

Waite - Heindel  
Environmental Management

March 19, 2014

Mr. Gerold Noyes, P.E.  
Vermont Department of Environmental Conservation  
Waste Management Division  
1 National Life Drive – Davis 1  
Montpelier, VT 05620-3704

RE: 2013 Annual Monitoring Report  
Wheatley Site, Brookfield, Vermont (Site #94-1693)

Dear Gerold:

Waite-Heindel Environmental Management (WHEM) is pleased to present the *2013 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 2013 (4<sup>th</sup> 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 contact us if you have any questions about the report or the work conducted. Please contact Christopher Page at [cpage@waiteenv.com](mailto:cpage@waiteenv.com) or myself at [mwaite@waiteenv.com](mailto:mwaite@waiteenv.com).

Sincerely,

A handwritten signature in black ink that reads 'Miles E. Waite'.

Miles E. Waite, Ph.D., P.G.  
Senior Hydrogeologist

A handwritten signature in black ink that reads 'Chris Page'.

Christopher M. Page  
Staff Scientist

Enclosure

# **2013 ANNUAL MONITORING REPORT**

for the

## **WHEATLEY SITE BROOKFIELD, VERMONT**

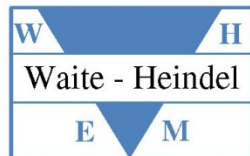
VT DEC Site #77-0087

March 19, 2014

*Prepared for:*

STATE OF VERMONT  
Vermont Department of Environmental Conservation  
Waste Management Division  
103 South Main Street, West Building  
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*Prepared by:*



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## **1.0 INTRODUCTION**

The following *2013 Annual Monitoring Report* for the Wheatley Site in Brookfield, Vermont (see attached Site Location Map in Appendix A) was prepared by Waite-Heindel Environmental Management, LLC (WHEM) for the Vermont Department of Environmental Conservation (VT DEC). This report has been completed in accordance WHEM's contract with State of Vermont (contract EC13-04) for environmental monitoring.

This report includes discussion of the results of groundwater monitoring conducted by WHEM during 2013. Monitoring locations were at the Wheatley Farm Site, currently a residential property occupied by Mr. James Moorcroft. Work conducted during 2013 and covered in this report include:

- Monitoring of four (4) groundwater monitoring wells during October 2013.

While the collection of indoor air samples from the Moorcroft residence has traditionally been a task conducted at this site during October, this protocol was changed during 2012 due to site business practices and lack of cooperation from the owner.

Monitoring is conducted in accordance with WHEM'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 WHEM on October 25, 2013. The following four (4) monitoring wells were monitored: MW-S1, MW-S2, MW-PL1 and 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. Former monitoring well MW-S3, which was damaged beyond repair in 2010, is no longer part of the monitoring routine.

### **2.1 Groundwater Level Measurement**

Prior to sampling on October 25, 2013, 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 5.20 to 18.69 ft below top-of-casing (ft btoc).

Using top-of-casing elevation data, the measurements were converted into groundwater elevations. Elevation data from October 2013 are shown with historical measurements in Table 1.1 in Appendix B. Compared to the previous round of measurements in October 2012, there was an average decrease in groundwater elevation of 0.44 ft; this was most evident in MW-PL2, which saw a decrease of 1.08 ft.



Groundwater elevations were also plotted to develop a groundwater elevation map (see Groundwater Elevation Map – October 2013 in Appendix A). As this map shows, the general direction of overburden groundwater flow was toward the west, or toward the Second Branch of the White River. The lateral hydraulic gradient between well MW-PL2 and MW-S2 was 0.014 ft/ft, or 1.4%. In the lower meadow in the vicinity of wells MW-S1 and MW-S2, the groundwater flow direction is southerly, also toward the River. The 2013 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. The purge rate, as specified by site protocols, was 200 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 YSI 556 multi-parameter water quality meter 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 WHEM to TestAmerica Laboratory (TA) of South Burlington, 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 Purgewater Management

All purgewater generated during this event was containerized in 5-gallon pails with watertight caps and transported by WHEM to the UniFirst Plant site in Williamstown, Vermont, where the water was added into the groundwater treatment system. This was accomplished by pouring the purgewater into a sump present in the treatment shed that is connected to the activated carbon treatment train. This protocol was introduced in 2012, and will be followed on all future monitoring events, with no further disposal of purgewater on the ground as done previously.

## 2.4 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.

### 2.4.1 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 (2002-2012), the following observations can be made from the October 2013 data:

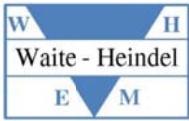
- **Dissolved oxygen** readings were all within the range of historical measurements with no anomalies or clear trends.
- **Specific conductance** readings were all within the range of historical measurements with no anomalies or clear trends.
- **pH** readings were generally lower than historical measurements for all wells except MW-S1, with no anomalies or clear trends.
- **Turbidity** readings were generally lower than historical measurements for all wells, likely attributable to the use of low-flow methodology.
- **Redox (ORP)** readings were generally lower than historical measurements for all wells, with no anomalies or clear trends.

### 2.4.2 Analytical Results

The analytical results from October 2013 indicate the following:

- **MW-PL1:** the target compound PCE was reported at a concentration of 2.8 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.

During the 2011 monitoring event, PCE was detected (5.1 ug/L) in MW-PL1 just above the Vermont Groundwater Enforcement Standard (VGES) of 5.0 ug/L for the first time since monitoring had begun. In 2012 and 2013, PCE levels (2.1 ug/L and 2.8 ug/L, respectively) decreased again to levels commonly observed in this well since 2005. PCE concentrations in MW-PL1 reported between 1997 and the present are shown in the graph presented in Appendix B, and are indicative of an increasing concentration trend between 2005-2012 as compared to data from 1999-2004. It should be noted that PCE has never been reported in any of the three other monitoring wells at this Site.



### 2.4.3 QA/QC Samples

As part of the quality assurance/quality control (QA/QC) program, WHEM collected a field duplicate sample during the October 2013 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). No compounds were detected in either sample, so precision in the field duplicate could not be verified.

WHEM also collected a trip blank (TB-4) and a field blank (FB-6) during the October 2013 sampling event. No target compounds were reported in either of these samples, indicating that there were no spurious influences on sample quality.

## 2.5 Discussion of Data Validation

The laboratory data from the October 2013 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] which is provided in Appendix D.

Results for the target VOCs were determined to be valid as detected for all groundwater samples collected in and October (sample delivery group SDG No. WHEA19). There were qualifications for non-target compounds carbon disulfide, acetone, and chloromethane, as well as some minor documentation and compliance issues noted for the sample group, but none that directly affected the validity of the groundwater data.

## 2.6 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, WHEM recommends continuing the groundwater monitoring program as specified in the Work Plan and FLCM-Water. The next sampling event is scheduled for October 2014.

## 3.0 INDOOR AIR SAMPLING

Indoor air sampling is no longer part of the monitoring protocol for this Site. Historical air sampling data are provided in Table 3 in Appendix B.



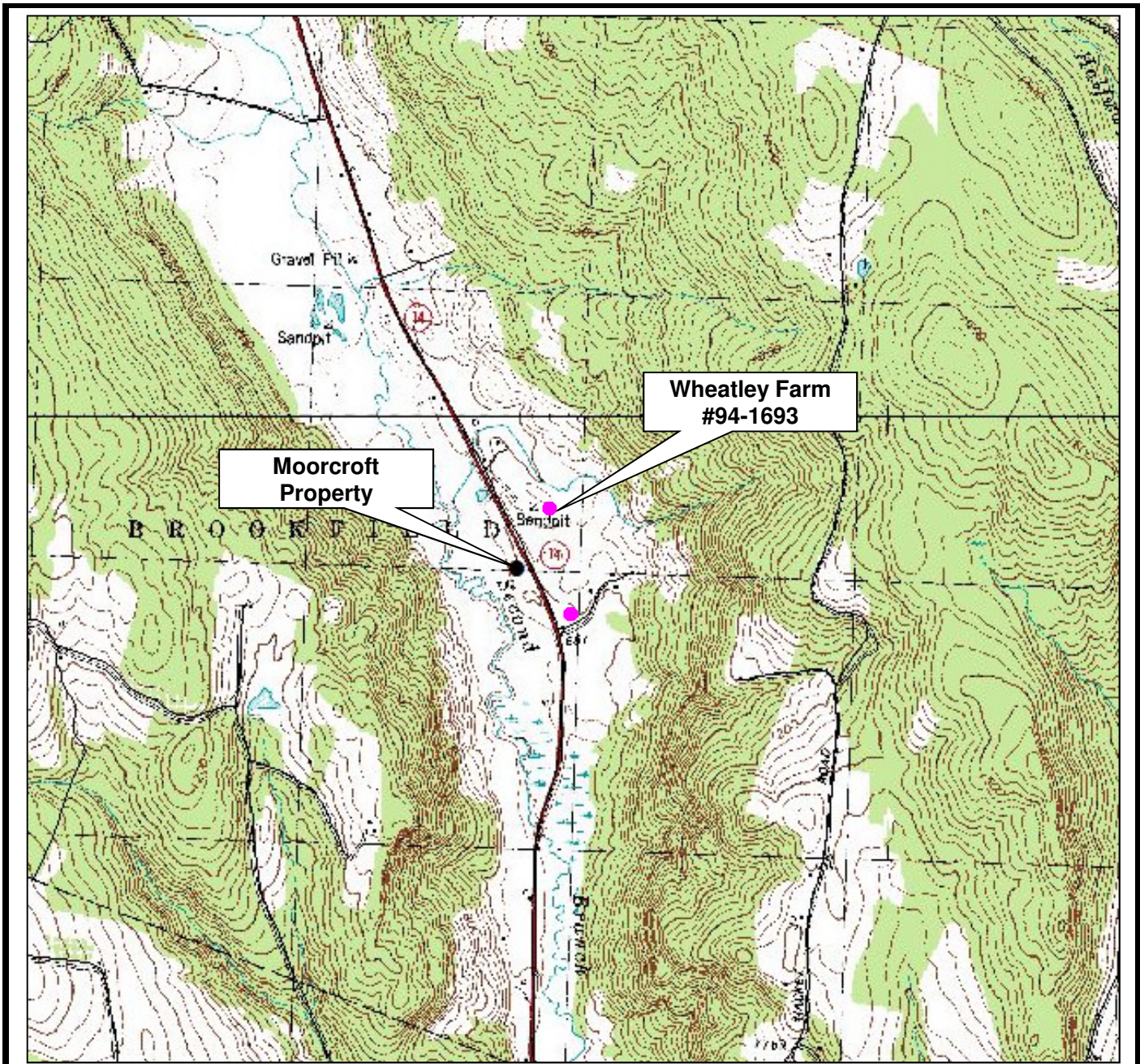
#### **4.0 REFERENCES**

1. Waite-Heindel Environmental Management, LLC, *Work Plan for Environmental Monitoring at the UniFirst Plant Site, Williamstown, Vermont, Wheatley Farm Site, Brookfield, Vermont, Bressett Site, Randolph, Vermont*, July 11, 2013.
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*, June 4, 2013.
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, Volatile Organics in Water Samples, Sample Delivery Group Nos. BRES56, UNIF47, WHEA19, and UNIF48, February 14, 2014.*
5. State of Vermont, Agency of Natural Resources, Department of Environmental Conservation, *Chapter 12, Groundwater Protection Rule and Strategy*, February, 2005.



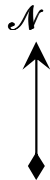
# **APPENDIX A:**

## **FIGURES**



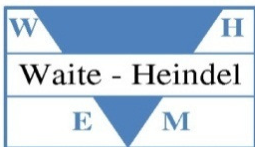
**LEGEND**

- Site
- State-Listed Hazardous Waste Site



Map Source:  
Data Source

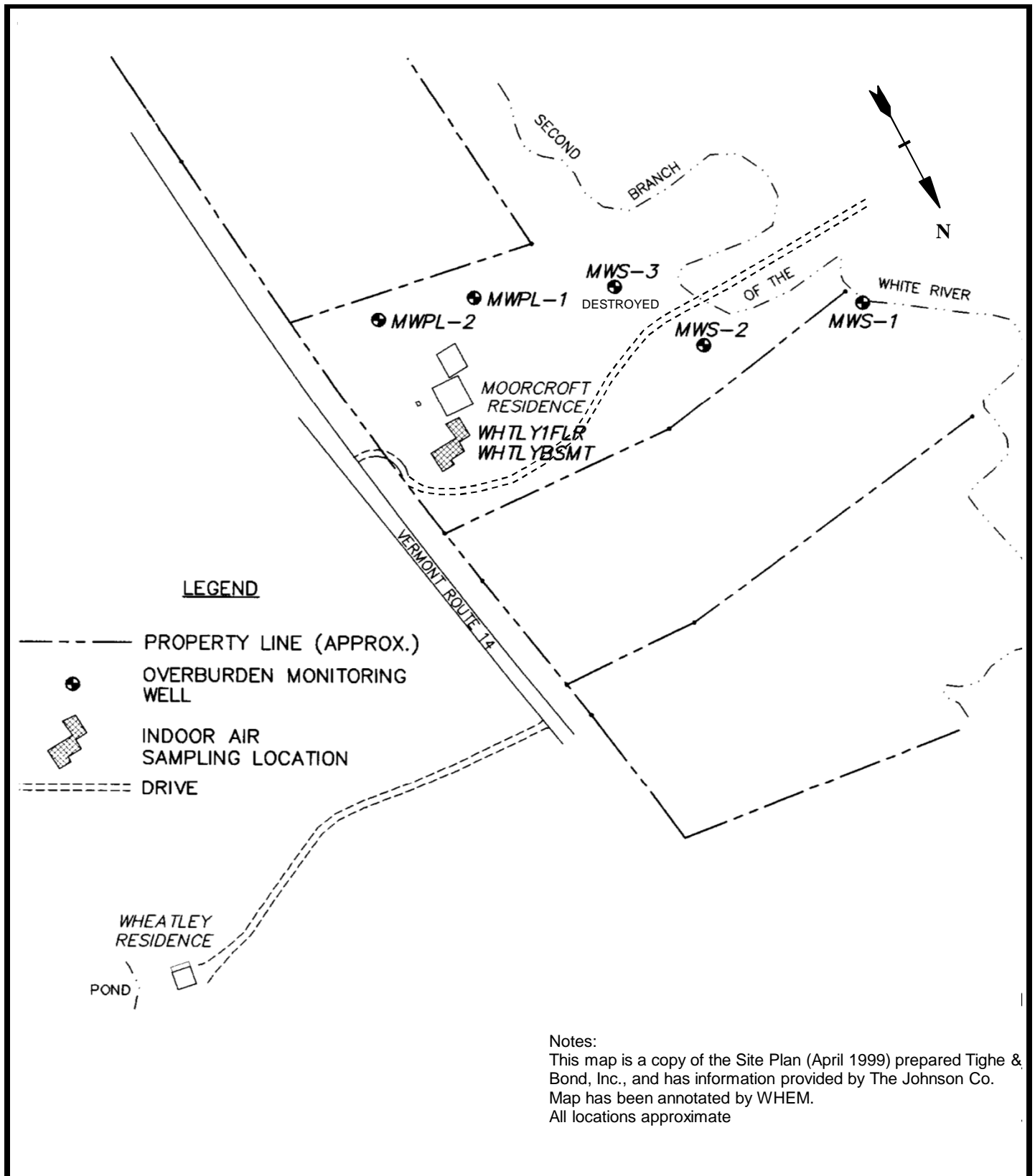
USGS Mapping 7.5 Minute Quadrangles: Brookfield (1983), Randolph Ctr (1983)  
Vermont DEC databases, updated 2006.



**Waite-Heindel**  
Environmental Management

**SITE LOCATION MAP**  
**Wheatley Site / Moorcroft Residence**  
**Brookfield, Vermont**

Date: 12/15/12 | Drawing No. 1 | Scale: 1:24,000 | By: MEW

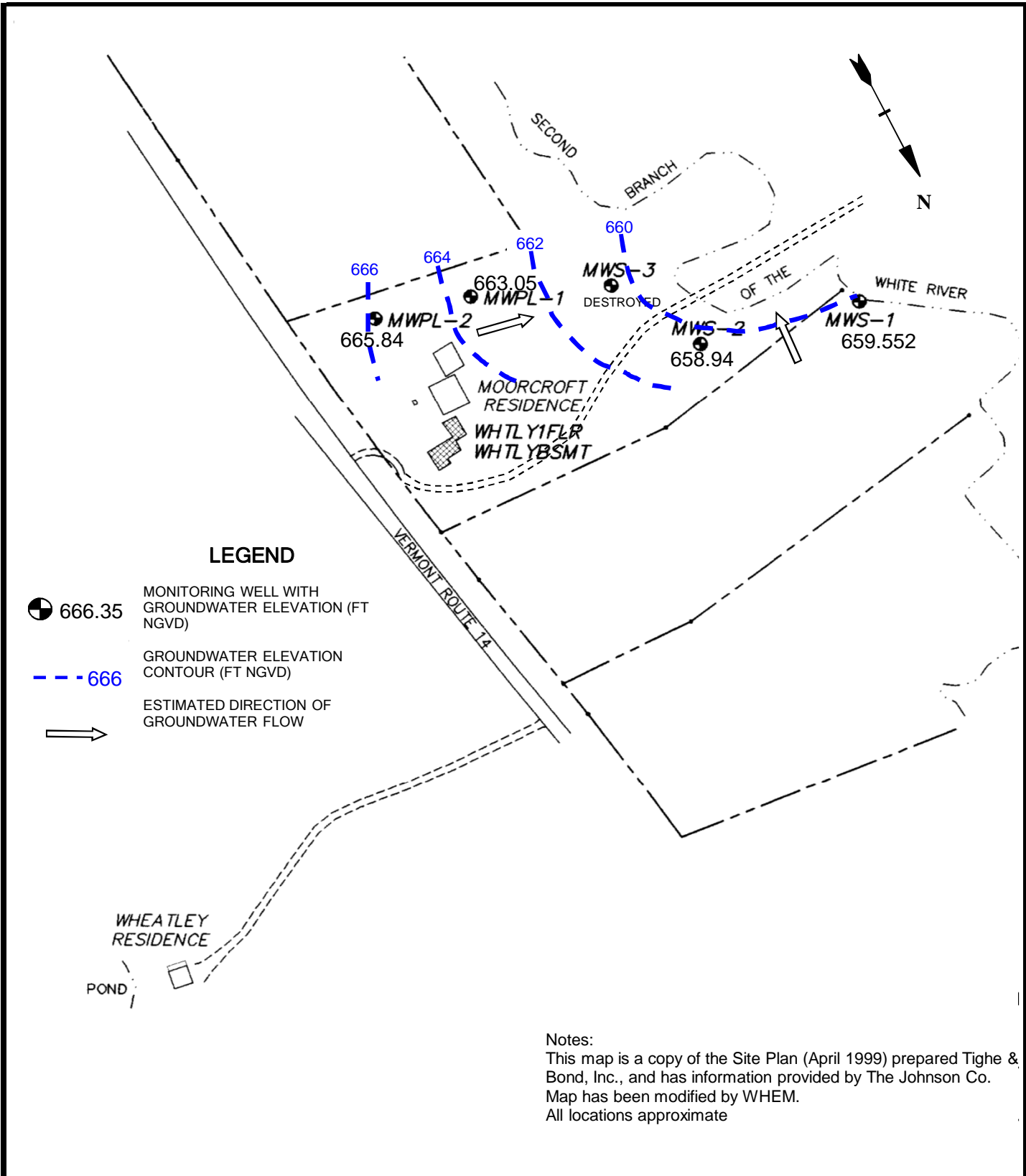


**Waite-Heindel**  
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**SITE PLAN**  
**Wheatley Farm / Moorcroft Property**  
**Brookfield, Vermont**

Date: 12/15/12 | Drawing No. 2 | Scale: 1" = 200' | By: MEW

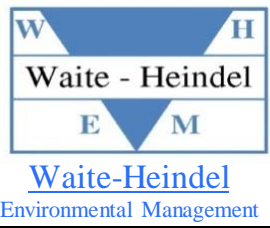




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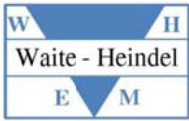
-  666.35 MONITORING WELL WITH GROUNDWATER ELEVATION (FT NGVD)
-  - - - 666 GROUNDWATER ELEVATION CONTOUR (FT NGVD)
-  ESTIMATED DIRECTION OF GROUNDWATER FLOW

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 WHEM.  
 All locations approximate



**GROUNDWATER ELEVATION CONTOUR MAP**  
**Oct-13**  
**Wheatley Farm / Moorcroft Property**  
**Brookfield, Vermont**

Date: 01/06/14 | Drawing No. 3 | Scale: 1" = 200' | By: MEW



# **APPENDIX B:**

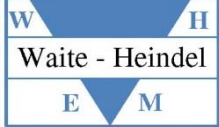
## **TABLES AND GRAPHS**



**TABLE 1.1**  
**Groundwater Elevation Measurements: 2004 - 2013**  
**Wheatley Site, Brookfield, Vermont**

| Location | Type            | Units | Oct-04 | Oct-05 | Apr-06 | Oct-06 | Oct-07 | Oct-08 | Oct-09         | Oct-10 | Oct-11 | Oct-12 | Oct-13 |
|----------|-----------------|-------|--------|--------|--------|--------|--------|--------|----------------|--------|--------|--------|--------|
| MW-S1    | Monitoring Well | FT    | 659.95 | 660.74 | 660.77 | 661.89 | 662.07 | 660.35 | 659.62         | 660.68 | 660.21 | 660.22 | 659.55 |
| MW-S2    | Monitoring Well | FT    | 658.93 | 660.62 | 659.42 | 660.79 | 661.23 | 660.32 | 659.30         | 660.46 | 659.89 | 660.02 | 658.94 |
| MW-S3    | Monitoring Well | FT    | 661.41 | 662.41 | 659.61 | 662.08 | 662.00 | 661.83 | WELL DESTROYED |        |        |        |        |
| MW-PL1   | Monitoring Well | FT    | 663.06 | 663.87 | 663.99 | 663.56 | 663.88 | 663.81 | 662.26         | 664.07 | 663.88 | 663.41 | 663.05 |
| MW-PL2   | Monitoring Well | FT    | 666.08 | 665.58 | 666.10 | 666.35 | 665.91 | 666.91 | 666.24         | 666.59 | 667.22 | 665.48 | 665.84 |

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.



**TABLE 1.2**  
**Dissolved Oxygen Field Measurements: 2004 - 2013**  
**Wheatley Site, Brookfield, Vermont**

| Location | Type            | Units | Oct-04 | Oct-05 | Oct-06 | Oct-07 | Oct-08 | Oct-09         | Oct-10 | Oct-11 | Oct-12 | Oct-13 |
|----------|-----------------|-------|--------|--------|--------|--------|--------|----------------|--------|--------|--------|--------|
| MW-S1    | Monitoring Well | mg/L  | 3.33   | 0.48   | 0.29   | 0.00   | 0.00   | 0.00           | 3.42   | 3.94   | 0.00   | 0.98   |
| MW-S2    | Monitoring Well | mg/L  | 0.34   | 0.00   | 0.42   | 0.00   | 1.51   | 0.00           | 3.89   | 3.81   | 0.00   | 0.31   |
| MW-S3    | Monitoring Well | mg/L  | 0.36   | 0.04   | 0.19   | 0.00   | 0.00   | WELL DESTROYED |        |        |        |        |
| MW-PL1   | Monitoring Well | mg/L  | 3.33   | 1.97   | 4.71   | 2.79   | 1.75   | 2.45           | 4.79   | 6.19   | 2.35   | 2.30   |
| MW-PL2   | Monitoring Well | mg/L  | 7.47   | 12.76  | 13.41  | 10.67  | 8.17   | 9.55           | 7.28   | 9.89   | 6.37   | 6.67   |

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).



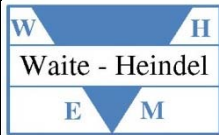
**TABLE 1.3**  
**Specific Conductance Field Measurements: 2004 - 2013**  
**Wheatley Site, Brookfield, Vermont**

| Location | Type            | Units | Oct-04 | Oct-05 | Oct-06 | Oct-07 | Oct-08 | Oct-09         | Oct-10 | Oct-11 | Oct-12 | Oct-13 |
|----------|-----------------|-------|--------|--------|--------|--------|--------|----------------|--------|--------|--------|--------|
| MW-S1    | Monitoring Well | us/cm | 369    | 296    | 229    | 385    | 319    | 518            | 401    | 528    | 348    | 332    |
| MW-S2    | Monitoring Well | us/cm | 268    | 257    | 138    | 273    | 222    | 346            | 255    | 310    | 238    | 188    |
| MW-S3    | Monitoring Well | us/cm | 368    | 283    | 203    | 345    | 273    | WELL DESTROYED |        |        |        |        |
| MW-PL1   | Monitoring Well | us/cm | 498    | 391    | 292    | 509    | 448    | 744            | 574    | 749    | 460    | 425    |
| MW-PL2   | Monitoring Well | us/cm | 401    | 400    | 215    | 399    | 376    | 661            | 528    | 750    | 523    | 336    |

Notes:

- All conductivity measurements 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).



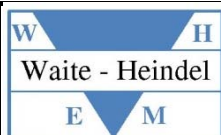


**TABLE 1.4**  
**Temperature Field Measurements: 2004 - 2013**  
**Wheatley Site, Brookfield, Vermont**

| Location | Type            | Units | Oct-04 | Oct-05 | Oct-06 | Oct-07 | Oct-08 | Oct-09         | Oct-10 | Oct-11 | Oct-12 | Oct-13 |
|----------|-----------------|-------|--------|--------|--------|--------|--------|----------------|--------|--------|--------|--------|
| MW-S1    | Monitoring Well | deg C | 16.1   | 13.6   | 15.1   | 11.8   | 15.3   | 14.3           | 9.8    | 10.6   | 12.5   | 13.45  |
| MW-S2    | Monitoring Well | deg C | 16.5   | 14.5   | 15.1   | 12.2   | 15.6   | 14.2           | 10.6   | 12.8   | 13.8   | 13.28  |
| MW-S3    | Monitoring Well | deg C | 10.9   | 11.2   | 11.8   | 10.2   | 11.3   | WELL DESTROYED |        |        |        |        |
| MW-PL1   | Monitoring Well | deg C | 11.1   | 10.7   | 10.9   | 9.8    | 10.1   | 10.0           | 8.5    | 9.6    | 10.5   | 10.22  |
| MW-PL2   | Monitoring Well | deg C | 10.7   | 11.0   | 10.8   | 10.0   | 10.7   | 9.8            | 9.2    | 9.2    | 11.3   | 10.10  |

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).



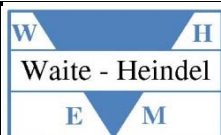
**TABLE 1.5**  
**pH Field Measurements: 2004 - 2013**  
**Wheatley Site, Brookfield, Vermont**

| Location | Type            | Units    | Oct-04 | Oct-05 | Oct-06 | Oct-07 | Oct-08 | Oct-09         | Oct-10 | Oct-11 | Oct-12 | Oct-13 |
|----------|-----------------|----------|--------|--------|--------|--------|--------|----------------|--------|--------|--------|--------|
| MW-S1    | Monitoring Well | unitless | 7.25   | 8.09   | 8.22   | 7.65   | NA     | 7.96           | 6.92   | 7.32   | 8.11   | 7.68   |
| MW-S2    | Monitoring Well | unitless | 6.80   | 7.63   | 8.09   | 6.33   | NA     | 6.71           | 6.00   | 6.66   | 6.46   | 6.20   |
| MW-S3    | Monitoring Well | unitless | 8.67   | 9.44   | 8.41   | 8.26   | NA     | WELL DESTROYED |        |        |        |        |
| MW-PL1   | Monitoring Well | unitless | 8.06   | 8.69   | 7.72   | 7.56   | NA     | 6.31           | 6.10   | 6.20   | 7.50   | 7.22   |
| MW-PL2   | Monitoring Well | unitless | 7.89   | 8.16   | 7.32   | 7.41   | NA     | 6.43           | 6.20   | 6.59   | 7.32   | 7.12   |

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).



**TABLE 1.6**  
**Turbidity Field Measurements: 2004 - 2013**  
**Wheatley Site, Brookfield, Vermont**

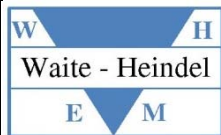
| Location | Type            | Units | Oct-04 | Oct-05 | Oct-06 | Oct-07 | Oct-08 | Oct-09         | Oct-10 | Oct-11 | Oct-12 | Oct-13 |
|----------|-----------------|-------|--------|--------|--------|--------|--------|----------------|--------|--------|--------|--------|
| MW-S1    | Monitoring Well | NTU   | 183    | 89     | 21.2   | 18.1   | 71.2   | 11.4           | NA     | 119    | 10.8   | 2.3    |
| MW-S2    | Monitoring Well | NTU   | 81     | 47     | 17.0   | 4.9    | 0.0    | 0.0            | NA     | 52.4   | 0.0    | 1.1    |
| MW-S3    | Monitoring Well | NTU   | 53     | 21     | 0.0    | 1.5    | 2.9    | WELL DESTROYED |        |        |        |        |
| MW-PL1   | Monitoring Well | NTU   | 108    | 95     | 0.0    | 0.0    | 0.0    | 1.2            | NA     | 44.3   | 0.0    | 11.2   |
| MW-PL2   | Monitoring Well | NTU   | 126    | 178    | 0.0    | 0.0    | 0.0    | 3.2            | NA     | 80.7   | 2.5    | 2.8    |

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).



**TABLE 1.7**  
**Redox Potential Field Measurements: 2004 - 2013**  
**Wheatley Site, Brookfield, Vermont**

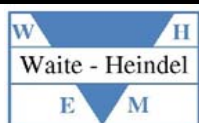
| Location | Type            | Units | Oct-04 | Oct-05 | Oct-06 | Oct-07 | Oct-08 | Oct-09         | Oct-10 | Oct-11 | Oct-12 | Oct-13 |
|----------|-----------------|-------|--------|--------|--------|--------|--------|----------------|--------|--------|--------|--------|
| MW-S1    | Monitoring Well | mV    | -72    | -99    | -159   | -216   | -182   | -173           | -187   | -197   | -112   | -103   |
| MW-S2    | Monitoring Well | mV    | -43    | -134   | -123   | -103   | -50    | -68            | -62    | -115   | -26    | -16    |
| MW-S3    | Monitoring Well | mV    | -220   | -214   | -168   | -183   | -205   | WELL DESTROYED |        |        |        |        |
| MW-PL1   | Monitoring Well | mV    | 43     | 169    | 150    | 139    | 101    | 155            | 158    | 148    | 169    | 122    |
| MW-PL2   | Monitoring Well | mV    | 128    | 190    | 162    | 150    | 112    | 153            | 170    | 148    | 175    | 127    |

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).



**TABLE 2.0  
MONITORING WELL RESULTS: 2005-2013  
Wheatley Farm Site, Brookfield**

| Location | Parameter<br>Method 8260 | Groundwater<br>Enforcement<br>Standard | Units | Oct-05 | Apr-06 | Oct-06 | Oct-07 | Oct-08 | Oct-09 | Oct-10 | Oct-11 | Oct-12 | Oct-13 |
|----------|--------------------------|--|-------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|
| MW-S1    | 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  | 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  | 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  | 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  | 1.0 U  | 1.0 U  | 1.0 U  |
| MW-S2    | 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  | 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  | 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  | 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  | 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  | 1.1    | 2.8    | 2.5    | 2.1    | 3.1    | 2.9    | 2.2    | 5.1    | 2.1    | 2.8    |
|          | 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  | 0.47 J | 0.19 J | 0.34 J |
|          | 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  | 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  | 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  | 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  | 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  | 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  | 1.0 U  | 1.0 U  | 1.0 U  |

Notes:  
 - "PCE" = tetrachlorethene; "TCE" = trichlorethene; "DCE" = dichloroethene.  
 - "U" = not detected above listed quantitation limit; "J" = reported concentration is an estimated value; "UJ" = reported quantitation limit is an estimated value.  
 - "Dry" = well dry during monitoring event; "NA" = not available.  
 - Data entered from the data validation report for each sampling event.  
 - Shaded cells indicate that the reported concentration is in excess of the Enforcement Standard.  
 - Groundwater Enforcement Standards referenced from Table 1, Chapter 12 - Groundwater Protection Rule and Strategy, February 2005.

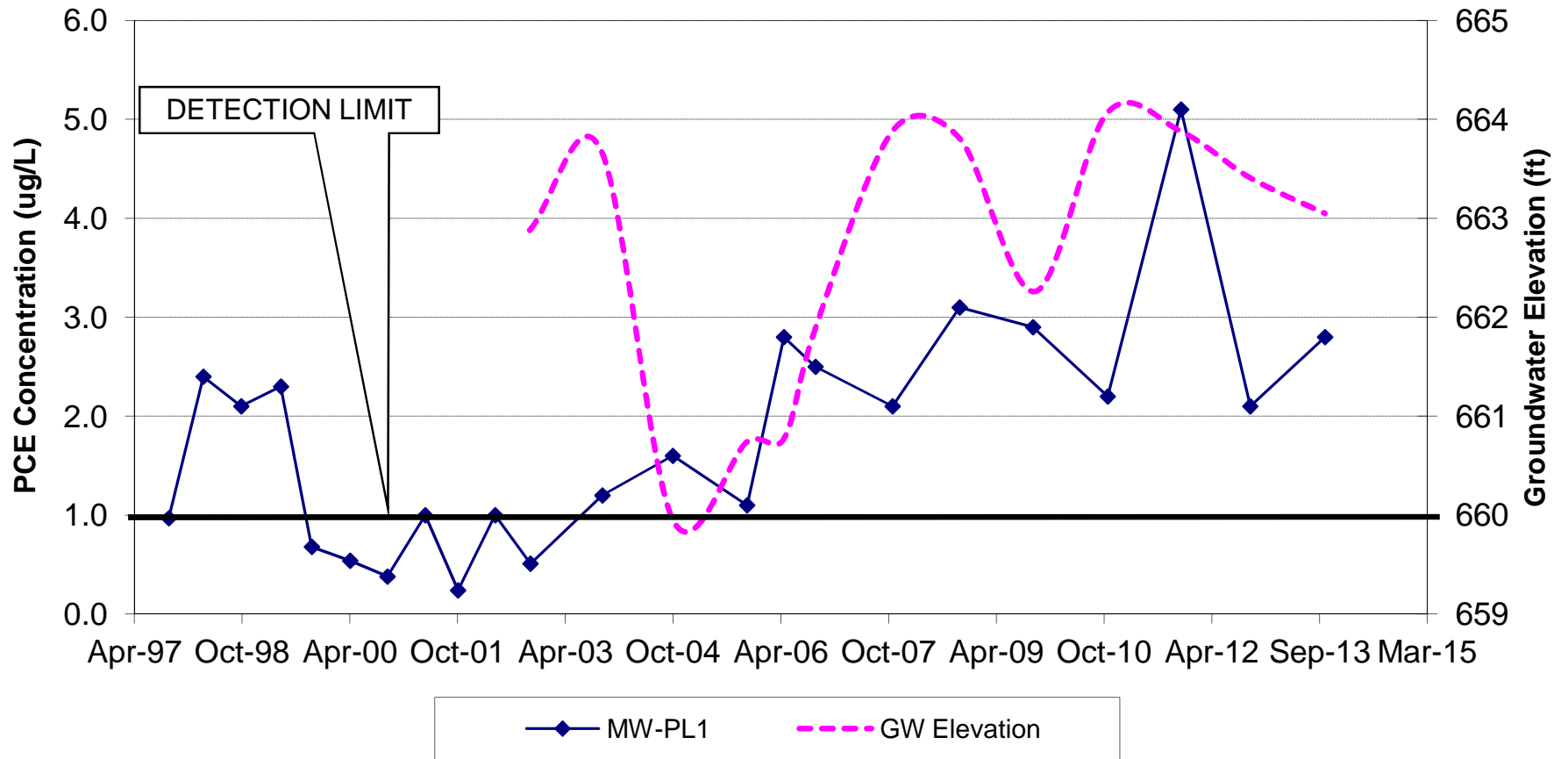


**TABLE 3.0  
HISTORICAL INDOOR AIR QUALITY RESULTS  
Wheatley Farm Site, Brookfield, Vermont**

| Owner     | Location  | Parameter<br>Method T-014A | Guidance<br>Level | Units | Jul-01     | Jan-02        | Jul-02 | Oct-03 | Oct-04 | Oct-05 | Oct-06 | Oct-07      | Oct-08 | Oct-09       | Oct-10       |
|-----------|-----------|----------------------------|-------------------|-------|------------|---------------|--------|--------|--------|--------|--------|-------------|--------|--------------|--------------|
| Moorcroft | WHTLY1FLR | Tetrachloroethene          | 0.08              | ppbv  | 0.42 U     | <b>0.09 J</b> | 0.5 U  | NS     | 0.5 U  | 0.2 U  | 0.2 U  | 0.010 U     | NS     | <b>0.022</b> | <b>0.100</b> |
|           |           | Trichloroethene            | 0.09              | ppbv  | 0.42 U     | 0.27 U        | 0.5 U  | NS     | 0.5 U  | 0.2 U  | 0.2 U  | <b>0.96</b> | NS     | <b>2.0</b>   | <b>0.012</b> |
|           |           | cis-1,2-Dichloroethene     |                   | ppbv  | 0.42 U     | 0.27 U        | 0.5 U  | NS     | 0.5 U  | 0.2 U  | 0.2 U  | 0.010 U     | NS     | 0.010 U      | 0.000 U      |
|           |           | trans-1,2-Dichloroethene   | 15.6              | ppbv  | 0.42 U     | 0.27 U        | 0.5 U  | NS     | 0.5 U  | 0.2 U  | 0.2 U  | 0.010 U     | NS     | <b>0.014</b> | <b>0.043</b> |
|           | WHTLYBSMT | Tetrachloroethene          | 0.08              | ppbv  | <b>4.8</b> | 0.32 U        | 0.5 U  | NS     | 0.5 U  | 0.2 U  | 0.2 U  | 0.010 U     | NS     | <b>0.020</b> | 0.010 U      |
|           |           | Trichloroethene            | 0.09              | ppbv  | 0.47 U     | 0.32 U        | 0.5 U  | NS     | 0.5 U  | 0.2 U  | 0.2 U  | 0.010 U     | NS     | <b>0.017</b> | 0.010 U      |
|           |           | cis-1,2-Dichloroethene     |                   | ppbv  | 0.47 U     | 0.32 U        | 0.5 U  | NS     | 0.5 U  | 0.2 U  | 0.2 U  | 0.010 U     | NS     | 0.010 U      | 0.010 U      |
|           |           | trans-1,2-Dichloroethene   | 15.6              | ppbv  | 0.47 U     | 0.32 U        | 0.5 U  | NS     | 0.5 U  | 0.2 U  | 0.2 U  | 0.010 U     | NS     | <b>0.028</b> | <b>0.017</b> |

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.  
 -Guidance levels for tetrachloroethene and trichloroethene is Target Indoor Air concentration (converted to ppbv) from Table C.7 of VT ANR Investigation and Remediation of Contaminated Properties Procedure, April 2012.  
 -Guidance level for trans-1,2,-dichloroethene is based on the EPA Regional Screening Level (RSL) for residential indoor air (April 2012). There is no EPA RSL for cis-1,2-dichloroethene.

### PCE in Groundwater: MW-PL1 Wheatley Site, Brookfield, Vermont



Note:

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



# **APPENDIX C:**

## **FIELD DATA SHEETS**





# UNIFIRST FIELD WATER COLLECTION SHEET

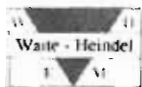
|                   |                             |                               |              |
|-------------------|-----------------------------|-------------------------------|--------------|
| SAMPLING LOCATION | <u>MW-PL1</u>               | Pump Intake Depth             | <u>16.1</u>  |
| Date              | <u>10/25/13</u>             | Pump Type                     | <u>peri</u>  |
| Sampler           | <u>CP</u>                   | Well Diameter                 | <u>3/4</u>   |
| Weather           | <u>culb, cloudy</u>         | Well Depth                    | <u>17.32</u> |
| Water Type        | <u>SW</u> sw supply         | Initial Depth to Water        | <u>13.46</u> |
| Sampling Method   | bailer <u>low flow</u> grab | Traditional Purge Vol. / Rate | <u>200</u>   |

| LOW FLOW PURGING DATA |                   |                        |                  |                                    |             |             |              |                    |                 |
|-----------------------|-------------------|------------------------|------------------|------------------------------------|-------------|-------------|--------------|--------------------|-----------------|
| Time                  | DTW<br>(ft btp)   | Purge Rate<br>(ml/min) | Temp.<br>(deg C) | Specific Cond.<br>(ms/m) / (us/cm) | pH          | ORP<br>(mv) | DO<br>(mg/L) | Turbidity<br>(NTU) | Notes           |
| <u>1141</u>           | <u>probe</u>      | <u>160</u>             |                  |                                    |             |             |              |                    | <u>begin</u>    |
| <u>1144</u>           | <u>1.2' net</u>   | <u>160</u>             | <u>10.6</u>      | <u>420</u>                         | <u>7.23</u> | <u>1250</u> | <u>2.01</u>  | <u>29.11</u>       |                 |
| <u>1147</u>           | <u>5.1'</u>       | <u>160</u>             | <u>10.10</u>     | <u>428</u>                         | <u>7.21</u> | <u>1241</u> | <u>2.13</u>  | <u>28.13</u>       | <u>clear</u>    |
| <u>1150</u>           | <u>past</u>       | <u>160</u>             | <u>10.14</u>     | <u>426</u>                         | <u>7.21</u> | <u>1236</u> | <u>2.17</u>  | <u>18.07</u>       |                 |
| <u>1153</u>           | <u>break in</u>   | <u>160</u>             | <u>10.17</u>     | <u>425</u>                         | <u>7.22</u> | <u>1227</u> | <u>2.20</u>  | <u>12.80</u>       |                 |
| <u>1156</u>           | <u>well @ 14'</u> | <u>160</u>             | <u>10.22</u>     | <u>425</u>                         | <u>7.22</u> | <u>1220</u> | <u>2.30</u>  | <u>11.15</u>       | <u>complete</u> |
|                       |                   |                        |                  |                                    |             |             |              |                    |                 |
|                       |                   |                        |                  |                                    |             |             |              |                    |                 |
|                       |                   |                        |                  |                                    |             |             |              |                    |                 |
|                       |                   |                        |                  |                                    |             |             |              |                    |                 |
|                       |                   |                        |                  |                                    |             |             |              |                    |                 |
|                       |                   |                        |                  |                                    |             |             |              |                    |                 |
|                       |                   |                        |                  |                                    |             |             |              |                    |                 |
|                       |                   |                        |                  |                                    |             |             |              |                    |                 |
|                       |                   |                        |                  |                                    |             |             |              |                    |                 |
|                       |                   |                        |                  |                                    |             |             |              |                    |                 |
|                       |                   |                        |                  |                                    |             |             |              |                    |                 |

| SAMPLE COLLECTION   | Purge Volume   | Temp.        | Specific Cond. | pH          | ORP         | DO          | Turbidity    |  |
|---------------------|----------------|--------------|----------------|-------------|-------------|-------------|--------------|--|
| Final Measurements: | <u>2,200.2</u> | <u>10.22</u> | <u>425</u>     | <u>7.22</u> | <u>1220</u> | <u>2.30</u> | <u>11.15</u> |  |

| Sample Description | Label         | Type Container | # Container | Preservative | Analysis Method | Collection Time | COC # |
|--------------------|---------------|----------------|-------------|--------------|-----------------|-----------------|-------|
| <u>Sample</u>      | <u>MW-PL1</u> | <u>VOA</u>     | <u>B</u>    | <u>HCl</u>   | <u>8260B</u>    | <u>1158</u>     |       |
| Additional         |               |                |             |              |                 |                 |       |
| Additional         |               |                |             |              |                 |                 |       |
| Field Duplicate    |               |                |             |              |                 |                 |       |
| MS/MSD             |               |                |             |              |                 |                 |       |
| Field Blank        |               |                |             |              |                 |                 |       |

General Notes: Water probe could not fit past head @ 14' w/ tubing in well.  
Container: net purge 420



# UNIFIRST FIELD WATER COLLECTION SHEET

|                   |                                     |   |                               |              |
|-------------------|-------------------------------------|---|-------------------------------|--------------|
| SAMPLING LOCATION | <u>MW-PL2</u>                       |   | Pump Intake Depth             | <u>19.4</u>  |
| Date              | <u>10/25/13</u>                     |   | Pump Type                     | <u>per</u>   |
| Sampler           | <u>cl</u>                           |   | Well Diameter                 | <u>3/4</u>   |
| Weather           | <u>cloudy &amp; cool</u>            |   | Well Depth                    | <u>204</u>   |
| Water Type        | <input checked="" type="radio"/> SW | sw  | supply                        |              |
| Sampling Method   | <u>bailer</u>                       | <input checked="" type="radio"/> low flow | grab                          |              |
|                   |                                     |   | Initial Depth to Water        | <u>18.69</u> |
|                   |                                     |   | Traditional Purge Vol. / Rate | <u>200</u>   |

| LOW FLOW PURGING DATA |                 |                        |                  |                                    |             |             |              |                    |  |                 |
|-----------------------|-----------------|------------------------|------------------|------------------------------------|-------------|-------------|--------------|--------------------|--|-----------------|
| Time                  | DTW<br>(ft btp) | Purge Rate<br>(ml/min) | Temp.<br>(deg C) | Specific Cond.<br>(ms/m) / (us/cm) | pH          | ORP<br>(mv) | DO<br>(mg/L) | Turbidity<br>(NTU) |  | Notes           |
| <u>1215</u>           | <u>18.69</u>    | <u>200</u>             |                  |                                    |             |             |              |                    |  | <u>boon</u>     |
| <u>1218</u>           | <u>18.92</u>    | <u>200</u>             | <u>9.90</u>      | <u>321</u>                         | <u>7.07</u> | <u>1222</u> | <u>6.256</u> | <u>15.94</u>       |  |                 |
| <u>1221</u>           | <u>18.93</u>    | <u>200</u>             | <u>9.99</u>      | <u>323</u>                         | <u>7.06</u> | <u>1252</u> | <u>5.46</u>  | <u>7.07</u>        |  | <u>clear</u>    |
| <u>1224</u>           | <u>18.95</u>    | <u>200</u>             | <u>10.06</u>     | <u>328</u>                         | <u>7.08</u> | <u>1245</u> | <u>6.0</u>   | <u>5.99</u>        |  |                 |
| <u>1227</u>           | <u>18.97</u>    | <u>200</u>             | <u>10.09</u>     | <u>332</u>                         | <u>7.09</u> | <u>1250</u> | <u>6.17</u>  | <u>2.66</u>        |  |                 |
| <u>1230</u>           | <u>19.01</u>    | <u>200</u>             | <u>10.07</u>     | <u>337</u>                         | <u>7.11</u> | <u>1262</u> | <u>6.86</u>  | <u>4.02</u>        |  |                 |
| <u>1232</u>           | <u>19.08</u>    | <u>200</u>             | <u>10.10</u>     | <u>336</u>                         | <u>7.12</u> | <u>1269</u> | <u>6.67</u>  | <u>2.81</u>        |  | <u>complete</u> |
|                       |                 |                        |                  |                                    |             |             |              |                    |  |                 |
|                       |                 |                        |                  |                                    |             |             |              |                    |  |                 |
|                       |                 |                        |                  |                                    |             |             |              |                    |  |                 |
|                       |                 |                        |                  |                                    |             |             |              |                    |  |                 |
|                       |                 |                        |                  |                                    |             |             |              |                    |  |                 |
|                       |                 |                        |                  |                                    |             |             |              |                    |  |                 |
|                       |                 |                        |                  |                                    |             |             |              |                    |  |                 |
|                       |                 |                        |                  |                                    |             |             |              |                    |  |                 |
|                       |                 |                        |                  |                                    |             |             |              |                    |  |                 |
|                       |                 |                        |                  |                                    |             |             |              |                    |  |                 |
|                       |                 |                        |                  |                                    |             |             |              |                    |  |                 |

| SAMPLE COLLECTION   |               | Purge Volume   | Temp.        | Specific Cond. | pH              | ORP             | DO          | Turbidity   |  |
|---------------------|---------------|----------------|--------------|----------------|-----------------|-----------------|-------------|-------------|--|
| Final Measurements: |               | <u>2,500ml</u> | <u>10.10</u> | <u>336</u>     | <u>7.12</u>     | <u>126.9</u>    | <u>6.67</u> | <u>2.81</u> |  |
| Sample Description  | Label         | Type Container | # Container  | Preservative   | Analysis Method | Collection Time | COC #       |             |  |
| <u>Sample</u>       | <u>MW-PL2</u> | <u>VOA</u>     | <u>3</u>     | <u>HCl</u>     | <u>8260 B</u>   | <u>1234</u>     |             |             |  |
| Additional          |               |                |              |                |                 |                 |             |             |  |
| Additional          |               |                |              |                |                 |                 |             |             |  |
| Field Duplicate     | <u>MW-PLX</u> | <u>"</u>       | <u>"</u>     | <u>"</u>       | <u>"</u>        | <u>"1234"</u>   |             |             |  |
| MS/MSD              |               |                |              |                |                 |                 |             |             |  |
| Field Blank         |               |                |              |                |                 |                 |             |             |  |

General Notes: Contaminated purge water



# UNIFIRST FIELD WATER COLLECTION SHEET

|                   |                             |                               |             |
|-------------------|-----------------------------|-------------------------------|-------------|
| SAMPLING LOCATION | <u>MW-51</u>                | Pump Intake Depth             | <u>9.8</u>  |
| Date              | <u>10/25/13</u>             | Pump Type                     | <u>peri</u> |
| Sampler           | <u>cl</u>                   | Well Diameter                 | <u>3/4</u>  |
| Weather           | <u>cool &amp; cloudy</u>    | Well Depth                    | <u>10.8</u> |
| Water Type        | <u>GW</u> sw      supply    | Initial Depth to Water        | <u>5.64</u> |
| Sampling Method   | baller <u>low flow</u> grab | Traditional Purge Vol. / Rate | <u>200</u>  |

| LOW FLOW PURGING DATA |                 |                        |                  |                                    |             |               |              |                    |                   |
|-----------------------|-----------------|------------------------|------------------|------------------------------------|-------------|---------------|--------------|--------------------|-------------------|
| Time                  | DTW<br>(ft btp) | Purge Rate<br>(ml/min) | Temp.<br>(deg C) | Specific Cond.<br>(ms/m) / (us/cm) | pH          | ORP<br>(mv)   | DO<br>(mg/L) | Turbidity<br>(NTU) | Notes             |
| <u>1302</u>           | <u>5.64</u>     | <u>200</u>             |                  |                                    |             |               |              |                    |                   |
| <u>1305</u>           | <u>7.00</u>     | <u>200</u>             | <u>12.55</u>     | <u>312</u>                         | <u>7.85</u> | <u>-15.3</u>  | <u>2.14</u>  | <u>5.78</u>        | <u>some clear</u> |
| <u>1308</u>           | <u>7.37</u>     | <u>200</u>             | <u>12.03</u>     | <u>322</u>                         | <u>7.88</u> | <u>-62.4</u>  | <u>0.79</u>  | <u>2.40</u>        |                   |
| <u>1311</u>           | <u>7.85</u>     | <u>200</u>             | <u>12.34</u>     | <u>322</u>                         | <u>7.88</u> | <u>-79.2</u>  | <u>0.67</u>  | <u>4.81</u>        |                   |
| <u>1314</u>           | <u>7.89</u>     | <u>200</u>             | <u>12.42</u>     | <u>328</u>                         | <u>7.87</u> | <u>-87.2</u>  | <u>0.79</u>  | <u>5.16</u>        |                   |
| <u>1317</u>           | <u>7.91</u>     | <u>200</u>             | <u>12.50</u>     | <u>327</u>                         | <u>7.81</u> | <u>-96.8</u>  | <u>1.04</u>  | <u>2.29</u>        |                   |
| <u>1319</u>           | <u>7.91</u>     | <u>200</u>             | <u>12.50</u>     | <u>328</u>                         | <u>7.73</u> | <u>-96.8</u>  | <u>1.09</u>  | <u>2.11</u>        |                   |
| <u>1321</u>           | <u>7.91</u>     | <u>200</u>             | <u>12.50</u>     | <u>320</u>                         | <u>7.79</u> | <u>-99.7</u>  | <u>1.07</u>  | <u>2.81</u>        |                   |
| <u>1323</u>           | <u>7.91</u>     | <u>200</u>             | <u>12.45</u>     | <u>332</u>                         | <u>7.68</u> | <u>-103.0</u> | <u>0.98</u>  | <u>2.30</u>        | <u>complete</u>   |

| SAMPLE COLLECTION   | Purge Volume | Temp.        | Specific Cond. | pH          | ORP           | DO          | Turbidity   |
|---------------------|--------------|--------------|----------------|-------------|---------------|-------------|-------------|
| Final Measurements: | <u>3250L</u> | <u>13.45</u> | <u>332</u>     | <u>7.68</u> | <u>-103.0</u> | <u>0.98</u> | <u>2.30</u> |

| Sample Description | Label        | Type Container | # Container | Preservative | Analysis Method | Collection Time | COC # |
|--------------------|--------------|----------------|-------------|--------------|-----------------|-----------------|-------|
| Sample             | <u>MW-51</u> | <u>VOA</u>     | <u>3</u>    | <u>HCl</u>   | <u>97606</u>    | <u>1325</u>     |       |
| Additional         |              |                |             |              |                 |                 |       |
| Additional         |              |                |             |              |                 |                 |       |
| Field Duplicate    |              |                |             |              |                 |                 |       |
| MS/MSD             |              |                |             |              |                 |                 |       |
| Field Blank        |              |                |             |              |                 |                 |       |

General Notes: contaminated purge water



Waite-Heindel  
Environmental Management

# UNIFIRST FIELD WATER COLLECTION SHEET

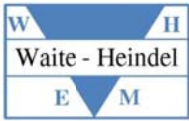
|                   |                       |                               |             |
|-------------------|-----------------------|-------------------------------|-------------|
| SAMPLING LOCATION | <u>MW-52</u>          | Pump Intake Depth             | <u>10.8</u> |
| Date              | <u>10/25/13</u>       | Pump Type                     | <u>peri</u> |
| Sampler           | <u>✓</u>              | Well Diameter                 | <u>3/4</u>  |
| Weather           | <u>Cloudy 26/3</u>    | Well Depth                    | <u>11.1</u> |
| Water Type        | <u>(sw)</u> sw supply | Initial Depth to Water        | <u>5.20</u> |
| Sampling Method   | bailer low flow grab  | Traditional Purge Vol. / Rate | <u>200</u>  |

| LOW FLOW PURGING DATA |                 |                        |                  |                                    |      |             |              |                    |  | Notes          |
|-----------------------|-----------------|------------------------|------------------|------------------------------------|------|-------------|--------------|--------------------|--|----------------|
| Time                  | DTW<br>(ft btp) | Purge Rate<br>(ml/min) | Temp.<br>(deg C) | Specific Cond.<br>(ms/m) / (us/cm) | pH   | ORP<br>(mv) | DO<br>(mg/L) | Turbidity<br>(NTU) |  |                |
| 1326                  | 5.20            | 200                    |                  |                                    |      |             |              |                    |  | begin<br>clear |
| 1339                  | 5.35            | 200                    | 12.79            | 191                                | 6.54 | -32.1       | 1.09         | 5.13               |  |                |
| 1342                  | 5.60            | 200                    | 13.24            | 191                                | 6.34 | -18.3       | 0.44         | 2.35               |  |                |
| 1345                  | 5.60            | 200                    | 13.52            | 188                                | 6.35 | -17.4       | 0.31         | 2.71               |  |                |
| 1348                  | 5.60            | 200                    | 13.52            | 189                                | 6.22 | -16.8       | 0.30         | 1.26               |  |                |
| 1351                  | 5.60            | 200                    | 13.28            | 188                                | 6.20 | -15.6       | 0.31         | 1.08               |  | complete       |
|                       |                 |                        |                  |                                    |      |             |              |                    |  |                |
|                       |                 |                        |                  |                                    |      |             |              |                    |  |                |
|                       |                 |                        |                  |                                    |      |             |              |                    |  |                |
|                       |                 |                        |                  |                                    |      |             |              |                    |  |                |
|                       |                 |                        |                  |                                    |      |             |              |                    |  |                |
|                       |                 |                        |                  |                                    |      |             |              |                    |  |                |
|                       |                 |                        |                  |                                    |      |             |              |                    |  |                |
|                       |                 |                        |                  |                                    |      |             |              |                    |  |                |
|                       |                 |                        |                  |                                    |      |             |              |                    |  |                |
|                       |                 |                        |                  |                                    |      |             |              |                    |  |                |

| SAMPLE COLLECTION   | Purge Volume | Temp.        | Specific Cond. | pH          | ORP          | DO          | Turbidity   |
|---------------------|--------------|--------------|----------------|-------------|--------------|-------------|-------------|
| Final Measurements: | <u>2,200</u> | <u>13.28</u> | <u>188</u>     | <u>6.20</u> | <u>-15.6</u> | <u>0.31</u> | <u>1.08</u> |

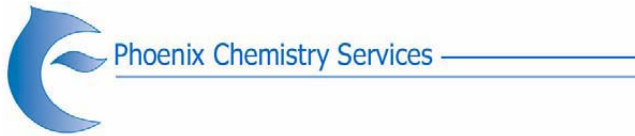
| Sample Description | Label        | Type Container | # Container | Preservative | Analysis Method | Collection Time | COC # |
|--------------------|--------------|----------------|-------------|--------------|-----------------|-----------------|-------|
| Sample             | <u>MW-52</u> | <u>VOA</u>     | <u>3</u>    | <u>HCl</u>   | <u>82605</u>    | <u>1353</u>     |       |
| Additional         |              |                |             |              |                 |                 |       |
| Additional         |              |                |             |              |                 |                 |       |
| Field Duplicate    |              |                |             |              |                 |                 |       |
| MS/MSD             | <u>"</u>     | <u>"</u>       | <u>4</u>    | <u>"</u>     | <u>"</u>        | <u>"</u>        |       |
| Field Blank        |              |                |             |              |                 |                 |       |

General Notes:



# **APPENDIX D:**

## **DATA VALIDATION REPORT**



February 14, 2014

Mr. Gerold Noyes  
VT Department of Environmental Conservation  
Waste Management and Prevention Division  
1 National Life Drive - Davis 1  
Montpelier, VT 05620-3704

Reference #: 2013-1119-001, -1129-001, and -1223 -001

Dear Gerold,

Attached please find the results of the data validation of Sample Delivery Group (SDG) Nos. BRES56, UNIF47, UNIF48, and WHEA19 from the Environmental Monitoring work at the Bressett Site, in Randolph, the UniFirst Site in Williamstown, and the Wheatley Farm site in Brookfield, VT. No air samples were collected for this sampling round; the water samples in these SDGs were collected on October 22, 23, 24, and 25, 2013. A second sample, identified in this report as WP-5 (resample) was collected on November 26, 2013 to confirm the result above the Vermont Action Limit for tetrachloroethene. The laboratory analyses were performed by TestAmerica Burlington (formerly STL Burlington) of South Burlington, VT.

The data packages were received on November 19 and 29, and December 23, 2013, and responses and revisions for issues identified during the validation were received on January 29, 2014. The validation has been performed by Phoenix Chemistry Services, to the extent possible according to the Tier III guidelines as defined by USEPA Region I, as presented in "Region I EPA-NE Data Validation Manual and Functional Guidelines for Evaluating Environmental Analyses", December, 1996. The EPA's National Functional Guidelines for Organic Data Review (EPA 540/R-99/008, October, 1999), and the Field/Laboratory Coordination Memorandum for Water Monitoring (FLCM), June 25, 2013 were also considered during the evaluation, and professional judgment was applied as necessary and appropriate. Data qualifiers have been applied in the final validation report as necessary and appropriate, in accordance with these guidelines.

Electronic copies of these reports are being submitted to Waite Environmental Management and TestAmerica Burlington, as well as to your attention. Attachment D of this report contains the requested revisions (quantitation reports) as well as selected supplemental documents supplied by the laboratory in response to issues identified during the validation. The year-end quality assurance summary report for air and water analyses will be submitted soon under separate cover.

Thank you for this opportunity to provide data validation services to the Waste Management Division. We look forward to continuing to work with you. If there are any questions or concerns about the material in this report, please do not hesitate to contact me for help and clarification.

Sincerely,

Deborah H. Gaynor, Ph.D.  
Principal, Phoenix Chemistry Services

**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. BRES56, UNIF47, WHEA19, and UNIF48**

**Chemical Analyses Performed by:**

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

**FOR**

**Mr. Gerold Noyes  
Department of Environmental Conservation  
Waste Management and Prevention Division  
1 National Life Dr – Davis 1  
Montpelier, VT 05620-3704**

**Data Validation Report by:**

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

**February 14, 2014**

Reference #s 2013-1119-001, 1129-001, &-1223-001  
VOA Validation Report/BRES56\_UNIF47\_WHEA19\_UNIF48/dpd/dhg

**EXECUTIVE SUMMARY**

Phoenix Chemistry Services (Phoenix) has completed the validation of the volatile organics analysis data prepared by TestAmerica Burlington (formerly STL Burlington) for 40 groundwater samples, 9 potable water samples, 1 performance evaluation (PE) sample, 6 field blanks (FB), and 5 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. BRES56, UNIF47, WHEA19, and UNIF48, which were submitted as four data packages received by Phoenix on November 19, November 29, and December 23, 2013, and revisions received on January 29, 2014. These SDGs include the following samples:

**Table 1. Sample Identifications**

| Sample Identifier     | Laboratory ID |
|-----------------------|---------------|
| <i>Method 8260B</i>   |               |
| <i>SDG No. BRES56</i> |               |
| BRW-3                 | 200-19070-5   |
| BRW-2                 | 200-19070-6   |
| BRW-1                 | 200-19070-7   |
| MW-103RD              | 200-19070-8   |
| MW-104S               | 200-19104-3   |
| MW-104D               | 200-19104-2   |
| MW-102D               | 200-19104-4   |
| MW-102S               | 200-19104-5   |
| MW-101S               | 200-19104-6   |
| MW-101D               | 200-19104-7   |
| MW-Z                  | 200-19104-12  |
| FB-3                  | 200-19104-13  |
| MW-4S                 | 200-19104-8   |
| TB-2                  | 200-19104-1   |
| MW-4D                 | 200-19104-9   |
| MW-3S                 | 200-19104-10  |
| MW-3D                 | 200-19104-11  |
| <i>SDG No. UNIF47</i> |               |
| W-19                  | 200-19119-4   |
| PZ-101                | 200-19119-2   |
| PZ-102                | 200-19119-3   |
| W-25                  | 200-19119-5   |
| MW-50                 | 200-19119-6   |
| W-Z                   | 200-19119-9   |
| FB-5                  | 200-19119-11  |
| MW-C                  | 200-19119-8   |
| W-1                   | 200-19143-1   |
| MW-E                  | 200-19119-10  |
| W-20                  | 200-19119-7   |
| MW-D                  | 200-19143-2   |



| Sample Identifier     | Laboratory ID |
|-----------------------|---------------|
| SS-2                  | 200-19119-20  |
| W-SEEP                | 200-19119-22  |
| SS-Z                  | 200-19119-26  |
| SS-5                  | 200-19119-21  |
| TB-3A                 | 200-19119-1   |
| SP-4                  | 200-19119-25  |
| MW-25884              | 200-19071-2   |
| BRW-Z                 | 200-19071-1   |
| FB-2                  | 200-19071-3   |
| SS-1A                 | 200-19119-23  |
| SP-MW3                | 200-19119-24  |
| <i>SDG No. WHEA19</i> |               |
| TB-4                  | 200-19142-1   |
| MW-PLX                | 200-19142-4   |
| MW-PL2                | 200-19142-3   |
| MW-PL1                | 200-19142-2   |
| MW-S1                 | 200-19142-5   |
| MW-S2                 | 200-19142-6   |
| FB-6                  | 200-19142-7   |
| <i>Method 524.2</i>   |               |
| <i>SDG No. BRES56</i> |               |
| SHIELDS               | 200-19070-3   |
| WELL Z                | 200-19070-2   |
| FB-1                  | 200-19070-4   |
| TB-1                  | 200-19070-1   |
| <i>SDG No. UNIF47</i> |               |
| WP-7                  | 200-19119-14  |
| WP-5                  | 200-19119-13  |
| WP-3                  | 200-19119-17  |
| WP-Z                  | 200-19119-12  |
| WP-8                  | 200-19119-15  |
| WP-13                 | 200-19119-16  |
| FB-4                  | 200-19119-18  |
| TB-3B                 | 200-19119-19  |
| WP-23                 | 200-19119-27  |
| <i>SDG No. UNIF48</i> |               |
| WP-5 (resample)       | 200-19748-1   |

Sample WP-5 was originally properly collected and analyzed, and the sample results were received on November 19, 2013. The field engineer alerted the Project Manager that the sample exhibited a result above the Vermont Action Limit for tetrachloroethene. The Project Manager agreed that the result should be confirmed, and a second sample was collected on Nov. 26, 2013, and submitted for analysis. Due to the unusual nature of this sample collection, field quality control samples (trip blank and field blank) were inadvertently not included with this sample. The results of both analyses are included in this sample set, and distinguished by the parenthetical suffix “(resample)” for the confirmation sample.

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

- Results for vinyl chloride, bromomethane, methylene chloride, and carbon disulfide in all samples analyzed by Method 524.2 were qualified as estimated (J, UJ).
- Results for carbon disulfide in all samples analyzed by Method 8260B were qualified as estimated (UJ).
- Results for bromomethane in all samples analyzed by Method 8260B, and in the Method 524.2 analyses, results for bromomethane in TB-1, FB-1, WELL-Z, SHIELDS, and WP-5 (resample); for chloromethane in samples SS-5, SS-Z, MW-D, TB-4, FB-6, W-1, MW-PL1, MW-PL2, MW-PLX, MW-S1, and MW-S2; and for trans-1,3-dichloropropene in samples W-1, MW-PL1, MW-PL2, MW-PLX, MW-S1, and MW-S2 were qualified as estimated (UJ).
- Results for acetone in MW-103RD, MW-104D, MW-50, MW-C, MW-D, MW-E, SP-MW3, SS-1A, SS-2, SS-5, W-20, W-25, W-SEEP, FB-5, FB-6, MW-PLX, and MW-S1, and for methylene chloride in FB-1, WP-8, and FB-4 were qualified as less than the reporting limit (U).
- The result for bromomethane in W-1, for carbon tetrachloride and acetone in SHIELDS and MW-4S, and for bromomethane in W-1 were qualified as estimated (UJ).
- Non-detected results for carbon tetrachloride in samples TB-2, FB-3, BRW-3, BRW-2, BRW-1, MW-103RD, FB-2, BRW-Z, and MW-25884 were qualified as estimated (UJ).
- Results for acetone in FB-4, TB-3B, WP-Z, WP-5, WP-7, WP-13, WP-3, and WP-8 were qualified as estimated (UJ).
- 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.
- All laboratory-specific qualifiers, such as the asterisk (\*), have been removed by the validator.

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 TestAmerica SOP BR-MV-005r8, and SDWA Method 524.2 Rev. 4.1, as documented in TestAmerica SOP BR-MV-005r11, and in accordance with requirements in the Field/Laboratory Coordination Memorandum for Water Monitoring (FLCM), June 25, 2013. 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 524.2 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 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 in the Data Summary Table contained in Attachment A and the spreadsheet summary files (Attachment B, submitted electronically) 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. BRES56, UNIF47, and WHEA19 were collected on October 22, 23, 24, and 25, 2013. A confirmation sample for volatiles analysis in SDG No. UNIF48 was collected on November 26, 2013. 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 at the time of screening, and is recorded in the Sample Preparation sections of the data packages. Vial preservation with hydrochloric acid is noted by the field sampler in all field sheets. All recorded sample pH values were <2.

The cooler temperatures on receipt at the laboratory were checked and documented in the data packages, and were 2.4, 4.0, 1.0, and 5.6 °C, which are within the acceptance range of 4 °C ±2 °C, with the exception of the cooler received on Nov. 26, 2013, at 11.2 °C. Although not noted in the data package, this cooler was received at an elevated temperature due to the sampling taking place less than two hours before the cooler temperature was measured at sample receipt, and the temperature was still dropping, which is acceptable.

The samples collected at the Bressett site on 10/22/13 (laboratory identifiers 200-19070-1 through 200-19070-8) were delivered to the laboratory on the same day as collected, as recorded on the chain of custody document, which was properly signed by the field sampler and the laboratory technician receiving the samples. However, these samples were incorrectly logged in as received on 10/23/13. The summary forms showing the date of receipt for these samples are incorrect, as are the entries in the electronic data deliverable in the "Receive Date" column for these eight samples. A revision has not been requested, but the laboratory has been notified of this error. A note indicating the correct receipt date has been added to the spreadsheet of validated results in a column labeled "Comments".

### **II. GC/MS Instrument Performance Check (Tuning)**

The samples were analyzed on two GC/MS systems identified as instrument L and instrument CHL. 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 ten (10) 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 (10/31/13) was performed on instrument CHL in support of the Method 8260B sample analyses, and one IC (11/4/13) 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.

No target compounds were manually integrated in the ICs and CCs performed for this data set.

All % RSDs for both ICs were below the maximum limit (30%) specified by Region I, and all RRF's were above the 0.05 minimum technical criterion, with the following exceptions:

**Table 2. Initial Calibration Exceedances**

| Instrument  | IC       | Average RRF |
|-------------|----------|-------------|
|             |          | 2-butanone  |
| CHL (8260B) | 10/31/13 | 0.0241      |
| L (524.2)   | 11/4/13  | 0.0282      |

Pursuant to the Region I validation document, results for 2-butanone in all samples analyzed by Method 8260B, and for 2-butanone in all samples analyzed by Method 524.2 in this data set warranted rejection (R) based on the low RRFs achieved. However, 2-butanone was spiked at a concentration of 5 µg/L in the matrix spikes, matrix spike duplicates, laboratory control samples, and laboratory control sample duplicates for both methods analyzed with this data set, and acceptable recoveries for this compound were achieved in these analyses. Therefore, results for 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 as percent differences (%D) in the data packages. All percent differences in the submitted ICVs were within laboratory established control limits ( $\pm 25$  %D for Method 8260B and  $\pm 30$  %D for Method 524.2), and Region 1 limits for continuing calibrations ( $\pm 25$  %D), with the exceptions of vinyl chloride, bromomethane, methylene chloride, and carbon disulfide, which exhibited 32.4 %D, 65.7 %D, 31.4 %D and 41.7 %D, respectively, in the Method 524.2 ICV. As presented in the Case Narratives, carbon disulfide was inadvertently not included in the spiking solution used for all Method 8260B independent spiked analyses (ICV, laboratory control samples, and matrix spikes) in this sample set.

On the basis of the unacceptably high percent difference results in the associated ICV, results for vinyl chloride, bromomethane, methylene chloride, and carbon disulfide in all samples analyzed by Method 524.2 were qualified as estimated (J, UJ). On the basis of inability to assess method accuracy due to the omission of carbon disulfide from the independent spiking solution, all results for carbon disulfide in samples analyzed by Method 8260B were qualified as estimated (UJ).

#### IV. Continuing Calibration (CC)

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

The maximum limit for %D in the CC standard allowed by Region 1 is  $\pm 25$ %. All %D results were below this limit for the CC standards analyzed by 8260B with the following exceptions:

- bromomethane exhibited a -27.4, -48.5, -36.1, -26.3, and -48.0 %D in the CC standards analyzed on 11/1/13 at 07:24, on 11/1/13 at 15:51, on 11/2/13 at 07:07, on 11/6/13 at 08:26, and on 11/6/13 at 15:13;
- chloromethane exhibited a -26.3, and -45.7 %D in the CC standards analyzed on 11/6/13

at 08:26, and on 11/6/13 at 15:13;

- trans-1,3-dichloropropene exhibited -33.8 %D in the CC standard analyzed on 11/6/13 at 15:13.

All RRFs were above the 0.05 minimum criterion with the exception of 2-butanone in all CC standards for 8260B (range: 2-butanone, 0.0216 - 0.0243).

All %D results were below  $\pm 25\%$  for the CC standards analyzed by 524.2 with the following exceptions:

- bromomethane exhibited a -44.3, and -54.2 %D in the CC standards analyzed on 11/5/13 at 08:53, and 12/4/13 at 09:16;
- 2-butanone with -31.1%, 2-hexanone at -30.6%, carbon tetrachloride at -32.0%, and trans-1,3-dichloropropene at -38.6%D in the CC standard analyzed on 11/5/13 at 08:53.

All RRFs were above the 0.05 minimum criterion with the exception of 2-butanone in all CC standards for 524.2 (range: 2-butanone, 0.0194 - 0.0282).

On the basis of the unacceptable %D value in the associated CC standards, results for bromomethane in all samples analyzed by Method 8260B and in the Method 524.2 analyses, results for bromomethane in TB-1, FB-1, WELL-Z, SHIELDS, and WP-5 (resample); for 2-butanone, 2-hexanone, and carbon tetrachloride in samples TB-1, FB-1, WELL-Z, and SHIELDS; for chloromethane in samples SS-5, SS-Z, MW-D, TB-4, FB-6, W-1, MW-PL1, MW-PL2, MW-PLX, MW-S1, and MW-S2, and for trans-1,3-dichloropropene in samples W-1, MW-PL1, MW-PL2, MW-PLX, MW-S1, MW-S2, TB-1, FB-1, WELL-Z, and SHIELDS were qualified as estimated (UJ). For the reasons discussed in Section III, no results for 2-butanone were qualified on the basis of the low RRFs in the associated ICs and CCs.

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 five (5) water-matrix laboratory method blanks (MBs) were reported in support of the Method 8260B, and three MBs were reported in support of the Method 524.2 sample analyses. No target compounds were detected in any MB for either method with the following exceptions:

**Table 3. Method Blank (MB) Detections**

| Method Blank ID | Analyte            | Concentration (ug/L) | Reporting limit (ug/L) | Action limit (ug/L) |
|-----------------|--------------------|----------------------|------------------------|---------------------|
| Method 524.2    |                    |                      |                        |                     |
| MB 200-63821    | chloromethane      | 0.0972               | 0.50                   | See MB 200-63609    |
|                 | methylene chloride | 0.115                | 0.50                   | See MB 200-63654    |
| MB-200-63837    | methylene chloride | 0.102                | 0.50                   | See MB 200-63654    |
| MB 200-65463    | methylene chloride | 0.0903               | 0.50                   | See MB 200-63654    |
|                 | acetone            | 1.18                 | 5.0                    | 11.8                |
| Method 8260B    |                    |                      |                        |                     |
| MB 200-63609    | chloromethane      | 0.120                | 1.0                    | 0.60                |
| MB 200-63654    | methylene chloride | 0.21                 | 1.0                    | 2.1                 |

Five trip blanks (TBs) were reported in these SDGs; three for Method 8260B analysis and two for Method 524.2 analysis. No target compounds were detected in any TB in this sample set.

Six field blanks (FBs) were reported in these SDGs; four were analyzed by Method 8260B and two by Method 524.2. No target analytes were detected in any FB with the following exceptions:

**Table 4. Field Blank (FB) Detections**

| Field Blank ID | Analyte            | Concentration (ug/L) | Reporting limit (ug/L) | Action limit (ug/L) |
|----------------|--------------------|----------------------|------------------------|---------------------|
| Method 524.2   |                    |                      |                        |                     |
| FB-1           | methylene chloride | 0.13                 | 0.50                   | See MB 200-63654    |
| FB-4           | methylene chloride | 0.11                 | 0.50                   | See MB 200-63654    |
| Method 8260B   |                    |                      |                        |                     |
| FB-5           | acetone            | 1.7                  | 5.0                    | 17                  |
| FB-6           | acetone            | 1.6                  | 5.0                    | see FB-5            |

Five holding (storage) blanks (HBs) were reported in these SDGs; three were analyzed by Method 8260B and two by Method 524.2. No target analytes were detected in any HB for either method with the following exceptions: trans-1,3-dichloropropene was detected below the reporting limit in the holding blank for Method 524.2 identified as 200-19748-2 at 0.11 ug/L. Acetone was detected below the reporting limit at 1.1 ug/L in the holding blank analyzed by Method 8260B identified as 200-19071-4,.

Since chloromethane and trans-1,3-dichloropropene were not detected in any water supply sample, nor in any ground water sample, no results for chloromethane or trans-1,3-dichloropropene were qualified on the basis of laboratory contamination. Acetone and methylene chloride were detected in method blanks (MBs), field blanks (FBs), and holding (storage) blanks (HBs). The levels of these compounds detected in the field blanks are considered field contamination, and those detected in the storage blanks are attributed to the laboratory storage environment. However, the water used for field blanks and storage blanks was supplied by the laboratory, and methylene chloride and acetone were seen to be ubiquitous contaminants in laboratory blanks at similar concentrations as reported in field blanks. The validator suspects contamination of laboratory water as the source of contamination in the field and storage blanks. Because acetone and methylene chloride are recognized as common laboratory contaminants, the action limit for these analytes is 10x the highest amount found in associated blanks.

On the basis of suspected laboratory contamination exhibited in method, field, and storage blanks, results for acetone in MW-103RD, MW-104D, MW-50, MW-C, MW-D, MW-E, SP-MW3, SS-1A, SS-2, SS-5, W-20, W-25, W-SEEP, FB-5, FB-6, MW-PLX, and MW-S1 were qualified as less than the reporting limit (U). Although the result for acetone in FB-5 was higher than the highest concentration in all associated method blanks, it was qualified as less than the reporting limit (U) because this result is attributed to suspected laboratory contamination. On the basis of laboratory contamination, results for methylene chloride in FB-1, WP-8, and FB-4 were qualified as less than the reporting limit (U).

## VI. Surrogate Compounds

Percent recoveries (%R) for all surrogate compounds in Method 8260B were correctly calculated, accurately reported on the Form II summaries within the data packages, and were within acceptance limits for all sample analyses.



Surrogate recoveries were reported for Method 524.2 analysis in the surrogate summary reports in the data summary sections of the data packages. The laboratory SOP includes four surrogate compounds, and these were present in all sample analyses; however, they were reported in the same manner as internal standard compounds (on the Form VIII) in the raw data sections of the data packages.

The surrogate compounds in the Method 524.2 sample analyses were evaluated from the Form VIII area responses, and were within the acceptance criteria established by the laboratory SOP ( $\pm 30\%$  of the area response in the associated continuing calibration standard). The laboratory SOP also defines recovery criteria relative to the associated initial calibration ( $\pm 30\%$  of the ion area for that analyte in the IC; it is not specified whether average area or from the mid-point).

## 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 a single exception: in the matrix spike duplicate analysis of sample SHIELDS, the 133% recovery of the internal standard 1,2-dichloroethane- $d_4$  was above of the upper acceptance limit established by the laboratory SOP (70-130% response of the opening CCV). The validator notes that potable water samples should not exhibit matrix effects in a Method 524.2 analysis; however, since this is a quality control (QC) sample, no qualification was required.

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

Samples SS-5, MW-4S, W-1, and MW-S2 were used for the Method 8260B MS/MSD analyses in this data set, and samples WP-8, and SHIELDS were used for the Method 524.2 MS/MSD analyses. The spiking solutions for both methods contained all target compounds at 1  $\mu\text{g/L}$  (except for the ketones at 5  $\mu\text{g/L}$ ). 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 61 – 128 %R; overall laboratory-established control limits: 15 – 200 %R; Region 1 limits 60 – 140 %R) and reproducible (range 0-28%; limit 30% RPD), with the following exceptions:

**Table 5. Matrix Spike/Matrix Spike Duplicate Exceedances**

| Parent Sample | Analyte                   | Native Conc. (ug/L) | % R (MS)   | % R (MSD)  | Laboratory Limits (%R) | % RPD     |
|---------------|---------------------------|---------------------|------------|------------|------------------------|-----------|
| SHIELDS       | carbon tetrachloride      | nd                  | a          | a          | 70 - 130               | <b>32</b> |
| MW-4S         | chloroethane              | nd                  | 79         | a          | 80 - 130               | a         |
|               | acetone                   | nd                  | a          | a          | 80 - 130               | <b>34</b> |
| W-1           | bromomethane              | nd                  | <b>0</b>   | a          | 60-120                 | nc        |
|               | carbon tetrachloride      | nd                  | 69         | a          | 75-120                 | a         |
|               | trans-1,3-dichloropropene | nd                  | 61         | 78         | 80-120                 | a         |
|               | dibromochloromethane      | nd                  | 78         | a          | 80-125                 | a         |
|               | bromoform                 | nd                  | 75         | 78         | 80-120                 | a         |
|               | tetrachloroethene         | 20                  | a          | -5         | 80-120                 | a         |
| MW-S2         | chloroethane              | nd                  | <b>377</b> | <b>450</b> | 80-130                 | a         |

nd = not detected a = acceptable nc = not calculable

Results exceeding both laboratory and Region I limits are shown in **boldface**.

Since tetrachloroethene was spiked at a concentration less than four times the native concentration in sample W-1, no qualifications were necessary on the basis of the unacceptable recoveries of tetrachloroethene in the associated MSD analysis. No qualifications were deemed necessary for recoveries of the analytes shown outside laboratory-established limits but within Region 1 limits in the MS and/or MSD analyses of samples MW-4S and W-1. Since chloroethane was not detected in sample MW-S2, it was not necessary to qualify the result for chloroethane in MW-S2.

On the basis of unacceptable (0 %) recovery in the associated MS analysis but the acceptable recovery in the MSD analysis, the result for bromomethane in W-1 was qualified as estimated (UJ). On the basis of poor precision in the associated MS and MSD analyses, results for carbon tetrachloride and acetone in SHIELDS and MW-4S, and for bromomethane in W-1 were qualified as estimated (UJ).

All analytes, with the exception of carbon disulfide, were spiked into the MS/MSD analyses; therefore non-spiked target compounds could not be evaluated against the parent samples to evaluate laboratory precision. As previously discussed, carbon disulfide was inadvertently not included when the spiking solution was prepared for the ICV, laboratory control samples, and the MS/MSD analyses associated with this sample set. All results for carbon disulfide were previously qualified on the basis of the inability to evaluate method accuracy for this analyte.

## IX. Field Duplicates

SDG Nos. BRES56, UNIF47, WHEA19, and UNIF48 contained four groundwater and two potable water field duplicate pairs, which were identified by the field sampler as follows:

**Table 6. Field Duplicate Identifications**

| Field Sample | Field Duplicate |
|--------------|-----------------|
| Groundwater  |                 |
| MW-101D      | MW-Z            |
| MW-25884     | BRW-Z           |
| MW-C         | W-Z             |
| MW-PL2       | MW-PLX          |
| Water Supply |                 |
| SHIELDS      | WELL-Z          |
| WP-3         | WP-Z            |

Tetrachloroethene were detected at greater than twice the quantitation limit in MW-101D, MW-Z, MW-C, and W-Z; trichloroethene was detected at greater than twice the quantitation limit in MW-101D and MW-Z, and above the quantitation limit in MW-C, W-Z, WP-3, and WP-Z; and cis-1,2-dichloroethene was detected at greater than twice the quantitation limit in MW-101D and MW-Z.

Trichloroethene, tetrachloroethene, cis-1,2-dichloroethene and total 1,2-dichloroethene were detected below the quantitation limit in MW-25884 and BRW-Z; cis-1,2-dichloroethene was detected below the quantitation limit in WP-3 and WP-Z; trans-1,2-dichloroethene was detected below the quantitation limit in MW-101D and MW-Z; cis-1,2-dichloroethene was detected below the quantitation limit in samples WP-3 and WP-Z; xylenes (total) were detected below the quantitation limit in MW-25884; and acetone was detected below the quantitation limit in MW-C and MW-PLX. Carbon disulfide was detected at the quantitation limit in WP-Z and just below the quantitation limit in WP-3. No other

target compounds greater than 2 times the quantitation limit were detected in these samples, so precision could not be evaluated for any other analytes in these field duplicate pairs.

Precision in the field duplicate pairs MW-101D and MW-Z, MW-25884 and BRW-Z, MW-C, and W-Z, MW-PL2 and MW-PLX, SHIELDS 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 and verification studies submitted for Method 8260B were performed from November, 2010 through January, 2011, and verified in December, 2010 and February, 2011. The Limit of Quantitation (LOQ) values are verified on a quarterly basis, and checked during on-site assessments performed by NELAP and Department of Defense assessors. All project analytes in this study had calculated MDL values below the method quantitation limits and verified, acceptable LOQ values.

The aqueous MDL and the MDL verification studies for Method 524.2 submitted for this project were completed on 2/1/13, which is less than one year prior to the sample analyses in this data set. All analytes had calculated and verified MDLs below the method quantitation limits in the MDL study.

New Method 820B MDL studies have been performed, but have not been fully reviewed and released by the laboratory. Current verification studies have not been requested for either method. 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 (ketones at 5 µg/L), as required by the FLCM. Recoveries within or above Region 1 acceptance criteria (60 – 140 %R) were obtained for all target analytes in all spiked analyses (except as noted). In addition, the low standard of the initial calibrations for both methods supports the reporting limit for the sample analyses.

On the basis of acceptable recoveries in low-concentration laboratory control samples, and the low standard of the initial calibrations at the reporting limit, sensitivity for both methods was deemed acceptable for the purposes of this monitoring program.

## **XI. Performance Evaluation (PE) Samples/Accuracy Check**

Five zero blind PE samples (commonly known as laboratory control sample, LCS) and duplicate (LCSD) pairs, and three LCS and LCSD pairs were prepared and analyzed by the laboratory at 1 µg/L (ketones at 5 µg/L) in support of the Method 8260B and Method 524.2, respectively, sample analyses in this data set. Laboratory established control limits are 15 – 200 %R (overall) for Method 8260B, and 70 - 130 %R for each analyte for Method 524.2; the Region 1 control limits are 60 – 140 %R. The laboratory limit of 30 %RPD limit is shown on the Form III summaries for Method 8260B analyses, and a 20 %RPD limit is shown on the Form III summaries for the Method 524.2 paired analyses; the Region 1 limit for paired aqueous analyses is 30 %RPD.

Percent recoveries were correctly calculated and accurately reported on Form III summaries in the data packages, and were acceptable (64 – 128 %R for Method 8260B, and 71 - 128 %R for Method 524.2) and reproducible (0 - 29 %RPD across both methods) with the following exceptions:

**Table 7. LCS/LCSD Exceedances**

| Batch ID (date)           | Analyte                   | LCS %R     | LCSD %R    | Laboratory Limits (%R) | % RPD     |
|---------------------------|---------------------------|------------|------------|------------------------|-----------|
| Method 524.2              |                           |            |            |                        |           |
| 200-63837 (11/5/13)       | acetone                   | a          | (a)        | 70 - 130               | <b>32</b> |
|                           | carbon tetrachloride      | a          | a          | 70 - 130               | 25        |
|                           | chloromethane             | a          | a          | 70 - 130               | 24        |
|                           | trans-1,3-dichloropropene | a          | a          | 70 - 130               | 24        |
| 200-65463 (12/4/13)       | bromomethane              | <b>175</b> | <b>163</b> | 70 - 130               | a         |
| Method 8260B              |                           |            |            |                        |           |
| 200-63609<br>(11/1/13 am) | carbon tetrachloride      | <b>58</b>  | <b>58</b>  | 75 - 120               | a         |
|                           | trans-1,3-dichloropropene | 76         | 76         | 80 - 120               | a         |
| 200-63643<br>(11/1/13 pm) | methylene chloride        | 123        | a          | 80 - 120               | a         |
| 200-63654<br>(11/2/13)    | chloromethane             | 121        | a          | 65 - 120               | a         |
|                           | methylene chloride        | 121        | a          | 80 - 120               | a         |
| 200-63819<br>(11/6/13 am) | chloromethane             | a          | <b>143</b> | 65 - 120               | a         |
| 200-63866<br>(11/6/13 pm) | chloromethane             | 136        | a          | 65 - 120               | a         |
|                           | bromomethane              | <b>142</b> | 126        | 60 - 120               | a         |

a = acceptable

(a) see discussion in text below

Results exceeding both laboratory and Region I limits are shown in **boldface**.

No reanalysis was performed for the recoveries above the upper acceptance limits in any of the LCS/LCSD pairs. For Method 8260B, since the reported recoveries were within Region 1 limits, no results were qualified for the recoveries slightly above laboratory control limits for methylene chloride and chloromethane in the LCS or LCSD analyses on 11/1/13, 11/2/13, and 11/6/13, or for the recoveries slightly below the lower laboratory control limit for trans-1,3-dichloropropene in the LCS and LCSD analyses on 11/1/13.

The validator requested that the laboratory Quality Assurance Officer review the manual integration performed for acetone in LCSD 200-63837. In an email response, the laboratory concurred with the validator's opinion that this integration was improperly or inconsistently performed, and agreed to review this integration and retrain all analysts. The original integration would have produced a recovery of 141 %R, which is above laboratory and Region I limits. A revision was not provided in response to these concerns.

Since bromomethane and chloromethane were not detected in associated samples, no results required qualification on the basis of recoveries above both laboratory and Region 1 limits in the associated LCS and LCSD analyses on 12/4/13 (bromomethane) for method 524.2 and on 11/6/13 (am and pm, chloromethane) and on 11/6/13 (pm, bromomethane) for Method 8260B.

Carbon tetrachloride recoveries were below both laboratory established control limits and Region 1 limits for the LCS and LCSD samples analyzed on 11/1/13 (am) for Method 8260B. Non-detected results for carbon tetrachloride in samples TB-2, FB-3, BRW-3, BRW-2, BRW-1, MW-103RD, FB-2, BRW-Z, and MW-25884 were qualified as estimated (UJ) on the basis of the unacceptably low recoveries in the associated LCS and LCSD analyses.

On the basis of the unacceptable precision in the associated LCS and LCSD sample analyses on

11/5/13, results for acetone in FB-4, TB-3B, WP-Z, WP-5, WP-7, WP-13, WP-3, and WP-8 were qualified as estimated (UJ). Since the relative percent differences were below the Region 1 limit of 30 %RPD, no results were qualified for the reported precision above the laboratory acceptance limit (20 %RPD) for carbon tetrachloride, chloromethane, and trans-1,3-dichloropropene in this LCS and LCSD pair.

As previously discussed, carbon disulfide was inadvertently not included when the spiking solution was prepared for the ICV, LCS/LCSD, and MS/MSD analyses associated with this sample set. All results for carbon disulfide were previously qualified on the basis of the inability to evaluate method accuracy for this analyte.

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). One target analyte not added by the vendor, chloroform, was reported in the analysis of the PES, at a concentration below the quantitation limit (0.26 ug/L). The validator requested that the laboratory investigate the false positive result for chloroform. The laboratory confirmed the detection for chloroform in the PES and also noted that it confirmed that the associated method blank was non-detect for this compound. Chloroform was also reported at 0.13 ug/L in sample WP-5, and at 1.0 ug/L in sample WP-13; however, per Region 1 guidelines, since this analyte was not detected in any laboratory blank analysis, no qualifications were applied on the basis of the false positive reported in the PES analysis.

## **XII. Target Compound Identification**

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

## **XIII. Compound Quantitation and Reported Quantitation Limits**

Target compound quantitation and practical quantitation limits (PQLs) were accurately reported on the Form I summaries. Based on screen results, dilution analyses (1.3- to 1.8-fold) were initially performed for samples MW-101D, MW-D, and MW-Z to bring results for tetrachloroethene within the upper half of the calibration range for Method 8260B. Based on the reported result, the 1.3-fold dilution performed on MW-D was probably not necessary, but because the concentration on-column was in the upper half of the calibration range and the dilution was less than 4-fold, the requirements of the FLCM were satisfied, and no full-strength analysis was performed.

One or more manual integrations were performed on field samples and spiked analyses. The manual integrations appear to be correctly performed, are initialed by the analyst, and are accurately reported with the final area listed on the tabular report and the before and after ion chromatograms included in the data packages with the following exception; the re-integration of acetone in LCSD 200-63837 was deemed by the validator to appear to be done in order to minimize the response and bring the recovery into the laboratory limits. At the validator's request, the laboratory reviewed automated and manual integrations for acetone in this data set, and agreed that this particular integration was improper. The laboratory stated that they would discuss the inconsistencies in the integrations with the analysts and retrain analysts on how to properly and consistently handle these situations.

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 in the “Validated\_Value” column in the Data Summary Table in Attachment A and in the spreadsheet summary files submitted electronically as Attachment B. The final qualifiers based on the validation effort are presented in the “Validator\_Qualifier” column in the Data Summary Table and in the spreadsheet summary files. All results, positive and non-detect, are listed in these summaries, whether or not the value or qualifier was changed as a result of the validation; if a value or qualifier was changed, this is indicated by the “Y” (for yes) notation in the column “Validator\_Change” in the Data Summary Table. Sample-specific (practical) quantitation limits (PQL) are given in the summaries.

All laboratory-specific qualifiers, such as the asterisk (\*), have been removed by the validator. This is not noted as a validation change.

#### **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 exceptions noted within this report.

#### **XVI. Overall Evaluation of Data**

Results for volatile organic compounds were determined to be valid as reported for all samples in SDG Nos. BRES56, UNIF47, WHEA19, and UNIF48, with the following exceptions:

- On the basis of the unacceptably high percent difference results in the associated ICV, results for vinyl chloride, bromomethane, methylene chloride, and carbon disulfide in all samples analyzed by Method 524.2 were qualified as estimated (J, UJ).
- On the basis of inability to assess method accuracy due to the omission of carbon disulfide from the independent spiking solution, all results for carbon disulfide in samples analyzed by Method 8260B were qualified as estimated (UJ)
- On the basis of the unacceptable %D value in the associated CC standards, results for bromomethane in all samples analyzed by Method 8260B, and in the Method 524.2 analyses, results for bromomethane in TB-1, FB-1, WELL-Z, SHIELDS, and WP-5 (resample); for chloromethane in samples SS-5, SS-Z, MW-D, TB-4, FB-6, W-1, MW-PL1, MW-PL2, MW-PLX, MW-S1, and MW-S2; and for trans-1,3-dichloropropene in samples W-1, MW-PL1, MW-PL2, MW-PLX, MW-S1, and MW-S2 were qualified as estimated (UJ).
- On the basis of suspected laboratory contamination exhibited in method, field, and storage blanks, results for acetone in MW-103RD, MW-104D, MW-50, MW-C, MW-D, MW-E, SP-

MW3, SS-1A, SS-2, SS-5, W-20, W-25, W-SEEP, FB-5, FB-6, MW-PLX, and MW-S1 were qualified as less than the reporting limit (U). On the basis of laboratory contamination, results for methylene chloride in FB-1, WP-8, and FB-4 were qualified as less than the reporting limit (U).

- On the basis of unacceptable (0 %) recovery in the associated MS analysis but the acceptable recovery in the MSD analysis, the result for bromomethane in W-1 was qualified as estimated (UJ). On the basis of poor precision in the associated MS and MSD analyses, results for carbon tetrachloride and acetone in SHIELDS and MW-4S, and for bromomethane in W-1 were qualified as estimated (UJ).
- Non-detected results for carbon tetrachloride in samples TB-2, FB-3, BRW-3, BRW-2, BRW-1, MW-103RD, FB-2, BRW-Z, and MW-25884 were qualified as estimated (UJ) on the basis of the unacceptably low recoveries in the associated LCS and LCSD analyses.
- On the basis of the unacceptable precision in the associated LCS and LCSD sample analyses, results for acetone in FB-4, TB-3B, WP-Z, WP-5, WP-7, WP-13, WP-3, and WP-8 were qualified as estimated (UJ).
- Although chloroform was reported below the quantitation limit as a false positive in the PES, and was also reported at 0.13 ug/L in sample WP-5, and at 1.0 ug/L in sample WP-13, per Region 1 guidelines, since this analyte was not detected in any laboratory blank analysis, no qualifications were applied on the basis of the false positive in the PES analysis.
- 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.
- All laboratory-specific qualifiers, such as the asterisk (\*), have been removed by the validator.

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

## **XVII. Documentation**

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

Data presentation was acceptable, with the following exceptions:

- The samples collected at the Bressett site on 10/22/13 (laboratory identifiers 200-19070-1 through 200-19070-8) were delivered to the laboratory on the same day as collected, as recorded on the chain of custody document, which was properly signed by the field sampler and the laboratory technician receiving the samples. However, these samples were incorrectly logged in as received on 10/23/13. The summary forms showing the date of receipt for these samples are incorrect, as are the entries in the electronic data deliverable in the “Receive Date” column for these eight samples. A note indicating the correct receipt date has been added to the spreadsheet of validated results in a column labeled “Comments”.

- The validator requested that the laboratory Quality Assurance Officer review the manual integration performed for acetone in LCSD 200-63837. In an email response, the laboratory concurred with the validator's opinion that this integration was improperly or inconsistently performed, and agreed to review this integration and retrain all analysts. The original integration would have produced a recovery of 141 %R, which is above laboratory and Region I limits. A revision was not provided in response to these concerns.
- Trichloroethene does not appear on the raw data quantitation report for either sample in SDG No. UNIF48, although the ion chromatograms were included for manual integrations in both samples, and it does appear on the Form 1's. At the validator's request, the laboratory investigated this reporting error, and the omissions were attributed to a "software glitch". On January 29, 2014, the laboratory submitted corrected reports (included in Attachment D).
- Total ion chromatograms for instrument CHL do not show integration marks, which are necessary for a full evaluation of the chromatographic system. The laboratory responded to the validator's concerns by saying they were using a new data software system and this feature had not been enabled. They were making the necessary change and stated that chromatograms showing the integration marks would be included in future data submissions.

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



**From:** [Chris Page](#)  
**To:** [Noyes, Gerold](#)  
**Cc:** ["Miles Waite"](#)  
**Subject:** Wheatley Report  
**Date:** Wednesday, May 14, 2014 4:49:17 PM

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Good afternoon Gerold,

Upon reviewing Johnson Company's comments regarding the Wheatley Site report, WHEM respectfully declines to reissue a report at this time, but has taken note of any deviations from the work plan and will correct them going forward. All wells were purged at a rate of 160-200 ml/min, which is sufficient to replace all water in our flow cell in a three-minute period. **It may be worth taking this opportunity to revise our work plan** to stress that the time between measurements is based on the ability for water to refill the flow cell we use, which is 500 ml. Therefore, any wells that are pumped at > 167ml/min do not need to be measured every 5 minutes- 3 minutes will suffice at meeting that requirement. At 160 ml/min, the difference is sufficiently marginal that WHEM stands by the field data reported, and believes that these wells did reach stabilization to a practical extent. Also, I've looked into it further, and the rental flow cell has a volume of 203ml, and would be perfect for use at any sites where the purge rate falls below 167 ml/min. We can avoid this problem altogether by using that flow cell, and I've spoken to Miles about this. We will employ that flow cell going forward.

2 minute measurements will be avoided going forward, unless the rental cell is used and the pump rate is sufficiently high (>100 ml/min). Additionally, WHEM will include information on the field sheets detailing the flow cell and volume used, so to validate the frequency of data collection with respect to flow rate.

I would be happy to add language like that above to our work plan to limit confusion going forward.

Regarding the groundwater contour, we agree that the contour is inaccurate but at the scale of the map and site status, it does not merit the time required to reissue the report.

Please let me know your thoughts. If you believe it is imperative to reissue the Wheatley reports based on Johnson Company's responses, we will go ahead and do that, but I thought it would be worth taking a moment to reason it out first.

Thanks much,

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