

Waite - Heindel  
Environmental Management

March 20, 2015

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

RE: 2014 Annual Monitoring Report  
Wheatley Site, Brookfield, Vermont (Site #94-1693)

Dear Gerold:

Waite-Heindel Environmental Management (WHEM) is pleased to present the *2014 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 2014 (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

# **2014 ANNUAL MONITORING REPORT**

for the

## **WHEATLEY SITE BROOKFIELD, VERMONT**

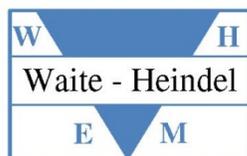
VT DEC Site #77-0087

March 20, 2015

*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 *2014 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 2014. Monitoring locations were at the Wheatley Farm Site, currently a residential property occupied by Mr. James Moorcroft. Work conducted during 2014 and covered in this report include:

- Monitoring of four (4) groundwater monitoring wells during October 2014.

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 23, 2014. 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 23, 2014, 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 5.31 to 19.62 ft below top-of-casing (ft btoc).

Using top-of-casing elevation data, the measurements were converted into groundwater elevations. Elevation data from October 2014 are shown with historical measurements in Table 1.1 in Appendix B. Compared to the previous round of measurements in October 2013, the water table elevation decreased in the PL-series wells (by an average of 0.52 ft), but increased in the S-series wells (by an average of 0.38 feet). The water table elevation in MW-PL2 was the lowest reported to date (data extending to October 2002).

Groundwater elevations were also plotted to develop a groundwater elevation map (see Groundwater Elevation Map – October 2014 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 0.011 ft/ft, or 1.1%. 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 2014 groundwater flow direction and gradient is typical for this Site.

## 2.2 Groundwater Sample Collection

Monitoring wells were purged and sampled using low-flow methodology. This involved utilizing 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 silicone tubing that ran through the head of the peristaltic pump; new silicone tubing was used for each well purged. The purge rate, as specified by site protocols, was 200 milliliters/minute (ml/min). Purge rates were reduced at wells MW-PL1 and MW-PL2 to reduce well drawdown and sample turbidity (to 100 ml/min and 75 ml/min, respectively). 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 calibrated 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; between each sample, the flow cell was rinsed with a mixture of methanol and de-ionized water, and the probes were rinsed with de-ionized water.

Wells were allowed to purge until geochemical parameters stabilized, as specified by site protocols. Upon stabilization, the silicone 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 recent historical data (2008 to present) 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 other than reducing the purge rate at MW-PL1 and MW-PL2.

## 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 located 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 (2002-2013), the following observations can be made from the October 2014 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, increasing only slightly from 2013 readings, with no anomalies or clear trends.
- **pH** readings were generally within the range of historical measurements with the exception of MW-PL2, which reported an unusually low pH.
- **Turbidity** readings were generally lower than historical measurements for all wells, likely attributable to the use of low-flow methodology. Readings increased compared to 2012 and 2013 monitoring rounds, however, though it is not clear why.
- **Redox (ORP)** readings were generally higher (more positive) than historical measurements for all wells, including a slightly positive ORP in MW-S1. Generally, reducing (negative ORP) conditions are observed in both S-series wells.

### 2.4.2 Analytical Results

The analytical results from October 2014 indicate the following:

- **MW-PL1:** the target compound PCE was reported at a concentration of 2.4 micrograms per liter (ug/L). TCE was estimated at a trace concentration of 0.32 ug/L, below the method detection limit. 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. Since that spike, contaminant concentrations have decreased to more typical levels (2.0-3.0 ug/L), as 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 2014 sampling event. A duplicate “MW-PLX” was collected in conjunction with MW-PL1. These samples were analyzed by TA using the same method (EPA Method 8260B). PCE was detected in both samples at comparable concentrations (2.4 ug/L in MW-PL1, 2.3 ug/L in “MW-PLX”) at over twice the method detection limit, indicating acceptable sample parity. Trace TCE was estimated in both compounds, but below the method detection limit in both cases.

WHEM also collected a trip blank (TB-4) and a field blank (FB-6) during the October 2014 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 2014 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 target volatile organic compounds in groundwater collected from the Site during October 2014 were determined to be valid as reported for all samples. While there were qualifications for non-target compounds (acetone, methylene chloride, chloromethane and bromomethane), and some documentation and compliance issues noted for the sample group, these issues did not 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 2015.

## 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.



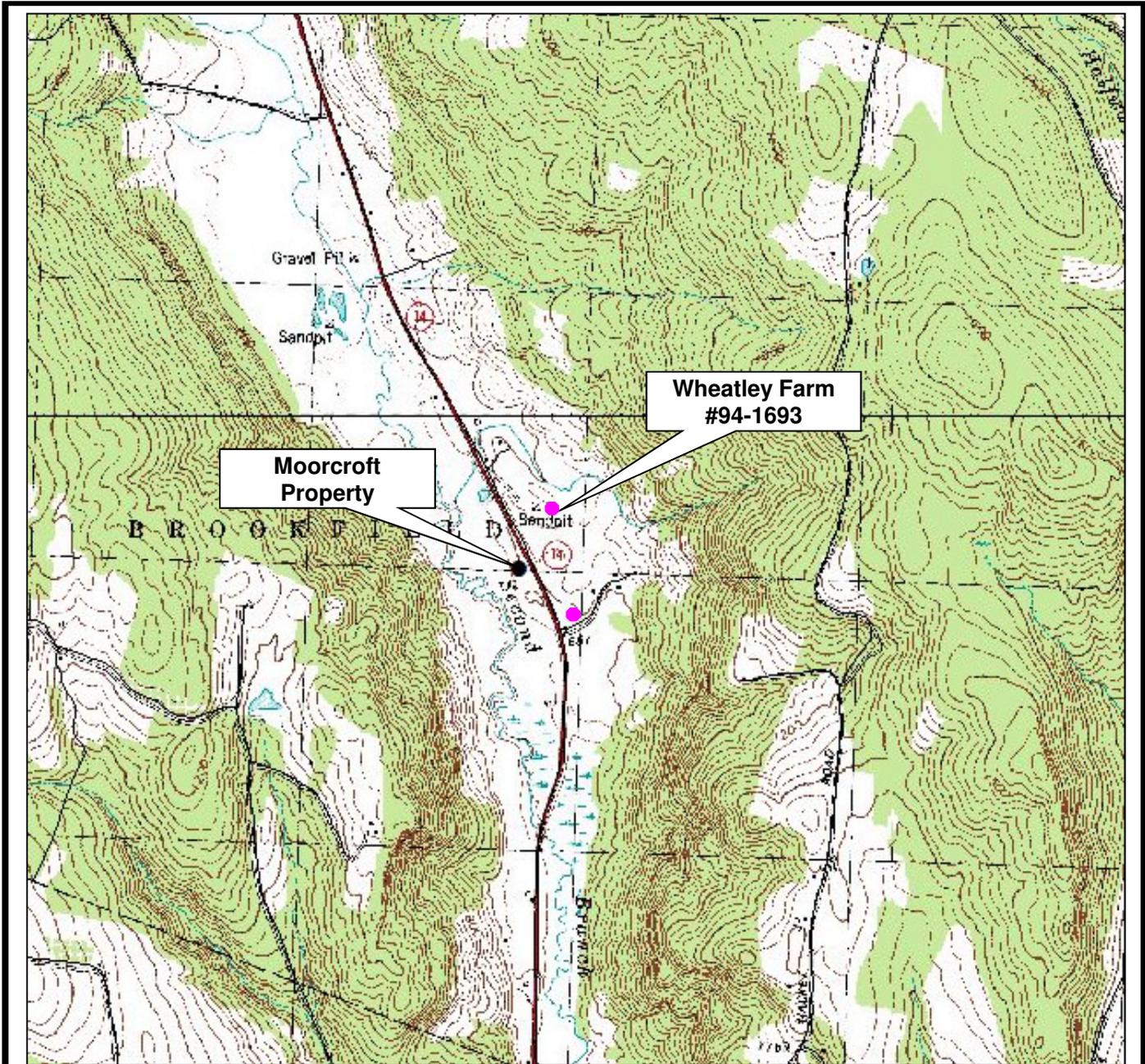
#### **4.0 REFERENCES**

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. BRES59, UNIF52, and WHEA20*, January 26, 2015.
5. State of Vermont, Agency of Natural Resources, Department of Environmental Conservation, *Chapter 12, Groundwater Protection Rule and Strategy*, February, 2005.



# **APPENDIX A:**

## **FIGURES**



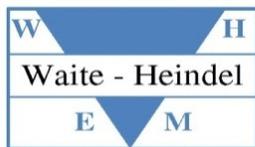
**LEGEND**

- Site
- State-Listed Hazardous Waste Site



Map Source:  
Data Source

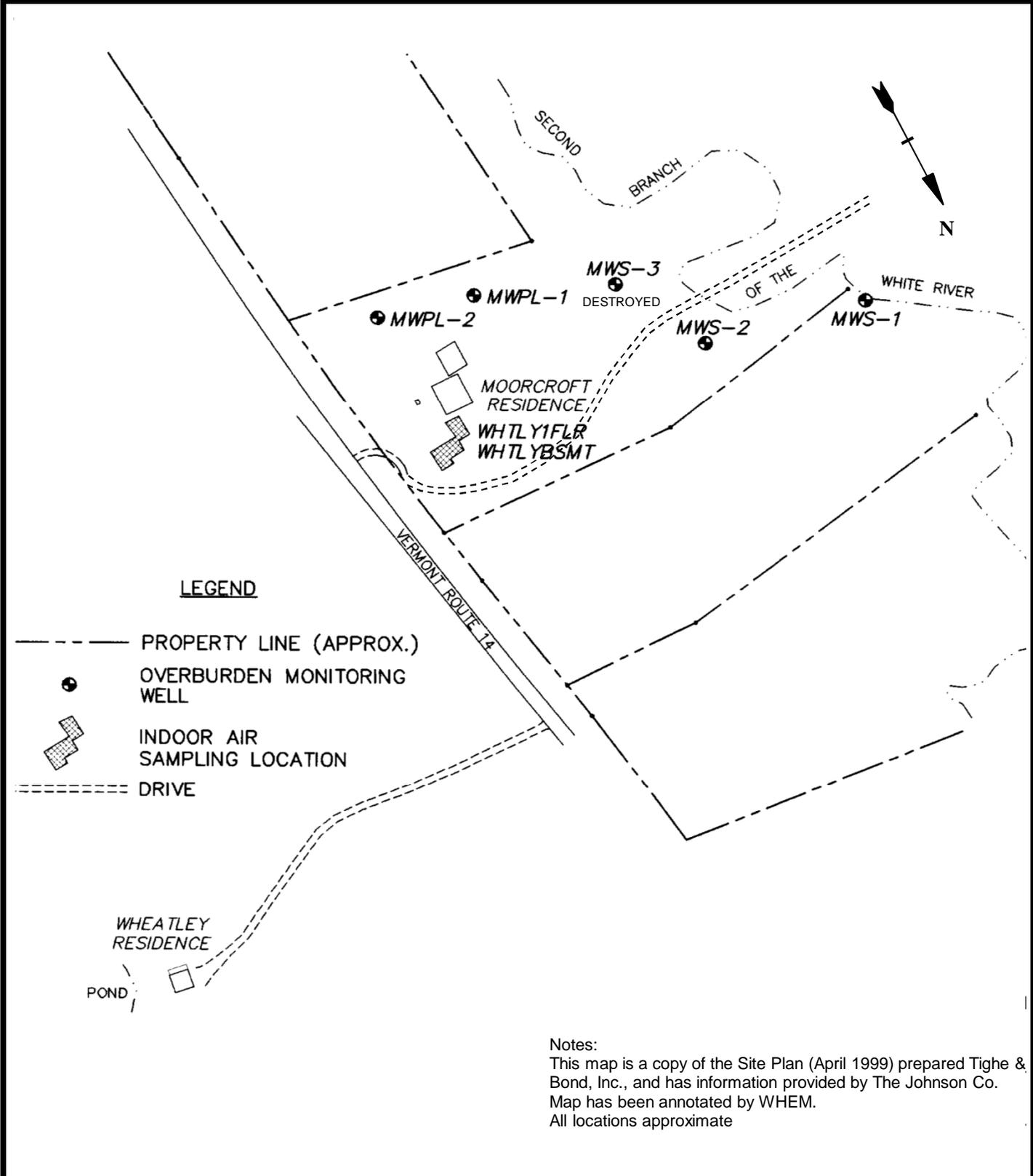
USGS Mapping 7.5 Minute Quadrangles: Brookfield (1983), Randolph Ctr (1983)  
Vermont DEC databases, updated 2006.



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

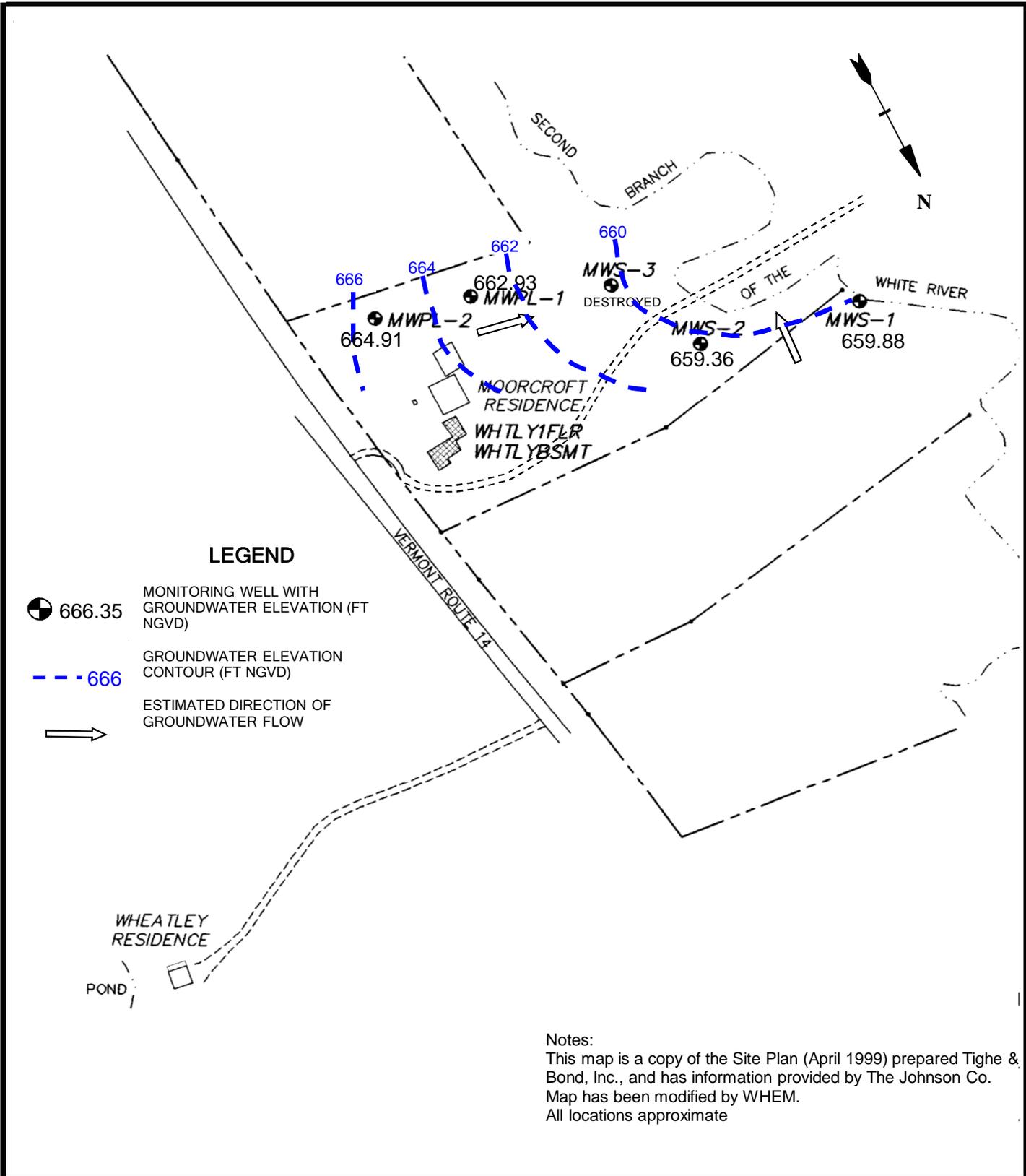
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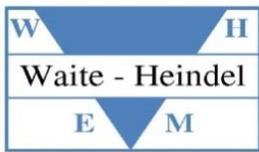
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**SITE PLAN**  
**Wheatley Farm / Moorcroft Property**  
**Brookfield, Vermont**

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



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



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 Environmental Management

**GROUNDWATER ELEVATION CONTOUR MAP**

**Oct-14**

**Wheatley Farm / Moorcroft Property**  
**Brookfield, Vermont**

Date: 01/21/15 | Drawing No. 3 | Scale: 1" = 200' | By: MEW



# **APPENDIX B:**

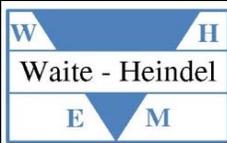
## **TABLES AND GRAPHS**



**TABLE 1.1**  
**Groundwater Elevation Measurements: 2008 - 2014**  
**Wheatley Site, Brookfield, Vermont**

Location	Type	Units	Oct-08	Oct-09	Oct-10	Oct-11	Oct-12	Oct-13	Oct-14
MW-S1	Monitoring Well	FT	660.35	659.62	660.68	660.21	660.22	659.55	659.88
MW-S2	Monitoring Well	FT	660.32	659.30	660.46	659.89	660.02	658.94	659.36
MW-S3	Monitoring Well	FT	661.83	WELL DESTROYED					
MW-PL1	Monitoring Well	FT	663.81	662.26	664.07	663.88	663.41	663.05	662.93
MW-PL2	Monitoring Well	FT	666.91	666.24	666.59	667.22	665.48	665.84	664.91

Notes:  
 -All elevations in feet above NGVD; "NGVD" = National Geodetic Vertical Datum (1988).  
 -"Dry" = well dry during monitoring event; "NA" =not available; "NS" = not sampled.



**TABLE 1.2**  
**Dissolved Oxygen Field Measurements: 2008 - 2014**  
**Wheatley Site, Brookfield, Vermont**

Location	Type	Units	Oct-08	Oct-09	Oct-10	Oct-11	Oct-12	Oct-13	Oct-14
MW-S1	Monitoring Well	mg/L	0.00	0.00	3.42	3.94	0.00	0.98	0.82
MW-S2	Monitoring Well	mg/L	1.51	0.00	3.89	3.81	0.00	0.31	0.86
MW-S3	Monitoring Well	mg/L	0.00	WELL DESTROYED					
MW-PL1	Monitoring Well	mg/L	1.75	2.45	4.79	6.19	2.35	2.30	2.65
MW-PL2	Monitoring Well	mg/L	8.17	9.55	7.28	9.89	6.37	6.67	5.44

Notes:

-"Dry" = well dry during monitoring event; "NA" = not available; "NS" = not sampled.

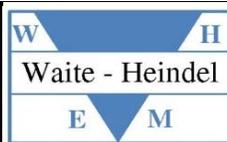
-Data from 2002-2003 collected by Tighe & Bond and reported in "2002 Monitoring Report Summary, Wheatley Farm Site" (March 12, 2003) and "2003 Monitoring Report Summary, Wheatley Farm Site" (March 12, 2004).



**TABLE 1.3**  
**Specific Conductance Field Measurements: 2008 - 2014**  
**Wheatley Site, Brookfield, Vermont**

Location	Type	Units	Oct-08	Oct-09	Oct-10	Oct-11	Oct-12	Oct-13	Oct-14
MW-S1	Monitoring Well	us/cm	319	518	401	528	348	332	353
MW-S2	Monitoring Well	us/cm	222	346	255	310	238	188	198
MW-S3	Monitoring Well	us/cm	273	WELL DESTROYED					
MW-PL1	Monitoring Well	us/cm	448	744	574	749	460	425	437
MW-PL2	Monitoring Well	us/cm	376	661	528	750	523	336	489

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).

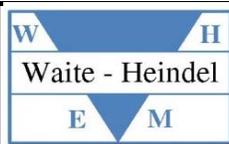


**TABLE 1.4**  
**Temperature Field Measurements: 2008 - 2014**  
**Wheatley Site, Brookfield, Vermont**

Location	Type	Units	Oct-08	Oct-09	Oct-10	Oct-11	Oct-12	Oct-13	Oct-14
MW-S1	Monitoring Well	deg C	15.3	14.3	9.8	10.6	12.5	13.45	13.49
MW-S2	Monitoring Well	deg C	15.6	14.2	10.6	12.8	13.8	13.28	10.73
MW-S3	Monitoring Well	deg C	11.3	WELL DESTROYED					
MW-PL1	Monitoring Well	deg C	10.1	10.0	8.5	9.6	10.5	10.22	9.59
MW-PL2	Monitoring Well	deg C	10.7	9.8	9.2	9.2	11.3	10.10	9.28

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).



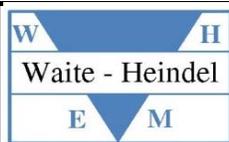
**TABLE 1.5**  
**pH Field Measurements: 2008 - 2014**  
**Wheatley Site, Brookfield, Vermont**

Location	Type	Units	Oct-08	Oct-09	Oct-10	Oct-11	Oct-12	Oct-13	Oct-14
MW-S1	Monitoring Well	unitless	NA	7.96	6.92	7.32	8.11	7.68	7.77
MW-S2	Monitoring Well	unitless	NA	6.71	6.00	6.66	6.46	6.20	6.38
MW-S3	Monitoring Well	unitless	NA	WELL DESTROYED					
MW-PL1	Monitoring Well	unitless	NA	6.31	6.10	6.20	7.50	7.22	6.95
MW-PL2	Monitoring Well	unitless	NA	6.43	6.20	6.59	7.32	7.12	6.09

Notes:

- "Dry" = well dry during monitoring event; "NA" = not available; "NS" = not sampled.

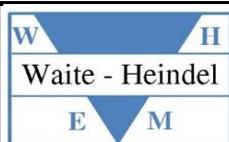
- Data from 2002-2003 collected by Tighe & Bond and reported in "2002 Monitoring Report Summary, Wheatley Farm Site" (March 12, 2003) and "2003 Monitoring Report Summary, Wheatley Farm Site" (March 12, 2004).



**TABLE 1.6**  
**Turbidity Field Measurements: 2008 - 2014**  
**Wheatley Site, Brookfield, Vermont**

Location	Type	Units	Oct-08	Oct-09	Oct-10	Oct-11	Oct-12	Oct-13	Oct-14
MW-S1	Monitoring Well	NTU	71.2	11.4	NA	119	10.8	2.3	17.9
MW-S2	Monitoring Well	NTU	0.0	0.0	NA	52.4	0.0	1.1	5.2
MW-S3	Monitoring Well	NTU	2.9	WELL DESTROYED					
MW-PL1	Monitoring Well	NTU	0.0	1.2	NA	44.3	0.0	11.2	19.8
MW-PL2	Monitoring Well	NTU	0.0	3.2	NA	80.7	2.5	2.8	13.8

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: 2008 - 2014**  
**Wheatley Site, Brookfield, Vermont**

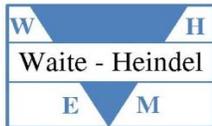
Location	Type	Units	Oct-08	Oct-09	Oct-10	Oct-11	Oct-12	Oct-13	Oct-14
MW-S1	Monitoring Well	mV	-182	-173	-187	-197	-112	-103	28
MW-S2	Monitoring Well	mV	-50	-68	-62	-115	-26	-16	-5
MW-S3	Monitoring Well	mV	-205	WELL DESTROYED					
MW-PL1	Monitoring Well	mV	101	155	158	148	169	122	247
MW-PL2	Monitoring Well	mV	112	153	170	148	175	127	309

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).



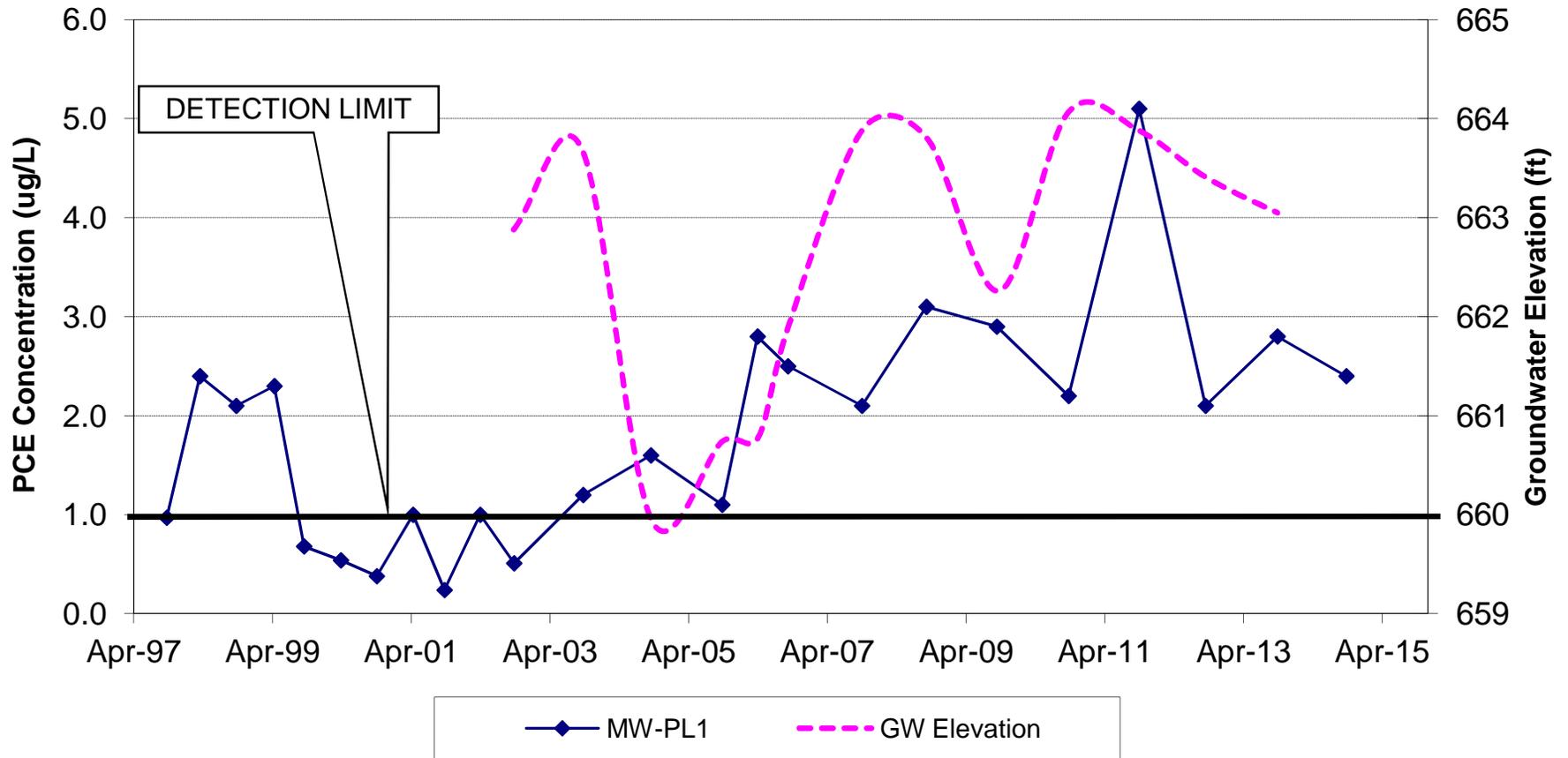
**TABLE 2.0  
MONITORING WELL RESULTS: 2007-2014  
Wheatley Farm Site, Brookfield**

Location	Parameter Method 8260	Groundwater Enforcement Standard	Units	Oct-07	Oct-08	Oct-09	Oct-10	Oct-11	Oct-12	Oct-13	Oct-14
MW-S1	PCE	5.0	ug/L	1.0 U							
	TCE	5.0	ug/L	1.0 U							
	cis-1,2-DCE	70.0	ug/L	1.0 U							
	trans-1,2-DCE	100.0	ug/L	1.0 U							
MW-S2	PCE	5.0	ug/L	1.0 U							
	TCE	5.0	ug/L	1.0 U							
	cis-1,2-DCE	70.0	ug/L	1.0 U							
	trans-1,2-DCE	100.0	ug/L	1.0 U							
MW-S3	PCE	5.0	ug/L	1.0 U	1.0 U						
	TCE	5.0	ug/L	1.0 U	1.0 U						
	cis-1,2-DCE	70.0	ug/L	1.0 U	1.0 U						
	trans-1,2-DCE	100.0	ug/L	1.0 U	1.0 U						
MW-PL1	PCE	5.0	ug/L	2.1	3.1	2.9	2.2	5.1	2.1	2.8	2.4
	TCE	5.0	ug/L	1.0 U	1.0 U	1.0 U	1.0 U	0.47 J	0.19 J	0.34 J	0.32 J
	cis-1,2-DCE	70.0	ug/L	1.0 U							
	trans-1,2-DCE	100.0	ug/L	1.0 U							
MW-PL2	PCE	5.0	ug/L	1.0 U							
	TCE	5.0	ug/L	1.0 U							
	cis-1,2-DCE	70.0	ug/L	1.0 U							
	trans-1,2-DCE	100.0	ug/L	1.0 U							

Notes:

- "PCE" = tetrachlorethene; "TCE" = tricholorethene; "DCE" = dichloroethene.
- "U" = not detected above listed quantitation limit; "J" = reported concentration is an estimated value; "UJ" = reported quantitation limit is an estimated value.
- "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.

### 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**



Waite-Heindel  
Environmental Management

UNIFIRST

FIELD WATER COLLECTION SHEET

SAMPLING LOCATION: MW-PL2 Pump Intake Depth: 20'

Date: 10/23/14 Pump Type: per

Sampler: CP/MW Well Diameter: 8 3/4"

Weather: drizzle, cold Well Depth: 20.40

Water Type: GW Initial Depth to Water: 19.62

Sampling Method: bailer Traditional Purge Vol. / Rate: 7.5 gal/min

sw    low    supply  
bailer    ↓    grab

Time	DTW (ft btp)	Purge Rate (ml/min)	Temp. (deg C)	Specific Cond. (ms/cm) / (us/cm)	pH	ORP (mv)	DO (mg/L)	Turbidity (NTU)	Notes
0926	19.90	100 → 75	9.53	50	5.67	344	5.64	65.7	state T.S.R./m clear, N.O.
0929	19.92	75	9.59	503	5.72	377	5.70	63.8	
0932			9.51	496	5.85	324	4.93	22.6	
0935			9.49	496	5.90	326	4.95	15.4	
0938			9.41	491	5.98	321	4.95	11.8	
0941			9.33	492	6.06	314	5.47	15.3	
0945			9.29	490	6.11	311	5.41	13.5	
0947			9.28	489	6.09	309	5.44	13.8	

**SAMPLE COLLECTION**

Purge Volume: 0.54    Temp.: 9.28    pH: 6.09    ORP: 309    DO: 5.44    Turbidity: 13.8

Final Measurements:    Type Container: VOA    # Container: 3    Preservative: HCL    Analysis Method: 8260    Collection Time: 0950    COC #:

Sample Description: MW-PL2

Additional:    Additional:    Field Duplicate:    MS/MSD:    Field Blank:

General Notes:



Waite-Heindel  
Environmental Management

# UNIFIRST FIELD WATER COLLECTION SHEET

**SAMPLING LOCATION** MW-PL1 Pump Intake Depth 16.5

Date 10/23/14 Pump Type per

Sampler CP/MW Well Diameter 3 3/4"

Weather 100% CLR Well Depth 17.35

Water Type SW Initial Depth to Water 13.58

Sampling Method bailler Traditional Purge Vol. / Rate 100L/100

Temp. low flow supply grab

Time	DTW (ft btp)	Purge Rate (ml/min)	Temp. (deg C)	Specific Cond. (ms/m) / (us/cm)	pH	ORP (mv)	DO (mg/L)	Turbidity (NTU)	Notes
1005	13.60	100	9.57	437	6.78	266	5.82	45.6	U. c. 11.1 No.
1009			9.61		6.78	250	5.65	17.9	
1012			9.61		6.28	264	2.99	37.2	
1015			9.59		6.92	251	2.79	26.2	
1019			9.57		6.94	244	2.70	22.3	clearing complete
1022			9.55		6.95	247	2.65	14.8	

**SAMPLE COLLECTION**

Sample Description	Label	Purge Volume	Temp.	Specific Cond.	pH	ORP	DO	Turbidity	COC #
Final Measurements:		0.5	9.59	437	6.95	247	2.65	19.8	
Sample	MW-PL1	100							
Additional									
Field Duplicate	MW-PLX	100							
MS/MSD									
Field Blank									

General Notes:



Waite - Heindel  
Environmental Management

# UNIFIRST

## FIELD WATER COLLECTION SHEET

**SAMPLING LOCATION** MW-51 Pump Intake Depth 9.5'

Date 10/23/16 Pump Type peri

Sampler CP/MV Well Diameter 2"

Weather rainy cool Well Depth 10.60

Water Type sw Initial Depth to Water 6.3'

Sampling Method bailer Traditional Purge Vol. / Rate 2.00

Time	DTW (ft btp)	Purge Rate (ml/min)	Temp. (deg C)	Specific Cond. (ms/m) / (us/cm)	pH	ORP (mv)	DO (mg/L)	Turbidity (NTU)	Notes
1053	6.68	200	12.27	346	7.58	123	22.18	113	set to 20
1056	7.28	200	12.69	349	7.87	55.3	2.45	21.3	
1059	7.15	150	13.28	348	7.87	55.6	6.49	43.8	reduced to 150 ml/min
1102	7.24	↓	13.42	348	7.86	54.6	1.22	59.3	450-10
1106	7.00	↓	13.53	351	7.82	25.6	0.89	24.5	
1110	7.18	↓	13.49	353	7.77	28.3	0.82	17.9	

**SAMPLE COLLECTION**

Purge Volume 1.25L Temp. 13.49 Specific Cond. 353 pH 7.77 ORP 28.3 DO 0.82 Turbidity

Final Measurements: Type Container # Preservative Analysis Method Collection Time COC #

Sample Description MW-51 Label VOA Container # 3 Preservative HCL Analysis Method 3260 Collection Time 1115 COC #

Additional

Additional

Field Duplicate

MS/MSD

Field Blank

General Notes:



Waite-Heindel Environmental Management

# UNIFIRST

## FIELD WATER COLLECTION SHEET

SAMPLING LOCATION ML-52

Date 10/23/14

Sampler cr/mhw

Weather rainy, cold

Water Type GW SW supply

Sampling Method bailer low flow grab

Pump Intake Depth 46.8 10.0 00

Pump Type pen

Well Diameter 2"

Well Depth 11.00

Initial Depth to Water 4.78

Traditional Purge Vol. / Rate 2.00

### LOW FLOW PURGING DATA

Time	DTW (ft. btp)	Purge Rate (ml/min)	Temp. (deg C)	Specific Cond. (ms/m) / (us/cm)	pH	ORP (mv)	DO (mg/L)	Turbidity (NTU)	Notes
1128	5.01	200	10.88	206	8.14	-70.6	6.90	28.7	Clear, No. 2
1132	5.05	↓	10.98	204	6.77	-58.6	1.33	17.0	
1135	5.00	↓	11.06	201	6.60	-73.2	1.02	9.62	
1138	↓	↓	10.91	198	6.46	-12.0	0.88	6.2	
1141	↓	↓	10.83	199	6.38	-5.2	0.87	5.6	
1144	↓	↓	10.73	197	6.38	-4.9	0.86	5.2	complete

### SAMPLE COLLECTION

Sample Description	Label	Purge Volume	Temp.	Specific Cond.	pH	ORP	DO	Turbidity	COC #
Final Measurements:		1.25	10.73	198	6.38	-4.9	0.86	5.2	
Sample	ML-52	V0A	# 3	Preservative		Analysis Method		Collection Time	
Additional						8260		1150	
Field Duplicate									
MSMSD	ML-52	V0A	4			8260		1150	
Field Blank	FB-5	V0A	2			8260		1200	

General Notes:



# **APPENDIX D:**

## **DATA VALIDATION REPORT**



January 28, 2015

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

Reference #: 2014-1117-001, -1121-001, and -1223 -001

Dear Gerold,

Attached please find the results of the data validation of Sample Delivery Group (SDG) Nos. BRES59, UNIF51, UNIF52, and WHEA20 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 20, 21, 22, and 23, 2014, and sample SP-4 collected on November 21, 2014 due to the necessity of removing pavement that the homeowner had applied over the well access. The laboratory analyses were performed by TestAmerica Burlington (formerly STL Burlington) of South Burlington, VT.

The data packages were received on November 17 and 21, and December 23, 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. 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. BRES59, UNIF51, WHEA20, and UNIF52**

**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. Ferrisburgh, VT 05473  
(802)-233-2473**

**January 26, 2015**

Reference #s 2014-1117-001, 1121-001, &-1223-001  
VOA Validation Report/BRES59\_UNIF51\_52\_WHEA20/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 39 groundwater samples, 8 potable water samples, 1 performance evaluation (PE) sample, 5 field blanks (FB), and 6 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. BRES59, UNIF51, UNIF52, and WHEA20 which were submitted as four data packages received by Phoenix on November 17, November 21, and December 23, 2014. These SDGs include the following samples:

**Table 1. Sample Identifications**

Sample Identifier	Laboratory ID
<i>Method 8260B</i>	
<i>SDG No. BRES59</i>	
TB-2	200-24909-1
MW-103RD	200-24909-2
MW-104S	200-24909-3
MW-104D	200-24909-4
MW-102D	200-24909-5
MW-102S	200-24909-6
MW-101S	200-24909-7
MW-Z	200-24909-8
MW-4S	200-24909-9
MW-4D	200-24909-10
MW-3S	200-24909-11
MW-3D	200-24909-12
TB-1	200-24910-1
BRW-3	200-24910-5
BRW-2	200-24910-6
BRW-1	200-24910-7
<i>SDG No. UNIF51</i>	
MW-25884	200-24910-8
BRW-Z	200-24910-9
FB-2	200-24910-10
W-19	200-24934-1
PZ-101	200-24934-2
PZ-102	200-24934-3
W-25	200-24934-4
MW-50	200-24934-5
W-Z	200-24934-7
MW-C	200-24934-6
MW-E	200-24934-8
W-1	200-24934-9
W-20	200-24934-10
MW-D	200-24934-11

Sample Identifier	Laboratory ID
FB-4	200-24934-12
TB-3	200-24934-13
SS-2	200-24981-9
SS-5	200-24981-10
W-SEEP	200-24981-11
SEEP-1A	200-24981-12
SP-MW3	200-24981-13
SS-Z	200-24981-14
<i>SDG No. WHEA20</i>	
TB-4	200-24977-1
FB-5	200-24977-2
MW-PL2	200-24977-3
MW-S1	200-24977-4
MW-S2	200-24977-5
MW-PL1	200-24977-6
MW-PLX	200-24977-7
<i>SDG No. UNIF52</i>	
TRIP BLANK	200-25551-1
SP-4	200-25551-2
<i>Method 524.2</i>	
<i>SDG No. BRES59</i>	
SHIELDS	200-24910-2
WELL Z	200-24910-3
FB-1	200-24910-4
<i>SDG No. UNIF51</i>	
TB-5	200-24981-1
FB-6	200-24981-2
WP-7	200-24981-3
WP-8	200-24981-4
WP-13	200-24981-5
WP-3	200-24981-6
WP-Z	200-24981-7
WP-5	200-24981-8
WP-23	200-24981-15

Sample MW-103RD was originally identified as MW-103D on the Chain of Custody received on November 17, 2014. This well has been renamed MW-103RD to identify it as a re-drilled well. The correct identifier has been used throughout this report and in the validated spreadsheet files.

Monitoring well SP-4 was paved over by the homeowner. The field engineer returned to the site to break through the pavement and sample this well on 11/21/14.

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

- Results for all non-detected aromatic compounds in MW-103RD were rejected (R).

- Results for chloromethane in SP-4 and TRIP BLANK were qualified as estimated (UJ).
- Results for acetone in samples TB-2, MW-103RD, MW-104S, MW-104D, MW102D, MW-102S, MW-101S, MW-Z, MW-4S, MW-4D, MW-3S, MW-3D, TB-1, FB-2, BRW-3, BRW-2, BRW-1, MW-25884, BRW-Z, MW-50, MW-C, W-Z, MW-E, W-1, W-20, MW-D, FB-4, and TB-3, and for bromomethane in BRW-3, BRW-2, BRW-1, MW-25884, BRW-Z, MW-50, MW-C, W-Z, MW-E, W-1, W-20, MW-D, FB-4, TB-3, W-19, PZ-101, PZ-102, W-25, SS-2, SS-5, W-SEEP, SEEP-1A, SP-MW3, SS-Z, TB-4, FB-5, MW-PL2, MW-S1, MW-S2, MW-PL1, and MW-PLX, all as analyzed by Method 8260B, were qualified as estimated (UJ).
- Results for acetone in TB-5, FB-1, SHIELDS, FB-6, WP-7, WP-8, WP-3, and WP-Z, and for methylene chloride in FB-1, FB-6, and WP-7 were qualified as less than the quantitation limit (U).
- Results for bromomethane in MW-4S, W-1, W-SEEP, and MW-S2; for carbon disulfide, cis-1,2-dichloroethene, chloroform, 1,1,1-trichloroethane, toluene, m&p-xylene, o-xylene, total xylenes, vinyl chloride, 1,1-dichloroethene, methylene chloride, 4-methyl-2-pentanone, dibromochloromethane, and bromoform in MW-4S; and for vinyl chloride in MW-S2 were qualified as estimated (UJ).
- Non-detected results for methylene chloride in samples TRIP BLANK and SP-4 were qualified as estimated (UJ).
- Results for chloromethane in TB-2, MW-103RD, MW-104S, MW-104D, MW-102D, MW-102S, MW-101S, MW-Z, MW-4S, MW-4D, MW-3S, MW-3D, TB-1, and FB-2; for vinyl chloride in BRW-3, BRW-2, BRW-1, MW-25884, BRW-Z, MW-50, MW-C, W-Z, MW-E, W-1, W-20, MW-D, FB-4, and TB-3, and the result for methylene chloride in MW-PLX were qualified as estimated (UJ), and results for all analytes in TRIP BLANK and SP-4 were qualified as estimated (J,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). To maintain consistency with previous work at these sites, 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. BRES59, UNIF51, and WHEA20 were collected on October 20, 21, 22, and 23, 2014, and the samples in SDG No. UNIF52 were collected on November 21, 2014. All volatiles analyses were performed within the acceptable holding times for preserved water samples (14 days from collection), as required by Region 1. The pH of the samples was measured at the time of screening, and is recorded in the Sample Preparation sections of the data packages and noted in the Case Narrative. Vial preservation with hydrochloric acid is noted by the field sampler in all field sheets. The pH of the vial analyzed is also measured immediately following analysis. All recorded sample pH values were <2 with the exception of MW-103RD, which had a post-analysis pH of 7. Due to the use of a non-preserved sample vial for analysis, and analysis 11 days following sample collection, results for all non-detected aromatic compounds in MW-103RD were rejected (R), while results for non-aromatic compounds were accepted.

The cooler temperatures on receipt at the laboratory were checked and documented in the data packages, and were 0.4, 3.2, 5.8, 5.4, 5.0, and 3.6 °C, which are within the acceptance range of 4 °C ±2 °C.

Only one vial each was submitted for TB-2 and FB-3 due to an error by the sampler. The laboratory consumed the single vial for FB-3 during screening, so no results were submitted for this sample. The laboratory did not screen TB-2 and results are included in the data packages.

The field data sheets and Chain of Custody incorrectly identified sample MW-103RD as MW-103D. This well has been renamed to MW-103RD to identify that it was re-drilled. The correct identifier has been used throughout this report and in the validated spreadsheet files.

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

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

### **III. Initial Calibration (IC)**

Two ICs (10/30/14, and 11/10/14) were performed on instrument CHL in support of the Method 8260B sample analyses, and one IC (10/23/14) was performed on instrument CHL 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	
		acetone	2-butanone
CHL (524.2)	10/23/14	0.0496	0.0186

Pursuant to the Region I validation document, results for acetone and 2-butanone in all samples analyzed by Method 524.2 in this data set warranted rejection (R) based on the low RRFs achieved. However, acetone and 2-butanone were spiked at a concentration of 5 µg/L in the matrix spikes, matrix spike duplicates, laboratory control samples, and laboratory control sample duplicates for method 524.2 in this data set, and acceptable recoveries for this compound were achieved in these analyses. Therefore, results for acetone and 2-butanone were not qualified on the basis of the low RRFs in the associated IC on this instrument.

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 exception of chloromethane, which exhibited 30.6 %D in the Method 8260B ICV analyzed on 11/10/14.

On the basis of the unacceptably high percent difference result in the associated ICV, results for chloromethane in SP-4 and TRIP BLANK were qualified as estimated (UJ).

#### IV. Continuing Calibration (CC)

Five continuing calibration (CC) standards were analyzed in support of the Method 8260B sample analyses, and three CC standards were analyzed 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 Method 8260B with the following exceptions:

- acetone exhibited a -33.1, and -26.5 %D in the CC standards analyzed on 10/31/14 at 14:22, and on 11/1/14 at 07:18;
- bromomethane exhibited a -47.7, -55.0, and -51.6 %D in the CC standards analyzed on 11/1/14 at 07:18, 11/2/14 at 16:40, and on 11/3/14 at 07:07;

All RRFs were above the 0.05 minimum criterion in all CC standards for Method 8260B.

All %D results were below  $\pm 25$ % for the CC standards analyzed by 524.2.

All RRFs for Method 524.2 CC standards were above the 0.05 minimum criterion with the exception of 2-butanone in all CC standards (range: 2-butanone, 0.0169 - 0.0191), and in acetone in the CC standards analyzed on 10/27/14 and 10/28/14 (0.0470 and 0.0481, respectively).

On the basis of the unacceptable %D values in the associated CC standards, non-detect results for acetone in samples TB-2, MW-103RD, MW-104S, MW-104D, MW102D, MW-102S, MW-101S, MW-Z, MW-4S, MW-4D, MW-3S, MW-3D, TB-1, FB-2, BRW-3, BRW-2, BRW-1, MW-25884, BRW-Z, MW-50, MW-C, W-Z, MW-E, W-1, W-20, MW-D, FB-4, and TB-3 were qualified as estimated (UJ). On the basis of the unacceptable %D value in the associated CC standards, results for bromomethane in samples BRW-3, BRW-2, BRW-1, MW-25884, BRW-Z, MW-50, MW-C, W-Z, MW-E, W-1, W-20, MW-D, FB-4, TB-3, W-19, PZ-101, PZ-102, W-25, SS-2, SS-5, W-SEEP, SEEP-1A, SP-MW3, SS-Z, TB-4, FB-5, MW-PL2, MW-S1, MW-S2, MW-PL1, and MW-PLX 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 200-79351	methylene chloride	0.0983	0.50	See MB 200-79437
MB-200-79437	methylene chloride	0.105	0.50	1.05
MB 200-79802	methylene chloride	0.0847	0.50	See MB 200-79437
	acetone	2.31	5.0	23.1

Six trip blanks (TBs) were reported in these SDGs; five for Method 8260B analysis and one for Method 524.2 analysis. No target compounds were detected in any TB in this sample set with the exception of acetone at 0.97 ug/L in TB-5. No trip blank was submitted with the samples collected on 10/20/14 for Method 524.2 analysis. No target compounds were detected in either of the two trip blanks submitted for Method 8260B analysis.

Five field blanks (FBs) were reported in these SDGs; three 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	acetone	1.2	5.0	See MB 200-79802
	methylene chloride	0.108	0.50	See MB 200-79437
FB-6	acetone	1.1	5.0	See MB 200-79802
	methylene chloride	0.084	0.50	See MB 200-79437

Six holding (storage) blanks (HBs) were reported in these SDGs; four 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: acetone was detected below the reporting limit in both holding blanks for Method 524.2. The holding blank identified as 200-24910-12 reported acetone at 0.98 ug/L, and the holding blank identified as 200-24981-16 reported acetone at 1.8 ug/L.

No target compounds were detected in any blanks analyzed by Method 8260B in these data packages, including method blanks, trip blanks, field blanks and holding blanks. Acetone and/or methylene chloride were present in every blank analyzed by Method 524.2, including method blanks, trip blanks, field blanks and holding blanks. Additionally, a false positive for acetone was reported in the PES sample also analyzed by Method 524.2. The validator suspects wide spread laboratory contamination as the source of acetone and/or methylene chloride in the field, storage, and holding blanks, as a false positive in the PES, and also in the method blanks. Because acetone and methylene chloride are recognized as common laboratory contaminants, the action limit for these analytes is ten times the highest amount found in associated blanks.

On the basis of laboratory contamination exhibited in method and storage blanks, results for acetone in TB-5, FB-1, SHIELDS, FB-6, WP-7, WP-8, WP-3, and WP-Z were qualified as less than the quantitation limit (U). On the basis of laboratory contamination, results for methylene chloride in FB-1, FB-6, and WP-7 were qualified as less than the quantitation 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 of the initial calibration).

## **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 for both 8260B and 524.2 analysis.

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

Samples MW-4S, W-1, W-SEEP, 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 µg/L (except for the ketones at 5 µg/L). Percent recoveries (%R) and relative percent differences (%RPD) between paired recoveries were correctly calculated and accurately reported on the Form III summaries for the spiked analytes.

All recoveries were acceptable (range 50 – 127 %R; overall laboratory-established control limits: 15 – 200 %R; Region 1 limits 60 – 140 %R) and reproducible (range: 0 - 30%; 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
WP-8	chloroethane	nd	61	63	70 - 130	a
MW-4S	chloromethane	nd	133	a	65 - 120	a
	bromomethane	nd	<b>50</b>	<b>45</b>	60 - 120	a
	carbon disulfide	nd	121	a	80-120	<b>31</b>
	1,1-dichloroethane	nd	127	a	80-120	a
	cis-1,2-dichloroethene	nd	126	a	80-125	<b>31</b>
	chloroform	nd	124	a	75-120	<b>32</b>
	1,1,1-trichloroethane	nd	121	a	75-120	<b>31</b>
	carbon tetrachloride	nd	123	a	75-120	a
	trichloroethene	nd	123	a	75-120	a
	toluene	nd	125	a	80-120	<b>31</b>
	tetrachloroethene	1.4	124	a	80-120	a
	o-xylene	nd	121	a	80-120	<b>31</b>
	vinyl chloride	nd	a	64	80-130	<b>33</b>
	1,1-dichloroethene	nd	a	a	80-120	<b>31</b>
	methylene chloride	nd	a	68	80-120	<b>47</b>
	4-methyl-2-pentanone	nd	a	a	80-125	<b>31</b>
	2-hexanone	nd	a	67	75-150	a
	dibromochloromethane	nd	a	a	80-125	<b>31</b>
	m&p-xylene	nd	a	a	80-125	<b>35</b>
	styrene	nd	a	78	80-120	a
bromoform	nd	a	a	80-120	<b>32</b>	
W-1	bromomethane	nd	<b>38</b>	<b>37</b>	60-120	a
	chloroethane	nd	131	a	80-130	a
	tetrachloroethene	24	<b>44</b>	126	80-120	a
	vinyl chloride	nd	a	64	80-130	a
	methylene chloride	nd	a	77	80-120	a
	2-hexanone	nd	a	68	75-150	a
W-SEEP	vinyl chloride	nd	72	65	80-130	a
	bromomethane	nd	<b>41</b>	<b>53</b>	60-120	a
	2-hexanone	nd	72	74	75-150	a
MW-S2	chloromethane	nd	130	a	65-120	a
	bromomethane	nd	<b>59</b>	<b>54</b>	60-120	a
	chloroethane	nd	<b>141</b>	a	80-130	a
	1,1-dichloroethane	nd	121	a	80-120	a
	1,1,2,2-tetrachloroethane	nd	126	a	80-125	a

Parent Sample	Analyte	Native Conc. (ug/L)	% R (MS)	% R (MSD)	Laboratory Limits (%R)	% RPD
	vinyl chloride	nd	a	66	80-130	<b>39</b>
	2-hexanone	nd	a	71	75-150	a

nd = not detected      a = acceptable

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 MS and 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 WP-8, MW-4S, W-1, W-SEEP, and MW-S2. 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 the high recovery of chloroethane in the MS analysis.

On the basis of the unacceptably low recoveries in the associated MS and MSD analyses (range 38-59%), results for bromomethane in MW-4S, W-1, W-SEEP, and MW-S2 were qualified as estimated (UJ). On the basis of poor precision in the associated MS and MSD analyses, results for carbon disulfide, cis-1,2-dichloroethene, chloroform, 1,1,1-trichloroethane, toluene, m&p-xylene, o-xylene, total xylenes, vinyl chloride, 1,1-dichloroethene, methylene chloride, 4-methyl-2-pentanone, dibromochloromethane, and bromoform in MW-4S, and for vinyl chloride in MW-S2 were qualified as estimated (UJ).

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

## IX. Field Duplicates

SDG Nos. BRES59, UNIF51, WHEA20, and UNIF52 contained five groundwater field duplicate pairs for Method 8260B and two drinking water field duplicate pairs analyzed by Method 524.2, which were identified by the field sampler as follows:

**Table 6. Field Duplicate Identifications**

Field Sample	Field Duplicate
Method 8260B	
MW-25884	BRW-Z
MW-C	W-Z
MW-PL1	MW-PLX
SEEP-1A	SS-Z
MW-101S	MW-Z
Method 524.2	
WP-3	WP-Z
SHIELDS	WELL-Z

Tetrachloroethene was detected at greater than twice the quantitation limit in MW-C, W-Z, MW-PL1, MW-PLX, MW-101S, and MW-Z by Method 8260B, and above the quantitation limit in SEEP-1A and at twice the quantitation limit in SS-Z; trichloroethene was detected at greater than twice the quantitation limit in MW-C and MW-Z by Method 8260B and in WP-3 and WP-Z by Method 524.2, and above the quantitation limit in SEEP-1A, SS-Z, MW-101S, and MW-Z.

Trichloroethene, tetrachloroethene, and cis-1,2-dichloroethene were detected below the quantitation limit in MW-25884 and BRW-Z; trichloroethene was detected below the quantitation limit in MW-PL1 and MW-PLX; and cis-1,2-dichloroethene was detected below the quantitation limit in MW-101S and MW-Z. Acetone, carbon disulfide, and benzene were detected below their quantitation limits in WP-3 and WP-Z, and acetone was detected below the quantitation limit in SHIELDS. 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-25884 and BRW-Z, MW-C and W-Z, MW-PL1 and MW-PLX, SEEP-1A and SS-Z, MW-101S and MW-Z, WP-3 and WP-Z, and SHIELDS and WELL-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 in December, 2013 and March and April, 2014. 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 in January, 2014, 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.

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 (67 – 134 %R for Method 8260B, and 70 - 130 %R for Method 524.2) and reproducible (0 - 30 %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					
200-79351 (10/27/14)	trans-1,3-dichloropropene	a	a	70 - 130	23
Method 8260B					
200-79725 (10/31/14)	chloromethane	60	a	65 - 120	<b>67</b>
	vinyl chloride	71	77	80 - 130	a
	1,1-dichloroethane	123	a	80-120	a
	trichloroethene	123	a	75-120	a
	toluene	122	a	80-120	a
	chlorobenzene	121	a	80-120	a
	1,1,2,2-tetrachloroethane	132	a	80-125	a
200-79733 (11/1/14)	chloromethane	139	a	65 - 120	a
	chloroethane	137	a	80-130	a
	carbon disulfide	124	a	80-120	a
	1,1-dichloroethane	126	a	80-120	a
	cis-1,2-dichloroethene	126	a	80-125	a
	chloroform	121	a	75-120	a
	carbon tetrachloride	121	a	75-120	a
	1,2-dichloroethane	123	a	70-120	a
	trichloroethene	123	a	75-120	a
	bromodichloromethane	121	a	80-120	a
	toluene	121	a	80-120	a
	trans-1,3-dichloropropene	124	a	80-120	a
	vinyl chloride	a	73	80-130	<b>31</b>
	200-79759 (11/2/14)	vinyl chloride	74	a	80-130
bromomethane		<b>53</b>	<b>54</b>	60 - 120	a
chloromethane		a	125	65-120	a
chloroethane		a	131	80-130	a
200-79760 (11/3/13)	chloromethane	139	a	65 - 120	a
	chloroethane	<b>142</b>	a	80-130	a
	carbon disulfide	121	a	80-120	a
	1,1-dichloroethane	122	a	80-120	a
	1,2-dichloroethane	123	a	70-120	a
	trichloroethene	122	a	75-120	a
	trans-1,3-dichloropropene	122	a	80-120	a
	bromomethane	a	<b>52</b>	60-120	a
methylene chloride	a	a	80-120	<b>31</b>	
200-81469 (12/1/14) [continued on next page]	bromomethane	<b>165</b>	<b>150</b>	60 - 120	a
	chloroethane	132	a	80 - 130	a
	1,1-dichloroethene	124	a	80-120	<b>32</b>
	carbon disulfide	127	a	80-120	a
	trans-1,2-dichloroethene	134	a	80-125	<b>36</b>
	1,1-dichloroethane	139	a	80-120	<b>34</b>

Batch ID (date)	Analyte	LCS %R	LCSD %R	Laboratory Limits (%R)	% RPD
200-81469 (12/1/14) [continued]	cis-1,2-dichloroethene	137	a	80-125	<b>41</b>
	chloroform	134	a	75-120	<b>34</b>
	1,1,1-trichloroethane	125	a	75-120	<b>32</b>
	carbon tetrachloride	124	a	75-120	<b>31</b>
	benzene	130	a	80-125	a
	1,2-dichloroethane	134	a	70-120	<b>35</b>
	trichloroethene	135	a	75-120	<b>37</b>
	1,2-dichloropropane	134	a	80-125	<b>33</b>
	bromodichloromethane	132	a	80-120	<b>37</b>
	cis-1,3-dichloropropene	126	a	80-125	<b>34</b>
	toluene	127	a	80-120	<b>31</b>
	trans-1,3-dichloropropene	131	a	80-120	<b>42</b>
	1,1,2-trichloroethane	139	a	80-125	<b>34</b>
	tetrachloroethene	123	a	80-120	a
	dibromochloromethane	126	a	80-125	<b>33</b>
	chlorobenzene	130	a	80-120	<b>32</b>
	ethylbenzene	126	a	80-125	<b>31</b>
	o-xylene	129	a	80-120	<b>32</b>
	bromoform	130	a	80-120	<b>36</b>
	1,1,2,2-tetrachloroethane	<b>144</b>	a	80-125	<b>35</b>
	vinyl chloride	a	76	80-130	a
acetone	a	a	15-200	<b>41</b>	
methylene chloride	a	42	80-120	<b>63</b>	
2-hexanone	a	a	75-150	<b>33</b>	

a = acceptable

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 in the LCS or LCSD analysis on 10/31/14, 11/1/14, 11/2/14, 11/3/14, and 12/1/14, or for the recoveries slightly below the lower laboratory control limit for vinyl chloride in the LCS and LCSD analyses on 10/31/14, 11/1/14, 11/2/14, and 12/1/14.

Since bromomethane and chloroethane 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 11/3/14 (chloroethane) and on 12/1/14 (bromomethane) for Method 8260B.

Bromomethane recoveries were below both laboratory established control limits and Region 1 limits for the LCS and LCSD samples analyzed on 11/2/14, and for the LCSD sample analyzed on 11/3/14 for Method 8260B. Non-detected results for bromomethane in samples W-19, PZ-101, PZ-102, W-25, SS-2, SS-5, W-SEEP, SEEP-1A, SP-MW3, SS-Z, TB-4, FB-5, MW-PL2, MW-S1, MW-S2, MW-PL1, and MW-PLX were qualified as estimated (UJ) on the basis of the unacceptably low recoveries in the associated LCS and LCSD analyses. Methylene chloride recovery was below both laboratory established control limits and Region 1 limits for the LCSD sample analyzed on 12/1/14 for Method 8260B. Non-detected results for methylene chloride in samples TRIP BLANK and SP-4 were qualified as estimated (UJ) on the basis of the unacceptably low recoveries in the associated LCSD analysis.

On the basis of the unacceptable precision in the associated LCS and LCSD sample analyses on 10/31/14, results for chloromethane in TB-2, MW-103RD, MW-104S, MW-104D, MW-102D, MW-102S, MW-101S, MW-Z, MW-4S, MW-4D, MW-3S, MW-3D, TB-1, and FB-2 were qualified as estimated (UJ).

On the basis of unacceptable precision in the associated LCS and LCSD sample analysis on 11/1/14, results for vinyl chloride in BRW-3, BRW-2, BRW-1, MW-25884, BRW-Z, MW-50, MW-C, W-Z, MW-E, W-1, W-20, MW-D, FB-4, and TB-3 were qualified as estimated (UJ). On the basis of the unacceptable precision in the associated LCS and LCSD sample analyses on 11/3/14, the result for methylene chloride in MW-PLX was qualified as estimated (UJ).

On the basis of unacceptable precision for most of the analytes in the associated LCS and LCSD sample analyses on 12/1/14, results for all analytes in TRIP BLANK and SP-4 were qualified as estimated (J, 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 trans-1,3-dichloropropene in the LCS and LCSD pair analyzed by Method 524.2 on 10/27/14.

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, acetone, was reported in the analysis of the PES, at a concentration below the quantitation limit (1.2 ug/L). The method blank, as well as trip blank, field blank and holding blank that were analyzed in this analytical window all had positive detections for acetone below reporting limit. The validator believes the presence of acetone in all these blanks as well as the false positive in the PES is due to wide spread laboratory contamination, and not indicative of contamination being introduced in the shipping cooler, field sampling, or holding refrigerator.

## **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 analysis (2-fold) was performed for sample MW-D to bring the result for tetrachloroethene within the upper half of the calibration range for Method 8260B. Based on the reported result, the 2-fold dilution performed on MW-D was necessary, 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.

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. BRES59, UNIF51, WHEA20, and UNIF52, with the following exceptions:

- On the basis of post-analysis pH measurement of sample MW-103RD being recorded as pH 7, results for all non-detected aromatic compounds in MW-103RD were rejected (R).
- On the basis of the unacceptably high percent difference results in the associated ICV, results for chloromethane in SP-4 and TRIP BLANK were qualified as estimated (UJ).
- On the basis of the unacceptable %D value in the associated CC standards, results for acetone in samples TB-2, MW-103RD, MW-104S, MW-104D, MW102D, MW-102S, MW-101S, MW-Z, MW-4S, MW-4D, MW-3S, MW-3D, TB-1, FB-2, BRW-3, BRW-2, BRW-1, MW-25884, BRW-Z, MW-50, MW-C, W-Z, MW-E, W-1, W-20, MW-D, FB-4, and TB-3 analyzed by Method 8260B, and for bromomethane in BRW-3, BRW-2, BRW-1, MW-25884, BRW-Z, MW-50, MW-C, W-Z, MW-E, W-1, W-20, MW-D, FB-4, TB-3, W-19, PZ-101, PZ-102, W-25, SS-2, SS-5, W-SEEP, SEEP-1A, SP-MW3, SS-Z, TB-4, FB-5, MW-PL2, MW-S1, MW-S2, MW-PL1, and MW-PLX analyzed by Method 8260B were qualified as estimated (UJ).
- On the basis of suspected laboratory contamination exhibited in method and storage blanks, results for acetone in TB-5, FB-1, SHIELDS, FB-6, WP-7, WP-8, WP-3, and WP-Z, and for methylene chloride in FB-1, FB-6, and WP-7 were qualified as less than the quantitation limit (U).

- On the basis of unacceptably low recoveries in the associated MS and MSD analyses, results for bromomethane in MW-4S, W-1, W-SEEP, and MW-S2 were qualified as estimated (UJ). On the basis of poor precision in the associated MS and MSD analyses, results for carbon disulfide, cis-1,2-dichloroethene, chloroform, 1,1,1-trichloroethane, toluene, m&p-xylene, o-xylene, total xylenes, vinyl chloride, 1,1-dichloroethene, methylene chloride, 4-methyl-2-pentanone, dibromochloromethane, and bromoform in MW-4S, and for vinyl chloride in MW-S2 were qualified as estimated (UJ).
- Non-detected results for bromomethane in samples W-19, PZ-101, PZ-102, W-25, SS-2, SS-5, W-SEEP, SEEP-1A, SP-MW3, SS-Z, TB-4, FB-5, MW-PL2, MW-S1, MW-S2, MW-PL1, and MW-PLX, and non-detected results for methylene chloride in samples TRIP BLANK, and SP-4 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 chloromethane in TB-2, MW-103RD, MW-104S, MW-104D, MW-102D, MW-102S, MW-101S, MW-Z, MW-4S, MW-4D, MW-3S, MW-3D, TB-1, and FB-2, for vinyl chloride in BRW-3, BRW-2, BRW-1, MW-25884, BRW-Z, MW-50, MW-C, W-Z, MW-E, W-1, W-20, MW-D, FB-4, and TB-3, and the result for methylene chloride in MW-PLX were qualified as estimated (UJ), and results for all analytes in TRIP BLANK and SP-4 were qualified as estimated (J,UJ).
- Although acetone was reported below the quantitation limit as a false positive in the PES, acetone was also positively detected in the method blank, trip blank, field blank and holding blank analyzed in the same analytical window, so 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. However, it was noted that the required trip blank for Method 524.2 analysis was not submitted with samples collected on 10/20/14. Instead, two trip blanks for Method 8260B analysis were submitted for samples collected and transported on this date.

Data presentation was acceptable, with the following exceptions:

- The sample MW-103RD was incorrectly identified on the field sheets and the Chain of Custody and logged into the laboratory as MW-103D. This monitoring well was originally identified as MW-103D but was re-drilled, and the “R” was added to the sample ID. The

validator has used the correct sample identifier (MW-103RD) throughout this report and in the associated spreadsheet files.

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