2009 ANNUAL MONITORING REPORT

for the

BRESSETT SITE
RANDOLPH, VERMONT

VT DEC Site #77-0019

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1.0 INTRODUCTION

The following *2009 Annual Monitoring Report* for the Bressett Site in Randolph, Vermont (see attached Site Location Map in Appendix A) was prepared by Waite Environmental Management, LLC (WEM) for the Vermont Department of Environmental Conservation (VT DEC). This report has been completed in accordance WEM's contract with State of Vermont (contract EC13-04) for environmental monitoring.

This report includes discussion of the results of groundwater, drinking water, surface water, and indoor air sampling conducted by WEM during 2009. Monitoring locations were in the vicinity of the former Bressett Residence, Vermont Route 12, and Town Road #23. Events covered in this report include:

- Monitoring of eighteen (18) groundwater monitoring wells during April and October 2009.
- Monitoring of one (1) active supply well in April and October 2009.
- Monitoring of one (1) active spring water system during April and October 2009.
- Monitoring of two (2) surface water locations in July 2009.
- Monitoring of indoor air at two (2) indoor locations inside a residence in January and July 2009.

Monitoring at these locations was conducted in accordance with WEM's *Work Plan for Environmental Monitoring* ("Work Plan") [1], the *Field/Lab Coordination Memorandum for Water Monitoring* ("FLCM-Water") [2], and the *Field/Lab Coordination Memorandum for Air Monitoring* ("FLCM-Air") [3].

All results except those from October (4th Quarter) 2009, which are discussed in this report, have been previously reported by WEM [4, 5, 6].

2.0 GROUNDWATER SAMPLING

Groundwater monitoring well sampling was conducted by WEM from a total of fifteen (15) wells on April 29-30, 2009 and from fourteen (14) wells on October 13-14, 2009. Wells sampled included six paired monitoring wells (MW-3S/D, MW4-S/D, MW-101S/D, MW-102S/D, MW-103S/D, MW-104S/D) and three bedrock monitoring wells (BRW-1, BRW-2, BRW-3). In addition, groundwater elevation measurement was conducted on an additional three (3) wells (MW-1, MW-2S/D). Sampling was conducted in accordance site protocols as specified in WEM's Work Plan and the FLCM-Water. All wells were in the general vicinity of the former Bressett residence. All well locations are shown in the Site Plan in Appendix A. Details and results of the sampling events are described below.

2.1 Groundwater Level Measurement

Prior to sampling, the water level in each well was measured with a water level probe. Using top-of-casing elevation data, the measurements were converted into groundwater elevations. Elevation data from April and October 2009 are shown with historical measurements in Table 1.1 in Appendix B. These data indicate the following:

- Groundwater elevation measurements in April 2009 were generally lower (0.7 ft average) than the typical springtime measurements from 2002-08.
- Groundwater elevation measurements in October 2009 were very similar to measurements from fall 2002-08. No atypical measurements were noted.
- Well MW-103S was observed to be dry during October 2009, which is often the case for fall sampling.
- Groundwater elevations fluctuate slightly with the seasons, and are typically higher in the spring than in the fall, often by several feet. The April 2009 average elevation was 1.13 feet higher than the October 2009 average elevation.

Groundwater elevations were also plotted to develop groundwater elevation maps for each sampling event (see Appendix A). As these maps show, the general direction of groundwater flow (based on shallow well data) was toward the southwest during both the spring and fall. The lateral hydraulic gradient, as calculated between MW-3S and MW-102S, was 0.041 ft/ft in April 2009 and 0.037 ft/ft in October 2009. Vertical hydraulic gradients calculated between the paired wells (see Table 1.1) were generally negligible except in paired well MW-101S/D which had downward vertical gradients of 0.09 ft/ft and 0.11 ft/ft in April and October, respectively; this well pair consistently has a measurable downward vertical gradient.

2.2 Groundwater Sample Collection

Overburden monitoring wells MW-101S/D, MW-102S/D, MW-103S/D, MW-104S/D were purged and sampled using a low-flow methodology. These monitoring wells were purged using a peristaltic pump (Geotech Geopump II) connected to dedicated high density polyethylene (HDPE) tubing within each well that extended to a pre-specified intake depth. The dedicated HDPE tubing was connected to disposable silicon tubing that ran through the head of the peristaltic pump; new silicon tubing was used for each well purged. Purge rates ranged between 20-300 milliliters/minute (ml/min). During the purging process, the water level was monitored using a water level probe (Solinst) with a 0.25-inch probe, and geochemical parameters were measured using a water quality meter (Horiba U-22 Model U-22XD) with a flow cell connected to the outlet of the peristaltic pump. The following field geochemical parameters were monitored: dissolved oxygen, specific conductance, temperature, pH, turbidity, and redox potential. Wells were allowed to purge until geochemical parameters stabilized, as specified by site protocols. Upon stabilization, the silicon tubing was disconnected from the water meter. Samples were then collected directly from the outlet of the peristaltic pump.

Bedrock monitoring wells BRW-1, BRW-2, and BRW-3 were also purged and sampled using the low flow methodology as described above. However, the pump used was a submersible (Grundfos Redi-Flo II) with dedicated flexible tubing. The pump was decontaminated with Alconox and deionized water prior to use and after use in each well. Purge rates and pump intake depths were as dictated by the site protocols. With the higher purge rates, the flow cell for the water quality meter could not be utilized, so water samples were regularly collected in a glass jar in which the probes for the water quality meter were inserted. Upon stabilization, samples were collected directly from the outlet of the disposable tubing.

Overburden monitoring wells MW-3S, MW-4S, and MW4-D were purged using dedicated bailers and well MW-3D is purged with the combination of a peristaltic pump and a bailer. Purge volumes were calculated as three (3) times the volume of water in the well. Upon reaching the desired purge volume in each well, a small volume of the water was collected in a glass jar in which the probes for the water quality meter were inserted. Samples were then poured directly from the bailers into the sampling containers.

In all cases, the order of sample collection was as dictated by site protocols, and all samples were collected in pre-acidified sampling containers supplied by the laboratory and immediately placed on ice in a cooler. All samples were delivered by WEM to Test America laboratory (TA) of South Burlington, Vermont for analysis of volatile organic compounds via EPA Method 8260B. The following four target VOCs are monitored as part of this project: tetrachloroethene (PCE), trichloroethene (TCE), cis-1,2-dichloroethene (cis-1,2-DCE), and trans-1,2-dichloroethene (trans-1,2-DCE). Results, in micrograms per liter (ug/L), are discussed below.

2.3 Discussion of Results

2.3.1 Field Geochemical Data

Field geochemical parameter measurements are summarized in Tables 1.2 through 1.7 in Appendix B. Based on these data, the geochemical parameter measurements from the monitoring wells in 2009 were generally within the historical range measured over the past several years. Anomalous measurements from April and October 2009 are discussed below:

- **Dissolved Oxygen**: wells MW-3S, MW-3D, MW-4S, and MW-4D had atypically low DO readings in April 2009. The DO readings recovered to typical levels at MW-3S, MW-4S, and MW-4D in October 2009, but remained low in MW-3D, suggestive of a decreasing trend.
- **Specific Conductance**: wells MW-101S, MW-101D, MW-104D, BRW-1, and BRW-2 had atypically high SC readings in April 2009. Most SC readings recovered to typical levels in October 2009, but several SC readings were deemed questionable due to a faulty probe.
- **pH**: during both April and October 2009 pH readings were within the range of historical measurements, with no anomalies or clear trends are noted.
- **Turbidity**: well MW-104D had an atypically low turbidity reading in April 2009, and wells MW-102D and MW-4D had atypically high turbidity readings in October 2009. No clear trends are noted.
- **Redox**: during both April and October 2009 redox potential readings were within the range of historical measurements, with no anomalies or clear trends are noted.

2.3.2 Laboratory Data

Validated laboratory analytical results are summarized in Table 2.0 in Appendix B. Full copies of the laboratory reports are presented in the Data Validation Reports [8, 11] prepared by Phoenix Chemistry Service, on file at the VT DEC offices in Waterbury.

The analytical results for the target compounds of interest during April and October 2009 are described below:

PCE

- PCE was detected above reporting limits in wells MW-3S, MW-3D, MW-4D, MW-101S, MW-101D, and MW-102S during both April and October 2009. PCE was detected in MW-4S during October but was detected at a trace concentration (estimated below reporting limits) in April 2009.
- PCE was not detected above reporting limits in any of the following wells: MW-102D, MW-103S/D, MW-104S/D, BRW-1, BRW-2, or BRW-3 during either April or October 2009.
- PCE concentrations increased between April and October 2009 in wells MW-3S and MW-3D. PCE was stable in MW-4S, MW-4D, MW-101S, MW-101D and MW-102D.

- With the exception of brief increasing trend in PCE concentrations in well MW-102S between 2005 and 2007, PCE has generally been decreasing or stable with time.

TCE

- TCE was detected above reporting limits in wells MW-3S, MW-3D, MW-101S, MW-101D, and MW-102S during both April and October 2009. TCE was detected at a trace concentration (estimated below reporting limits) in well MW-4D during April 2009.
- TCE was not detected above reporting limits in any of the following wells: MW-4S, MW-102D, MW-103S/D, MW-104S/D, BRW-1, BRW-2, or BRW-3 during either April or October 2009.
- TCE concentrations increased between April and October in wells MW-3S and MW-3D. TCE was stable in MW-4D, MW-101S, MW-101D, and MW-102S.
- TCE has generally been decreasing or stable with time.

cis-1,2-DCE

- cis-1,2-DCE was detected above reporting limits in wells MW-3S, MW-3D, MW-101D, and MW-102S during both April and October 2009. cis-1,2-DCE was detected at a trace concentration (estimated below reporting limits) in well MW-101S during both April and October 2009.
- cis-1,2-DCE was not detected above reporting limits in wells MW-4S, MW-4D, MW-102D, MW-103S/D, MW-104S/D, BRW-1, BRW-2, or BRW-3 during April or October 2009.
- cis-1,2-DCE concentration increased between April and October in well MW-3D, but remained stable in MW-3S, MW-101D and MW-102S.
- cis-1,2-DCE has generally been decreasing or stable with time

trans-1,2-DCE

- trans-1,2-DCE was detected above reporting limits in well MW-3D in April 2009. This compound was also detected at estimated concentrations below the reporting limit in wells MW-101D and MW-102S in April and October and in well MW-3S in April.
- trans-1,2-DCE was not detected above reporting limits in any of the following wells: MW-4S/D, MW-101S, MW-102D, MW-103S/D, MW-104S/D, BRW-1, BRW-2, or BRW-3.
- No significant trends in trans-1,2-DCE concentrations were noted.

Compared to Vermont groundwater enforcement standard ("VGES") [12] most of the reported PCE and TCE concentrations were above the 5.0 ug/L standard for each compound. Wells out of compliance with VGES for PCE and/or TCE during both the April and October 2009 events include: MW-3S/D, MW-4D, MW-101S, MW-101D, and MW-102S.

To compare the 2009 results to historical groundwater results, PCE concentrations were plotted against time (see graphs in Appendix C). As these graphs show, long-term concentration trends are generally decreasing or stable with time for wells MW-3S, MW-4S, MW-4D, MW-101S, MW-101D, and MW-102D. Previously noted increasing trends in PCE concentration in wells

MW-3D and MW-102S now appear to have ended. The wells that are not shown in the graphs in Appendix C are generally steadily non-detect with time.

Regarding the distribution of CVOC contamination, the plume continues to extend in a general northeast/southwest orientation between wells MW-3S/D and MW-102S/D. The approximate limits of the plume during 2009 are shown in the maps in Appendix A. The upgradient extent of the plume increased between April and October due to the increase in VOCs in MW-3D.

2.3.3 QA/QC Samples

As part of the quality assurance/quality control (QA/QC) program, WEM collected field duplicate samples during the April and October 2009 sampling events. During April, sample "MW-X" was conducted in conjunction with MW-3D. During October, sample "MW-Z" was collected in conjunction with MW-3D. Duplicate samples were analyzed by TA using the same method (EPA Method 8260B). In all cases precision in these field duplicate samples was acceptable (less than 30% RPD) for all target analytes greater than 2 times the quantitation limit.

During each day of sampling for the April and October sampling events, one field blank was prepared and one pre-containerized trip blank was added to the cooler and submitted for analysis by EPA Method 8260B. No target compounds were reported in any field blank or trip blank sample collected at the site during 2009.

2.4 Discussion of Data Validation

The laboratory data from the April and October 2009 sampling events were validated by Phoenix Chemistry Services, an independent data validator. The validation was performed in accordance with Tier III guidelines as described by the USEPA Region I. Details are presented in the Data Validation Reports [8, 11] on file at the VT DEC offices in Waterbury. The text of the data validation report for the October 2009 sampling event is included in Appendix E.

Results for the target VOCs were determined to be valid as reported for all groundwater samples collected from the Site on April 29-30, 2009 (sample delivery group (SDG) No. BRES43) and on October 13-14, 2009 (SDG No. BRES45) with the following exceptions:

- The October 2009 results for TCE (trace below quantitation limit) in samples MW-104D and MW-4D were qualified as less than the quantitation limit due to field contamination in a trip blank submitted for a different site.

- October 2009 results for PCE initially outside the calibration range in the original analyses of MW-3D and MW-Z were rejected (R) and replaced with the acceptable concentrations from the corresponding diluted samples.

There were some qualifications for non-target VOCs and some documentation and compliance issues noted for both sample groups, but none that directly affected the validity of the groundwater data.

2.5 Recommendations

Based on the above information, overburden groundwater at the Site continues to show evidence of chlorinated VOCs at concentrations that exceed applicable enforcement standards. Given these conditions, WEM recommends continuing the groundwater monitoring program as specified in the Work Plan and FLCM-Water. The next sampling event is scheduled for April 2010.

3.0 WATER SUPPLY SAMPLING

Water supply sampling was conducted by WEM from the water system at the former Bressett residence and from the active bedrock well at the former Shields residence on April 29 and October 13, 2009. The water supply sampling locations are the bedrock well at the former Shields residence on Town Road #23 and the spring system in the former Bressett Residence on Route 12. Sampling locations are shown in the Site Plan in Appendix A.

In October-November 2009 the water line from the Bressett Spring was replaced with a new copper line, and the water holding tank in the basement of the residence was replaced, both part of an effort to stop the migration of PCE into the water system. The new line was completed after the fall water sampling event. Further details of the work will be provided in the 1st Quarter 2010 report.

Sampling from the Sheilds Well was conducted in accordance with WEM's Work Plan and with the FLCM-Water. Sampling from the Bressett Spring was conducted in a different manner than specified in the FLCM-Water, as has been the case since 2006. Instead of sampling directly from the spring tile, this spring is now sampled from two locations: 1) at the pre-filter location upstream of the holding tank in the basement, and 2) at the post-filter kitchen tap. Details and results of the water supply sampling events are described below.

3.1 Water Supply Sample Collection

The Bressett Spring is the primary water supply for the former Bressett residence (recently purchased by Joe and Joanne Vonner). The cement spring tile is located on the hill northeast of the house and extends above the ground surface covered by a cement top. A buried water line (former plastic, now copper) connects the spring to an approximately 300-gallon holding tank in the basement of the residence. A filter is present just upstream of the holding tank. The filters are "Taste & Odor Cartridges" manufactured by Campbell (model 1C9-30), and are diamond-wound polypropylene fibers over rolled, activated carbon batting and polypropylene core. The holding tank is connected to a float activated jet pump, which pumps water to a 30-gallon pressure tank, and then is distributed throughout the house.

In April and October 2009, WEM purged the system of at least 30 gallons and then collected one (1) sample directly from the kitchen tap with the filter installed (i.e. treated water) and then collected one (1) "pre-filter" sample from upstream of the holding tank (i.e. untreated water).

The Shields well is accessed via the hand-activated pump on the well head. During both April and October 2009 the well was purged of approximately 50 gallons prior to sampling. The sample was colleted directly from the hand pump discharge nozzle.

All samples were delivered by WEM to TA. Water supply samples were submitted for analysis of volatile organic compounds via EPA Method 524.2. Results for PCE, TCE, cis-1,2-DCE and trans-1,2-DCE are discussed below.

3.2 Discussion of Results

Validated laboratory analytical results are summarized in Table 3.0 in Appendix B. Full copies of the laboratory reports are presented in Data Validation Reports prepared by Phoenix Chemistry Service [8, 11].

The analytical results indicate the following:

- No target VOCs were detected above reporting limits in the Bressett kitchen tap sample during either April or October 2009.
- No target VOCs were detected above reporting limits in the Bressett pre-filter sample during either April or October 2009.
- No target VOCs were detected above reporting limits in the Shields Well during either April or October 2009.

The compound PCE has been detected in the Bressett water system between April 2006 and October 2008. On several occasions, the PCE concentration was above the Vermont Action Level of 0.7 ug/L. It was assumed that the PCE was migrating into the water distribution system, likely through the plastic water line, and that the magnitude of PCE in the water system was dependent on the residence time of water in the piping, meaning that an increase in water usage results in lower PCE concentrations. Future sampling results will confirm that the PCE migration has been stemmed by the replacement of the plastic water line with copper.

3.2.1 QA/QC Samples

As part of the QA/QC program, WEM collected field duplicate samples during each sample event. In April 2009, “Well-Z” was collected in conjunction with the Bressett Kitchen Tap. In October 2009, “Well Z” was collected in conjunction with the Shields Well. Each sample was analyzed by TA using the same method (EPA Method 524.2). No target compounds were detected at concentrations greater then 2 times the quantitation limit in any sample, so precision could not be evaluated.

WEM also prepared field blanks and added pre-made trip blanks to the cooler during each day of water supply sampling in April and October 2009. All samples were submitted to TA for analysis by EPA Method 524.2. No target compounds were reported in any of these blank samples.

3.3 Discussion of Data Validation

The laboratory data from the April and October 2009 sampling events were validated by Phoenix Chemistry Services, an independent data validator. The validation was performed in accordance with Tier III guidelines as described by the USEPA Region I. Details are presented in the Data Validation Reports [8, 11] on file at the VT DEC offices in Waterbury. The text of the data validation report for the October 2009 sampling event is provided in Appendix E.

Results for the target VOCs were determined to be valid as reported for all supply well samples collected from the Site on April 29, 2009 (sample delivery group SDG No. BRES43) and on October 13, 2009 (SDG No. BRES45) with the exception of the following:

- On the basis of professional opinion, non-detected results for trans-1,2-DCE and PCE drinking water samples collected in October 2009 were qualified as less than the adjusted quantitation limit of 0.71 ug/L.

There were also rejections for non-detected results for other non-target compounds (1,1,1-trichloroethane, o-xylene) for the October 2009 samples. In addition, there were some documentation issues with both the July and October analyses, but these issues don't directly affect the validity of the data.

3.4 Recommendations

Due to presence of PCE in at the point of entry of the former Bressett residence in 2006-2008 and the continuing presence of chlorinated VOCs in the overburden aquifer as described in Section 2.0, WEM recommends continuing the supply well monitoring program. The Shields Well should continue to be sampled from the well head as specified in the FLCM. At the former Bressett residence, samples from the kitchen tap and pre-filter locations should be collected until it can be confirmed that the new water line has stopped the migration of PCE into the system. The next water supply sampling event is scheduled for April 2010.

4.0 SURFACE WATER SAMPLING

Surface water sampling was conducted by WEM on July 16, 2009. As dictated by the *Work Plan*, there should be at least 36 hours without precipitation prior to the collection of surface water samples (weather tracking data from Knapp State Airport in Barre, Vermont). During this sampling event, there had been no precipitation on July 14 or July 15. However, Barre recorded 0.11 inches of rain on the early morning of July 16 prior to sampling. WEM collected the surface water sample at approximately 11:00 am on July 16. Given the atypical amount of precipitation that fell in Vermont during July 2009, resulting in high stream flows everywhere, the lack of the 36-hour pause in rain did not merit canceling or delaying the 3rd Quarter sampling event.

4.1 Surface Water Sample Collection

WEM collected two (2) surface water samples on July 16, 2009. Regular sampling locations, labeled as SW-1 and SW-2 in the Site Map in Appendix A, are along the Howard Hill Brook, and an unnamed tributary of the Ayers Brook. The unnamed tributary of the Ayers Brook (SW-1) was flowing at an approximate flow rate of 60 gallons per minute. This sample was collected by dipping the sample container directly into the pool of water. The Howard Hill Brook sample (SW-2) was also collected by dipping the container into the stream at the middle of the channel. The Brook was flowing at an approximate rate of 1,800 gpm. Flow rate at SW-1 was measured using a measuring cup below a 4-in diameter pipe placed in a narrow portion of the stream channel. Flow at SW-2 was measured upstream of the sample by measuring the stream flow velocity and calculating the stream channel area in the culvert that underlies Route 12.

All samples were delivered by WEM to TA for analysis of volatile organic compounds via EPA Method 8260B on the day of sampling. Results for PCE, TCE, cis-1,2-DCE and trans-1,2-DCE are discussed below.

4.2 Discussion of Results

Surface water sampling results from July 2009 are summarized in Table 4.0 in Appendix B. These results have been validated by an independent validator (see Section 4.3). A full copy of the laboratory report is presented in the data validation report [10] on file in Waterbury.

The laboratory results indicate that VOCs were <u>not</u> detected above reporting limits in either sample collected during the July 2009 sampling event. Based on results dating back to 2001 (see Table 4.0), target VOCs are not regularly detected at these two sampling locations.

4.2.1 QA/QC Samples

As part of the QA/QC program, WEM collected one (1) field duplicate sample (SW-X) on July 16, 2009. This sample was collected in conjunction with the sample SW-2 and analyzed by TA using the same method (EPA Method 8260B). No target compounds were detected in sample SW-2 or SW-X, so precision could not be evaluated in this field duplicate pair.

WEM also collected one (1) trip blank (TB-2) and one (1) field blank (FB-2) on July 16, 2009. No target compounds were reported in either sample.

4.3 Discussion of Data Validation

The laboratory data were validated by Phoenix Chemistry Services, an independent data validator. The validation was performed in accordance with Tier III guidelines as described by the USEPA Region I. Details are presented in the report [10] on file at the VT DEC offices in Waterbury.

Results for target compounds were determined to be valid as reported for all samples in SDG No. BRES44. While there was a minor documentation issue, it did not directly affect the validity of the analytical data.

4.4 Recommendations

Due to the continuing presence of chlorinated VOCs in the overburden aquifer as described in Section 2.0, WEM recommends continuing the surface water monitoring program as specified in the Work Plan and FLCM-Water. The next sampling event is scheduled for July 2010.

5.0 INDOOR AIR SAMPLING

Indoor air sampling was conducted at the former Bressett residence by WEM on January 30 and July 16, 2009. Sampling was conducted in accordance with WEM's Work Plan and with the FLCM-Air. Details and results of the air sampling event are described below.

It should be noted that the two (2) Allen Air model 5000 VOCARB air treatment units that were in use during prior sampling events in 2007 were not in use during air sampling in July or October 2009. It should also be noted that during November 2009, extensive work was done on the basement of the residence in an effort to create a vapor barrier and re-direct vapor from the basement out a ventilation system. Full details of the system will be presented in the 1st quarter 2010 report.

5.1 Air Sample Collection

A total of two (2) air samples were collected from the residence on January 30 and July 16, 2009. The 1st floor sample ("BRST1FLR") was collected from the office off the kitchen on the east side of the house[1], and the basement ("BRSTBSMT") sample was collected from the northeastern portion of the basement, halfway between the stair and the north wall.

Samples were collected by WEM using 6-liter stainless steel Silco air canisters. The canisters and flow controllers were procured by WEM from TA prior to sampling. The flow controllers were all calibrated by TA to provide a flow rate that allowed a final canister pressure between -7.0 and -2.0 inches of Mercury (in Hg) below ambient pressure after a run time of approximately 4 hours. The cleanliness of each canister was individually certified by TA. Prior to use of the canisters, WEM reviewed the "Air Canister Cleaning Logs and Clean Canister Certification Report" and the "Mass Flow Controller Set Flow Rate & Leak Check Record" and did not find any problems.

The sampling procedure at each site involved setting up the canister at the designated sampling location, attaching a digital pressure gauge to measure initial pressure and comparing it to the pressure recorded by laboratory, attaching the flow controller, recording initial canister pressure from the analog pressure gauge, recording ambient pressure and temperature, and then opening the valve to initiate the sample collection. Ambient pressure values were obtained in the morning and afternoon from the Knapp State Airport, and ambient temperature was recorded using a digital thermometer or the thermostat in the sampling location. Samples were allowed to run for approximately 4 hours. Upon completion, a second digital pressure gauge measurement is made and recorded along with the analog pressure gauge measurement.

1 This room has previously been a bedroom and a "craft room" during previous sampling events.

With the exception of a leaking canister that prevented the collection of a duplicate sample during the January event, (see Section 5.2.1), no significant problems were encountered during the sampling event and all sampling procedures were in accordance with the *Work Plan* and acceptable final canister pressures were attained.

All samples were delivered by WEM to TA under chain-of-custody procedures for analysis of the four target volatile organic compounds: PCE, TCE, cis-1,2-DCE, and trans-1,2-DCE. Analysis was by Method TO-15 (Low Level). Results, in parts per billion (ppbv), are discussed below.

5.2 Discussion of Results

Air sampling results from January and July 2009 are summarized in Table 5.0 in Appendix B. These results have been validated by an independent validator (see Section 5.3). A full copy of the laboratory reports are presented in the data validation reports [7, 9] on file in Waterbury.

The results indicate that one or more of the target compounds were reported in both of the indoor air samples collected during January and July. During January, both the 1st floor and basement samples had reported concentrations of PCE, TCE, cis-1,2-DCE, and trans-1,2-DCE. During July, both the 1st floor and basement samples had reported concentrations of PCE, TCE, cis-1,2-DCE, while only the basement had a reported concentration of trans-1,2-DCE.

The Vermont Department of Health (DOH) has developed indoor air guidance levels of 1.0 ppbv for PCE and TCE (based on statewide study titled *Indoor Ambient Air Survey Results, Yearly Sampling Between 12/21/91 and 12/20/92*). The US EPA has developed risk-based guidelines (Region III RBCs for ambient air, 2002 table) that are used for cis-1,2-DCE and trans-1,2-DCE. Based on the January and July 2009 results, the PCE concentrations detected on the 1st floor (1.8 – 3.4 ppbv) and the basement (2.6 – 9.9 ppbv) are all <u>above the DOH guidance level</u>. The concentrations of TCE, cis-1,2-DCE, and trans-1,2-DCE are below applicable guidelines.

Based on historical results dating back to 1997 (see graphs in Appendix B), the presence of target compounds inside the house, particularly PCE, is not unusual. This compound has been detected during all of the prior sampling events. As the graphs in Appendix B indicate, contaminant concentrations were generally steady or decreasing during 1997-2002, then appeared to rise when the sampling program resumed in 2006, followed by a decreasing trend during 2007-09. Concentrations increased between January and July 2009. As is typical, the basement concentrations are higher than the 1st floor concentrations, suggesting that the source of the contaminants is migration into the basement from the ground under/surrounding the house. The house has a stone foundation and a portion of basement has a dirt floor. During November and December 2009, work was done to seal the floor and stone foundation as part of a new basement vapor control system. Details of this new system will be provided in the 1st Quarter 2010 report.

5.2.1 QA/QC Samples

As part of the quality assurance/quality control (QA/QC) program, WEM collected one (1) field duplicate sample (FD-2) during the July 2009 event. This sample was collected in conjunction with the sample from the basement sample (BRSTBSMT) and analyzed by TA using the same method. All four target compounds were detected in both FD-2 and BRSTBSMT. Precision was acceptable (0.0 – 20 %RPD) for all analytes detected at concentrations greater than twice the quantitation limit.

WEM was prepared to collect one (1) field duplicate sample in the basement during the January 2009 event. However, one of the canisters to be used had an initial canister pressure of -21.8 in Hg, which was well below the laboratory recorded pressure of -29.7 in Hg. Due to the possibility that this canister had leaked during transport from the lab, it was not used.

WEM also submitted one trip blank during each event for analysis by Method TO-15. No target compounds were reported in the trip blank.

5.3 Discussion of Data Validation

The laboratory data were validated by Phoenix Chemistry Services, an independent data validator. The validation was performed in accordance with Tier III guidelines as described by the USEPA Region I. Details are presented in the reports [7, 9] on file at the VT DEC offices in Waterbury.

Findings of the validation effort resulted in the following qualifications:

January 2009 results:

- Results for PCE in BRST1FLR and BRSTBSMT outside the calibration range in the original analyses of select samples were rejected (R) and replaced with the acceptable concentrations from the corresponding diluted samples.

July 2009 results:

- On the basis of unacceptable internal standard area recoveries, results for trans-1,2-DCE and cis-1,2-DCE in BRSTBSMT were qualified as estimated (J).

- Results for PCE in BRST1FLR, BRSTBSMT, and FD-2 and TCE in BRSTBSMT outside the calibration range in the original analyses of select samples were rejected (R) and replaced with the acceptable concentrations from the corresponding diluted samples.

While there were also some laboratory documentation issues noted in the report, these issues did not directly affect the validity of the analytical data.

5.4 Recommendations

Given the presence of VOCs in the overburden groundwater and historical indoor air sampling results, WEM recommends that air sampling continue as specified in the Work Plan and FLCM-Air. The 2010 sampling schedule will be February and July. The 2010 results will be used to evaluate the effectiveness of the new vapor barrier and ventilation system in the basement of the residence.

6.0 REFERENCES

1. Waite Environmental Management, LLC, *Work Plan for Environmental Monitoring at the UniFirst Plant Site, Williamstown, Vermont, Wheatley Farm Site, Brookfield, Vermont, Bressett Site, Randolph, Vermont,* December 31, 2007.

2. Phoenix Chemistry Services, *Field/Lab Coordination Memorandum for Water Monitoring, UniFirst Plant Site, Williamstown, Vermont, Wheatley Farm Site, Brookfield, Vermont, Bressett Site, Randolph, Vermont,* April 2, 2004.

3. Phoenix Chemistry Services, *Field/Lab Coordination Memorandum for Air Monitoring, UniFirst Plant Site, Williamstown, Vermont, Wheatley Farm Site, Brookfield, Vermont, Bressett Site, Randolph, Vermont,* December 22, 2007.

4. Waite Environmental Management, LLC, *1st Quarter 2009 Monitoring Report, Bressett Site, Randolph, Vermont,* April 7, 2009.

5. Waite Environmental Management, LLC, *2nd Quarter 2009 Monitoring Report, Bressett Site, Randolph, Vermont,* August 3, 2009.

6. Waite Environmental Management, LLC, *3rd Quarter 2009 Monitoring Report, Bressett Site, Randolph, Vermont,* November 10, 2009.

7. Phoenix Chemistry Services, *Data Validation for the UniFirst Project, Williamstown and Bressett Sites, Williamstown and Randolph, VT (Sample Delivery Group No. 129897), March 24, 2009.*

8. Phoenix Chemistry Services, *Data Validation for the UniFirst Project, Bressett and UniFirst Sites, Randolph and Williamstown, VT, Organic Analysis Data, Volatile Organics in Water Samples, Sample Delivery Group Nos. BRES43 and UNIF34, July 5, 2009.*

9. Phoenix Chemistry Services, *Data Validation for the UniFirst Project, Williamstown and Bressett Sites, Williamstown and Randolph, VT (Sample Delivery Group No. 132636 and 132691), August 31, 2009.*

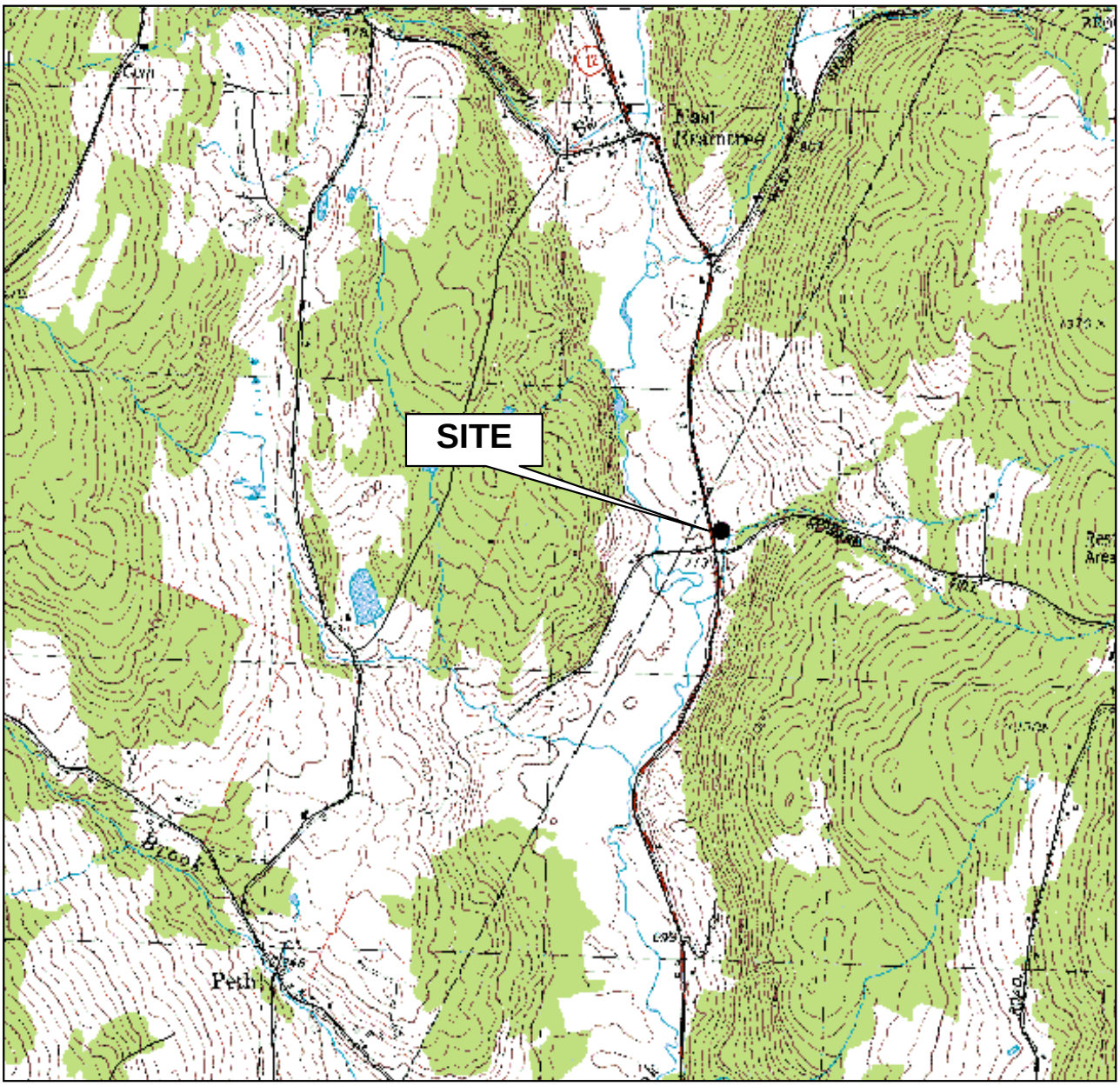
10. Phoenix Chemistry Services, *Data Validation for the UniFirst Project, Bressett and UniFirst Sites, Randolph and Williamstown, VT (Sample Delivery Groups No. BRES44 and UNIF35), August 26, 2009.*

11. Phoenix Chemistry Services, *Data Validation for the UniFirst Project, Bressett, Wheatley, and UniFirst Sites, Randolph, Brookfield, and Williamstown, VT, Organic Analyses Data, Volatile Organics in Water Samples, Sample Delivery Group Nos. BRES45, UNIF36 , and WHEA15,* January 26, 2010, revised February 5, 2010.

12. State of Vermont, Agency of Natural Resources, Department of Environmental Conservation, *Chapter 12, Groundwater Protection Rule and Strategy*, January 20, 2000.

APPENDIX A:

FIGURES



N

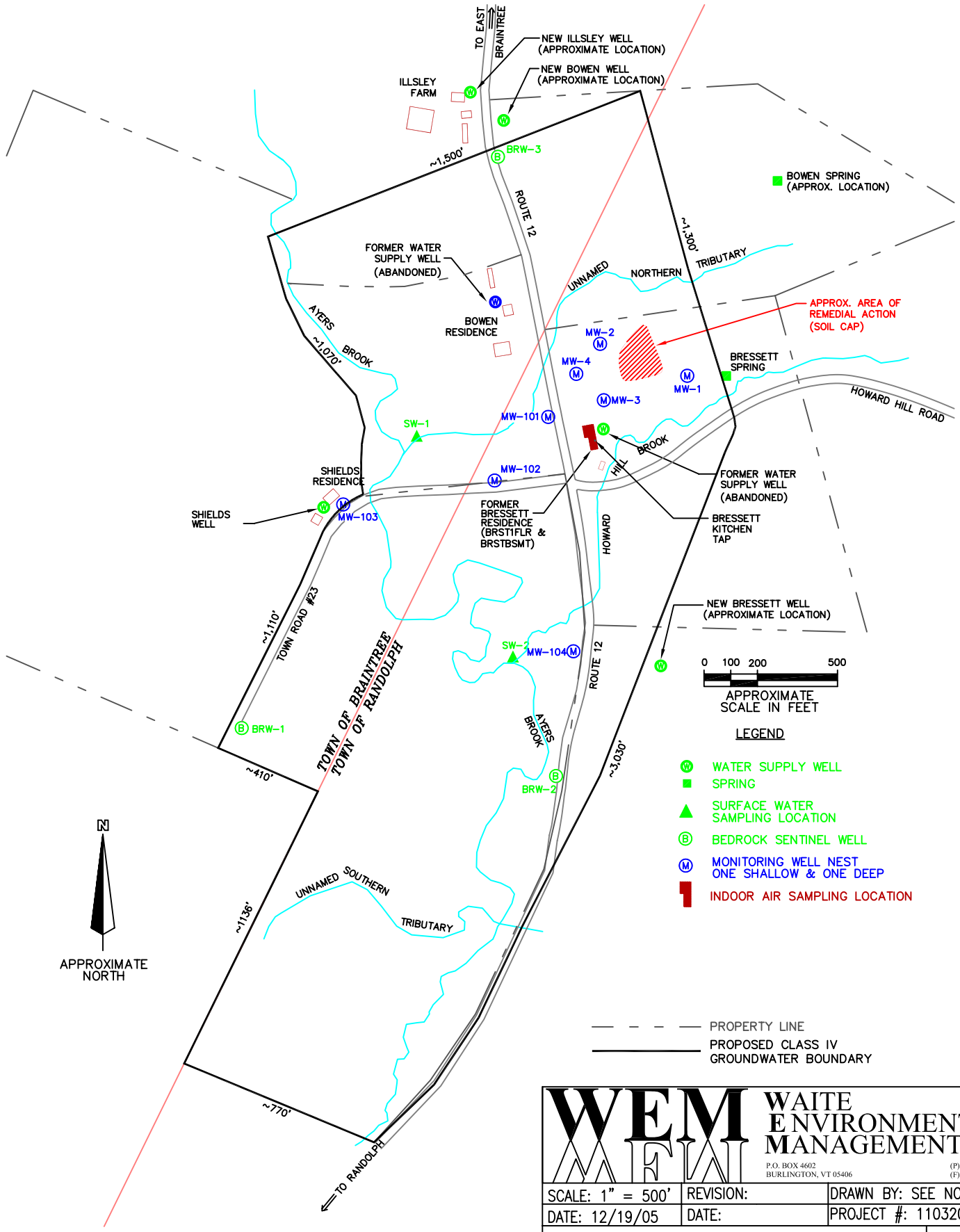
Map Source: *USGS Mapping 7.5 Minute Quadrangle: Randolph (1981)*

Waite Environmental Management, LLC

SITE LOCATION MAP

Bressett Site
Randolph, Vermont

Date: 01/04/05	Drawing No. 1	Scale: 1:24,000	By: MEW



NOTES:
1. MAP SOURCE IS "PLATE 1: SITE MAP, BRESSETT SITE, RANDOLPH, VERMONT" PREPARED BY THE JOHNSON COMPANY, INC. MAP DRAWN ON 4/25/00 BY TJK, MOST RECENTLY REVISED BY TJK ON 8/16/04. MAP TEXT WAS REVISED BY MEW OF WAITE ENVIRONMENTAL MGT ON 12/19/05.

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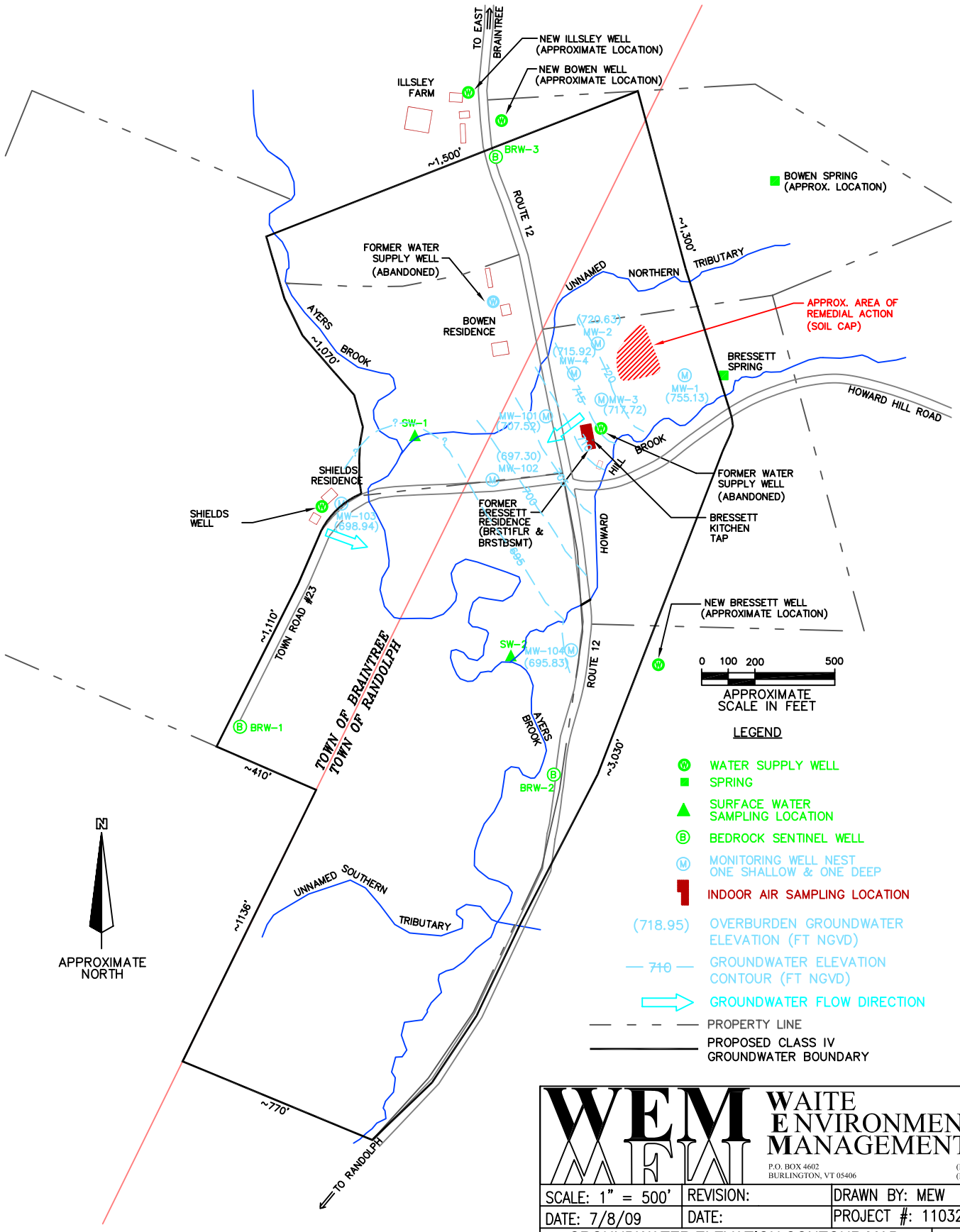
(F) 802-860-9440

SCALE: 1" = 500'	REVISION:	DRAWN BY: SEE NOTE
DATE: 12/19/05	DATE:	PROJECT #: 110320012

SITE PLAN

BRESSETT SITE
RANDOLPH, VERMONT



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2. GROUNDWATER ELEVATIONS ARE FROM THE SHALLOW PAIRED WELL.
3. ELEVATIONS MEASURED BY WEM ON APRIL 30, 2009.

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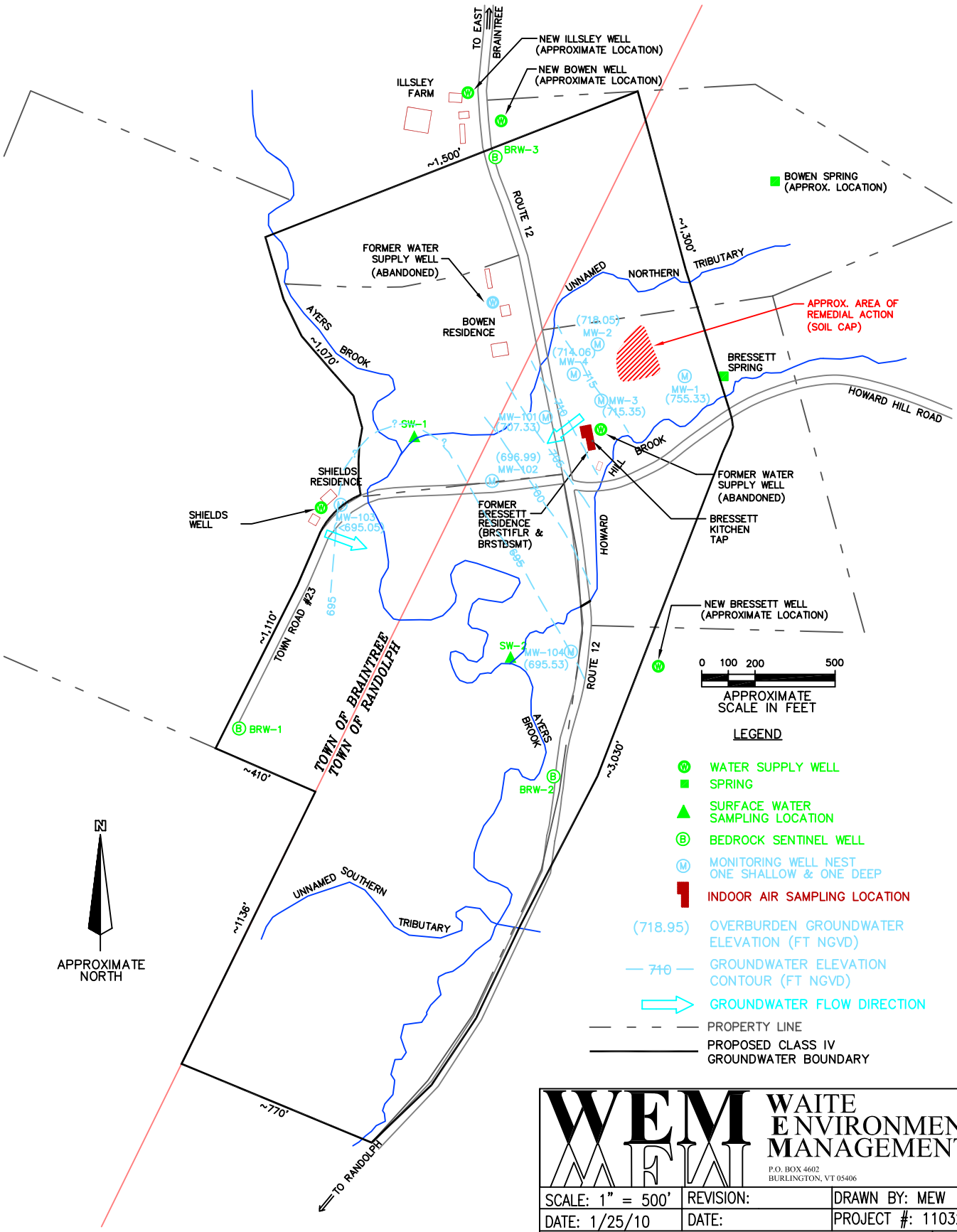
DATE: 7/8/09	DATE:	PROJECT #: 110320012

GROUNDWATER ELEVATION CONTOUR MAP
APRIL 2009
BRESSETT SITE
RANDOLPH, VERMONT



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2. GROUNDWATER ELEVATIONS ARE FROM THE SHALLOW PAIRED WELL.
3. ELEVATIONS MEASURED BY WEM ON OCTOBER 13, 2009.

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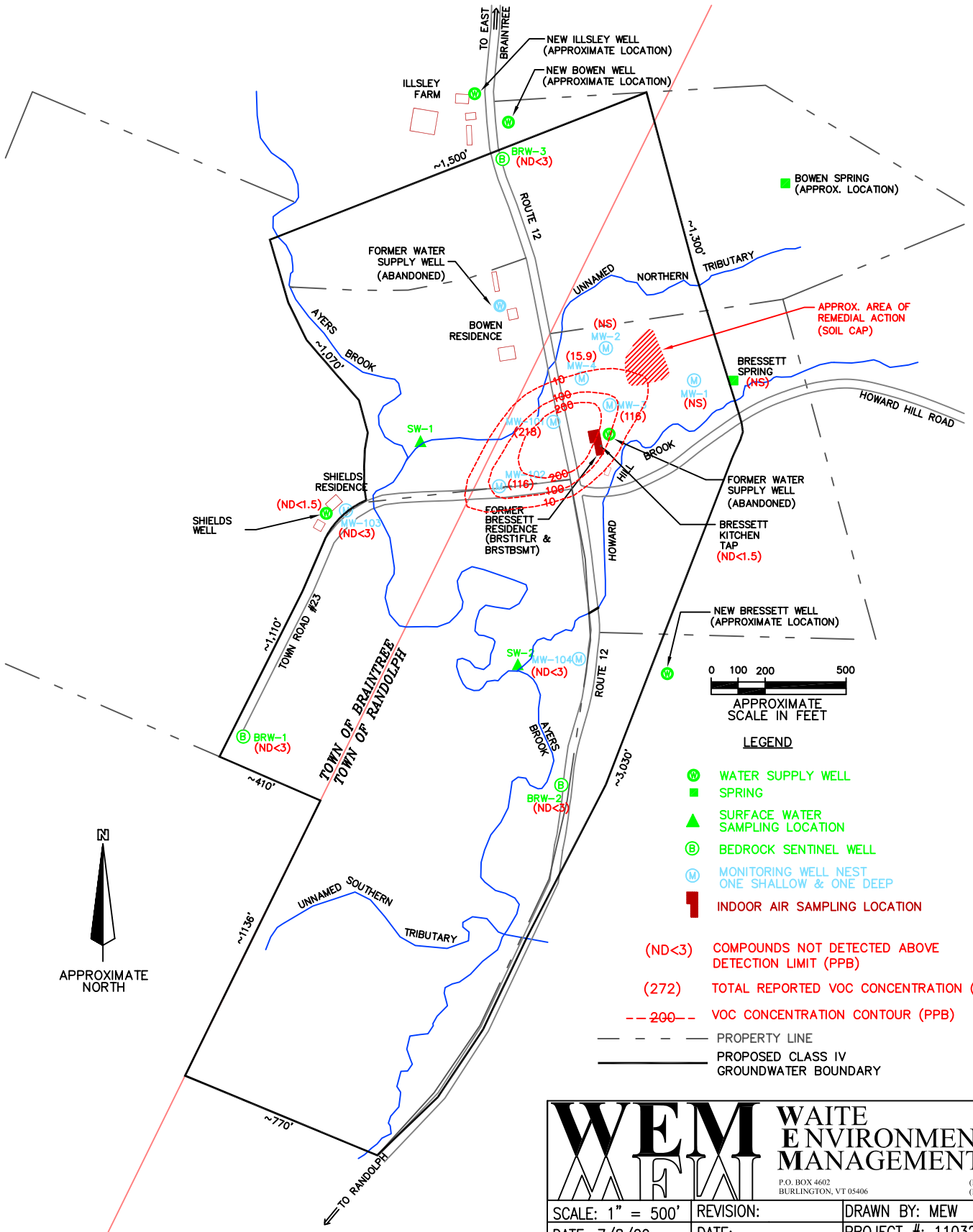
DATE: 1/25/10	DATE:	PROJECT #: 110320012

GROUNDWATER ELEVATION CONTOUR MAP
OCTOBER 2009
BRESSETT SITE
RANDOLPH, VERMONT



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2. TOTAL REPORTED CHLORINATED VOLATILE ORGANIC COMPOUND (CVOC) CONCENTRATION IS CALCULATED AS THE SUM OF PCE, TCE, AND 1,2-DCE CONCENTRATIONS. FOR THE PAIRED WELLS, THE MAXIMUM CONCENTRATION IS USED.
3. ND = VOCs NOT DETECTED BY EITHER EPA METHOD 8260B OR 524.2; NS = NOT SAMPLED

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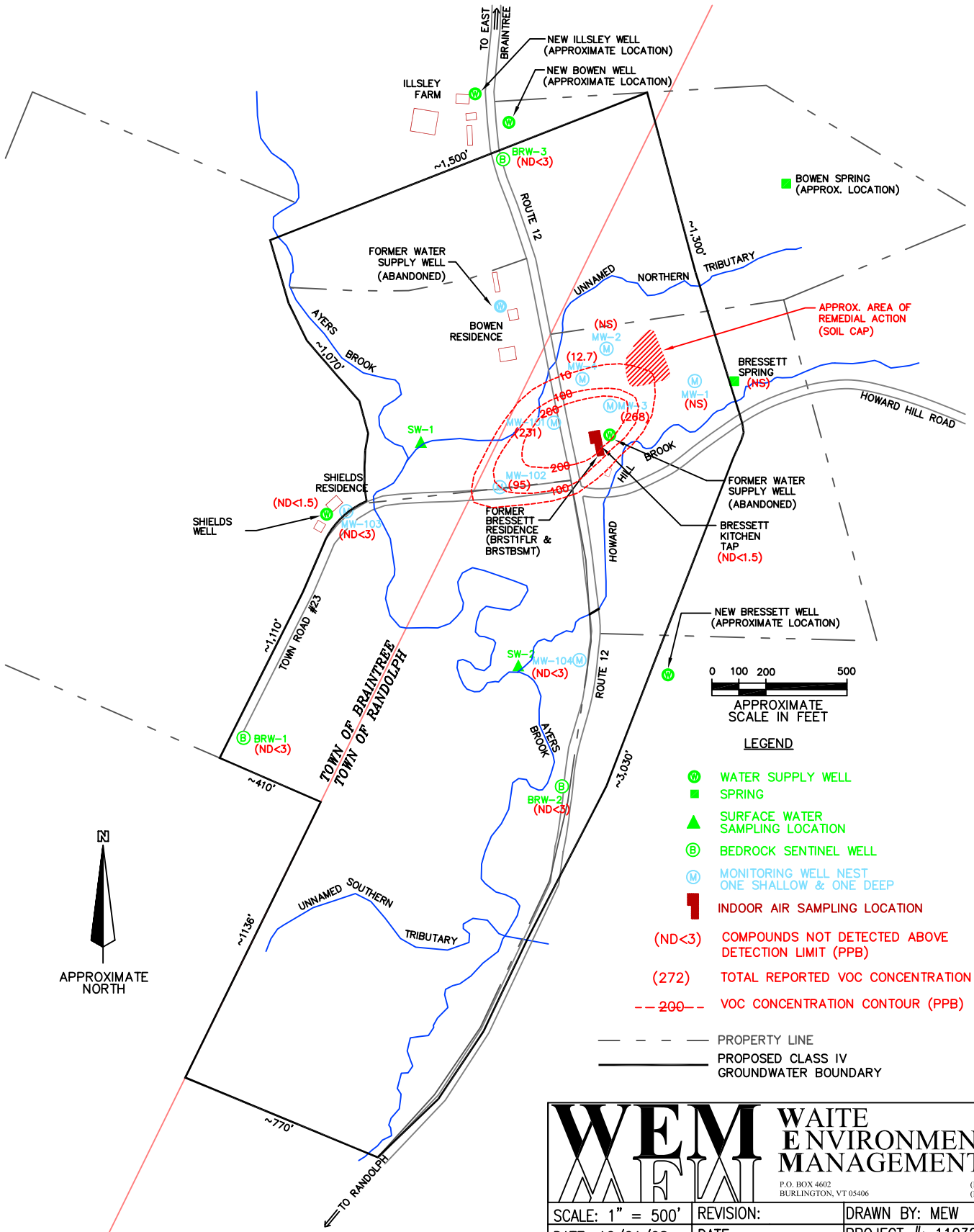
SCALE: 1" = 500'	REVISION:	DRAWN BY: MEW
DATE: 7/8/09	DATE:	PROJECT #: 110320012

CVOC CONCENTRATION CONTOUR MAP
APRIL 2009
BRESSETT SITE
RANDOLPH, VERMONT



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SCALE: 1" = 500'	REVISION:	DRAWN BY: MEW
DATE: 12/21/08	DATE:	PROJECT #: 110320012

CVOC CONCENTRATION CONTOUR MAP
OCTOBER 2009
BRESSETT SITE
RANDOLPH, VERMONT

APPENDIX B:

TABLES

WEM

TABLE 1.1
Groundwater Elevation Measurements: 2008- 2009
Bressett Site, Randolph, Vermont

Location	Type	Units	Screen Center Elevation	Apr-08	Sep-08	Apr-09	Oct-09	Apr-09 Vertical Hydraulic Gradient (ft/ft)	Oct-09 Vertical Hydraulic Gradient (ft/ft)
MW-101D	Monitoring Well	FT	690.52	708.02	706.17	706.59	706.22	-0.09	-0.11
MW-101S	Monitoring Well	FT	701.03	708.89	707.16	707.50	707.33		
MW-102D	Monitoring Well	FT	674.76	698.63	696.96	697.17	697.05	-0.01	0.00
MW-102S	Monitoring Well	FT	689.46	698.22	697.02	697.30	696.99		
MW-103D	Monitoring Well	FT	685.48	NA	697.84	699.55	698.74	0.05	NA
MW-103S	Monitoring Well	FT	697.39	NA	< 695.05	698.94	< 695.05		
MW-104D	Monitoring Well	FT	676.26	696.72	695.59	695.93	695.44	0.01	-0.01
MW-104S	Monitoring Well	FT	690.98	696.49	695.56	695.83	695.53		
MW-1	Monitoring Well	FT	755.60	757.22	754.30	755.13	755.33	NA	NA
MW-2D	Monitoring Well	FT	683.40	NA	NA	NA	NA	NA	NA
MW-2S	Monitoring Well	FT	714.50	723.58	718.58	720.63	718.05		
MW-3D	Monitoring Well	FT	664.55	720.12	716.06	717.42	716.53	-0.01	0.02
MW-3S	Monitoring Well	FT	714.09	720.46	715.74	717.72	715.35		
MW-4D	Monitoring Well	FT	689.82	717.02	713.80	714.96	713.76	-0.04	-0.01
MW-4S	Monitoring Well	FT	711.44	718.21	714.24	715.92	714.06		
BRW-1	Monitoring Well	FT	659.30	708.06	704.13	704.97	703.73	NA	NA
BRW-2	Monitoring Well	FT	639.40	697.78	697.15	695.66	694.83	NA	NA
BRW-3	Monitoring Well	FT	678.00	725.61	722.18	723.83	721.81	NA	NA

Notes:
-All elevations in feet above NGVD; "NGVD" = National Geodetic Vertical Datum (1988).
-"Dry" = well dry during monitoring event; "NA" = data not available.
-Negative sign ("-") indicates downward vertical gradient. Positive numbers indicate upward vertical gradients.
-Screen center elevations are from Tighe & Bond reports: "2002 Monitoring Report Summary, Bressett Site" (March 12, 2003) and "2003 Monitoring Report Summary, Bressett Site" (March 12, 2004).

WEM

TABLE 1.2
Dissolved Oxygen Field Measurements: 2005 - 2009
Bressett Site, Randolph, Vermont

Location	Type	Units	Apr-05	Oct-05	Apr-06	Oct-06	May-07	Oct-07	Apr-08	Sep-08	Apr-09	Oct-09
MW-101D	Monitoring Well	mg/L	6.31	1.65	0.00	0.92	2.76	0.67	3.77	0.64	0.00	0.59
MW-101S	Monitoring Well	mg/L	5.32	0.00	0.00	0.10	1.95	0.00	6.31	0.00	0.00	0.00
MW-102D	Monitoring Well	mg/L	5.19	0.00	0.00	0.00	1.78	0.00	2.09	0.00	0.00	0.00
MW-102S	Monitoring Well	mg/L	6.74	4.33	0.13	4.16	4.22	5.47	6.49	5.50	1.61	4.05
MW-103D	Monitoring Well	mg/L	5.25	0.00	0.00	0.00	1.46	0.00	3.80	0.00	0.00	0.00
MW-103S	Monitoring Well	mg/L	9.08	DRY	0.98	DRY	4.78	DRY	2.93	DRY	NA	DRY
MW-104D	Monitoring Well	mg/L	5.52	0.00	0.00	0.05	2.25	0.00	8.00	1.27	0.00	0.00
MW-104S	Monitoring Well	mg/L	8.57	2.20	2.79	1.91	8.34	0.24	11.95	3.31	0.19	1.89
MW-1	Monitoring Well	mg/L	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
MW-2D	Monitoring Well	mg/L	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
MW-2S	Monitoring Well	mg/L	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
MW-3D	Monitoring Well	mg/L	8.99	11.64	9.12	12.90	12.13	3.02	5.16	2.75	1.06	0.13
MW-3S	Monitoring Well	mg/L	11.73	11.87	10.12	11.91	11.85	9.15	11.90	9.47	4.15	8.60
MW-4D	Monitoring Well	mg/L	9.44	11.15	9.82	9.65	8.30	5.95	8.95	9.22	4.10	6.56
MW-4S	Monitoring Well	mg/L	11.17	10.06	11.09	9.14	11.60	9.91	11.35	9.95	6.14	7.89
BRW-1	Monitoring Well	mg/L	10.32	4.56	2.41	2.06	6.10	2.71	13.66	3.20	2.35	1.31
BRW-2	Monitoring Well	mg/L	8.86	0.00	0.00	0.48	3.43	0.53	13.48	0.31	0.99	0.00
BRW-3	Monitoring Well	mg/L	10.41	7.30	7.23	10.41	9.58	6.68	10.89	6.13	6.45	6.42

Notes:
- All dissolved oxygen meaurements in milligrams/liter (mg/L).
-"Dry" = well dry during monitoring event; "NA" = data not available.
- All data shown collected by Waite Environmental Management.

WEM

TABLE 1.3
Specific Conductance Field Measurements: 2005 - 2009
Bressett Site, Randolph, Vermont

Location	Type	Units	Apr-05	Oct-05	Apr-06	Oct-06	May-07	Oct-07	Apr-08	Sep-08	Apr-09	Oct-09
MW-101D	Monitoring Well	us/cm	591	669	784	509	462	771	839	611	920	960
MW-101S	Monitoring Well	us/cm	221	273	334	197	184	307	273	203	990	378
MW-102D	Monitoring Well	us/cm	238	272	319	198	205	340	356	271	892	374
MW-102S	Monitoring Well	us/cm	277	367	385	247	237	429	444	331	488	NA
MW-103D	Monitoring Well	us/cm	148	230	237	157	135	268	246	210	541	301
MW-103S	Monitoring Well	us/cm	137	DRY	260	DRY	185	DRY	204	DRY	NA	DRY
MW-104D	Monitoring Well	us/cm	201	213	278	149	116	280	295	227	914	284
MW-104S	Monitoring Well	us/cm	327	337	248	210	146	418	399	309	336	NA
MW-1	Monitoring Well	us/cm	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
MW-2D	Monitoring Well	us/cm	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
MW-2S	Monitoring Well	us/cm	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
MW-3D	Monitoring Well	us/cm	328	371	412	289	258	410	426	333	352	NA
MW-3S	Monitoring Well	us/cm	361	519	534	374	299	549	413	432	391	NA
MW-4D	Monitoring Well	us/cm	240	286	325	197	200	332	324	254	292	541
MW-4S	Monitoring Well	us/cm	144	189	121	74	61	145	82	103	113	371
BRW-1	Monitoring Well	us/cm	158	189	203	121	130	221	166	177	478	248
BRW-2	Monitoring Well	us/cm	255	299	312	193	226	343	256	265	611	362
BRW-3	Monitoring Well	us/cm	312	468	421	247	278	391	270	280	405	NA

Notes:
- All conductivity meaurements in microsiemens per centimeter (us/cm).
-"Dry" = well dry during monitoring event; "NA" = data not available.
-All data shown collected by Waite Environmental Management.

WEM

TABLE 1.4
Temperature Field Measurements: 2005 - 2009
Bressett Site, Randolph, Vermont

Location	Type	Units	Apr-05	Oct-05	Apr-06	Oct-06	May-07	Oct-07	Apr-08	Sep-08	Apr-09	Oct-09
MW-101D	Monitoring Well	deg C	8.8	11.1	8.8	11.5	9.2	10.9	7.9	12.4	10.7	9.5
MW-101S	Monitoring Well	deg C	6.1	14.6	6.9	14.4	7.3	13.4	6.6	14.5	9.6	11.3
MW-102D	Monitoring Well	deg C	8.4	10.0	9.9	10.7	10.9	11.2	6.4	13.0	12.1	9.0
MW-102S	Monitoring Well	deg C	7.2	11.5	8.6	11.5	8.2	12.2	6.3	13.1	11.1	10.0
MW-103D	Monitoring Well	deg C	7.7	11.2	8.4	10.1	9.4	10.8	7.3	12.0	8.2	9.6
MW-103S	Monitoring Well	deg C	5.0	DRY	7.7	DRY	9.4	DRY	6.5	DRY	NA	DRY
MW-104D	Monitoring Well	deg C	7.7	12.1	7.9	11.4	10.1	12.1	7.2	16.7	18.2	10.4
MW-104S	Monitoring Well	deg C	6.7	14.1	7.3	13.6	7.6	14.4	6.5	13.8	7.4	11.5
MW-1	Monitoring Well	deg C	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
MW-2D	Monitoring Well	deg C	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
MW-2S	Monitoring Well	deg C	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
MW-3D	Monitoring Well	deg C	8.9	9.0	9.6	9.8	10.7	9.0	9.1	9.3	9.0	8.0
MW-3S	Monitoring Well	deg C	8.5	9.5	8.7	10.2	9.5	8.9	7.8	9.8	9.4	8.4
MW-4D	Monitoring Well	deg C	8.5	9.4	9.4	11.0	9.9	9.4	8.2	9.9	9.0	9.0
MW-4S	Monitoring Well	deg C	8.3	10.1	9.0	10.7	9.9	9.6	7.6	11.4	9.2	8.4
BRW-1	Monitoring Well	deg C	9.6	10.4	8.5	9.5	10.0	9.5	8.9	8.8	9.2	9.3
BRW-2	Monitoring Well	deg C	10.0	11.3	8.7	10.5	9.8	10.8	9.4	11.0	9.8	10.0
BRW-3	Monitoring Well	deg C	10.5	10.7	9.6	9.8	10.5	10.2	9.7	10.3	9.6	10.1

Notes:
- All temperature measurements in degrees Celsius (deg C).
-"Dry" = well dry during monitoring event; "NA" = data not available.
-All data shown collected by Waite Environmental Management.

WEM

TABLE 1.5
pH Field Measurements: 2005 - 2009
Bressett Site, Randolph, Vermont

Location	Type	Units	Apr-05	Oct-05	Apr-06	Oct-06	May-07	Oct-07	Apr-08	Sep-08	Apr-09	Oct-09
MW-101D	Monitoring Well	unitless	7.02	6.08	7.84	7.28	7.23	6.85	7.18	NA	6.97	7.04
MW-101S	Monitoring Well	unitless	6.65	6.94	7.26	6.80	6.63	6.41	6.76	NA	6.61	6.49
MW-102D	Monitoring Well	unitless	7.93	7.81	8.98	8.01	7.79	7.75	8.23	NA	7.94	7.99
MW-102S	Monitoring Well	unitless	7.67	7.87	8.51	7.68	7.60	7.49	7.85	NA	7.64	7.62
MW-103D	Monitoring Well	unitless	6.70	7.36	8.35	7.62	6.89	6.78	7.68	NA	7.41	7.62
MW-103S	Monitoring Well	unitless	6.01	DRY	6.89	DRY	5.72	DRY	6.71	NA	NA	DRY
MW-104D	Monitoring Well	unitless	7.59	7.09	8.93	7.49	6.88	6.27	8.29	NA	7.86	6.98
MW-104S	Monitoring Well	unitless	6.95	6.65	7.79	7.19	6.59	6.78	7.24	NA	7.06	7.17
MW-1	Monitoring Well	unitless	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
MW-2D	Monitoring Well	unitless	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
MW-2S	Monitoring Well	unitless	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
MW-3D	Monitoring Well	unitless	7.50	7.59	8.47	6.09	7.56	7.48	7.65	NA	7.49	7.63
MW-3S	Monitoring Well	unitless	7.31	5.41	8.21	7.55	7.27	7.31	7.51	NA	7.29	7.40
MW-4D	Monitoring Well	unitless	7.45	5.02	8.32	7.82	7.47	7.47	7.33	NA	7.16	7.63
MW-4S	Monitoring Well	unitless	7.50	6.70	8.62	7.96	7.31	7.76	6.44	NA	7.32	7.37
BRW-1	Monitoring Well	unitless	7.36	7.58	8.52	7.79	7.44	7.51	7.57	NA	7.63	7.61
BRW-2	Monitoring Well	unitless	6.98	7.43	7.98	7.61	7.10	7.25	7.28	NA	7.34	7.28
BRW-3	Monitoring Well	unitless	6.76	8.19	7.81	7.86	7.17	7.02	7.20	NA	7.39	7.14

Notes:
-"Dry" = well dry during monitoring event; "NA" = data not available.
-All data shown collected by Waite Environmental Management.

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TABLE 1.6
Turbidity Field Measurements: 2005 - 2009
Bressett Site, Randolph, Vermont

Location	Type	Units	Apr-05	Oct-05	Apr-06	Oct-06	May-07	Oct-07	Apr-08	Sep-08	Apr-09	Oct-09
MW-101D	Monitoring Well	NTU	29.7	> 1000	124	15.1	0.0	0.7	366	806	> 1000	> 1000
MW-101S	Monitoring Well	NTU	53.8	72.5	625	627	> 1000	> 1000	> 1000	> 1000	122	330
MW-102D	Monitoring Well	NTU	56.2	28.7	44.9	22.6	0.0	0.0	42.0	49.3	53.4	164
MW-102S	Monitoring Well	NTU	37.4	4.9	15.0	16.7	0.0	31.3	47.0	105	21.4	20.9
MW-103D	Monitoring Well	NTU	15.8	230	112	13.1	143	17.0	104	27.9	40.0	63.3
MW-103S	Monitoring Well	NTU	34	DRY	> 1000	DRY	82	DRY	> 1000	DRY	NA	DRY
MW-104D	Monitoring Well	NTU	> 1000	> 1000	> 1000	> 1000	> 1000	176	690	154	15.7	> 1000
MW-104S	Monitoring Well	NTU	4.4	73.8	0.0	8.1	0.0	2.8	16.3	47.8	8.0	7.0
MW-1	Monitoring Well	NTU	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
MW-2D	Monitoring Well	NTU	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
MW-2S	Monitoring Well	NTU	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
MW-3D	Monitoring Well	NTU	> 1000	> 1000	> 1000	> 1000	788	132	533	> 1000	> 1000	> 1000
MW-3S	Monitoring Well	NTU	271	> 1000	594	283	146	86.7	413	498	281	567
MW-4D	Monitoring Well	NTU	464	115	575	131	467	13.3	152	650	684	> 1000
MW-4S	Monitoring Well	NTU	162	32	82.7	81.5	92.9	2.7	209	323	373	268
BRW-1	Monitoring Well	NTU	1.1	9.8	0.0	3.5	0.0	0.0	NA	0.0	8.6	0.0
BRW-2	Monitoring Well	NTU	67	109	612	39.5	120	13	NA	2.2	41.1	67.9
BRW-3	Monitoring Well	NTU	12.9	6.7	35.9	9.8	0.0	0.0	NA	6.1	19.6	9.8

Notes:
-All turbidity measurements in nephelometric turbidity units (NTU).
-"Dry" = well dry during monitoring event; "NA" = data not available.
-All data shown collected by Waite Environmental Management.

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TABLE 1.7
Redox Potential Field Measurements: 2005 - 2009
Bressett Site, Randolph, Vermont

Location	Type	Units	Apr-05	Oct-05	Apr-06	Oct-06	May-07	Oct-07	Apr-08	Sep-08	Apr-09	Oct-09
MW-101D	Monitoring Well	mV	146	85	24	69	109	113	138	132	116	185
MW-101S	Monitoring Well	mV	142	31	18	68	116	65	138	138	120	164
MW-102D	Monitoring Well	mV	-86	-221	-199	-196	-180	-166	-181	-185	-190	-172
MW-102S	Monitoring Well	mV	84	-23	-3	57	40	42	94	92	66	97
MW-103D	Monitoring Well	mV	-26	-217	-132	-215	-100	-235	-150	-160	-157	-138
MW-103S	Monitoring Well	mV	170	DRY	70	DRY	142	DRY	103	DRY	NA	DRY
MW-104D	Monitoring Well	mV	17	-122	-97	-113	-16	26	-134	-50	-119	-26
MW-104S	Monitoring Well	mV	133	64	52	19	155	-6	131	77	74	106
MW-1	Monitoring Well	mV	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
MW-2D	Monitoring Well	mV	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
MW-2S	Monitoring Well	mV	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
MW-3D	Monitoring Well	mV	158	150	20	192	149	74	196	129	153	217
MW-3S	Monitoring Well	mV	167	162	57	103	151	63	203	145	148	211
MW-4D	Monitoring Well	mV	160	179	41	88	130	41	204	137	146	200
MW-4S	Monitoring Well	mV	151	200	43	78	120	26	230	141	142	212
BRW-1	Monitoring Well	mV	69	136	16	-53	-21	-2	-2	19	-13	38
BRW-2	Monitoring Well	mV	-75	-170	-133	-160	-127	-174	-128	-148	-136	-157
BRW-3	Monitoring Well	mV	268	36	80	81	169	145	179	162	132	246

Notes:
-All redox potential measurements in millivolts (mV).
-"Dry" = well dry during monitoring event; "NA" = data not available.
-All data shown collected by Waite Environmental Management.

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TABLE 2.0
MONITORING WELL RESULTS: 2006-2009
Bressett Site, Randolph, Vermont

Location	Parameter Method 8260B	Groundwater Enforcement Standard	Units	Oct-06	May-07	Oct-07	Apr-08	Sep-08	Apr-09	Oct-09
MW-3S	PCE	5.0	ug/L	150	88	140	49	110	54	79
	TCE	5.0	ug/L	36	19	27	9.8	21	9.4	16
	cis-1,2-DCE	70.0	ug/L	29	8.1	13	3.2	9.0	2.7	5.4
	trans-1,2-DCE	100.0	ug/L	0.84 J	0.84 J	0.63 J	1.0 U	0.64 J	1.9 U	0.68 J
MW-3D	PCE	5.0	ug/L	240	300	49	250	210	97	220
	TCE	5.0	ug/L	23	35	4.1	30	25	9.8	22
	cis-1,2-DCE	70.0	ug/L	21	35	2.1	31	23	9.2	24
	trans-1,2-DCE	100.0	ug/L	0.61 J	1.0 U	1.0 U	8.8 U	1.4	3.8 U	1.4
MW-4S	PCE	5.0	ug/L	1.3 UJ	0.58 J	1.1	0.32 J	1.2	0.79 J	2.1
	TCE	5.0	ug/L	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
	cis-1,2-DCE	70.0	ug/L	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
	trans-1,2-DCE	100.0	ug/L	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
MW-4D	PCE	5.0	ug/L	17	24	22	12	13	15	11
	TCE	5.0	ug/L	2.0	2.6	2.0	0.90 J	0.90 J	0.92 J	1.0 U
	cis-1,2-DCE	70.0	ug/L	0.29 J	0.34 J	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
	trans-1,2-DCE	100.0	ug/L	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
MW-101S	PCE	5.0	ug/L	7.5	4.1	7.2	7.5	8.2	6.2	6.9
	TCE	5.0	ug/L	1.7	0.69 J	1.5	1.7	1.7	1.0	1.4
	cis-1,2-DCE	70.0	ug/L	1.2	0.39 J	1.1	1.4	1.6	0.47 J	0.75 J
	trans-1,2-DCE	100.0	ug/L	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
MW-101D	PCE	5.0	ug/L	310	190	180	160	170	140	150
	TCE	5.0	ug/L	45	35	32	32	31	30	31
	cis-1,2-DCE	70.0	ug/L	110	68	60	58	52	47	47
	trans-1,2-DCE	100.0	ug/L	0.96 J	0.81 J	0.77 J	6.1 U	1.9	1.3 J	3.4 J
MW-102S	PCE	5.0	ug/L	120	110	140	78	100	89	70
	TCE	5.0	ug/L	19	18	21	13	17	13	11
	cis-1,2-DCE	70.0	ug/L	21	19	25	15	22	14	13
	trans-1,2-DCE	100.0	ug/L	0.45 J	0.43 J	0.65 J	0.46 J	0.85 J	0.73 J	0.73 J
MW-102D	PCE	5.0	ug/L	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
	TCE	5.0	ug/L	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
	cis-1,2-DCE	70.0	ug/L	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
	trans-1,2-DCE	100.0	ug/L	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
MW-103S	PCE	5.0	ug/L	DRY	1.0 U	DRY	1.0 U	DRY	1.0 U	DRY
	TCE	5.0	ug/L	DRY	1.0 U	DRY	1.0 U	DRY	1.0 U	DRY
	cis-1,2-DCE	70.0	ug/L	DRY	1.0 U	DRY	1.0 U	DRY	1.0 U	DRY
	trans-1,2-DCE	100.0	ug/L	DRY	1.0 U	DRY	1.0 U	DRY	1.0 U	DRY
MW-103D	PCE	5.0	ug/L	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
	TCE	5.0	ug/L	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
	cis-1,2-DCE	70.0	ug/L	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
	trans-1,2-DCE	100.0	ug/L	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U

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TABLE 2.0
MONITORING WELL RESULTS: 2006-2009
Bressett Site, Randolph, Vermont

Location	Parameter Method 8260B	Groundwater Enforcement Standard	Units	Oct-06	May-07	Oct-07	Apr-08	Sep-08	Apr-09	Oct-09
MW-104S	**PCE**	**5.0**	ug/L	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
	TCE	**5.0**	ug/L	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
	cis-1,2-DCE	**70.0**	ug/L	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
	trans-1,2-DCE	**100.0**	ug/L	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
MW-104D	**PCE**	**5.0**	ug/L	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
	TCE	**5.0**	ug/L	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
	cis-1,2-DCE	**70.0**	ug/L	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
	trans-1,2-DCE	**100.0**	ug/L	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
BRW-1	**PCE**	**5.0**	ug/L	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
	TCE	**5.0**	ug/L	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
	cis-1,2-DCE	**70.0**	ug/L	0.24 J	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
	trans-1,2-DCE	**100.0**	ug/L	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
BRW-2	**PCE**	**5.0**	ug/L	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
	TCE	**5.0**	ug/L	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
	cis-1,2-DCE	**70.0**	ug/L	0.29 J	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
	trans-1,2-DCE	**100.0**	ug/L	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
BRW-3	**PCE**	**5.0**	ug/L	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
	TCE	**5.0**	ug/L	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
	cis-1,2-DCE	**70.0**	ug/L	0.34 J	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
	trans-1,2-DCE	**100.0**	ug/L	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U

Notes:
- "PCE" = tetrachlorethene; "TCE" = tricholorethene; "DCE" = dichloroethene.
- "U" = not detected above listed quantitation limit; "J" = reported concentration is an estimated value; "UJ" = reported quantitation limit is an estimated value; "R" = the data are unusable (analyte may or may not be present).
- "Dry" = well dry during monitoring event; "NA" = not applicable; "NS" = not sampled.
- Data entered from the data validation report for each sampling event.
- Shaded cells indicate that the reported concentration is in excess of the Enforcement Standard.
- Groundwater Enforcement Standards referenced from Table 1, Chapter 12 - Groundwater Protection Rule and Strategey, December 2000.

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TABLE 3.0
SUPPLY WELL RESULTS: 2006-2009
Bressett Site, Randolph, Vermont

Owner	Location	Parameter Method 524.2	Groundwater Enforcement Standard	Units	May-06	Oct-06	May-07	Oct-07	Apr-08	Jul-08	Oct-08	Apr-09	Oct-09
Hammond	**Bressett Spring**	**PCE**	**0.7**	ug/L	0.5 U								
		TCE	**5.0**	ug/L	0.5 U								
		cis-1,2-DCE	**70.0**	ug/L	0.5 U								
		trans-1,2-DCE	**100.0**	ug/L	0.5 U								
Hammond	**Bressett Kitchen Tap**	**PCE**	**0.7**	ug/L	**2.0**	**2.7**	**0.53**			**1.3**	**0.69**	0.5 U	0.7 U
		TCE	**5.0**	ug/L	0.5 U	0.5 U	0.5 U			0.5 U	0.5 U	0.5 U	0.5 U
		cis-1,2-DCE	**70.0**	ug/L	0.5 U	0.5 U	0.5 U			0.5 U	0.5 U	0.5 U	0.5 U
		trans-1,2-DCE	**100.0**	ug/L	0.5 U	0.5 U	0.5 U			0.5 U	0.5 U	0.5 U	0.7 U
Hammond	**Bressett Holding Tank / Bressett Pre-Filter**	**PCE**	**0.7**	ug/L	**2.1**		**0.41 J**			**0.78**	**0.47 J**	0.5 U	0.7 U
		TCE	**5.0**	ug/L	0.5 U		0.5 U			0.5 U	0.5 U	0.5 U	0.5 U
		cis-1,2-DCE	**70.0**	ug/L	0.5 U		0.5 U			0.5 U	0.5 U	0.5 U	0.5 U
		trans-1,2-DCE	**100.0**	ug/L	0.5 U		0.5 U			0.5 U	0.5 U	0.5 U	0.7 U
Hammond	**Sheilds Well**	**PCE**	**0.7**	ug/L		0.5 U	0.5 U	0.5 U	0.5 U		0.5 U	0.5 U	0.7 U
		TCE	**5.0**	ug/L		0.5 U	0.5 U	0.5 U	0.5 U		0.5 U	0.5 U	0.5 U
		cis-1,2-DCE	**70.0**	ug/L		0.5 U	0.5 U	0.5 U	0.5 U		0.5 U	0.5 U	0.5 U
		trans-1,2-DCE	**100.0**	ug/L		0.5 U	0.5 U	0.5 U	0.5 U		0.5 U	0.5 U	0.7 U
Bowen	**Bowen Well**	**PCE**	**0.7**	ug/L				0.5 U					
		TCE	**5.0**	ug/L				0.5 U					
		cis-1,2-DCE	**70.0**	ug/L				0.5 U					
		trans-1,2-DCE	**100.0**	ug/L				0.5 U					

Notes:
- "PCE" = tetrachlorethene; "TCE" = tricholorethene; "DCE" = dichloroethene.
- "U" = not detected above listed quantitation limit; "J" = reported concentration is an estimated value; "UJ" = reported quantitation limit is an estimated value; "R' = data are unusable
- "Dry" = well dry during monitoring event; "NA" = not applicable; "NS" = no sample collected.
- All data have been qualified based on the data validation report for each sampling event.
- Shaded cells indicate that the reported concentration is in excess of the Enforcement Standard.
- Enforcement Standard for PCE is the Vermont Action Level, taken from the Vermont Department of Health Drinking Water Guidance, December 2002.
- Enforcement Standard for TCE, cis-1,2-DCE, and trans-1,2-DCE is the Federal Maximum Contaminant Level (MCL), December 2002.

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TABLE 4.0
SURFACE WATER QUALITY RESULTS: 2001 - 2009
Bressett Site, Randolph, Vermont

Location	Parameter Method 8260B	Water Quality Standard	Units	Jul-01	Jul-02	Jul-03	Jul-04	Jul-05	Jul-06	Jul-07	Jul-08	Jul-09
SW-1	**PCE**	**0.8**	ug/L	DRY	1.0 U	DRY	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
	TCE	**2.7**	ug/L	DRY	1.0 U	DRY	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
	cis-1,2-DCE	**NA**	ug/L	DRY	1.0 U	DRY	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
	trans-1,2-DCE	**NA**	ug/L	DRY	1.0 U	DRY	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
SW-2	**PCE**	**0.8**	ug/L	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
	TCE	**2.7**	ug/L	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
	cis-1,2-DCE	**NA**	ug/L	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
	trans-1,2-DCE	**NA**	ug/L	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U

Notes:
- "PCE" = tetrachlorethene; "TCE" = tricholorethene; "DCE" = dichloroethene.
-"U" = not detected above listed quantitation limit; "J" = reported concentration is an estimated value; "UJ" = reported quantitation limit is an estimated value; "R" = the data are unusable (analyte may or may not be present).
-"Dry" = well dry during monitoring event; "NA" = not applicable; "NS" = not sampled.
- All data are qualified based on the data validation report for each sampling event.
- Water Quality Standard referenced from Appendix C of "Vermont Water Quality Standards" (water and organisms) effective July 2, 2000.

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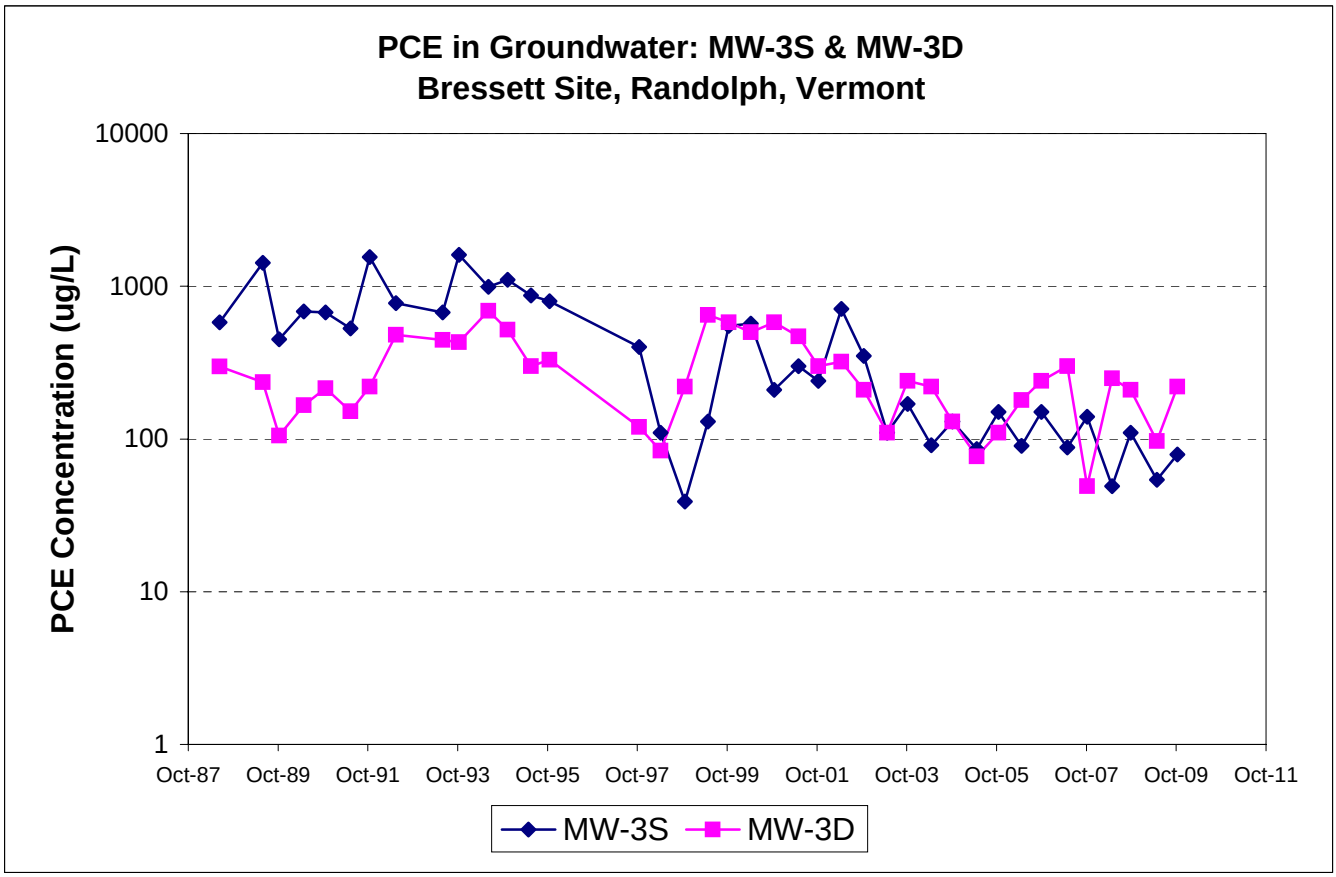
TABLE 5.0
INDOOR AIR QUALITY RESULTS: 1998-2009
Bressett Site, Randolph, Vermont

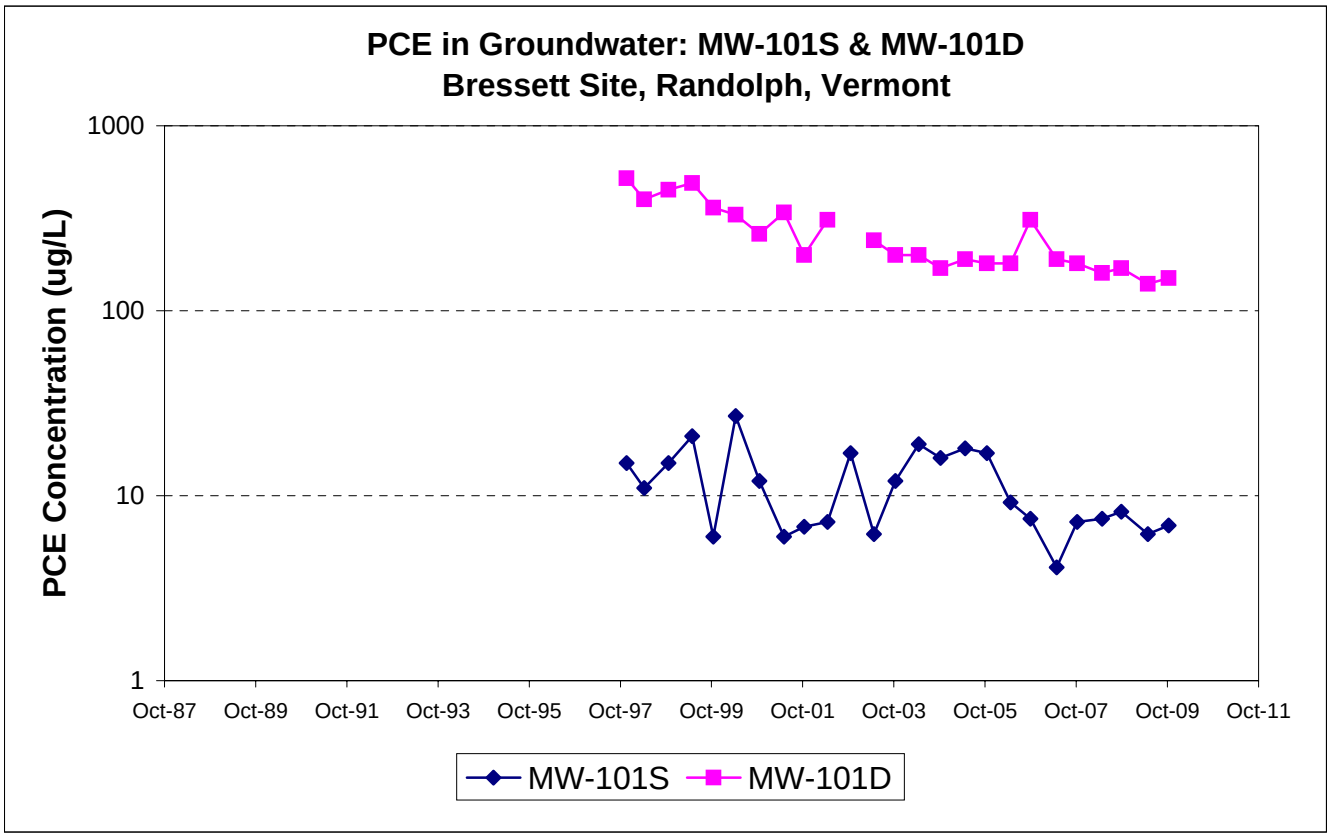
Current Owner	Location	Parameter Method T-014A	Guidance Level	Units	Jul-98	Jan-01	Jul-01	Jul-02	Feb-06	Jul-06	Jan-07	Jul-08	Jan-09	Jul-09
Hammond	BRST1FLR	Tetrachloroethene	1.0	ppbv	1 U	**0.69**	2 U	0.5 U	**4.4**	**6.3** J	**6.0**	**2.8**	**1.8**	**3.4**
		Trichloroethene	1.0	ppbv	1 U	0.47 U	2 U	0.5 U	**0.53**	**0.58**	**0.71**	**0.19**	**0.22**	**0.20**
		cis-1,2-Dichloroethene	9.3	ppbv		0.47 U	2 U	0.5 U	**0.38**	**0.14** J	**0.49**	**0.040**	**0.13**	**0.055**
		trans-1,2-Dichloroethene	18.4	ppbv		0.47 U	2 U	0.5 U	0.20 U	0.20 U	0.20 U	0.010 U	**0.013**	0.010 U
	BRSTBSMT	Tetrachloroethene	1.0	ppbv	**10.7**	**4.8**	**6**	**1.2**	**9.7**	**22** J	**10**	**4.4**	**2.6**	**9.1**
		Trichloroethene	1.0	ppbv	**2.3** J	**0.5**	**0.53**	0.5 U	**1.2**	**1.6**	**1.2**	**0.30**	**0.33**	**0.55**
		cis-1,2-Dichloroethene	9.3	ppbv		0.35 U	0.42 U	0.5 U	**0.78**	**0.40**	**0.88**	**0.055**	**0.18**	**0.14** J
		trans-1,2-Dichloroethene	18.4	ppbv		**0.33** J	0.42 U	0.5 U	0.20 U	0.20 U	0.20 U	**0.011**	**0.018**	**0.016** J

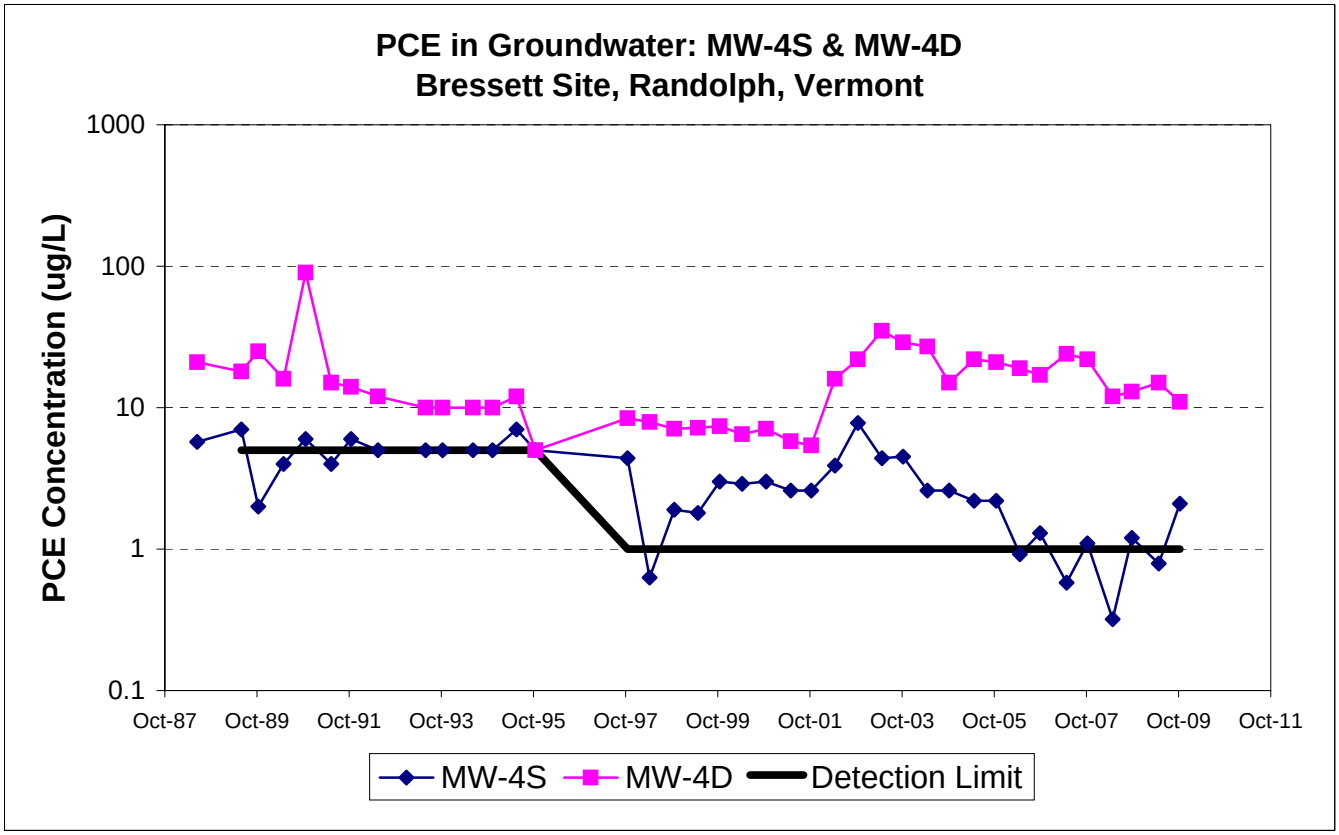
Notes:
-"U" = not detected above listed quantitation limit; "J" = reported concentration is an estimated value; "UJ" = reported quantitation limit is an estimated value; "R" = the data are unusable (analyte may or may be present).
-"NS" = Not Sampled (house unoccupied or access not obtained).
Bold values are reported above quantitation limit; shaded cells are in excess of the guidance level.
Data (qualified) from 1997-2002 was collected by others; data (qualified) starting in 2006 was collected by WEM.
Guidance level for tetrachloroethene and trichloroethene based on results of statewide indoor ambient air survey conducted by the Vermont Dept. Health in 1991-92.
Guidance level for cis- and trans-1,2,-dichloroethene is based on the EPA Region III risk-based concentration for ambient air (2002 RBC table).

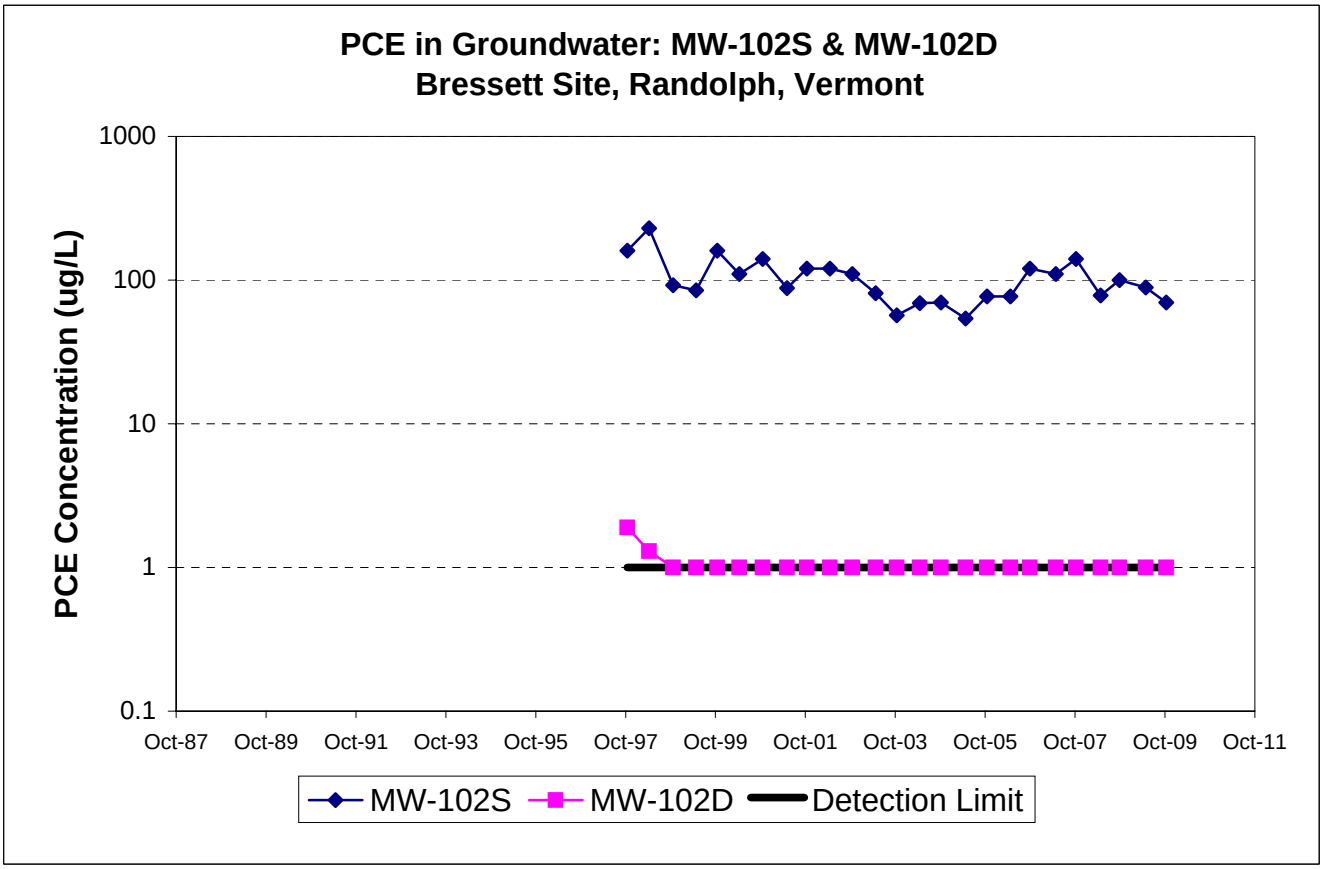
APPENDIX C:

GRAPHS


PCE in Groundwater: MW-3S & MW-3D
Bressett Site, Randolph, Vermont
PCE Concentration (ug/L)
10000
1000
100
10
1
Oct-87
Oct-89
Oct-91
Oct-93
Oct-95
Oct-97
Oct-99
Oct-01
Oct-03
Oct-05
Oct-07
Oct-09
Oct-11
MW-3S
MW-3D


PCE in Groundwater: MW-101S & MW-101D
Bressett Site, Randolph, Vermont
PCE Concentration (ug/L)
1000
100
10
1
Oct-87
Oct-89
Oct-91
Oct-93
Oct-95
Oct-97
Oct-99
Oct-01
Oct-03
Oct-05
Oct-07
Oct-09
Oct-11
MW-101S
MW-101D


PCE in Groundwater: MW-4S & MW-4D
Bressett Site, Randolph, Vermont
PCE Concentration (ug/L)
1000
100
10
1
0.1
Oct-87
Oct-89
Oct-91
Oct-93
Oct-95
Oct-97
Oct-99
Oct-01
Oct-03
Oct-05
Oct-07
Oct-09
Oct-11
MW-4S
MW-4D
Detection Limit


PCE in Groundwater: MW-102S & MW-102D
Bressett Site, Randolph, Vermont
PCE Concentration (ug/L)
1000
100
10
1
0.1
Oct-87
Oct-89
Oct-91
Oct-93
Oct-95
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Oct-01
Oct-03
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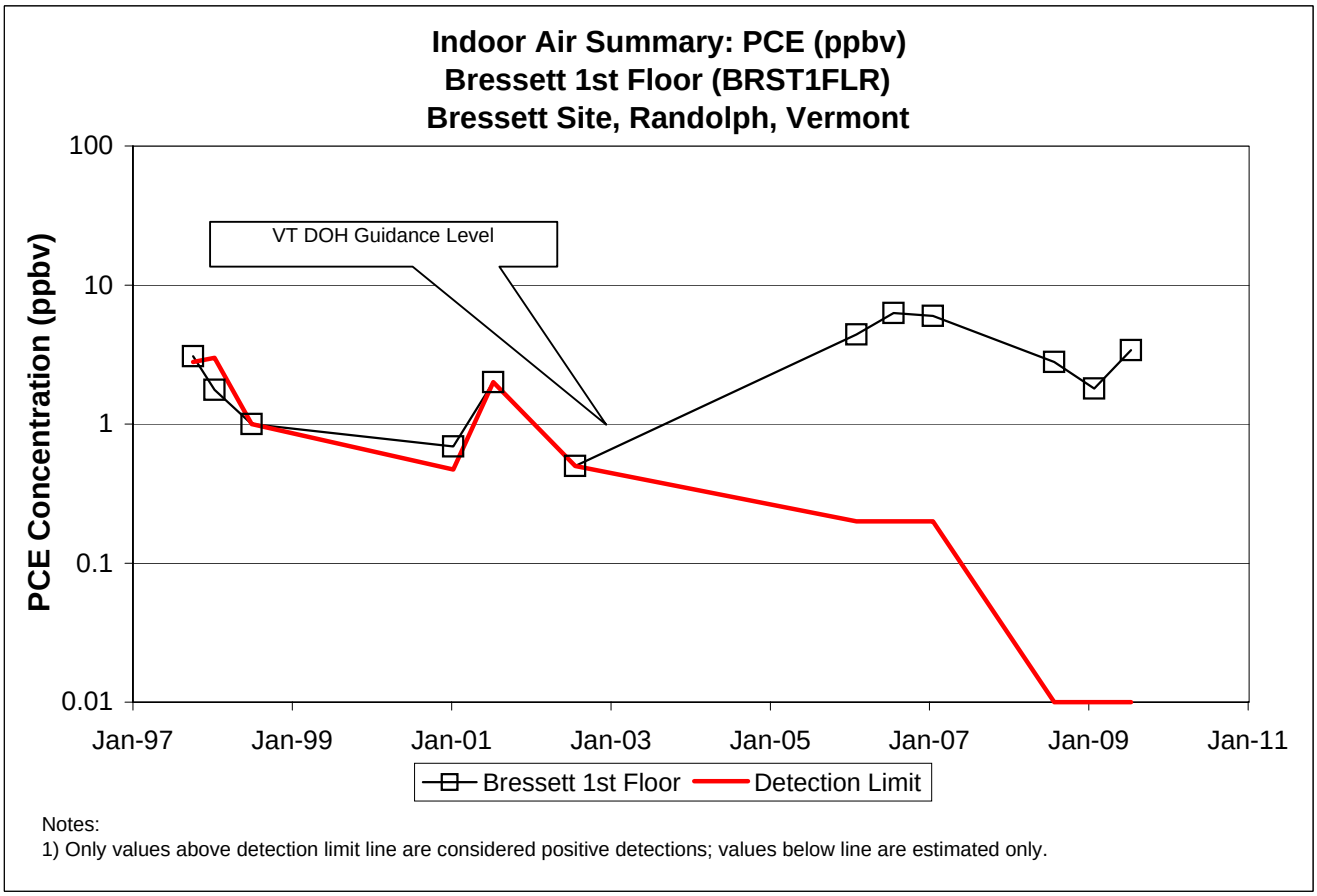
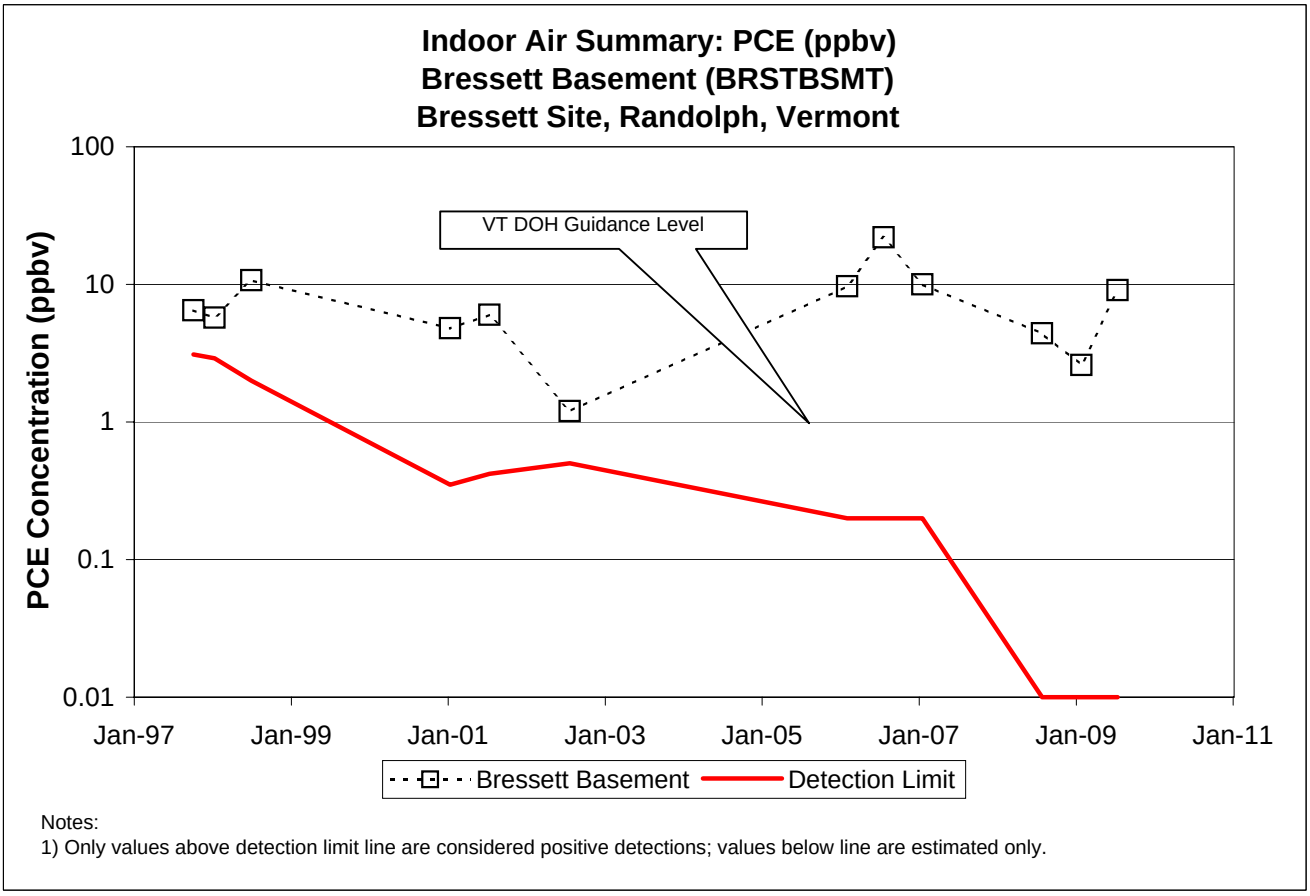
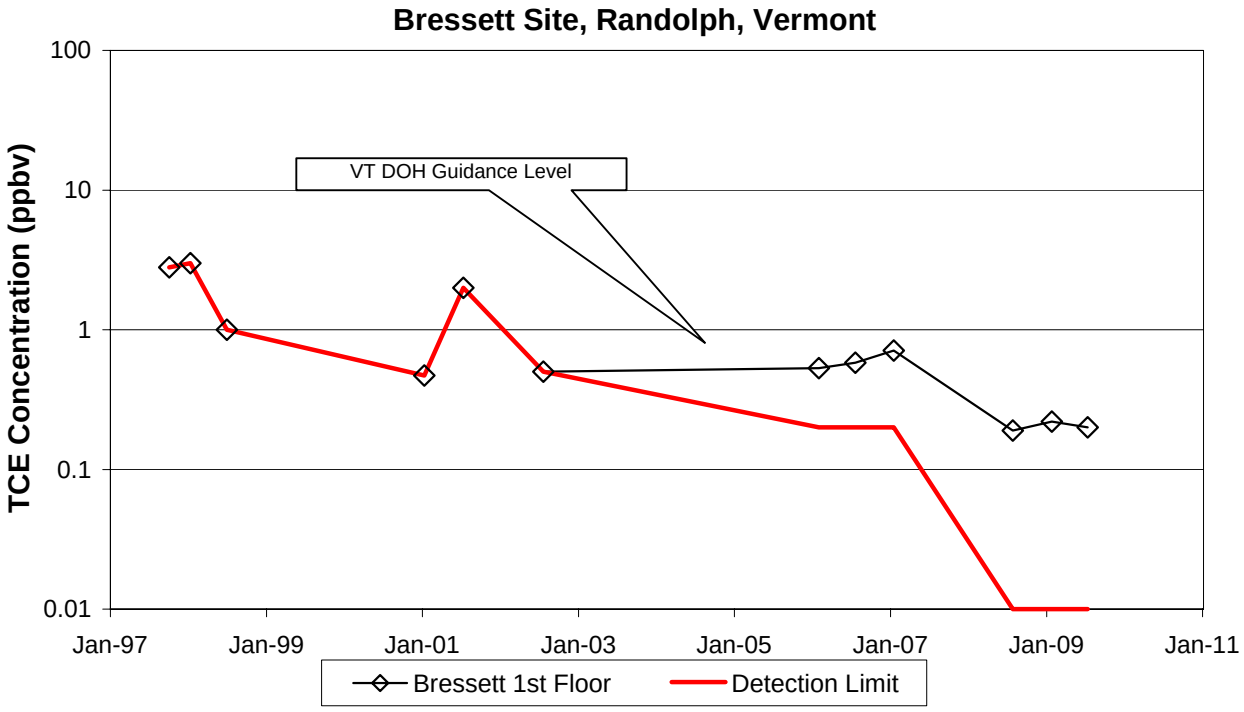
Oct-07
Oct-09
Oct-11
MW-102S
MW-102D
Detection Limit



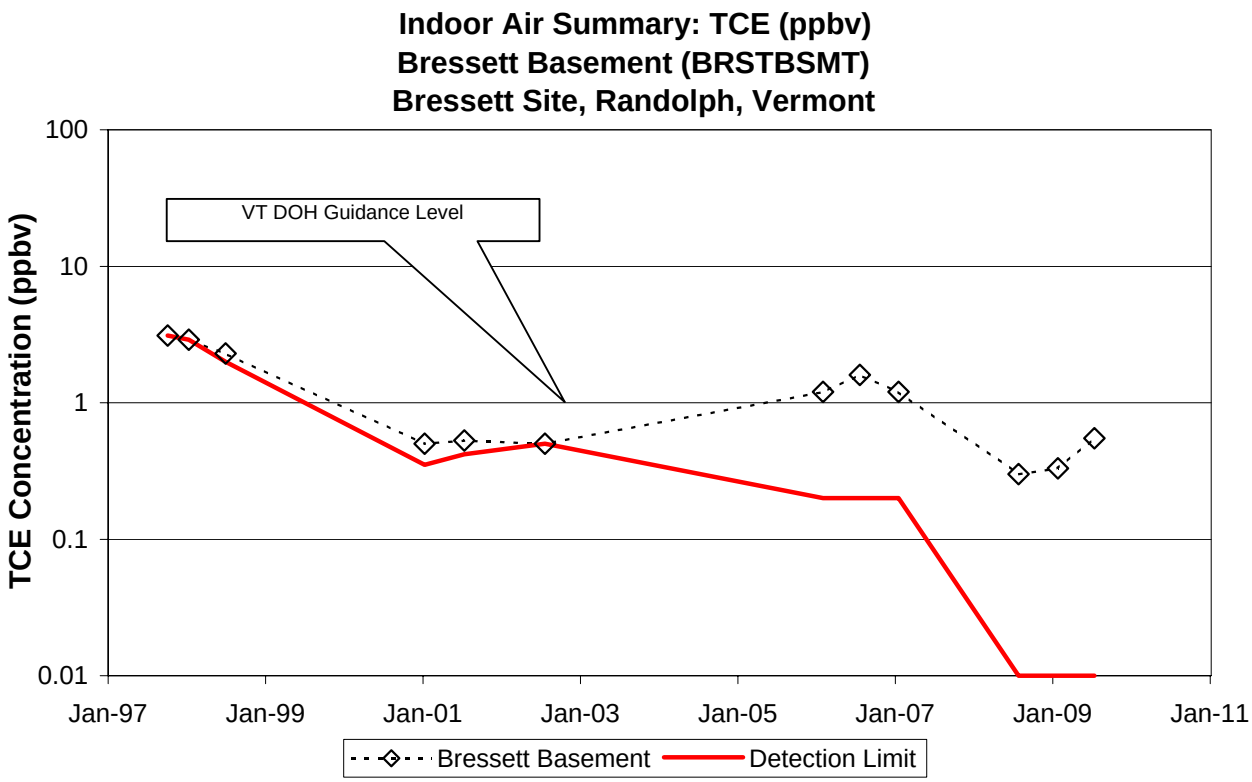
Notes:
1) Only values above detection limit line are considered positive detections; values below line are estimated only.



Notes:
1) Only values above detection limit line are considered positive detections; values below line are estimated only.



Notes:
1) Only values above detection limit line are considered positive detections; values below line are estimated only.



Notes:
1) Only values above detection limit line are considered positive detections; values below line are estimated only.

APPENDIX D:

FIELD DATA SHEETS: 4TH QUARTER

WEM Waite Environmental Management, LLC.

UNIFIRST
FIELD WATER COLLECTION SHEET

SAMPLING LOCATION	MW-103D	Pump Intake Depth	18.5'
Date	10/13/09	Pump Type	peri
Sampler	MW	Well Diameter	3/4"
Weather	Snow & rain	Well Depth	20.2'
Water Type	(gw) sw supply	Initial Depth to Water	5.32'
Sampling Method	bailer low flow grab	Traditional Purge Vol. (bailer)	75 ml/min

LOW FLOW PURGING DATA

Time	DTW (ft btp)	Purge Rate (ml/min)	Temp. (deg C)	Specific Cond. (s/cm)	pH	ORP (mv)	DO (mg/L)	Turbidity (NTU)		Notes
			within 3%	within 3%	1 pH unit	10 mv	within 10%	within 10%		
0903	5.32	75								began
0906	8.28	75	9.70	0.999*	7.25	-22	0.00	393		* blinking
0910	8.46	75	9.97	0.999*	7.34	-87	0.00	468		
0913	8.52	75	9.92	0.999*	7.41	-109	0.00	379		
0916	8.68	75	9.88	0.449	7.50	-122	0.00	176		
0919	8.72	75	9.67	0.341	7.55	-132	0.00	79.7		
0923	8.76	75	9.61	0.316	7.60	-137	0.00	70.5		
0926	8.76	75	9.64	0.301	7.62	-138	0.00	63.3		

SAMPLE COLLECTION	Purge Volume	Temp.	Specific Cond.	pH	ORP	DO	Turbidity		
Final Measurements:	2200	9.64	0.301	7.62	-138	0.00	63.3		

Sample Description	Label	Type Container	# Container	Preservative	Analysis Method	Collection Time	COC #
Sample	MW-103D	VOA	3	HCl	8260B	0930	UF-1
As Required:							
Field Duplicate							
Field Blank							
MS/MSD							

General Notes: MW-103S : V = 6.96 – not enough water to sample

WEM Project #110320012

VT DEC Site #

WEM Waite Environmental Management, LLC.

UNIFIRST
FIELD WATER COLLECTION SHEET

SAMPLING LOCATION	MW-104S	Pump Intake Depth	6.4'
Date	10/13/09	Pump Type	peri
Sampler	[illegible]	Well Diameter	3/4
Weather	rain & snow	Well Depth	8.91
Water Type	(gw) sw supply	Initial Depth to Water	1.78
Sampling Method	bailer (low flow) grab	Traditional Purge Vol. (bailer)	100 ml/min

LOW FLOW PURGING DATA

Time	DTW (ft btp)	Purge Rate (ml/min)	Temp. (deg C)	Specific Cond. (s/cm)	pH	ORP (mv)	DO (mg/L)	Turbidity (NTU)		Notes
			within 3%	within 3%	1 pH unit	10 mv	within 10%	within 10%		
1022	1.78	100								begin
1026	1.78	100	10.85	0.999 *	6.81	84	2.19	7.7		* see bailing
1029	1.78	100	11.17	0.999	7.21	84	1.82	7.0		
1032	1.78	100	11.27	0.999	7.21	87	1.92	7.1		
1036	1.78	100	11.45	0.999	7.19	94	1.85	8.1		
1039	1.78	100	11.51	0.999	7.18	100	1.89	7.1		
1043	1.78	100	11.52	0.999	7.17	106	1.89	7.0		

SAMPLE COLLECTION

	Purge Volume	Temp.	Specific Cond.	pH	ORP	DO	Turbidity		
Final Measurements:	3000	11.52	0.999 *	7.17	106	1.89	7.0		

Sample Description	Label	Type Container	# Container	Preservative	Analysis Method	Collection Time	COC #	
Sample	MW-104S	VOA	3	HCl	5260B	1045	UF-1	
As Required:								
Field Duplicate								
Field Blank								
MS/MSD								

General Notes:

WEM Project #110320012

WEM Waite Environmental Management, LLC.

UNIFIRST
FIELD WATER COLLECTION SHEET

SAMPLING LOCATION	MW-104D	Pump Intake Depth	20.4'
Date	10/13/09	Pump Type	peri.
Sampler	MV	Well Diameter	3/4
Weather	rain & snow	Well Depth	22.89'
Water Type	GW sw supply	Initial Depth to Water	1.90
Sampling Method	bailer low flow grab	Traditional Purge Vol. (bailer)	15-20

LOW FLOW PURGING DATA

Time	DTW (ft btp)	Purge Rate (ml/min)	Temp. (deg C)	Specific Cond. (s/cm)	pH	ORP (mv)	DO (mg/L)	Turbidity (NTU)		Notes
			within 3%	within 3%	1 pH unit	10 mv	within 10%	within 10%		
1053	1.90	15								begin
1108	2.11	15	10.18	0.694	7.28	-28	4.86	979		
1112	2.16	15	10.34	0.311	7.18	-36	0.00	>1000		
1115	2.21	15	10.18	0.294	7.04	-29	0.00	886		
1118	2.31	15	10.46	0.289	7.01	-33	0.00	>1000		
1126	2.36	15	10.43	0.284	6.98	-26	0.00	>1000		

SAMPLE COLLECTION	Purge Volume	Temp.	Specific Cond.	pH	ORP	DO	Turbidity		
Final Measurements:	450	10.43	0.284	6.98	-26	0.00	>1000		

Sample Description	Label	Type Container	# Container	Preservative	Analysis Method	Collection Time	COC #
Sample	MW-104D	VOA	3	HCl	8260B	1130	UF-1
As Required:							
Field Duplicate							
Field Blank							
MS/MSD							

General Notes:

VT DEC Site #

WEM Waite Environmental Management, LLC.

UNIFIRST
FIELD WATER COLLECTION SHEET

SAMPLING LOCATION	MW-102D	Pump Intake Depth	28.8'
Date	10/13/09	Pump Type	peri.
Sampler	MW	Well Diameter	2/4"
Weather	rain & snow	Well Depth	70.8'
Water Type	(gw) sw supply	Initial Depth to Water	8.56
Sampling Method	bailer (low flow) grab	Traditional Purge Vol. (bailer)	75

LOW FLOW PURGING DATA

Time	DTW (ft btp)	Purge Rate (ml/min)	Temp. (deg C)	Specific Cond. (s/cm)	pH	ORP (mv)	DO (mg/L)	Turbidity (NTU)		Notes
			within 3%	within 3%	1 pH unit	10 mv	within 10%	within 10%		
1137	8.56	75								6.5 gal
1141	10.59	75	8.83	0.799 *	7.37	-124	1.48	546		* Flashing
1145	10.92	75	8.89	0.548	7.58	-151	0.00	337		
1148	10.89	75	8.67	0.420	7.73	-160	0.00	228		
1151	10.79	75	8.84	0.399	7.84	-165	0.00	130		
1155	10.79	75	8.94	0.379	7.91	-170	0.00	158		
1158	10.79	75	9.01	0.373	7.96	-173	0.00	169		
1201	10.79	75	8.97	0.374	7.99	-172	0.00	164		

SAMPLE COLLECTION	Purge Volume	Temp.	Specific Cond.	pH	ORP	DO	Turbidity		
Final Measurements:	2000	8.97	0.374	7.99	-172	0.00	164		

Sample Description	Label	Type Container	# Container	Preservative	Analysis Method	Collection Time	COC #
Sample	MW-102D	VOA	3	HCl	8260B	1205	
As Required:							
Field Duplicate							
Field Blank							
MS/MSD							

General Notes:

VT DEC Site #

WEM Waite Environmental Management, LLC.

UNIFIRST
FIELD WATER COLLECTION SHEET

SAMPLING LOCATION	MW-102S	Pump Intake Depth	11.9'
Date	10/13/05	Pump Type	peri.
Sampler	MW	Well Diameter	3/4
Weather	rain & snow	Well Depth	12.9'
Water Type	(gw) sw supply	Initial Depth to Water	8.43
Sampling Method	bailer (low flow) grab	Traditional Purge Vol. (bailer)	75

LOW FLOW PURGING DATA

Time	DTW (ft btp)	Purge Rate (ml/min)	Temp. (deg C)	Specific Cond. (s/cm)	pH	ORP (mv)	DO (mg/L)	Turbidity (NTU)		Notes
			within 3%	within 3%	1 pH unit	10 mv	within 10%	within 10%		
1214	8.43	75								begin
1219	8.76	75	9.52	0.999*	7.70	73	4.53	98.0		* flushing
1222	8.80	75	9.99	0.997*	7.71	80	3.61	26.1		
1225	8.80	75	9.97	0.999*	7.77	89	4.07	22.1		
1228	8.80	75	9.99	0.999*	7.62	95	4.12	18.0		
1231	8.80	75	10.00	0.999*	7.62	97	4.05	20.9		

SAMPLE COLLECTION	Purge Volume	Temp.	Specific Cond.	pH	ORP	DO	Turbidity		
Final Measurements:	1800	10.00	0.999*	7.62	97	4.05	20.9		

Sample Description	Label	Type Container	# Container	Preservative	Analysis Method	Collection Time	COC #
Sample	MW-102S	VOA	3	HCl	8260B	1235	
As Required:							
Field Duplicate							
Field Blank							
MS/MSD							

General Notes:

WEM Project #110320012

VT DEC Site #

WEM Waite Environmental Management, LLC.

UNIFIRST
FIELD WATER COLLECTION SHEET

SAMPLING LOCATION	MW-101S	Pump Intake Depth	11.9'
Date	10/13/09	Pump Type	peri
Sampler	AL	Well Diameter	1/4"
Weather	rain & snow	Well Depth	14.3'
Water Type	(gw) sw supply	Initial Depth to Water	5.55
Sampling Method	bailer (low flow) grab	Traditional Purge Vol. (bailer)	75

LOW FLOW PURGING DATA

Time	DTW (ft btp)	Purge Rate (ml/min)	Temp. (deg C)	Specific Cond. (s/cm)	pH	ORP (mv)	DO (mg/L)	Turbidity (NTU)		Notes
			within 3%	within 3%	1 pH unit	10 mv	within 10%	within 10%		
1310	5.55	75								begin
1314	6.35	75	11.50	0.995*	7.09	150	3.36	572		* flushing
1318	6.36	75	11.66	0.999	6.75	154	0.00	808		
1321	6.35	75	11.32	0.473	6.63	157	0.00	916		
1324	6.35	75	11.17	0.454	6.57	158	0.00	770		
1327	6.35	75	11.01	0.403	6.52	161	0.00	587		
1330	6.35	75	11.34	0.394	6.49	162	0.00	618		
1333	6.35	75	11.33	0.386	6.49	163	0.00	355		
1336	6.35	75	11.30	0.378	6.49	164	0.00	330		

SAMPLE COLLECTION	Purge Volume	Temp.	Specific Cond.	pH	ORP	DO	Turbidity		
Final Measurements:	2500	11.30	0.378	6.49	164	0.00	330		

Sample Description	Label	Type Container	# Container	Preservative	Analysis Method	Collection Time	COC #	
Sample								
As Required:								
Field Duplicate								
Field Blank								
MS/MSD								

General Notes:

WEM Waite Environmental Management, LLC

UNIFIRST
FIELD WATER COLLECTION SHEET

SAMPLING LOCATION	MW-101D	Pump Intake Depth	22.5'
Date	10/13/09	Pump Type	peri
Sampler	MM	Well Diameter	3/4
Weather	Rain & Snow	Well Depth	~~6.75~~ 24.8'
Water Type	~~GW~~ sw supply	Initial Depth to Water	6.75
Sampling Method	bailer low flow grab	Traditional Purge Vol. (bailer)	75

LOW FLOW PURGING DATA

Time	DTW (ft btp)	Purge Rate (ml/min)	Temp. (deg C)	Specific Cond. (s/cm)	pH	ORP (mv)	DO (mg/L)	Turbidity (NTU)		Notes
			within 3%	within 3%	1 pH unit	10 mv	within 10%	within 10%		
1349	6.75	75								6.90
1353	7.82	75	10.13	2.40	6.93	179	3.44	>1000		
1356	7.85	75	10.29	1.50	6.97	179	1.29	>1000		
1359	7.87	75	10.05	1.26	7.00	179	0.94	"		
1402	7.90	75	9.68	1.09	7.02	180	0.73	"		
~~1405~~	7.90	75	9.47	1.01	7.03	182	0.61	"		
~~1408~~	7.90	75	9.59	0.990	7.03	184	0.59	"		
1410	7.90	75	9.54	0.960	7.04	185	0.59	>1000		

SAMPLE COLLECTION

	Purge Volume	Temp.	Specific Cond.	pH	ORP	DO	Turbidity		
Final Measurements:	2400	9.54	0.960	7.04	185	0.59	>1000		

Sample Description	Label	Type Container	# Container	Preservative	Analysis Method	Collection Time	COC #	
Sample	MW-101D	VOA	3	HCl	8260B	1415		
As Required:								
Field Duplicate								
Field Blank								
MS/MSD								

General Notes:

(8)

UNIFIRST

WEM Waite Environmental Management, LLC.

FIELD WATER COLLECTION SHEET

SAMPLING LOCATION	MW-4S	Pump Intake Depth	—
Date	10/13/09	Pump Type	—
Sampler	MW	Well Diameter	2
Weather	rain & snow	Well Depth	24.20
Water Type	(gw) sw supply	Initial Depth to Water	20.13
Sampling Method	(bailer) low flow grab	Traditional Purge Vol.	3 well vol.

SAMPLE COLLECTION	Purge Volume (ml / (gal))	Temp. (deg C)	Specific Cond. (s/cm)	pH	ORP (mv)	DO (mg/L)	Turbidity (NTU)	Filtered (y/n)	NOTES
Final Measurements:	2.0	8.36	0.371	7.97	212	7.89	268		

Sample Description	Label	Type Container	# Container	Preservative	Analysis Method	Collection Time	COC #	
Sample	MW-4S	VOA	3	HCl	8260	1500		
As Required:								
Field Duplicate								
Field Blank								
MS/MSD	MW-4S	VOA	4	"	"	"		

General Notes:

SAMPLING LOCATION	MW-4D	Pump Intake Depth	—
Date	10/13/09	Pump Type	—
Sampler	MW	Well Diameter	2
Weather		Well Depth	46.8
Water Type	(gw) sw supply	Initial Depth to Water	20.51
Sampling Method	(bailer) low flow grab	Traditional Purge Vol.	3 well vol.

SAMPLE COLLECTION	Purge Volume (ml / (gal))	Temp. (deg C)	Specific Cond. (s/cm)	pH	ORP (mv)	DO (mg/L)	Turbidity (NTU)	Filtered (y/n)	NOTES
Final Measurements:	13	8.98	0.541	7.63	200	6.56	71000		

Sample Description	Label	Type Container	# Container	Preservative	Analysis Method	Collection Time	COC #	
Sample	MW-4D	VOA	3	HCl	8260	1535		
As Required:								
Field Duplicate								
Field Blank								
MS/MSD								

General Notes:

(9)

UNIFIRST

WEM Waite Environmental Management, LLC.

FIELD WATER COLLECTION SHEET

SAMPLING LOCATION	MW-3S	Pump Intake Depth	/
Date	10/13/09	Pump Type	/
Sampler	MW	Well Diameter	2
Weather	warm & snow	Well Depth	27.70
Water Type	(gw) sw supply	Initial Depth to Water	23.99
Sampling Method	(bailer) low flow grab	Traditional Purge Vol.	3 well vol

SAMPLE COLLECTION	Purge Volume (ml / (gal))	Temp. (deg C)	Specific Cond. (s/cm)	pH	ORP (mv)	DO (mg/L)	Turbidity (NTU)	Filtered (y/n)	NOTES
Final Measurements:	1.5	8.27	0.900	7.40	211	8.60	567		

Sample Description	Label	Type Container	# Container	Preservative	Analysis Method	Collection Time	COC #	
Sample	MW-3S	VOA	3	HCl	8260	1550		
As Required:								
Field Duplicate								
Field Blank								
MS/MSD								

General Notes:

SAMPLING LOCATION	MW-3D	Pump Intake Depth	/
Date	10/13/09	Pump Type	/
Sampler		Well Diameter	2
Weather		Well Depth	74.6
Water Type	gw sw supply	Initial Depth to Water	21.97
Sampling Method	bailer low flow grab	Traditional Purge Vol.	3 well vol

SAMPLE COLLECTION	Purge Volume (ml / (gal))	Temp. (deg C)	Specific Cond. (s/cm)	pH	ORP (mv)	DO (mg/L)	Turbidity (NTU)	Filtered (y/n)	NOTES
Final Measurements:	27	8.03	0.999*	7.63	217	0.13	71000		* blinking

Sample Description	Label	Type Container	# Container	Preservative	Analysis Method	Collection Time	COC #	
Sample	MW-3D	VOA	3	HCl	8260	1640		
As Required:								
Field Duplicate	MW-Z	"	"	"	"	"1700"		blind
Field Blank								
MS/MSD								

General Notes: purged well using peristaltic pump for 90 minutes prior to bailer purging

WEM Waite Environmental Management, LLC.

UNIFIRST
FIELD WATER COLLECTION SHEET

SAMPLING LOCATION	BRW-3	Pump Intake Depth	72'
Date	10/14/09	Pump Type	grundfos rediflo 2
Sampler	MW	Well Diameter	2"
Weather	pc 1 cm/	Well Depth	80.8'
Water Type	(gw) sw supply	Initial Depth to Water	9.52
Sampling Method	bailer (low flow) grab	Traditional Purge Vol. (bailer)	3 L/min

LOW FLOW PURGING DATA

Time	DTW (ft btp)	Purge Rate (ml/min)	Temp. (deg C)	Specific Cond. (s/cm)	pH	ORP (mv)	DO (mg/L)	Turbidity (NTU)		Notes
			within 3%	within 3%	1 pH unit	10 mv	within 10%	within 10%		
0923	9.52	3								2 gal.
0925	11.50	3	9.13	0.999*	5.97	314	8.37	97.9		* blinking
0930	11.92	3	9.68	0.589	6.54	279	9.81	65.8		
0935	12.06	3	9.83	0.999*	6.86	266	8.32	28.4		
0938	12.22	3	9.93	0.999*	6.87	259	7.69	14.3		
0941	12.02	3	9.97	0.999*	6.99	254	6.54	14.3		
0944	12.48	3	10.13	0.999*	7.12	245	6.47	10.0		
0947	12.42	3	10.06	0.999*	7.14	246	6.42	9.8		

SAMPLE COLLECTION	Purge Volume	Temp.	Specific Cond.	pH	ORP	DO	Turbidity		
Final Measurements:	52L	10.06	0.999*	7.14	246	6.42	9.8		

Sample Description	Label	Type Container	# Container	Preservative	Analysis Method	Collection Time	COC #	
Sample	BRW-3	VOA	3.	HCl	8260	0950		
As Required:								
Field Duplicate								
Field Blank								
MS/MSD								

General Notes:

WEM Project #110320012

VT DEC Site #

WEM Waite Environmental Management, LLC.

UNIFIRST
FIELD WATER COLLECTION SHEET

SAMPLING LOCATION	BRW-2	Pump Intake Depth	75'
Date	10/14/09	Pump Type	Grundfos Rediflo2
Sampler	MV	Well Diameter	2"
Weather	cl & cool	Well Depth	101.5'
Water Type	(gw) sw supply	Initial Depth to Water	11.07
Sampling Method	bailer (low flow) grab	Traditional Purge Vol. (bailer)	600 ml/min

LOW FLOW PURGING DATA

Time	DTW (ft btp)	Purge Rate (ml/min)	Temp. (deg C)	Specific Cond. µ(s/cm)	pH	ORP (mv)	DO (mg/L)	Turbidity (NTU)		Notes
			within 3%	within 3%	1 pH unit	10 mv	within 10%	within 10%		
1018	11.07	600								boya
1023	10.18	600	9.24	0.304	7.25	-104	11.41	9.2		sulfur odor
1027	11.90	600	9.31	0.367	7.23	-126	2.05	28.5		
1031	13.92	600	9.46	0.338	7.24	-141	0.00	76.0		
1035	15.41	600	9.69	0.381	7.26	-147	0.00	80.6		
1038	16.42	600	9.94	0.325	7.27	-151	0.00	81.6		
1041	17.50	600	9.92	0.370	7.27	-153	0.00	69.7		
1043	18.82	600	9.95	0.362	7.28	-157	0.00	67.9		

SAMPLE COLLECTION	Purge Volume	Temp.	Specific Cond.	pH	ORP	DO	Turbidity		
Final Measurements:	12 L	9.95	0.362	7.28	-157	0.00	67.9		

Sample Description	Label	Type Container	# Container	Preservative	Analysis Method	Collection Time	COC #	
Sample	BRW-2	VOA	3	HCl	8260	1045		
As Required:								
Field Duplicate								
Field Blank								
MS/MSD								

General Notes:

WEM Project #110320012

VT DEC Site #

WEM Waite Environmental Management, LLC.

UNIFIRST
FIELD WATER COLLECTION SHEET

SAMPLING LOCATION	BRW-1	Pump Intake Depth	40'
Date	10/14/09	Pump Type	Grundfos Rel. Plo 2
Sampler	ML	Well Diameter	2"
Weather	cl/1 cool	Well Depth	80.8'
Water Type	(gw) sw supply	Initial Depth to Water	13.85
Sampling Method	bailer (low flow) grab	Traditional Purge Vol. (bailer)	2 L/min

LOW FLOW PURGING DATA

Time	DTW (ft btp)	Purge Rate (ml/min)	Temp. (deg C)	Specific Cond. (mS/cm)	pH	ORP (mv)	DO (mg/L)	Turbidity (NTU)		Notes
			within 3%	within 3%	1 pH unit	10 mv	within 10%	within 10%		
1120	13.85	2								
1122	17.70	2	8.82	0.218	7.47	45	6.29	0.0		begin
1126	18.48	2	8.64	0.229	7.50	52	4.18	0.0		
1130	18.82	2	9.05	0.218	7.55	42	1.81	0.0		
1334	19.06	2	9.23	0.235	7.58	39	1.20	0.0		
1338	19.08	2	9.26	0.245	7.60	37	1.28	0.0		
1342	19.08	2	9.28	0.248	7.61	38	1.31	0.0		

SAMPLE COLLECTION	Purge Volume	Temp.	Specific Cond.	pH	ORP	DO	Turbidity		
Final Measurements:	44L	9.28	0.248	7.61	38	1.31	0.0		

Sample Description	Label	Type Container	# Container	Preservative	Analysis Method	Collection Time	COC #	
Sample	BRW-1	VOA	3	HCl	8260	1145		
As Required:								
Field Duplicate								
Field Blank								
MS/MSD								

General Notes:

WEM Project #110320012

VT DEC Site #

APPENDIX E:

DATA VALIDATION REPORT: 4TH QUARTER

DATA VALIDATION

FOR

UniFirst Project
Bressett, Wheatley, and UniFirst Sites
Randolph, Brookfield, and Williamstown, VT

ORGANIC ANALYSIS DATA
Volatile Organics in Water Samples

Sample Delivery Group Nos. BRES45, UNIF36, and WHEA15

Chemical Analyses Performed by:

TestAmerica Burlington
30 Community Drive Dr. Suite 11
South Burlington, VT 05403

FOR

Mr. Gerold Noyes
VT Department of Environmental Conservation
Waste Management Division
103 South Main Street, West Building
Waterbury, VT 05676-0404

Data Validation Report by:

Phoenix Chemistry Services
126 Covered Bridge Rd.
N. Ferrisburg, VT 05473
(802)-233-2473

January 26, 2010
revised February 5, 2010

Reference #s 2009-1118-001, -1210-001, &-002
VOA Validation Report/BRES45_UNIF36_WHEA15/dhg

EXECUTIVE SUMMARY

Phoenix Chemistry Services (Phoenix) has completed the validation of the volatile organics analysis data prepared by TestAmerica Burlington (formerly STL Burlington) for 40 groundwater samples, 10 potable water samples, 1 performance evaluation (PE) sample, 6 field blanks (FB), and 3 trip blanks (TB) from the Bressett Site in Randolph, VT, the UniFirst Site in Williamstown, VT, and the Wheatley Farm site in Brookfield, VT. The laboratory reported the data under Sample Delivery Group (SDG) Nos. BRES45, UNIF36, and WHEA15, which were submitted as three data packages received by Phoenix on November 18 and December 10, 2009. These SDGs include the following samples:

Sample Identifier	Laboratory ID
Method 8260B	
SDG No. BRES45	
MW-103D	810344
MW-104S	810345
MW-104D	810346
MW-102D	810347
MW-102S	810348
MW-101S	810349
MW-101D	810350
MW-4S	810351
MW-4D	810352
MW-3S	810353
MW-3D	810354
FB-2	810355
MW-Z	810356
BRW-3	810357
BRW-2	810358
BRW-1	810359
SDG No. UNIF36	
MW-25884	810360
FB-3	810361
BRW-X	810362
TB-3	811110
PZ-101	811111
PZ-102	811112
W-25	811113
MW-50	811114
W-19	811115
W-20	811116
MW-E	811117
MW-C	811118
W-1	811119
MW-D	811120

Sample Identifier	Laboratory ID
W-Z	811121
FB-5	811122
SEEP-1A	811123
SS-2	811124
W-SEEP	811125
SS-Z	811126
SS-5	811127
SP-4	811128
SP-3	811129
SDG No. WHEA15	
TB-2	810988
MW-PL2	810989
MW-PL1	810990
MW-S1	810991
MW-S2	810992
FB-4	810993
MW-PLX	810994
Method 524.2	
SDG No. BRES45	
TB-1	810338
SHIELDS	810339
WELL Z	810340
FB-1	810341
KITCHEN TAP	810342
PRE-FILTER	810343
SDG No. UNIF36	
WP-5	811130
WP-7	811131
WP-8	811132
WP-13	811133
WP-3	811134
WP-Z	811135
FB-6	811136
W-23	811137

A cross-reference table of sample IDs was provided in the data packages.

Findings of the validation effort resulted in the following qualifications of sample results:

- Results for chloromethane and 1,1,-dichloroethane in samples TB-1, SHIELDS, WELL Z, FB-1, KITCHEN TAP, and PRE-FILTER, and for chloroethane in all samples analyzed by Method 524.2 were qualified as estimated (UJ).

- Results for bromomethane in samples BRW-1, MW-102S, MW-3S, MW-3D, MW-Z, FB-4, MW-PLX, MW-D, FB-5, SEEP-1A, SS-2, W-SEEP, SS-Z, SS-5, SP-4, SP-3, and W-Z were

qualified as estimated (UJ).

- Results for acetone in samples MW-103D, MW-104D, MW-102D, MW-101D, MW-4D, BRW-3, BRW-2, SEEP-1A, SS-2, and SS-5; results for trichloroethene in samples MW-104D, MW-4D, MW-PL1, and MW-PLX; and results for carbon disulfide in MW-103D, BRW-2, and BRW-1 were qualified as less than the quantitation limit, and results for carbon disulfide in WP-3 and WP-Z and for trichloroethene in W-25 were qualified as less than the reported value (U).

- All laboratory-applied "B" qualifiers have been removed by the validator.

- Results for all analytes in MW-D and TB-2 were qualified as estimated (J, UJ).

- Results for trichloroethene and tetrachloroethene in MW-D and W-Z were qualified as estimated (J).

- All non-detected results in all drinking water field samples for trans-1,2-dichloroethene, 1,1,1-trichloroethane, tetrachloroethene, and o-xylene were qualified as less than the adjusted quantitation limit (U), and the quantitation limit was adjusted to 0.71 ug/L.

- Results for m,p-xylenes and total xylenes were rejected (R) in all samples analyzed by Method 524.2.

- Results for 2-butanone in TB-1, SHIELDS, WELL-Z, FB-1, KITCHEN TAP, and PRE-FILTER were qualified as estimated (UJ).

- Results for tetrachloroethene in the original analyses of samples MW-3D and MW-Z were rejected (R), and replaced with the acceptable concentrations from the corresponding diluted samples (MW-3DDL and MW-ZDL).

- Results for all other analytes in samples MW-3DDL and MW-ZDL were rejected (R) and taken from the original analyses (MW-3D and MW-Z).

- "E" qualifiers were appropriately applied by the laboratory to sample Form I results when concentrations of target analytes were greater than the instrument calibration range. "D" qualifiers were properly applied by the laboratory to positive results from diluted sample analyses. The validator removed all laboratory-applied "E" and "D" qualifiers.

- The laboratory appropriately applied "J" qualifiers to the sample Form I's when the concentration of an analyte was less than the sample-specific PQL. The validator did not remove these qualifiers.

The Overall Evaluation of Data (Section XVI) summarizes the validation results. The validation findings and conclusions for each analytical parameter are detailed in the remaining sections of this report.

Documentation problems observed in the data packages are described in Section XVII.

This validation report shall be considered <u>part of the data packages</u> for all future distributions of the volatiles (8260B and 524.2) analysis data.

INTRODUCTION

Analyses were performed according to SW-846 Method 8260B Low Level, as documented in STL SOP 8260B, and SDWA Method 524.2 Rev. 4.1, as documented in STL SOP 524.2, and in accordance with requirements in the Field/Laboratory Coordination Memorandum for Water Monitoring (FLCM), April 2, 2004. The target compound list for the Method 8260B analyses was limited to the OLM03.1 CLP target compound list, and the target compound list for Method 52.4.2 was limited to the OLM03.1 CLP target compound list plus methyl-*tert*-butyl ether (MTBE).

Tentative identification of non-target analyte peaks (i.e., tentatively identified compounds, or TICs) was not requested for these analyses.

Phoenix Chemistry Services' validation was performed in conformance with Tier III guidelines as defined by USEPA Region in the "Region I EPA-NE Data Validation Manual: The Data Quality System", (12/96 Revision). The data were evaluated in accordance with the "Region I EPA-NE Data Validation Functional Guidelines for Evaluating Environmental Analyses", December 1996. EPA's National Functional Guidelines for Organic Data Review (EPA 540/R-99/008, October, 1999) were also considered during the evaluation, and professional judgment was applied as necessary and appropriate.

The data validation process evaluates data on a technical basis for chemical analyses conducted under the CLP or other well-defined methods. Contract compliance is evaluated only in specific situations. Issues pertaining to contractual compliance are noted where applicable. It is assumed that the data package is presented in accordance with the CLP (CLP-like or SW-846) requirements. It is also assumed that the data package represents the best efforts of the laboratory and has already been subjected to adequate and sufficient quality review prior to submission for validation. In instances where SW-846 or other specific methods have been used for the analyses, the validation effort is modified to acknowledge the differences in methodology while maintaining the goals and quality objectives of the CLP.

Results of sample analyses are reported by the laboratory as either qualified or unqualified; various qualifier codes are used by the laboratory to denote specific information regarding the analytical results. During the validation process, laboratory data are verified against all available supporting documentation. Based on this evaluation, qualifier codes may be added, deleted, or modified by the data validator. Raw data is examined in detail to check calculations, compound identification, and/or transcription errors. Validated results are either qualified or unqualified; if results are unqualified, this means that the reported values may be used without reservation. Final validated results are annotated with the following codes, as defined in the EPA Region I Functional Guidelines:

U - The analyte was analyzed for, but was not detected. The associated numerical value is the sample quantitation limit. The sample quantitation limit accounts for sample specific dilution factors and percent solids corrections or sample sizes that deviate from those required by the method.

J - The associated numerical value is an estimated quantity.

UJ - The analyte was analyzed for, but was not detected. The sample quantitation limit is an estimated quantity.

R - The data are unusable (analyte may or may not be present). Resampling and reanalysis is necessary for verification. The R replaces the numerical value or sample quantitation limit. In some instances (e.g., a dilution) a result may be indicated as "rejected" to avoid confusion when a more quantitatively accurate result is available.

EB, TB, BB - An analyte that was identified in an aqueous equipment (field) blank, trip blank, or bottle blank that was used to assess field contamination associated with soil/sediment samples. These qualifiers are to be applied to soil/sediment sample results only.

These codes are assigned during the validation process and are based on the data review of the results. They are recorded on the Data Summary Forms contained in Attachment A and the Organic Analysis Data Sheets (Form I) in Attachment B of this validation report.

All data users should note two facts. First, **the "R" qualifier means that the laboratory-reported value is completely unusable.** The analysis is invalid due to significant quality control problems, and provides no information as to whether the compound is present or not. Rejected values should not appear on data tables because they have no useful purpose under any circumstances. Second, **no analyte concentration is guaranteed to be accurate even if all associated quality control is acceptable.** While strict quality control conformance provides well-defined confidence in the reported results, any analytical result will always contain some error.

The user is also cautioned that the validation effort is based on the materials provided by the laboratory. Software manipulation, resulting in misleading raw data printouts, cannot be routinely detected during validation; unless otherwise stated in the report, these kinds of issues are outside the scope of this review.

Detailed Findings of Measurement Error Associated with the Analytical Analysis

I. Preservation and Technical Holding Times (Sample Integrity)

The samples for volatiles analysis in SDG Nos. BRES45, UNIF36, and WHEA15 were collected on October 13, 14, 19, and 20, 2009. All volatiles analyses were performed within the acceptable holding times for preserved water samples (14 days from collection), as required by Region 1. Although not provided in the case narrative (as required by the CLP SOW), the pH of the samples was measured within three days after receipt at the laboratory, and is recorded in the Sample Preparation sections of the data packages. All recorded sample pH values were <2. The field sample collection sheets also note that the samples were appropriately preserved with HCl.

The cooler temperatures on receipt at the laboratory were checked and documented in the data packages, and were 4.7, 2.7, and 7.6 ^{o}C, which are within the acceptance range of 4 ^{o}C ±2 ^{o}C, with the exception of the cooler at 7.6 ^{o} C. Since the samples in the cooler at 7.6 ^{o}C were all collected within five hours of receipt at the laboratory, had been iced, and cooling was demonstrated, no qualifications were necessary on the basis of the cooler temperature slightly above the acceptance limit.

II. GC/MS Instrument Performance Check (Tuning)

The samples were analyzed on two GC/MS systems identified as instruments L and M. The tuning of these instruments was demonstrated with analysis of 4-bromofluorobenzene (BFB); tunes were analyzed for each shift (12-hour period) during which the samples or associated standards were analyzed. All eleven (11) BFB tunes were correctly calculated, within acceptance limits, and are reported accurately on the Form V summaries in the data packages.

III. Initial Calibration (IC)

One IC (10/23/09) was performed on instrument M and one IC (10/31/09) was performed on instrument L in support of the Method 8260B sample analyses, and two ICs (10/13/09 and 10/27/09) were performed on instrument L in support of the method 524.2 sample analyses reported in these data packages. Documentation of all individual IC standards was present in the data packages and relative response factor (RRF) as well as percent relative standard deviation (%RSD) values were correctly calculated and accurately reported on the Form VI summaries.

One or more target compounds were manually integrated in each of the Method 8260B ICs performed on instruments L and M. The manual integrations appear to be correctly performed, are initialed by the analyst, and are accurately reported with the final area listed on the tabular report and the before and after ion chromatograms included in the data packages.

All % RSDs for both ICs were below the maximum limit (30%) specified by Region I, with the exception of acetone at 30.1 %RSD in the Method 524.2 IC on instrument L on 10/27/09. All RRF's were above the 0.05 minimum technical criterion, with the following exceptions:

Instrument	IC	Average RRF	
		acetone	2-butanone
M (8260B)	10/23/09	acceptable	0.028
L (8260B)	10/31/09	acceptable	0.021
L (524.2)	10/13/09	0.037	0.016
L (524.2)	10/27/09	acceptable	0.017

Pursuant to the Region I validation document, results for 2-butanone in all samples in this data set and for acetone in samples TB-1, SHIELDS, WELL Z, FB-1, KITCHEN TAP, and PRE-FILTER warranted rejection (R) based on the low RRFs achieved. However, acetone and 2-butanone were spiked at a concentration of 5 µg/L in the matrix spikes, matrix spike duplicates, laboratory control samples, and laboratory control sample duplicates analyzed with this data set, and mostly acceptable or high recoveries for both compounds were achieved in these analyses. Therefore, results for acetone and 2-butanone were not qualified on the basis of the low RRFs in the associated ICs on both instruments.

An ICV was analyzed immediately after each IC, as required, and recoveries were correctly calculated and accurately reported in the data packages. All percent recoveries (%R) in the submitted ICVs were within (81 - 112 % R for Method 8260B, and 98 – 126 %R for Method 524.2) laboratory established control limits (75 – 125 % R for Method 8260B and 70 – 130 % R for Method 524.2), with the following exceptions in the Method 524.2 ICVs on instrument L:

ICV	Analyte	Recovery (%R)
10/13/09 12:50	chloromethane	146.3
	chloroethane	135.5
	1,1-dichloroethane	131.1
10/27/09 15:07	chloroethane	130.6

On the basis of recoveries in the ICV outside established criteria, results for chloromethane and 1,1,-dichloroethane in samples TB-1, SHIELDS, WELL Z, FB-1, KITCHEN TAP, and PRE-FILTER, and for chloroethane in all samples analyzed by Method 524.2 were qualified as estimated (UJ).

IV. Continuing Calibration (CC)

Five continuing calibration (CC) standards were run on instrument M in support of the Method 8260B sample analyses, and two CC standards were run on instrument L in support of the Method 524.2 sample analyses reported in this data set. Documentation of the CC standards was present in the data packages and RRF as well as percent difference (%D) values were correctly calculated and accurately reported on the Form VII summaries within the data packages.

The maximum limit for %D in the CC standard allowed by Region 1 is ±25%. All %D results were below this limit for the CC standards on both instruments, with the following exceptions:

Instrument	CC	Analyte	%D
M (8260B)	10/26/09 08:52	bromomethane	-31.1
L (8260B)	11/2/09 08:40	bromomethane	-25.3

All RRFs were above the 0.05 minimum criterion, with the exceptions of acetone and 2-butanone, in the CC standards as shown:

Instrument	CC	RRF	
		acetone	2-butanone
M (8260B)	10/24/09 03:04	acceptable	0.024
	10/24/09 18:14	acceptable	0.025
	10/26/09 08:52	acceptable	0.027
L (8260B)	11/1/09 06:21	0.048	0.017
	11/2/09 08:40	0.049	0.016
L (524.2)	10/21/09 19:52	0.045	0.017
	10/28/09 08:35	acceptable	0.015

For the reasons discussed in Section III, no results for acetone or 2-butanone were qualified on the basis of the low RRFs in the associated ICs and CCs.

On the basis of the unacceptable %D value in the associated CC standard, results for bromomethane in samples BRW-1, MW-102S, MW-3S, MW-3D, MW-Z, FB-4, MW-PLX, MW-D, FB-5, SEEP-1A, SS-2, W-SEEP, SS-Z, SS-5, SP-4, SP-3, and W-Z were qualified as estimated (UJ).

It should be noted that negative % difference values will result in a low bias for positive detects, and a positive % difference will result in a high bias for positive detects.

The Form 7 submitted in SDG No. WHEA15 for the CC analyzed on instrument M on 10/24/09 at 18:14 is incorrect; it contains the results for the CC analyzed on instrument M on 10/26/09 at 08:52. Since quantitation is performed using the initial calibration, no results are affected by this error, and since the correct Form 7 was submitted in SDG No. UNIF36, the validation was performed using this summary form. The laboratory has been informed of this error, and asked to replace the summary forms within the data package.

V. Blanks

Results for eight (8) water-matrix laboratory method blanks (MBs) were reported in association with this set of samples. Acetone was reported below the quantitation limit at 1.1 ug/L, and carbon disulfide was detected below the quantitation limit at 0.23 ug/L in the MB identified as MBLK102409MA.

Three trip blanks (TBs) were reported in these SDGs. The analytes carbon disulfide (0.35 ug/L; action limit = 1.75 ug/L) and trichloroethene (0.26 ug/L; action limit = 1.30 ug/L) were detected at concentrations below the quantitation limit in TB-2, which accompanied the samples in SDG No. WHEA15. It should be noted that this quantitation is based on unacceptably low internal standard recoveries (see section VII), which may cause a high bias.

Six field blanks (FBs) were reported in these SDGs. Acetone was reported below the quantitation limit in FB-1 at 1.7 ug/L, and in FB-2 at 3.8 ug/L (action limit = 38 ug/L).

No holding (storage) blanks (HBs) were reported in these SDGs.

On the basis of field contamination, results for acetone in samples MW-103D, MW-104D, MW-102D, MW-101D, MW-4D, BRW-3, BRW-2, SEEP-1A, SS-2, and SS-5; results for trichloroethene in samples MW-104D, MW-4D, MW-PL1, and MW-PLX; and results for carbon disulfide in MW-103D, BRW-2, and BRW-1 were qualified as less than the quantitation limit, and results for carbon disulfide in WP-3 and WP-Z and for trichloroethene in W-25 were qualified as less than the reported value (U).

The laboratory appropriately applied "B" qualifiers to sample Form 1 results when the analyte was detected in the associated method blank. All laboratory-applied "B" qualifiers have been removed by the validator.

VI. Surrogate Compounds

Percent recoveries (%R) for all surrogate compounds in both analytical methods were correctly calculated, accurately reported on the Form II summaries within the data packages for Method 8260B, and were within acceptance limits for all sample analyses, with the exception that the three surrogates which are used in the Method 8260B analysis were slightly below (72 – 82 %R) the acceptance criteria (80 – 85 %R) in sample MW-D. This sample was initially analyzed at a greater dilution due to incorrect interpretation of the screen results, with acceptable surrogate recoveries; however, a third analysis was not possible because all sample vials had been utilized. The more dilute analysis was included in the Sample Preparation section of the data package SDG No. UNIF36.

On the basis of unacceptably low surrogate recoveries, results for all analytes in MW-D were qualified as estimated (J, UJ).

VII. Internal Standards (IS)

All IS areas and retention times (RT) were within the established QC limits for all reported sample analyses in these data packages, with the exception that all three internal standards in B-2 were slightly below the lower acceptance limit (50 %R). Due to analyst oversight, no reanalysis was attempted within holding time, and a reanalysis out of holding time was not performed.

On the basis of unacceptably low recoveries of all three internal standards, results for all analytes in TB-2 were qualified as estimated (J, UJ).

The surrogate standards were incorrectly included on the summary forms for the Method 524.2 sample analyses in SDG No. UNIF36.

VIII. Matrix Spike/Matrix Spike Duplicate (MS/MSD)

Samples W-1, SS-5, MW-4S, and MW-S2 were used for the Method 8260B MS/MSD analyses in this data set. The spiking solutions contained all target compounds at 1 μg/L (except for the ketones at 5 μg/L). Percent recoveries (%R) and relative percent differences (%RPD) between paired recoveries were correctly calculated and accurately reported on the Form III summaries for the spiked analytes.

All recoveries were acceptable (range 69 – 130 %R; overall laboratory-derived control limits: 60 – 145 %R; Region 1 limits 60 – 140 %R) and reproducible (RPD range 0-27%; limit 30% RPD), with the following exceptions:

Parent Sample	Analyte	% R (MS)	% R (MSD)	Laboratory Limits (%R)	% RPD
W-1	tetrachloroethene	-200	-200	80 - 115	
SS-5	1,1-dichloroethene	120	120	80 - 115	
	carbon disulfide		130	80 - 125	
	methylene chloride		120	80 - 115	
	trans-1,2-dichloroethene		120	80 - 115	
	1,1-dichloroethane		120	80 - 115	
	1,2-dichloropropane		120	80 - 115	
MW-4S	chloromethane			55 - 140	36
	1,1-dichloroethene	120	120	80 - 115	
	methylene chloride	120	130	80 - 115	
	trans-1,2-dichloroethene	120	120	80 - 115	
	1,1-dichloroethane		120	80 - 115	
	cis-1,2-dichloroethene	120		80 - 115	
	trichloroethene	120	120	80 - 115	
	1,1,2-trichloroethane		120	80 - 115	
MW-S2	chloroethane		170	75 - 135	
	1,1-dichloroethene	130	140	80 - 115	
	carbon disulfide		130	80 - 125	
	methylene chloride		130	80 - 115	
	trans-1,2-dichloroethene	130	130	80 - 115	
	1,2-dichloroethene (total)	135	130	80 - 115	
	cis-1,2-dichloroethene	140	130	80 - 115	
	chloroform	120	120	80 - 115	
	1,1,1-trichloroethane	120	120	80 - 115	
	carbon tetrachloride		120	80 - 115	
	1,2-dichloroethane		120	80 - 115	
	trichloroethene	130	120	80 - 115	
	1,2-dichloropropane	120		80 - 115	
	cis-1,3-dichloropropene	120		80 - 115	
	toluene	120		80 - 115	
	1,1,2-trichloroethane	130	120	80 - 115	
	tetrachloroethene	210	140	80 - 115	40
	ethylbenzene		120	80 - 115	

On the basis of recoveries within Region 1 criteria, no qualifications were deemed necessary for recoveries of the analytes shown above slightly above laboratory-established limits in the MS or MSD analyses of samples SS-5, MW-4S, and MW-S2. Since chloromethane, chloroethane, and tetrachloroethene were not detected in samples MW-4S and MW-S2, results for these compounds do not warrant qualification on the basis of poor reproducibility and the recoveries above the laboratory-established and Region 1 upper limits in the associated MS or MSD analyses. On the basis of the native concentration being more than four times the spiking level, the result for tetrachloroethene in sample W-1 does not warrant qualification on the basis of its unacceptably low recoveries in the associated MS and MSD analyses.

Samples KITCHENTAP and WP-8 were used for the Method 524.2 MS/MSD analyses in this data set. The spiking solution contained all target compounds at 1 µg/L (except for the ketones at 5 µg/L) for both MS/MSD pairs. Percent recoveries (%R) and relative percent differences (%RPD) between paired recoveries were correctly calculated and accurately reported on the Form III summaries for the spiked analytes.

All recoveries were acceptable (range 86 – 120 %R; overall limits: 70 – 130 %R) and reproducible (RPD range 0-19%; limit 40% RPD), with the exception of acetone in KITCHEN TAPMS, which was recovered at 148 %R.

Since acetone was not detected in sample KITCHEN TAP, the result for acetone in KITCHEN TAP did not warrant qualification on the basis of its recovery above both laboratory and Region 1 upper acceptance limits.

All analytes were spiked into the MS/MSD analyses; therefore non-spiked target compounds could not be evaluated against the parent samples to evaluate laboratory precision.

IX. Field Duplicates

SDG Nos. BRES45, UNIF36, and WHEA15 contained five groundwater and two potable water field duplicate pairs, which were identified by the field sampler as follows:

Field Sample	Field Duplicate
Groundwater	
MW-3	MW-Z
MW-D	W-Z
W-SEEP	SS-Z
MW-PL1	MW-PLX
MW-25884	BRW-X
Potable Water	
SHIELDS	WELL-Z
WP-3	WP-Z

Precision in the field duplicate pairs MW-3 and MW-Z, MW-PL1 and MW-PLX, and WP-3 and WP-Z was acceptable (less than 30 % RPD) for all target analytes greater than 2 times the quantitation limit. The analyte cis-1,2-dichloroethene was reported at greater than twice the quantitation limit in both members of the field duplicate pair MW-D and W-Z; however, total 1,2-dichloroethene was reported at greater than twice the quantitation limit in MW-D due to the contribution of a small concentration (below the quantitation limit) of the *trans* isomer in that sample only. Trichloroethene and tetrachloroethene were reported at greater than twice the quantitation limit in both members of the field duplicate pair MW-D and W-Z, and evidenced poor reproducibility (30.8 % RPD and 35.1 %RPD, respectively). No target compounds greater than 2 times the quantitation limit were detected in any of the remaining samples, so precision could not be evaluated in these field duplicate pairs.

On the basis of unacceptable reproducibility, results for trichloroethene and tetrachloroethene in MW-D and W-Z were qualified as estimated (J).

X. Sensitivity Check

The aqueous MDL for Method 8260B submitted for this project was begun on 4/21/09 and the MDL verification studies were completed on 5/7/09, which is within one year of the sample analyses in this data set. All analytes had calculated and verified MDLs below the method quantitation limits in the studies.

The aqueous MDL and the MDL verification studies for Method 524.2 submitted for this project were completed on 10/9/08, which is just slightly more than one year prior to the sample analyses in this data set. All analytes had calculated and verified MDLs below the Method quantitation limits in the MDL study.

All of the laboratory control samples and the MS and MSD analyses analyzed with the samples for both methods were spiked at 1 µg/L, as required by the FLCM. Recoveries within or above Region 1 acceptance criteria (60 – 140 %R) were obtained for all target analytes in all spiked analyses (except as noted). In addition, the low standard of the initial calibrations for both methods supports the reporting limit for the sample analyses.

XI. Performance Evaluation (PE) Samples/Accuracy Check

Five zero blind PE samples (commonly known as laboratory control sample, LCS) and duplicate (LCSD) pairs were prepared and analyzed by the laboratory at 1 µg/L (ketones at 5 ug/L) on instrument M in support of the Method 8260B sample analyses in this data set. Laboratory established control limits are 60 – 145%R overall; the Region 1 control limits are 60 – 140 %R. Percent recoveries were correctly calculated and accurately reported on Form III summaries in the data packages, and were acceptable (84 – 136 %R) for the LCS and LCSD pairs analyzed on 10/24/09, 10/26/09, 11/1/09, and 11/2/09, with the exception of one-quarter to one-half the analytes, which were slightly above (120 – 130 %R) the upper laboratory limit, but within the Region 1 limits, for the LCS and LCSD pairs analyzed on instrument M on 10/24/09 and 10/26/09. One to three analytes were slightly above the laboratory upper limit, but within Region 1 control limits, in the LCS and LCSD pairs analyzed on instrument L on 11/1/09 and 11/2/09.

No reanalysis was performed for the unacceptably high recoveries in the LCS/LCSD pairs analyzed for Method 8260B. Pursuant to the Region I validation document, results for all analytes detected in sample analyses associated with an LCS or LCSD analysis in which more than one half the analytes are recovered above the upper control limit warrant qualification as estimated (J). However, most recoveries were just slightly above laboratory control limits, and were within Region 1 control limits, so on the basis of professional judgment, no qualifications were applied on the basis of LCS or LCSD recoveries above the laboratory limits but within Region I upper control limits.

No analytes were found outside both laboratory and Region I control limits in any LCS or LCSD analyses. Reproducibility between all Method 8260B LCS and LCSD pairs was acceptable (0 – 26 % RPD).

Three zero blind PE sample (commonly known as laboratory control sample, LCS) and duplicate (LCSD) pairs were prepared and analyzed by the laboratory at 1 µg/L (ketones at 5 ug/L) on instrument L in support of the Method 524.2 sample analyses in this data set. Percent recoveries were correctly calculated and accurately reported on Form III summaries in the data packages, and were within (87 – 140 %R) laboratory established control limits (70 – 130 %R), with the following exceptions:

LCS/LCSD ID	Analyte	% R (LCS)	% R (LCSD)	%RPD
LB102109	chloromethane	160	160	
	chloroethane	150	140	
	acetone	146		
	2-butanone	62		62
LA102809	acetone		132	

Since chloromethane, chloroethane, and acetone were not detected in associated samples, no results warranted qualification on the basis of unacceptably high recoveries in the associated LCS/LCSD pairs. On the basis of the unacceptably low recovery of 2-butanone in the LCS identified as LB102109LCS, results for 2-butanone in TB-1, SHIELDS, WELL-Z, FB-1, KITCHEN TAP, and PRE-FILTER were qualified as estimated (UJ).

One external single-blind PES sample for Method 524.2 was submitted with the samples in this sampling round. The results of the PES are summarized in Appendix C. All spiked compounds were within the vendor's published QC Performance Acceptance Limits (three standard deviations), with the following exceptions:

Analyte	**Result (ug/L)**	**Lab Qualifier**	**% Recovery**	**Certified Value**	**Acceptance Range**
trans-1,2-Dichloroethene	36	E	77.8	46.3	37.0 - 55.6
1,1,1-Trichloroethane	14		77.3	18.1	14.5 - 21.7
Tetrachloroethene	8.5		72.0	11.8	9.44 - 14.2
Ethylbenzene	11.8		78.7	15	12.0 - 18.0
m,p-Xylenes	18		67.2	26.8	n/a
Xylene (total)	22		70.7	31.1	24.9 - 37.3
Styrene	nd		0.0	5.2	3.14 - 7.32
o-Xylene	3.4		78.3	4.34	n/a

n/a = not available nd = not detected

Based on examination of the raw data to determine the value before rounding for reporting, chlorobenzene was recovered just within the acceptance range, at 22.3 ug/L (acceptance range 22.2 - 33.4 ug/L), and ethylbenzene was recovered just below the acceptance range, at 11.8 ug/L, as shown above. Styrene was not detected, and a dilution analysis was not performed to bring the result for trans-1,2-dichloroethene within the established calibration range. The laboratory was informed of these unacceptable results, and responded quickly.

The corrective action plan submitted by the laboratory in response to the validator's request to address the issue of the low recoveries for the analytes shown is included in Attachment C of this report, and is discussed in further detail in the annual QA Summary Report. Pursuant to the Region I validation document, on the basis of recoveries outside the vendor's established limits, non-detected results for trans-1,2-dichloroethene, 1,1,1-trichloroethane, tetrachloroethene, ethylbenzene, total xylene, and styrene in all Method 524.2 sample analyses warrant rejection (R).

However, the PT vendor was consulted by the laboratory, and they acknowledged that the stock standard used for making the whole-volume PT had exhibited lower than normal (although still acceptable)

values when originally used in 2008 for a national water supply PT study, in which approximately 60 laboratories participated. The recoveries for the target analytes trans-1,2-dichloroethene, 1,1,1-trichloroethane, tetrachloroethene, and ethylbenzene were above 70 % recovery, although they were below the vendor's minimum acceptance criteria. Styrene was not detected, and the m,p-xylenes were recovered at 67 %.

Since all Method 524.2 sample analyses, including the PT sample, met all method requirements (with the single exception of the lack of dilution for the high trans-1,2-dichloroethene result), it is the opinion of the laboratory with the concurrence of the data validator that a non-detected result is valid at the concentration represented by the lowest detectable value within method criteria (70 – 130 %R). The adjusted quantitation limit for a 70 % recovery is 0.5 ug/L /70%, or 0.71 ug/L. Since the analytes trans-1,2-dichloroethene, 1,1,1-trichloroethane, tetrachloroethene, and o-xylene were recovered above 70 %R in the PT analysis, the non-detected results in associated field samples are deemed acceptable at a concentration not less than 0.7 ug/L.

On the basis of professional judgment, all non-detected results in all drinking water field samples for trans-1,2-dichloroethene, 1,1,1-trichloroethane, tetrachloroethene, and o-xylene were qualified as less than the adjusted quantitation limit (U), and the quantitation limit was adjusted to a value equivalent to a 70% recovery. Although an acceptance range for the combined m- & p-xylene isomers and the o-xylene isomer were not established by the vendor, on the basis of unacceptably low recovery in the PT sample, results for m,p-xylenes and total xylenes were rejected (R) in all samples analyzed by Method 524.2.

XII. Target Compound Identification

Reported target compounds were correctly identified with supporting spectra present for all samples in these data packages.

XIII. Compound Quantitation and Reported Quantitation Limits

Target compound quantitation and practical quantitation limits (PQLs) were accurately reported on the Form I summaries. Based on screen results, dilution analyses were initially performed for samples MW-102S, MW-101D, MW-3S, MW-D, and W-Z to bring results for tetrachloroethene within the upper half of the calibration range. All dilutions were less than 4-fold, so a full-strength analysis was not required. Tetrachloroethene was detected above the calibration range in the original analyses of samples MW-3D and MW-Z; these samples were reanalyzed at an appropriate dilution to bring tetrachloroethene within the upper half of the calibration range, and both sets of analyses were reported in the data package.

Results for tetrachloroethene initially outside the calibration range in the original analyses of samples MW-3D and MW-Z were rejected (R), and replaced with the acceptable concentrations from the corresponding diluted samples (MW-3DDL and MW-ZDL).

Results for all other analytes in samples MW-3DDL and MW-ZDL were rejected (R) because acceptable results for these compounds were taken from the original analyses (MW-3D and MW-Z).

"E" qualifiers were appropriately applied by the laboratory to sample Form I results when concentrations of target analytes were greater than the instrument calibration range. "D" qualifiers were properly applied by the laboratory to positive results from diluted sample analyses. The validator removed all

laboratory-applied "E" and "D" qualifiers. An "X" has been drawn across the entire Form I for the diluted analyses noted above.

The laboratory appropriately applied "J" qualifiers to the sample Form I's when the concentration of an analyte was less than the sample-specific PQL. The validator did not remove these qualifiers.

The values that the validator has judged to be acceptable are presented on the Data Summary Forms in Attachment A and on the Form 1s in Attachment B.

The Data Summary Forms (DSFs) in Attachment A list all individual sample analytes affected by the applied qualifications. All positive results are listed on these forms, whether or not the value or qualifier was changed as a result of the validation. Where no result is listed, the compound was not detected and the PQL was not qualified. Sample-specific quantitation limits may be found on the laboratory-generated Form I for each sample (Attachment B) or may be calculated for waters from the information on the DSFs as follows: unadjusted PQL (far left column) multiplied by the concentration/dilution factor (DF).

XIV. Tentatively Identified Compounds (TICs)

Evaluation of unidentified, non-target analyte peaks was not requested or performed for these samples.

XV. System Performance

The analytical systems appear to have been operating well at the time of these analyses based on the evaluation of the available raw data.

XVI. Overall Evaluation of Data

Results for volatile organic compounds were determined to be valid as reported for all samples in SDG Nos. BRES45, UNIF36, and WHEA15, with the following exceptions:

- On the basis of recoveries in the ICV outside established criteria, results for chloromethane and 1,1,-dichloroethane in samples TB-1, SHIELDS, WELL Z, FB-1, KITCHEN TAP, and PRE-FILTER, and for chloroethane in all samples analyzed by Method 524.2 were qualified as estimated (UJ).

- On the basis of the unacceptable %D value in the associated CC standard, results for bromomethane in samples BRW-1, MW-102S, MW-3S, MW-3D, MW-Z, FB-4, MW-PLX, MW-D, FB-5, SEEP-1A, SS-2, W-SEEP, SS-Z, SS-5, SP-4, SP-3, and W-Z were qualified as estimated (UJ).

- On the basis of field contamination, results for acetone in samples MW-103D, MW-104D, MW-102D, MW-101D, MW-4D, BRW-3, BRW-2, SEEP-1A, SS-2, and SS-5; results for trichloroethene in samples MW-104D, MW-4D, MW-PL1, and MW-PLX; and results for carbon disulfide in MW-103D, BRW-2, and BRW-1 were qualified as less than the quantitation limit, and results for carbon disulfide in WP-3 and WP-Z and for trichloroethene in W-25 were

qualified as less than the reported value (U).

- The laboratory appropriately applied "B" qualifiers to sample Form 1 results when the analyte was detected in the associated method blank. All laboratory-applied "B" qualifiers have been removed by the validator.

- On the basis of unacceptably low surrogate recoveries, results for all analytes in MW-D were qualified as estimated (J, UJ).

- On the basis of unacceptably low recoveries of all three internal standards, results for all analytes in TB-2 were qualified as estimated (J, UJ).

- On the basis of unacceptable reproducibility, results for trichloroethene and tetrachloroethene in MW-D and W-Z were qualified as estimated (J).

- On the basis of professional judgment, all non-detected results in all drinking water field samples for trans-1,2-dichloroethene, 1,1,1-trichloroethane, tetrachloroethene, and o-xylene were qualified as less than the adjusted quantitation limit (U), and the quantitation limit was adjusted to a value equivalent to a 70% recovery (0.71 ug/L).

- On the basis of unacceptably low recovery in the PT sample, results for m,p-xylenes and total xylenes were rejected (R) in all samples analyzed by Method 524.2.

- On the basis of the unacceptably low recovery of 2-butanone in the LCS identified as LB102109LCS, results for 2-butanone in TB-1, SHIELDS, WELL-Z, FB-1, KITCHEN TAP, and PRE-FILTER were qualified as estimated (UJ).

- Results for tetrachloroethene initially outside the calibration range in the original analyses of samples MW-3D and MW-Z were rejected (R), and replaced with the acceptable concentrations from the corresponding diluted samples (MW-3DDL and MW-ZDL).

- Results for all other analytes in samples MW-3DDL and MW-ZDL were rejected (R) because acceptable results for these compounds were taken from the original analyses (MW-3D and MW-Z).

- "E" qualifiers were appropriately applied by the laboratory to sample Form I results when concentrations of target analytes were greater than the instrument calibration range. "D" qualifiers were properly applied by the laboratory to positive results from diluted sample analyses. The validator removed all laboratory-applied "E" and "D" qualifiers.

- The laboratory appropriately applied "J" qualifiers to the sample Form I's when the concentration of an analyte was less than the sample-specific PQL. The validator did not remove these qualifiers.

Documentation problems observed in the data packages are described in Section XVII.

XVII. Documentation

Chain-of-custody (COC) and internal chain of custody (ICOC) records were present and completed accurately.

Data presentation was acceptable, with the following observations:

- The Form 7 submitted in SDG No. WHEA15 for the CC analyzed on instrument M on 10/24/09 at 18:14 is incorrect; it contains the results for the CC analyzed on instrument M on 10/26/09 at 08:52. Since quantitation is performed using the initial calibration, no results are affected by this error, and since the correct Form 7 was submitted in SDG No. UNIF36, the validation was performed using this summary form. The laboratory has been informed of this error, and asked to replace the summary forms within the data package.

- The Form VIII summaries submitted with the Method 524.2 samples included not just the internal standard areas and RTs, but also the areas and RTs for the four surrogate standards. Corrected forms have been requested from the laboratory.

This validation report should be considered <u>part of the data packages</u> for all future distributions of the volatiles (8260B and 524.2) analysis data.

ATTACHMENT A

DATA SUMMARY FORMS
SDG Nos. BRES45, UNIF36, and WHEA15
Volatile Organics in Water Samples

ATTACHMENT B

ORGANIC ANALYSIS DATA SHEETS (Form I)
SDG Nos. BRES45, UNIF36, and WHEA15
Volatile Organics in Water Samples

ATTACHMENT C

PERFORMANCE EVALUATION SAMPLE RESULTS
and
LABORATORY CORRECTIVE ACTION PLAN
SDG Nos. BRES45, UNIF36, and WHEA15
Volatile Organics in Water Samples

DATA SUMMARY FORM: VOLATILE COMPOUNDS
WATER PE SAMPLES
(ug/L)

Site Names: Bressett, Randolph, VT
& UniFirst, Williamstown, VT
SDG Nos. BRES45, UNIF36, & WHEA15

Sampling Dates: OCt. 13, 14, 19 and 20, 2009

Phoenix Chemistry Services Project Nos. 2009-1118-001, -1210-001, and -1210-002

	Client ID	W-23		%	Lot No. S144-703					
	Lab ID	811137		Recovery	QC True Values					
					Certified	Acceptance				
PQL					Value	Range				
0.5	Chloromethane									
0.5	Vinyl Chloride	8.0		78.4	10.2	6.12 - 14.3				
0.5	Bromomethane									
0.5	Chloroethane									
0.5	1,1-Dichloroethene	16		80.8	19.8	15.8 - 23.8				
5.0	Acetone									
0.5	Carbon disulfide									
0.5	Methylene chloride	10		81.3	12.3	9.84 - 14.8				
0.5	trans-1,2-Dichloroethene	**36**	E	77.8	46.3	**37.0 - 55.6**				
0.5	Methyl tert-butyl ether (MTBE)									
0.5	1,1-Dichloroethane									
0.5	cis-1,2-Dichloroethene	15		81.1	18.5	14.8 - 22.2				
5.0	2-Butanone									
0.5	Chloroform									
0.5	1,1,1-Trichloroethane	**14**		77.3	18.1	**14.5 - 21.7**				
0.5	Carbon tetrachloride	4.5		73.8	6.10	3.66 - 8.54				
0.5	Benzene	7.0		83.1	8.42	5.05 - 11.8				
0.5	1,2-Dichlorethane	4.1		86.9	4.72	2.83 - 6.61				
0.5	Trichloroethene	4.7		78.9	5.96	3.58 - 8.34				
0.5	1,2-Dichloropropane	15		85.2	17.6	14.1 - 21.1				
0.5	Bromodichloromethane									
0.5	cis-1,3-Dichloropropene									
2.5	4-Methyl-2-Pentanone									
0.5	Toluene	7.4		76.9	9.62	5.77 - 13.5				
0.5	trans-1,3-Dichloropropene									
0.5	1,1,2-Trichloroethane	6.5		90.0	7.22	4.33 - 10.1				

DATA SUMMARY FORM: VOLATILE COMPOUNDS
WATER PE SAMPLES
(ug/L)

Site Names: Bressett, Randolph, VT
& UniFirst, Williamstown, VT
SDG Nos. BRES45, UNIF36, & WHEA15

Sampling Dates: OCt. 13, 14, 19 and 20, 2009

Phoenix Chemistry Services Project Nos. 2009-1118-001, -1210-001, and -1210-002

	Client ID	W-23		%	Lot No. S144-703					
	Lab ID	811137		Recovery	QC True Values					
					Certified	Acceptance				
PQL					Value	Range				
0.5	Tetrachloroethene	**8.5**		72.0	11.8	**9.44 - 14.2**				
2.5	2-Hexanone									
0.5	Dibromochloromethane									
0.5	Chlorobenzene	22.3		80.2	27.8	22.2 - 33.4				
0.5	Ethylbenzene	**11.8**		78.7	15	**12.0 - 18.0**				
0.5	m,p-Xylenes	**18**		**67.2**	26.8	n/a				
0.5	Xylene (total)	**22**		**70.7**	31.1	**24.9 - 37.3**				
0.5	Styrene			**0.0**	5.2	**3.14 - 7.32**				
0.5	o-Xylene	**3.4**		**78.3**	4.34	n/a				
0.5	Bromoform									
0.5	1,1,2,2-Tetrachloroethane									

FORM 1
VOLATILE ORGANICS ANALYSIS DATA SHEET

VTDEC3 SAMPLE NO.

W-23

Lab Name: TESTAMERICA BURLINGTON Contract: 24034

Lab Code: STLV Case No.: 24034 SAS No.: SDG No.: UNIF36

Matrix: (soil/water) WATER Lab Sample ID: 811137

Sample wt/vol: 5.000 (g/mL) ML Lab File ID: 811137

Level: (low/med) LOW Date Received: 10/20/09

% Moisture: not dec. _____ Date Analyzed: 10/28/09

GC Column: DB-624 ID: 0.53 (mm) Dilution Factor: 1.0

Soil Extract Volume:_____(uL) Soil Aliquot Volume: _____(uL)

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/L	Q
74-87-3	Chloromethane	0.50	U
75-01-4	Vinyl Chloride	8.0	
74-83-9	Bromomethane	0.50	U
75-00-3	Chloroethane	0.50	U
75-35-4	1,1-Dichloroethene	16	
67-64-1	Acetone	5.0	U
75-15-0	Carbon Disulfide	0.50	U
75-09-2	Methylene Chloride	10	
156-60-5	trans-1,2-Dichloroethene	36	E
1634-04-4	Methyl-t-Butyl Ether	0.50	U
75-34-3	1,1-Dichloroethane	0.50	U
156-59-2	cis-1,2-Dichloroethene	15	
78-93-3	2-Butanone	5.0	U
67-66-3	Chloroform	0.50	U
71-55-6	1,1,1-Trichloroethane	14	
56-23-5	Carbon Tetrachloride	4.5	
71-43-2	Benzene	7.0	
107-06-2	1,2-Dichloroethane	4.1	
79-01-6	Trichloroethene	4.7	
78-87-5	1,2-Dichloropropane	15	
75-27-4	Bromodichloromethane	0.50	U
10061-01-5	cis-1,3-Dichloropropene	0.50	U
108-10-1	4-Methyl-2-Pentanone	2.5	U
108-88-3	Toluene	7.4	
10061-02-6	trans-1,3-Dichloropropene	0.50	U
79-00-5	1,1,2-Trichloroethane	6.5	
127-18-4	Tetrachloroethene	8.5	
591-78-6	2-Hexanone	2.5	U
124-48-1	Dibromochloromethane	0.50	U
108-90-7	Chlorobenzene	22	
100-41-4	Ethylbenzene	12	
1330-20-7	m- & p-Xylene	18	
95-47-6	o-Xylene	3.4	

FORM 1
VOLATILE ORGANICS ANALYSIS DATA SHEET

VTDEC3 SAMPLE NO.

W-23

Lab Name: TESTAMERICA BURLINGTON Contract: 24034

Lab Code: STLV Case No.: 24034 SAS No.: SDG No.: UNIF36

Matrix: (soil/water) WATER Lab Sample ID: 811137

Sample wt/vol: 5.000 (g/mL) ML Lab File ID: 811137

Level: (low/med) LOW Date Received: 10/20/09

% Moisture: not dec. _____ Date Analyzed: 10/28/09

GC Column: DB-624 ID: 0.53 (mm) Dilution Factor: 1.0

Soil Extract Volume:_____(uL) Soil Aliquot Volume: _____(uL)

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/L	Q
1330-20-7	Xylene (total)	22	
100-42-5	Styrene	0.50	U
75-25-2	Bromoform	0.50	U
79-34-5	1,1,2,2-Tetrachloroethane	0.50	U

TestAmerica
THE LEADER IN ENVIRONMENTAL TESTING

January 22, 2010

Deborah H. Gaynor, PhD
Phoenix Chemistry Services
126 Covered Bridge Road
No. Ferrisburg, VT 05473

Re: Corrective Action Response / UniFirst UNIF36

Dear Ms. Gaynor:

Please accept the attached corrective action investigation for the unacceptable values reported in the project PT sample associated with SDG UNIF36.

Please do not hesitate to contact me at (802) 923-1019 should you have any concerns or require additional information.

Regards,

Kirstin McCracken

Kirstin McCracken
Quality Assurance Manager

UniFirst SDG UNIF36
PT Corrective Action Report
Prepared by Kirstin McCracken, Quality Assurance Manager
January 22, 2010

The following corrective action report is provided for the results that were scored not acceptable for the PT sample that was included in SDG UNIF36

For quick reference I have summarized the results reported by the laboratory that were outside the established limits in the attached spreadsheet.

One analyte in the project PT sample was reported over calibration range because the need for dilution was not caught by the instrument analyst during primary review. When the error was discovered, the sample was out of holding time therefore the sample was not reanalyzed at dilution. As corrective action the laboratory has implemented a primary data review checklist in this section. Use of the checklist is mandatory for all analytical sequences and all analysts regardless of years of experience. A copy of the new checklist is attached for review.

The Department Manager performed a through review of the data set and found no source of error to account for the low bias reported in the project PT sample. The initial calibration and second source calibration verification were within established method criteria. The instrument performance check standards were within method established criteria and the QC samples were within method established acceptance limits.

The QA Manager reviewed the historical NELAC PT performance of these analytes in each PT study reported over the past two and a half years and there were no instances in which the laboratory reported an unacceptable PT result over this time-frame for the analytes that exhibited low bias in the project PT sample. For the studies reviewed, laboratory performance as measured by the percent recovery of the true value is near 100% in three studies, and 91.4 and 88.1% in the remaining two. This performance is well within the method established accuracy limits of 70-130%. A summary of PT performance for the past five PT studies in which the laboratory participated is attached for review.

The only difference between the NELAC PT studies and the project PT sample is that the project PT sample is a whole volume preserved PT sample. The laboratory has found through prior experience that some of the analytes in preserved whole volume PT samples for volatile analysis degrade rapidly with preservation. One of these compounds is styrene. In February 2003, the laboratory performed a stability study of styrene in whole volume preserved PT samples for EPA Method 524.2. The study was performed as corrective action investigation to a false negative result reported for styrene in a double blind PT sample that was submitted to the laboratory in October 2002. The laboratory found that styrene rapidly degraded in preserved sample volumes but showed stable recovery in unpreserved sample volumes. This finding is congruent with EPA findings from the Office of Solid and Hazardous Waste. For SW-846 methodology, the EPA found that that there is poor recovery of highly reactive volatile compounds in preserved VOA samples and the SW-846 methods now recommend the collection of unpreserved samples for VOA analysis when certain VOA compounds, including styrene are compounds of interest. Based on the results of the study which are supported by findings from the EPA (albeit from the Office of Solid Waste) the laboratory suspects that the rapid degradation of styrene in the preserved PT volume is the cause for the false negative in the project PT sample.

For the remaining compounds it is interesting to note that with the exception of the xylenes the value reported by the laboratory is within the QC acceptance limits established by the vendor of the project PT sample but outside the PT acceptance limits established by the same vendor. With permission from the data validation firm, the laboratory contacted the vendor for further information and learned that the PT acceptance limits are fixed limits based on 40CFR Part 142.23 criteria and the QC limits are performance based limits derived from the vendor database. Thus, it may be concluded that laboratory performance, although outside the PT acceptance limits, is comparable to the performance of peer laboratories performing the same test method.

Based on the investigation performed the laboratory can find no source of technical error or bias in the measurement system to account for the low bias results. With the exception of styrene and m,p Xylenes, the values reported by the laboratory as measured by percent recovery are within the established accuracy limits (70-130%) for the drinking water method. Laboratory performance in the past two years of NELAC PT studies shows no trends to indicate poor performance and laboratory performance in the project PT sample is within performance based limits for peer laboratories. The laboratory suspects that the stability of some of the VOA analytes is compromised in whole volume preserved PT samples and will explore this hypothesis further with the vendor of the whole volume project PT sample.

Double Blind PT Results
UNIF36

Method	Analyte	Reported Value	Certfied Value	Percent Recovery	PT Acceptance Limits	QC Acceptance Limits
524.2	trans-1,2-Dichloroethene	36	46.3	77.8%	37.0 - 55.6	34.4-57.9
524.2	1,1,1-Trichloroethane	14	18.1	77.3%	14.5 - 21.7	13.0-22.4
524.2	Tetrachloroethene	8.5	11.8	72.0%	9.44 - 14.2	8.07-14.3
524.2	Chlorobenzene	22	27.8	79.1%	22.2 - 33.4	21.7-33.9
524.2	Ethylbenzene	12	15	80.0%	12.0 - 18.0	11.4-18.6
524.2	m,p-Xylenes	18	26.8	67.2%	na	na
524.2	Xylene (total)	22	31.1	70.7%	24.9 - 37.3	23.5-38.6
524.2	Styrene	Non-Detect	5.2	#VALUE!	3.14 - 7.32	3.92-6.59
524.2	o-Xylene	3.4	4.34	78.3%	na	na

GC/MS Batch Data Review Checklist

INST Batch ID:

TALS Batch ID:

Test Method:	1st Level Review Analyst:	Review Date:
Analysis Date:	2nd Level Review Analyst:	Review Date:
Instrument Analyst:	Other Review:	Review Date:
ICAL REF #:		

	Primary Review				2nd Level			
Review Items	**NA**	**Yes**	**No**	**NCM**	**Req**	**Spot**	**Yes**	**Comments**
Tune Standard								
Did Tune standard pass? Date/Time _____ / _____					X			
(SVOA) Verify degradation for DDT is ≤ 20%					X			
(SVOA) Tailing factor < 2 (benzidine and pentachlorophenol)?					X			
Verify all acquisitions performed within 12 hrs of Tune					X			
CCAL								
Verify compound ID and integration								
Were all isomeric pairs ID'd correctly?								
Are RTs correct?								
Verify all manual integrations are assigned MI codes					X			
Are ISTDs RTs and Areas within limits?					X			
Were RTs (and Ratios) updated?					X			
Did all analytes meet criteria (%D or drift)?					X			
Verify ICAL association for data processing								
Verify ICAL Reference Number					X			
QC & Samples								
Verify compound ID and integration						X		
Were all isomeric pairs ID'd correctly?						X		
Verify all manual integrations are assigned MI codes					X			
Are ISTDs RTs and Areas within limits?					X			
Are there hits in the method blank?					X			
Verify LCS acceptance criteria met for each spiked analyte					X			
Verify surrogate meet criteria					X			
Batch Samples: Are any analytes above calibration range?					X			
Batch Samples: Are dilutions within upper half of calibration range?					X			
Samples: Were TICs evaluated?								
Is there 1 MB per 20 field samples?					X			
Is there 1 LCS per 20 field samples?					X			

GC/MS Batch Data Review Checklist INST Batch ID: TALS Batch ID:

Test Method:	1st Level Review Analyst:	Review Date:
Analysis Date:	2nd Level Review Analyst:	Review Date:
Instrument Analyst:	Other Review:	Review Date:
ICAL REF #:		

	Primary Review				2nd Level			
Review Items	**NA**	**Yes**	**No**	**NCM**	**Req**	**Spot**	**Yes**	**Comments**
Is there an MS/MSD per analytical or prep batch?					X			
Do MS/MSD and/or MD meet RPD criteria?					X			
Is there screen data? If so, scan and attach to TALS batch								
If ICOC, is ICOC record complete?					X			
Verify samples / extracts analyzed within hold time&					X			
Project Requirements & Record Keeping								
Are there nonroutine projectspecific requirements?					X			
If yes, verify project requirements followed					X			
Verify instrument run log is complete and legible								
(SVOA): Verify sample preparation record is complete and legible								
Verify any photocopies / scans are legible								
TALS Processing								
Verify sample and graphic upload successful								
Enter / check worksheet information								
Enter / check reagent information								
Enter / check batch information (view batch)								
Verify CAL ID association								
Verify QC linkages								

Additional Comments

GC/MS ICAL Review Checklist

INST Batch ID:

TALS Batch ID:

Test Method:	1st Level Review Analyst:	Review Date:
Analysis Date:	2nd Level Review Analyst:	Review Date:
Instrument Analyst:	Other Review:	Review Date:
ICAL Date/Time Start _____/_____ End _____/_____	ICAL REF #:	ICAL Lock Analyst/Date: _____/_____

	Primary Review				2nd Level			
Review Items	**NA**	**Yes**	**No**	**NCM**	**Req**	**Spot**	**Yes**	**Comments**
Tune Standard								
Did Tune standard pass? Date/Time _____ / _____					X			
(SVOA) Verify degradation for DDT is $\leq$ 20%					X			
(SVOA) Tailing factor < 2 (benzidine and pentachlorophenol)?					X			
Verify all acquisitions performed within 12 hrs of Tune					X			
Initial Calibration (ICAL)								
Was the Target Method pulled from the METHODS10 folder?					X			
Review each standard for compound ID and integration					X			
Verify integration parameters optimized								
Verify all manual integrations are assigned MI codes					X			
Were all isomeric pairs ID'd correctly?					X			
Did sample spectra match library spectra for each compound?					X			
Are RTs correct?					X			
Were RTs and Ratios updated?					X			
Was Initial Calibration Table Zeroed?					X			
Verify there are at least 5 calibration points per analyte					X			
Verify required cal points used for each analyte per SOP					X			
Did all analytes meet the linearity criteria (%RSD, r^2 or r)?					X			
Did all analytes meet min. response criteria (Min. RRF, SPCCs etc)?					X			
Verify ICAL date/time					X			
Verify ICAL reference number (Primary) / CAL ID (2nd)					X			
Was README file initiated, initialed and dated?								
Print and sign MI Summary Form?					X			
MI Summary form scanned?					X			
Verify ICV meet acceptance criteria?					X			

GC/MS ICAL Review Checklist

INST Batch ID:

TALS Batch ID:

Test Method:	1st Level Review Analyst:	Review Date:
Analysis Date:	2nd Level Review Analyst:	Review Date:
Instrument Analyst:	Other Review:	Review Date:
ICAL Date/Time Start _____/_____ End _____/_____	ICAL REF #:	ICAL Lock Analyst/Date: _____/_____

	Primary Review				2nd Level			
Review Items	**NA**	**Yes**	**No**	**NCM**	**Req**	**Spot**	**Yes**	**Comments**
Project Requirements & Record Keeping								
Are there nonroutine project specific requirements?					X			
If yes, verify project requirements followed					X			
Verify instrument run log is complete and legible					X			
Verify any photocopies / scans are legible					X			
TALS Processing								
Verify sample and graphic upload successful					X			
Enter / check worksheet information					X			
Enter / check reagent information					X			
Enter / check batch information (view batch)					X			
Verify ICAL linkage					X			
Approve ICAL								

	WS156	WS150	WS144	WS138	WS132
	7/7/2009 - 8/20/2009	1/12/2009 - 2/26/2009	7/7/2008 - 8/21/2008	1/7/2008 - 2/21/2008	7/9/2007 - 8/23/2007
Analyte Name	**Percent Recovery**	**Percent Recovery**	**Percent Recovery**	**Percent Recovery**	**Percent Recovery**
Benzene	98.8%	98.4%	87.5%	100.9%	96.1%
Carbon tetrachloride	108.3%	85.5%	82.0%	104.1%	87.8%
Chlorobenzene	90.2%	97.5%	88.5%	101.8%	90.4%
1,2-Dichlorobenzene	107.8%	100.7%	89.5%	96.9%	91.7%
1,4-Dichlorobenzene	100.0%	102.9%	84.1%	94.1%	83.1%
1,2-Dichloroethane	99.7%	104.1%	92.8%	99.5%	94.5%
1,1-Dichloroethylene	100.3%	96.3%	87.4%	105.1%	88.4%
cis-1,2-Dichloroethylene	96.1%	104.1%	91.4%	101.4%	93.1%
trans-1,2-Dichloroethylene	94.8%	98.3%	96.1%	100.7%	90.9%
1,2-Dichloropropane	100.6%	99.2%	88.1%	100.0%	98.4%
Ethylbenzene	99.8%	94.8%	84.7%	100.5%	90.9%
Methylene chloride (Dichloromethane)	98.7%	94.7%	92.7%	99.7%	95.1%
Styrene	100.7%	99.5%	86.8%	98.8%	91.6%
Tetrachloroethylene	100.6%	87.1%	81.8%	100.0%	84.1%
Toluene	101.1%	95.8%	85.4%	100.4%	91.8%
1,2,4-Trichlorobenzene	99.7%	98.6%	89.1%	98.9%	85.3%
1,1,1-Trichloroethane	98.3%	88.9%	84.0%	99.8%	89.7%
1,1,2-Trichloroethane	106.6%	103.5%	93.1%	103.2%	95.9%
Trichloroethylene	99.4%	93.0%	83.7%	97.4%	92.1%
Vinyl chloride	100.8%	100.1%	91.9%	100.8%	97.4%
Xylenes, total	107.8%	98.2%	89.1%	104.9%	90.1%
Average % Recovery	**100.5%**	**97.2%**	**88.1%**	**100.4%**	**91.4%**