,200.**	**4,008.**	**5,929.**	**2,323.**	**27.**	**9,190.**	**6,130.**	-
GW Elevation (ft.)						85.92	86.78	85.51	87.11	87.06	86.17	-

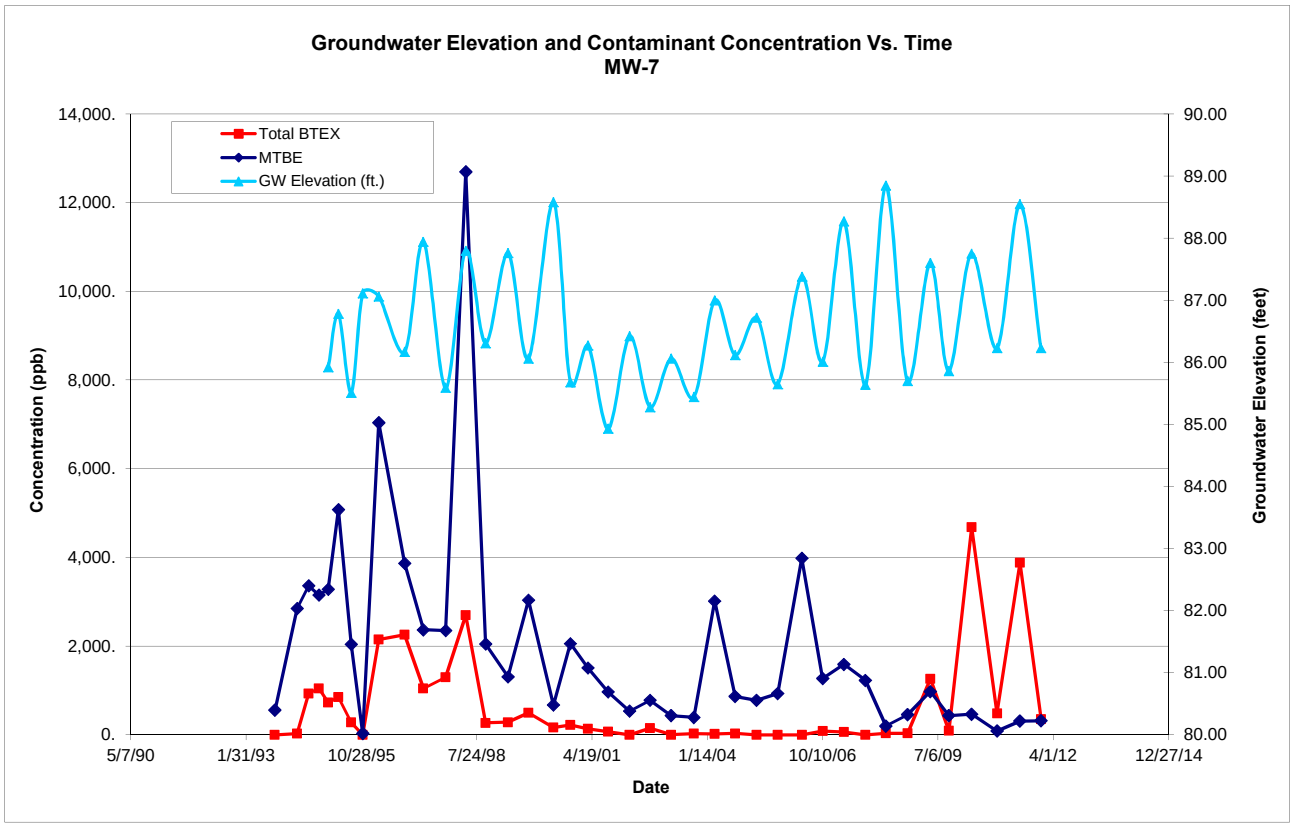
Sample Date	4/17/97	10/27/97	4/20/98	10/9/98	4/21/99	10/15/99	5/18/00	10/12/00	3/15/01	9/5/01	3/11/02	
EPA Analysis Method	602	602	602	602	602	8021B	8021B	8021B	8021B	8021B	8021B	VGES
PARAMETER												(ppb)
Benzene	**894.**	**1,300.**	**2,420.**	**271.**	**230.**	**496.**	**168.**	**224.**	**136.**	**71.1**	ND<5.0	5.
Toluene	**42.1**	ND<100	**TBQ<200**	ND<50	ND<20	ND<50	ND<10.0	ND<20.0	ND<20.0	ND<20.0	ND<5.0	1,000.
Ethylbenzene	ND<20	ND<100	ND<200	ND<50	**TBQ<20**	ND<50	ND<10.0	ND<20.0	ND<20.0	ND<20.0	ND<5.0	700.
Xylenes	**111.**	ND<100	**278.**	ND<50	**53.9**	ND<50	ND<10.0	ND<20.0	ND<20.0	ND<20.0	ND<5.0	10,000.
Total BTEX	**1,047.**	**1,300.**	**2,698.**	**271.**	**284.**	**496.**	**168.**	**224.**	**136.**	**71.1**	ND	-
MTBE	**2,370.**	**2,350.**	**12,700.**	**2,050.**	**1,310.**	**3,040.**	**672.**	**2,060.**	**1,510.**	**966.**	**533.**	40.
1,3,5-Trimethylbenzene	NA	NA	NA	NA	NA	ND<50	ND<10.0	ND<20.0	ND<20.0	ND<20.0	ND<5.0	4.
1,2,4-Trimethylbenzene	NA	NA	NA	NA	NA	**TBQ<50**	ND<10.0	ND<20.0	ND<20.0	ND<20.0	ND<5.0	5.
Naphthalene	NA	NA	NA	NA	NA	**TBQ<50**	**18.3**	ND<20.0	ND<20.0	ND<20.0	ND<5.0	20.
Total Targeted VOCs	**3,417.**	**3,650.**	**15,398.**	**2,321.**	**1,594.**	**3,536.**	**858.**	**2,284.**	**1,646.**	**1,037.**	**533.**	-
GW Elevation (ft.)	87.94	85.59	87.80	86.31	87.76	86.06	88.58	85.68	86.27	84.93	86.42	-

Sample Date	9/4/02	3/6/03	9/19/03	3/18/04	9/10/04	3/16/05	9/14/05	4/12/06	10/9/06	4/11/07	10/15/07	
EPA Analysis Method	8021B	8021B	8021B	8021B	8021B	8021B	8021B	8021B	8021B	8021B	8260B	VGES
PARAMETER												(ppb)
Benzene	**151.**	**2.3**	**29.1**	**19.1**	**32.4**	ND<5.0	ND<10.0	ND<10.0	**88.3**	**66.8**	ND<20.0	5.
Toluene	ND<10.0	ND<2.0	ND<4.0	ND<4.0	ND<5.0	ND<5.0	ND<10.0	ND<10.0	ND<1.0	ND <20.0	ND<20.0	1,000.
Ethylbenzene	ND<10.0	ND<2.0	ND<4.0	ND<4.0	ND<5.0	ND<5.0	ND<10.0	ND<10.0	ND<1.0	ND <20.0	ND<20.0	700.
Xylenes	ND<20.0	ND<4.0	ND<8.0	ND<8.0	ND<10.0	ND<10.0	ND<20.0	ND<20.0	ND<2.0	ND <40.0	ND<40.0	10,000.
Total BTEX	**151.**	**2.3**	**29.1**	**19.1**	**32.4**	ND	ND	ND	**88.3**	**66.8**	ND	-
MTBE	**777.**	**430.**	**392.**	**3,020.**	**864.**	**780.**	**928.**	**3,980.**	**1,270.**	**1,590.**	**1,230.**	40.
1,3,5-Trimethylbenzene	ND<10.0	ND<2.0	ND<4.0	ND<4.0	ND<5.0	ND<5.0	ND<10.0	ND<10.0	ND<1.0	ND <20.0	ND <20.0	350.
1,2,4-Trimethylbenzene	ND<10.0	ND<2.0	ND<4.0	ND<4.0	ND<5.0	ND<5.0	ND<10.0	ND<10.0	**1.2**	ND <20.0	ND <20.0	
Naphthalene	ND<10.0	ND<2.0	ND<4.0	ND<4.0	ND<5.0	ND<5.0	ND<10.0	ND<20.0	ND<2.0	ND <40.0	ND <40.0	20.
Total Targeted VOCs	**928.**	**432.**	**421.**	**3,039.**	**896.**	**780.**	**928.**	**3,980.**	**1,360.**	**1,657.**	**1,230.**	-
GW Elevation (ft.)	85.28	86.06	85.44	87.00	86.12	86.72	85.65	87.38	86.01	88.27	85.64	-

Sample Date	4/9/08	10/14/08	4/29/09	10/7/09	4/22/10	11/29/10	6/15/11	12/15/11				
EPA Analysis Method	8021B	8021B	8021B	VT PCF	VT PCF	VT PCF	VT PCF	VT PCF				VGES
PARAMETER												(ppb)
Benzene	**34.4**	**34.8**	**1,260.**	**95.3**	**1,840.**	**487.**	**2,960.**	**336.**				5.
Toluene	**2.0**	ND<5.0	ND <20.0	ND <20.0	**417.**	ND<5.0	**112.**	ND<5.0				1,000.
Ethylbenzene	ND <2.0	ND<5.0	ND <20.0	ND <20.0	**227.**	ND<5.0	**111.**	**21.6**				700.
Xylenes	ND <4.0	ND<10.0	ND <40.0	ND <40.0	**2,200.**	ND<10.0	**696.**	ND<10.0				10,000.
Total BTEX	**36.4**	**34.8**	**1,260.**	**95.3**	**4,684.**	**487.**	**3,879.**	**358.**				-
MTBE	**197.**	**455.**	**977.**	**434.**	**464.**	**87.9**	**312.**	**317.**				40.
1,3,5-Trimethylbenzene	ND <2.0	ND<5.0	ND <20.0	ND <20.0	**85.2**	ND<5.0	**31.9**	ND<5.0				350.
1,2,4-Trimethylbenzene	ND <2.0	ND<5.0	**5.7**	ND <20.0	**293.**	ND<5.0	**67.3**	ND<5.0				
Naphthalene	ND <4.0	ND<10.0	ND <40.0	ND <40.0	**79.6**	**21.7**	**127.**	**11.7**				20.
Total Targeted VOCs	**233.**	**490.**	**2,243.**	**529.**	**5,606.**	**597.**	**4,417.**	**687.**				-
GW Elevation (ft.)	88.85	85.70	87.60	85.86	87.75	86.23	88.55	86.23				-

All values reported in ug/L (ppb)
TBQ - Trace Below Quantitation Limit
Chlorobenzene isomers removed from table due to non-detect results.
Bold values indicate detections. Shaded values indicate concentrations at or above the VGES.
VGES - Vermont Groundwater Enforcement Standard (February 26, 2007). Detections prior to that date are compared to previously applicable standards.

ND - None Detected
NA - Not Analyzed


Groundwater Elevation and Contaminant Concentration Vs. Time
MW-7
Total BTEX
MTBE
GW Elevation (ft.)
Concentration (ppb)
Groundwater Elevation (feet)
Date
14,000.
12,000.
10,000.
8,000.
6,000.
4,000.
2,000.
0.
90.00
89.00
88.00
87.00
86.00
85.00
84.00
83.00
82.00
81.00
80.00
5/7/90
1/31/93
10/28/95
7/24/98
4/19/01
1/14/04
10/10/06
7/6/09
4/1/12
12/27/14

GROUNDWATER QUALITY DATA SUMMARY

Monitoring Well 8

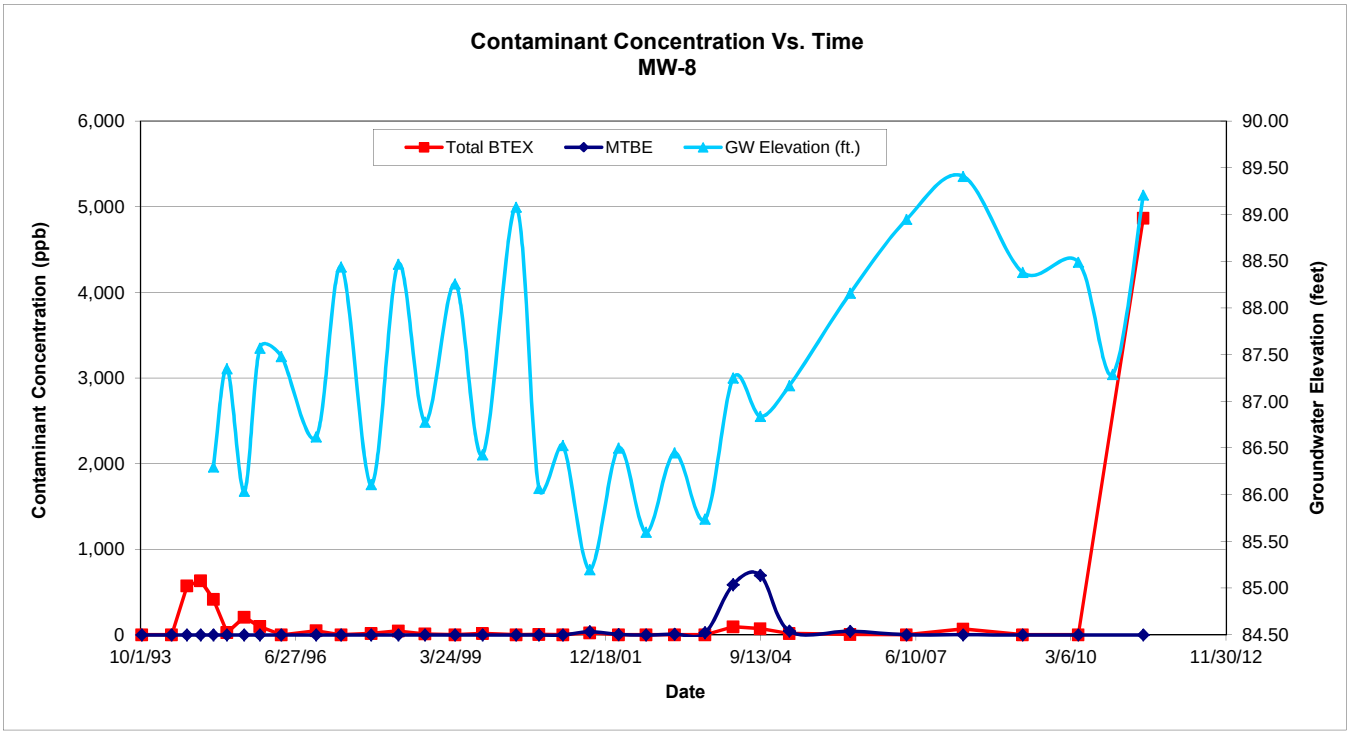
Sample Date *EPA Analysis Method* PARAMETER		10/8/93 602	4/19/94 602	7/27/94 602	10/24/94 602	1/13/95 602	4/11/95 602	7/31/95 602	11/8/95 602	3/27/96 602	11/6/96 602	VGES (ppb)
Benzene		ND	ND	**128.0**	**194.0**	**155**	**19.4**	**71.2**	**46.0**	ND	**43.3**	5.
Toluene		ND	ND	**292.0**	**226.0**	**143**	**TBQ**	**50.7**	**17.5**	ND	**3.2**	1,000.
Ethylbenzene		ND	ND	**15.6**	ND	**TBQ**	ND	**5.4**	**1.4**	ND	**1.1**	700.
Xylenes		ND	ND	**136.0**	**214.0**	**119**	**6.6**	**79.4**	**32.3**	ND	**3.3**	10,000.
Total BTEX		ND	ND	**571.6**	**634.0**	**417**	**26**	**206.7**	**97.2**	ND	**50.9**	-
MTBE		ND	ND	ND	ND	ND	ND	ND	**TBQ**	ND	TBQ<10	40.
BTEX+MTBE		ND	ND	**571.6**	**634.0**	**417.0**	**26.0**	**206.7**	**97.2**	ND	**50.9**	-
GW Elevation (ft.)						86.30	87.35	86.04	87.57	87.48	86.62	-

Sample Date *EPA Analysis Method* PARAMETER	4/17/97 602	10/27/97 602	4/20/98 602	10/9/98 602	4/21/99 602	10/15/99 8021B	5/18/00 8021B	10/12/00 8021B	3/15/01 8021B	9/5/01 8021B	3/11/02 8021B	VGES (ppb)
Benzene	ND<1	**13.9**	ND<1	**12.0**	ND<1	**13.4**	ND<1.0	**3.8**	ND<1.0	**17.1**	ND<1.0	5.
Toluene	ND<1	**TBQ<1**	**10.1**	ND<1	ND<1	ND<1	ND<1.0	ND<1.0	ND<1.0	ND<1.0	ND<1.0	1,000.
Ethylbenzene	ND<1	ND<1	**4.9**	ND<1	ND<1	ND<1	ND<1.0	ND<1.0	ND<1.0	ND<1.0	ND<1.0	700.
Xylenes	ND<1	**1.2**	**31.2**	ND<1	ND<1	**1.3**	ND<1.0	ND<1.0	ND<1.0	**7.1**	ND<1.0	10,000.
Total BTEX	ND	**15.1**	**46.2**	**12.0**	ND	**14.7**	ND	**3.8**	ND	**24.2**	ND	-
MTBE	ND<10	ND<10	ND<10	ND<10	ND<10	ND<10	ND<10.0	ND<10.0	ND<10.0	**38.7**	**6.0**	40.
1,3,5-Trimethylbenzene	NA	NA	NA	NA	NA	ND<1	ND<1.0	ND<1.0	ND<1.0	ND<1.0	ND<1.0	4.
1,2,4-Trimethylbenzene	NA	NA	NA	NA	NA	**TBQ<1**	ND<1.0	ND<1.0	ND<1.0	ND<1.0	ND<1.0	5.
Naphthalene	NA	NA	NA	NA	NA	ND<1	ND<1.0	ND<1.0	ND<1.0	ND<1.0	ND<1.0	20.
Total Targeted VOCs	ND	**15.1**	**46.2**	**12.0**	ND	**14.7**	ND	**3.8**	ND	**62.9**	**6.0**	-
GW Elevation (ft.)	88.44	86.11	88.47	86.78	88.26	86.43	89.08	86.07	86.53	85.20	86.50	-

Sample Date *EPA Analysis Method* PARAMETER	9/4/02 8021B	3/6/03 8021B	9/19/03 8021B	3/18/04 8021B	9/10/04 8021B	3/16/05 8021B	4/12/06 8021B	4/11/07 8021B	4/9/08 8021B	4/29/09 8021B	4/22/10 VT PCF	VGES (ppb)
MTBE	ND<2.0	**9.8**	**26.1**	**589.**	**697.**	**45.0**	**44.3**	**2.7**	**3.1**	ND<2.0	ND<2.0	40.
Benzene	ND<1.0	ND<1.0	ND<1.0	**42.0**	**73.2**	**10.3**	**4.5**	**1.7**	**38.6**	ND<1.0	ND<1.0	5.
Toluene	ND<1.0	ND<1.0	ND<1.0	**3.8**	ND<5.0	ND<1.0	ND<1.0	ND <1.0	ND <1.0	ND<1.0	ND<1.0	1,000.
Ethylbenzene	ND<1.0	ND<1.0	ND<1.0	ND<1.0	ND<5.0	ND<1.0	ND<1.0	ND <1.0	**1.9**	ND<1.0	ND<1.0	700.
Xylenes	ND<2.0	ND<2.0	ND<2.0	**49.0**	ND<10.0	**6.9**	ND<2.0	ND <2.0	**28.1**	ND<2.0	ND<2.0	10,000.
Total BTEX	ND	ND	ND	**94.8**	**73.2**	**17.2**	**4.5**	**1.7**	**68.6**	ND	ND	-
1,3,5-Trimethylbenzene	ND<1.0	ND<1.0	ND<1.0	ND<1.0	ND<5.0	ND<1.0	ND<1.0	ND <1.0	ND <1.0	ND<1.0	ND<1.0	350.
1,2,4-Trimethylbenzene	ND<1.0	ND<1.0	ND<1.0	ND<1.0	ND<5.0	**2.5**	ND<1.0	ND <1.0	**2.1**	ND<1.0	ND<1.0	
Naphthalene	ND<1.0	ND<1.0	ND<1.0	ND<1.0	**77.4**	ND<1.0	ND<2.0	ND <2.0	**2.3**	ND<1.0	ND<2.0	20.
Total Targeted VOCs	ND	**9.8**	**26.1**	**684.**	**848.**	**64.7**	**48.8**	**4.4**	**76.1**	ND	ND	-
GW Elevation (ft.)	85.60	86.45	85.74	87.25	86.84	87.17	88.16	88.95	89.41	88.38	88.49	-

Sample Date *EPA Analysis Method* PARAMETER	11/29/10 8021B	6/15/11 8021B	12/15/11 -									VGES (ppb)
MTBE	No	ND<40.0	No									40.
Benzene	Sample	**297.**	Sample									5.
Toluene	Collected	**557.**	Collected									1,000.
Ethylbenzene	LNAPL	**711.**	Car									700.
Xylenes	Observed	**3,300.**	Over Well									10,000.
Total BTEX	in	**4,865**										-
1,3,5-Trimethylbenzene	Bailer	**584.**										350.
1,2,4-Trimethylbenzene		**1,590.**										
Naphthalene		**317.**										20.
Total Targeted VOCs		**7,356.**										-
GW Elevation (ft.)	87.29	89.21										-

All values reported in ug/L (ppb)
VGES - Vermont Groundwater Enforcement Standard (February 26, 2007). Detections prior to that date are compared to previously applicable standards.
TBQ - Trace Below Quantitation Limit
Chlorobenzene isomers removed from table due to non-detect results.
Bold values indicate detections. Shaded values indicate concentrations at or above the VGES.

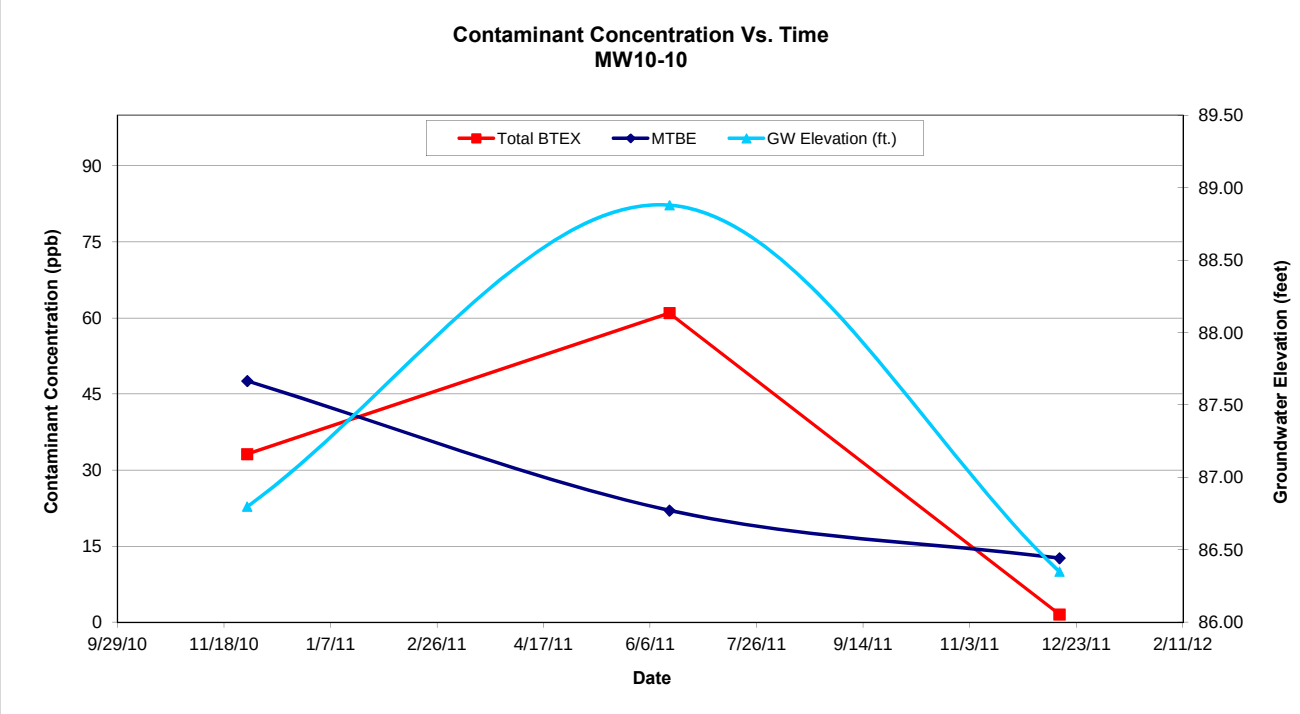

Contaminant Concentration Vs. Time
MW-8
Total BTEX
MTBE
GW Elevation (ft.)
Contaminant Concentration (ppb)
Groundwater Elevation (feet)
Date
6,000
5,000
4,000
3,000
2,000
1,000
0
90.00
89.50
89.00
88.50
88.00
87.50
87.00
86.50
86.00
85.50
85.00
84.50
10/1/93
6/27/96
3/24/99
12/18/01
9/13/04
6/10/07
3/6/10
11/30/12

GROUNDWATER QUALITY DATA SUMMARY

Monitoring Well MW10-10

Sample Date *EPA Analysis Method* PARAMETER	11/29/10 8021B	6/15/11 8021B	12/15/11 8021B									VGES (ppb)
Benzene	**18.2**	**55.0**	**1.6**									5.
Toluene	ND <1.0	ND <1.0	ND <1.0									1,000.
Ethylbenzene	**3.1**	**1.9**	ND <1.0									700.
Xylenes	**11.9**	**4.1**	ND <2.0									10,000.
Total BTEX	**33.2**	**61**	**1.6**									-
MTBE	**47.6**	**22.1**	**12.7**									40.
1,3,5-Trimethylbenzene	**2.2**	ND <1.0	ND <1.0									350.
1,2,4-Trimethylbenzene	**2.5**	ND <1.0	ND <1.0									
Naphthalene	ND <2.0	ND <2.0	ND <2.0									20.
Total Targeted VOCs	**85.5**	**83.1**	**14.3**									-
GW Elevation (ft.)	86.80	88.88	86.35									-

All values reported in ug/L (ppb)
VGES - Vermont Groundwater Enforcement Standard (February 26, 2007). Detections prior to that date are compared to previously applicable standards.
TBQ - Trace Below Quantitation Limit
Chlorobenzene isomers removed from table due to non-detect results.
Bold values indicate detections. Shaded values indicate concentrations at or above the VGES.

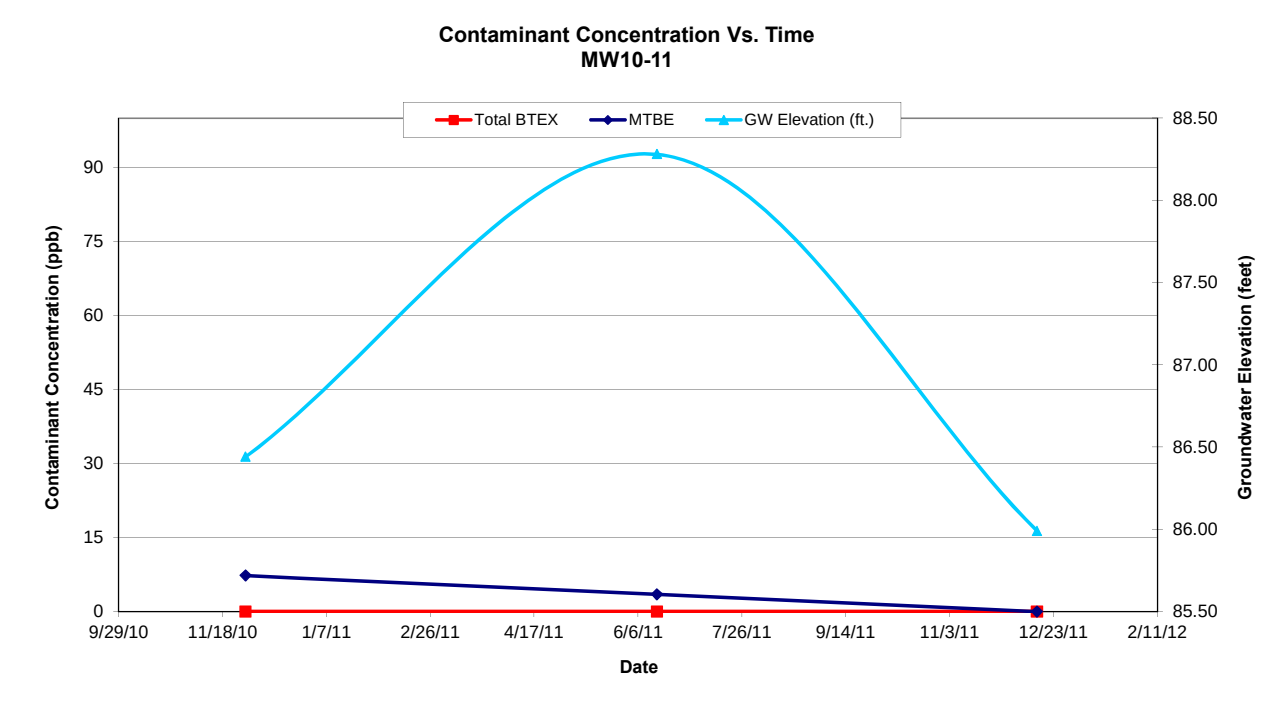


GROUNDWATER QUALITY DATA SUMMARY

Monitoring Well MW10-11

Sample Date *EPA Analysis Method* PARAMETER	11/29/10 8021B	6/15/11 8021B	12/15/11 8021B									VGES (ppb)
Benzene	ND <1.0	ND <1.0	ND <1.0									5.
Toluene	ND <1.0	ND <1.0	ND <1.0									1,000.
Ethylbenzene	ND <1.0	ND <1.0	ND <1.0									700.
Xylenes	ND <2.0	ND <2.0	ND <2.0									10,000.
Total BTEX	ND	ND	ND									-
MTBE	**7.3**	**3.5**	ND <2.0									40.
1,3,5-Trimethylbenzene	ND <1.0	ND <1.0	ND <1.0									350.
1,2,4-Trimethylbenzene	ND <1.0	ND <1.0	ND <1.0									
Naphthalene	ND <2.0	ND <2.0	ND <2.0									20.
Total Targeted VOCs	**7.3**	**3.5**	ND									-
GW Elevation (ft.)	86.44	88.28	85.99									-

All values reported in ug/L (ppb)
VGES - Vermont Groundwater Enforcement Standard (February 26, 2007). Detections prior to that date are compared to previously applicable standards.
TBQ - Trace Below Quantitation Limit
Chlorobenzene isomers removed from table due to non-detect results.
Bold values indicate detections. Shaded values indicate concentrations at or above the VGES.

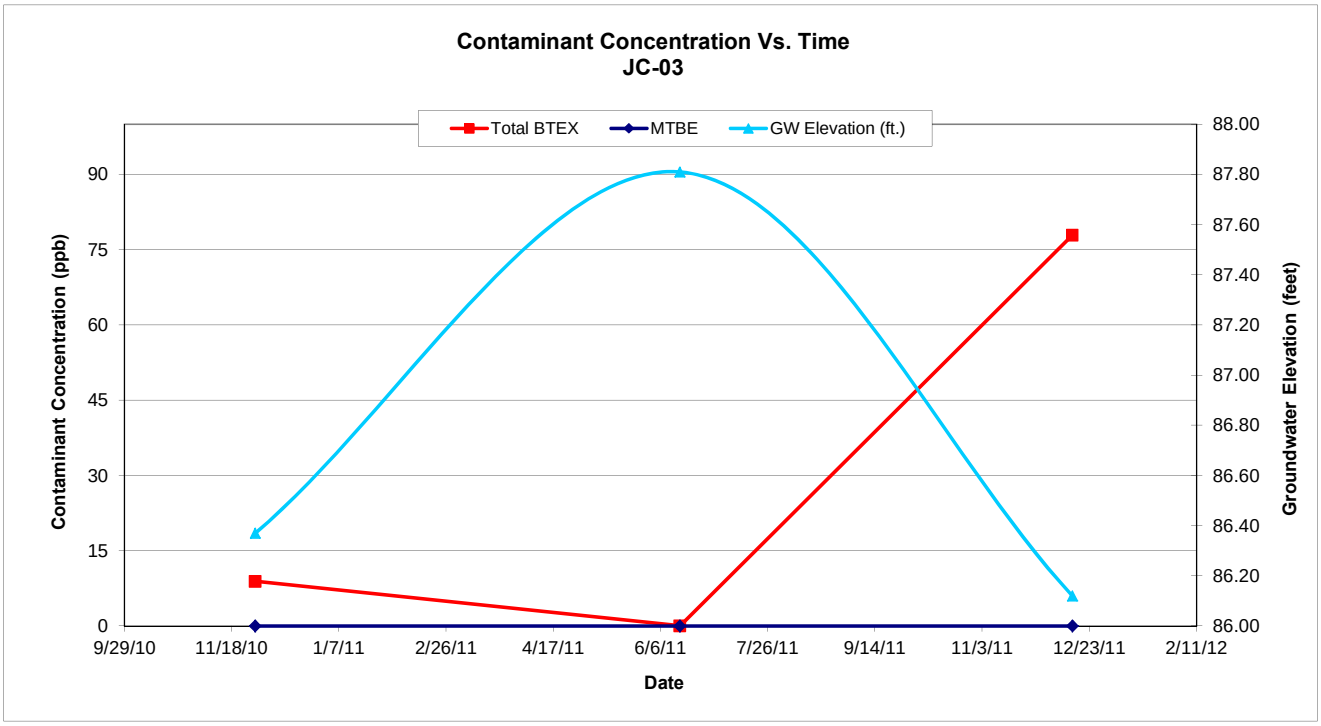


GROUNDWATER QUALITY DATA SUMMARY

Monitoring Well JC-03

Sample Date *EPA Analysis Method* PARAMETER	11/29/10 8021B	6/15/11 8021B	12/15/11 8021B									VGES (ppb)
Benzene	ND<1.0	ND<1.0	**2.9**									5.
Toluene	ND<1.0	ND<1.0	**12.7**									1,000.
Ethylbenzene	**1.3**	ND<1.0	**10.6**									700.
Xylenes	**7.6**	ND<2.0	**51.7**									10,000.
Total BTEX	**8.9**	ND	**77.9**									-
MTBE	ND<2.0	ND<2.0	ND<2.0									40.
1,3,5-Trimethylbenzene	ND<1.0	ND<1.0	**10.9**									350.
1,2,4-Trimethylbenzene	**3.1**	ND<1.0	**35.1**									
Naphthalene	ND<2.0	ND<2.0	**6.8**									20.
Total Targeted VOCs	**12.0**	ND	**130.7**									-
GW Elevation (ft.)	86.37	87.81	86.12									-

All values reported in ug/L (ppb)
VGES - Vermont Groundwater Enforcement Standard (February 26, 2007). Detections prior to that date are compared to previously applicable standards.
TBQ - Trace Below Quantitation Limit
Chlorobenzene isomers removed from table due to non-detect results.
Bold values indicate detections. Shaded values indicate concentrations at or above the VGES.



Quality Assurance and Control Summary

PARAMETER	Date of Sample Collection			
	12/15/2011			
	Trip Blank	MW-7	MW-7 Duplicate	RPD
MTBE	ND<2.0	**317.**	**315.**	0.6
Benzene	ND<1.0	**336.**	**324.**	3.6
Toluene	ND<1.0	ND<5.0	ND<5.0	-
Ethylbenzene	ND<1.0	**21.6**	**20.2**	6.7
Xylenes	ND<2.0	ND<10.0	ND<10.0	-
1,3,5-TMB*	ND<1.0	ND<5.0	ND<5.0	-
1,2,4-TMB*	ND<1.0	ND<5.0	ND<5.0	-
Naphthalene	ND<2.0	**11.7**	**10.7**	8.9
Total Reported VOCs	ND	**686.**	**670.**	2.4

NOTES

Results reported above detection limits are indicated in bold

* TMB = Trimethyl Benzene

EPA Method 8021B used for laboratory analysis

All values reported in ug/l (ppb) unless otherwise noted

ND<X - Not Detected (Detection Limit)

TBQ <X = Trace Below Quantitation Limit

n/a = not applicable

The results of the laboratory analysis of the duplicate sample were analyzed using a relative percent difference (RPD) analysis. The RPD is defined as 100 times the difference in reported concentration between sample and duplicate, divided by the mean of the two samples. A small RPD indicates good correlation between sample and duplicate.

Appendix G

Groundwater Analytical Laboratory Results

ENDYNE Inc.
Environmental Laboratories

Laboratory Report

KAS, Inc.	100306
PO Box 787	
Williston, VT 05495	
Atten: Sam Driver	

PROJECT: 411040130 Capitol Deli Montp.
WORK ORDER: **1112-18622**
DATE RECEIVED: December 16, 2011
DATE REPORTED: December 20, 2011
SAMPLER: Lauren Morley

Enclosed please find the results of the analyses performed for the samples referenced on the attached chain of custody. All required method quality control elements including instrument calibration were performed in accordance with method requirements and determined to be acceptable unless otherwise noted.

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

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

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

Reviewed by:

Harry B. Locker, Ph.D.
Laboratory Director

CLIENT: KAS, Inc.
PROJECT: 411040130 Capitol Deli Montp.
REPORT DATE: 12/20/2011

WORK ORDER: **1112-18622**
DATE RECEIVED: 12/16/2011

TEST METHOD: EPA 8021B

001 Site: MW-1 Date Sampled: 12/15/11 12:00 Analysis Date: 12/19/11 W EEP

Parameter	Result	Unit	Nelac	Qual	Parameter	Result	Unit	Nelac	Qual
Methyl-t-butyl ether (MTBE)	3.2	ug/L	N		Benzene	48.1	ug/L	N	
Toluene	2.4	ug/L	N		Ethylbenzene	1.8	ug/L	N	
Xylenes, Total	15.3	ug/L	N		1,3,5-Trimethylbenzene	3.9	ug/L	N	
1,2,4-Trimethylbenzene	13.3	ug/L	N		Naphthalene	7.2	ug/L	N	
Surr. 1 (Bromobenzene)	137	%	N	QS+	Unidentified Peaks	> 10		N	

TEST METHOD: EPA 8021B

002 Site: MW-6 Date Sampled: 12/15/11 09:43 Analysis Date: 12/16/11 W RBF

Parameter	Result	Unit	Nelac	Qual	Parameter	Result	Unit	Nelac	Qual
Methyl-t-butyl ether (MTBE)	< 2.0	ug/L	N		Benzene	< 1.0	ug/L	N	
Toluene	< 1.0	ug/L	N		Ethylbenzene	< 1.0	ug/L	N	
Xylenes, Total	3.2	ug/L	N		1,3,5-Trimethylbenzene	< 1.0	ug/L	N	
1,2,4-Trimethylbenzene	2.3	ug/L	N		Naphthalene	< 2.0	ug/L	N	
Surr. 1 (Bromobenzene)	92	%	N		Unidentified Peaks	> 10		N	

TEST METHOD: EPA 8021B

003 Site: MW-7 Date Sampled: 12/15/11 10:25 Analysis Date: 12/16/11 W RBF

Parameter	Result	Unit	Nelac	Qual	Parameter	Result	Unit	Nelac	Qual
Methyl-t-butyl ether (MTBE)	317	ug/L	N		Benzene	336	ug/L	N	
Toluene	< 5.0	ug/L	N		Ethylbenzene	21.6	ug/L	N	
Xylenes, Total	< 10.0	ug/L	N		1,3,5-Trimethylbenzene	< 5.0	ug/L	N	
1,2,4-Trimethylbenzene	< 5.0	ug/L	N		Naphthalene	11.7	ug/L	N	
Surr. 1 (Bromobenzene)	83	%	N		Unidentified Peaks	> 10		N	

TEST METHOD: EPA 8021B

004 Site: MW10-10 Date Sampled: 12/15/11 11:00 Analysis Date: 12/16/11 W RBF

Parameter	Result	Unit	Nelac	Qual	Parameter	Result	Unit	Nelac	Qual
Methyl-t-butyl ether (MTBE)	12.7	ug/L	N		Benzene	1.6	ug/L	N	
Toluene	< 1.0	ug/L	N		Ethylbenzene	< 1.0	ug/L	N	
Xylenes, Total	< 2.0	ug/L	N		1,3,5-Trimethylbenzene	< 1.0	ug/L	N	
1,2,4-Trimethylbenzene	< 1.0	ug/L	N		Naphthalene	< 2.0	ug/L	N	
Surr. 1 (Bromobenzene)	92	%	N		Unidentified Peaks	4		N	

TEST METHOD: EPA 8021B

005 Site: MW10-11 Date Sampled: 12/15/11 10:02 Analysis Date: 12/16/11 W RBF

Parameter	Result	Unit	Nelac	Qual	Parameter	Result	Unit	Nelac	Qual
Methyl-t-butyl ether (MTBE)	< 2.0	ug/L	N		Benzene	< 1.0	ug/L	N	
Toluene	< 1.0	ug/L	N		Ethylbenzene	< 1.0	ug/L	N	
Xylenes, Total	< 2.0	ug/L	N		1,3,5-Trimethylbenzene	< 1.0	ug/L	N	
1,2,4-Trimethylbenzene	< 1.0	ug/L	N		Naphthalene	< 2.0	ug/L	N	
Surr. 1 (Bromobenzene)	89	%	N		Unidentified Peaks	0		N	

CLIENT: KAS, Inc.
PROJECT: 411040130 Capitol Deli Montp.
REPORT DATE: 12/20/2011

WORK ORDER: **1112-18622**
DATE RECEIVED: 12/16/2011

TEST METHOD: EPA 8021B

006 Site: JC-03 Date Sampled: 12/15/11 09:30 Analysis Date: 12/16/11 W RBF

Parameter	Result	Unit	Nelac	Qual	Parameter	Result	Unit	Nelac	Qual
Methyl-t-butyl ether (MTBE)	< 2.0	ug/L	N		Benzene	2.9	ug/L	N	
Toluene	12.7	ug/L	N		Ethylbenzene	10.6	ug/L	N	
Xylenes, Total	51.7	ug/L	N		1,3,5-Trimethylbenzene	10.9	ug/L	N	
1,2,4-Trimethylbenzene	35.1	ug/L	N		Naphthalene	6.8	ug/L	N	
Surr. 1 (Bromobenzene)	98	%	N		Unidentified Peaks	> 10		N	

TEST METHOD: EPA 8021B

007 Site: Duplicate Date Sampled: 12/15/11 10:25 Analysis Date: 12/16/11 W RBF

Parameter	Result	Unit	Nelac	Qual	Parameter	Result	Unit	Nelac	Qual
Methyl-t-butyl ether (MTBE)	315	ug/L	N		Benzene	324	ug/L	N	
Toluene	< 5.0	ug/L	N		Ethylbenzene	20.2	ug/L	N	
Xylenes, Total	< 10.0	ug/L	N		1,3,5-Trimethylbenzene	< 5.0	ug/L	N	
1,2,4-Trimethylbenzene	< 5.0	ug/L	N		Naphthalene	10.7	ug/L	N	
Surr. 1 (Bromobenzene)	86	%	N		Unidentified Peaks	> 10		N	

TEST METHOD: EPA 8021B

008 Site: Trip Blank Date Sampled: 12/15/11 08:00 Analysis Date: 12/16/11 W RBF

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

Report Summary of Qualifiers and Notes

QS+: Indicates surrogate recovery was above method acceptance limits.

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

CHAIN-OF-CUSTODY-RECORD

58367

Special Reporting Instructions/PO#:

Project Name: Capitol Deli Montpelier 411040130	Client/Contact Name: KAS, Inc Sam Driver	Sampler Name: Lauren Morley
State of Origin: VT ✓ NY __ NH __ Other __	Phone #: 802-383-0486	Phone #: 802-383-0486
Endyne WO # 1112-18622	Mailing Address: KAS, Inc	Billing Address: KAS, Inc

Sample Location	Matrix	GRAB	COMP	Date/Time Sampled 12/15/11	Sample Containers No.	Sample Containers Type/Size	Sample Preservation	Analysis Required	FieldResults/Remarks	Due Date
MW-1	H_2O	X		12:00	2	40ml	HCl	19	Sheen	
MW-6				9:43						
MW-7				10:25						
MW10-10				11:00						
MW10-11				10:02						
JC-03				9:30						
Duplicate				10:25						
Trip Blank				8:00						

Relinquished by:	Date/Time	Received by:	Date/Time	Received by:	Date/Time
Lauren Morley	12/15/11 14:00	John M Timm	12/16/11 1045	Jane Parka	12/16/11 1055

1	pH	6	TKN	11	Total Solids	16	Sulfate	21	1664 TPH/FOG	26	8270 PAH Only
2	Chloride	7	Total P	12	TSS	17	Coliform (Specify)	22	8015 GRO	27	8081 Pest
3	Ammonia N	8	Total Diss. P	13	TDS	18	COD	23	8015 DRO	28	8082 PCB
4	Nitrite N	9	BOD	14	Turbidity	19	VT PCF	24	8260B	29	PP13 Metals
5	Nitrate N	10	Alkalinity	15	Conductivity	20	VOC Halocarbons	25	8270 B/N or Acid	30	Total RCRA8
31	Metals (Total, Diss.) Ag, Al, As, B, Ba, Be, Ca, Cd, Co, Cr, Cu, Fe, Hg, K, Mg, Mn, Mo, Na, Ni, Pb, Sb, Se, Sn, Tl, U, V, Zn										
32	TCLP (volatiles, semi-volatiles, metals, pesticides, herbicides)					33	Other				
34	Corrosivity	35	Ignitability	36	Reactivity	37	Other				
38	Other										

LAB USE ONLY
Delivery: Client
Temp: 3.6°C
Comment:

(White - Laboratory / Yellow - Client)

Appendix H

SVE/AS Pilot Test Data

Capital Deli SVE Pilot Test Results

1/5/2012

Vacuum at SVE Point (in. Water): 5
Influent PID Reading (ppm): 470
Flow Rate (cfm): 6000+

Monitoring Well ID	Distance from SVE Point (ft.)	Elapsed Time (min.) 25
Vacuum Reading (" water)		
MW-1	59	0.01
MW-2	21	0.08
MW-3	48	0.04
MW-4	12	0.10
MW-5	6	0.15
MW-8	63	0.01
MW10-09	23	0.05
MW10-10	44	0.04
Basement Well	50	0.00

Vacuum at SVE Point (in. Water): 20
Influent PID Reading (ppm): 875
Flow Rate (cfm): 6000+

Monitoring Well ID	Distance from SVE Point (ft.)	Elapsed Time (min.) 25
Vacuum Reading (" water)		
MW-1	59	0.02
MW-2	21	0.10
MW-3	48	0.03
MW-4	12	0.30
MW-5	6	0.50
MW-8	63	0.02
MW10-09	23	0.15
MW10-10	44	0.02
Basement Well	50	0.00

Vacuum at SVE Point (in. Water): 31 (Max)
Influent PID Reading (ppm): 954
Flow Rate (cfm): 6000+

Monitoring Well ID	Distance from SVE Point (ft.)	Elapsed Time (min.) 25
Vacuum Reading (" water)		
MW-1	59	0.03
MW-2	21	0.15
MW-3	48	0.03
MW-4	12	0.50
MW-5	6	0.70
MW-8	63	0.03
MW10-09	23	0.20
MW10-10	44	0.02
Basement Well	50	0.00

Capital Deli AS Pilot Test Results

1/5/2012

Compressor Output Pressure (psi): 2 6 10

Monitoring Well ID	Distance from AS Point (ft.)	Initial Reading	Elapsed Time (min.) 12	25	20
Pressure Reading (in. Water)					
MW-1	43	-	0.00	0.00	0.00
MW-2	9	-	0.00	0.03	0.00
MW-3	33	-	0.00	0.01	0.00
MW-4	26	-	0.01	0.01	0.00
MW-5	17	-	0.01	0.01	0.00
MW-8	49	-	0.00	0.00	0.00
MW10-09	32	-	0.01	0.00	0.00
MW10-10	61	-	0.00	0.00	0.00
Basement Well	53	-	-	0.00	0.00
PID Reading (ppm)					
MW-1	43	0.0	5.6	3.8	3.8
MW-2	9	0.0	2.1	0.5	7.0
MW-3	33	413	52.5	78.9	60.0
MW-4	26	0.0	1.3	4.7	1.1
MW-5	17	16.6	26.1	44.7	25.4
MW-8	49	7.3	5.0	5.4	7.1
MW10-09	32	-	-	26.7	-
MW10-10	61	0.4	3.2	1.5	3.1
Basement Well	53	-	-	979	1,107
Water Level Measurment (ft.)					
MW-1	43	12.71	12.73	12.73	12.78
MW-2	9	12.81	12.85	12.84	12.84
MW-3	33	12.40	12.40	12.40	12.40
MW-4	26	12.64	12.64	12.64	12.64
MW-5	17	12.36	12.40	12.40	12.40
MW-8	49	12.11	12.14	12.14	12.13
MW10-09	32	11.99	-	-	-
MW10-10	61	12.25	12.25	12.25	12.25
Basement Well	53	6.04	-	-	-

SVE/AS Pilot Test Results

1/5/2012

Compressor Output Pressure at AS Point (psi):	5
Vacuum at SVE Point (in. Water):	5
Influent PID Reading (ppm):	631
Flow Rate (cfm):	6000+

Monitoring Well ID	Distance from SVE Point (ft)	Distance from AS Point (ft)	Elapsed Time (min.) 20	
			Vacuum Reading (" water)	**Pressure Reading (" water)**
MW-1	59	43	0.00	-
MW-2	21	9	0.02	-
MW-3	48	33	0.00	-
MW-4	12	26	0.11	-
MW-5	6	17	0.15	-
MW-8	63	49	0.00	-
MW10-09	23	32	0.01	-
MW10-10	44	61	0.00	-
Basement Well	50	53	-	-

Compressor Output Pressure at AS Point (psi):	5
Vacuum at SVE Point (in. Water):	20
Influent PID Reading (ppm):	930
Flow Rate (cfm):	6000+

Monitoring Well ID	Distance from SVE Point (ft)	Distance from AS Point (ft)	Elapsed Time (min.) 20	
			Vacuum Reading (" water)	**Pressure Reading (" water)**
MW-1	59	43	0.00	-
MW-2	21	9	0.10	-
MW-3	48	33	0.00	-
MW-4	12	26	0.42	-
MW-5	6	17	0.50	-
MW-8	63	49	0.00	-
MW10-09	23	32	0.11	-
MW10-10	44	61	0.00	-
Basement Well	50	53	0.00	-

Compressor Output Pressure at AS Point (psi):	5
Vacuum at SVE Point (in. Water):	31 (max)
Influent PID Reading (ppm):	964
Flow Rate (cfm):	6000+

Monitoring Well ID	Distance from SP-1 (ft.)	Distance from MW 05-4 (ft.)	Elapsed Time (min.) 20	
			Vacuum Reading (" water)	**Pressure Reading (" water)**
MW-1	59	43	0.00	-
MW-2	21	9	0.15	-
MW-3	48	33	0.01	-
MW-4	12	26	0.70	-
MW-5	6	17	1.00	-
MW-8	63	49	0.02	-
MW10-09	23	32	0.21	-
MW10-10	44	61	0.00	-
Basement Well	50	53	0.00	-

Appendix I

SVE Pilot Test Calculated Radii of Influence

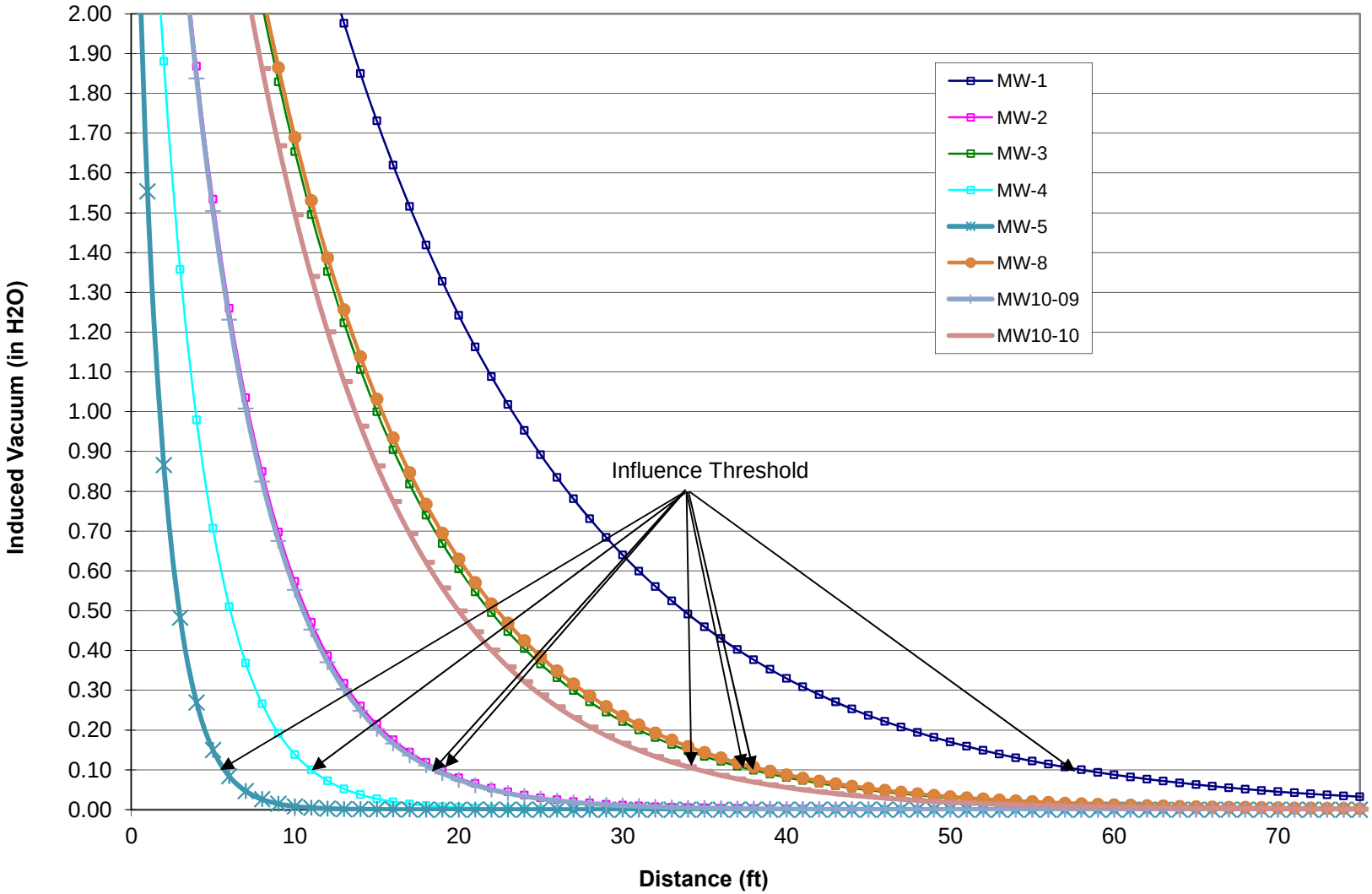
SVE Pilot Test
Radius of Influence Calculations
5" water vacuum

Recorded Data	feet	Vac
MW-1	0	5.00
	59	0.10
MW-2	0	5.00
	21	0.08
MW-3	0	5.00
	48	0.04
MW-4	0	5.00
	12	0.10
MW-5	0	5.00
	6	0.15
MW-8	0	5.00
	63	0.01
MW10-09	0	5.00
	23	0.05
MW10-10	0	5.00
	44	0.04

Calculated Induced Vacuum- Values Calculated by Interpolating Data from Logarithmic Function

Feet	MW-1	MW-2	MW-3	MW-4	MW-5	MW-8	MW10-09	MW10-10
0	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00
1	4.68	4.11	4.52	3.61	2.79	4.53	4.09	4.48
2	4.38	3.37	4.09	2.61	1.55	4.10	3.35	4.01
3	4.10	2.77	3.70	1.88	0.87	3.72	2.74	3.60
4	3.84	2.27	3.34	1.36	0.48	3.37	2.24	3.22
5	3.59	1.87	3.02	0.98	0.27	3.05	1.84	2.89
6	3.36	1.53	2.73	0.71	0.15	2.77	1.50	2.59
7	3.14	1.26	2.47	0.51	0.08	2.51	1.23	2.32
8	2.94	1.03	2.24	0.37	0.05	2.27	1.01	2.08
9	2.75	0.85	2.02	0.27	0.03	2.06	0.82	1.86
10	2.58	0.70	1.83	0.19	0.01	1.86	0.68	1.67
11	2.41	0.57	1.65	0.14	0.01	1.69	0.55	1.50
12	2.26	0.47	1.50	0.10	0.00	1.53	0.45	1.34
13	2.11	0.39	1.35	0.07	0.00	1.39	0.37	1.20
14	1.98	0.32	1.22	0.05	0.00	1.26	0.30	1.08
15	1.85	0.26	1.11	0.04	0.00	1.14	0.25	0.96
16	1.73	0.21	1.00	0.03	0.00	1.03	0.20	0.86
17	1.62	0.18	0.90	0.02	0.00	0.93	0.17	0.77
18	1.52	0.14	0.82	0.01	0.00	0.85	0.14	0.69
19	1.42	0.12	0.74	0.01	0.00	0.77	0.11	0.62
20	1.33	0.10	0.67	0.01	0.00	0.70	0.09	0.56
21	1.24	0.08	0.60	0.01	0.00	0.63	0.07	0.50
22	1.16	0.07	0.55	0.00	0.00	0.57	0.06	0.45
23	1.09	0.05	0.49	0.00	0.00	0.52	0.05	0.40
24	1.02	0.04	0.45	0.00	0.00	0.47	0.04	0.36
25	0.95	0.04	0.40	0.00	0.00	0.42	0.03	0.32
26	0.89	0.03	0.37	0.00	0.00	0.38	0.03	0.29
27	0.83	0.02	0.33	0.00	0.00	0.35	0.02	0.26
28	0.78	0.02	0.30	0.00	0.00	0.32	0.02	0.23
29	0.73	0.02	0.27	0.00	0.00	0.29	0.02	0.21
30	0.68	0.01	0.24	0.00	0.00	0.26	0.01	0.19
31	0.64	0.01	0.22	0.00	0.00	0.23	0.01	0.17
32	0.60	0.01	0.20	0.00	0.00	0.21	0.01	0.15
33	0.56	0.01	0.18	0.00	0.00	0.19	0.01	0.13
34	0.52	0.01	0.16	0.00	0.00	0.17	0.01	0.12
35	0.49	0.01	0.15	0.00	0.00	0.16	0.00	0.11
36	0.46	0.00	0.13	0.00	0.00	0.14	0.00	0.10
37	0.43	0.00	0.12	0.00	0.00	0.13	0.00	0.09
38	0.40	0.00	0.11	0.00	0.00	0.12	0.00	0.08
39	0.38	0.00	0.10	0.00	0.00	0.11	0.00	0.07
40	0.35	0.00	0.09	0.00	0.00	0.10	0.00	0.06
41	0.33	0.00	0.08	0.00	0.00	0.09	0.00	0.06
42	0.31	0.00	0.07	0.00	0.00	0.08	0.00	0.05
43	0.29	0.00	0.07	0.00	0.00	0.07	0.00	0.04
44	0.27	0.00	0.06	0.00	0.00	0.07	0.00	0.04
45	0.25	0.00	0.05	0.00	0.00	0.06	0.00	0.04
46	0.24	0.00	0.05	0.00	0.00	0.05	0.00	0.03
47	0.22	0.00	0.04	0.00	0.00	0.05	0.00	0.03
48	0.21	0.00	0.04	0.00	0.00	0.04	0.00	0.03
49	0.19	0.00	0.04	0.00	0.00	0.04	0.00	0.02
50	0.18	0.00	0.03	0.00	0.00	0.04	0.00	0.02
51	0.17	0.00	0.03	0.00	0.00	0.03	0.00	0.02
52	0.16	0.00	0.03	0.00	0.00	0.03	0.00	0.02
53	0.15	0.00	0.02	0.00	0.00	0.03	0.00	0.01
54	0.14	0.00	0.02	0.00	0.00	0.02	0.00	0.01
55	0.13	0.00	0.02	0.00	0.00	0.02	0.00	0.01
56	0.12	0.00	0.02	0.00	0.00	0.02	0.00	0.01
57	0.11	0.00	0.02	0.00	0.00	0.02	0.00	0.01
58	0.11	0.00	0.01	0.00	0.00	0.02	0.00	0.01
59	0.10	0.00	0.01	0.00	0.00	0.01	0.00	0.01
60	0.09	0.00	0.01	0.00	0.00	0.01	0.00	0.01
61	0.09	0.00	0.01	0.00	0.00	0.01	0.00	0.01
62	0.08	0.00	0.01	0.00	0.00	0.01	0.00	0.01
63	0.08	0.00	0.01	0.00	0.00	0.01	0.00	0.00
64	0.07	0.00	0.01	0.00	0.00	0.01	0.00	0.00
65	0.07	0.00	0.01	0.00	0.00	0.01	0.00	0.00
66	0.06	0.00	0.01	0.00	0.00	0.01	0.00	0.00
67	0.06	0.00	0.01	0.00	0.00	0.01	0.00	0.00
68	0.06	0.00	0.01	0.00	0.00	0.01	0.00	0.00
69	0.05	0.00	0.00	0.00	0.00	0.01	0.00	0.00
70	0.05	0.00	0.00	0.00	0.00	0.01	0.00	0.00
71	0.05	0.00	0.00	0.00	0.00	0.00	0.00	0.00
72	0.04	0.00	0.00	0.00	0.00	0.00	0.00	0.00
73	0.04	0.00	0.00	0.00	0.00	0.00	0.00	0.00
74	0.04	0.00	0.00	0.00	0.00	0.00	0.00	0.00
75	0.03	0.00	0.00	0.00	0.00	0.00	0.00	0.00
76	0.03	0.00	0.00	0.00	0.00	0.00	0.00	0.00
77	0.03	0.00	0.00	0.00	0.00	0.00	0.00	0.00

Induced 5" Vacuum vs. Distance



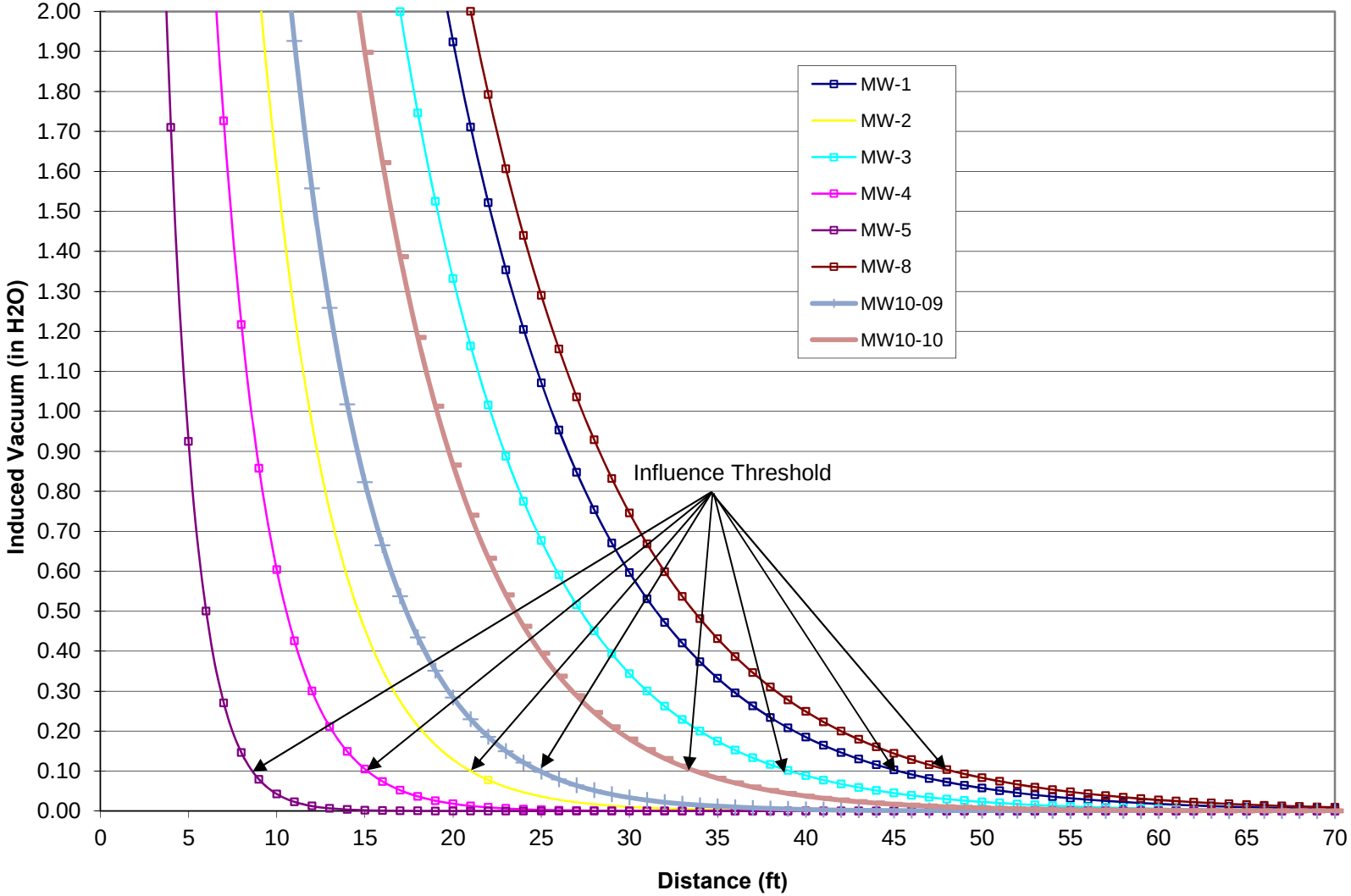
SVE Pilot Test
Radius of Influence Calculations
20" H20 Vacuum

Recorded Data	feet	Vac
MW-1	0	20.00
	59	0.02
MW-2	0	20.00
	21	0.10
MW-3	0	20.00
	48	0.03
MW-4	0	20.00
	12	0.30
MW-5	0	20.00
	6	0.50
MW-8	0	20.00
	63	0.02
MW10-09	0	20.00
	23	0.15
MW10-10	0	20.00
	44	0.02

Calculated Induced Vacuum- Values Calculated by Interpolating Data from Logarithmic Function

Feet	MW-1	MW-2	MW-3	MW-4	MW-5	MW-8	MW10-09	MW10-10
0	20.00	20.00	20.00	20.00	20.00	20.00	20.00	20.00
1	17.79	15.54	17.47	14.09	10.81	17.92	16.17	17.09
2	15.82	12.07	15.25	9.93	5.85	16.06	13.07	14.61
3	14.08	9.38	13.32	7.00	3.16	14.39	10.56	12.49
4	12.52	7.29	11.63	4.93	1.71	12.90	8.54	10.67
5	11.14	5.66	10.16	3.48	0.92	11.56	6.90	9.12
6	9.91	4.40	8.87	2.45	0.50	10.36	5.58	7.80
7	8.81	3.42	7.75	1.73	0.27	9.28	4.51	6.66
8	7.84	2.66	6.77	1.22	0.15	8.32	3.65	5.70
9	6.97	2.06	5.91	0.86	0.08	7.46	2.95	4.87
10	6.20	1.60	5.16	0.60	0.04	6.68	2.38	4.16
11	5.52	1.25	4.51	0.43	0.02	5.99	1.93	3.56
12	4.91	0.97	3.94	0.30	0.01	5.37	1.56	3.04
13	4.37	0.75	3.44	0.21	0.01	4.81	1.26	2.60
14	3.88	0.58	3.00	0.15	0.00	4.31	1.02	2.22
15	3.45	0.45	2.62	0.10	0.00	3.86	0.82	1.90
16	3.07	0.35	2.29	0.07	0.00	3.46	0.66	1.62
17	2.73	0.27	2.00	0.05	0.00	3.10	0.54	1.39
18	2.43	0.21	1.75	0.04	0.00	2.78	0.43	1.19
19	2.16	0.17	1.52	0.03	0.00	2.49	0.35	1.01
20	1.92	0.13	1.33	0.02	0.00	2.23	0.28	0.87
21	1.71	0.10	1.16	0.01	0.00	2.00	0.23	0.74
22	1.52	0.08	1.02	0.01	0.00	1.79	0.19	0.63
23	1.35	0.06	0.89	0.01	0.00	1.61	0.15	0.54
24	1.20	0.05	0.77	0.00	0.00	1.44	0.12	0.46
25	1.07	0.04	0.68	0.00	0.00	1.29	0.10	0.39
26	0.95	0.03	0.59	0.00	0.00	1.16	0.08	0.34
27	0.85	0.02	0.52	0.00	0.00	1.04	0.06	0.29
28	0.75	0.02	0.45	0.00	0.00	0.93	0.05	0.25
29	0.67	0.01	0.39	0.00	0.00	0.83	0.04	0.21
30	0.60	0.01	0.34	0.00	0.00	0.75	0.03	0.18
31	0.53	0.01	0.30	0.00	0.00	0.67	0.03	0.15
32	0.47	0.01	0.26	0.00	0.00	0.60	0.02	0.13
33	0.42	0.00	0.23	0.00	0.00	0.54	0.02	0.11
34	0.37	0.00	0.20	0.00	0.00	0.48	0.01	0.10
35	0.33	0.00	0.17	0.00	0.00	0.43	0.01	0.08
36	0.30	0.00	0.15	0.00	0.00	0.39	0.01	0.07
37	0.26	0.00	0.13	0.00	0.00	0.35	0.01	0.06
38	0.23	0.00	0.12	0.00	0.00	0.31	0.01	0.05
39	0.21	0.00	0.10	0.00	0.00	0.28	0.00	0.04
40	0.18	0.00	0.09	0.00	0.00	0.25	0.00	0.04
41	0.16	0.00	0.08	0.00	0.00	0.22	0.00	0.03
42	0.15	0.00	0.07	0.00	0.00	0.20	0.00	0.03
43	0.13	0.00	0.06	0.00	0.00	0.18	0.00	0.02
44	0.12	0.00	0.05	0.00	0.00	0.16	0.00	0.02
45	0.10	0.00	0.05	0.00	0.00	0.14	0.00	0.02
46	0.09	0.00	0.04	0.00	0.00	0.13	0.00	0.01
47	0.08	0.00	0.03	0.00	0.00	0.12	0.00	0.01
48	0.07	0.00	0.03	0.00	0.00	0.10	0.00	0.01
49	0.06	0.00	0.03	0.00	0.00	0.09	0.00	0.01
50	0.06	0.00	0.02	0.00	0.00	0.08	0.00	0.01
51	0.05	0.00	0.02	0.00	0.00	0.07	0.00	0.01
52	0.05	0.00	0.02	0.00	0.00	0.07	0.00	0.01
53	0.04	0.00	0.02	0.00	0.00	0.06	0.00	0.00
54	0.04	0.00	0.01	0.00	0.00	0.05	0.00	0.00
55	0.03	0.00	0.01	0.00	0.00	0.05	0.00	0.00
56	0.03	0.00	0.01	0.00	0.00	0.04	0.00	0.00
57	0.03	0.00	0.01	0.00	0.00	0.04	0.00	0.00
58	0.02	0.00	0.01	0.00	0.00	0.03	0.00	0.00
59	0.02	0.00	0.01	0.00	0.00	0.03	0.00	0.00
60	0.02	0.00	0.01	0.00	0.00	0.03	0.00	0.00
61	0.02	0.00	0.01	0.00	0.00	0.02	0.00	0.00
62	0.01	0.00	0.00	0.00	0.00	0.02	0.00	0.00
63	0.01	0.00	0.00	0.00	0.00	0.02	0.00	0.00
64	0.01	0.00	0.00	0.00	0.00	0.02	0.00	0.00
65	0.01	0.00	0.00	0.00	0.00	0.02	0.00	0.00
66	0.01	0.00	0.00	0.00	0.00	0.01	0.00	0.00
67	0.01	0.00	0.00	0.00	0.00	0.01	0.00	0.00
68	0.01	0.00	0.00	0.00	0.00	0.01	0.00	0.00
69	0.01	0.00	0.00	0.00	0.00	0.01	0.00	0.00
70	0.01	0.00	0.00	0.00	0.00	0.01	0.00	0.00
71	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.00
72	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.00
73	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.00
74	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.00
75	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.00
76	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
77	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
78	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
79	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
80	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

Induced 20" Vacuum vs. Distance



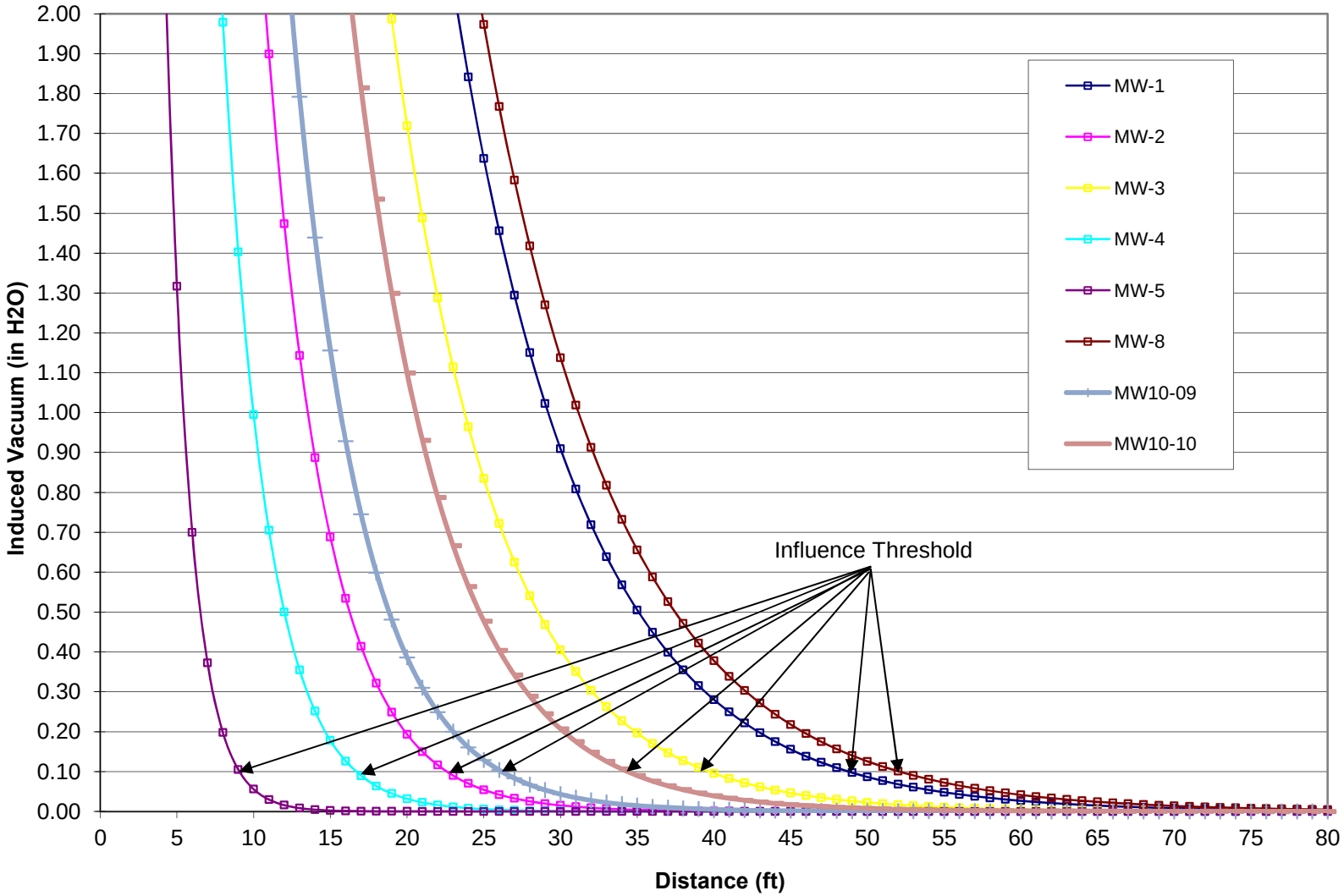
SVE Pilot Test
Radius of Influence Calculations
31" H20 Vacuum

Recorded Data	feet	Vac
MW-1	0	31.00
	59	0.03
MW-2	0	31.00
	21	0.15
MW-3	0	31.00
	48	0.03
MW-4	0	31.00
	12	0.50
MW-5	0	31.00
	6	0.70
MW-8	0	31.00
	63	0.03
MW10-09	0	31.00
	23	0.20
MW10-10	0	31.00
	44	0.02

Calculated Induced Vacuum- Values Calculated by Interpolating Data from Logarithmic Functior

Feet	MW-1	MW-2	MW-3	MW-4	MW-5	MW-8	MW10-09	MW10-10
0	31.00	31.00	31.00	31.00	31.00	31.00	31.00	31.00
1	27.56	24.05	26.83	21.98	16.48	27.77	24.90	26.23
2	24.50	18.66	23.21	15.58	8.76	24.87	19.99	22.20
3	21.78	14.47	20.09	11.05	4.66	22.28	16.06	18.79
4	19.36	11.23	17.39	7.83	2.48	19.95	12.90	15.90
5	17.22	8.71	15.04	5.55	1.32	17.87	10.36	13.45
6	15.30	6.76	13.02	3.94	0.70	16.01	8.32	11.38
7	13.61	5.24	11.27	2.79	0.37	14.34	6.68	9.63
8	12.10	4.07	9.75	1.98	0.20	12.84	5.36	8.15
9	10.75	3.16	8.44	1.40	0.11	11.50	4.31	6.90
10	9.56	2.45	7.30	0.99	0.06	10.30	3.46	5.84
11	8.50	1.90	6.32	0.71	0.03	9.23	2.78	4.94
12	7.56	1.47	5.47	0.50	0.02	8.26	2.23	4.18
13	6.72	1.14	4.73	0.35	0.01	7.40	1.79	3.54
14	5.97	0.89	4.09	0.25	0.00	6.63	1.44	2.99
15	5.31	0.69	3.54	0.18	0.00	5.94	1.16	2.53
16	4.72	0.53	3.07	0.13	0.00	5.32	0.93	2.14
17	4.20	0.41	2.65	0.09	0.00	4.76	0.75	1.81
18	3.73	0.32	2.30	0.06	0.00	4.27	0.60	1.54
19	3.32	0.25	1.99	0.05	0.00	3.82	0.48	1.30
20	2.95	0.19	1.72	0.03	0.00	3.42	0.39	1.10
21	2.62	0.15	1.49	0.02	0.00	3.07	0.31	0.93
22	2.33	0.12	1.29	0.02	0.00	2.75	0.25	0.79
23	2.07	0.09	1.11	0.01	0.00	2.46	0.20	0.67
24	1.84	0.07	0.96	0.01	0.00	2.20	0.16	0.56
25	1.64	0.05	0.83	0.01	0.00	1.97	0.13	0.48
26	1.46	0.04	0.72	0.00	0.00	1.77	0.10	0.40
27	1.29	0.03	0.62	0.00	0.00	1.58	0.08	0.34
28	1.15	0.03	0.54	0.00	0.00	1.42	0.07	0.29
29	1.02	0.02	0.47	0.00	0.00	1.27	0.05	0.24
30	0.91	0.02	0.41	0.00	0.00	1.14	0.04	0.21
31	0.81	0.01	0.35	0.00	0.00	1.02	0.03	0.18
32	0.72	0.01	0.30	0.00	0.00	0.91	0.03	0.15
33	0.64	0.01	0.26	0.00	0.00	0.82	0.02	0.13
34	0.57	0.01	0.23	0.00	0.00	0.73	0.02	0.11
35	0.50	0.00	0.20	0.00	0.00	0.66	0.01	0.09
36	0.45	0.00	0.17	0.00	0.00	0.59	0.01	0.08
37	0.40	0.00	0.15	0.00	0.00	0.53	0.01	0.06
38	0.35	0.00	0.13	0.00	0.00	0.47	0.01	0.05
39	0.32	0.00	0.11	0.00	0.00	0.42	0.01	0.05
40	0.28	0.00	0.10	0.00	0.00	0.38	0.00	0.04
41	0.25	0.00	0.08	0.00	0.00	0.34	0.00	0.03
42	0.22	0.00	0.07	0.00	0.00	0.30	0.00	0.03
43	0.20	0.00	0.06	0.00	0.00	0.27	0.00	0.02
44	0.18	0.00	0.05	0.00	0.00	0.24	0.00	0.02
45	0.16	0.00	0.05	0.00	0.00	0.22	0.00	0.02
46	0.14	0.00	0.04	0.00	0.00	0.20	0.00	0.01
47	0.12	0.00	0.03	0.00	0.00	0.17	0.00	0.01
48	0.11	0.00	0.03	0.00	0.00	0.16	0.00	0.01
49	0.10	0.00	0.03	0.00	0.00	0.14	0.00	0.01
50	0.09	0.00	0.02	0.00	0.00	0.13	0.00	0.01
51	0.08	0.00	0.02	0.00	0.00	0.11	0.00	0.01
52	0.07	0.00	0.02	0.00	0.00	0.10	0.00	0.01
53	0.06	0.00	0.01	0.00	0.00	0.09	0.00	0.00
54	0.05	0.00	0.01	0.00	0.00	0.08	0.00	0.00
55	0.05	0.00	0.01	0.00	0.00	0.07	0.00	0.00
56	0.04	0.00	0.01	0.00	0.00	0.06	0.00	0.00
57	0.04	0.00	0.01	0.00	0.00	0.06	0.00	0.00
58	0.03	0.00	0.01	0.00	0.00	0.05	0.00	0.00
59	0.03	0.00	0.01	0.00	0.00	0.05	0.00	0.00
60	0.03	0.00	0.01	0.00	0.00	0.04	0.00	0.00
61	0.02	0.00	0.00	0.00	0.00	0.04	0.00	0.00
62	0.02	0.00	0.00	0.00	0.00	0.03	0.00	0.00
63	0.02	0.00	0.00	0.00	0.00	0.03	0.00	0.00
64	0.02	0.00	0.00	0.00	0.00	0.03	0.00	0.00
65	0.01	0.00	0.00	0.00	0.00	0.02	0.00	0.00
66	0.01	0.00	0.00	0.00	0.00	0.02	0.00	0.00
67	0.01	0.00	0.00	0.00	0.00	0.02	0.00	0.00
68	0.01	0.00	0.00	0.00	0.00	0.02	0.00	0.00
69	0.01	0.00	0.00	0.00	0.00	0.02	0.00	0.00
70	0.01	0.00	0.00	0.00	0.00	0.01	0.00	0.00
71	0.01	0.00	0.00	0.00	0.00	0.01	0.00	0.00
72	0.01	0.00	0.00	0.00	0.00	0.01	0.00	0.00
73	0.01	0.00	0.00	0.00	0.00	0.01	0.00	0.00
74	0.01	0.00	0.00	0.00	0.00	0.01	0.00	0.00
75	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.00
76	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.00
77	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.00
78	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.00
79	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.00
80	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
81	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
82	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
83	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
84	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
85	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
86	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

Induced 31" Vacuum vs. Distance



Appendix J

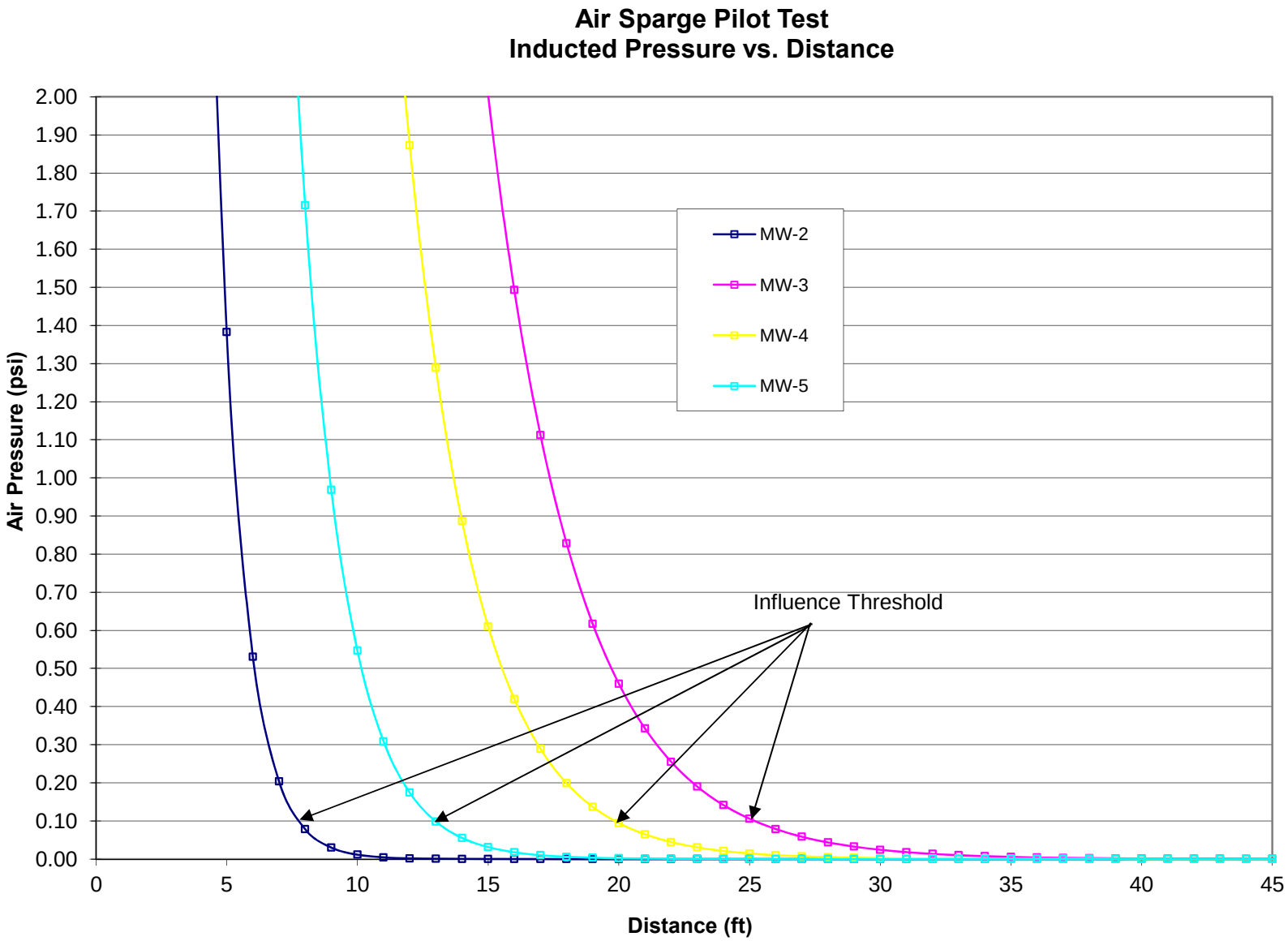
AS Pilot Test Calculated Radii of Influence

AS Pilot Test
Radius of Influence Calculations
6 psi 166.02 in water

Recorded Data	feet	Vac
MW-2	0	166.02
	9	0.03
MW-3	0	166.02
	33	0.01
MW-4	0	166.02
	26	0.01
MW-5	0	166.02
	17	0.01

Calculated Induced Vacuum- Values Calculated by Interpolating Data from Logarithmic Function

Feet	MW-2	MW-3	MW-4	MW-5
0	166.02	166.02	166.02	166.02
1	63.72	123.67	114.25	93.74
2	24.46	92.13	78.62	52.93
3	9.39	68.63	54.10	29.88
4	3.60	51.12	37.23	16.87
5	1.38	38.08	25.62	9.53
6	0.53	28.37	17.63	5.38
7	0.20	21.13	12.13	3.04
8	0.08	15.74	8.35	1.71
9	0.03	11.73	5.75	0.97
10	0.01	8.74	3.95	0.55
11	0.00	6.51	2.72	0.31
12	0.00	4.85	1.87	0.17
13	0.00	3.61	1.29	0.10
14	0.00	2.69	0.89	0.06
15	0.00	2.00	0.61	0.03
16	0.00	1.49	0.42	0.02
17	0.00	1.11	0.29	0.01
18	0.00	0.83	0.20	0.01
19	0.00	0.62	0.14	0.00
20	0.00	0.46	0.09	0.00
21	0.00	0.34	0.06	0.00
22	0.00	0.26	0.04	0.00
23	0.00	0.19	0.03	0.00
24	0.00	0.14	0.02	0.00
25	0.00	0.11	0.01	0.00
26	0.00	0.08	0.01	0.00
27	0.00	0.06	0.01	0.00
28	0.00	0.04	0.00	0.00
29	0.00	0.03	0.00	0.00
30	0.00	0.02	0.00	0.00
31	0.00	0.02	0.00	0.00
32	0.00	0.01	0.00	0.00
33	0.00	0.01	0.00	0.00
34	0.00	0.01	0.00	0.00
35	0.00	0.01	0.00	0.00
36	0.00	0.00	0.00	0.00
37	0.00	0.00	0.00	0.00
38	0.00	0.00	0.00	0.00
39	0.00	0.00	0.00	0.00
40	0.00	0.00	0.00	0.00
41	0.00	0.00	0.00	0.00
42	0.00	0.00	0.00	0.00
43	0.00	0.00	0.00	0.00
44	0.00	0.00	0.00	0.00
45	0.00	0.00	0.00	0.00
46	0.00	0.00	0.00	0.00
47	0.00	0.00	0.00	0.00
48	0.00	0.00	0.00	0.00
49	0.00	0.00	0.00	0.00
50	0.00	0.00	0.00	0.00
51	0.00	0.00	0.00	0.00
52	0.00	0.00	0.00	0.00
53	0.00	0.00	0.00	0.00
54	0.00	0.00	0.00	0.00


Air Sparge Pilot Test
Inducted Pressure vs. Distance
Air Pressure (psi)
2.00
1.90
1.80
1.70
1.60
1.50
1.40
1.30
1.20
1.10
1.00
0.90
0.80
0.70
0.60
0.50
0.40
0.30
0.20
0.10
0.00
0
5
10
15
20
25
30
35
40
45
Distance (ft)
MW-2
MW-3
MW-4
MW-5
Influence Threshold

Appendix K

EFR Data Summary

Fluid Recovery Estimates

Date	Vapor Phase Gasoline Recovery (fluid gallons)	Liquid Phase Gasoline Recovery (fluid gallons)	Total Gasoline Recovery (fluid gallons)	Total Fluids Recovered (gallons)	Average Recovery Well Groundwater Elevation (ft)*
1/30/2012	22.39	6.5	28.9	92	87.59

* Average elevation collected from MW-2, -4 and -5 prior to event

EFR E traction Event Data Summary

Date	Total Volume of Gasoline Recovered per event (gal)	Approx. $/Gallon	Cumulative Gallons Recovered	Cumulative Approx. $/Gallon
1/30/2012	28.9	$60.00	28.9	$ 60.00

KAS Montpelier
108 State Street
Montpelier, VT
January 30, 2012

Clock Time	Time (min)	Down Time (min)	Extraction Well IDs	System Influent Concentration (ppm)	System Influent End Concentration (ppm)	System Influent Average Concentrations (ppm)	Initial Air Flow (scfm)	End Air Flow (scfm)	Mean Air Flow (scfm)	Influent BTUs/hr	System Well Vacuum at engine (in H2O)	Mass Removal Rate (lbs/hr) based upon Inf Conc	Mass Removal (lbs)	Cumulative Removal (lbs) based upon FID measurements	Mass Removal Rate (lbs/hr) based upon BTU/hr	Mass Removal (lbs)	Cumulative Removal based upon BTU rate
1905 - start	5	0	MW-2, MW-4, MW-5	56900	56900	56900	54	54	54	398800	48	3.77	0.31	0.31	22.16	1.85	1.85
1905 to 1931	30	0	MW-2, MW-4, MW-5	56900	76300	66600	54	57	55.5	375600	55	27.21	13.61	13.61	20.87	10.43	10.43
1931 to 1957	30	0	MW-2, MW-4, MW-5	76300	99400	87850	57	60	58.5	376400	115	37.84	18.92	32.53	20.91	10.46	20.89
1957 to 2024	30	0	MW-2, MW-4, MW-5	99400	108000	103700	60	61	60.5	361400	81	46.19	23.10	55.62	20.08	10.04	30.93
2024 to 2058	30	0	MW-2, MW-4, MW-5	108000	105500	106750	61	60	60.5	375800	105	47.55	23.77	79.40	20.88	10.44	41.37
2058 to 2128	30	0	MW-2, MW-4, MW-5	105500	93700	99600	60	60	60	367700	75	44.00	22.00	101.40	20.43	10.21	51.58
2128 to 2203	30	0	MW-2, MW-4, MW-5	93700	84800	89250	60	57	58.5	355600	139	38.44	19.22	120.62	19.76	9.88	61.46
2203 to 2228	30	0	MW-2, MW-4, MW-5	84800	74000	79400	57	55	56	383200	177	32.74	16.37	136.98	21.29	10.64	72.10
2228 to 2301	30	0	MW-2, MW-4, MW-5	74000	67600	70800	55	58	56.5	355600	164	29.45	14.73	151.71	19.76	9.88	81.98
2301 to 2337	30	0	MW-2, MW-4, MW-5	67600	85000	76300	58	56	57	418700	132	32.02	16.01	167.72	23.26	11.63	93.61
0009 to 0037	30	0	MW-2, MW-4, MW-5	85000	69000	77000	56	56	56	426300	126	31.75	15.87	183.59	23.68	11.84	105.45
0037 to 0105	30	0	MW-2, MW-4, MW-5	69000	65900	67450	56	56	56	370200	119	27.81	13.90	197.50	20.57	10.28	115.74
0105 to 0123	30	0	MW-2, MW-4, MW-5	65900	64800	65350	56	56	56	369000	124	26.94	13.47	210.97	20.50	10.25	125.99
0123 to 0159	30	0	MW-2, MW-4, MW-5	64800	77400	71100	56	56	56	376000	71	29.31	14.66	225.63	20.89	10.44	136.43
0201 - finish	5	0	MW-2, MW-4, MW-5	77400	76900	77150	56	56	56	374000	79	5.30	0.44	226.07	20.78	1.73	138.16
TOTAL	395													226.07			138.16

NOTES:
1 Empty knock out tank of liquid to vac truck
2 Swap propane tank at 18:30 (1/2 tank), 21:25
3 18000 btu/lb for gasoline
4 pounds removed per time period based upon FID measurements = (Hrs) x Average Flow (cfm) x ((Average VOC (ppm)) x (95 g / mol) x (1.55 x 10^-7 (lb-mol-min/ppm-hr-ft3-g))
5 pounds removed per time period based upon BTU/hr measurements = BTUs/hr x (1/18000 BTU/lb of gasoline)
6 2 bottles of propane used
7 Stinger set at approximately 2 feet in water table
8 Total volume of water extracted 92 gallons
9 ppm: parts per million, readings collected using internal Flame Ionization Detector in Internal Combustion Engine
10 min: minutes
11 scfm: standard cubic feet per minute, as calculated within the Internal Combustion Engine logic controller
12 BTUs/hr: British Thermal Units per hour, as calculated within the Internal Combustion Engine logic controller
13 lbs/hr: pounds per hour
14 in H2O: inches of water
15 lbs: pounds
16 Ice forming in lines throughout evening, resulting in pipe restrictions and head losses

Groundwater Environmental Services, Inc.,
Windsor, CT

Appendix L

Cost Effectiveness Analysis

Cost Effectiveness Analysis

	Effectiveness	Feasibility	Treatment Time	Cost	Weighted
	30%	20%	20%	30%	Score
Soil Vapor Extraction	2	2	2	2.5	2.2
Enhanced Fluid Recovery	3	2.5	3	3	2.9

Appendix M

Cost Estimate

SVE Cost Estimate Summary

Task 1.0:		
Design/CAP Preparation:		**4,710.00**
Task 2.0:		
Project Coordination/HASP Preparation:		**2,800.00**
Task 3.0:		
Subsurface Remediation Installation		
3.1	Premark/Digsafe	$198.25
3.2	SVE Point Install	$3,292.82
3.3	Trenching / Piping Installation SVE Setup	$72,328.25
3.4	System Startup	$893.25
2.5	As-Built Report	$1,620.00
	Task Total:	**78,332.57**
Task 4.0:		
Bi-Weekly SVE O&M Site Visits - First 6 months (12 Visits) followed by 6 monthly site visits		
529/Site Visit		
	Total 18 SVE O&M Visits:	**9,518.85**
Task 5.0:		
Semi-Annual GW Monitoring & Report Preparation:		
2,915.75/Event		
	Annual Cost (2 Visits):	**5,831.50**
	Total Estimated Cost After 1 Year:	**101,192.92**

EFR Cost Estimate Summary

Task 1.0:		
Coordination		$160.00
Bi-Monthly EFR Events		$4,789.45
	Total per Event	**4,949.45**

Total Estimated Cost After 1 Year (6 Events):	**29,696.70**