Waite
Environmental Management, LLC.

January 29, 2007

Mr. Gerold Noyes, P.E.
Vermont Department of Environmental Conservation
Waste Management Division
103 S. Main Street, West Building
Waterbury, Vermont 05671-0404

RE: 2006 Annual Monitoring Report
Wheatley Site, Brookfield, Vermont (Site #94-1693)

Dear Gerold:

Waite Environmental Management, LLC (WEM) is pleased to present two copies of the *2006 Annual Monitoring Report* for the Wheatley Site in Brookfield, Vermont. A digital copy (*.PDF) has been placed on the VT DEC ftp site. The report provides details and results of the October 2006 (4th Quarter) sampling event. This report has been prepared in accordance with the requirements and conditions described in the *State of Vermont Contract for Personal Services* EC13-04.

Do not hesitate to call me if you have any questions about the report or the work conducted. I can be reached at (802) 860-9400 or by email at mwaite@waiteenv.com.

Sincerely,

Miles E. Waite, Ph.D.
Principal Hydrogeologist

Enclosure

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2006 ANNUAL MONITORING REPORT

for the

WHEATLEY SITE
BROOKFIELD, VERMONT

VT DEC Site #77-0087

January 29, 2007

Prepared for:

STATE OF VERMONT
Vermont Department of Environmental Conservation
Waste Management Division
103 South Main Street, West Building
Waterbury, Vermont 05671-0404

Prepared by:

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1.0 INTRODUCTION

The following *2006 Annual Monitoring Report* for the Wheatley Site in Brookfield, 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 and indoor air monitoring conducted by WEM during 2006. Monitoring locations were at the Wheatley Farm Site, currently a residential property occupied by Mr. James Moorcroft. Work conducted during this year under contract EC13-04 and covered in this report include:

- Monitoring of five (5) groundwater monitoring wells during October 2006.
- Monitoring of two (2) indoor air locations in October 2006.

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

It should be noted that an additional round of groundwater sampling was conducted by WEM in April 2006 under separate contract [4]. The results are shown in the Tables 1.1 and 2.0 in Appendix B.

2.0 GROUNDWATER SAMPLING

Groundwater monitoring was conducted by WEM on October 5, 2006. The following five (5) monitoring wells were monitored: MW-S1, MW-S2, MW-S3, MW-PL1, MW-PL2. All monitoring well locations are shown in the Site Plan in Appendix A. Details and results of the sampling event are described below.

2.1 Groundwater Level Measurement

Prior to sampling on October 5, 2006, the water level in each monitoring well was measured with a water level probe. None of the wells were observed to be dry. Depth to groundwater ranged from 3.38 to 18.18 ft below top-of-casing (ft btoc).

Using top-of-casing elevation data, the measurements were converted into groundwater elevations. Elevation data from October 2006 are shown with historical measurements in Table 1.1 in Appendix B. Compared to the previous round of measurements in October 2005, there were slight increases in groundwater elevations in three wells, and slight decreases in two wells. The 2006 groundwater elevations had increased by an average of 0.29 ft compared to the 2005 results. The higher overall groundwater elevation in the vicinity of wells MW-S1 and MW-S2 was evident by pools of standing water in the lower meadow.

Groundwater elevations were also plotted to develop a groundwater elevation map (see Groundwater Elevation Map – October 2006 in Appendix A). As this map shows, the general direction of overburden groundwater flow was toward the north/northeast, or toward the Second Branch of the White River. The lateral hydraulic gradient between well MW-PL2 and MW-S3, was 0.01 ft/ft, or 1%. In the lower meadow in the vicinity of wells MW-S1 and MW-S2, the groundwater flow direction is easterly, also toward the River. The 2006 groundwater flow direction and gradient is typical for this site.

2.2 Groundwater Sample Collection

Monitoring wells were purged and sampled using a low-flow methodology. This involved 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, as specified by site protocols, ranged between 100-250 milliliters/minute (ml/min). Purge rates, purge volumes, and pump intake depths are shown in the field water collection sheets provided in Appendix C. 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. The water quality meter was calibrated in the morning prior to sampling.

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. Parameter measurements and sample times are shown in the field sheets in Appendix C. Stabilized parameter measurements are shown with historical data in Tables 1.2 through 1.7.

All samples were delivered by WEM to Severn-Trent Laboratories, Inc. (STL) of Colchester, Vermont for analysis of volatile organic compounds via EPA Method 8260B. Results for PCE, TCE, cis-1,2-DCE and trans-1,2-DCE are discussed below.

Sampling proceeded as per protocol, and there were no deviations from the Work Plan or the FLCM-Water.

2.3 Discussion of Results

Validated laboratory analytical results are summarized in Table 2.0 in Appendix B. Full copies of the laboratory report and the data validation package are presented in the Data Validation Report [5]. Following is a detailed discussion of field and laboratory results.

2.3.1 Field Geochemical Parameters

Field geochemical parameter measurements are summarized in Tables 1.2 through 1.7 in Appendix B. While there are not enough historical data to evaluate clear trends in water quality parameters, the following observation can me made from the October 2006 data:

- Dissolved oxygen levels were all of a similar magnitude and range as measurements from 2002-2005.
- Specific conductance measurements were all slightly decreased as compared to measurements from 2002-2005.
- pH measurements were all of a similar magnitude and range as measurements from 2002-2005, with the exception of well MW-S2 which had an elevated measurement. The rising trend noted in the 2005 data is no longer as apparent.
- Turbidity measurements were all slightly decreased as compared to measurements from 2002-2005.
- Redox (ORP) measurements were of a similar magnitude and range as measurements from 2002-2005.

2.3.2 Analytical Results

The analytical results from October 2006 indicate the following:

- **MW-PL1**: the target compound PCE was reported at a concentration of 2.5 micrograms per liter (ug/L). No other target compounds were reported above detection limits.
- **MW-PL2**: no target compounds were reported above detection limits.
- **MW-S1**: no target compounds were reported above detection limits.
- **MW-S2**: no target compounds were reported above detection limits.
- **MW-S3**: no target compounds were reported above detection limits.

The PCE concentration in MW-PL1 is below the Vermont groundwater enforcement standard ("VGES") [7] of 5.0 ug/L. While this compound has been reported in MW-PL1 before, it has never been reported above the VGES. PCE concentrations in MW-PL1 reported between 1997 and the present are shown in the graph presented in Appendix B. The concentration has risen slightly in 2005-2006 as compared to data from 1999-2004. It should be noted that PCE has never been reported in any of the four other monitoring wells at this Site. Also, the other target compounds (TCE, cis-1,2-DCE, trans-1,2-DCE) have never been reported in any monitoring well on this Site based on records dating back to 1997.

It should be mentioned that of the two non-target compounds that were reported in sample MW-S2 during October 2005 (toluene and acetone), only acetone was present in the 2006 sample.

2.3.3 QA/QC Samples

As part of the quality assurance/quality control (QA/QC) program, WEM collected a field duplicate sample during the October 2006 sampling event. A duplicate "MW-PLX" was collected in conjunction with MW-PL1. These samples were analyzed by STL using the same

method (EPA Method 8260B). According to the Data Validation Report [5], precision in the field duplicate pair was acceptable (less than 30 % RPD) for all target analytes greater than 2 times the quantitation limit.

WEM also collected a trip blank (TB-4) and a field blank (FB-4) during the October 2006 sampling event. No target compounds were reported in either of these samples, indicating that the effect of spurious influences on sample quality was non-existent during the sampling event.

2.4 Discussion of Data Validation

The laboratory data from the October 2006 groundwater sampling event 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 Report [5], the text of which is provided in Appendix D.

Results for the target VOCs were determined to be valid as reported for all groundwater samples collected from the Site on October 5, 2006 (sample delivery group SDG No. WHEA12). There was a qualification made for the non-target VOCs acetone due to poor recovery in the associated matrix spike duplicate analysis. No other issues that directly affect that validity of data were discovered by the data validator.

2.5 Recommendations

Based on the above information, overburden groundwater within a portion of the Site continues to show evidence of low levels of dissolved PCE. Given this condition, WEM recommends continuing the groundwater monitoring program as specified in the Work Plan and FLCM-Water. The next sampling event is scheduled for October 2007.

3.0 INDOOR AIR SAMPLING

Indoor air sampling was conducted from inside the Moorcroft residence by WEM on October 5, 2006. Sampling was conducted in accordance with WEM's Work Plan. However, there was one deviation from the FLCM-Air: the air canister for one sample reached atmospheric pressure, likely due to the flow controller. This issue is addressed in Section 3.3.

Details and results of the air sampling events are described below.

3.1 Air Sample Collection

The indoor air sampling program involves sample collection from two (2) locations inside the Moorcroft residence at the Site. This building was the former Wheatley Farm farmhouse; refer to the Site Plan in Appendix A. Samples are collected from the kitchen of the first floor and from the basement.

Samples were collected by WEM using 6-liter stainless steel Silco air canisters. The canisters were procured by WEM from STL several days prior to sampling. With each canister, a flow regulator was utilized that had a pressure gauge. The flow regulators were all calibrated by STL to provide a flow rate that allowed each canister will to have a final pressure between -7.0 psi and -0.5 psi below ambient pressure after a run time of approximately 4 hours.

The sampling procedure at each site involved setting up the canister at the designated sampling location, attaching the flow regulator, recording initial canister pressure, 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. Samples were allowed to run for approximately 4 hours.

All samples were delivered by WEM to STL 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-14A/TO-15. Results, in parts per billion (ppbv), are discussed below.

3.2 Discussion of Results

Air sampling results October 2006 are summarized in Table 3.0 in Appendix B. These results have been validated by an independent validator (see Section 3.3). Full copies of the laboratory report are presented in the data validation report [6].

No target compounds were reported in air collected from either the basement or first floor of the Moorcroft residence on October 5, 2006.

The most recent air sampling event during which a chlorinated VOC was detected was in July 2001, when PCE was reported at 4.8 ppbv. Given the lack of historical data, no clear trends in VOC concentrations could be evaluated.

3.2.1 QA/QC Samples

As part of the QA/QC program, WEM collected one (1) field duplicate sample (FD1) during the indoor air sampling event. This sample was collected in conjunction with the sample from the first floor (WHTLY1FLR). The field duplicate pair was analyzed by STL using the same method. No target compounds were reported in either air sample, so these results cannot be utilized for an evaluation of laboratory precision.

WEM also submitted a trip blank (TB1). No target compounds were reported in the trip blank, indicating that the effect of spurious influences on sample quality was non-existent during the October 2006 sampling event.

3.3 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 data validation report [6], the text of which is included in Appendix D. The full report is on file at the VT DEC offices in Waterbury.

Analytical Results for the target VOCs were determined to be valid as reported for all indoor air collected at the Site on October 5, 2006 (SDG No. 116780). No issues that directly affect that validity of data were discovered by the data validator for this air sampling event.

As mentioned previously, the final pressure in the sample collected from the first floor had reached atmospheric pressure during sample collection (0.0 psi reading on the pressure gauge). The FLCM requires that the final pressure be between -7.0 and -0.5 psi. The sample collection time was only slightly longer than 4-hours (242 minutes), and the flow controllers are adjusted by the lab to have a 4-hour collection time. Occasionally, flow controllers do not function as planned and allow more/less sample volume into the canister. For this particular case, since no results were reported in this sample, there is no resulting impact on the data quality.

While there were some laboratory documentation deficiencies, there were no issues that directly affected the validity of the analytical data.

3.4 Recommendations

Due to the occasional presence of chlorinated VOCs in the indoor air as described in Section 3.2, WEM recommends continuing the air sampling program as specified in the Work Plan and FLCM-Air. The next sampling event is scheduled for October 2007.

4.0 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*, February 6, 2004.

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*, April 2, 2004.

4. Waite Environmental Management, LLC, letter report to the VT DEC, *Extra Groundwater Sampling Event*, June 12, 2006.

5. 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. BRES36, UNIF27, and WHEA12*, December 26, 2006.

6. Phoenix Chemistry Services, *Data Validation for the UniFirst Project, Williamstown and Wheatley Sites, Williamstown and Brookfield, VT (Sample Delivery Group No. 116780 and 116832)*, November 25, 2006.

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

APPENDIX A:

FIGURES

APPENDIX B:

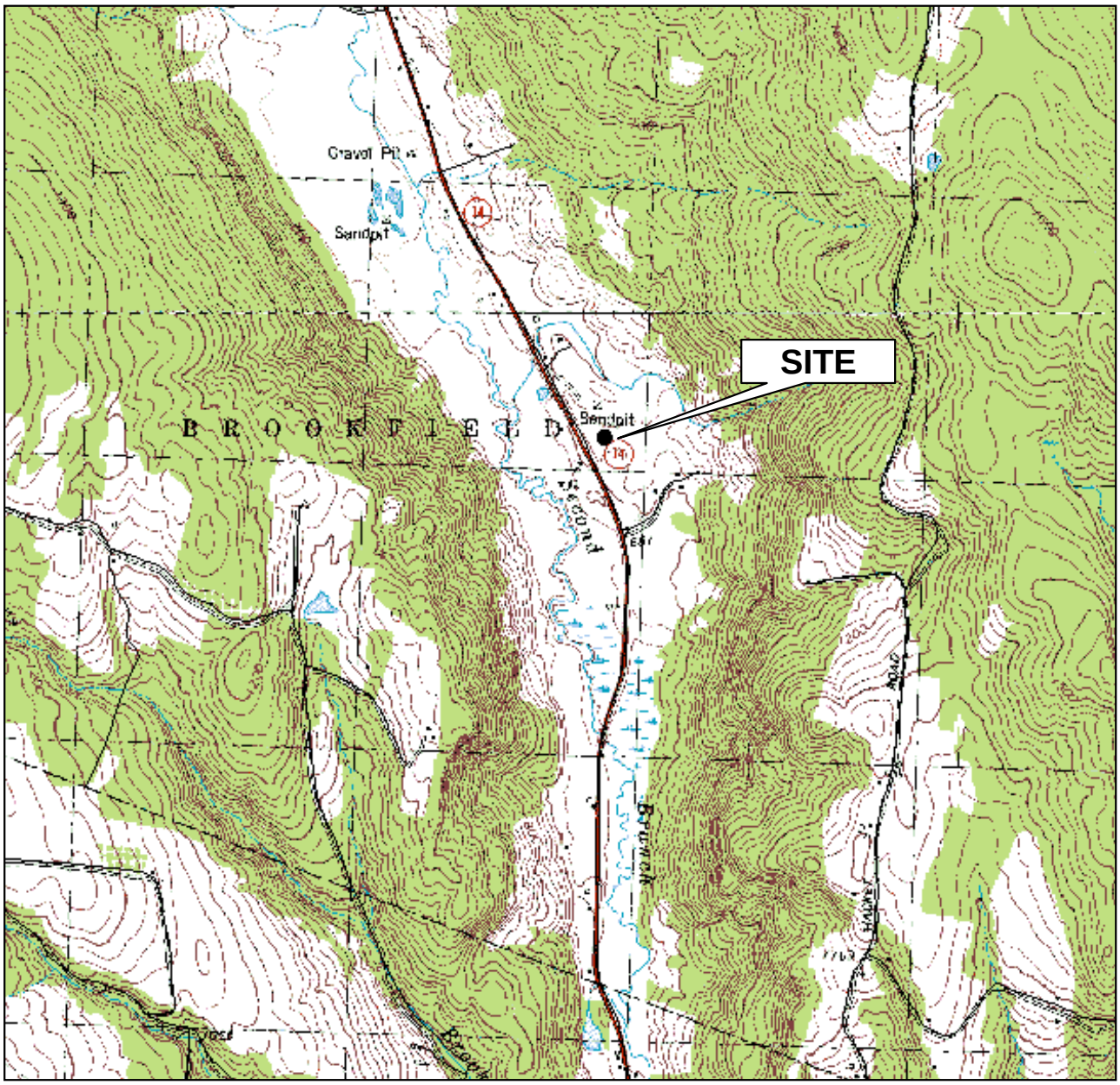
TABLES AND GRAPHS

APPENDIX C:

FIELD DATA SHEETS

APPENDIX D:

DATA VALIDATION REPORTS



LEGEND

- ● Site
- ● State-Listed Hazardous Waste Site
- —— Roadway

N

Map Source: *USGS Mapping 7.5 Minute Quadrangles: Brookfield (1983), Randolph Ctr (1983)*

Data Source *Vermont DEC databases, updated August 2003.*

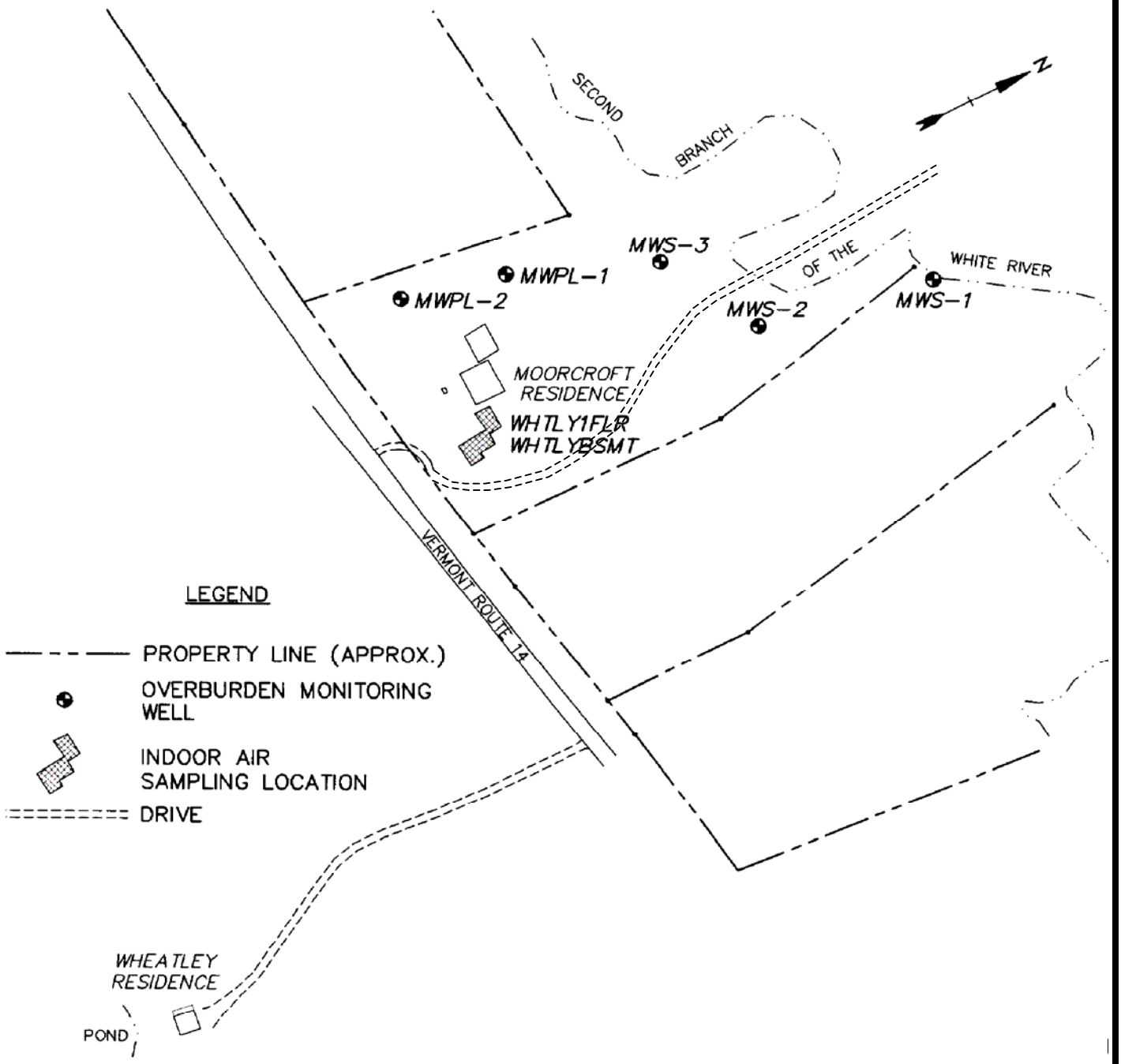
Waite Environmental Management, LLC

SITE LOCATION MAP

Wheatley Farm Site

Brookfield, Vermont

Date: 01/08/04	Drawing No. 1	Scale: 1:24,000	By: MEW



Notes:
This map is a copy of the Site Plan (April 1999) prepared Tighe & Bond, Inc., and has information provided by The Johnson Co.
All locations approximate

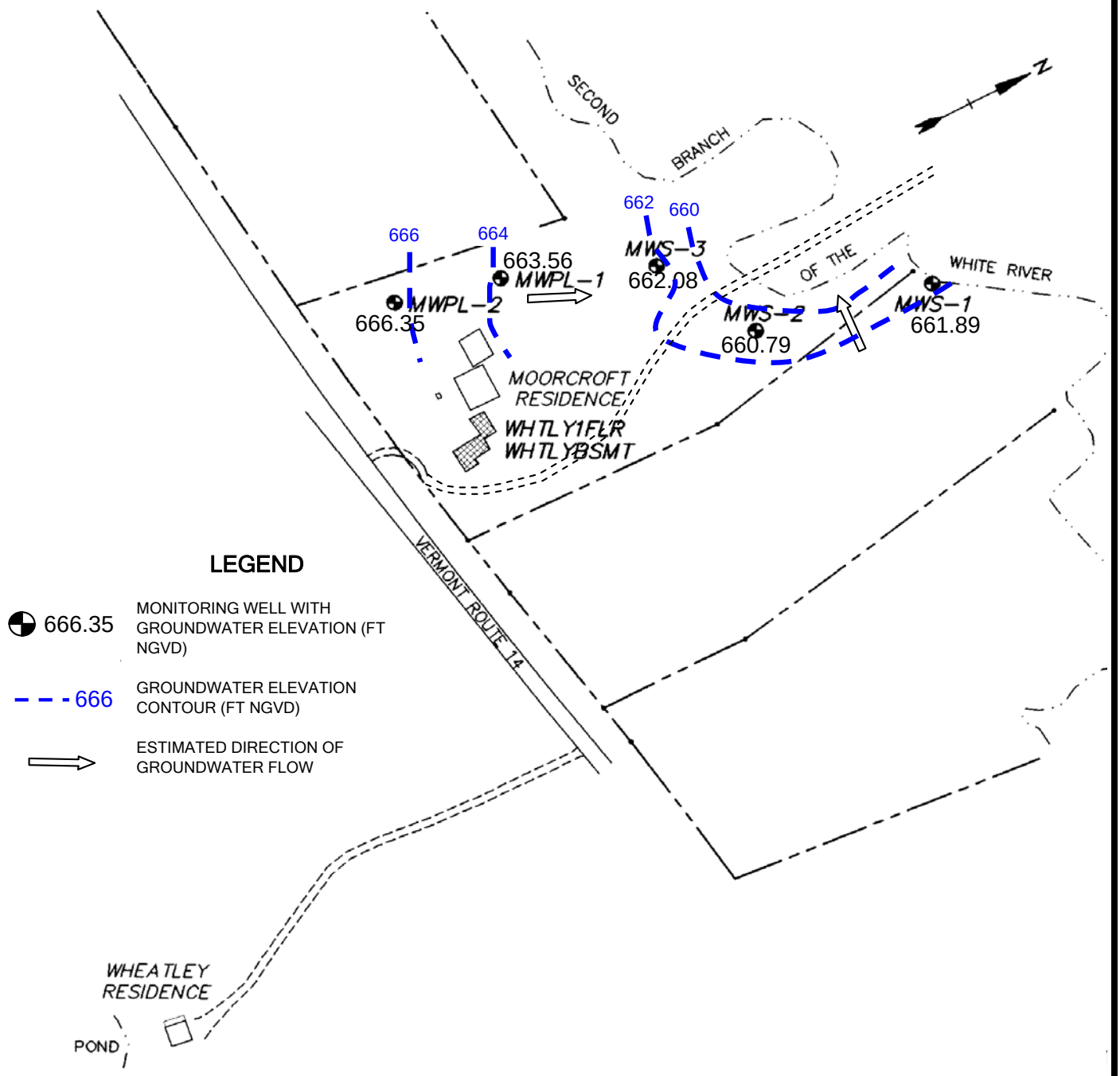
Waite Environmental Management, LLC

SITE PLAN

Wheatley Farm Site

Brookfield, Vermont

Date: 02/16/06	Drawing No.	Scale: 1" = 200'	By: MEW



LEGEND

666.35 — MONITORING WELL WITH GROUNDWATER ELEVATION (FT NGVD)

666 — GROUNDWATER ELEVATION CONTOUR (FT NGVD)

ESTIMATED DIRECTION OF GROUNDWATER FLOW

Notes:
This map is a copy of the Site Plan (April 1999) prepared Tighe & Bond, Inc., and has information provided by The Johnson Co.
Map has been modified by WEM.
All locations approximate

Waite Environmental Management, LLC

GROUNDWATER ELEVATION CONTOUR MAP

Oct-06

Wheatley Farm Site

Brookfield, Vermont

Date: 01/17/07	Drawing No.	Scale: 1" = 200'	By: MEW

WEM

TABLE 1.1
Groundwater Elevation Measurements: 2003 - 2006
Wheatley Site, Brookfield, Vermont

Location	Type	Units	Oct-03	Apr-04	Oct-04	Oct-05	Apr-06	Oct-06
MW-S1	Monitoring Well	FT	NA	NS	659.95	660.74	660.77	661.89
MW-S2	Monitoring Well	FT	NA	NS	658.93	660.62	659.42	660.79
MW-S3	Monitoring Well	FT	662.58	NS	661.41	662.41	659.61	662.08
MW-PL1	Monitoring Well	FT	663.70	NS	663.06	663.87	663.99	663.56
MW-PL2	Monitoring Well	FT	666.37	NS	666.08	665.58	666.10	666.35

Notes:
-All elevations in feet above NGVD; "NGVD" = National Geodetic Vertical Datum (1988).
-"Dry" = well dry during monitoring event; "NA" =not available; "NS" = not sampled.
-Data from 2003 collected by Tighe & Bond and reported in "2003 Monitoring Report Summary, Wheatley Farm Site" (March 12, 2004).
-Data from 2004-2006 collected by Waite Environmental Management.

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TABLE 1.2
Dissolved Oxygen Field Measurements: 2002 - 2006
Wheatley Site, Brookfield, Vermont

Location	Type	Units	Oct-02	Apr-03	Oct-03	Apr-04	Oct-04	Oct-05	Oct-06
MW-S1	Monitoring Well	mg/L	0.61	NS	NA	NS	3.33	0.48	0.29
MW-S2	Monitoring Well	mg/L	9.00	NS	1.63	NS	0.34	0.00	0.42
MW-S3	Monitoring Well	mg/L	0.40	NS	1.38	NS	0.36	0.04	0.19
MW-PL1	Monitoring Well	mg/L	4.39	NS	4.06	NS	3.33	1.97	4.71
MW-PL2	Monitoring Well	mg/L	10.61	NS	2.96	NS	7.47	12.76	13.41

Notes:
-"Dry" = well dry during monitoring event; "NA" = not available; "NS = not sampled.
-Data from 2002-2003 collected by Tighe & Bond and reported in "2002 Monitoring Report Summary, Wheatley Farm Site" (March 12, 2003) and "2003 Monitoring Report Summary, Wheatley Farm Site" (March 12, 2004).
-Data from 2004-2006 collected by Waite Environmental Management.

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TABLE 1.3
Specific Conductance Field Measurements: 2002 - 2006
Wheatley Site, Brookfield, Vermont

Location	Type	Units	Oct-02	Apr-03	Oct-03	Apr-04	Oct-04	Oct-05	Oct-06
MW-S1	Monitoring Well	us/cm	248	NS	NA	NS	369	296	229
MW-S2	Monitoring Well	us/cm	191	NS	210	NS	268	257	138
MW-S3	Monitoring Well	us/cm	261	NS	257	NS	368	283	203
MW-PL1	Monitoring Well	us/cm	348	NS	349	NS	498	391	292
MW-PL2	Monitoring Well	us/cm	318	NS	287	NS	401	400	215

Notes:
- All conductivity meaurements in microsiemens per centimeter (us/cm).
-"Dry" = well dry during monitoring event; "NA" = not available; "NS = not sampled..
-Data from 2002-2003 collected by Tighe & Bond and reported in "2002 Monitoring Report Summary, Wheatley Farm Site" (March 12, 2003) and "2003 Monitoring Report Summary, Wheatley Farm Site" (March 12, 2004).
-Data from 2004-2006 collected by Waite Environmental Management.

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TABLE 1.4
Temperature Field Measurements: 2002 - 2006
Wheatley Site, Brookfield, Vermont

Location	Type	Units	Oct-02	Apr-03	Oct-03	Apr-04	Oct-04	Oct-05	Oct-06
MW-S1	Monitoring Well	deg C	12.9	NS	NA	NS	16.1	13.6	15.1
MW-S2	Monitoring Well	deg C	13.4	NS	12.0	NS	16.5	14.5	15.1
MW-S3	Monitoring Well	deg C	8.8	NS	8.7	NS	10.9	11.2	11.8
MW-PL1	Monitoring Well	deg C	9.9	NS	8.9	NS	11.1	10.7	10.9
MW-PL2	Monitoring Well	deg C	9.9	NS	8.8	NS	10.7	11.0	10.8

Notes:
- All temperature measurements in degrees Celsius (deg C).
-"Dry" = well dry during monitoring event; "NA" = not available; "NS = not sampled.
-Data from 2002-2003 collected by Tighe & Bond and reported in "2002 Monitoring Report Summary, Wheatley Farm Site" (March 12, 2003) and "2003 Monitoring Report Summary, Wheatley Farm Site" (March 12, 2004).
-Data from 2004-2006 collected by Waite Environmental Management.

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TABLE 1.5
pH Field Measurements: 2002 - 2006
Wheatley Site, Brookfield, Vermont

Location	Type	Units	Oct-02	Apr-03	Oct-03	Apr-04	Oct-04	Oct-05	Oct-06
MW-S1	Monitoring Well	unitless	6.60	NS	NA	NS	7.25	8.09	8.22
MW-S2	Monitoring Well	unitless	6.30	NS	6.25	NS	6.80	7.63	8.09
MW-S3	Monitoring Well	unitless	8.36	NS	8.24	NS	8.67	9.44	8.41
MW-PL1	Monitoring Well	unitless	7.66	NS	7.54	NS	8.06	8.69	7.72
MW-PL2	Monitoring Well	unitless	7.44	NS	7.09	NS	7.89	8.16	7.32

Notes:
-"Dry" = well dry during monitoring event; "NA" = not available; "NS = not sampled.
-Data from 2002-2003 collected by Tighe & Bond and reported in "2002 Monitoring Report Summary, Wheatley Farm Site" (March 12, 2003) and "2003 Monitoring Report Summary, Wheatley Farm Site" (March 12, 2004).
-Data from 2004-2006 collected by Waite Environmental Management.

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TABLE 1.6
Turbidity Field Measurements: 2002 - 2006
Wheatley Site, Brookfield, Vermont

Location	Type	Units	Oct-02	Apr-03	Oct-03	Apr-04	Oct-04	Oct-05	Oct-06
MW-S1	Monitoring Well	NTU	0.6	NS	NA	NS	183	89	21
MW-S2	Monitoring Well	NTU	2.0	NS	2.0	NS	81	47	17
MW-S3	Monitoring Well	NTU	0.5	NS	1.0	NS	53	21	0.0
MW-PL1	Monitoring Well	NTU	2.3	NS	2.5	NS	108	95	0.0
MW-PL2	Monitoring Well	NTU	4.5	NS	0.8	NS	126	178	0.0

Notes:
-All turbidity measurements in nephelometric turbidity units (NTU).
-"Dry" = well dry during monitoring event; "NA" = not available; "NS = not sampled.
-Data from 2002-2003 collected by Tighe & Bond and reported in "2002 Monitoring Report Summary, Wheatley Farm Site" (March 12, 2003) and "2003 Monitoring Report Summary, Wheatley Farm Site" (March 12, 2004).
-Data from 2004-2006 collected by Waite Environmental Management.

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TABLE 1.7
Redox Potential Field Measurements: 2002 - 2006
Wheatley Site, Brookfield, Vermont

Location	Type	Units	Oct-02	Apr-03	Oct-03	Apr-04	Oct-04	Oct-05	Oct-06
MW-S1	Monitoring Well	mV	-69	NS	NA	NS	-72	-99	-159
MW-S2	Monitoring Well	mV	12	NS	-31	NS	-43	-134	-123
MW-S3	Monitoring Well	mV	-179	NS	-177	NS	-220	-214	-168
MW-PL1	Monitoring Well	mV	150	NS	137	NS	43	169	150
MW-PL2	Monitoring Well	mV	176	NS	174	NS	128	190	162

Notes:
-All redox potential measurements in millivolts (mV).
-"Dry" = well dry during monitoring event; "NA" = not available; "NS = not sampled.
-Data from 2002-2003 collected by Tighe & Bond and reported in "2002 Monitoring Report Summary, Wheatley Farm Site" (March 12, 2003) and "2003 Monitoring Report Summary, Wheatley Farm Site" (March 12, 2004)..
-Data from 2004-2006 collected by Waite Environmental Management.

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TABLE 2.0
MONITORING WELL RESULTS: 2003-2006
Wheatley Farm Site, Brookfield

Location	Parameter Method 8260	Groundwater Enforcement Standard	Units	Oct-03	Oct-04	Oct-05	Apr-06	Oct-06
MW-S1	**PCE**	**5.0**	ug/L	NA	1.0 U	1.0 U	1.0 U	1.0 U
	TCE	**5.0**	ug/L	NA	1.0 U	1.0 U	1.0 U	1.0 U
	cis-1,2-DCE	**70.0**	ug/L	NA	1.0 U	1.0 U	1.0 U	1.0 U
	trans-1,2-DCE	**100.0**	ug/L	NA	1.0 U	1.0 U	1.0 U	1.0 U
MW-S2	**PCE**	**5.0**	ug/L	1.0 UJ	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
	cis-1,2-DCE	**70.0**	ug/L	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
MW-S3	**PCE**	**5.0**	ug/L	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
	cis-1,2-DCE	**70.0**	ug/L	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
MW-PL1	**PCE**	**5.0**	ug/L	**1.2**	**1.6**	**1.1**	**2.8**	**2.5**
	TCE	**5.0**	ug/L	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
	trans-1,2-DCE	**100.0**	ug/L	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
MW-PL2	**PCE**	**5.0**	ug/L	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
	cis-1,2-DCE	**70.0**	ug/L	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

Notes:
- "PCE" = tetrachlorethene; "TCE" = tricholorethene; "DCE" = dichloroethene.
-"U" = not detected above listed quantitation limit; "J/J1" = reported concentration is an estimated value; "UJ" = reported quantitation limit is an estimated value; "J4" = values are estimated due to poor initial calibration data.
-"Dry" = well dry during monitoring event; "NA" = not available.
- Data from 2003 collected by Tighe & Bond and provided to WEM in digital format by Severn-Trent laboratory.
- Data starting in 2004 collected by Waite Environmental Management.
- Groundwater Enforcement Standards referenced from Table 1, Chapter 12 - Groundwater Protection Rule and Strategey, December 2000.

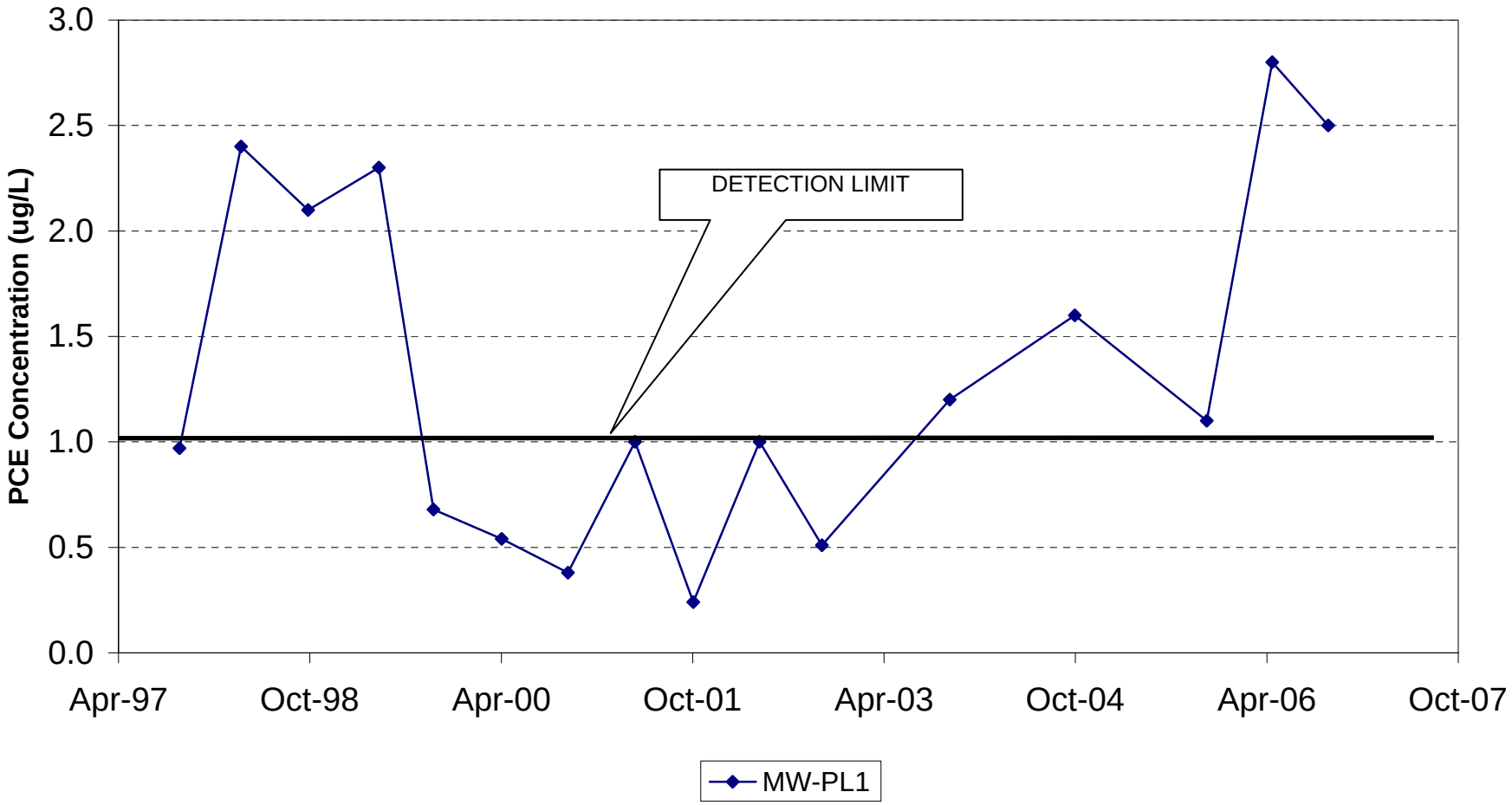
WEM Waite Environmental Management, LLC.

TABLE 3.0
INDOOR AIR QUALITY RESULTS: 2002 - 2006
Wheatley Farm Site, Brookfield, Vermont

Owner	Location	Parameter Method T-014A	Guidance Level	Units	Jan-02	Jul-02	Oct-03	Oct-04	Oct-05	Oct-06
Moorcroft	WHTLY1FLR	Tetrachloroethene	1.0	ppbv	**0.09** J	0.5 U	NS	0.5 U	0.2 U	0.2 U
		Trichloroethene	1.0	ppbv	0.27 U	0.5 U	NS	0.5 U	0.2 U	0.2 U
		cis-1,2-Dichloroethene	9.3	ppbv	0.27 U	0.5 U	NS	0.5 U	0.2 U	0.2 U
		trans-1,2-Dichloroethene	18.4	ppbv	0.27 U	0.5 U	NS	0.5 U	0.2 U	0.2 U
	WHTLYBSMT	Tetrachloroethene	1.0	ppbv	0.32 U	0.5 U	NS	0.5 U	0.2 U	0.2 U
		Trichloroethene	1.0	ppbv	0.32 U	0.5 U	NS	0.5 U	0.2 U	0.2 U
		cis-1,2-Dichloroethene	9.3	ppbv	0.32 U	0.5 U	NS	0.5 U	0.2 U	0.2 U
		trans-1,2-Dichloroethene	18.4	ppbv	0.32 U	0.5 U	NS	0.5 U	0.2 U	0.2 U

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 not 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 2001-2003 was collected by Tighe & Bond and was entered from tabulated data from annual reports.
Data starting in 2004 collected by Waite Environmental Management.
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).

Dissolved PCE: MW-PL1
Wheatley Site, Brookfield, Vermont



Note:
1) Non-detectable values (i.e. detection limits) are graphed as positive values. Values below detection limit are estimated (J).

WEM Waite Environmental Management, LLC.

SITE: Wheatly
FIELD WATER COLLECTION SHEET

SAMPLING LOCATION	MW-PL2	Pump Intake Depth	19.4
Date	10/5/06	Pump Type	Grupump
Sampler	MW	Well Diameter	3/4"
Weather	pa & cool	Well Depth	20.4
Water Type	(gw) sw supply	Initial Depth to Water	18.18
Sampling Method	bailer (low flow) grab	Traditional Purge Vol. (bailer)	200 ml/min

LOW FLOW PURGING DATA

Time	DTW (ft btp)	Purge Rate (ml/min)	Temp. (deg C)	Specific Cond. (us/cm)	pH	ORP (mv)	DO (mg/L)	Turbidity (NTU)		Notes
				within 3%	within 3%	1 pH unit	10 mv	within 10%	within 10%	
10:45	18.18	200								begin
1048	18.42	200	11.20	239	6.31	198	13.36	0.1		
1052	18.45	200	10.97	223	6.64	187	13.42	26.5		
1057	18.45	200	10.74	217	6.94	177	14.12	0.0		
1102	18.45	200	10.69	216	7.09	172	15.67*	0.0		
1107	18.45	200	10.78	216	7.23	168	15.95*	0.0		
1113	18.45	200	10.72	214	7.37	164	13.43	0.0		
1118	18.45	200	10.77	215	7.32	162	13.41	0.0		purging complete

SAMPLE COLLECTION	Purge Volume	Temp.	Specific Cond.	pH	ORP	DO	Turbidity	Filtered (y/n)
Final Measurements:	2.0 gal	10.77	215	7.32	162	13.41	0.0	n

Sample Description	Label	Type Container	# Container	Preservative	Analysis Method	Collection Time	COC #
Sample	MW-PL1	VOA	3	HCl	8260B	1120	UF-6
As Required:							
Field Duplicate							
Field Blank							
MS/MSD							

General Notes:

* high D.O. readings due to bubble in flow cell

WEM Waite Environmental Management, LLC

SITE: Whetting

FIELD WATER COLLECTION SHEET

(2)

SAMPLING LOCATION	NW-PL1			Pump Intake Depth	16.0
Date	10/5/06			Pump Type	Geopump
Sampler	PC & Cool			Well Diameter	3/4
Weather	MW			Well Depth	17.32
Water Type	(gw)	sw	supply	Initial Depth to Water	12.95
Sampling Method	bailer	(low flow)	grab	Traditional Purge Vol. (bailer)	250 ml/min

LOW FLOW PURGING DATA

Time	DTW (ft btp)	Purge Rate (ml/min)	Temp. (deg C)	Specific Cond. (us/cm)	pH	ORP (mv)	DO (mg/L)	Turbidity (NTU)		Notes
				within 3%	within 3%	1 pH unit	10 mv	within 10%	within 10%	
1132	12.95	250								begin purging
1135	12.98	250	10.97	292	7.56	164	5.50	121		
1140	12.98	250	10.89	292	7.62	154	4.91	12.6		
1145	12.98	250	10.96	292	7.68	151	4.68	1.6		
1150	12.98	250	10.92	292	7.72	150	4.71	0.6		purging complete

SAMPLE COLLECTION

	Purge Volume	Temp.	Specific Cond.	pH	ORP	DO	Turbidity	Filtered (y/n)
Final Measurements:	1.0 gal	10.92	292	7.72	150	4.71	0.6	n

Sample Description	Label	Type Container	# Container	Preservative	Analysis Method	Collection Time	COC #	
Sample	NW-PL1	VOA	3	HCl	8260B	1155	UF-5	
As Required:								
Field Duplicate	NW-PLX	VOA	3	HCl	8260B	"1160"	UF-6	blind
Field Blank								
MS/MSD								

General Notes:

WEM Project #110220010

VT DEC Site #

WEM Waite Environmental Management, LLC.

SITE: Wheatly
FIELD WATER COLLECTION SHEET

SAMPLING LOCATION	MW-S3	Pump Intake Depth	19.4
Date	10/5/06	Pump Type	Grapvap
Sampler	MW	Well Diameter	3/4"
Weather	pc & cool	Well Depth	19.8
Water Type	(gw) sw supply	Initial Depth to Water	3.61
Sampling Method	bailer (low flow) grab	Traditional Purge Vol. (bailer)	200 ml/min

LOW FLOW PURGING DATA

Time	DTW (ft btp)	Purge Rate (ml/min)	Temp. (deg C)	Specific Cond. (us/cm) within 3%	pH within 3%	ORP (mv) 1 pH unit	DO (mg/L) 10 mv	Turbidity (NTU) within 10%	within 10%	Notes
1220	3.01	200								begin purging
1223	6.28	200	13.40	204	8.13	-117	3.92	2.8		reduced rate
1228	6.20	175	11.93	202	8.17	-139	0.75	0.0		
1232	6.16	175	11.81	203	8.26	-150	0.44	0.0		
1237	6.24	175	11.74	205	8.35	-162	0.20	0.0		
1242	6.31	175	11.65	204	8.41	-170	0.17	0.0		
1248	6.42	175	11.75	203	8.41	-168	0.19	0.0		purging complete

SAMPLE COLLECTION	Purge Volume	Temp.	Specific Cond.	pH	ORP	DO	Turbidity	Filtered (y/n)
Final Measurements:	1.25 gal	11.75	203	8.41	-168	0.19	0.0	-

Sample Description	Label	Type Container	# Container	Preservative	Analysis Method	Collection Time	COC #
Sample	MW-S3	VOA	3	HCl	8260B	1255	UP-6
As Required:							
Field Duplicate							
Field Blank							
MS/MSD							

General Notes:

WEM Waite Environmental Management, LLC

SITE: Wheatly

Page 1 of 1

(4)

FIELD WATER COLLECTION SHEET

SAMPLING LOCATION	MW-51	Pump Intake Depth	9.8
Date	10/5/06	Pump Type	Geopump peri
Sampler	NW	Well Diameter	3/4"
Weather	pc & cool	Well Depth	10.80
Water Type	(gw) sw supply	Initial Depth to Water	3.30
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. (us/cm)	pH	ORP (mv)	DO (mg/L)	Turbidity (NTU)		Notes
				within 3%	within 3%	1 pH unit	10 mv	within 10%	within 10%	
1310	3.30	100								begin
1315	4.45	100	14.87	224	8.31	-134	0.92	74.5		
1320	4.45	100	15.14	227	8.21	-152	0.48	41.6		
1325	4.45	100	15.20	229	8.16	-159	0.40	26.8		
1330	4.45	100	15.06	233	8.21	-157	0.32	16.2		
1333	4.45	100	15.09	229	8.22	-159	0.29	21.2		complete

SAMPLE COLLECTION

	Purge Volume	Temp.	Specific Cond.	pH	ORP	DO	Turbidity	Filtered (y/n)
Final Measurements:	0.5 gal	15.09	229	8.22	-159	0.29	21.2	n

Sample Description	Label	Type Container	# Container	Preservative	Analysis Method	Collection Time	COC #
Sample	MW-51	VOA	3	HCl	8260B	1335	UF-6
As Required:							
Field Duplicate							
Field Blank							
MS/MSD							

General Notes:

WEM Project #110320012

VT DEC Site #

WEM Waite Environmental Management, LLC.

SITE: Wheatley

FIELD WATER COLLECTION SHEET

(5)

SAMPLING LOCATION	MW-S2	Pump Intake Depth	10.8
Date	10/5/06	Pump Type	Geopump peri.
Sampler	MW	Well Diameter	3/4
Weather	pc & cool	Well Depth	11.1
Water Type	(gw) sw supply	Initial Depth to Water	3.35
Sampling Method	bailer (low flow) grab	Traditional Purge Vol. (bailer)	250 ml/min

LOW FLOW PURGING DATA

Time	DTW (ft btp)	Purge Rate (ml/min)	Temp. (deg C)	Specific Cond. (us/cm) within 3%	pH within 3%	ORP (mv) 1 pH unit	DO (mg/L) 10 mv	Turbidity (NTU) within 10%	within 10%	Notes
1340	3.35	250	14.29	138	8.17	-99	1.91	42.9		begin purge
1345	3.69	250	14.38	139	8.17	-118	0.68	21.2		
1349	3.72	250	14.79	140	8.12	-119	0.60	9.6		
1353	3.72	250	14.99	140	8.10	-122	0.51	16.2		
1357	3.71	250	15.21	140	8.10	-123	0.41	10.2		
1402	3.70	250	15.14	138	8.09	-123	0.42	17.0		purge complete

SAMPLE COLLECTION	Purge Volume	Temp.	Specific Cond.	pH	ORP	DO	Turbidity	Filtered (y/n)
Final Measurements:	1.0 gal	15.14	138	8.09	-123	0.42	17.0	n

Sample Description	Label	Type Container	# Container	Preservative	Analysis Method	Collection Time	COC #
Sample	MW-S2	VOA	3	HCl	8260B	1405	UF-6
As Required:							
Field Duplicate					"		
Field Blank	FB-4	"	2	"		1445	UF-6
MS/MSD	MW-S2	"	3	"	"	1405	UF-6

General Notes:

WEM Project #110320012

VT DEC Site #

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. BRES36, UNIF27, and WHEA12

Chemical Analyses Performed by:

STL Burlington
208 South Park Dr. Suite 1
Colchester, VT 05446

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

December 26, 2006

Reference #2006-1103-001, -1107-001, & -1109-001
VOA Validation Report/BRES36_UNIF27_ WHEA12/dhg

EXECUTIVE SUMMARY

Phoenix Chemistry Services (Phoenix) has completed the validation of the volatile organics analysis data prepared by Severn Trent Laboratories (STL Burlington) for 42 groundwater samples, 10 water supply samples, 8 field blanks (FB), 8 trip blanks (TB) and one performance evaluation (PE) sample from the Bressett Site in Randolph, VT, the UniFirst Site in Williamstown, VT, and the Wheatley Site in Brookfield, VT. The laboratory reported the data under Sample Delivery Group (SDG) Nos. BRES36, UNIF27, and WHEA12, which were submitted as three data packages received by Phoenix on November 3, 7, and 9, 2006, and two complete revisions for SDG Nos. BRES36 and WHEA12, which were received on December 15, 2006. These SDGs include the following samples:

Sample Identifier	Laboratory ID
Method 8260B	
SDG No. BRES36	
TB-1	686168
MW-103D	686169
MW-104S	686170
MW-104D	686171
MW-102D	686172
MW-101S	686173
MW-102S	686174
MW-101D	686175
MW-4S	686176
MW-4D	686177
MW-3S	686178
FB-1	686179
MW-Z	686180
MW-3D	686181
TB-5	686188
BRW-3	686189
BRW-2	686190
BRW-1	686191
FB-5	686192
SDG No. WHEA12	
TB-4	686193
MW-PLZ	686194
MW-PLX	686195
MW-PL1	686196
MW-S3	686197
MW-S1	686198

Sample Identifier	Laboratory ID
MW-S2	686199
FB-4	686200
SDG No. UNIF27	
TB-6	686183
MW-25884	686184
BMW-X	686185
FB-6	686186
TB-3	686202
SS-2	686203
SS-5	686204
W-SEEP	686205
SEEP-1A	686206
SP-3	686207
SS-Z	686208
SS-3	686209
FB-3	686210
TB-7	686715
PZ-101	686716
PZ-102	686717
W-25	686718
MW-50	686719
W-19	686720
W-20	686721
MW-E	686722
MW-C	686723
MW-D	686724
W-1	686725
SP-4	686726
FB-7	686727
W-Z	686728
Method 524.2	
SDG No. UNIF27	
Bressett site	
TB-2	686162
SHIELDS WELL	686163
BRESSETT TAP	686164
FB-2	686165
WELL Z	686166
UniFirst site	
TB-8	686729
WP-5	686730

Sample Identifier	Laboratory ID
WP-7	686731
WP-8	686732
WP-13	686733
WP-20	686734
WP-3	686735
FB-8	686736
WP-Z	686737
WP-23	686738

A cross-reference table of sample IDs was provided in the data packages. Sample MW-PL2 was logged in and reported as MW-PLZ; the validator has not changed this identifier. The water supply samples from the Bressett site were logged in and reported with SDG No. UNIF27. The sites for the water supply samples are noted on the table above.

The initial submissions of SDG Nos. BRES36 and WHEA12 contained several serious flaws, which included use of an incorrect compound list, poor or no documentation of manual integrations, and apparent contamination of blanks and samples with the target analyte chloroethane. The validator requested that the laboratory investigate and address these and other issues, discussed later in this report. Full revisions of these two SDGs were submitted by the laboratory, and used for the validation. The original submissions should be discarded, and replaced with the revisions.

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

- Results for bromomethane in samples TB-7, FB-7, W-25, W-19, FB-2, TB-8, FB-8, SHIELDS, BRESSETT TAP, and WELL Z were qualified as estimated (UJ).

- Results for chloromethane in samples MW-103D, MW-104S, MW-104D, and MW-Z were qualified as less than the quantitation limit (U).

- Results for tetrachloroethene in samples MW-25884, BMW-X, W-SEEP, SP-3, and SS-Z were qualified as less than the quantitation limit (U), and in results for tetrachloroethene samples MW-4S and SEEP-1A were qualified as less than the reported value (U).

- The result for acetone in MW-S2 was qualified as estimated (J).

- The result for tetrachloroethene in MW-4S was qualified as estimated (J).

- Results for tetrachloroethene in the original analyses of samples MW-102S, MW-101D, MW-3S, MW-Z, and MW-3D, and for cis-1,2-dichloroethene in the original analyses of samples MW-101D and MW-Z were rejected (R) and replaced with the acceptable concentrations from the corresponding diluted samples (MW-102SDL, MW-101DDL, MW-3SDL, MW-ZDL, and MW-3DDL).

- Results for all other analytes in samples MW-102SDL, MW-101DDL, MW-3SDL, MW-ZDL, and MW-3DDL were rejected (R).

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 part of the data packages 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 I. Data qualifiers were applied as necessary and appropriate. 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. BRES36, UNIF27, and WHEA12 were collected on October 3, 4, 5, 6, 9, and 10, 2006. 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 2-10 days after receipt at the laboratory, and is recorded in the Sample Preparation sections of the data packages. It should be noted that the FLCM requires that the pH be measured upon receipt at the laboratory. All recorded sample pH values were <2.

The cooler temperatures on receipt at the laboratory were checked and documented in the data packages, and ranged from 2.0 ^{o}C to 5.1^{o}C, which are within the acceptable range of 4 ^{o}C ±2°C.

II. GC/MS Instrument Performance Check (Tuning)

The samples for volatiles analysis from SDG Nos. BRES36, UNIF27, and WHEA12 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 twelve (12) 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 (10/2/06) was performed on instrument L and one IC (10/23/06) was performed on instrument M in support of the Method 8260B sample analyses reported in these data packages. One IC (10/14/06) was 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. Some target compounds were manually integrated in the ICs and in the continuing calibrations and spiked samples submitted with this data set. Many of the manual integrations submitted in the first submissions of SDG Nos. BRES36 and WHEA12 were not printed and the initials of the analyst were not shown; the laboratory addressed this and submitted proper documentation of all manual integrations in the revised data packages. In the data packages used for the validation, all of the manual integrations appear to be correctly performed, and are accurately reported with the final area listed on the tabular report.

All % RSDs for the Method 8260B ICs were below the maximum limit (30%) specified by Region I. All RRF's were above the 0.05 minimum technical criterion, with the exception of 2-butanone, which had average RRF values below (0.023 and 0.019) the acceptance level in the ICs performed on instruments L and

M, respectively, and acetone, which exhibited an average RRF value below (0.042) the acceptance level in the IC on instrument M. All RSDs for the Method 524.2 ICs were below the maximum limit, and all average RRF values were above the minimum criterion, with the exception of 2-butanone, which had an average RRF value below (0.022) the acceptance level; acetone exhibited a marginally low average RRF value , which rounds to within the criterion.

Pursuant to the Region I validation document, results for 2-butanone in all samples in this data set and for acetone in all samples analyzed by Method 8260B on instrument M warranted rejection (R) based on the low RRF achieved. However, 2-butanone was spiked at a concentration of 5 µg/L in the laboratory control samples and in the matrix spike and matrix spike duplicate samples prepared and analyzed with this data set, and acceptable or high recoveries for 2-butanone were achieved in almost all of these analyses. Likewise, acetone was spiked at a concentration of 5 µg/L in the laboratory control samples and in the matrix spike and matrix spike duplicate samples prepared and analyzed for Method 524.2, and acceptable recoveries for acetone were achieved in all of these analyses. Therefore, based on the mostly acceptable recoveries for acetone and 2-butanone in the laboratory control samples and the matrix spike analyses, results for acetone and 2-butanone were not qualified in any ground water or supply water samples based on the low RRFs in the associated ICs for both methods.

An ICV was analyzed immediately after each Method 8260B IC, as required, and recoveries were correctly calculated and accurately reported in the data packages. All recoveries in both ICVs were within laboratory established control limits.

IV. Continuing Calibration (CC)

Four continuing calibration (CC) standards were run on instrument L and one was 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 these data packages. 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.

All RRFs were above the 0.05 minimum criterion, with the exception of 2-butanone, which had RRFs of 0.020 to 0.026 in the Method 8260B CCs, and acetone, which had RRFs of 0.046 to 0.049 in the Method 8260B CCs analyzed on instrument L on 10/10/06 at 1240, 10/11/06 at 2135, 10/12/06 at 0950, and on 10/19/06 at 0723, and an RRF of 0.045 in the Method 8260B CC analyzed on instrument M on 10/23/06 at 2049. In the Method 524.2 CCs, all RRFs were above the 0.05 minimum criterion, with the exceptions of 2-butanone, which had RRFs of 0.023 and 0.020 in the CCs analyzed on 10/15/06 and 10/16/06, and acetone, which had an RRF of 0.049 in the CC analyzed on 10/16/06.

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.

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 and for both methods, with the following exceptions:

Date	Time	Compound	%D
L (Method 8260B)			
10/10/06	12:40	2-hexanone	25.2
10/19/06	07:23	bromomethane	34.7
10/19/06	22:09	chloromethane	33.3
L (Method 52.4.2)			
10/15/06	21:16	bromomethane	34.2

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.

On the basis of the unacceptable %D in the associated CC standards, results for bromomethane in samples TB-7, FB-7, W-25, W-19, FB-2, TB-8, FB-8, SHIELDS, BRESSETT TAP, and WELL Z were qualified as estimated (UJ). No field samples were reported from the second analytical window on instrument L on 10/19/06, so no qualifications were necessary on the basis of the unacceptably high %D for chloromethane in the CC standard. On the basis of professional judgment, no results for 2-hexanone were qualified on the basis of its marginally high %D, which rounds to within the limit, in the CC standard analyzed on instrument L on 10/10/06.

V. Blanks

Results for eight (8) water-matrix laboratory method blanks (MBs) were reported in association with this set of samples. No target analytes were detected in any MB, with the exception of bromomethane, which was detected in MBLK101906LA, which was analyzed on instrument L on 10/19/06 at 0822.

Eight trip blanks (TBs) were reported in these SDGs. No target analytes were detected in any TB, with the exception of tetrachloroethene, which was detected in TB-3 at 0.27 ug/L.

Eight field blanks (FBs) were reported in these SDGs. No target analytes were detected in any FB, with the exception of tetrachloroethene, which was detected in FB-3 at 0.41 ug/L (action limit 2.0 ug/L).

Three holding (storage) blanks (HBs) for Method 8260B and one HB for Method 524.2 were reported in these SDGs. No target analytes were detected in any HB, with the exceptions of chloromethane, which was detected in HB88260 at 0.32 ug/L (action limit 1.6 ug/L), and tetrachloroethene, which was detected in HB368260 at 0.25 ug/L.

Since bromomethane was not detected in any sample associated with MBLK101906LA, no qualifications for bromomethane were necessary on the basis of laboratory contamination with bromomethane. On the basis of laboratory contamination, results for chloromethane in samples MW-103D, MW-104S, MW-104D, and MW-Z were qualified as less than the quantitation limit (U). On the basis of field contamination, results for tetrachloroethene in samples MW-25884, BMW-X, W-SEEP, SP-3, and SS-Z were qualified as less than the quantitation limit (U), and results for tetrachloroethene in samples MW-4S and SEEP-1A were qualified as less than the reported value (U).

VI. Surrogate Compounds

Percent recoveries (%R) for all four surrogate compounds were correctly calculated, accurately reported on the Form II summaries within the data packages, and were within acceptance limits for all sample analyses, with the following exceptions:

Recoveries for the surrogate compound bromofluorobenzene (BFB) were slightly above (116 and 119% R) the upper limit (115% R) for samples TB-7 and FB-7, respectively. The samples were appropriately reanalyzed, and the surrogate recovery for BFB in sample TB-7 improved in both analyses; however, the recovery (80% R) of surrogate toluene-d_8 in the reanalysis of TB-7 was below the lower acceptance limit (85% R), and recovery of the internal standard 1,4-dichlorobenzene-d_4 was below it's acceptance limit for both reanalyses. On the basis of professional judgment, only the first analyses of samples TB-7 and FB-7 were used for the validation effort, and since no target compounds were detected in either analysis, no qualifications were necessary on the basis of the slightly high recoveries of the surrogate compound BFB.

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 exceptions of the reanalyses of samples TB-7 and FB-7, as noted in Section VI above. Since these reanalyses were not used for the validation, no qualifications were necessary on the basis of the unacceptably low recoveries of the internal standard 1,4-dichlorobenzene-d_4 in these analyses.

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

Samples SS-5, W-1, MW-4S, and MW-S2 were used for the MS/MSD analyses for Method 8260B, and samples SHIELDS and WP-8 were used for the MS/MSD analyses for Method 524.2 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 76 – 130 %R) and reproducible (RPD range 0-28%; limit 30% RPD for Method 8260B, and 40% RPD for Method 524.2), with the following exceptions:

Recoveries of bromomethane (140% R) in SS-5MSD, and tetrachloroethene (150% R) in W-1MS and W-1MSD were reported above the upper laboratory control limits (135% and 120% R, respectively), and recoveries of trans-1,3-dichloropropene (75% R) in W-1MS, acetone in MW-S2MS and MW-S2MSD (62% and 52% R, respectively), 2-butanone (76% R) in MW-4SMS, tetrachloroethene (50% R) in both MW-4SMS and MW-4SMSD, and styrene (78% R) in MW-4SMSD were reported below the lower laboratory control limits (80% R for trans-1,3-dichloropropene, 2-butanone, and styrene, and 65% R for tetrachloroethene). Other than tetrachloroethene, which was detected in the parent samples W-1MS and MW-4S at 27 and 1.3

ug/L, respectively, and acetone in MW-SWMSD, all other recoveries are with in the Region 1 acceptance limits (60 – 140 %R).

On the basis of professional judgment, and recoveries outside the laboratory established acceptance limits but within the Region 1 acceptance criteria (60 – 140 %R), no qualifications were applied on the basis of the high recoveries for bromomethane in the MSD analysis of sample SS-5, and the low recoveries of -1,3-dichloropropene in W-1MS, 2-butanone in MW-4SMS, and styrene in MW-4SMSD. On the basis of recovery below the laboratory and Region 1 lower limits in the associated MSD analysis, the result for acetone in MW-S2 was qualified as estimated (J).

On the basis of the native concentration of tetrachloroethene being more than four times the spiking level, no results for tetrachloroethene were qualified on the basis of the high recoveries in samples W-1MS and W-1MSD.

On the basis of recoveries below the laboratory and Region 1 acceptance criteria in the associated MS and MSD analyses, the result for tetrachloroethene in MW-4S was qualified as estimated (J).

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. BRES36, UNIF27, and WHEA12 contained five ground water field duplicate pairs and two supply water field duplicate pairs, which were identified as presented in the table below:

Field Sample	Field Duplicate
MW-101D	MW-Z
MW-25884	BMW-X
MW-PL1	MW-PLX
W-SEEP	SS-Z
MW-E	W-Z
BRESSETT TAP	WELL-Z
WP-3	WP-Z

Precision in the field duplicate pairs MW-101D and MW-Z, MW-25884 and BMW-X, MW-PL1 and MW-PLX, W-SEEP and SS-Z, MW-E and MW-Z, BRESSETT TAP and WELL-Z, and WP-3 and WP-Z was acceptable (less than 30 % RPD) for all target analytes greater than 2 times the quantitation limit.

X. Sensitivity Check

The aqueous MDL for Method 8260B submitted for this project was performed on 03/28/05, and the aqueous MDL for Method 524.2 submitted for this project was performed on 11/05/05, which are both slightly more than one year prior to the sample analyses in this data set. All analytes had calculated MDL's

below the method quantitation limits, however they were not all less than one fifth the PQL, as required in the Field/Laboratory Coordination Memorandum (FLCM).

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 Region 1 acceptance criteria (60 – 140 %R) were obtained, except as noted in Sections VIII (above) and XI (below). In addition, the low standard of the initial calibration for Method 8260B supports the reporting limit for the sample analyses.

XI. Performance Evaluation (PE) Samples/Accuracy Check

Eight zero blind PE samples (commonly known as laboratory control sample, LCS) were prepared and analyzed by the laboratory at 1 µg/L in support of the Method 8260B sample analyses in this data set. Two LCS samples were prepared and analyzed by the laboratory at 1 µg/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 acceptable (overall range, 73 – 142 %R for the Method 8260B analyses, and 93 – 120 %R for the Method 524.2 analyses), with the following exceptions in LCS samples analyzed for Method 8260B:

In the LCS analysis identified as LA101106LCS, o-xylene and styrene were recovered just below (79% R) the lower laboratory control limit (80% R). In LB101106LCS, chloromethane and bromomethane were recovered above (150% and 140% R, respectively) the upper laboratory control limits (130% R and 135% R, respectively). In LA101906LCS, bromomethane and chlorobenzene were recovered above (210% and 130% R, respectively), the upper laboratory control limits (135% R for bromomethane and 120% R for chlorobenzene). Almost half of the compounds in LB101906LCS were recovered above their upper laboratory control limits; however, no field samples were used for the validation from this analytical window, so no qualifications were necessary on the basis of the unacceptably high recoveries in this LCS.

On the basis of professional judgment, no results for o-xylene and styrene were qualified on the basis of recoveries just below the laboratory limit but above the Region 1 lower limit recovery (60% R), in LA101106LCS. Since chloromethane, bromomethane, and chlorobenzene were recovered above the upper laboratory control limits, and these compounds were not detected in any associated field samples, no qualifications were necessary on the basis of their high recoveries in one or more of the LCS analyses.

No laboratory control sample duplicates (LCSD) were analyzed with this data set, so laboratory precision could not be evaluated.

XII. Target Compound Identification

Reported target compounds were correctly identified with supporting spectra present for all samples in these data packages, with the following exception:

At the request of the data validator, the laboratory investigated the qualitative identification of chloroethane in all standards, blanks, and samples in SDG Nos. BRES36 and WHEA12. Since chloroethane was not reported in any blanks or samples for SDG No. UNIF27, no revision was requested for that data package. As presented in the Case Narratives submitted with the revised data packages, the laboratory identified instrument contamination with sulfur dioxide, which elutes at a very similar retention time, and which shares a mass spectral base peak (m/z 64) with chloroethane. Based on the matrix spike analyses, in which the spiked chloroethane peak can be clearly distinguished from the broader sulfur dioxide peak, and on the distinctly different ratio of m/z 64 to m/z 66 in the two compounds, the original identification of chloroethane in blanks and samples in SDG Nos. BRES36 and WHEA12 was revised to Undetected (U) in all affected analyses.

In the process of revising these identifications, some manual integrations were performed in the CC standards and laboratory control samples which were also reported originally in SDG No. UNIF27. Since no revision was requested for UNIF27, slight differences in the reported areas and amounts for these laboratory control samples may be found; however, these differences are not significant enough to warrant further revision or qualification of any results in SDG No. UNIF27.

XIII. Compound Quantitation and Reported Quantitation Limits

Target compound quantitation and practical quantitation limits (PQLs) were accurately reported on the Form I summaries. Tetrachloroethene was detected above the calibration range in the original analyses of samples MW-102S, MW-101D, MW-3S, MW-Z, and MW-3D, and cis-1,2-dichloroethene was also detected above the calibration range in the original analyses of samples MW-101D 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 packages. Based on screen results, samples W-1 and MW-D were analyzed at an appropriate dilution to bring tetrachloroethene within the upper half of the calibration range; as per the FLCM, a more concentrated analysis was not required or performed for either sample.

Results for tetrachloroethene initially outside the calibration range in the original analyses of samples MW-102S, MW-101D, MW-3S, MW-Z, and MW-3D, and for cis-1,2-dichloroethene in the original analyses of samples MW-101D and MW-Z were rejected (R) and replaced with the acceptable concentrations from the corresponding diluted samples (MW-102SDL, MW-101DDL, MW-3SDL, MW-ZDL, and MW-3DDL).

Results for all other analytes in samples MW-102SDL, MW-101DDL, MW-3SDL, MW-ZDL, and MW-3DDL were rejected (R) because acceptable results for these compounds were taken from the original analyses (MW-102S, MW-101D, MW-3S, MW-Z, and MW-3D).

“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, with the exception of the sulfur dioxide contamination discussed in Section XII above.

XVI. Overall Evaluation of Data

Results for volatile organic compounds were determined to be valid as reported for all samples in SDG Nos. BRES36, UNIF27, and WHEA12, with the following exceptions:

- On the basis of the unacceptable %D in the associated CC standards, results for bromomethane in samples TB-7, FB-7, W-25, W-19, FB-2, TB-8, FB-8, SHIELDS, BRESSETT TAP, and WELL Z were qualified as estimated (UJ).

- On the basis of laboratory contamination, results for chloromethane in samples MW-103D, MW-104S, MW-104D, and MW-Z were qualified as less than the quantitation limit (U).

- On the basis of field contamination, results for tetrachloroethene in samples MW-25884, BMW-X, W-SEEP, SP-3, and SS-Z were qualified as less than the quantitation limit (U), and results for tetrachloroethene in samples MW-4S and SEEP-1A were qualified as less than the reported value (U).

- On the basis of recovery below the laboratory and Region 1 lower limits in the associated MSD

analysis, the result for acetone in MW-S2 was qualified as estimated (J).

- On the basis of recoveries below the laboratory and Region 1 acceptance criteria in the associated MS or MSD analyses, the result for tetrachloroethene in MW-4S was qualified as estimated (J).

- Results for tetrachloroethene initially outside the calibration range in the original analyses of samples MW-102S, MW-101D, MW-3S, MW-Z, and MW-3D, and for cis-1,2-dichloroethene in the original analyses of samples MW-101D and MW-Z were rejected (R) and replaced with the acceptable concentrations from the corresponding diluted samples (MW-102SDL, MW-101DDL, MW-3SDL, MW-ZDL, and MW-3DDL).

- Results for all other analytes in samples MW-102SDL, MW-101DDL, MW-3SDL, MW-ZDL, and MW-3DDL were rejected (R) because acceptable results for these compounds were taken from the original analyses (MW-102S, MW-101D, MW-3S, MW-Z, and MW-3D).

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

XVII. Documentation

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

- Internal chain of custody (ICOC) documents, as required by the FLCM, were not submitted with this data set.

Data presentation was acceptable, with the following observations:

- Sample MW-PL2 was logged in and reported as MW-PLZ; the validator has not changed this identifier.

- The initial submissions of SDG Nos. BRES36 and WHEA12 contained several serious flaws, which included use of an incorrect compound list, poor or no documentation of manual integrations, and apparent contamination of blanks and samples with chloroethane. At the request of the validator, full revisions of these two SDGs were submitted by the laboratory, and used for the validation. The original submissions should be discarded, and replaced with the revisions.

- The electronic data deliverable (EDD) submitted with SDG No. UNIF27 contains erroneous identifications of laboratory sample numbers 686715 and 686716. The correct identifications for these samples are TB-7 and PZ-101, respectively. All other information on the EDD associated with these samples is correct.

These issues do not directly affect the validity of the analytical data, but could be problematic if the results were to be used in a litigation situation.

DATA VALIDATION

FOR

UniFirst Project
Williamstown and Wheatley Sites
Williamstown and Brookfield, VT

ORGANIC ANALYSIS DATA
Selected Volatiles in Air Samples

Sample Delivery Group (SDG) No.
116780 and 116832

Chemical Analyses Performed by:

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FOR

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Data Validation Report by:

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November 25, 2006

References #2006-1020-001 and -1025-001
VOA Validation Report/116780 and 116832/dhg

EXECUTIVE SUMMARY

Phoenix Chemistry Services (Phoenix) has completed the validation of the method TO-14A/TO-15 (volatiles in air) analysis data prepared by Severn Trent Laboratories (STL Burlington) for 5 air samples, 2 field duplicates (FD), and 2 trip blanks (TB) from the UniFirst and Wheatley project sites in Williamstown and Brookfield, VT. The laboratory reported the data under Sample Delivery Group (SDG) No. 116780 and 116832, which was submitted as two data packages received by Phoenix on October 20 and 25, 2006, and which include the following samples:

Sample Identifier Number	Laboratory ID
686410	WHTLY1FLR
686411	WHTLYBSMT
686412	FD-1
686413	TB-1
686803	NORTH SIDE
686804	AS-3
686805	AS-4
686806	FD-2
686807	TB-2

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

The samples in this data set represent the sample collections from October 5 and 10, 2006 for the Williamstown Elementary School site and a private residence in Brookfield, VT. These samples were hand-delivered to the laboratory on the same day they were collected.

Results for volatile organic compounds in air were determined to be valid as reported for all samples in SDG Nos. 116780 and 116832.

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 part of the data packages for all future distributions of TO-14A/TO-15 (volatiles in air) analysis data.

INTRODUCTION

Analyses of selected volatiles in air samples were performed according to Method TO-14A/TO-15/TO-15 and in accordance with requirements in the Field/Laboratory Coordination Memorandum for Air Monitoring (FLCM), April 2, 2004. The target compound list was limited to the following compounds:

cis-1,2-Dichloroethene	Trichloroethene
trans-1,2-Dichloroethene	Tetrachloroethene

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

Phoenix's validation was performed in conformance with Tier III guidelines as defined by USEPA Region I. Data qualifiers are applied as necessary and appropriate. To the extent possible, 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-94/012, 2/94) 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 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.

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 in air analysis in SDG Nos. 116780 and 116832 were collected on October 5 and 20, 2006 for the October sampling round at the Williamstown Elementary School site (Williamstown, VT) and a private residence in Brookfield, VT. No samples from the Bressett site were collected. All analyses were performed within nine (9) days after sample collection, which is within the 30 day holding time defined in Method TO-15. The canisters were hand-delivered to the laboratory on the same day that the samples were collected.

The canister pressures on release from the laboratory were checked and documented in the data package; however, no measurement of pressure in the canisters upon receipt at the laboratory was recorded in the data package. It should be noted that the sampling canister for sample WHTLY1FLR reached atmospheric pressure during sample collection. Since no results were reported in this sample, there is no impact on the data quality.

Full supporting documentation of the air canister batch cleaning was not included in the data package for SDG No. 116780. Since the complete supporting documentation for the air canister batch cleaning reported in SDG No. 116832 also included 3 of the 4 cleaning batches from SDG No. 116780, only one batch (BFAB) is missing complete documentation.

II. GC/MS Instrument Performance Check (Tuning)

The samples for volatiles in air analysis from SDG Nos. 116780 and 116832 were analyzed on a single GC/MS system identified as instrument C. The tuning of this instrument was demonstrated with analysis of 4-bromofluorobenzene (BFB); tunes were analyzed for each shift (24-hour period) during which the samples or associated standards were analyzed. All three (3) BFB tunes were correctly calculated, within acceptance limits, and are reported accurately on the Form V summaries in the data package.

III. Initial Calibration (IC)

One IC (10/12/06) was performed on instrument C in support of the method TO-14/15 sample analyses reported in this data package. Documentation of all individual IC standards was present in the data package and relative response factor (RRF) as well as percent relative standard deviation (%RSD) values were correctly calculated and accurately reported on the Form VI summary. No target compounds were manually integrated in any of the initial calibration standards submitted with this data set.

A six-point (0.2, 0.5, 5, 10, 20, and 40 ppbv) calibration curve was used for the initial calibration. The raw data from a seventh point (15 ppbv) was included in the data package although it was not used in the IC. An independent calibration verification (ICV) standard was analyzed following the IC, as required by the FLCM. All compound recoveries in the ICV were acceptable.

All %RSDs for the IC were below the maximum limit (30%) specified by Region I, and all RRF's were above the 0.05 minimum technical criterion.

IV. Continuing Calibration (CC)

Two continuing calibration (CC) standards were run in support of the sample analyses reported in these data packages. 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. No target compounds were manually integrated in the continuing calibration standards submitted with this data set. All RRF values were above the 0.05 minimum criterion, and all %D results were below the maximum limit of 25% specified by Region I.

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.

V. Blanks

Results for two volatile air-matrix laboratory method blanks (MBs) were reported in association with this set of samples. No target analytes were detected in either MB.

Two trip blanks (TBs) were reported in this SDG. No target analytes were detected in either TB.

VI. Surrogate Compounds

Surrogate compounds are not used with this method.

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.

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

A matrix spike and matrix spike duplicate (MS/MSD) analysis was not requested nor performed with the samples in this data set.

IX. Field Duplicates

SDG Nos. 116780 and 116832 contained two field duplicate pairs. Sample FD-1 was identified as a field duplicate of WHTLY1FLR, and sample FD-2 was identified as a field duplicate of NORTH SIDE.

No target compounds were reported in either of the field duplicate pairs, so precision could not be evaluated in these field duplicate pairs.

X. Sensitivity Check

The air matrix MDL for Method TO014/15 submitted for this project was performed on 10/19/05, which is within one year prior to these analyses. All analytes in this study had calculated MDL's below the method quantitation limits.

XI. Performance Evaluation (PE) Samples/Accuracy Check

Two (1) zero blind PE samples (commonly known as a laboratory control sample, LCS) and two duplicates (LCSD) were prepared and analyzed by the laboratory at 10 ppbv in support of the ample analyses in this data set. All target analytes were spiked into the QC samples. Percent recoveries (%R) were correctly calculated for the spiked compounds, accurately reported on Form III summaries in the data packages, and were within established QC limits (70 - 130 %R) for all target analytes. Relative percent difference (RPD) values for the duplicate pairs were also within established QC limits (25 % RPD) for all target analytes.

No external single-blind PES sample was required or submitted with the samples in this data set.

XII. Target Compound Identification

Reported target compounds were correctly identified for all samples in this data set.

XIII. Compound Quantitation and Reported Quantitation Limits

Target compound quantitation and practical quantitation limits (PQLs) were accurately reported on the Form I summaries.

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 air samples 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 in air were determined to be valid as reported for all samples in SDG Nos. 116780 and 116832. However, it should be noted that the sampling canister for sample WHTLY1FLR reached atmospheric pressure during sample collection. Since no results were reported in this sample, there is no impact on the data quality.

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

XVII. Documentation

The chain-of-custody (COC) records were present and accurately completed for all reported samples, with the following exceptions:

- No Internal Chain of Custody (ICOC) records were submitted with SDG Nos. 116780 and 116832, as required by the Field/Laboratory Coordination Memorandum for Air Monitoring. The laboratory log-in document Form DC-1 indicates that ICOC records are not required; this is incorrect. The laboratory should be reminded at the time of sample delivery that ICOC records are required.

- Improper edits were noted on the field sampling sheet and the canister batch cleaning records. All corrections should be made by making a single line through the edit, adding the correct information, and recording the editor's initials and the date.

- Calibration records for the air sampling apparatus supplied by the laboratory were not included with this data set. These records are required by the Field/Laboratory Coordination Memorandum (FLCM).

- Full supporting documentation of the air canister batch cleaning was not included in the data package

for SDG No. 116780.

These issues do not directly affect the validity of the analytical data, but could be problematic if the results were to be used in a litigation situation.

This validation report should be considered part of the data packages for all future distributions of the TO-14A/TO-15 (volatiles in air) analysis data.