# 2008 ANNUAL MONITORING REPORT

for the

## WHEATLEY SITE
## BROOKFIELD, VERMONT

VT DEC Site #77-0087

January 28, 2009

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## 1.0 INTRODUCTION

The following *2008 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 monitoring conducted by WEM during 2008. 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 2008.

Monitoring of indoor air quality at two (2) locations inside the Moorcroft residence is typically conducted during the October monitoring event. This event did not occur in 2008, as Mr. Moorcroft did not respond to several calls prior to the sampling event and was not present at the time of sampling, so WEM was unable to access the sampling locations.

Monitoring is 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].

## 2.0 GROUNDWATER SAMPLING

Groundwater monitoring was conducted by WEM on October 3, 2008. 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 3, 2008, 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 3.26 to 17.62 ft below top-of-casing (ft btoc).

Using top-of-casing elevation data, the measurements were converted into groundwater elevations. Elevation data from October 2008 are shown with historical measurements in Table 1.1 in Appendix B. Compared to the previous round of measurements in October 2007, there were slight increases in groundwater elevations in the upper wells (MW-PL1 and MW-PL2), and slight decreases in the lower wells (MW-S1, MW-S2, and MW-S3). The 2008 groundwater elevations had decreased by an average of 0.29 ft compared to the 2007 results. The previously established rising trend in groundwater elevations at MW-S1 and MW-S2 appears to have now stabilized.

Groundwater elevations were also plotted to develop a groundwater elevation map (see Groundwater Elevation Map – October 2008 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 0.015 ft/ft, or 1.5%. In the lower meadow in the vicinity of wells MW-S1 and MW-S2, the groundwater flow direction is westerly, also toward the River. The 2008 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. Please note that due to dysfunctional pH probe on the water quality meter used during the October sampling event, pH data are not presented in Table 1.5.

All samples were delivered by WEM to TestAmerica Laboratory (TA) of South Burlington, Vermont (formerly Severn-Trent Laboratories, Inc) 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 [4]. 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. Based on a comparison to historical water quality parameters (2002-2007), the following observation can me made from the October 2008 data:

- **Dissolved oxygen** readings were all within the range of historical measurements with no anomalies or clear trends.
- **Specific conductance** readings were all within the range of historical measurements with no anomalies or clear trends.
- **pH** (no readings)
- **Turbidity** readings were all of a similar magnitude and range as measurements from 2006-2007, but significantly lower than the 2004-2005 values.
- **Redox (ORP)** readings were generally within the range of historical measurements with the exception of MW-PL1 and MW-PL2 which have been in a decreasing trend since 2005.

### 2.3.2 Analytical Results

The analytical results from October 2008 indicate the following:

- **MW-PL1**: the target compound PCE was reported at a concentration of 3.1 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") [6] 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 2005-2008 as compared to data from 1999-2004. It should be noted that PCE has <u>never</u> 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 <u>never</u> been reported in any monitoring well on this Site based on records dating back to 1997.

It should be mentioned that neither of the two non-target compounds that were reported in sample MW-S2 during October 2005 (toluene and acetone) were present in the 2008 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 2008 sampling event. A duplicate "MW-PLX" was collected in conjunction with MW-PL2. These samples were analyzed by TA using the same

method (EPA Method 8260B). Because no target compounds greater than 2 times the quantitation limit were detected in this sample pair, precision cold not be evaluated.

WEM also collected a trip blank (TB-4) and a field blank (FB-6) during the October 2008 sampling event. No target compounds were reported in either of these samples, indicating that were no spurious influences on sample quality.

## 2.4 Discussion of Data Validation

The laboratory data from the October 2008 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 [4], 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 3, 2008 (sample delivery group SDG No. WHEA14). There were some documentation and compliance issues noted for the sample group, but none that directly affected the validity of the data.

## 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 2009.

## 3.0 INDOOR AIR SAMPLING

Monitoring of indoor air quality at two (2) locations inside the Moorcroft residence is typically conducted during the October monitoring event. This event did not occur in 2008, as Mr. Moorcroft did not respond to several calls prior to the sampling event and was not present at the time of sampling, so WEM was unable to access the sampling locations.

Due to the occasional presence of chlorinated VOCs in the indoor air, WEM recommends continuing the air sampling program as specified in the Work Plan and FLCM-Air. The next sampling event is scheduled for October 2009.

## 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,* 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.

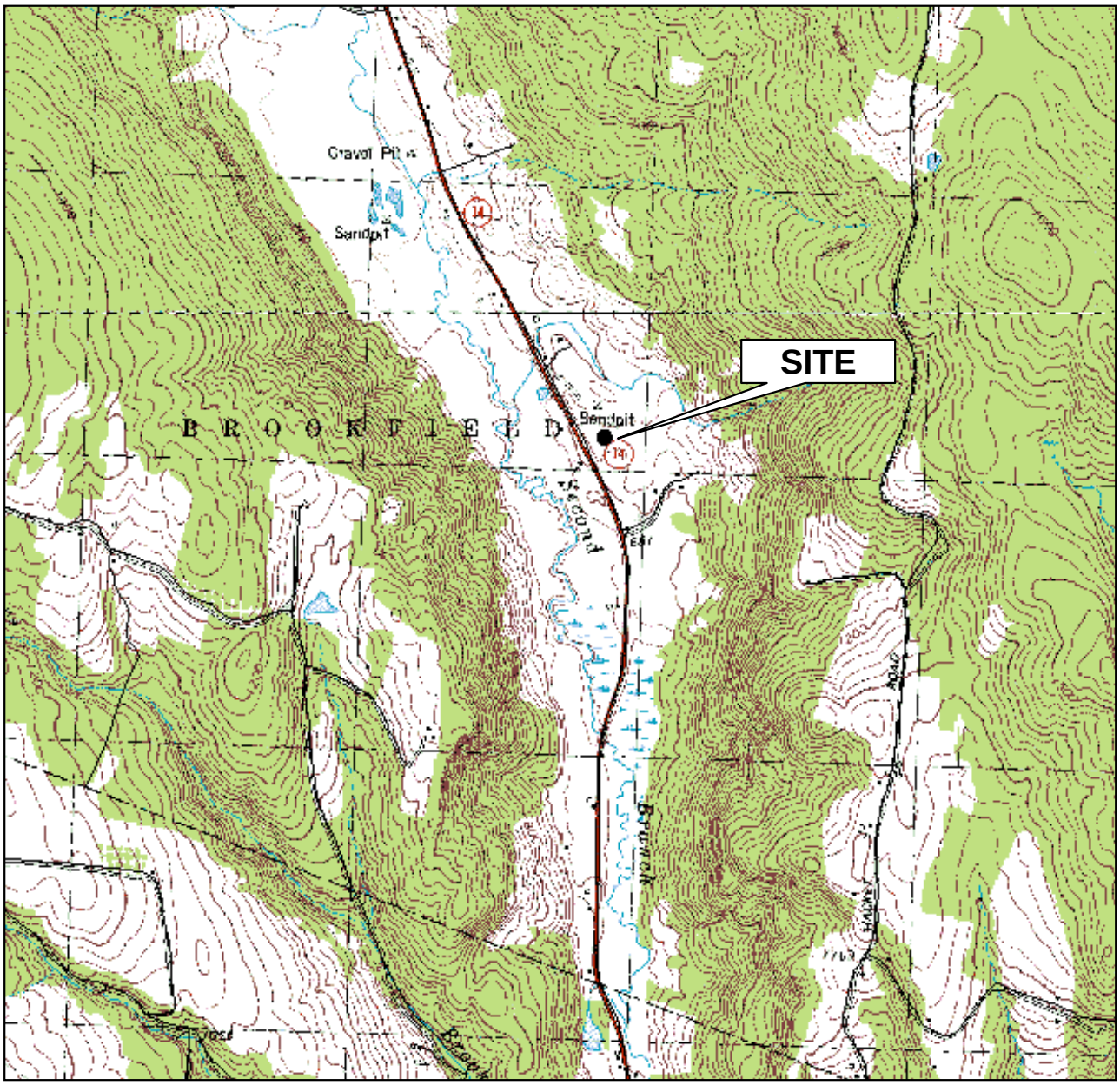
3. Phoenix Chemistry Services, *Field/Lab Coordination Memorandum for Air Monitoring, UniFirst Plant Site, Williamstown, Vermont, Wheatley Farm Site, Brookfield, Vermont, Bressett Site, Randolph, Vermont,* December 22, 2007.

4. 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. BRES42, UNIF33 , and WHEA14,* December 6, 2008.

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

# APPENDIX A:

## FIGURES




**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.*

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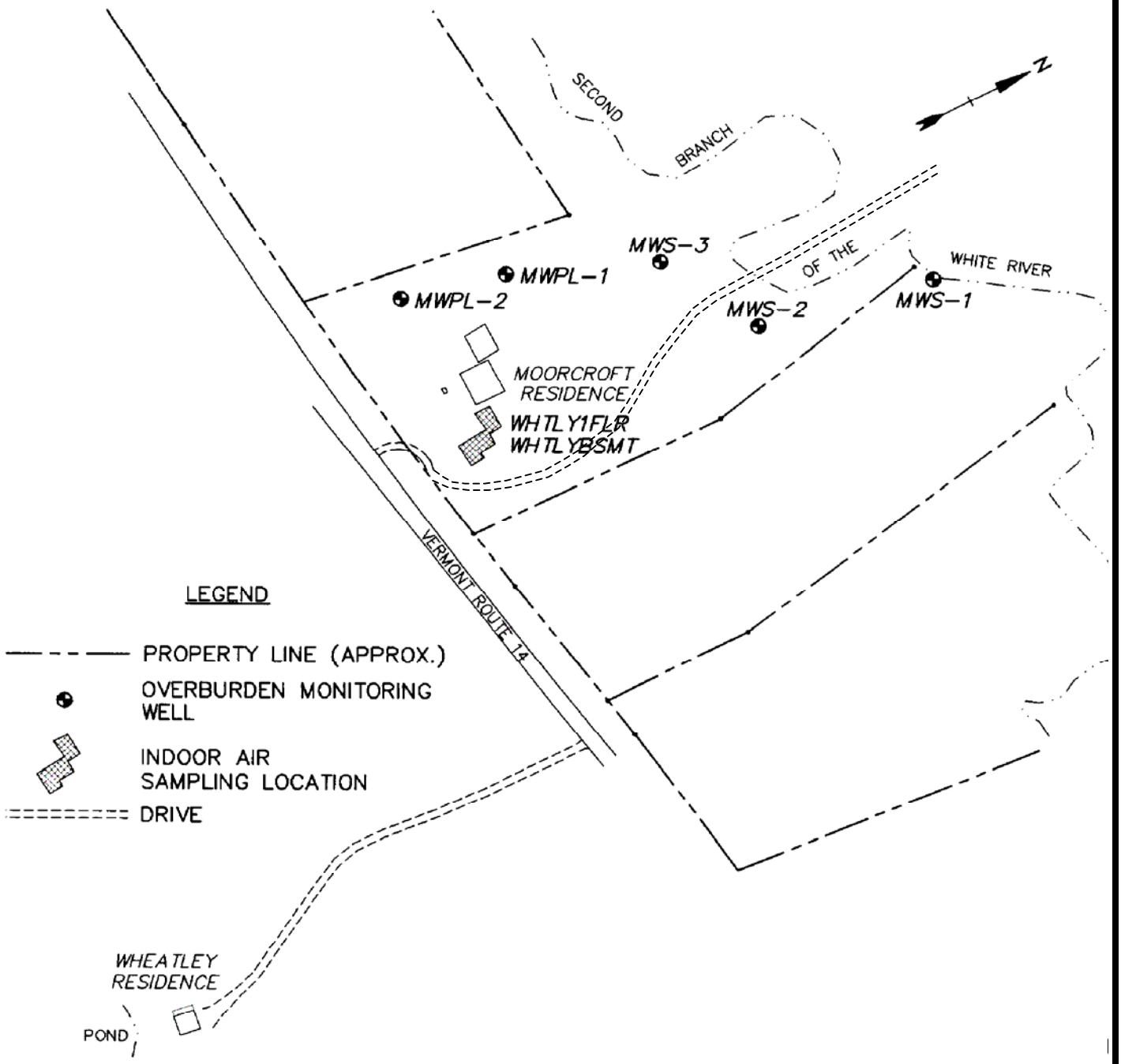
# SITE LOCATION MAP

**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

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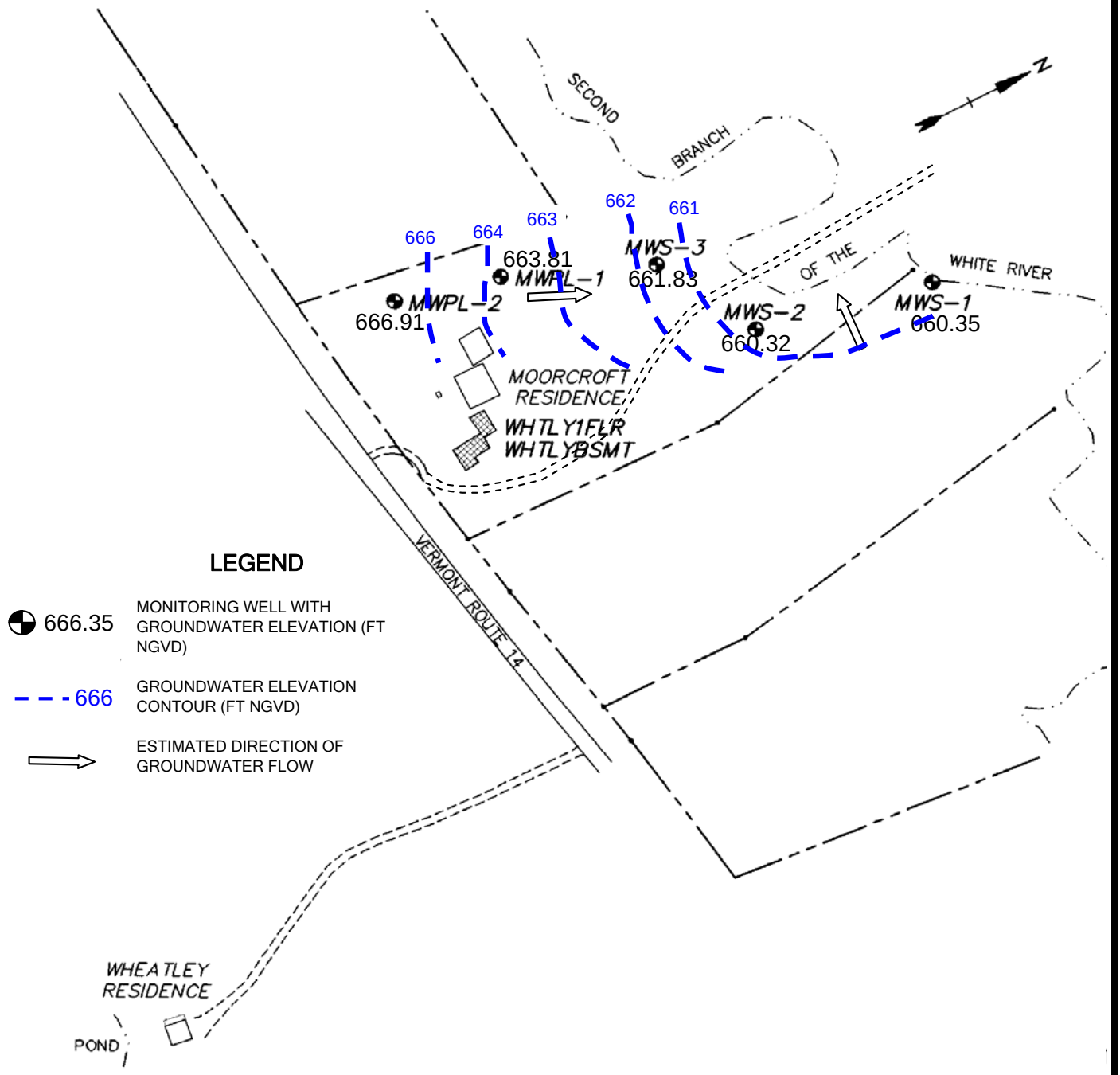
# SITE PLAN

**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-08**

**Wheatley Farm Site**

**Brookfield, Vermont**

| Date: 11/26/08 | Drawing No. | Scale: 1" = 200' | By: MEW |
|---|---|---|---|

# APPENDIX B:

## TABLES AND GRAPHS

WEM

**TABLE 1.1**
**Groundwater Elevation Measurements: 2003 - 2008**
**Wheatley Site, Brookfield, Vermont**

| Location | Type | Units | Oct-03 | Oct-04 | Oct-05 | Apr-06 | Oct-06 | Oct-07 | Oct-08 |
|---|---|---|---|---|---|---|---|---|---|
| MW-S1 | Monitoring Well | FT | NA | 659.95 | 660.74 | 660.77 | 661.89 | 662.07 | 660.35 |
| MW-S2 | Monitoring Well | FT | NA | 658.93 | 660.62 | 659.42 | 660.79 | 661.23 | 660.32 |
| MW-S3 | Monitoring Well | FT | 662.58 | 661.41 | 662.41 | 659.61 | 662.08 | 662.00 | 661.83 |
| MW-PL1 | Monitoring Well | FT | 663.70 | 663.06 | 663.87 | 663.99 | 663.56 | 663.88 | 663.81 |
| MW-PL2 | Monitoring Well | FT | 666.37 | 666.08 | 665.58 | 666.10 | 666.35 | 665.91 | 666.91 |

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 starting in 2004 collected by Waite Environmental Management.

WEM

**TABLE 1.2**
**Dissolved Oxygen Field Measurements: 2002 - 2008**
**Wheatley Site, Brookfield, Vermont**

| Location | Type | Units | Oct-02 | Apr-03 | Oct-03 | Apr-04 | Oct-04 | Oct-05 | Oct-06 | Oct-07 | Oct-08 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| MW-S1 | Monitoring Well | mg/L | 0.61 | NS | NA | NS | 3.33 | 0.48 | 0.29 | 0.00 | 0.00 |
| MW-S2 | Monitoring Well | mg/L | 9.00 | NS | 1.63 | NS | 0.34 | 0.00 | 0.42 | 0.00 | 1.51 |
| MW-S3 | Monitoring Well | mg/L | 0.40 | NS | 1.38 | NS | 0.36 | 0.04 | 0.19 | 0.00 | 0.00 |
| MW-PL1 | Monitoring Well | mg/L | 4.39 | NS | 4.06 | NS | 3.33 | 1.97 | 4.71 | 2.79 | 1.75 |
| MW-PL2 | Monitoring Well | mg/L | 10.61 | NS | 2.96 | NS | 7.47 | 12.76 | 13.41 | 10.67 | 8.17 |

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 starting in 2004 collected by Waite Environmental Management.

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**TABLE 1.3**
**Specific Conductance Field Measurements: 2002 - 2008**
**Wheatley Site, Brookfield, Vermont**

| Location | Type | Units | Oct-02 | Apr-03 | Oct-03 | Apr-04 | Oct-04 | Oct-05 | Oct-06 | Oct-07 | Oct-08 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| MW-S1 | Monitoring Well | us/cm | 248 | NS | NA | NS | 369 | 296 | 229 | 385 | 319 |
| MW-S2 | Monitoring Well | us/cm | 191 | NS | 210 | NS | 268 | 257 | 138 | 273 | 222 |
| MW-S3 | Monitoring Well | us/cm | 261 | NS | 257 | NS | 368 | 283 | 203 | 345 | 273 |
| MW-PL1 | Monitoring Well | us/cm | 348 | NS | 349 | NS | 498 | 391 | 292 | 509 | 448 |
| MW-PL2 | Monitoring Well | us/cm | 318 | NS | 287 | NS | 401 | 400 | 215 | 399 | 376 |

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 starting in 2004 collected by Waite Environmental Management.

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**TABLE 1.4**
**Temperature Field Measurements: 2002 - 2008**
**Wheatley Site, Brookfield, Vermont**

| Location | Type | Units | Oct-02 | Apr-03 | Oct-03 | Apr-04 | Oct-04 | Oct-05 | Oct-06 | Oct-07 | Oct-08 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| MW-S1 | Monitoring Well | deg C | 12.9 | NS | NA | NS | 16.1 | 13.6 | 15.1 | 11.8 | 15.3 |
| MW-S2 | Monitoring Well | deg C | 13.4 | NS | 12.0 | NS | 16.5 | 14.5 | 15.1 | 12.2 | 15.6 |
| MW-S3 | Monitoring Well | deg C | 8.8 | NS | 8.7 | NS | 10.9 | 11.2 | 11.8 | 10.2 | 11.3 |
| MW-PL1 | Monitoring Well | deg C | 9.9 | NS | 8.9 | NS | 11.1 | 10.7 | 10.9 | 9.8 | 10.1 |
| MW-PL2 | Monitoring Well | deg C | 9.9 | NS | 8.8 | NS | 10.7 | 11.0 | 10.8 | 10.0 | 10.7 |

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 starting in 2004 collected by Waite Environmental Management.

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**TABLE 1.5**
**pH Field Measurements: 2002 - 2008**
**Wheatley Site, Brookfield, Vermont**

| Location | Type | Units | Oct-02 | Apr-03 | Oct-03 | Apr-04 | Oct-04 | Oct-05 | Oct-06 | Oct-07 | Oct-08 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| MW-S1 | Monitoring Well | unitless | 6.60 | NS | NA | NS | 7.25 | 8.09 | 8.22 | 7.65 | NA |
| MW-S2 | Monitoring Well | unitless | 6.30 | NS | 6.25 | NS | 6.80 | 7.63 | 8.09 | 6.33 | NA |
| MW-S3 | Monitoring Well | unitless | 8.36 | NS | 8.24 | NS | 8.67 | 9.44 | 8.41 | 8.26 | NA |
| MW-PL1 | Monitoring Well | unitless | 7.66 | NS | 7.54 | NS | 8.06 | 8.69 | 7.72 | 7.56 | NA |
| MW-PL2 | Monitoring Well | unitless | 7.44 | NS | 7.09 | NS | 7.89 | 8.16 | 7.32 | 7.41 | NA |

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 starting in 2004 collected by Waite Environmental Management.

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**TABLE 1.6**
**Turbidity Field Measurements: 2002 - 2008**
**Wheatley Site, Brookfield, Vermont**

| Location | Type | Units | Oct-02 | Apr-03 | Oct-03 | Apr-04 | Oct-04 | Oct-05 | Oct-06 | Oct-07 | Oct-08 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| MW-S1 | Monitoring Well | NTU | 0.6 | NS | NA | NS | 183 | 89 | 21.2 | 18.1 | 71.2 |
| MW-S2 | Monitoring Well | NTU | 2.0 | NS | 2.0 | NS | 81 | 47 | 17.0 | 4.9 | 0.0 |
| MW-S3 | Monitoring Well | NTU | 0.5 | NS | 1.0 | NS | 53 | 21 | 0.0 | 1.5 | 2.9 |
| MW-PL1 | Monitoring Well | NTU | 2.3 | NS | 2.5 | NS | 108 | 95 | 0.0 | 0.0 | 0.0 |
| MW-PL2 | Monitoring Well | NTU | 4.5 | NS | 0.8 | NS | 126 | 178 | 0.0 | 0.0 | 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 starting in 2004 collected by Waite Environmental Management.

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**TABLE 1.7**
**Redox Potential Field Measurements: 2002 - 2008**
**Wheatley Site, Brookfield, Vermont**

| Location | Type | Units | Oct-02 | Apr-03 | Oct-03 | Apr-04 | Oct-04 | Oct-05 | Oct-06 | Oct-07 | Oct-08 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| MW-S1 | Monitoring Well | mV | -69 | NS | NA | NS | -72 | -99 | -159 | -216 | -182 |
| MW-S2 | Monitoring Well | mV | 12 | NS | -31 | NS | -43 | -134 | -123 | -103 | -50 |
| MW-S3 | Monitoring Well | mV | -179 | NS | -177 | NS | -220 | -214 | -168 | -183 | -205 |
| MW-PL1 | Monitoring Well | mV | 150 | NS | 137 | NS | 43 | 169 | 150 | 139 | 101 |
| MW-PL2 | Monitoring Well | mV | 176 | NS | 174 | NS | 128 | 190 | 162 | 150 | 112 |

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 starting in 2004 collected by Waite Environmental Management.

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**TABLE 2.0**
**MONITORING WELL RESULTS: 2003-2008**
**Wheatley Farm Site, Brookfield**

| Location | Parameter<br>Method 8260 | Groundwater Enforcement Standard | Units | Oct-03 | Oct-04 | Oct-05 | Apr-06 | Oct-06 | Oct-07 | Oct-08 |
|---|---|---|---|---|---|---|---|---|---|---|
| **MW-S1** | **PCE** | **5.0** | ug/L | NA | 1.0 U | 1.0 U | 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 | 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 | 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 | 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 | 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-S3** | **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-PL1** | **PCE** | **5.0** | ug/L | **1.2** | **1.6** | **1.1** | **2.8** | **2.5** | **2.1** | **3.1** |
| | **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-PL2** | **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 |

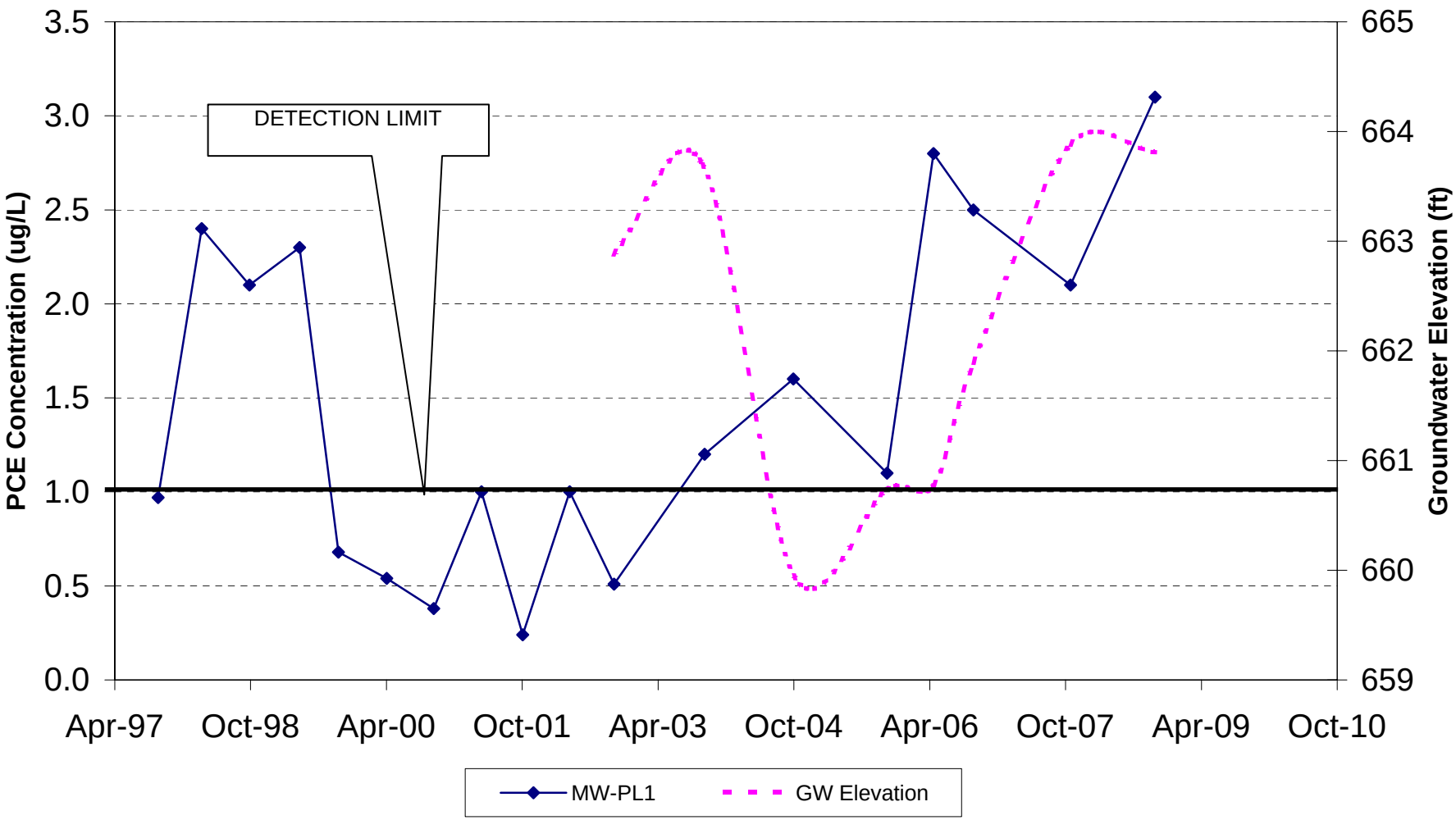
Notes:
- "PCE" = tetrachlorethene; "TCE" = tricholorethene; "DCE" = dichloroethene.
-"U" = not detected above listed quantitation limit; "J/J1" = reported concentration is an estimated value; "UJ" = reported quantitation limit is an estimated value; "J4" = values are estimated due to poor initial calibration 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 - 2007**
**Wheatley Farm Site, Brookfield, Vermont**

| Owner | Location | Parameter<br>Method T-014A | Guidance Level | Units | Jan-02 | Jul-02 | Oct-03 | Oct-04 | Oct-05 | Oct-06 | Oct-07 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Moorcroft | WHTLY1FLR | Tetrachloroethene | 1.0 | ppbv | **0.09** J | 0.5 U | NS | 0.5 U | 0.2 U | 0.2 U | 0.010 U |
| | | Trichloroethene | 1.0 | ppbv | 0.27 U | 0.5 U | NS | 0.5 U | 0.2 U | 0.2 U | **0.96** |
| | | cis-1,2-Dichloroethene | 9.3 | ppbv | 0.27 U | 0.5 U | NS | 0.5 U | 0.2 U | 0.2 U | 0.010 U |
| | | trans-1,2-Dichloroethene | 18.4 | ppbv | 0.27 U | 0.5 U | NS | 0.5 U | 0.2 U | 0.2 U | 0.010 U |
| | WHTLYBSMT | Tetrachloroethene | 1.0 | ppbv | 0.32 U | 0.5 U | NS | 0.5 U | 0.2 U | 0.2 U | 0.010 U |
| | | Trichloroethene | 1.0 | ppbv | 0.32 U | 0.5 U | NS | 0.5 U | 0.2 U | 0.2 U | 0.010 U |
| | | cis-1,2-Dichloroethene | 9.3 | ppbv | 0.32 U | 0.5 U | NS | 0.5 U | 0.2 U | 0.2 U | 0.010 U |
| | | trans-1,2-Dichloroethene | 18.4 | ppbv | 0.32 U | 0.5 U | NS | 0.5 U | 0.2 U | 0.2 U | 0.010 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).




Note:
1) Concentrations shown below the detection limit are estimated (J).

# APPENDIX C:

## FIELD DATA SHEETS

**WEM** Waite Environmental Management, LLC.

# UNIFIRST
# FIELD WATER COLLECTION SHEET

| | | | |
|---|---|---|---|
| SAMPLING LOCATION | MW-PL2 | Pump Intake Depth | 19.4 |
| Date | 10/3/08 | Pump Type | peri |
| Sampler | MC | Well Diameter | 2/4 |
| Weather | sh & cold | Well Depth | 20.4 |
| Water Type | (gw) sw supply | Initial Depth to Water | 17.62 |
| 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. (s/cm) | pH | ORP (mv) | DO (mg/L) | Turbidity (NTU) | | Notes |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | within 3% | within 3% | 1 pH unit | 10 mv | within 10% | within 10% | | |
| 0933 | 17.62 | 200 | | | | | | | | begin |
| 0937 | 17.76 | 200 | 10.65 | 392 | — | 109 | 8.09 | 36.2 | | |
| 0941 | 17.78 | 200 | 10.67 | 384 | — | 110 | 8.07 | 5.1 | | |
| 0945 | 17.78 | 200 | 10.67 | 379 | — | 112 | 8.24 | 0.0 | | |
| 0949 | 17.78 | 200 | 10.67 | 376 | — | 112 | 8.17 | 0.0 | | complete |

| SAMPLE COLLECTION | Purge Volume | Temp. | Specific Cond. | pH | ORP | DO | Turbidity | | |
|---|---|---|---|---|---|---|---|---|---|
| Final Measurements: | 3000 | 10.67 | 376 | — | 112 | 8.17 | 0.0 | | |

| Sample Description | Label | Type Container | # Container | Preservative | Analysis Method | Collection Time | COC # |
|---|---|---|---|---|---|---|---|
| Sample | MW-PL2 | VOA | 3 | HCl | 8260B | 0950 | |
| *As Required:* | | | | | | | |
| Field Duplicate | MW PL4 | " | " | " | " | "0900" | |
| Field Blank | | | | | | | |
| MS/MSD | | | | | | | |

General Notes: added trip blank TB-4 to cooler

WEM Project #110320012

VT DEC Site #

**WEM** Waite Environmental Management, LLC.

# UNIFIRST
# FIELD WATER COLLECTION SHEET



| | | | |
|---|---|---|---|
| SAMPLING LOCATION | MW-PL1 | Pump Intake Depth | 16.0 |
| Date | 10/3/08 | Pump Type | peri |
| Sampler | ML | Well Diameter | 3/4 |
| Weather | SL 1 cold | Well Depth | 17.32 |
| Water Type | (gw) sw supply | Initial Depth to Water | 12.70 |
| 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. (s/cm) | pH | ORP (mv) | DO (mg/L) | Turbidity (NTU) | | Notes |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | within 3% | within 3% | 1 pH unit | 10 mv | within 10% | within 10% | | |
| 1012 | 12.70 | 250 | | | | | | | | began |
| 1015 | 12.73 | 250 | 9.98 | 446 | — | 110 | 2.70 | 0.0 | | |
| 1018 | 12.75 | 250 | 9.99 | 447 | — | 107 | 1.94 | 0.0 | | |
| 1021 | 12.75 | 250 | 10.02 | 448 | — | 105 | 1.85 | 0.0 | | |
| 1025 | 12.75 | 250 | 10.07 | 448 | — | 104 | 1.78 | 0.0 | | |
| 1028 | 12.75 | 250 | 10.08 | 448 | — | 102 | 1.75 | 0.0 | | |
| 1032 | 12.75 | 250 | 10.08 | 448 | — | 101 | 1.75 | 0.0 | | complete |

| SAMPLE COLLECTION | Purge Volume | Temp. | Specific Cond. | pH | ORP | DO | Turbidity | | |
|---|---|---|---|---|---|---|---|---|---|
| Final Measurements: | 5000 ml | 10.08 | 448 | — | 101 | 1.75 | 0.0 | | |

| Sample Description | Label | Type Container | # Container | Preservative | Analysis Method | Collection Time | COC # | |
|---|---|---|---|---|---|---|---|---|
| Sample | MW-PL1 | VOA | 3 | HCl | 8260B | 1035 | | |
| *As Required:* | | | | | | | | |
| Field Duplicate | | | | | | | | |
| Field Blank | | | | | | | | |
| MS/MSD | | | | | | | | |

General Notes:

WEM Project #

VT DEC Site #

**WEM** Waite Environmental Management, LLC.

# UNIFIRST
# FIELD WATER COLLECTION SHEET

| | | | | | |
|---|---|---|---|---|---|
| SAMPLING LOCATION | MW-S3 | | | Pump Intake Depth | 19.4 |
| Date | 10/3/18 | | | Pump Type | peri. |
| Sampler | MW | | | Well Diameter | 3/4 |
| Weather | sh & cld | | | Well Depth | 19.8 |
| Water Type | GW | sw | supply | Initial Depth to Water | ~~3.06~~ 3.26 |
| 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. (µs/cm) | pH | ORP (mv) | DO (mg/L) | Turbidity (NTU) | | Notes |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | within 3% | within 3% | 1 pH unit | 10 mv | within 10% | within 10% | | |
| 1658 | 3.26 | 200 | | | | | | | | begin |
| 1100 | 6.40 | 206 | 11.50 | 283 | — | -177 | 0.76 | 14.8 | | |
| 1104 | 6.85 | 200 | 11.26 | 275 | — | -206 | 0.00 | 21.8 | | reduced rate |
| 1107 | 7.80 | 150 | 11.23 | 274 | — | -203 | 0.00 | 3.0 | | |
| 1110 | 7.15 | 150 | 11.40 | 273 | — | -204 | 0.00 | 8.4 | | |
| 1114 | 6.04 | 150 | 11.39 | 273 | — | -206 | 0.00 | 11.3 | | |
| 1118 | 6.08 | 150 | 11.33 | 273 | — | -205 | 0.00 | 2.9 | | complete |

**SAMPLE COLLECTION**

| | Purge Volume | Temp. | Specific Cond. | pH | ORP | DO | Turbidity | | |
|---|---|---|---|---|---|---|---|---|---|
| Final Measurements: | 3500 | 11.33 | 273 | — | -205 | 0.00 | 2.9 | | |

| Sample Description | Label | Type Container | # Container | Preservative | Analysis Method | Collection Time | COC # |
|---|---|---|---|---|---|---|---|
| Sample | MW-S3 | VOA | 3 | HCl | 8260B | 1120 | |
| *As Required:* | | | | | | | |
| Field Duplicate | | | | | | | |
| Field Blank | | | | | | | |
| MS/MSD | | | | | | | |

General Notes: well cap off - exposed to rainwater

WEM Project #110320012

VT DEC Site #

WEM Waite Environmental Management, LLC.

# UNIFIRST
# FIELD WATER COLLECTION SHEET



| | | | |
|---|---|---|---|
| SAMPLING LOCATION | MW-S1 | Pump Intake Depth | 9.8 |
| Date | 10/7/08 | Pump Type | peri |
| Sampler | ML | Well Diameter | 3/4 |
| Weather | sun & cold | Well Depth | 10.8 |
| Water Type | gw sw supply | Initial Depth to Water | 4.84 |
| 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% | | |
| 1152 | 4.84 | 100 | | | | | | | | begin |
| 1153 | 5.12 | 100 | 14.98 | 308 | — | -158 | 0.00 | 404 | | |
| 1155 | 5.14 | 100 | 15.11 | 313 | — | -160 | 0.00 | 191 | | |
| 1159 | 5.13 | 100 | 15.21 | 314 | — | -175 | 0.00 | 139 | | |
| 1202 | 5.13 | 100 | 15.27 | 316 | — | -182 | 0.00 | 98.0 | | |
| 1206 | 5.13 | 100 | 15.40 | 318 | — | -183 | 0.00 | 83.1 | | |
| 1209 | 5.13 | 100 | 15.23 | 320 | — | -182 | 0.00 | 60.8 | | |
| 1212 | 5.13 | 100 | 15.31 | 319 | — | -182 | 0.00 | 71.2 | | complete |

| SAMPLE COLLECTION | Purge Volume | Temp. | Specific Cond. | pH | ORP | DO | Turbidity | | |
|---|---|---|---|---|---|---|---|---|---|
| Final Measurements: | 2500 ml | 15.31 | 319 | — | -182 | 0.00 | 71.2 | | |

| Sample Description | Label | Type Container | # Container | Preservative | Analysis Method | Collection Time | COC # | |
|---|---|---|---|---|---|---|---|---|
| Sample | MW-S1 | VOA | 3 | HCl | 8260B | 1215 | | |
| *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-52 | Pump Intake Depth | 10.8 |
| Date | 10/3/08 | Pump Type | peri |
| Sampler | MC | Well Diameter | 3/4 |
| Weather | 82 & cold | Well Depth | 11.1 |
| Water Type | (gw) sw supply | Initial Depth to Water | 3.82 |
| 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. (µs/cm) | pH | ORP (mv) | DO (mg/L) | Turbidity (NTU) | | Notes |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | within 3% | within 3% | 1 pH unit | 10 mv | within 10% | within 10% | | |
| 1225 | 3.82 | 200 | | | | | | | | begin |
| 1228 | 4.01 | 200 | 15.08 | 222 | — | -61 | 2.30 | 123 | | |
| 1234 | 4.11 | 200 | 15.44 | 222 | — | -56 | 2.95 | 4.1 | | |
| 1238 | 4.12 | 200 | 15.58 | 223 | — | -50 | 1.45 | 0.0 | | |
| 1242 | 4.11 | 200 | 15.53 | 222 | — | -50 | 1.56 | 0.0 | | |
| 1246 | 4.12 | 200 | 15.56 | 222 | — | -49 | 1.41 | 0.0 | | |
| 1250 | 4.12 | 200 | 15.53 | 222 | — | -50 | 1.51 | 0.6 | | complete |

| SAMPLE COLLECTION | Purge Volume | Temp. | Specific Cond. | pH | ORP | DO | Turbidity | | |
|---|---|---|---|---|---|---|---|---|---|
| Final Measurements: | 5000 ml | 15.53 | 222 | — | -50 | 1.51 | 0.0 | | |

| Sample Description | Label | Type Container | # Container | Preservative | Analysis Method | Collection Time | COC # | |
|---|---|---|---|---|---|---|---|---|
| Sample | MW-52 | VOA | 3 | HCl | 8260 | ~~1355~~ | 1255 | |
| *As Required:* | | | | | | | | |
| Field Duplicate | FB-6 | VOA | 2 | HCl | " | ~~1405~~ | 1305 | TA metal |
| Field Blank | | | | | | | | |
| MS/MSD | MW-52 | VOA | 4 | " | " | ~~1255~~ | 1255 | |

General Notes:

WEM Project #110320012

VT DEC Site #

# APPENDIX D:

## DATA VALIDATION REPORT

# DATA VALIDATION

**FOR**

**UniFirst Project**
**Bressett and UniFirst Sites**
**Randolph and Williamstown, VT**

**ORGANIC ANALYSIS DATA**
**Volatile Organics in Water Samples**

**Sample Delivery Group Nos. BRES42, UNIF33, and WHEA14**

**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**

**December 6, 2008**

**Reference #s 2008-1102-001, -1104 -001, & -1105-001**
**VOA Validation Report/BRES42_UNIF33_WHEA14/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 41 groundwater samples, 11 potable water samples, 1 performance evaluation (PE) sample, 6 field blanks (FB), and 4 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. BRES42, UNIF33, and WHEA14, which were submitted as three data packages received by Phoenix on November 2, 4, and 5, 2008, and a revision received on December 5, 2008. These SDGs include the following samples:

| Sample Identifier | Laboratory ID |
|---|---|
| *Method 8260B* | |
| *SDG No. BRES42* | |
| MW-103D | 769922 |
| MW-104S | 769923 |
| MW-104D | 769924 |
| MW-102D | 769925 |
| MW-102S | 769926 |
| MW-101S | 769927 |
| MW-101D | 769928 |
| MW-4S | 769929 |
| MW-4D | 769930 |
| MW-3S | 769931 |
| MW-3D (logged in as ME-3D) | 769932 |
| FB-1 | 769933 |
| TB-1 | 769934 |
| MW-Z | 769935 |
| BRW-3 | 769936 |
| BRW-2 | 769937 |
| BRW-1 | 769938 |
| MW-Y | 769939 |
| MW-25884 | 769940 |
| FB-2 | 769941 |
| *SDG No. UNIF33* | |
| SS-2 | 770107 |
| SS-Z | 770108 |
| W-SEEP | 770109 |
| SEEP-1A | 770110 |
| SS-5 | 770111 |
| SP-4 | 770112 |
| SP-3 | 770113 |
| TB-3 | 770323 |
| PZ-101 | 770324 |
| PZ-102 | 770325 |
| W-25 | 770326 |

| Sample Identifier | Laboratory ID |
|---|---|
| MW-50 | 770327 |
| W-19 | 770328 |
| W-20 | 770329 |
| MW-E | 770330 |
| MW-C | 770331 |
| W-1 | 770332 |
| MW-D | 770333 |
| FB-5 | 770334 |
| W-Z | 770335 |
| *SDG No. WHEA14* | |
| TB-4 | 770513 |
| MW-PLX | 770514 |
| MW-PL2 | 770515 |
| MW-PL1 | 770516 |
| MW-S3 | 770517 |
| MW-S1 | 770518 |
| MW-S2 | 770519 |
| FB-6 | 770520 |
| *Method 524.2* | |
| *SDG No. BRES42* | |
| TB-2 | 770092 |
| KITCHEN TAP | 770093 |
| PRE-FILTER | 770094 |
| SHIELDS | 770095 |
| FB-3 | 770096 |
| WELL Z | 770097 |
| *SDG No. UNIF33* | |
| FB-4 | 770104 |
| WP-13 | 770101 |
| WP-20 | 770102 |
| WP-3 | 770103 |
| WP-5 | 770098 |
| WP-7 | 770099 |
| WP-8 | 770100 |
| WP-Z | 770105 |

A cross-reference table of sample IDs was provided in the data packages. The sample identified on the Chain of Custody as “MW-3D” was incorrectly logged in as “ME-3D”; for the sake of consistency with historical data, and at the request of the sampler, the laboratory identifier was corrected by the validator on the Form 1s and in the Data Summary Forms.

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

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

3SDL, MW-3DDL, MW-ZDL, MW-DDL, and W-ZDL).

- Results for cis-1,2-dichloroethene, and results for total 1,2-dichloroethene based on the cis-isomer, in the original analysis of sample MW-101D were rejected (R) and replaced with the acceptable concentrations from the corresponding diluted sample (MW-101DDL).

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

- The laboratory applied "E" and "D" qualifiers to the sample Form I's as appropriate. 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. BRES42, UNIF33, and WHEA14 were collected on September 29-30, and October 1-3, 2008. 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 2.4, 0.2, 3.1, and 3.2$^{o}$C, which are within the acceptable range of 4 $^{o}$C ±2$^{o}$C, with the exception of the cooler at 0.2$^{o}$ C. Since no ice was observed in the samples in this cooler, no qualifications were necessary on the basis of the slightly low cooler temperature.

### 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 nine (9) 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 (10/8/08) was performed on instrument M in support of the Method 8260B sample analyses and one IC (10/9/08) 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.

One target compound was manually integrated in the IC performed on instrument M. The manual integration appears to be correctly performed, is initialed by the analyst, and is 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. All RRF's were above the 0.05 minimum technical criterion, with the following exceptions:

| Instrument | IC | Average RRF | |
|---|---|---|---|
| | | acetone | 2-butanone |
| M (8260B) | 10/8/08 | 0.035 | 0.022 |
| L (524.2) | 10/9/07 | 0.044 | 0.021 |

Pursuant to the Region I validation document, results for acetone and 2-butanone in all samples in this data set 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 recoveries in the submitted ICVs were within (88 - 119 % recovery overall) laboratory established control limits (75 – 125 % recovery for Method 8260B and 70 – 130 % recovery for Method 524.2).

## 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.

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) | 10/9/08 08:29 | 0.035 | 0.021 |
| | 10/9/08 19:19 | 0.036 | 0.021 |
| | 10/10/08 08:23 | 0.035 | 0.023 |
| | 10/13/08 09:20 | 0.039 | 0.021 |
| | 10/13/08 20:49 | 0.035 | 0.020 |
| L (524.2) | 10/9/08 19:33 | 0.040 | 0.021 |
| | 10/10/08 09:10 | 0.046 | 0.020 |

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.

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 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.

Four trip blanks (TBs) were reported in these SDGs. No target analytes were detected in any TB.

Six field blanks (FBs) were reported in these SDGs. No target analytes were detected in any FB.

Three holding (storage) blanks (HBs) were reported in these SDGs; each HB was analyzed by both methods. No target analytes were detected in any HB.

## VI. Surrogate Compounds

Percent recoveries (%R) for all four 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. No Form II summaries were submitted with the Method 524.2 analyses. The surrogates are incorrectly included on the Form VIII summaries for internal standards; however the acceptance criteria for surrogates are not the same as for internal standards. The missing forms were requested from the laboratory, and were received on December 5, 2008. All surrogate recoveries were acceptable.

## 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. The surrogate standards were incorrectly included on the summary forms; corrected forms were requested from the laboratory and were received on December 5, 2008.

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

Samples MW-4S and W-1 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 80 – 140 %R; overall laboratory-derived control limits: 60 – 145 %R; Region 1 limits 60 – 140 %R) and reproducible (RPD range 0-30%; limit 30% RPD), with the following exceptions:

| Parent Sample | Analyte | % R (MS) | % R (MSD) | Laboratory Limits (%R) | % RPD |
|---|---|---|---|---|---|
| MW-4S | vinyl chloride | | 130 | 70 - 125 | |
| | 1,1-dichloroethene | 120 | | 80 - 115 | |
| | 2-butanone | 66 | 68 | 70 - 125 | |
| | 4-methyl-2-pentanone | 74 | | 75 – 125 | |
| | tetrachloroethene | 70 | | 80 - 115 | |
| W-1 | chloroethane | | | 75 - 135 | 35 |
| | 1,1-dichloroethene | | 120 | 80 - 115 | |
| | acetone | | 146 | 60 - 140 | |
| | tetrachloroethene | 300 | 300 | 80 - 115 | |

Since vinyl chloride, chloroethane, and 1,1-dichloroethene were not detected in samples MW-4S and W-1, results for these compounds do not warrant qualification on the basis of the recoveries above the laboratory-established upper limits in the associated MS or MSD analyses. On the basis of the recoveries of 2-butanone, 4-methyl-2-pentanone, and tetrachloroethene below the laboratory-established lower control limits but above the Region I lower limit, no results in MW-4S warranted qualification on the basis of the low recoveries 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 high recoveries in the associated MS and MSD analyses.

On the basis of recoveries below the lower laboratory limits but above Region 1 lower control limit, results for 2-butanone, 4-methyl-2-pentanone, and tetrachloroethene did not warrant qualification on the basis of the unacceptably low recoveries in the associated MS and MSD analyses of sample MW-4S.

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).

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. BRES42, UNIF33, and WHEA14 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-3D | MW-Z |
| MW-D | W-Z |
| W-SEEP | SS-Z |
| MW-PL2 | MW-PLX |
| MW-25884 | MW-Y |
| Potable Water | |
| SHIELDS | WELL-Z |
| WP-3 | WP-Z |

Precision in the field duplicate pairs MW-3D and MW-Z, and MW-D and W-Z was acceptable (less than 30 % RPD) for all target analytes greater than 2 times the quantitation limit. 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.

## X. Sensitivity Check

The aqueous MDL for Method 8260B submitted for this project was begun on 11/7/07 and the MDL verification studies were completed on 11/21/07, which is less than one year prior to the analyses of these samples. All analytes had calculated, verified MDLs below the method quantitation limits in both MDL studies.

The aqueous MDL for Method 524.2 submitted for this project was begun on 9/23/07 and the MDL verification studies were completed on 10/26/07, which is just less than one year prior to the analysis of these samples. All analytes had calculated, 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. 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, and 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 for the LCS and LCSD pairs analyzed on 10/8/08, 10/9/08, and 10/13/08, with the following exceptions:

| LCS/LCSD ID | Analyte | % R (LCS) | % R (LCSD) | Laboratory Limits (%R) | % RPD |
|---|---|---|---|---|---|
| MA100908 | vinyl chloride | 130 | 130 | 70 - 125 | |
| | bromomethane | 170 | | 65 - 145 | 34 |
| | 1,1-dichloroethene | 120 | 120 | 80 - 115 | |
| | acetone | | 146 | 60 - 140 | |
| | trans-1,2-dichloroethene | | 120 | 80 - 115 | |
| | trichloroethene | | 120 | 80 - 115 | |
| | tetrachloroethene | | 120 | 80 - 115 | |
| MB100908 | vinyl chloride | 140 | | 70 - 125 | |
| | chloroethane | 150 | | 75 - 135 | |
| | 1,1-dichloroethene | 130 | 120 | 80 - 115 | |
| | methylene chloride | 130 | | 80 - 115 | |
| | trans-1,2-dichloroethene | 130 | | 80 - 115 | |
| | 1,2-dichloroethene (total) | 125 | | 80 - 115 | |
| | cis-1,2-dichloroethene | 120 | | 70 - 125 | |
| | toluene | 120 | | 80 - 115 | |
| | trans-1,3-dichloropropene | 120 | | 80 - 115 | |
| | tetrachloroethene | 120 | | 80 - 115 | |
| MA101008 | chloromethane | | 130 | 70 - 125 | |
| | vinyl chloride | 140 | 140 | 70 - 125 | |
| | chloroethane | 140 | 150 | 75 - 135 | |

| LCS/LCSD ID | Analyte | % R (LCS) | % R (LCSD) | Laboratory Limits (%R) | % RPD |
|---|---|---|---|---|---|
| MA101008 | 1,1-dichloroethene | 120 | 130 | 80 - 115 | |
| | methylene chloride | | 120 | 80 - 115 | |
| | trans-1,2-dichloroethene | | 130 | 80 - 115 | |
| | 1,2-dichloroethene (total) | | 125 | 80 - 115 | |
| | 1,1-dichloroethane | | 120 | 80 - 115 | |
| | cis-1,2-dichloroethene | 120 | 120 | 80 - 115 | |
| | 1,1,1-trichloroethane | 120 | 120 | 80 - 115 | |
| | carbon tetrachloride | | 120 | 80 - 115 | |
| | benzene | | 120 | 80 - 115 | |
| | 1,2-dichloroethane | | 120 | 80 - 115 | |
| | trichloroethene | 120 | 120 | 80 - 115 | |
| | 1,2-dichloropropane | | 120 | 80 - 115 | |
| | bromodichloromethane | | 120 | 80 - 115 | |
| | cis-1,3-dichloropropene | | 120 | 80 - 115 | |
| | toluene | 120 | 120 | 80 - 115 | |
| | trans-1,3-dichloropropene | | 120 | 80 - 115 | |
| | 1,1,2-trichloroethane | 120 | 120 | 80 - 115 | |
| | tetrachloroethene | 120 | 130 | 80 - 115 | |
| | ethylbenzene | | 120 | 80 - 115 | |
| MB101008 | chloromethane | 130 | | 70 - 125 | |
| | 1,1-dichloroethene | 140 | 120 | 80 - 115 | |
| | methylene chloride | 120 | | 80 - 115 | |
| | trans-1,2-dichloroethene | 120 | | 80 - 115 | |
| | 1,2-dichloroethene (total) | 125 | | 80 - 115 | |
| | 1,1-dichloroethane | 120 | | 80 - 115 | |
| | cis-1,2-dichloroethene | 130 | | 80 - 115 | |
| | trichloroethene | 120 | 120 | 80 - 115 | |
| | cis-1,3-dichloropropene | 120 | | 80 - 115 | |
| MA101308 | vinyl chloride | | | | 32 |
| | chloromethane | | 130 | 70 - 125 | |
| | 1,1-dichloroethene | 120 | 120 | 80 - 115 | |
| | methylene chloride | | 120 | 80 - 115 | |
| | trans-1,2-dichloroethene | 120 | 130 | 80 - 115 | |
| | 1,2-dichloroethene (total) | 120 | 125 | 80 - 115 | |
| | 1,1-dichloroethane | | 120 | 80 - 115 | |
| | cis-1,2-dichloroethene | 120 | 130 | 80 - 115 | |
| | 2-butanone | 126 | | 70 - 125 | |
| | chloroform | | 120 | 80 - 115 | |
| | benzene | | 120 | 80 - 115 | |
| | 1,2-dichloroethane | | 130 | 80 - 115 | |
| | Trichloroethene | | 120 | 80 - 115 | |
| | 1,2-dichloropropane | | 120 | 80 - 115 | |
| | bromodichloromethane | | 120 | 80 - 115 | |
| | cis-1,3-dichloropropene | | 120 | 80 - 115 | |
| | toluene | | 120 | 80 - 115 | |
| | trans-1,3-dichloropropene | | 120 | 80 - 115 | |

| LCS/LCSD ID | Analyte | % R (LCS) | % R (LCSD) | Laboratory Limits (%R) | % RPD |
|---|---|---|---|---|---|
| MA101308 | 1,1,2-trichloroethane | | 120 | 80 - 115 | |
| | tetrachloroethene | | 120 | 80 - 115 | |
| MB101308 | chloroethane | | 150 | 75 - 135 | 31 |
| | 1,1-dichloroethene | 120 | | 80 - 115 | |
| | trans-1,2-dichloroethene | 120 | | 80 - 115 | |
| | trichloroethene | 120 | | 80 - 115 | |
| | 1,1,2-trichloroethane | | 120 | 80 - 115 | |

Unacceptably high recoveries were found in all LCS/LCSD pairs analyzed for Method 8260B, ranging from a few analytes to more than half; no reanalysis was performed. 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.

The following analytes were found above both laboratory and Region I upper control limits in the indicated LCS or LCSD analyses:

| LCS/LCSD ID | Analyte | % R (LCS) | % R (LCSD) | Laboratory Limits (%R) | Region I Limits (%R) |
|---|---|---|---|---|---|
| MA100908 | bromomethane | 170 | | 65 - 145 | 60 - 140 |
| | acetone | | 146 | 60 - 140 | 60 - 140 |
| MB100908 | chloroethane | 150 | | 75 - 135 | 60 - 140 |
| MA101008 | vinyl chloride | | 140 | 70 - 125 | 60 - 140 |
| | chloroethane | | 150 | 75 - 135 | 60 - 140 |
| MB101308 | chloroethane | | 150 | 75 - 135 | 60 - 140 |

Since vinyl chloride, bromomethane, chloroethane, and acetone were not detected in associated field samples, no results warranted qualification on the basis of recoveries of these compounds above both laboratory and Region 1 upper control limits in the associated LCS or LCSD analyses.

Reproducibility between all Method 8260B LCS and LCSD pairs was acceptable (0 – 26 % RPD), with the exceptions of bromomethane (34 %RPD) in the LCS/LCSD pair identified as MA100908LCS and MA100908LCSD and vinyl chloride (32 %RPD)in the LCS/LCSD pair identified as MA101308LCS and MA101308LCSD. On the basis of professional judgment, no results for bromomethane and vinyl chloride in field sample analyses warranted qualification on the basis of the unacceptable laboratory precision in the associated LCS and LCSD pairs analyzed in the first analytical windows on 10/9/08 and 10/13/08, respectively.

Two 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 – 126 %R) laboratory established control limits (70 – 130 %R),

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).

An acceptance range for the combined m- & p-xylene isomers was not established by the vendor; however, the total xylenes result was well within its acceptance range.

## 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. Tetrachloroethene was detected above the calibration range in the original analyses of samples MW-102S, MW-101D, MW-3S, MW-3D, MW-Z, MW-D, and W-Z, and cis-1,2-dichloroethene was detected above the calibration range in the original analysis of MW-101D; 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-102S, MW-101D, MW-3S, MW-3D, MW-Z, MW-D, and W-Z were rejected (R) and replaced with the acceptable concentrations from the corresponding diluted samples (MW-102SDL, MW-101DDL, MW-3SDL, MW-3DDL, MW-ZDL, MW-DDL, and W-ZDL). Results for cis-1,2-dichloroethene initially outside the calibration range, and results for total 1,2-dichloroethene based on the cis- isomer, in the original analysis of sample MW-101D were rejected (R) and replaced with the acceptable concentrations from the corresponding diluted sample (MW-101DDL).

Results for all other analytes in samples MW-102SDL, MW-101DDL, MW-3SDL, MW-3DDL, MW-ZDL, MW-DDL, and W-ZDL were rejected (R) because acceptable results for these compounds were taken from the original analyses (MW-102S, MW-101D, MW-3S, MW-3D, MW-Z, MW-D, and W-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. BRES39 and UNIF30, with the following exceptions:

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

- Results for cis-1,2-dichloroethene initially outside the calibration range, and results for total 1,2-dichloroethene based on the cis- isomer, in the original analysis of sample MW-101D were rejected (R) and replaced with the acceptable concentrations from the corresponding diluted sample (MW-101DDL).

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

- Improper edits were noted on some of the instrument run logs. 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.

- Sample MW-3D was listed on the COC but was incorrectly logged in as ME-3D. For the sake of consistency with historical data, and at the request of the sampler, the laboratory identifier was corrected by the validator on the Form 1s and in the Data Summary Forms.

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 presentation was acceptable, with the following observations:

- The Form II summaries of surrogate recoveries were not submitted with the Method 524.2 sample analyses. These forms were requested from the laboratory, and were received on December 5, 2008.

- 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 were requested from the laboratory, and were received on December 5, 2008.

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.