LMS/MND/S29206

Sitewide Groundwater Monitoring Report Mound, Ohio, Site

Calendar Year 2019

October 2020

U.S. DEPARTMENT OF ENERGY | Legacy Management

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Abbreviations

BVA	Buried Valley Aquifer
DCE	dichloroethene
DOE	U.S. Department of Energy
EPA	U.S. Environmental Protection Agency
H_α	alternative hypothesis
H_0	null hypothesis
MCL	maximum contaminant level
µg/L	micrograms per liter
MNA	monitored natural attenuation
nCi/L	nanocuries per liter
Ohio EPA	Ohio Environmental Protection Agency
PCE	tetrachloroethene
RAO	remedial action objective
RIN	report identification number
TCE	trichloroethene
VC	vinyl chloride
VOC	volatile organic compound

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1.0 Introduction

1.1 Purpose

This report was prepared in support of the selected remedies for Phase I and Parcels 6, 7, and 8 of the Mound, Ohio, Site as outlined in the *Operations and Maintenance Plan for the U.S. Department of Energy Mound, Ohio, Site* (DOE 2015), hereafter called the Sitewide Operations and Maintenance Plan. It summarizes the data collected in 2019 and documents the progress of the monitored natural attenuation (MNA) remedies for both areas of the Mound site. All sampling and data analyses were performed in accordance with the Sitewide Operations and Maintenance Plan, unless noted otherwise.

This report includes data collected during the groundwater sampling performed in 2019. Data are presented in both time-series and map-view plots. Trend analysis was performed on selected wells using the nonparametric Mann-Kendall test. This type of long-term trend analysis can be used to confirm trends in contaminant concentrations over time. The time-series plots will also be used to evaluate changes in data over time and interpret the effectiveness of the MNA remedy.

This report also documents operational changes that occurred during the reporting period and identifies maintenance activities associated with the monitoring wells being sampled.

1.2 Project Description

The Mound site[1] is in Miamisburg, Ohio, approximately 10 miles southwest of Dayton. In 1995, the U.S. Department of Energy (DOE) Mound Plant, named after the Miamisburg Indian Mound adjacent to the site, comprised 120 buildings on 306 acres. The Great Miami River, west of the site, flows from northeast to southwest through Miamisburg and dominates the geography of the region surrounding the site. Figure 1 shows the locations of Phase I (in green) and Parcels 6, 7, and 8 (in purple).

DOE remediated the Mound site to an "industrial/commercial use" standard consistent with the exposure assumptions provided in the *Mound 2000 Residual Risk Evaluation Methodology, Mound Plant* (DOE 1997) and endorsed by the U.S. Environmental Protection Agency (EPA) and Ohio Environmental Protection Agency (Ohio EPA). The remedies for groundwater at the site combine groundwater monitoring and institutional controls in the form of deed restrictions on future land and groundwater use. These combined remedies will prevent current and future exposure of workers, the public, and the environment to contaminated groundwater from the Mound site.

[1] The Mound site has also been called the Mound Laboratory, Mound Laboratories, the Mound Plant (EPA ID OH6890008984), the USDOE Mound Plant, the Mound Facility, the USDOE Mound Facility, the Miamisburg Environmental Management Project (MEMP), and the Miamisburg Closure Project (MCP). Currently, LM uses Mound, Ohio, Site as the formal name of the site.

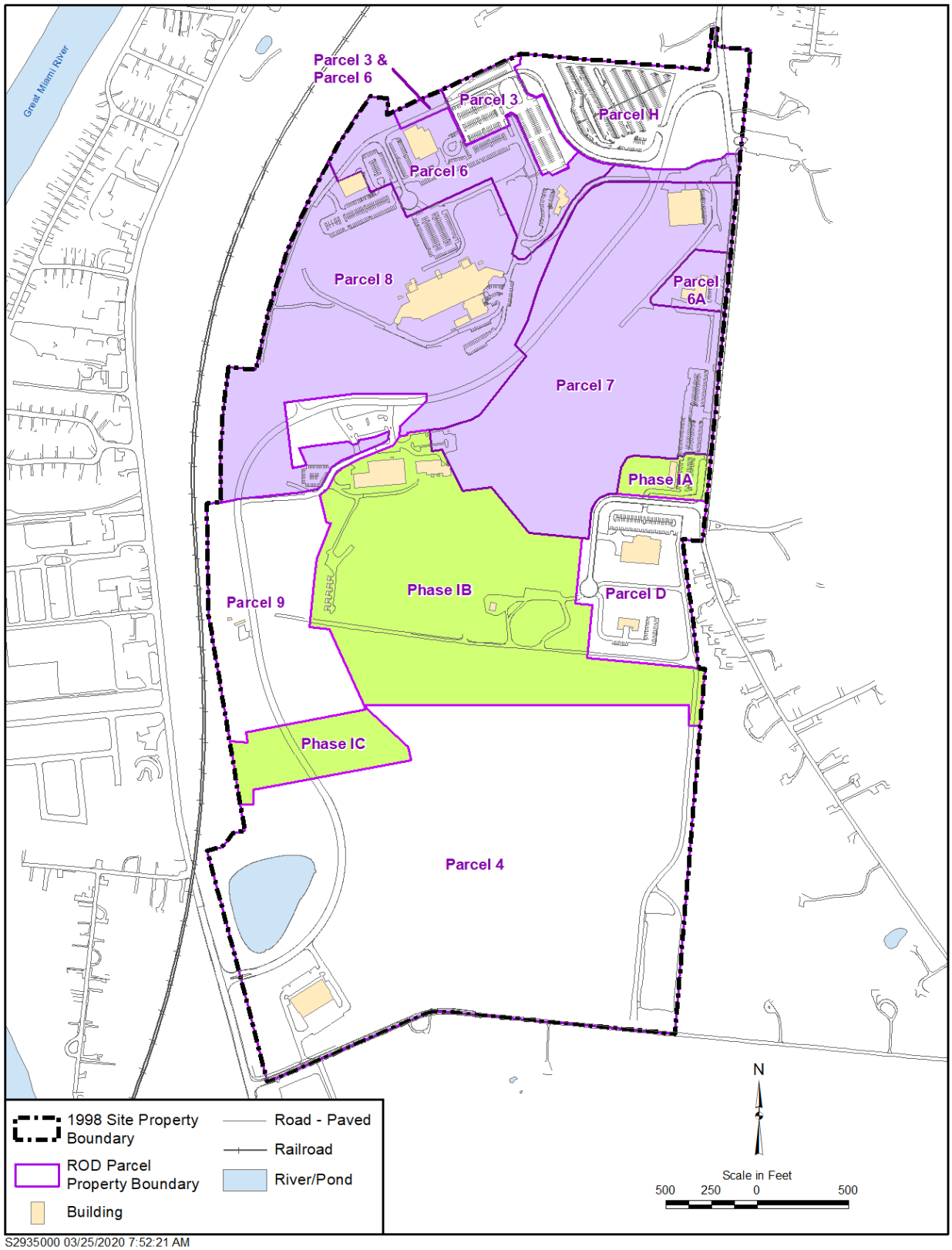

Figure 1. Locations of Phase I and Parcels 6, 7, and 8

The long-term remedial action objective (RAO) for groundwater is to meet Safe Drinking Water Act maximum contaminant levels (MCLs) through MNA in the Phase I and Parcels 6, 7, and 8 areas. Until these goals are achieved, the near-term RAO is to prohibit the extraction and use of groundwater underlying the premises unless prior written approval is obtained from EPA and Ohio EPA.

1.2.1 Phase I

Phase I is an approximately 52-acre area made up of three distinct sections. It lies on the southern border of the former production area of the Mound site. This area contains monitoring wells that are screened in both the Great Miami Buried Valley Aquifer (BVA) and the upgradient bedrock aquifer system. MNA is being used as the remedy for a small, discrete section of the bedrock groundwater system contaminated with trichloroethene (TCE) to ensure that concentrations of TCE within the bedrock groundwater are decreasing to levels below the Safe Drinking Water Act MCL and do not impact the downgradient BVA.

1.2.2 Parcels 6, 7, and 8

Parcels 6, 7, and 8 occupy approximately 101 acres of the northern portion of the Mound Plant site. The main production facilities were in an area called the Main Hill in Parcels 6 and 8. A tributary valley runs between these two parcels and Parcel 7; it contains a narrow tongue of glacial deposits that is hydraulically connected with the BVA. Groundwater within the fractured bedrock beneath the Main Hill area, and in topographic highs within Parcel 7, flows along horizontal bedding planes and fractures and ultimately discharges to naturally occurring seeps or to the downgradient BVA.

Two monitoring wells on the eastern edge of the BVA indicate volatile organic compound (VOC) impact, primarily TCE, that exceed MCLs of the Safe Drinking Water Act. MNA is the remedy for the VOCs in groundwater associated with the Main Hill. Sampling is being performed to assess the contaminant concentrations and verify that the BVA offsite and downgradient of these wells is not being adversely impacted.

Five seeps associated with this area are along the Main Hill of the plant property. Two of the five seeps are within the plant property boundary, and the remaining three are offsite to the north. Several seeps have elevated levels of tritium and VOCs. These seeps, as well as several downgradient wells, are being monitored to verify that source removal (buildings and soil) on the Main Hill will result in decreasing concentrations over time.

1.3 Geology and Hydrology

The aquifer system at the Mound site consists of two distinct hydrogeologic environments: (1) groundwater flow through the Ordovician shale and limestone bedrock beneath the hills and (2) groundwater flow within the unconsolidated glacial deposits and alluvium associated with the BVA in the Great Miami River valley. A thin tributary valley along the southern edge of the Main Hill divides the two main portions of the Mound site and features a narrow tongue of glacial deposits that is hydraulically connected with the BVA.

The bedrock flow system is dominated by fracture flow and is not considered a highly productive aquifer. Groundwater flow in the bedrock typically mimics the topography, with groundwater discharging to the BVA or at seeps from the upper bedrock. The BVA is dominated by porous flow, with interbedded gravel deposits providing the major pathway for water movement. The unconsolidated deposits are Quaternary-age sediments that consist of both glacial and fluvial deposits. The BVA is a highly productive aquifer capable of yielding a significant quantity of water. It is designated a sole-source aquifer. Groundwater flow in the BVA flows south, following the downstream course of the Great Miami River. The general structure and flow characteristics for these two interconnected systems are depicted in Figure 2.

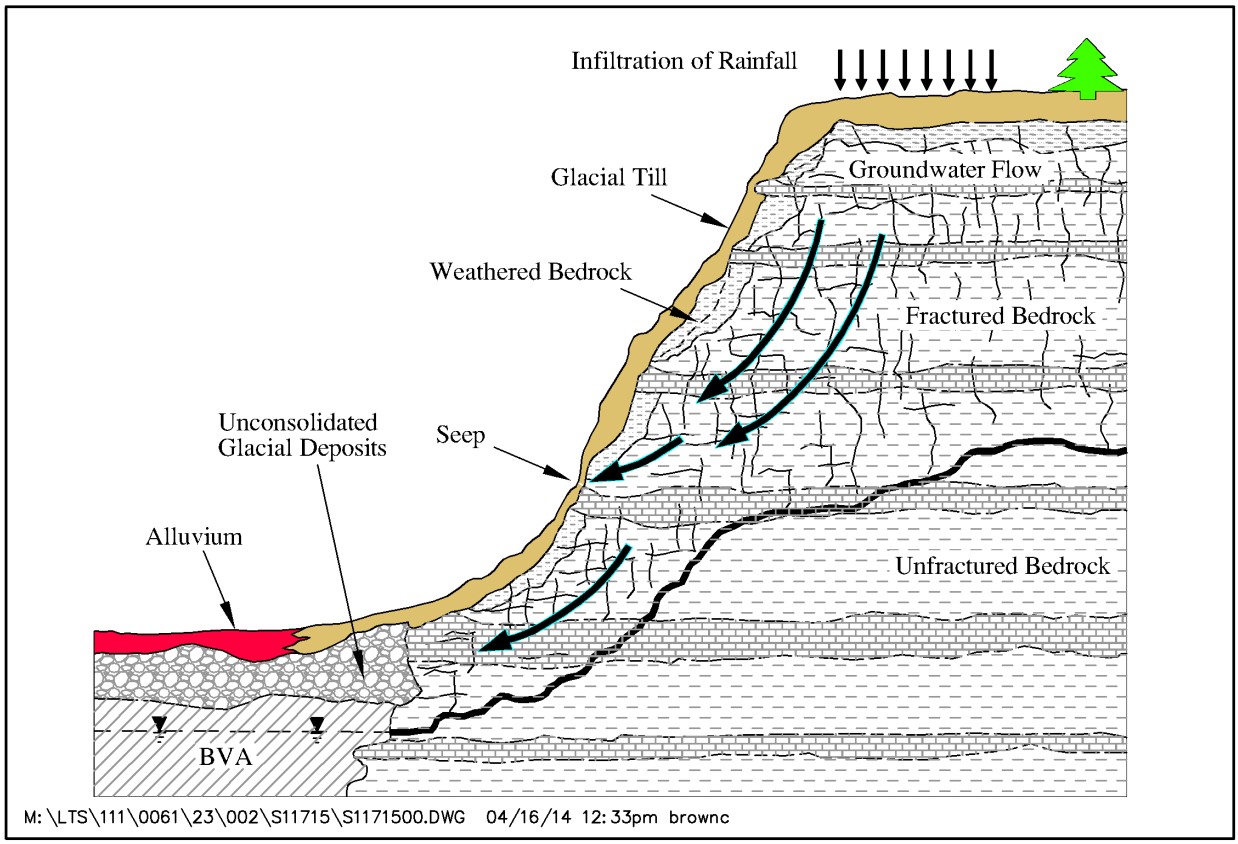

Figure 2. Generalized Cross Section Showing Flow from Bedrock to the BVA

For detailed descriptions of the geology, lithology, and groundwater flow regimes at the Mound site and specific hydrogeologic information for each area, refer to hydrogeologic investigation reports and work plans prepared for the site (DOE 1992; DOE 1994a; DOE 1994b; DOE 1995; and DOE 1999).

2.0 Monitoring Programs

2.1 Phase I

The Phase I groundwater monitoring program was established to verify that the BVA is not negatively affected by TCE-contaminated groundwater within the bedrock aquifer system. Groundwater in Phase I is monitored for TCE and its degradation products to verify that concentrations of TCE are decreasing by natural attenuation. The objective of this monitoring is to protect the BVA by verifying that the concentration of TCE near well 0411, well 0443, and seep 0617 is decreasing and to confirm that TCE is not adversely affecting the BVA.

Well P064 was added to the Phase I MNA remedy monitoring program starting in 2018 to monitor groundwater discharge from the bedrock to the BVA, and sampling at wells 0400, 0402, and P033 was discontinued. These changes to the monitoring program were approved by EPA and Ohio EPA during the August 17, 2017, Core Team meeting. The Core Team consists of representatives from DOE, EPA and Ohio EPA.

2.1.1 Monitored Natural Attenuation of TCE

Under the Phase I MNA monitoring program, samples are collected semiannually from selected wells and one seep (Figure 3) and analyzed as outlined in Table 1. Sampling was performed in the first and third quarters of 2019.

Table 1. Remedy (MNA) Monitoring for Phase I

Monitoring Location	Area	Parameters
Well 0411	Well 0411 area	TCE DCE VC
Well 0443		
Well 0353	Bedrock monitoring	
Well 0444		
Well 0445		
Seep 0617		
Well P064	BVA monitoring	

Abbreviations:
DCE = dichloroethene
VC = vinyl chloride

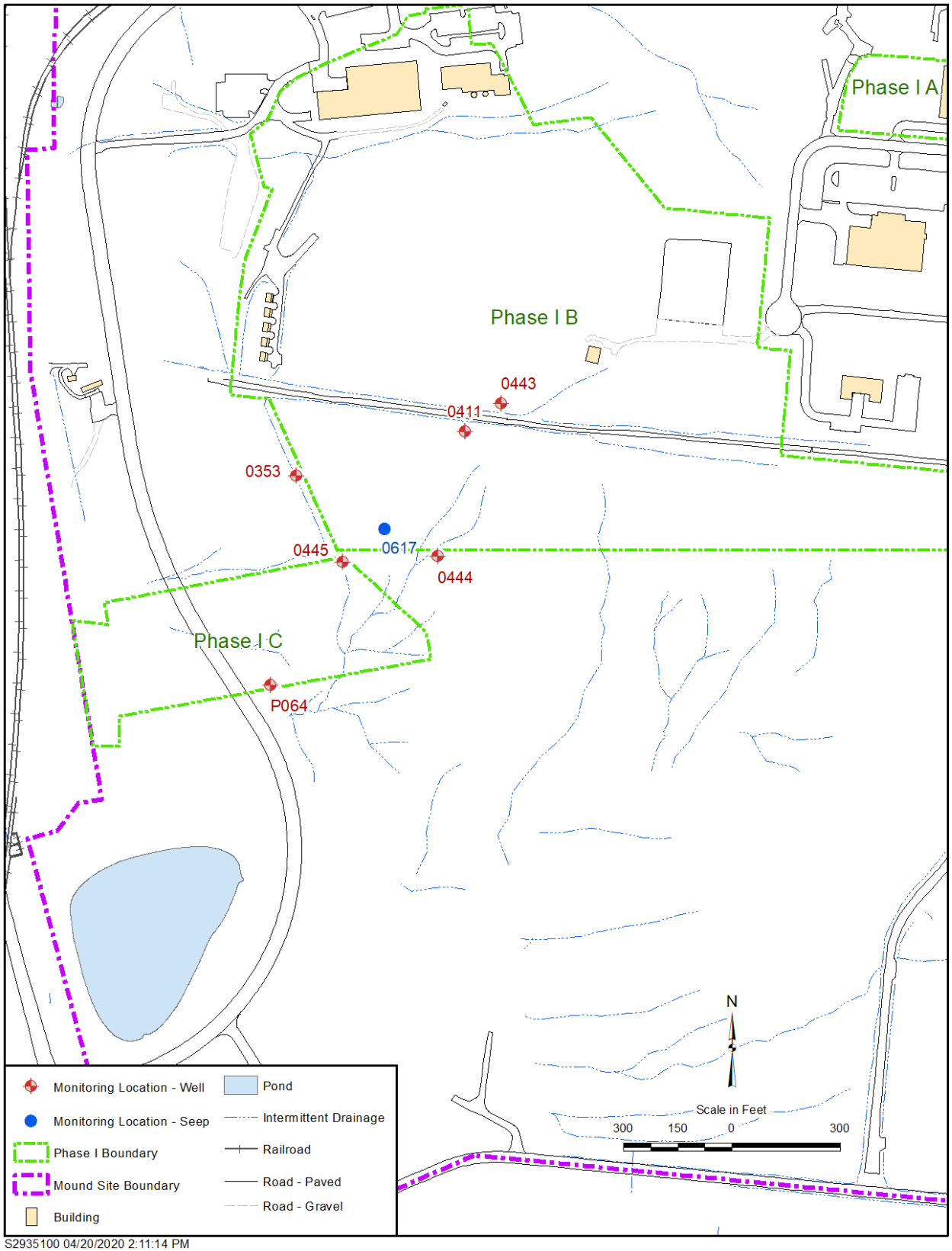

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Figure 3. Phase I MNA Remedy Monitoring Locations

2.1.2 Triggers

The contaminant data are evaluated against previous data collected at each location to determine if MNA is adequately addressing groundwater impact and to monitor geochemical conditions in the aquifer. Trigger levels and response actions have been established for each contaminant as presented in the Sitewide Operations and Maintenance Plan (DOE 2015). The triggers and MCLs for each contaminant are summarized in Table 2.

Table 2. Trigger Levels for Phase I MNA Remedy

Location	TCE (µg/L)	DCE (µg/L)	Vinyl Chloride (µg/L)
Well 0353	5	70	2
Well 0411	30	70	2
Well 0443	18	70	2
Well 0444	5	70	2
Well 0445	5	70	2
Well P064	5	70	2
Seep 0617	16	70	2
MCL	5	70	2

Abbreviation:
µg/L = micrograms per liter

EPA and Ohio EPA must be notified if trigger levels are exceeded. After notification, the Core Team (EPA, Ohio EPA, and DOE) will determine an appropriate course of action.

2.2 Parcels 6, 7, and 8

Groundwater in the Parcels 6, 7, and 8 area is monitored for TCE and its degradation products to verify that the downgradient BVA is not affected and that concentrations are decreasing. In addition, groundwater discharging from seeps is monitored for tritium and TCE and its degradation products to verify that source removal has resulted in decreasing concentrations over time.

The sampling program focuses on the following areas:

- **Well 0315/0347 Area:** Wells at the edge of the BVA on the southwestern corner of Parcel 8 that have elevated concentrations of VOCs. The program consists of wells that have TCE concentrations greater than the MCL and downgradient wells to the west. Wells 0315 and 0347 (source wells) and other selected downgradient BVA wells are monitored for VOCs—namely, tetrachloroethene (PCE), DCE isomers, TCE, and vinyl chloride (VC).
- **Main Hill Seeps:** Seeps on the northern and southern sides of the Main Hill that have elevated concentrations of VOCs and tritium. The program consists of the downgradient seeps to the north and south and downgradient wells to the west. Water from seeps 0601, 0602, 0605, 0606, and 0607 is collected and analyzed for VOCs and tritium. Select wells within the BVA that are downgradient of the bedrock groundwater discharge area of the Main Hill are also sampled to monitor VOCs and tritium.

2.2.1 Monitored Natural Attenuation of TCE and Tritium

Under the Parcels 6, 7, and 8 MNA monitoring program, samples are collected quarterly for VOCs and semiannually for tritium in selected wells and seeps (Figure 4). Table 3 provides a summary of the monitoring locations as specified in the Sitewide Operations and Maintenance Plan.

Table 3. Monitoring for Parcels 6, 7, and 8 Area

Monitoring Location	Area	VOC	Tritium
Well 0315	Source wells	X	
Well 0347		X	
Well 0118	Downgradient BVA monitoring	X	X
Well 0124		X	
Well 0126		X	
Well 0138		X	X
Well 0346		X	X
Well 0379		X	X
Well 0386		X	
Well 0387		X	
Well 0389		X	
Well 0392		X	
Seep 0601	Main Hill seeps	X	X
Seep 0602		X	X
Seep 0605		X	X
Seep 0606		X	X
Seep 0607		X	X

Note:
VOCs monitored are PCE, TCE, *cis*-1,2-DCE, *trans*-1,2-DCE, and VC.

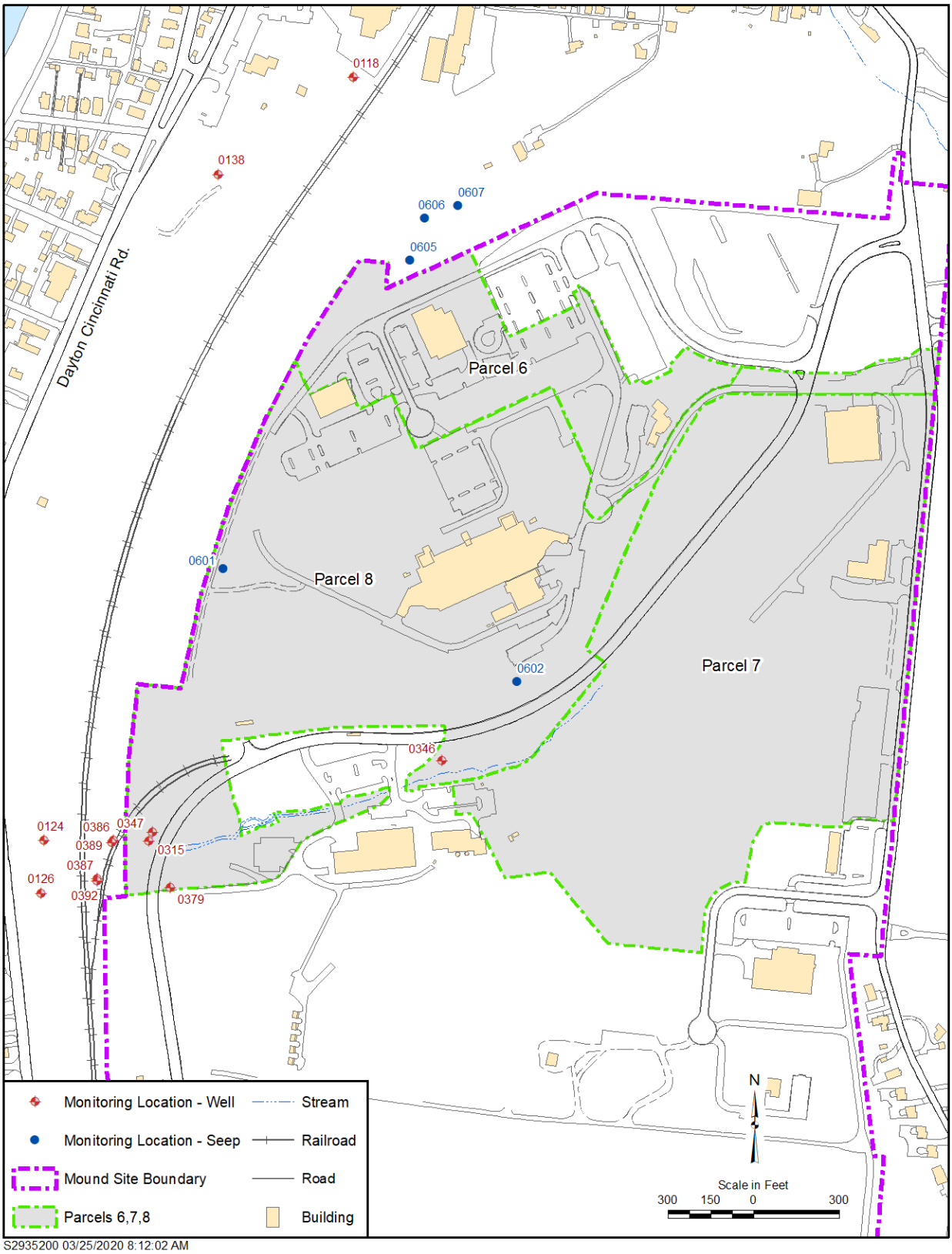


Figure 4. Parcels 6, 7, and 8 Remedy Monitoring Locations

2.2.2 Triggers

The contaminant data are evaluated against previous data collected at each location to determine if downward trends are occurring. Trigger levels and response actions have been established for specific contaminants at specified locations as presented in the Sitewide Operations and Maintenance Plan (DOE 2015). The triggers and MCLs for each contaminant are summarized in Table 4.

Table 4. Trigger Levels for Parcels 6, 7, and 8 Monitoring Locations

Location	TCE (µg/L)	PCE (µg/L)	Tritium (nCi/L)
Well 0315	30		
Well 0347	30		
Well 0124	5		
Well 0126	5		
Well 0386	5		
Well 0387	5		
Well 0389	5		
Well 0392	5		
Seep 0601		75	1500
Seep 0605	150		
MCL	5	70	2

Abbreviations:
µg/L = micrograms per liter
nCi/L = nanocuries per liter

EPA and Ohio EPA must be notified if these trigger levels are exceeded. After notification, the Mound Core Team (EPA, Ohio EPA, and DOE) will determine an appropriate course of action.

2.3 Monitoring Network

The monitoring well and seep locations sampled under these programs were selected to provide data of sufficient quality to meet the objectives of the groundwater remedies for Phase I and Parcels 6, 7, and 8. These wells were initially installed to support various site characterization activities and were designed and constructed to provide high-quality groundwater data. Appendix A contains construction information for each well used to support these remedies.

2.4 Deviations from the Sitewide Operations and Maintenance Plan

Sampling was performed as outlined in the Sitewide Operations and Maintenance Plan (DOE 2015), which compiles the sampling requirements outlined in previous plans for each area. Modifications to these monitoring programs (e.g., reduction in sampling frequency or discontinuation of monitoring locations) are also incorporated into the Sitewide Operations and Maintenance Plan.

Sampling was performed as follows:

- All required locations in Phase I were sampled in 2019.
- All required locations in Parcels 6, 7, and 8 were sampled in 2019 with the exception of seeps 0602 and 0606, which were dry (no visible flow) during the fourth quarter sampling event.
- Site-specific sampling methods for the Mound site were followed during these sampling events. These methods were approved by the Mound Core Team and are integrated into the Sitewide Operations and Maintenance Plan.

2.5 Trend Analysis Methodology

Groundwater data from select locations are evaluated for trends in contaminant concentrations over time. The computer program ProUCL (ProUCL, Version 5.1.002), developed by Lockheed Martin and EPA, was used to perform trend analysis. The method used was the Mann-Kendall test, a nonparametric statistical procedure that is appropriate for analyzing trends in data over time.

There is no requirement that the data be normally distributed or that the trend, if present, be linear. The Mann-Kendall test can be used if values are missing or below the detection limit. The assumption of independence requires that the time between samples be sufficiently large so there is no correlation between measurements collected at different times. All locations were previously evaluated for seasonality as part of the annual review in 2014 (DOE 2015). Those results indicated there are no seasonal trends in contaminant data collected from any of the monitoring locations.

The Mann-Kendall procedure tests whether to reject the null hypothesis (H_0) and accept the alternative hypothesis (H_α), where:

- H_0 asserts there is no monotonic trend in the series.
- H_α asserts that a monotonic trend exists.

The initial assumption of the Mann-Kendall test is that H_0 is true and the data must be convincing beyond a reasonable doubt before H_0 is rejected and H_α is accepted. One of three alternative hypotheses is chosen:

1. A monotonic downward trend exists.
2. Either a monotonic upward or monotonic downward trend exists.
3. A monotonic upward trend exists.

Results of the trend analyses for each monitoring program are presented in Section 3.0. For those locations that exhibit downward trends and currently exceed the MCL, the data were additionally evaluated using the Theil-Sen test to determine the linear rate of change in the concentrations for estimating cleanup timeframes. A summary of the Mann-Kendall and Theil-Sen statistical approaches used for this report, as well as the specified error rates and data assumptions, are presented in Appendix B. Data analysis reports for each well and parameter are also included in Appendix B.

3.0 Phase I MNA Remedy

3.1 Monitoring Results

Monitoring results for 2019 (Table 5) continue to show low-level detections of TCE and *cis*-1,2-DCE, a TCE degradation product, in source area wells 0411 and 0443 and seep 0617. Concentrations of TCE at these locations continue to exceed the MCL of 5 micrograms per liter (µg/L). All VOC concentrations were below the applicable trigger levels (Table 2). No detectable concentrations of *trans*-1,2-DCE or VC were reported at the two source wells and the seep monitoring locations. Downgradient BVA monitoring well P064 had detectable concentrations of TCE that were below the MCL but indicated slight impact attributable to VOCs originating from the Phase I area. No detectable concentrations of *cis*-1,2-DCE, *trans*-1,2-DCE or VC were reported in the BVA or bedrock wells.

Table 5. Summary of VOC Monitoring Results in Phase I for 2019

Well ID	Location	Parameter	First Semiannual Event	Second Semiannual Event
Source Area Wells and Seep				
0411	0411 Area	TCE (µg/L)	**10.4**	**10.1**
		cis-1,2-DCE (µg/L)	0.95 (J)	0.98 (J)
0443	0411 Area	TCE (µg/L)	**5.3**	4.7
		cis-1,2-DCE (µg/L)	ND (<1)	0.32 (J)
0617	Seep/ Bedrock	TCE (µg/L)	**6.9**	**7.3**
		cis-1,2-DCE (µg/L)	2.05	1.84
Bedrock/BVA Monitoring Wells				
0353	Bedrock	TCE (µg/L)	ND (<1)	ND (<1)
		cis-1,2-DCE (µg/L)	ND (<1)	ND (<1)
0444	Bedrock	TCE (µg/L)	ND (<1)	ND (<1)
		cis-1,2-DCE (µg/L)	ND (<1)	ND (<1)
0445	Bedrock	TCE (µg/L)	ND (<1)	ND (<1)
		cis-1,2-DCE (µg/L)	ND (<1)	ND (<1)
P064	BVA	TCE (µg/L)	0.7	0.6
		cis-1,2-DCE (µg/L)	ND (<1)	ND (<1)

Note:
Values in **bold** exceed the MCL of 5 µg/L for TCE.

Abbreviations:
J = estimated value less than the reporting limit
ND = not detected above reporting limit

The data collected during 2019 continue to indicate that impact is localized in the bedrock groundwater near wells 0411 and 0443 and seep 0617. Data from downgradient BVA monitoring well P064 indicate the concentrations of VOCs are low at the point where bedrock groundwater enters the BVA.

TCE concentrations in well 0411 (Figure 5) have decreased since monitoring began in 1999; however, since 2002, the concentrations of TCE in this well have ranged between 9 and 15 micrograms per liter (µg/L). Concentrations of TCE in well 0443 and seep 0617 have varied since monitoring of these locations started in 2002. Concentrations of TCE in well 0443 had been consistently greater than the MCL since 2010, but results were below the MCL for the second semiannual sampling event in 2019. The time-concentration plots for well 0443 and seep 0617 indicate that concentrations vary and are lower than those in well 0411.

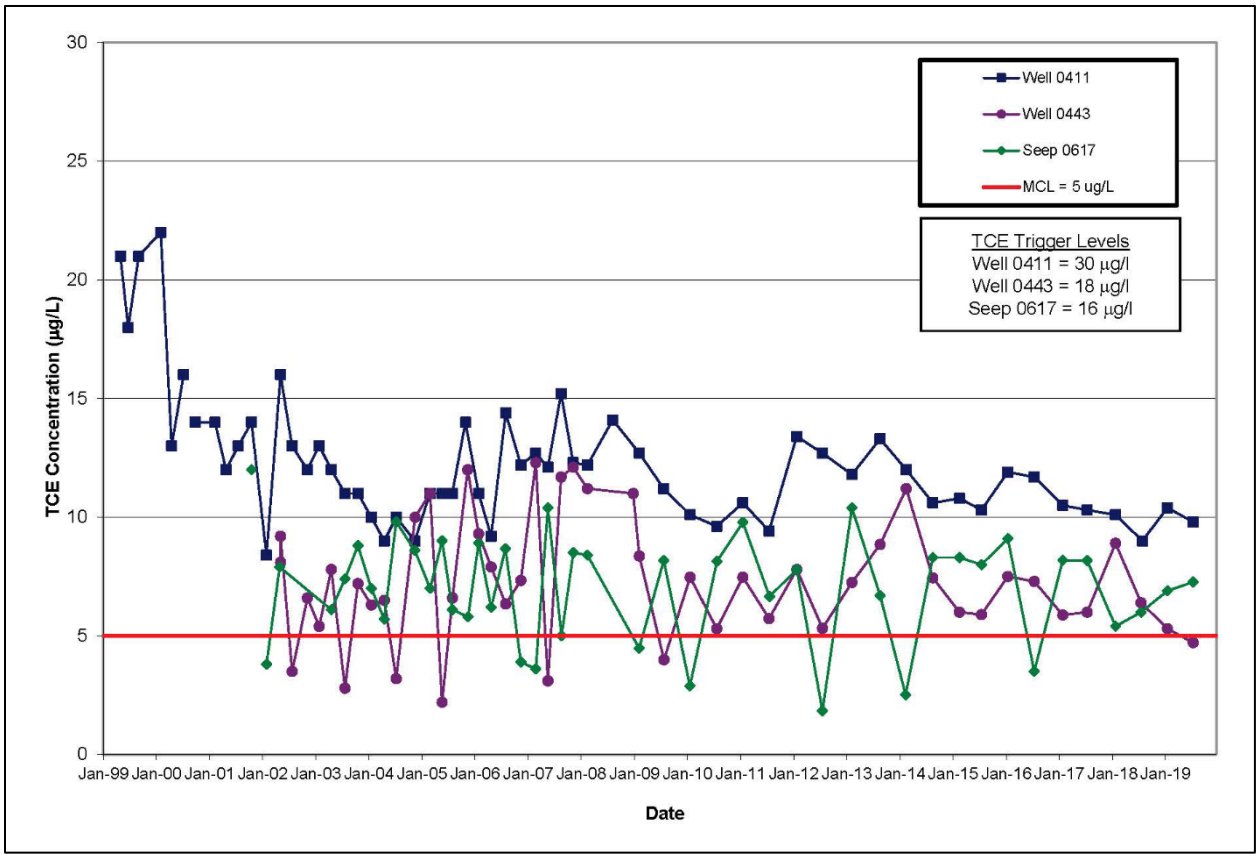


Figure 5. TCE Concentrations in Phase I, 1999–2019

The concentrations of *cis*-1,2-DCE in groundwater (Figure 6) continue to be varied. Concentrations greater than the reporting limit of 1 µg/L have consistently been reported in well 0411 and seep 0617. Historically, concentrations of *cis*-1,2-DCE in well 0411 were generally greater than those measured in seep 0617; however, over the past few years, the concentrations in seep 0617 have been higher than in well 0411. Estimated detections lower than 1 µg/L have been reported in well 0443 since 2009. None of the locations had concentrations of *cis*-1,2-DCE that exceeded the MCL of 70 µg/L.

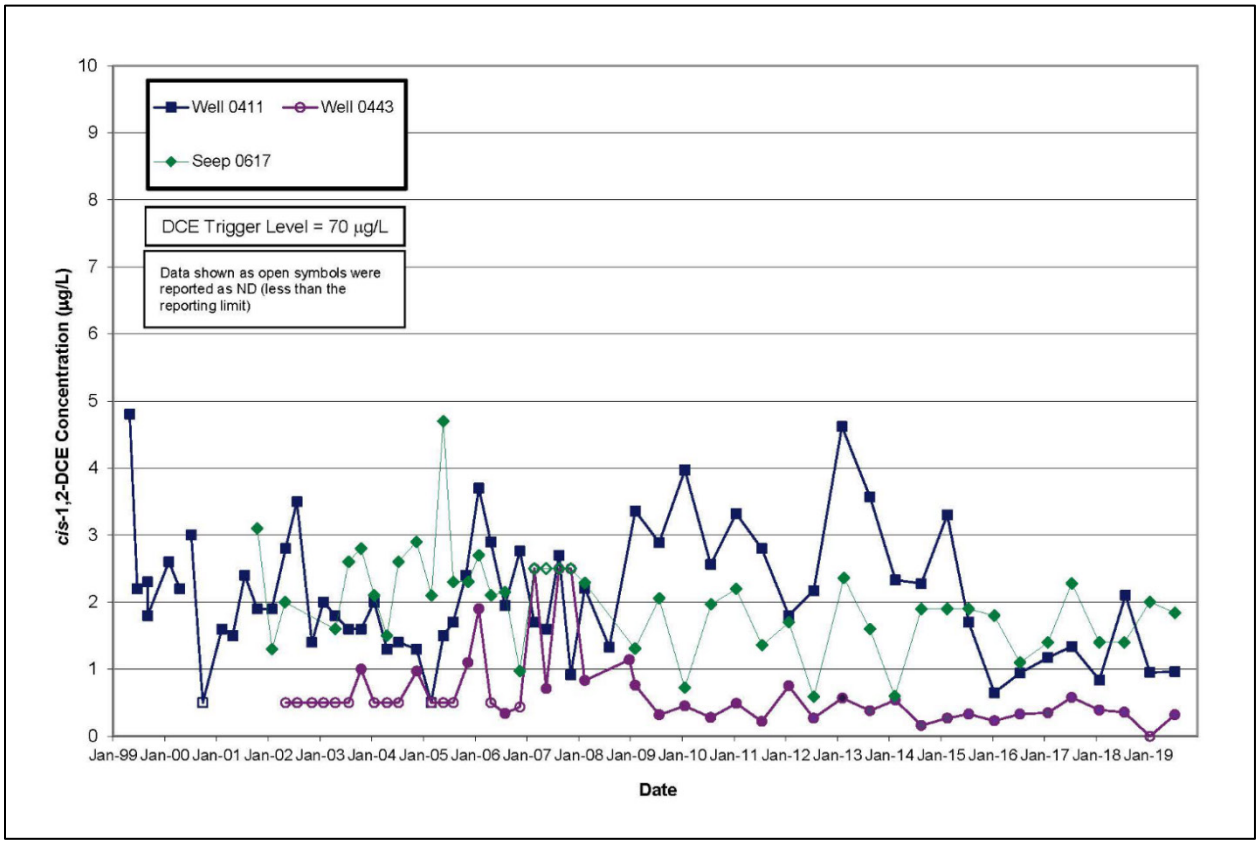


Figure 6. cis-*1,2-DCE Concentrations in Phase I, 1999–2019*

3.2 Trend Analysis

Mann-Kendall trend analysis was performed using data collected since 1999 for wells 0411 and 0443 and seep 0617 and indicates downward trends for TCE in well 0411 and for *cis*-1,2-DCE in well 0443 and seep 0617 (Table 6). Trend analysis for well P064 was performed using data collected since its installation in 2017 and indicates a downward trend for TCE. Trend analysis was not performed for the remainder of the wells because results consistently showed nondetects or sporadic detections. Summary reports providing details for each statistical evaluation for each monitoring location are contained in Appendix B.

Table 6. Trend Analysis Results for TCE and DCE in Phase I

Location	Analyte	Trend
Well 0411	TCE	**Down**
Well 0443		None
Seep 0617		None
P064		**Down**
Well 0411	*cis*-1,2-DCE	None
Well 0443		**Down**
Seep 0617		**Down**
P064		None

Evaluation of the downward trend in TCE concentrations in well 0411 may indicate the time frame when concentrations may approach the MCL of 5 µg/L. The slope calculated for the trend line using the Theil-Sen test was used as an estimate and suggests that the MCL may be reached by 2051, which is similar to the estimated time frame from previous annual reports. The remainder of the locations were less than the MCL or no trend was present; therefore, no time frames are estimated.

Table 7 summarizes the results from each annual trend analysis performed since 2007 in Phase I for source area monitoring wells 0411 and 0443 and seep 0617. Results show continued downward trends in TCE concentrations in well 0411 since the monitoring program was started. No trends in the data are observed in TCE concentrations in well 0443 and 0617. No trends in the *cis*-1,2-DCE data have been observed at well 0411 since 2016. Downward trends in *cis*-1,2-DCE have been observed at both well 0443 and seep 0617 since 2014 and 2012, respectively.

Table 7. Summary of Annual Trend Analysis Results for Phase I

Location	Analyte	Year												
		2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019
Well 0411	TCE	D	D	D	D	D	D	D	D	D	D	D	D	D
Well 0443		N	U	N	N	N	N	N	N	N	N	N	N	N
Seep 0617		N	N	N	N	N	N	N	N	N	N	N	N	N
Well 0411	cDCE	---	N	N	N	N	N	N	U	U	N	N	N	N
Well 0443		---	U	N	N	N	N	N	D	D	D	D	D	D
Seep 0617		---	N	N	N	N	D	D	D	D	D	D	D	D

Abbreviations:
D = downward trend
N = no trend (either upward or downward)
U = upward trend

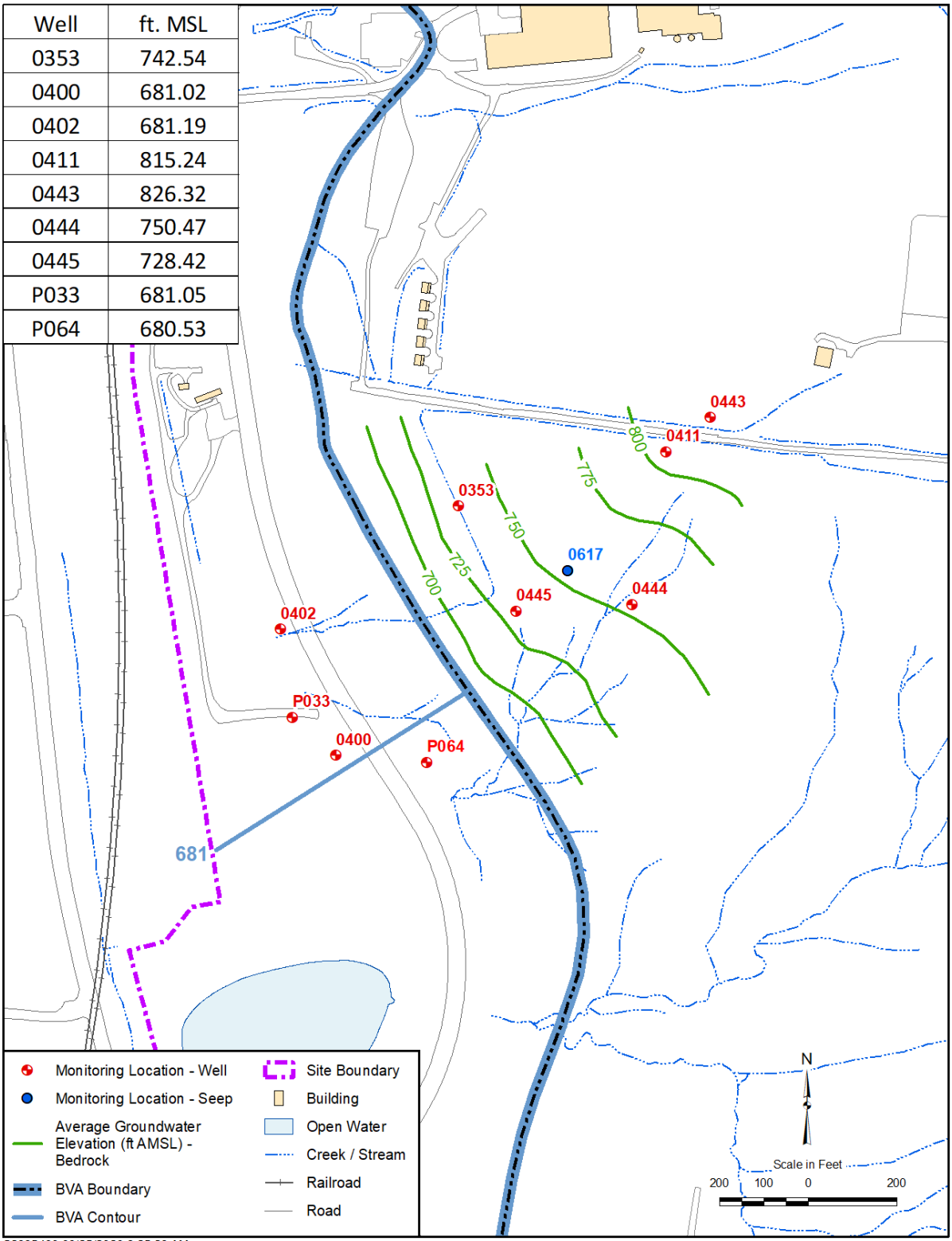
3.3 Groundwater Elevations

A map of the average groundwater elevations measured in the Phase I area during 2019 (Figure 7) represents the two flow regimes present at the Mound site: bedrock and the unconsolidated materials of the BVA. The approximate location of contact of the BVA with the bedrock is indicated in this figure. Groundwater originating from the area of wells 0411 and 0443 flows southwest within the bedrock, following the bedrock topography. This groundwater enters the BVA along this contact. Flow within the BVA is generally to the south-southeast (parallel to the bedrock contact). Appendix C presents a summary of the groundwater elevations measured during 2019.

3.4 Recommendations

No samples in 2019 were above trigger levels. Concentrations of TCE and *cis*-1,2-DCE in BVA monitoring wells continue to remain below MCLs, indicating no impacts to the BVA, and the

absence of upward trends demonstrates that analyte concentrations are not statistically increasing. No changes to the Phase I MNA monitoring program are recommended at this time, and the wells and seeps will continue to be sampled semiannually in 2020.



Well	ft. MSL
0353	742.54
0400	681.02
0402	681.19
0411	815.24
0443	826.32
0444	750.47
0445	728.42
P033	681.05
P064	680.53

Figure 7. 2019 Average Groundwater Elevations in Phase I

4.0 Parcels 6, 7, and 8 MNA Remedy

4.1 Monitoring Results—VOCs

4.1.1 Seeps

Concentrations of TCE were reported in all of the Main Hill seeps; none of the seeps exceeded the MCL of 5 µg/L (Table 8) in 2019. The trigger level of 150 µg/L for TCE in seep 0605 (Table 4) was not exceeded in 2019. Concentrations of PCE were above the MCL of 5 µg/L in seep 0601 for all sampling events except for the fourth quarter 2019 sampling event. All PCE concentrations for seep 0601 were well below the trigger level of 75 µg/L in 2019. A low concentration of PCE (less than 1 µg/L) was reported as an estimated value below the detection limit in seeps 0605, 0606, and 0607. *cis*-1,2-DCE was reported in all of the seeps, with seep 0602 showing the highest concentrations; however, none of the concentrations exceeded the MCL of 70 µg/L. An estimated detection of *trans*-1,2-DCE (less than 1 µg/L) was reported in seep 0602 during the second quarter sampling event. No VC was detected in the seeps.

Table 8. Summary of VOC Results in the Main Hill Seeps for 2019

Location	Area	VOC Concentrations				
		VOC	Q1	Q2	Q3	Q4
0601	Onsite	PCE (µg/L)	**11.0**	**11.3**	**8.5**	3.8
		TCE (µg/L)	1.08	0.85 (J)	1.02	0.88 (J)
		cis-1,2-DCE (µg/L)	0.63 (J)	0.51 (J)	0.47 (J)	0.46 (J)
		trans-1,2-DCE (µg/L)	ND (<1)	ND (<1)	ND (<1)	ND (<1)
0602	Onsite	PCE (µg/L)	ND (<1)	ND (<1)	ND (<1)	DRY
		TCE (µg/L)	2.7	4.7	2.7	
		cis-1,2-DCE (µg/L)	3.6	5.1	3.23	
		trans-1,2-DCE (µg/L)	ND (<1)	0.24 (J)		
0605	Offsite	PCE (µg/L)	ND (<1)	0.38 (J)	ND (< 1)	ND (<1)
		TCE (µg/L)	1.66	1.45	0.27 (J)	1.33
		cis-1,2-DCE (µg/L)	1.45	0.97 (J)	0.23 (J)	2.34
		trans-1,2-DCE (µg/L)	ND (<1)	ND (<1)	ND (<1)	ND (<1)
0606	Offsite	PCE (µg/L)	ND (<1)	ND (<1)	0.31 (J)	DRY
		TCE (µg/L)	ND (<1)	ND (<1)	1.64	
		cis-1,2-DCE (µg/L)	ND (<1)	ND (<1)	2.46	
		trans-1,2-DCE (µg/L)	ND (<1)	ND (<1)	ND (<1)	
0607	Offsite	PCE (µg/L)	ND (<1)	ND (<1)	0.17 (J)	ND (<1)
		TCE (µg/L)	0.44 (J)	0.44 (J)	0.74 (J)	0.69 (J)
		cis-1,2-DCE (µg/L)	ND (<1)	0.18 (J)	0.43 (J)	0.47 (J)
		trans-1,2-DCE (µg/L)	ND (<1)	ND (<1)	ND (<1)	ND (<1)

Notes:
PCE trigger level at seep 0601 = 75 µg/L.
TCE trigger level at the seeps = 150 µg/L.
Values in **bold** exceed the MCL.

Abbreviations:
J = estimated value that is less than the reporting limit
ND = not detected
Q = quarter

A graph of TCE concentrations measured in the seeps since the remediation of contaminated buildings and soil on the Main Hill (completed in mid-2006) (Figure 8) shows that the highest concentrations of TCE were measured in seeps 0602 and 0605. After the completion of site improvements and the closure of the tritium capture pits on the Main Hill in 2011, VOC concentrations have been less variable and decreasing. Data from the past few years show that elevated concentrations of TCE only periodically occur in seep 0602.

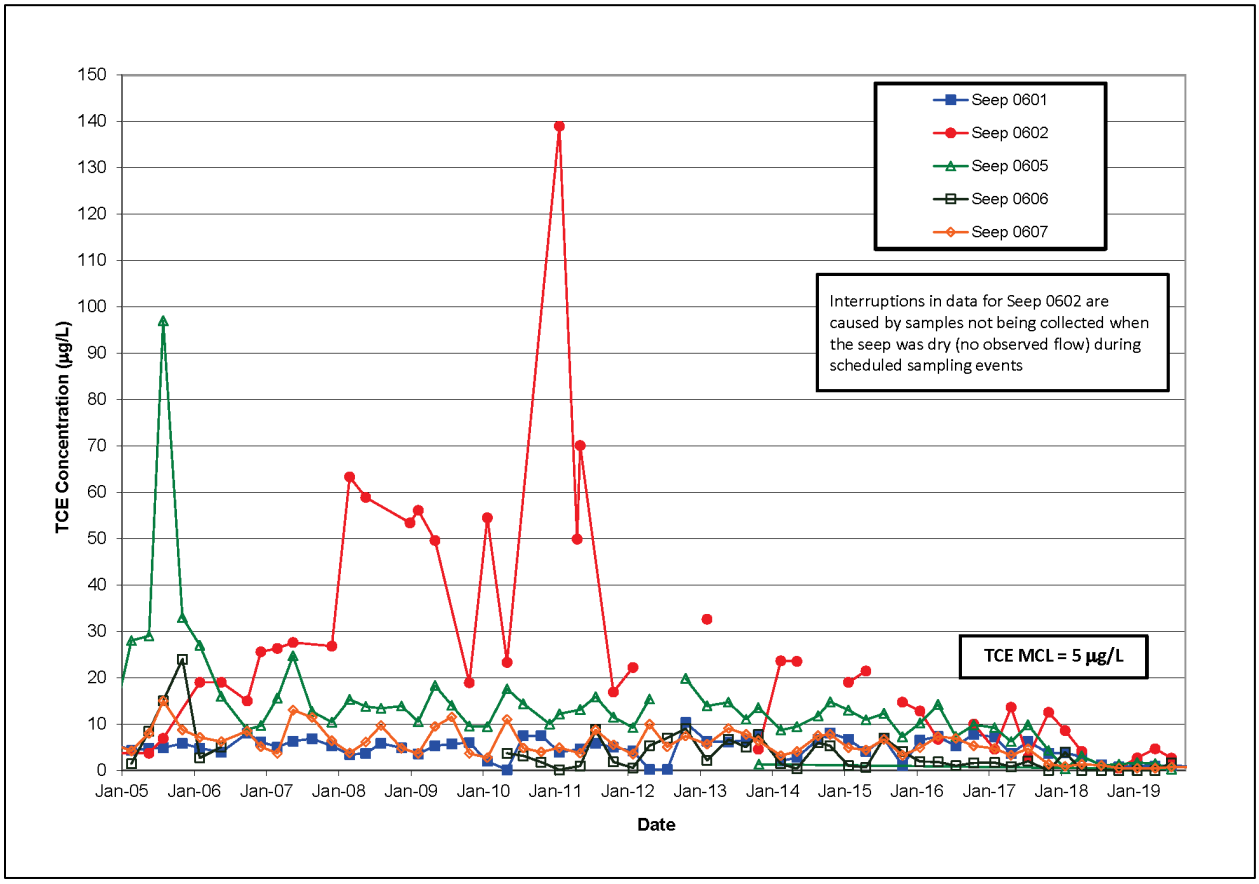


Figure 8. TCE Concentrations in Parcels 6, 7, and 8 Main Hill Seeps

Seep 0601 is the only location where PCE was routinely reported and PCE concentrations in this seep (Figure 9) are similar to those measured before remediation on the Main Hill. Estimated PCE concentrations less than 1 µg/L were reported in seeps 0605, 0606, and 0607 during 2019.

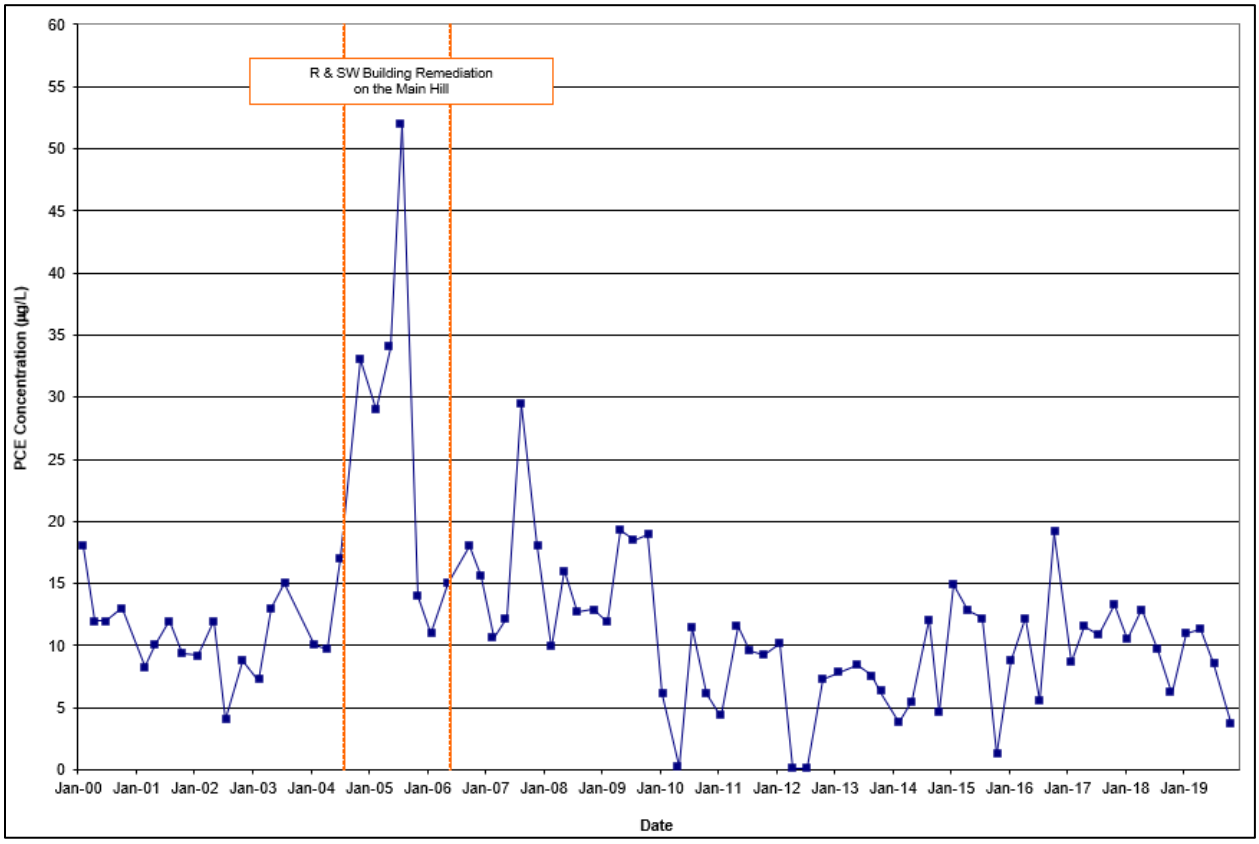


Figure 9. PCE Concentrations in Seep 0601 (Parcels 6, 7, and 8)

4.1.2 Groundwater

Monitoring results for 2019 (Table 9) continue to show TCE in wells 0315, 0347, 0379, and 0386; the highest concentrations are detected in well 0347 (source area well), where concentrations exceeded the MCL. The MCL for TCE was not exceeded during any quarter of 2019 in well 0315 (other source area well). The concentrations of TCE reported in wells 0315 and 0347 were below the trigger level of 30 µg/L established for these source area wells (Table 4). Wells 0379 and 0386 are within the tributary valley, as are wells 0315 and 0347 (Figure 4). Estimated detections of TCE were reported in wells 0124 and 0389. There were no detectable concentrations of TCE measured in the other wells.

Estimated detections of PCE less than 1 µg/L were reported in wells 0124, 0126, 0379, 0386, 0387, and 0392. These wells are located where the tributary valley enters the BVA. No trigger levels for PCE have been set for these locations. No detectable concentrations of *cis*-1,2-DCE, *trans*-1,2-DCE, or VC were reported in any of the wells monitored as part of this program.

Table 9. Summary of VOC Results in Parcels 6, 7, and 8 Groundwater for 2019

Location	Area	VOC Concentrations				
		VOC	Q1	Q2	Q3	Q4
Onsite Wells						
0315	Source Area	PCE (μg/L)	ND (<1)	ND (<1)	ND (<1)	ND (<1)
		TCE (μg/L)	2.6	1.2	0.42 (J)	0.95 (J)
0347		PCE (μg/L)	ND (<1)	ND (<1)	ND (<1)	ND (<1)
		TCE (μg/L)	**26.1**	**21.4**	**5.0**	**23.8**
0346	Onsite	PCE (μg/L)	ND (<1)	ND (<1)	ND (<1)	ND (<1)
		TCE (μg/L)	ND (<1)	ND (<1)	ND (<1)	ND (<1)
0379		PCE (μg/L)	0.36 (J)	0.42 (J)	0.38 (J)	0.42 (J)
		TCE (μg/L)	1.6	1.0	0.32 (J)	0.27 (J)
Downgradient Wells—Near (offsite)						
0386	BVA	PCE (μg/L)	ND (<1)	ND (<1)	0.20 (J)	0.17 (J)
		TCE (μg/L)	2.6	2.9	2.6	2.4
0387		PCE (μg/L)	ND (<1)	0.27 (J)	0.35 (J)	0.29 (J)
		TCE (μ/L)	ND (<1)	ND (<1)	ND (<1)	ND (<1)
0389		PCE (μg/L)	ND (<1)	ND (<1)	ND (<1)	ND (<1)
		TCE (μg/L)	ND (<1)	ND (<1)	0.54 (J)	ND (<1)
0392		PCE (μg/L)	ND (<1)	0.19 (J)	0.24 (J)	0.23 (J)
		TCE (μg/L)	ND (<1)	ND (<1)	ND (<1)	ND (<1)
Downgradient Wells—Far (offsite)						
0118	BVA	PCE (μg/L)	ND (<1)	ND (<1)	ND (<1)	ND (<1)
		TCE (μg/L)	ND (<1)	ND (<1)	ND (<1)	ND (<1)
0124		PCE (μg/L)	ND (<1)	0.31 (J)	0.35 (J)	0.34 (J)
		TCE (μg/L)	ND (<1)	0.25 (J)	0.23 (J)	ND (<1)
0126		PCE (μg/L)	0.82 (J)	0.80 (J)	0.85 (J)	0.93 (J)
		TCE (μg/L)	ND (<1)	ND (<1)	ND (<1)	ND (<1)
0138		PCE (μg/L)	ND (<1)	ND (<1)	ND (<1)	ND (<1)
		TCE (μg/L)	ND (<1)	ND (<1)	ND (<1)	ND (<1)

Notes:
TCE trigger level for wells 0315 and 0347 = 30 μg/L.
TCE trigger level for other wells = 5 μg/L.
Values in **bold** exceed the MCL.

Abbreviations:
J = estimated value that is less than the reporting limit
ND = not detected
Q = quarter

TCE data from the Main Hill area indicate that the highest concentrations were measured in groundwater in well 0347. Historically, concentrations of TCE were higher in the seeps than in the groundwater monitoring wells. Starting last year, it was observed that the concentrations of TCE in wells 0315 and 0347 were higher than those measured in the upgradient seeps.

A graph of TCE concentrations measured in select wells shows that concentrations in wells 0315 and 0347 have consistently been greater than the MCL of 5 µg/L (Figure 10), although TCE concentrations in well 0315 have periodically been lower than the MCL in the last 4 years and were below the MCL for all 2019 sampling events. The concentrations of TCE in the downgradient wells have been below the MCL since 2000. The pattern in TCE concentrations in wells 0315 and 0347 has been similar since 2012. The concentrations in well 0347 have continued to be higher and have greater changes (increases and decreases) compared to those in well 0315. An overall decrease in TCE concentrations can be observed beginning at the same time. It is likely that surface water influences noted in previous reports (DOE 2014a; DOE 2014b) have been reduced or eliminated and that more recent data reflect TCE concentrations in groundwater not influenced by infiltration of surface water through the exposed tritium capture pits.

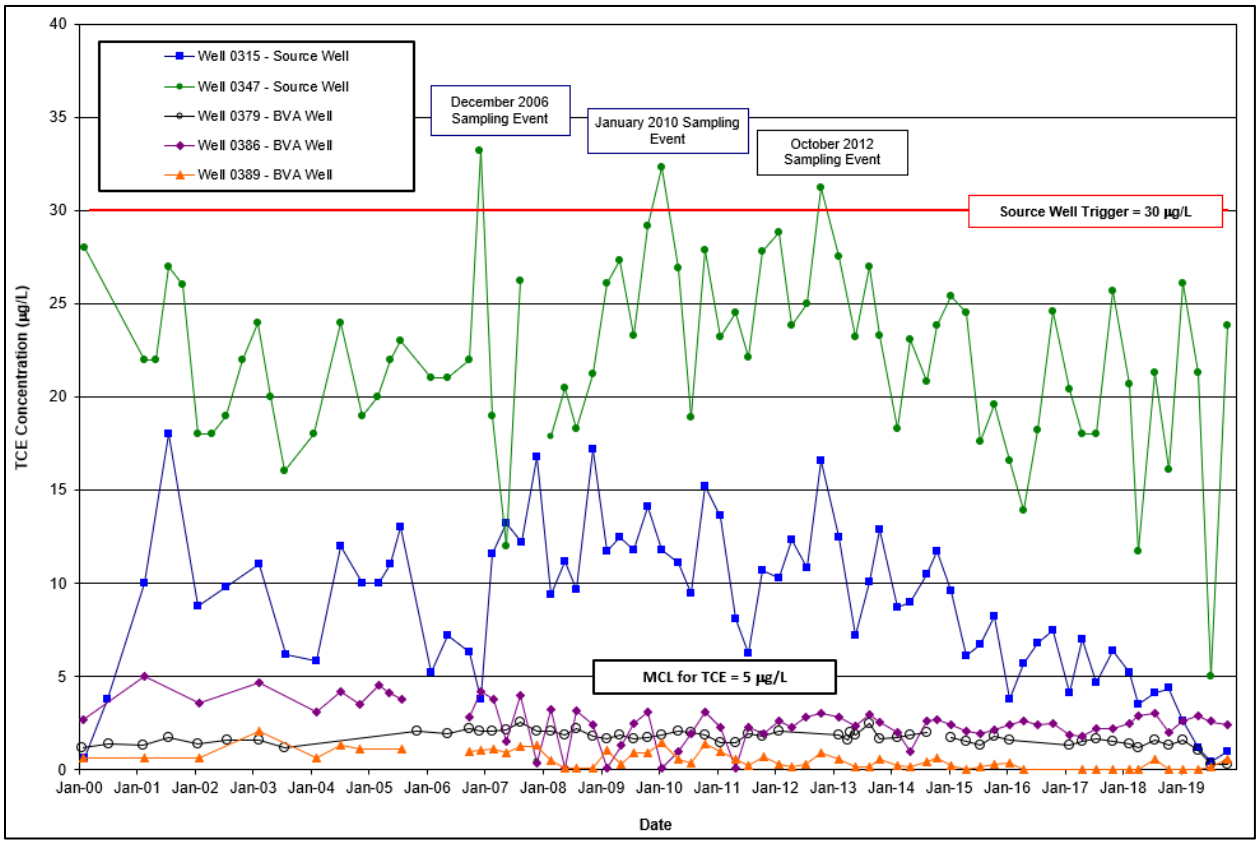


Figure 10. TCE Concentrations in Parcels 6, 7, and 8 Groundwater

Data collected over the past several years indicate variable concentrations of VOCs, primarily TCE, in the groundwater in Parcels 6, 7, and 8, as exhibited from the data from seep 0602 (Figure 8) and wells 0315 and 0347 (Figure 10). Seep 0602 and the downgradient wells 0315 and 0347 are in the tributary valley, which is along the southern edge of the Main Hill. As discussed in Section 1.3, the tributary valley is a narrow tongue of glacial deposits connected to the BVA that overlies the fractured bedrock at the site. Water infiltrating on the Main Hill moves through the fractured bedrock and ultimately discharges into the unconsolidated materials. TCE-impacted groundwater that originated on the Main Hill discharges to seeps or the tributary valley (DOE 2017). Annual average TCE concentrations from wells within the tributary valley

show that the deep wells screened directly above the bedrock (wells 0347, 0386, and 0387) have the highest TCE concentrations and are used to monitor the TCE-impacted groundwater discharging from the bedrock.

4.2 Monitoring Results—Tritium

Tritium levels in the Main Hill seeps continued to be higher than those in the downgradient groundwater wells (Table 10). The highest tritium activity continued to be measured in seep 0601, which is onsite. No location exceeded the MCL of 20 nanocuries per liter (nCi/L) or the trigger level of 1500 nCi/L in 2019 (Table 4). The wells had tritium levels similar to background (0.77 nCi/L [DOE 1996]).

Table 10. Summary of Tritium Results in the Main Hill Area for 2019

Location	Tritium Activity (nCi/L)	
	Semiannual Period 1	Semiannual Period 2
Seeps		
0601	8.0	10.9
0602	1.0	0.85 (J)
0605	2.6	2.6
0606	2.0	2.3
0607	1.0	1.1
Downgradient Wells		
0118	ND (<0.08)	ND (<0.07)
0138	0.31 (J)	0.39 (J)
0346	0.44 (J)	ND (<0.4)
0347	1.2	1.0
0379	1.1	0.58 (J)

Note:
Tritium trigger level at the seeps = 1500 nCi/L.

Abbreviations:
J = estimated value that is less than the reporting limit
ND = not detected

Tritium levels in the seeps were highest during remediation activities on the Main Hill (2004−2006). Tritium data collected after building demolition and soil removal indicate decreasing levels in all of the seeps (Figure 11). The decrease in tritium levels in post remediation data supports that the majority of the source was removed from the Main Hill area and that, with continued flushing, levels are expected to continue to decline. Starting in 2009, the tritium levels in all seeps except seep 0601 were lower than the MCL of 20 nCi/L. The levels of tritium in seep 0601 have been below the MCL since 2017.

Tritium data from the Main Hill area indicates that the greatest impact is still associated with the seeps, particularly seep 0601. Downgradient wells showed some levels of tritium similar to background.

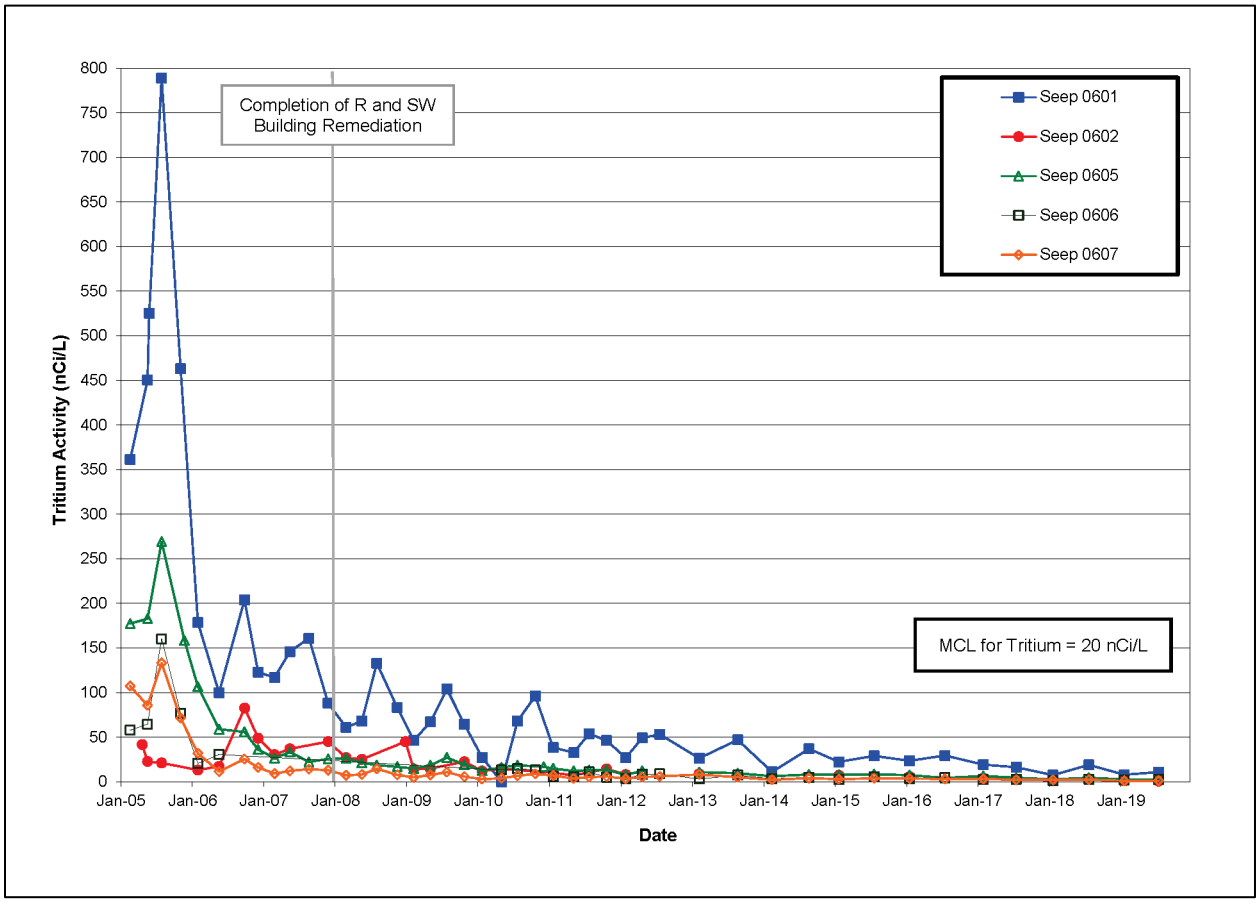


Figure 11. Tritium Activity in Parcels 6, 7, and 8 Main Hill Seeps

A graph of tritium levels in downgradient wells (Figure 12) illustrates that groundwater impact in the wells lagged behind impact expressed in the seeps. Groundwater impact increased near the end of remediation activities on the Main Hill; impact in the seeps occurred as remediation activities were being performed and began to decrease as activities were completed. The tritium levels in the wells also responded quickly to remediation activities. In general, the tritium levels in the wells have leveled off and are similar to background (0.77 nCi/L). Well 0347 historically had the highest levels of tritium and starting in 2016 the levels like those measured in the other wells. All tritium levels in the monitoring wells were below the MCL of 20 nCi/L.

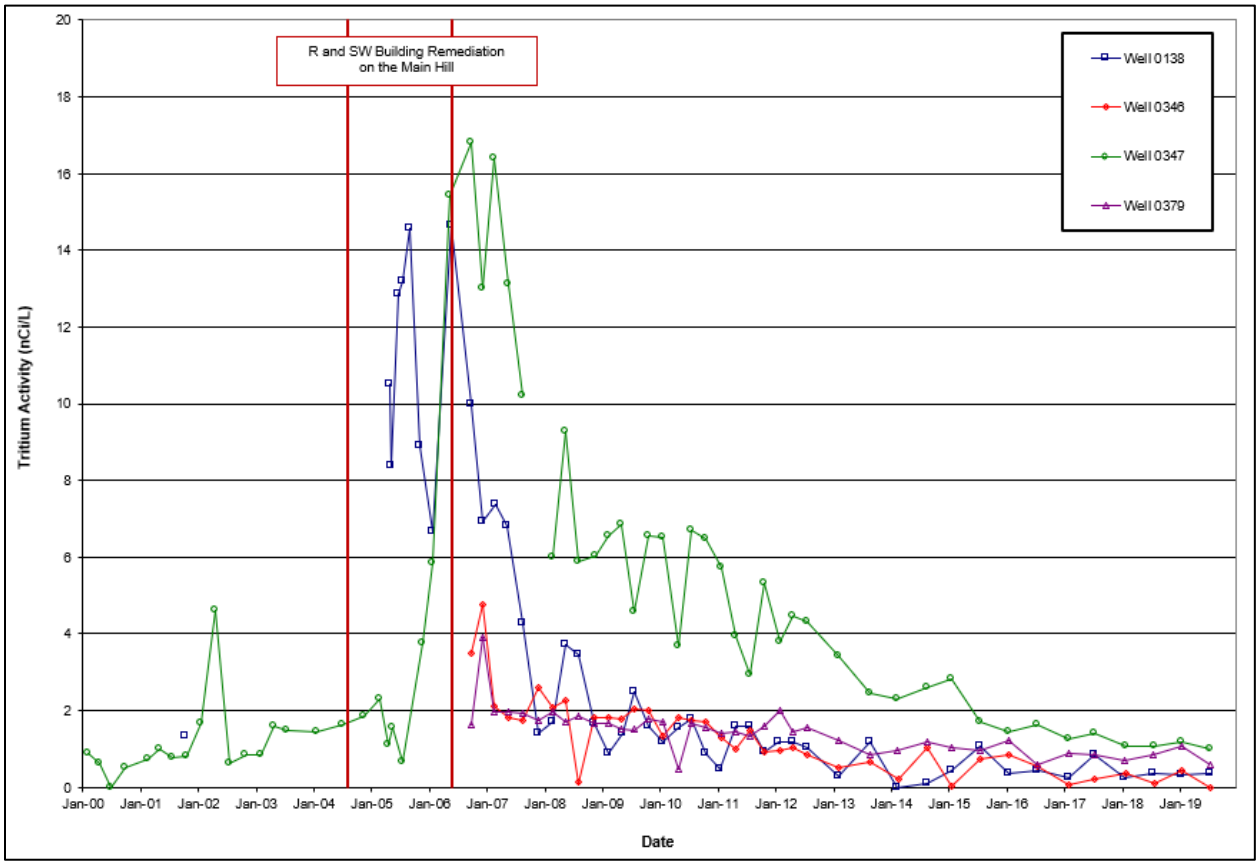


Figure 12. Tritium Activity in Parcels 6, 7, and 8 Wells 0138, 0346, 0347, and 0379

4.3 Trend Analysis

Trend analysis was performed on VOCs and tritium data using the nonparametric Mann-Kendall test. Trend analysis is reported for data collected since 2005. This period was selected to represent data collected since the completion of remediation activities on the Main Hill.

4.3.1 VOCs

Trend analysis of TCE data collected since 2005 indicates downward trends for seeps 0602, 0605, 0606, and 0607 and wells 0315, and 0389 (Table 11). Concentrations of PCE in seep 0601 were evaluated for a trend in PCE concentrations, and a downward trend was indicated. Data from seeps 0602 and 0605 were evaluated for trends in *cis*-1,2-DCE concentrations (Table 11), and downward trends were determined by the nonparameteric Mann-Kendall test for both seeps. Trend analysis was not performed on data from the remainder of the wells because results consistently showed nondetects or sporadic estimated detections. Summary reports providing details for each statistical evaluation for each monitoring location are in Appendix B.

Table 11. Trend Analysis Results for VOCs in Parcels 6, 7, and 8 (2005–2019)

Location	Trend
TCE	
Seep 0601	None
Seep 0602	**Down**
Seep 0605	**Down**
Seep 0606	**Down**
Seep 0607	**Down**
Well 0315	**Down**
Well 0347	None
Well 0386	None
Well 0389	**Down**
PCE	
Seep 0601	**Down**
***cis*-1,2-DCE**	
Seep 0602	**Down**
Seep 0605	**Down**

A separate trend analysis of TCE data collected since 2012 was performed (Table 12) to better evaluate more recent trends. As previously noted, the influences of surface water entering the subsurface appear to have been reduced or eliminated and starting in 2012, similar patterns in concentration changes were observed in wells 0315 and 0347. Downward trends were determined by the nonparameteric Mann-Kendall test for seeps 0602, 0605, 0606, and 0607 and wells 0315 and 0347. The slope of the trend line of 2012–2019 data calculated using the Theil-Sen test for the well 0347 data was used as an estimate and suggests that the MCL may be reached by 2030, which is similar to estimates presented in previous annual reports.

Table 12. Trend Analysis Results for TCE in Parcels 6, 7, and 8 (2012–2019)

Location	Trend
Seep 0601	None
Seep 0602	**Down**
Seep 0605	**Down**
Seep 0606	**Down**
Seep 0607	**Down**
Well 0315	**Down**
Well 0347	**Down**
Well 0386	None
Well 0389	None

Table 13 summarizes the results from annual trend analyses of VOC data in Parcels 6, 7, and 8 since 2007. Results show that upward trends in TCE concentrations observed in the seeps (from 2007 to 2012) have reverted to either no trends or downward trends starting in 2013. Since 2017, four out of the five seeps showed downward trends in TCE concentrations. Source wells 0315 and 0347 showed upward trends between 2009 and 2014. Either no trends or downward trends have been observed in both of these source wells starting in 2017. TCE concentrations in seep 0601 and well 0386 vary enough to have exhibited no trend in 2018 and 2019. Downward trends in PCE and *cis*-1,2-DCE in seeps 0601 and 0605, respectively, started in 2011, and a downward trend in *cis*-1,2-DCE in seep 0602 started in 2016. These downward trends are attributable to source removal and efforts in 2011 to reduce the impact of surface water entering the subsurface on the Main Hill (DOE 2014a; DOE 2014b).

Table 13. Summary of Trend Analysis Results for VOCs in Parcels 6, 7, and 8

Location	Analyte	Year												
		2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019
Seep 0601	TCE	U	N	N	N	N	N	N	N	N	N	N	N	N
Seep 0602	TCE	U	U	U	U	U	U	N	N	N	N	D	D	D
Seep 0605	TCE	D	D	D	D	D	D	D	D	D	D	D	D	D
Seep 0606	TCE	---	---	---	N	N	N	N	N	N	N	D	D	D
Seep 0607	TCE	N	N	N	N	N	N	N	N	N	N	D	D	D
Well 0315	TCE	N	N	U	N	N	N	N	N	N	N	D	D	D
Well 0347	TCE	N	N	N	N	N	U	U	U	N	N	N	D	N
Well 0386	TCE	N	D	D	D	D	D	N	D	D	D	D	N	N
Well 0389	TCE	N	N	N	N	N	N	D	D	D	D	D	D	D
Seep 0601	PCE	---	---	N	N	D	D	D	D	D	D	D	D	D
Seep 0602	cDCE	---	---	---	---	N	N	N	N	N	D	D	D	D
Seep 0605	cDCE	---	---	---	---	D	D	D	D	D	D	D	D	D

Abbreviations:
D = downward trend
N = no trend (either upward or downward)
U = upward trend

4.3.2 Tritium

Trend analysis for tritium data collected since 2005 was performed for all seeps and wells where detectable levels have been consistently measured. The trend analysis showed that downward trends in activity were observed in all seeps and wells (Table 14). Summary reports providing details for each statistical evaluation for each monitoring location are in Appendix B.

Table 14. Summary of Trend Analysis Results for Tritium in the Main Hill Seeps and Downgradient Wells

Location	Trend
Seeps	
Seep 0601	**Down**
Seep 0602	**Down**
Seep 0605	**Down**
Seep 0606	**Down**
Seep 0607	**Down**
Wells	
Well 0138	**Down**
Well 0346	**Down**
Well 0347	**Down**
Well 0379	**Down**

Table 15 summarizes the results from annual trend analysis of tritium data in Parcels 6, 7, and 8 since 2007. Results of the trend analysis of tritium data indicate downward trends starting in 2011 for all the seeps and wells, with the exception of well 0347, where no trends were observed from 2011 through 2013 and downward trends have been observed since 2014. The downward trends determined from post-remediation data support that the majority of the source of contamination was removed from the Main Hill area during remediation, and that flushing and radioactive decay have continued to lower the levels.

Table 15. Summary of Annual Trend Analysis Results for Tritium in Parcels 6, 7, and 8

Location	Analyte	Year												
		2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019
Seep 0601	Tritium	D	D	D	D	D	D	D	D	D	D	D	D	D
Seep 0602		N	N	N	N	D	D	D	D	D	D	D	D	D
Seep 0605		---	---	---	D	D	D	D	D	D	D	D	D	D
Seep 0606		D	D	D	D	D	D	D	D	D	D	D	D	D
Seep 0607		D	D	D	D	D	D	D	D	D	D	D	D	D
Well 0138		D	D	D	D	D	D	D	D	D	D	D	D	D
Well 0346		N	N	N	D	D	D	D	D	D	D	D	D	D
Well 0347		N	N	N	D	N	N	N	D	D	D	D	D	D
Well 0379		N	N	D	D	D	D	D	D	D	D	D	D	D

Abbreviations:
D = downward trend
N = no trend (either upward or downward)

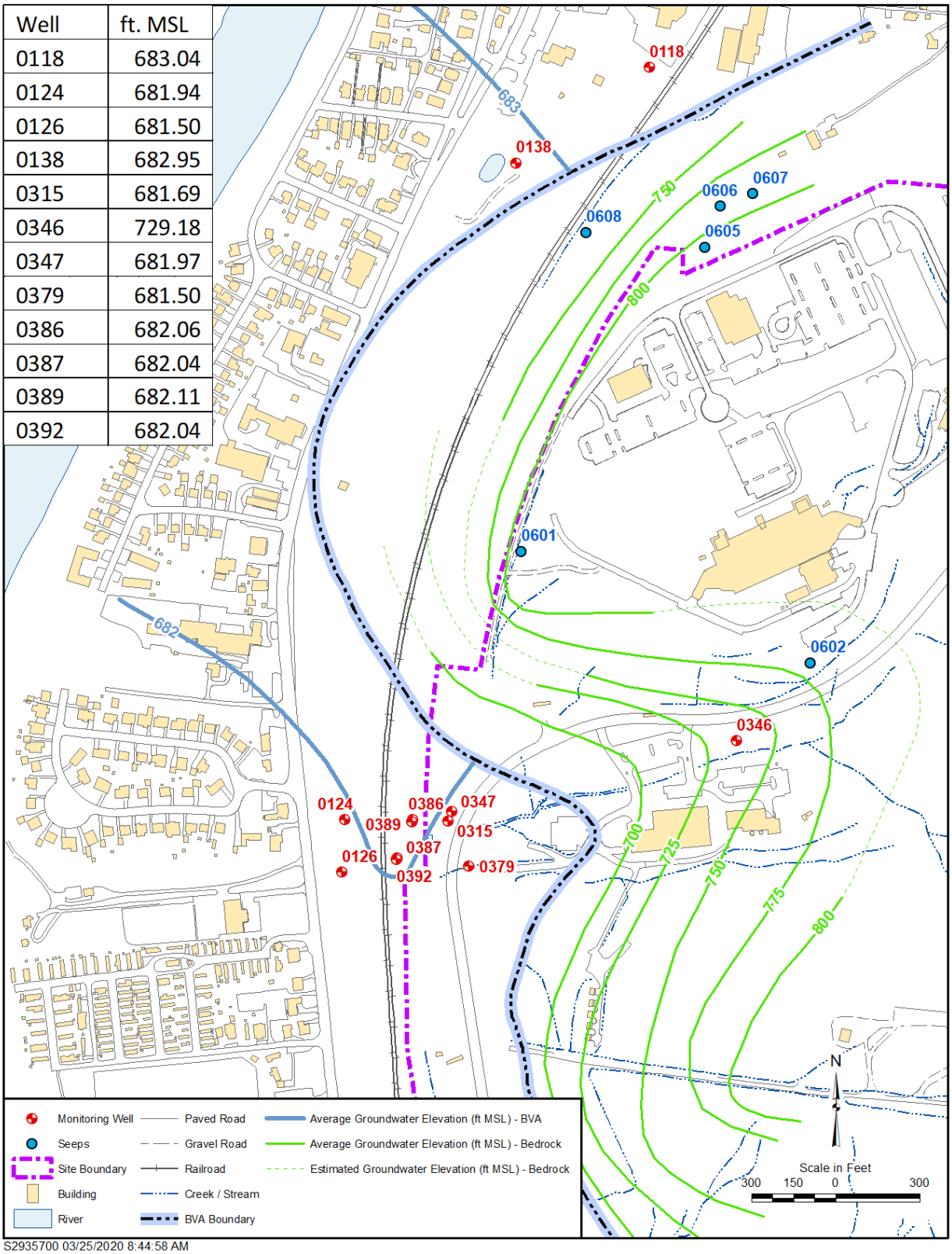
4.4 Groundwater Elevations

A map of the average groundwater elevations measured in the Parcels 6, 7, and 8 area during 2019 (Figure 13) represents the two flow regimes present at the Mound site: bedrock and the unconsolidated materials of the BVA. The approximate location of contact of the BVA with the bedrock is indicated on this figure. Groundwater originating from the Main Hill area flows within the bedrock, following the bedrock topography. This groundwater enters the BVA along this contact, and flow within the BVA is parallel to the bedrock contact. Appendix C presents a summary of the groundwater elevations measured during 2019.

4.5 Recommendations

TCE concentrations greater than the MCL continued to be measured in seep 0601 and in downgradient monitoring well 0347. The concentrations of VOCs continue to be variable at a few locations, although recent data (since 2012) indicate decreasing VOC concentrations at most locations. Quarterly sampling will continue at the seep and monitoring well locations in 2020 to determine if the system has stabilized since efforts were taken to reduce surface water infiltration into the subsurface (DOE 2014a; DOE 2014b) and to determine if VOCs continue to attenuate naturally. Evaluation of the 2019 data indicates that no changes to the VOC monitoring program should be made at this time.

All seeps and downgradient wells were below the MCL for tritium in 2019, and downward trends have been observed for all seeps and wells since 2011 and 2014, respectively. Historically, only seep 0601 has routinely shown levels of tritium that exceeded the MCL since MNA remedy monitoring was initiated in 2009. Tritium levels at this location have been below the MCL for 3 consecutive years of semiannual sampling, and a downtrend has been in place since 2007. In accordance with the Sitewide Operations and Maintenance Plan (DOE 2015), 2 consecutive years of tritium levels below the MCL qualify for a recommendation to the Core Team to discontinue sampling. The calendar year 2018 report (DOE 2019) included a recommendation to discontinue tritium monitoring in Parcels 6, 7, and 8. Tritium levels in the seeps and groundwater wells had been consistently below the MCL in previous years and had been less than the MCL for 2 years in seep 0601. Also, the data exhibited downward trends in all the seeps and wells since 2014. Based on comments from the regulators to provide additional data to support that the concentrations in seep 0601 would continue to remain less than the MCL, tritium monitoring will continue until four additional consecutive samples below the MCL are collected; therefore, monitoring will continue through 2019 and 2020.



Well	ft. MSL
0118	683.04
0124	681.94
0126	681.50
0138	682.95
0315	681.69
0346	729.18
0347	681.97
0379	681.50
0386	682.06
0387	682.04
0389	682.11
0392	682.04

Figure 13. 2019 Averages for Groundwater Elevations in Parcels 6, 7, and 8

5.0 Inspection of the Monitoring System

A routine maintenance program has been established for long-term groundwater monitoring locations at the Mound site. This program includes periodic inspections that focus on the integrity of each well and the condition of the protective casing and surface pad, the surrounding area, and the access route. These inspections are usually performed during each sampling event. Overall, the wells and seep locations were in good condition.

Well 0138, located offsite in the Miamisburg Community Park, had its permanent protective casing and pad completed in March 2019. This well had a temporary casing installed in December 2015 to allow for grading changes during construction of the City of Miamisburg's new dog park. Fencing was installed around this well as part of the City of Miamisburg's construction project to isolate the well from the rest of the dog park; therefore, bollards were not installed to protect this well. The well was resurveyed in September 2019.

Figure 14. Well 0138

6.0 Data Validation

All data collected were validated in accordance with procedures specified in the Sitewide Operations and Maintenance Plan (DOE 2015). This procedure also fulfills the requirements of applicable procedures in the *Mound Methods Compendium* (MD-80045). Data validation was documented in reports prepared for each data package. All 2019 data, including data validation qualifiers, are summarized in Appendix D.

Laboratory performance is assessed by a review and evaluation of the following quality indicators:

- Sample shipping and receiving practices
- Chain of custody
- Laboratory blanks
- Preparation blanks
- Laboratory replicates
- Serial dilutions
- Detection limits
- Peak integrations
- Matrix spikes and matrix spike duplicates
- Holding times
- Instrument calibrations
- Interference check samples
- Radiochemical uncertainty
- Laboratory control samples
- Sample dilutions
- Surrogate recoveries
- Confirmation analyses
- Electronic data

A total of six report identification numbers (RINs) were established for the 2019 environmental sampling efforts at the Mound site. A RIN is a set of samples that is relinquished to the laboratory using a chain of custody form. Data Assessment Reports are prepared for each RIN and are presented in Appendix E.

The laboratory prepares an analytical package for each RIN that includes a summary of results, a complete set of supporting analytical data for every analysis reported, and an electronic data deliverable that is used to upload analytical data into databases for validation and qualification before the data are released. Every RIN received from the laboratory is thoroughly reviewed and evaluated before the data package is finalized and released to the public. Table 16 lists the RINs associated with this report.

Table 16. RINs for Mound Site Calendar Year 2019 Sampling

RIN	Area	Sampling Date(s)
MND01-01.1901006	Parcels 6, 7, and 8	January 28–February 4, 2019
MND01-01.1904007		April 29–30, 2019
MND01-01.1907008		July 25–24, 2019
MND01-01.1911009		November 4–6, 2019
MND01-02.1901004	Phase I	January 28–February 4, 2019
MND01-02.1907008		July 22–24, 2019

The Data Assessment Reports also summarize and assess the sampling quality control for each sampling event. The following items are included:

- Sampling protocol
- Trip blanks
- Outliers
- Equipment blanks
- Field duplicates

7.0 References

DOE (U.S. Department of Energy), 1992. *Remedial Investigation/Feasibility Study, Operable Unit 9, Site-Wide Work Plan*, *Mound Plant, Miamisburg, Ohio*, April.

DOE (U.S. Department of Energy), 1994a. *Operable Unit 9 Hydrogeologic Investigation: Bedrock Report*, *Mound Plant, Miamisburg, Ohio*, Technical Memorandum, January.

DOE (U.S. Department of Energy), 1994b. *Operable Unit 9 Hydrogeologic Investigation: Buried Valley Aquifer Report*, *Mound Plant, Miamisburg, Ohio*, Technical Memorandum (Revision 1), September.

DOE (U.S. Department of Energy), 1995. *Operable Unit 1 Record of Decision*, *Mound Plant, Miamisburg, Ohio*, June.

DOE (U.S. Department of Energy), 1996. *Operable Unit 9 Hydrogeologic Investigation: Groundwater Sweeps Report*, January.

DOE (U.S. Department of Energy), 1997. *Mound 2000 Residual Risk Evaluation Methodology*, *Mound Plant*, January 6.

DOE (U.S. Department of Energy), 1999. *Work Plan for Environmental Restoration of the DOE Mound Site, The Mound 2000 Approach*, February.

DOE (U.S. Department of Energy), 2014a. *Sitewide Groundwater Monitoring Report, Calendar Year 2012, Mound, Ohio*, LMS/MND/S10184, Office of Legacy Management, February.

DOE (U.S. Department of Energy), 2014b. *Sitewide Groundwater Monitoring Report, Mound, Ohio, Site, Calendar Year 2013*, LMS/MND/S11737, Office of Legacy Management, May.

DOE (U.S. Department of Energy), 2015. *Operations and Maintenance Plan for the U.S. Department of Energy*, *Mound, Ohio, Site*, LMS/MND/S08406, Office of Legacy Management, January.

DOE (U.S. Department of Energy), 2017. *Sitewide Groundwater Monitoring Report, Mound, Ohio, Site, Calendar Year 2016*, LMS/MND/S15892, Office of Legacy Management, June.

DOE (U.S. Department of Energy), 2019. *Sitewide Groundwater Monitoring Report, Mound, Ohio, Site, Calendar Year 2018*, LMS/MND/S24210, Office of Legacy Management, May.

Mound Methods Compendium, Issue 2, MD-80045, prepared by BWXT of Ohio Inc.

Appendix A

Well Construction Summary

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Table A-1. Well Construction Summary

Location ID	Program	Northing	Easting	Ground Elevation (ft AMSL)	TOC Elevation (ft AMSL)	Well Depth (ft)	Top of Screen Elevation (ft AMSL)	Bottom of Screen Elevation (ft AMSL)	Screen Length (ft)	Well Material	Screened Formation
0118	Parcels 6, 7, 8	600464.95	1464737.80	705.36	704.86	40.1	674.73	664.73	10	4-inch SS	BVA
0124	Parcels 6, 7, 8	597789.14	1463654.10	704.18	705.12	55.9	659.18	649.18	10	4-inch SS	BVA
0126	Parcels 6, 7, 8	597603.58	1463643.30	704.61	705.54	54.8	660.78	650.78	10	4-inch SS	BVA
0138	Parcels 6, 7, 8	600124.02	1464263.30	698.59	697.76	40.2	667.59	657.59	10	4-inch SS	BVA
0315	Phase I	597786.28	1464020.40	722.57	723.99	54.8	679.17	669.17	10	4-inch SS	BVA
0346	Parcels 6, 7, 8	598070.11	1465048.90	743.50	742.97	45.5	702.50	697.50	5	4-inch SS	BVA
0347	Parcels 6, 7, 8	597819.31	1464034.10	723.76	725.20	68.4	666.76	656.76	10	4-inch SS	BVA
0353	Phase I	596686.11	1464609.40	744.04	745.33	19.3	731.04	726.04	5	4-inch SS	Bedrock
0379	Parcels 6, 7, 8	597624.41	1464095.90	715.24	716.11	40.9	685.24	675.24	10	4-inch SS	BVA
0386	Parcels 6, 7, 8	597789.23	1463896.00	725.16	724.79	86.6	648.16	638.16	10	4-inch SS	BVA
0387	Parcels 6, 7, 8	597654.63	1463839.50	721.26	720.89	81.6	644.26	639.26	5	4-inch SS	BVA
0389	Parcels 6, 7, 8	597781.29	1463891.90	724.96	724.65	51.7	682.96	672.96	10	4-inch SS	BVA
0392	Parcels 6, 7, 8	597648.77	1463838.30	721.18	720.84	44.7	681.18	676.18	5	4-inch SS	BVA
0411	Phase I	596808.81	1465077.10	834.83	836.57	39.7	806.89	796.89	10	2-inch SS	Bedrock
0443	Phase I	596886.22	1465177.11	856.89	858.78	39.6	829.20	819.20	10	2-inch PVC	Bedrock
0444	Phase I	596463.35	1465001.58	770.71	773.00	32.8	750.20	740.20	10	2-inch PVC	Bedrock
0445	Phase I	596448.12	1464738.54	741.29	743.43	42.5	710.93	700.93	10	2-inch PVC	Bedrock
P064	Phase I	596106.72	1464537.47	726.82	729.98	56.9	680.08	670.08	10	2-inch PVC	BVA
0601	Parcels 6, 7, 8	598743.22	1464280.80	817.52						Seep	Bedrock
0602	Parcels 6, 7, 8	598346.65	1465311.40	779.61						Seep	Bedrock
0605	Parcels 6, 7, 8	599824.63	1464935.40	817.70						Seep	Bedrock
0606	Parcels 6, 7, 8	599971.45	1464989.00	789.23						Seep	Bedrock
0607	Parcels 6, 7, 8	600015.30	1465105.70	797.00						Seep	Bedrock
0617	Phase I	596539.80	1464855.80	766.07						Seep	Bedrock

Abbreviations:
ft AMSL = feet above mean sea level
SS = stainless steel
TOC = top of casing

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Appendix B

Trending Summaries

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Mann-Kendall Test for Monotonic Trend
(from Visual Sample Plan [VSP] software version 7.10, 2018)

The purpose of the Mann-Kendall (MK) test (Mann 1945, Kendall 1975, Gilbert 1987) is to statistically assess if there is a monotonic upward or downward trend of the variable of interest over time. A monotonic upward (downward) trend means that the variable consistently increases (decreases) through time, but the trend may or may not be linear.

Selected Statistical Testing Approach

The MK test can be used in place of a parametric linear regression analysis that is used to test if the slope of the estimated linear regression line is different from zero. The regression analysis requires that the residuals from the fitted regression line be normally distributed; an assumption not required by the MK test. Hence, the MK test is a non-parametric (distribution-free) test.

The MK test is used to decide whether to reject the null hypothesis (H_o) that no monotonic trend exists in favor of the alternative hypothesis (H_a) that a monotonic trend exists.

One of three alternative hypotheses is chosen:

1. A monotonic downward trend exists.
2. Either a monotonic upward or monotonic downward trend exists.
3. A monotonic upward trend exists.

Assumptions

The following assumptions underlie the MK test:

1. When no trend is present, the measurements (observations or data) obtained over time are independent and identically distributed. The assumption of independence means that the observations are not serially correlated over time.
2. The observations obtained over time are representative of the true conditions at sampling times.
3. The sample collection, handling, and measurement methods provide unbiased and representative observations of the underlying populations over time.

The MK test does not require that the measurements or the residuals about a trend line be normally distributed or that the trend, if present, be linear.

The MK test can be computed if there are missing values (no measurements for some sampling times), but the performance of the test will be adversely affected. The assumption of independence requires that the time between samples be sufficiently long so that there is no correlation between measurements collected at different times.

References

Gilbert, R.O., 1987. *Statistical Methods for Environmental Pollution Monitoring*, Wiley & Sons, New York.

Kendall, M.G., 1975. *Rank Correlation Methods*, 4th ed., Charles Griffin, London.

Mann, H.B., 1945. "Non-parametric tests against trend," *Econometrica* 13:163–171.

Theil-Sen Test for Monotonic Trend
(from ProUCL software version 5.1, 2015)

In non-parametric statistics, the Theil–Sen test (Theil 1950, and Sen 1968) is a method for robustly fitting a line to sample points in the plane (i.e., simple linear regression) by choosing the median of the slopes of all lines through pairs of points. This estimator can be computed efficiently, and is insensitive to outliers. It can be significantly more accurate than non-robust simple linear regression (i.e., least squares) for skewed data, and competes well against least squares even for normally distributed data in terms of statistical power.

As defined by Theil, the Theil–Sen estimator of a set of two-dimensional points (x_i,y_i) is the median β of the slopes $(y_j - y_i)/(x_j - x_i)$ determined by all pairs of sample points. The null hypothesis is that the slope, β, of the regression line is some specified value β_0, namely,

$$H_0 : \beta = \beta_0$$

The null hypothesis asserts that for every unit increase in the value of the independent variable x, we would expect an increase (or decrease, depending of the sign of β_0) of approximately β_0 in the value of the dependent variable y (Hollander and Wolfe, 2014).

The estimation of the model is done by calculating the slopes (β) and intercepts (α) of a subpopulation of all possible combinations of sample points. The final slope and intercept are then defined as the spatial median of these slopes and intercepts. Once the slope β has been determined, a line can be determined from the sample points by setting the y-intercept α to be the median of the values $y_i - \beta x_i$. The fit line is then the line $y = \beta x + \alpha$ with coefficients β and α in slope-intercept form.

<u>Assumptions</u>

The following assumptions underlie the Theil-Sen test and slope estimation:

- The observations obtained over time are not serially correlated.
- The true trend is linear over time
- There are no differences in the trend line for different seasons, e.g., months or calendar quarters.
- There is no requirement that the measurements be normally distributed.
- The observations obtained over time are representative of the true conditions at sampling times.
- The sample collection, handling, and measurement methods provide unbiased and representative observations of the underlying populations over time.

References

Gilbert, R.O. 1987. Statistical Methods for Environmental Pollution Monitoring, Wiley, New York.

Hollander, M, Wolfe, D.A., and Chicken, E. 2014. Nonparameteric Statistical Methods, Wiley, New York.

Sen, P.K. 1968. Estimates of the regression coefficient based on Kendall's tau. Journal of the American Statistical Association 63:1379-1389.

Theil, H. 1950. A rank-invariant method of linear and polynomial regression analysis, 1,2, and 3: Ned. Akad. Wentsch Proc., 53:386-392, 521-525, and 1397-1412.

Well 0138 Tritium	Mann-Kendall Trend Test Analysis	
User Selected Options		
Date/Time of Computation	ProUCL 5.12/20/2020 4:45:20 PM	
From File	WorkSheet.xls	
Full Precision	OFF	
Confidence Coefficient	0.95	
Level of Significance	0.05	
C1		
General Statistics		
Number or Reported Events Not Used		0
Number of Generated Events		47
Number Values Reported (n)		47
Minimum		250
Maximum		14630
Mean		3499
Geometric Mean		1711
Median		1400
Standard Deviation		4248
Coefficient of Variation		1.214
Mann-Kendall Test		
MK Test Value (S)		-819
Critical Value (0.05)		-1.645
Standard Deviation of S		109
Standardized Value of S		-7.502
Approximate *p* value		3.141E-14
Statistically significant evidence of a decreasing trend at the specified level of significance.		

Well 0315 TCE	Mann-Kendall Trend Test Analysis	
User Selected Options		
Date/Time of Computation	ProUCL 5.12/26/2020 1:09:07 PM	
From File	WorkSheet.xls	
Full Precision	OFF	
Confidence Coefficient	0.95	
Level of Significance	0.05	
C1		
General Statistics		
Number or Reported Events Not Used		0
Number of Generated Events		59
Number Values Reported (n)		59
Minimum		0.42
Maximum		17.2
Mean		8.904
Geometric Mean		7.564
Median		9.48
Standard Deviation		4.021
Coefficient of Variation		0.452
Mann-Kendall Test		
MK Test Value (S)		-770
Critical Value (0.05)		-1.645
Standard Deviation of S		152.9
Standardized Value of S		-5.029
Approximate *p* value		2.4628E-7
Statistically significant evidence of a decreasing trend at the specified level of significance.		

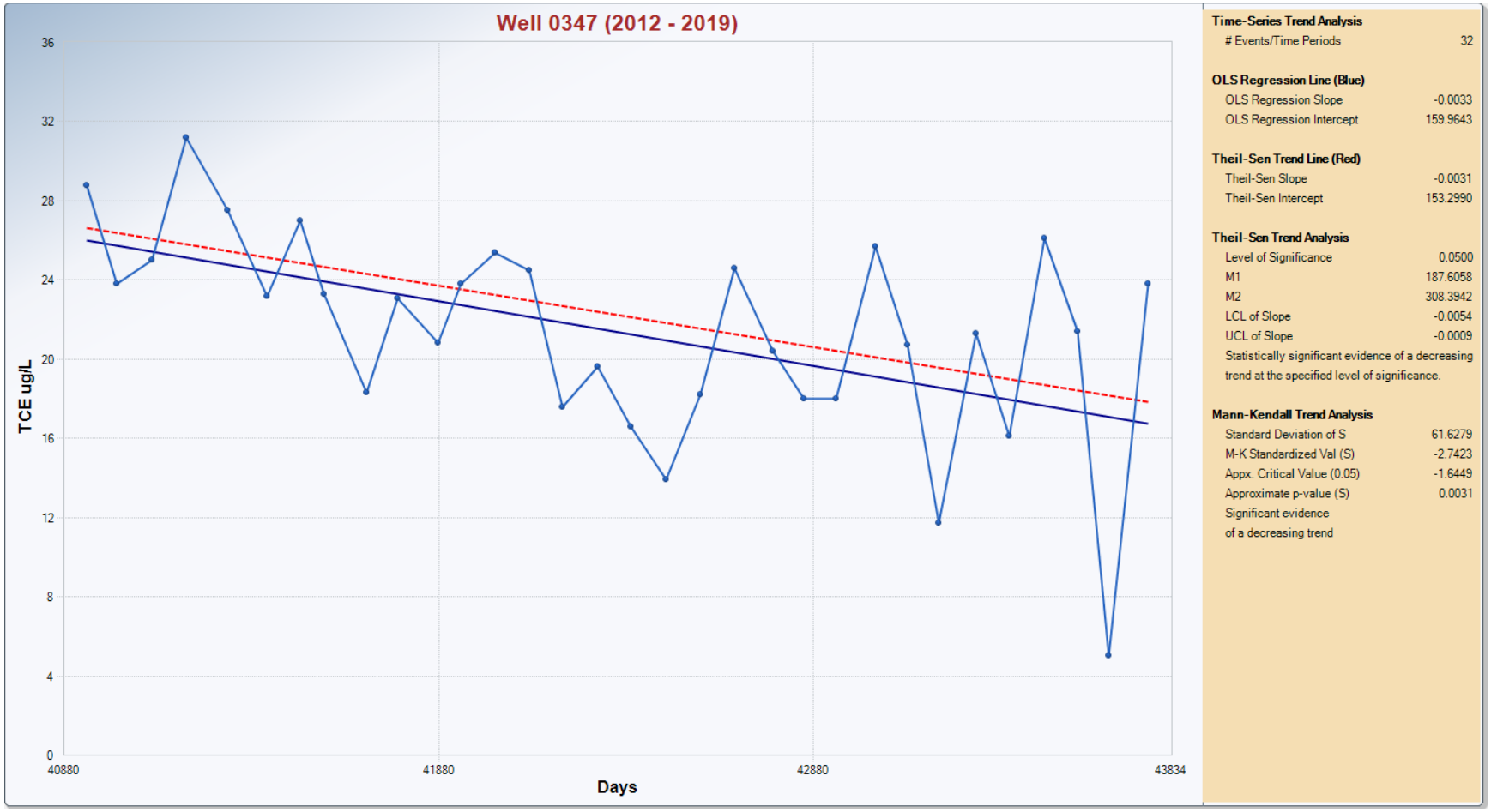
Well 0315 TCE (2012–2019)	Mann-Kendall Trend Test Analysis	
User Selected Options		
Date/Time of Computation	ProUCL 5.12/26/2020 2:16:36 PM	
From File	WorkSheet.xls	
Full Precision	OFF	
Confidence Coefficient	0.95	
Level of Significance	0.05	
C1		
General Statistics		
Number or Reported Events Not Used		0
Number of Generated Events		32
Number Values Reported (n)		32
Minimum		0.42
Maximum		16.6
Mean		7.228
Geometric Mean		5.818
Median		6.895
Standard Deviation		3.851
Coefficient of Variation		0.533
Mann-Kendall Test		
MK Test Value (S)		-350
Critical Value (0.05)		-1.645
Standard Deviation of S		61.67
Standardized Value of S		-5.66
Approximate *p* value		7.5889E-9
Statistically significant evidence of a decreasing trend at the specified level of significance.		

Well 0346 Tritium	Mann-Kendall Trend Test Analysis	
User Selected Options		
Date/Time of Computation	ProUCL 5.12/20/2020 4:47:03 PM	
From File	WorkSheet.xls	
Full Precision	OFF	
Confidence Coefficient	0.95	
Level of Significance	0.05	
C1		
General Statistics		
Number or Reported Events Not Used		0
Number of Generated Events		49
Number Values Reported (n)		49
Minimum		5.96
Maximum		33770
Mean		2933
Geometric Mean		1208
Median		1730
Standard Deviation		5433
Coefficient of Variation		1.853
Mann-Kendall Test		
MK Test Value (S)		-967
Critical Value (0.05)		-1.645
Standard Deviation of S		116
Standardized Value of S		-8.328
Approximate *p* value		4.115E-17
Statistically significant evidence of a decreasing trend at the specified level of significance.		

Well 0347 TCE	Mann-Kendall Trend Test Analysis	
User Selected Options		
Date/Time of Computation	ProUCL 5.12/20/2020 4:54:36 PM	
From File	WorkSheet.xls	
Full Precision	OFF	
Confidence Coefficient	0.95	
Level of Significance	0.05	
C1		
General Statistics		
Number or Reported Events Not Used		0
Number of Generated Events		59
Number Values Reported (n)		59
Minimum		0.431
Maximum		33.2
Mean		21.89
Geometric Mean		20.14
Median		22.1
Standard Deviation		5.801
Coefficient of Variation		0.265
Mann-Kendall Test		
MK Test Value (S)		-199
Critical Value (0.05)		-1.645
Standard Deviation of S		152.9
Standardized Value of S		-1.295
Approximate *p* value		0.0976
Insufficient evidence to identify a significant trend at the specified level of significance.		

Well 0347 TCE (2012–2019)	Mann-Kendall Trend Test Analysis	
User Selected Options		
Date/Time of Computation	ProUCL 5.12/26/2020 2:17:50 PM	
From File	WorkSheet.xls	
Full Precision	OFF	
Confidence Coefficient	0.95	
Level of Significance	0.05	
C1		
General Statistics		
Number or Reported Events Not Used		0
Number of Generated Events		32
Number Values Reported (n)		32
Minimum		5.01
Maximum		31.2
Mean		21.38
Geometric Mean		20.49
Median		22.2
Standard Deviation		5.293
Coefficient of Variation		0.247
Mann-Kendall Test		
MK Test Value (S)		-171
Critical Value (0.05)		-1.645
Standard Deviation of S		61.62
Standardized Value of S		-2.759
Approximate *p* value		0.0029
Statistically significant evidence of a decreasing trend at the specified level of significance.		

Well 0347 TCE (2012–2019)	Theil-Sen Trend Test Analysis	
User Selected Options		
Date/Time of Computation	ProUCL 5.110/13/2020 10:57:29 AM	
From File	Mann-Kendall.xls	
Full Precision	OFF	
Average Replicates	Replicates at sampling events will not be averaged!	
Confidence Coefficient		
Level of Significance	0.95	
TCE ug/L		
General Statistics		
Number of Events	32	
Number of Values Reported (n)	32	
Number of Replicates	0	
Minimum	5.01	
Maximum	31.2	
Mean	21.39	
Geometric Mean	20.49	
Median	22.25	
Standard Deviation	5.293	
Coefficient of Variation	0.247	
Mann-Kendall Statistics		
MK Test Value (S)	-170	
Critical Value (0.05)	-1.645	
Standard Deviation of S	61.63	
Standardized Value of S	-2.742	
Approximate *p* value	0.00305	
Approximate Inference for Theil-Sen Trend Test		
Theil-Sen Test	Number of Slopes	496
x = x(median) + Q(t - t(median))	Theil-Sen Slope	-0.00309
5=22.25 + (-0.00309)(t - 42349.5)	Theil-Sen Intercept	153.3
t = 47734.63	M2'	298.7
9/8/2030	One-sided 95% upper limit of Slope	-0.00127
	95% LCL of Slope (0.025)	-0.00542
	95% UCL of Slope (0.975)	-9.423E-4
Statistically significant evidence of a decreasing trend at the specified level of significance.		


Well 0347 (2012 - 2019)
TCE ug/L
36
32
28
24
20
16
12
8
4
0
40880
41880
42880
43834
Days
Time-Series Trend Analysis
Events/Time Periods 32
OLS Regression Line (Blue)
OLS Regression Slope -0.0033
OLS Regression Intercept 159.9643
Theil-Sen Trend Line (Red)
Theil-Sen Slope -0.0031
Theil-Sen Intercept 153.2990
Theil-Sen Trend Analysis
Level of Significance 0.0500
M1 187.6058
M2 308.3942
LCL of Slope -0.0054
UCL of Slope -0.0009
Statistically significant evidence of a decreasing trend at the specified level of significance.
Mann-Kendall Trend Analysis
Standard Deviation of S 61.6279
M-K Standardized Val (S) -2.7423
Appx. Critical Value (0.05) -1.6449
Approximate p-value (S) 0.0031
Significant evidence of a decreasing trend

Well 0347 Tritium	Mann-Kendall Trend Test Analysis	
User Selected Options		
Date/Time of Computation	ProUCL 5.12/20/2020 4:48:53 PM	
From File	WorkSheet.xls	
Full Precision	OFF	
Confidence Coefficient	0.95	
Level of Significance	0.05	
C1		
General Statistics		
Number or Reported Events Not Used		0
Number of Generated Events		46
Number Values Reported (n)		46
Minimum		157
Maximum		16800
Mean		5027
Geometric Mean		3461
Median		3870
Standard Deviation		4244
Coefficient of Variation		0.844
Mann-Kendall Test		
MK Test Value (S)		-472
Critical Value (0.05)		-1.645
Standard Deviation of S		105.6
Standardized Value of S		-4.46
Approximate *p* value		4.1037E-6
Statistically significant evidence of a decreasing trend at the specified level of significance.		

Well 0379 Tritium	Mann-Kendall Trend Test Analysis	
User Selected Options		
Date/Time of Computation	ProUCL 5.12/20/2020 4:50:09 PM	
From File	WorkSheet.xls	
Full Precision	OFF	
Confidence Coefficient	0.95	
Level of Significance	0.05	
C1		
General Statistics		
Number or Reported Events Not Used		0
Number of Generated Events		44
Number Values Reported (n)		44
Minimum		479
Maximum		3890
Mean		1385
Geometric Mean		1263
Median		1450
Standard Deviation		601.8
Coefficient of Variation		0.435
Mann-Kendall Test		
MK Test Value (S)		-427
Critical Value (0.05)		-1.645
Standard Deviation of S		98.84
Standardized Value of S		-4.31
Approximate *p* value		8.1709E-6
Statistically significant evidence of a decreasing trend at the specified level of significance.		

Well 0386 TCE	Mann-Kendall Trend Test Analysis	
User Selected Options		
Date/Time of Computation	ProUCL 5.12/20/2020 4:56:12 PM	
From File	WorkSheet.xls	
Full Precision	OFF	
Confidence Coefficient	0.95	
Level of Significance	0.05	
C1		
General Statistics		
Number or Reported Events Not Used		0
Number of Generated Events		57
Number Values Reported (n)		57
Minimum		0.11
Maximum		4.5
Mean		2.362
Geometric Mean		1.932
Median		2.42
Standard Deviation		0.985
Coefficient of Variation		0.417
Mann-Kendall Test		
MK Test Value (S)		-166
Critical Value (0.05)		-1.645
Standard Deviation of S		145.2
Standardized Value of S		-1.136
Approximate *p* value		0.128
Insufficient evidence to identify a significant trend at the specified level of significance.		

Well 0386 TCE (2012–2019)	Mann-Kendall Trend Test Analysis	
User Selected Options		
Date/Time of Computation	ProUCL 5.12/26/2020 2:25:17 PM	
From File	WorkSheet.xls	
Full Precision	OFF	
Confidence Coefficient	0.95	
Level of Significance	0.05	
C1		
General Statistics		
Number or Reported Events Not Used	0	
Number of Generated Events	32	
Number Values Reported (n)	32	
Minimum	0.97	
Maximum	3.04	
Mean	2.411	
Geometric Mean	2.365	
Median	2.465	
Standard Deviation	0.429	
Coefficient of Variation	0.178	
Mann-Kendall Test		
MK Test Value (S)	-25	
Critical Value (0.05)	-1.645	
Standard Deviation of S	61.6	
Standardized Value of S	-0.39	
Approximate *p* value	0.348	
Insufficient evidence to identify a significant trend at the specified level of significance.		

Well 0389 TCE	Mann-Kendall Trend Test Analysis	
User Selected Options		
Date/Time of Computation	ProUCL 5.12/20/2020 4:57:38 PM	
From File	WorkSheet.xls	
Full Precision	OFF	
Confidence Coefficient	0.95	
Level of Significance	0.05	
C1		
General Statistics		
Number or Reported Events Not Used		0
Number of Generated Events		55
Number Values Reported (n)		55
Minimum		0.16
Maximum		1.48
Mean		0.548
Geometric Mean		0.416
Median		0.44
Standard Deviation		0.391
Coefficient of Variation		0.713
Mann-Kendall Test		
MK Test Value (S)		-671
Critical Value (0.05)		-1.645
Standard Deviation of S		136.5
Standardized Value of S		-4.908
Approximate *p* value		4.6093E-7
Statistically significant evidence of a decreasing trend at the specified level of significance.		

Well 0389 TCE (2012–2019)	Mann-Kendall Trend Test Analysis	
User Selected Options		
Date/Time of Computation	ProUCL 5.12/26/2020 2:26:33 PM	
From File	WorkSheet.xls	
Full Precision	OFF	
Confidence Coefficient	0.95	
Level of Significance	0.05	
C1		
General Statistics		
Number or Reported Events Not Used	0	
Number of Generated Events	32	
Number Values Reported (n)	32	
Minimum	0.16	
Maximum	0.9	
Mean	0.333	
Geometric Mean	0.272	
Median	0.185	
Standard Deviation	0.228	
Coefficient of Variation	0.686	
Mann-Kendall Test		
MK Test Value (S)	-56	
Critical Value (0.05)	-1.645	
Standard Deviation of S	58.89	
Standardized Value of S	-0.934	
Approximate *p* value	0.175	
Insufficient evidence to identify a significant trend at the specified level of significance.		

Well P064 TCE	Mann-Kendall Trend Test Analysis	
User Selected Options		
Date/Time of Computation	ProUCL 5.12/24/2020 8:33:12 AM	
From File	WorkSheet.xls	
Full Precision	OFF	
Confidence Coefficient	0.95	
Level of Significance	0.05	
C1		
General Statistics		
Number or Reported Events Not Used		0
Number of Generated Events		5
Number Values Reported (n)		5
Minimum		0.56
Maximum		1.54
Mean		1.014
Geometric Mean		0.952
Median		1.12
Standard Deviation		0.388
Coefficient of Variation		0.383
Mann-Kendall Test		
MK Test Value (S)		-10
Tabulated *p* value		0.008
Standard Deviation of S		4.082
Standardized Value of S		-2.205
Approximate *p* value		0.0137
Statistically significant evidence of a decreasing trend at the specified level of significance.		

Well P064 DCE	Mann-Kendall Trend Test Analysis	
User Selected Options		
Date/Time of Computation	ProUCL 5.12/24/2020 8:35:25 AM	
From File	WorkSheet.xls	
Full Precision	OFF	
Confidence Coefficient	0.95	
Level of Significance	0.05	
C1		
General Statistics		
Number or Reported Events Not Used	0	
Number of Generated Events	5	
Number Values Reported (n)	5	
Minimum	0.16	
Maximum	2.52	
Mean	0.672	
Geometric Mean	0.327	
Median	0.16	
Standard Deviation	1.037	
Coefficient of Variation	1.543	
Mann-Kendall Test		
MK Test Value (S)	-5	
Tabulated *p* value	0.242	
Standard Deviation of S	3.606	
Standardized Value of S	-1.109	
Approximate *p* value	0.134	
Insufficient evidence to identify a significant trend at the specified level of significance.		

Seep 0601 TCE	Mann-Kendall Trend Test Analysis	
User Selected Options		
Date/Time of Computation	ProUCL 5.12/26/2020 12:51:11 PM	
From File	WorkSheet.xls	
Full Precision	OFF	
Confidence Coefficient	0.95	
Level of Significance	0.05	
C1		
General Statistics		
Number or Reported Events Not Used		0
Number of Generated Events		60
Number Values Reported (n)		60
Minimum		0.11
Maximum		10.3
Mean		4.667
Geometric Mean		3.544
Median		4.925
Standard Deviation		2.374
Coefficient of Variation		0.509
Mann-Kendall Test		
MK Test Value (S)		-207
Critical Value (0.05)		-1.645
Standard Deviation of S		156.8
Standardized Value of S		-1.314
Approximate *p* value		0.0944
Insufficient evidence to identify a significant trend at the specified level of significance.		

Seep 0601 TCE (2012–2019)	Mann-Kendall Trend Test Analysis	
User Selected Options		
Date/Time of Computation	ProUCL 5.12/26/2020 2:28:33 PM	
From File	WorkSheet.xls	
Full Precision	OFF	
Confidence Coefficient	0.95	
Level of Significance	0.05	
C1		
General Statistics		
Number or Reported Events Not Used	0	
Number of Generated Events	32	
Number Values Reported (n)	32	
Minimum	0.16	
Maximum	19.1	
Mean	8.722	
Geometric Mean	6.524	
Median	8.7	
Standard Deviation	4.287	
Coefficient of Variation	0.492	
Mann-Kendall Test		
MK Test Value (S)	98	
Critical Value (0.05)	1.645	
Standard Deviation of S	61.65	
Standardized Value of S	1.573	
Approximate *p* value	0.0578	
Insufficient evidence to identify a significant trend at the specified level of significance.		

Seep 0601 PCE	Mann-Kendall Trend Test Analysis	
User Selected Options		
Date/Time of Computation	ProUCL 5.12/26/2020 1:34:15 PM	
From File	WorkSheet.xls	
Full Precision	OFF	
Confidence Coefficient	0.95	
Level of Significance	0.05	
C1		
General Statistics		
Number or Reported Events Not Used		0
Number of Generated Events		61
Number Values Reported (n)		61
Minimum		0.1
Maximum		52
Mean		11.75
Geometric Mean		8.07
Median		11
Standard Deviation		8.44
Coefficient of Variation		0.718
Mann-Kendall Test		
MK Test Value (S)		-460
Critical Value (0.05)		-1.645
Standard Deviation of S		160.7
Standardized Value of S		-2.857
Approximate *p* value		0.00214
Statistically significant evidence of a decreasing trend at the specified level of significance.		

Seep 0601 Tritium	Mann-Kendall Trend Test Analysis	
User Selected Options		
Date/Time of Computation	ProUCL 5.12/20/2020 4:36:43 PM	
From File	WorkSheet.xls	
Full Precision	OFF	
Confidence Coefficient	0.95	
Level of Significance	0.05	
C1		
General Statistics		
Number or Reported Events Not Used		0
Number of Generated Events		46
Number Values Reported (n)		46
Minimum		89.3
Maximum		789040
Mean		111556
Geometric Mean		52124
Median		53600
Standard Deviation		158626
Coefficient of Variation		1.422
Mann-Kendall Test		
MK Test Value (S)		-768
Critical Value (0.05)		-1.645
Standard Deviation of S		105.6
Standardized Value of S		-7.262
Approximate *p* value		1.901E-13
Statistically significant evidence of a decreasing trend at the specified level of significance.		

Seep 0602 TCE	Mann-Kendall Trend Test Analysis	
User Selected Options		
Date/Time of Computation	ProUCL 5.12/26/2020 12:54:26 PM	
From File	WorkSheet.xls	
Full Precision	OFF	
Confidence Coefficient	0.95	
Level of Significance	0.05	
C1		
General Statistics		
Number or Reported Events Not Used		0
Number of Generated Events		42
Number Values Reported (n)		42
Minimum		0.46
Maximum		139
Mean		25.51
Geometric Mean		15.43
Median		19
Standard Deviation		26.06
Coefficient of Variation		1.022
Mann-Kendall Test		
MK Test Value (S)		-359
Critical Value (0.05)		-1.645
Standard Deviation of S		92.25
Standardized Value of S		-3.881
Approximate *p* value		5.2046E-5
Statistically significant evidence of a decreasing trend at the specified level of significance.		

Seep 0602 TCE (2012–2019)	Mann-Kendall Trend Test Analysis	
User Selected Options		
Date/Time of Computation	ProUCL 5.12/26/2020 2:09:55 PM	
From File	WorkSheet.xls	
Full Precision	OFF	
Confidence Coefficient	0.95	
Level of Significance	0.05	
C1		
General Statistics		
Number or Reported Events Not Used	0	
Number of Generated Events	21	
Number Values Reported (n)	21	
Minimum	0.46	
Maximum	32.6	
Mean	11.79	
Geometric Mean	8.059	
Median	10	
Standard Deviation	8.961	
Coefficient of Variation	0.76	
Mann-Kendall Test		
MK Test Value (S)	-137	
Tabulated *p* value	0	
Standard Deviation of S	33.1	
Standardized Value of S	-4.109	
Approximate *p* value	1.9898E-5	
Statistically significant evidence of a decreasing trend at the specified level of significance.		

Seep 0602 cisDCE	Mann-Kendall Trend Test Analysis	
User Selected Options		
Date/Time of Computation	ProUCL 5.12/26/2020 1:35:44 PM	
From File	WorkSheet.xls	
Full Precision	OFF	
Confidence Coefficient	0.95	
Level of Significance	0.05	
C1		
General Statistics		
Number or Reported Events Not Used	0	
Number of Generated Events	42	
Number Values Reported (n)	42	
Minimum	1.95	
Maximum	42.3	
Mean	15.02	
Geometric Mean	11.71	
Median	14.85	
Standard Deviation	10.03	
Coefficient of Variation	0.668	
Mann-Kendall Test		
MK Test Value (S)	-386	
Critical Value (0.05)	-1.645	
Standard Deviation of S	92.24	
Standardized Value of S	-4.174	
Approximate *p* value	1.4979E-5	
Statistically significant evidence of a decreasing trend at the specified level of significance.		

Seep 0602 Tritium	Mann-Kendall Trend Test Analysis	
User Selected Options		
Date/Time of Computation	ProUCL 5.12/20/2020 4:39:02 PM	
From File	WorkSheet.xls	
Full Precision	OFF	
Confidence Coefficient	0.95	
Level of Significance	0.05	
C1		
General Statistics		
Number or Reported Events Not Used		0
Number of Generated Events		31
Number Values Reported (n)		31
Minimum		850
Maximum		82700
Mean		18806
Geometric Mean		11867
Median		14500
Standard Deviation		17612
Coefficient of Variation		0.937
Mann-Kendall Test		
MK Test Value (S)		-347
Critical Value (0.05)		-1.645
Standard Deviation of S		58.84
Standardized Value of S		-5.881
Approximate *p* value		2.0419E-9
Statistically significant evidence of a decreasing trend at the specified level of significance.		

Seep 0605 TCE	Mann-Kendall Trend Test Analysis	
User Selected Options		
Date/Time of Computation	ProUCL 5.12/26/2020 12:55:54 PM	
From File	WorkSheet.xls	
Full Precision	OFF	
Confidence Coefficient	0.95	
Level of Significance	0.05	
C1		
General Statistics		
Number or Reported Events Not Used		0
Number of Generated Events		60
Number Values Reported (n)		60
Minimum		0.27
Maximum		97
Mean		13.22
Geometric Mean		8.973
Median		11.65
Standard Deviation		13.03
Coefficient of Variation		0.986
Mann-Kendall Test		
MK Test Value (S)		-899
Critical Value (0.05)		-1.645
Standard Deviation of S		156.8
Standardized Value of S		-5.727
Approximate *p* value		5.0962E-9
Statistically significant evidence of a decreasing trend at the specified level of significance.		

Seep 0605 TCE (2012–2019)	Mann-Kendall Trend Test Analysis	
User Selected Options		
Date/Time of Computation	ProUCL 5.12/26/2020 2:11:33 PM	
From File	WorkSheet.xls	
Full Precision	OFF	
Confidence Coefficient	0.95	
Level of Significance	0.05	
C1		
General Statistics		
Number or Reported Events Not Used	0	
Number of Generated Events	31	
Number Values Reported (n)	31	
Minimum	0.27	
Maximum	19.8	
Mean	8.62	
Geometric Mean	5.789	
Median	9.43	
Standard Deviation	5.324	
Coefficient of Variation	0.618	
Mann-Kendall Test		
MK Test Value (S)	-295	
Critical Value (0.05)	-1.645	
Standard Deviation of S	58.84	
Standardized Value of S	-4.997	
Approximate *p* value	2.9123E-7	
Statistically significant evidence of a decreasing trend at the specified level of significance.		

Seep 0605 cisDCE	Mann-Kendall Trend Test Analysis	
User Selected Options		
Date/Time of Computation	ProUCL 5.12/26/2020 1:37:13 PM	
From File	WorkSheet.xls	
Full Precision	OFF	
Confidence Coefficient	0.95	
Level of Significance	0.05	
C1		
General Statistics		
Number or Reported Events Not Used	0	
Number of Generated Events	60	
Number Values Reported (n)	60	
Minimum	0.16	
Maximum	50	
Mean	7.062	
Geometric Mean	3.539	
Median	2.96	
Standard Deviation	9.73	
Coefficient of Variation	1.378	
Mann-Kendall Test		
MK Test Value (S)	-1017	
Critical Value (0.05)	-1.645	
Standard Deviation of S	156.8	
Standardized Value of S	-6.48	
Approximate *p* value	4.583E-11	
Statistically significant evidence of a decreasing trend at the specified level of significance.		

Seep 0605 Tritium	Mann-Kendall Trend Test Analysis	
User Selected Options		
Date/Time of Computation	ProUCL 5.12/20/2020 4:40:14 PM	
From File	WorkSheet.xls	
Full Precision	OFF	
Confidence Coefficient	0.95	
Level of Significance	0.05	
C1		
General Statistics		
Number or Reported Events Not Used		0
Number of Generated Events		45
Number Values Reported (n)		45
Minimum		2550
Maximum		269300
Mean		34388
Geometric Mean		16686
Median		14900
Standard Deviation		55894
Coefficient of Variation		1.625
Mann-Kendall Test		
MK Test Value (S)		-820
Critical Value (0.05)		-1.645
Standard Deviation of S		102.2
Standardized Value of S		-8.012
Approximate *p* value		5.656E-16
Statistically significant evidence of a decreasing trend at the specified level of significance.		

Seep 0606 TCE	Mann-Kendall Trend Test Analysis	
User Selected Options		
Date/Time of Computation	ProUCL 5.12/26/2020 12:57:32 PM	
From File	WorkSheet.xls	
Full Precision	OFF	
Confidence Coefficient	0.95	
Level of Significance	0.05	
C1		
General Statistics		
Number or Reported Events Not Used		0
Number of Generated Events		44
Number Values Reported (n)		44
Minimum		0.15
Maximum		24
Mean		3.711
Geometric Mean		1.785
Median		1.845
Standard Deviation		4.498
Coefficient of Variation		1.212
Mann-Kendall Test		
MK Test Value (S)		-349
Critical Value (0.05)		-1.645
Standard Deviation of S		98.72
Standardized Value of S		-3.525
Approximate *p* value		2.1155E-4
Statistically significant evidence of a decreasing trend at the specified level of significance.		

Seep 0606 TCE (2012–2019)	Mann-Kendall Trend Test Analysis	
User Selected Options		
Date/Time of Computation	ProUCL 5.12/26/2020 2:13:02 PM	
From File	WorkSheet.xls	
Full Precision	OFF	
Confidence Coefficient	0.95	
Level of Significance	0.05	
C1		
General Statistics		
Number or Reported Events Not Used	0	
Number of Generated Events	31	
Number Values Reported (n)	31	
Minimum	0.16	
Maximum	9.01	
Mean	2.788	
Geometric Mean	1.412	
Median	1.7	
Standard Deviation	2.712	
Coefficient of Variation	0.973	
Mann-Kendall Test		
MK Test Value (S)	-211	
Critical Value (0.05)	-1.645	
Standard Deviation of S	58.59	
Standardized Value of S	-3.584	
Approximate *p* value	1.6888E-4	
Statistically significant evidence of a decreasing trend at the specified level of significance.		

Seep 0606 Tritium	Mann-Kendall Trend Test Analysis	
User Selected Options		
Date/Time of Computation	ProUCL 5.12/20/2020 4:41:35 PM	
From File	WorkSheet.xls	
Full Precision	OFF	
Confidence Coefficient	0.95	
Level of Significance	0.05	
C1		
General Statistics		
Number or Reported Events Not Used		0
Number of Generated Events		30
Number Values Reported (n)		30
Minimum		1360
Maximum		159930
Mean		18304
Geometric Mean		7753
Median		5670
Standard Deviation		32909
Coefficient of Variation		1.798
Mann-Kendall Test		
MK Test Value (S)		-334
Critical Value (0.05)		-1.645
Standard Deviation of S		56.04
Standardized Value of S		-5.942
Approximate *p* value		1.4077E-9
Statistically significant evidence of a decreasing trend at the specified level of significance.		

Seep 0607 TCE	Mann-Kendall Trend Test Analysis	
User Selected Options		
Date/Time of Computation	ProUCL 5.12/26/2020 12:59:43 PM	
From File	WorkSheet.xls	
Full Precision	OFF	
Confidence Coefficient	0.95	
Level of Significance	0.05	
C1		
General Statistics		
Number or Reported Events Not Used		0
Number of Generated Events		60
Number Values Reported (n)		60
Minimum		0.44
Maximum		15
Mean		5.6
Geometric Mean		4.348
Median		4.975
Standard Deviation		3.269
Coefficient of Variation		0.584
Mann-Kendall Test		
MK Test Value (S)		-714
Critical Value (0.05)		-1.645
Standard Deviation of S		156.8
Standardized Value of S		-4.548
Approximate *p* value		2.7124E-6
Statistically significant evidence of a decreasing trend at the specified level of significance.		

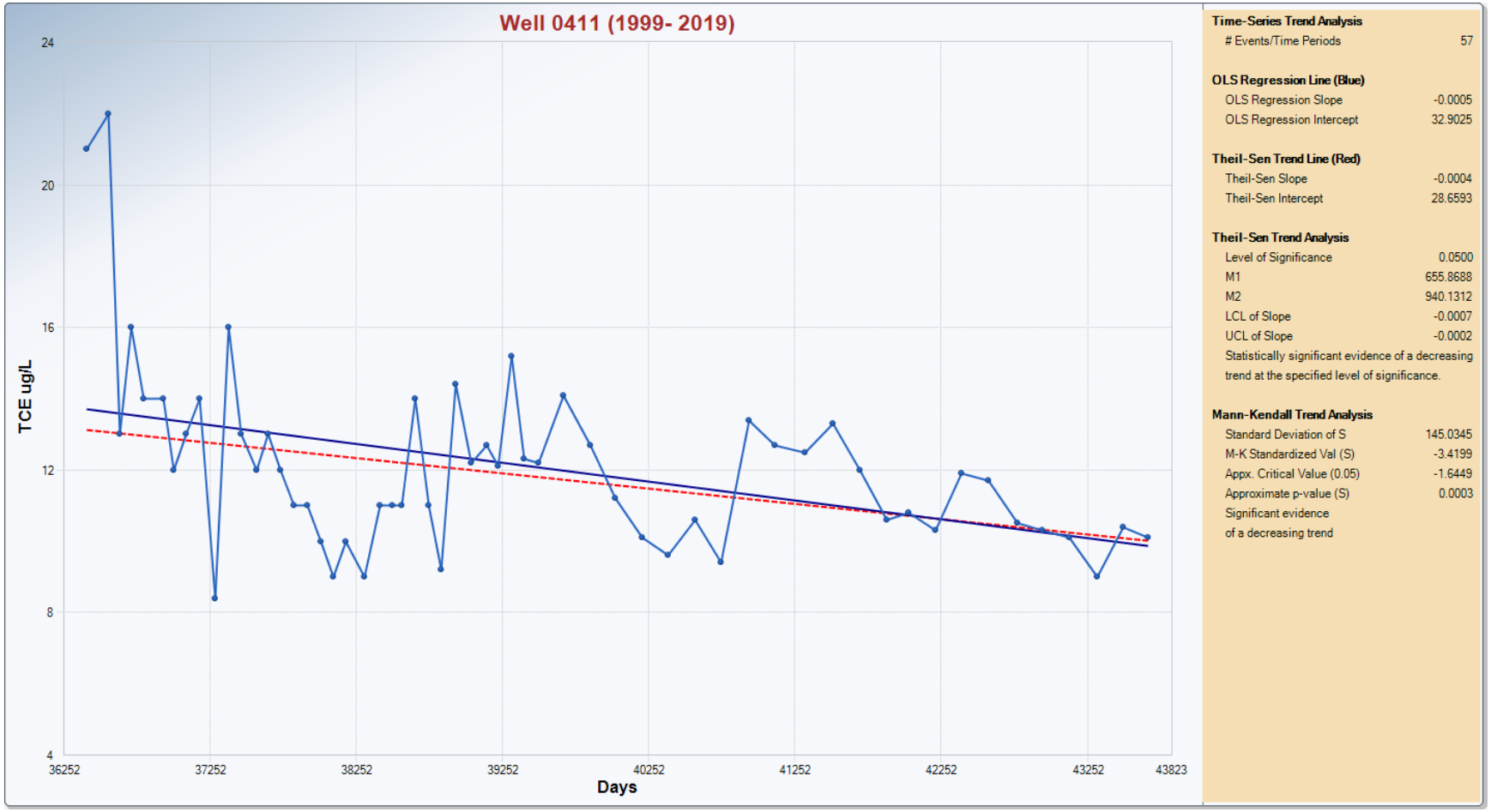
Seep 0607 TCE (2012–2019)	Mann-Kendall Trend Test Analysis	
User Selected Options		
Date/Time of Computation	ProUCL 5.12/26/2020 2:14:22 PM	
From File	WorkSheet.xls	
Full Precision	OFF	
Confidence Coefficient	0.95	
Level of Significance	0.05	
C1		
General Statistics		
Number or Reported Events Not Used	0	
Number of Generated Events	32	
Number Values Reported (n)	32	
Minimum	0.44	
Maximum	9.95	
Mean	4.401	
Geometric Mean	3.15	
Median	4.68	
Standard Deviation	2.794	
Coefficient of Variation	0.635	
Mann-Kendall Test		
MK Test Value (S)	-283	
Critical Value (0.05)	-1.645	
Standard Deviation of S	61.66	
Standardized Value of S	-4.574	
Approximate *p* value	2.3966E-6	
Statistically significant evidence of a decreasing trend at the specified level of significance.		

Seep 0607 Tritium	Mann-Kendall Trend Test Analysis	
User Selected Options		
Date/Time of Computation	ProUCL 5.12/20/2020 4:42:51 PM	
From File	WorkSheet.xls	
Full Precision	OFF	
Confidence Coefficient	0.95	
Level of Significance	0.05	
C1		
General Statistics		
Number or Reported Events Not Used		0
Number of Generated Events		45
Number Values Reported (n)		45
Minimum		1030
Maximum		133130
Mean		15488
Geometric Mean		7111
Median		5750
Standard Deviation		28057
Coefficient of Variation		1.812
Mann-Kendall Test		
MK Test Value (S)		-763
Critical Value (0.05)		-1.645
Standard Deviation of S		102.2
Standardized Value of S		-7.454
Approximate *p* value		4.511E-14
Statistically significant evidence of a decreasing trend at the specified level of significance.		

Well 0411 DCE	Mann-Kendall Trend Test Analysis	
User Selected Options		
Date/Time of Computation	ProUCL 5.12/20/2020 4:05:46 PM	
From File	WorkSheet.xls	
Full Precision	OFF	
Confidence Coefficient	0.95	
Level of Significance	0.05	
C1		
General Statistics		
Number or Reported Events Not Used	0	
Number of Generated Events	59	
Number Values Reported (n)	59	
Minimum	0.65	
Maximum	4.8	
Mean	2.17	
Geometric Mean	1.978	
Median	2	
Standard Deviation	0.934	
Coefficient of Variation	0.431	
Mann-Kendall Test		
MK Test Value (S)	-144	
Critical Value (0.05)	-1.645	
Standard Deviation of S	152.9	
Standardized Value of S	-0.935	
Approximate *p* value	0.175	
Insufficient evidence to identify a significant trend at the specified level of significance.		

Well 0411 TCE	Mann-Kendall Trend Test Analysis	
User Selected Options		
Date/Time of Computation	ProUCL 5.12/20/2020 4:03:08 PM	
From File	WorkSheet.xls	
Full Precision	OFF	
Confidence Coefficient	0.95	
Level of Significance	0.05	
C1		
General Statistics		
Number or Reported Events Not Used	0	
Number of Generated Events	59	
Number Values Reported (n)	59	
Minimum	8.4	
Maximum	22	
Mean	12.33	
Geometric Mean	12.06	
Median	12	
Standard Deviation	2.853	
Coefficient of Variation	0.231	
Mann-Kendall Test		
MK Test Value (S)	-611	
Critical Value (0.05)	-1.645	
Standard Deviation of S	152.7	
Standardized Value of S	-3.995	
Approximate *p* value	3.2384E-5	
Statistically significant evidence of a decreasing trend at the specified level of significance.		

Well 0411 TCE (1999-2019)	Theil-Sen Trend Test Analysis	
User Selected Options		
Date/Time of Computation	ProUCL 5.110/13/2020 11:20:23 AM	
From File	WorkSheet.xls	
Full Precision	OFF	
Average Replicates	Replicates at sampling events will not be averaged!	
Confidence Coefficient	0.95	
Level of Significance	0.05	
TCE ug/L		
General Statistics		
Number of Events		57
Number of Values Reported (n)		57
Number of Replicates		0
Minimum		8.4
Maximum		22
Mean		12.09
Geometric Mean		11.87
Median		12
Standard Deviation		2.536
Coefficient of Variation		0.21
Mann-Kendall Statistics		
MK Test Value (S)		-497
Critical Value (0.05)		-1.645
Standard Deviation of S		145
Standardized Value of S		-3.42
Approximate *p* value		3.1325E-4
Approximate Inference for Theil-Sen Trend Test		
Theil-Sen Test	Number of Slopes	1596
	Theil-Sen Slope	-4.267E-4
x = x(median) + Q(t - t(median))	Theil-Sen Intercept	28.66
5=12.0 + (-0.0004267)(t - 39038)	M2'	917.3
t 55442.97	One-sided 95% upper limit of Slope	-1.938E-4
10/16/2051	95% LCL of Slope (0.025)	-6.832E-4
	95% UCL of Slope (0.975)	-1.623E-4
Statistically significant evidence of a decreasing trend at the specified level of significance.		


Well 0411 (1999- 2019)
TCE ug/L
24
20
16
12
8
4
36252
37252
38252
39252
40252
41252
42252
43252
43823
Days
Time-Series Trend Analysis
Events/Time Periods 57
OLS Regression Line (Blue)
OLS Regression Slope -0.0005
OLS Regression Intercept 32.9025
Theil-Sen Trend Line (Red)
Theil-Sen Slope -0.0004
Theil-Sen Intercept 28.6593
Theil-Sen Trend Analysis
Level of Significance 0.0500
M1 655.8688
M2 940.1312
LCL of Slope -0.0007
UCL of Slope -0.0002
Statistically significant evidence of a decreasing trend at the specified level of significance.
Mann-Kendall Trend Analysis
Standard Deviation of S 145.0345
M-K Standardized Val (S) -3.4199
Appx. Critical Value (0.05) -1.6449
Approximate p-value (S) 0.0003
Significant evidence of a decreasing trend

Well 0443 DCE	Mann-Kendall Trend Test Analysis	
User Selected Options		
Date/Time of Computation	ProUCL 5.12/20/2020 4:11:34 PM	
From File	WorkSheet.xls	
Full Precision	OFF	
Confidence Coefficient	0.95	
Level of Significance	0.05	
C1		
General Statistics		
Number or Reported Events Not Used		0
Number of Generated Events		47
Number Values Reported (n)		47
Minimum		0.16
Maximum		5
Mean		0.785
Geometric Mean		0.623
Median		0.75
Standard Deviation		0.725
Coefficient of Variation		0.923
Mann-Kendall Test		
MK Test Value (S)		-588
Critical Value (0.05)		-1.645
Standard Deviation of S		107.5
Standardized Value of S		-5.461
Approximate *p* value		2.3652E-8
Statistically significant evidence of a decreasing trend at the specified level of significance.		

Well 0443 TCE	Mann-Kendall Trend Test Analysis	
User Selected Options		
Date/Time of Computation	ProUCL 5.12/20/2020 4:07:54 PM	
From File	WorkSheet.xls	
Full Precision	OFF	
Confidence Coefficient	0.95	
Level of Significance	0.05	
C1		
General Statistics		
Number or Reported Events Not Used		0
Number of Generated Events		47
Number Values Reported (n)		47
Minimum		2.2
Maximum		14
Mean		7.423
Geometric Mean		6.875
Median		7.25
Standard Deviation		2.782
Coefficient of Variation		0.375
Mann-Kendall Test		
MK Test Value (S)		-18
Critical Value (0.05)		-1.645
Standard Deviation of S		109
Standardized Value of S		-0.156
Approximate *p* value		0.438
Insufficient evidence to identify a significant trend at the specified level of significance.		

Seep 0617 DCE	Mann-Kendall Trend Test Analysis	
User Selected Options		
Date/Time of Computation	ProUCL 5.12/20/2020 3:57:40 PM	
From File	WorkSheet.xls	
Full Precision	OFF	
Confidence Coefficient	0.95	
Level of Significance	0.05	
C1		
General Statistics		
Number or Reported Events Not Used	0	
Number of Generated Events	45	
Number Values Reported (n)	45	
Minimum	0.59	
Maximum	4.7	
Mean	1.969	
Geometric Mean	1.826	
Median	2	
Standard Deviation	0.738	
Coefficient of Variation	0.375	
Mann-Kendall Test		
MK Test Value (S)	-255	
Critical Value (0.05)	-1.645	
Standard Deviation of S	102.2	
Standardized Value of S	-2.485	
Approximate *p* value	0.00647	
Statistically significant evidence of a decreasing trend at the specified level of significance.		

Seep 0617 TCE	Mann-Kendall Trend Test Analysis	
User Selected Options		
Date/Time of Computation	ProUCL 5.12/20/2020 3:54:36 PM	
From File	WorkSheet.xls	
Full Precision	OFF	
Confidence Coefficient	0.95	
Level of Significance	0.05	
C1		
General Statistics		
Number or Reported Events Not Used		0
Number of Generated Events		45
Number Values Reported (n)		45
Minimum		1.84
Maximum		12
Mean		7.045
Geometric Mean		6.591
Median		7.4
Standard Deviation		2.271
Coefficient of Variation		0.322
Mann-Kendall Test		
MK Test Value (S)		-94
Critical Value (0.05)		-1.645
Standard Deviation of S		102.2
Standardized Value of S		-0.91
Approximate *p* value		0.181
Insufficient evidence to identify a significant trend at the specified level of significance.		

Appendix C

2019 Groundwater Elevations

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Table C-1. Phase I Groundwater Elevations

Well ID	Date	Top of Casing Elevation (ft AMSL)	Groundwater Elevation (ft AMSL)	Depth from Top of Casing (ft)
0353	01/29/19	745.33	743.66	1.67
0353	07/22/19	745.33	741.41	3.92
0400	01/16/19	705.11	682.42	22.69
0400	02/26/19	705.11	684.66	20.45
0400	03/28/19	705.11	682.42	22.69
0400	04/17/19	705.11	682.21	22.9
0400	05/16/19	705.11	682.91	22.2
0400	06/20/19	705.11	684.3	20.81
0400	07/23/19	705.11	680.73	24.38
0400	08/13/19	705.11	679.32	25.79
0400	09/09/19	705.11	678.8	26.31
0400	10/10/19	705.11	678.08	27.03
0400	11/14/19	705.11	678.17	26.94
0400	12/11/19	705.11	678.27	26.84
0402	01/16/19	704.02	682.48	21.54
0402	02/05/19	704.02	682.75	21.27
0402	02/26/19	704.02	684.66	19.36
0402	03/28/19	704.02	682.49	21.53
0402	04/17/19	704.02	682.26	21.76
0402	05/06/19	704.02	684.36	19.66
0402	05/16/19	704.02	682.96	21.06
0402	06/20/19	704.02	684.6	19.42
0402	07/23/19	704.02	680.81	23.21
0402	07/31/19	704.02	680.13	23.89
0402	08/13/19	704.02	679.63	24.39
0402	09/09/19	704.02	678.9	25.12
0402	10/10/19	704.02	678.18	25.84
0402	10/19/19	704.02	678.22	25.8
0402	11/14/19	704.02	678.29	25.73
0402	12/11/19	704.02	678.38	25.64
0411	02/04/19	836.57	820.9	15.67
0411	07/24/19	836.57	809.57	27
0443	02/04/19	858.78	830.58	28.2
0443	07/22/19	858.78	822.06	36.72
0444	01/31/19	773	752.02	20.98
0444	07/24/19	773	748.92	24.08
0445	01/29/19	743.43	729.15	14.28
0445	07/22/19	743.43	727.68	15.75
P033	01/16/19	705.83	682.39	23.44

Table C-1. Phase I Groundwater Elevations (continued)

Well ID	Date	Top of Casing Elevation (ft AMSL)	Groundwater Elevation (ft AMSL)	Depth from Top of Casing (ft)
P033	02/26/19	705.83	684.59	21.24
P033	03/28/19	705.83	682.39	23.44
P033	04/17/19	705.83	682.18	23.65
P033	05/16/19	705.83	682.88	22.95
P033	06/20/19	705.83	684.38	21.45
P033	07/23/19	705.83	680.71	25.12
P033	08/13/19	705.83	679.52	26.31
P033	09/09/19	705.83	678.79	27.04
P033	10/10/19	705.83	678.36	27.47
P033	11/14/19	705.83	678.18	27.65
P033	12/11/19	705.83	678.21	27.62
P064	01/16/19	729.98	682.25	47.73
P064	01/31/19	729.98	683.21	46.77
P064	02/26/19	729.98	684.5	45.48
P064	03/28/19	729.98	682.24	47.74
P064	04/17/19	729.98	682.02	47.96
P064	05/16/19	729.98	682.73	47.25
P064	06/20/19	729.98	683.89	46.09
P064	07/23/19	729.98	680.51	49.47
P064	07/24/19	729.98	680.48	49.5
P064	08/13/19	729.98	679.27	50.71
P064	09/09/19	729.98	678.56	51.42
P064	10/10/19	729.98	677.86	52.12
P064	11/14/19	729.98	671.93	58.05
P064	12/11/19	729.98	678.03	51.95

Abbreviation:
ft AMSL = feet above mean sea level

Table C-2. Parcels 6, 7, and 8 Groundwater Elevations

Well ID	Date	Top of Casing Elevation (ft AMSL)	Groundwater Elevation (ft AMSL)	Depth from Top of Casing (ft)
0118	1/28/2019	704.86	685.26	19.6
0118	04/29/19	704.86	685.06	19.8
0118	07/23/19	704.86	681.86	23
0118	11/04/09	704.86	679.99	24.87
0124	1/28/2019	705.12	684.25	20.87
0124	04/29/19	705.12	683.8	21.32
0124	07/23/19	705.12	681.07	24.05
0124	11/04/09	705.12	678.64	26.48
0126	01/16/19	705.54	682.59	22.95
0126	1/28/2019	705.54	684.19	21.35
0126	02/26/19	705.54	684.7	20.84
0126	03/28/19	705.54	682.58	22.96
0126	04/17/19	705.54	682.44	23.1
0126	04/29/19	705.54	683.81	21.73
0126	05/16/19	705.54	683.11	22.43
0126	06/20/19	705.54	685.32	20.22
0126	07/23/19	705.54	681.07	24.47
0126	07/23/19	705.54	681.07	24.47
0126	08/13/19	705.54	679.92	25.62
0126	09/09/19	705.54	679.14	26.4
0126	10/10/19	705.54	678.42	27.12
0126	11/04/09	705.54	678.6	26.94
0126	11/14/19	705.54	678.61	26.93
0126	12/11/19	705.54	678.67	26.87
0138	1/28/2019	708.04	685.14	22.9
0138	04/29/19	708.04	684.94	23.1
0138	07/23/19	708.04	681.79	26.25
0138	11/04/09	708.04	679.94	28.1
0315	02/04/19	723.99	683.13	40.86
0315	04/29/19	723.99	683.79	40.2
0315	07/22/19	723.99	681.24	42.75
0315	11/04/09	723.99	678.59	45.4
0346	02/04/19	742.97	730.59	12.38
0346	04/30/19	742.97	730.73	12.24
0346	07/24/19	742.97	729.05	13.92
0346	11/04/09	742.97	726.36	16.61
0347	01/31/19	725.2	683.67	41.53
0347	04/29/19	725.2	684.42	40.78
0347	07/22/19	725.2	681.22	43.98

Table C-2. Parcels 6, 7, and 8 Groundwater Elevations (continued)

Well ID	Date	Top of Casing Elevation (ft AMSL)	Groundwater Elevation (ft AMSL)	Depth from Top of Casing (ft)
0347	11/05/19	725.2	678.55	46.65
0379	01/16/19	716.11	682.63	33.48
0379	01/29/19	716.11	683.13	32.98
0379	02/05/19	716.11	683.01	33.1
0379	02/26/19	716.11	684.75	31.36
0379	03/28/19	716.11	682.61	33.5
0379	04/17/19	716.11	682.43	33.68
0379	04/30/19	716.11	684.31	31.8
0379	05/08/19	716.11	684.11	32
0379	05/16/19	716.11	683.13	32.98
0379	06/20/19	716.11	685.18	30.93
0379	07/23/19	716.11	681.11	35
0379	07/24/19	716.11	681.16	34.95
0379	07/30/19	716.11	680.63	35.48
0379	08/13/19	716.11	679.88	36.23
0379	09/09/19	716.11	679.13	36.98
0379	10/10/19	716.11	678.43	37.68
0379	10/19/19	716.11	678.41	37.7
0379	11/05/19	716.11	678.57	37.54
0379	11/14/19	716.11	678.58	37.53
0379	12/11/19	716.11	678.77	37.34
0386	01/29/19	724.79	684.08	40.71
0386	04/30/19	724.79	684.31	40.48
0386	07/22/19	724.79	681.25	43.54
0386	11/05/19	724.79	678.58	46.21
0387	01/29/19	720.89	684.08	36.81
0387	04/30/19	720.89	684.28	36.61
0387	07/22/19	720.89	681.24	39.65
0387	11/05/19	720.89	678.57	42.32
0389	01/29/19	724.65	684.19	40.46
0389	04/30/19	724.65	684.34	40.31
0389	07/22/19	724.65	681.3	43.35
0389	11/05/19	724.65	678.63	46.02
0392	01/31/19	720.84	683.78	37.06
0392	04/30/19	720.84	684.41	36.43
0392	07/22/19	720.84	681.33	39.51
0392	11/05/19	720.84	678.66	42.18

Abbreviation:
ft AMSL = feet above mean sea level

Appendix D

2019 Groundwater and Seep Data Tables

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Table D-1. Phase I Groundwater Data

Location	Analyte	Sample Date	Value	Detection Limit	Laboratory Qualifiers	Validation Qualifiers	Units	Sample Type
0353	*cis*-1,2-Dichloroethene	1/29/2019	0.16	0.160	U	N	µg/L	F
		7/22/2019	0.16	0.160	U	N	µg/L	F
0353	Dissolved Oxygen	1/29/2019	7.77			Y	mg/L	F
		7/22/2019	1.91			Y	mg/L	F
0353	Oxidation Reduction Potential	1/29/2019	10.1			Y	mV	F
		7/22/2019	125.4			Y	mV	F
0353	pH	1/29/2019	7.43			Y	s.u.	F
		7/22/2019	7.04			Y	s.u.	F
0353	Specific Conductance	1/29/2019	1300			Y	µmhos/cm	F
		7/22/2019	1330			Y	µmhos/cm	F
0353	Temperature	1/29/2019	7.3			Y	C	F
		7/22/2019	20.3			Y	C	F
0353	Tetrachloroethene	1/29/2019	0.16	0.160	U	N	µg/L	F
		7/22/2019	0.16	0.160	U	N	µg/L	F
0353	*trans*-1,2-Dichloroethene	1/29/2019	0.16	0.160	U	N	µg/L	F
		7/22/2019	0.16	0.160	U	N	µg/L	F
0353	Trichloroethene	1/29/2019	0.16	0.160	U	N	µg/L	F
		7/22/2019	0.16	0.160	U	N	µg/L	F
0353	Turbidity	1/29/2019	18.2			Y	NTU	F
		7/22/2019	20.4			Y	NTU	F
0353	Vinyl Chloride	1/29/2019	0.16	0.160	U	N	µg/L	F
		7/22/2019	0.16	0.160	U	N	µg/L	F
0411	*cis*-1,2-Dichloroethene	2/4/2019	0.95	0.160	J	Y	µg/L	F
		7/24/2019	0.96	0.160	J	Y	µg/L	F
		7/24/2019	0.98	0.160	J	Y	µg/L	D
0411	Dissolved Oxygen	2/4/2019	0.88			Y	mg/L	F
		7/24/2019	2.89			Y	mg/L	F

Table D-1. Phase I Groundwater Data (continued)

Location	Analyte	Sample Date	Value	Detection Limit	Laboratory Qualifiers	Validation Qualifiers	Units	Sample Type
0411	Oxidation Reduction Potential	2/4/2019	3.6			Y	mV	F
		7/24/2019	72.8			Y	mV	F
0411	pH	2/4/2019	7.29			Y	s.u.	F
		7/24/2019	6.98			Y	s.u.	F
0411	Specific Conductance	2/4/2019	1310			Y	µmhos/cm	F
		7/24/2019	1340			Y	µmhos/cm	F
0411	Temperature	2/4/2019	13.1			Y	C	F
		7/24/2019	15.6			Y	C	F
0411	Tetrachloroethene	2/4/2019	0.16	0.160	U	N	µg/L	F
		7/24/2019	0.16	0.160	U	N	µg/L	F
		7/24/2019	0.16	0.160	U	N	µg/L	D
0411	*trans*-1,2-Dichloroethene	2/4/2019	0.16	0.160	U	N	µg/L	F
		7/24/2019	0.16	0.160	U	N	µg/L	F
		7/24/2019	0.16	0.160	U	N	µg/L	D
0411	Trichloroethene	2/4/2019	10.4	0.160		Y	µg/L	F
		7/24/2019	9.8	0.160		Y	µg/L	F
		7/24/2019	10.1	0.160		Y	µg/L	D
0411	Turbidity	2/4/2019	43.5			Y	NTU	F
		7/24/2019	10.2			Y	NTU	F
0411	Vinyl Chloride	2/4/2019	0.16	0.160	U	N	µg/L	F
		7/24/2019	0.16	0.160	U	N	µg/L	D
		7/24/2019	0.16	0.160	U	N	µg/L	F
0443	*cis*-1,2-Dichloroethene	2/4/2019	0.16	0.160	U	N	µg/L	F
		7/22/2019	0.32	0.160	J	Y	µg/L	F
0443	Dissolved Oxygen	2/4/2019	1.8			Y	mg/L	F
		7/22/2019	4.24			Y	mg/L	F
0443	Oxidation Reduction Potential	2/4/2019	15.3			Y	mV	F
		7/22/2019	100.6			Y	mV	F

Table D-1. Phase I Groundwater Data (continued)

Location	Analyte	Sample Date	Value	Detection Limit	Laboratory Qualifiers	Validation Qualifiers	Units	Sample Type
0443	pH	2/4/2019	7.18			Y	s.u.	F
		7/22/2019	6.98			Y	s.u.	F
0443	Specific Conductance	2/4/2019	1160			Y	umhos/cm	F
		7/22/2019	1330			Y	µmhos/cm	F
0443	Temperature	2/4/2019	12.9			Y	C	F
		7/22/2019	16.7			Y	C	F
0443	Tetrachloroethene	2/4/2019	0.16	0.160	U	N	µg/L	F
		7/22/2019	0.16	0.160	U	N	µg/L	F
0443	*trans*-1,2-Dichloroethene	2/4/2019	0.16	0.160	U	N	µg/L	F
		7/22/2019	0.16	0.160	U	N	µg/L	F
0443	Trichloroethene	2/4/2019	5.32	0.160		Y	µg/L	F
		7/22/2019	4.72	0.160		Y	µg/L	F
0443	Turbidity	2/4/2019	1.47			Y	NTU	F
		7/22/2019	8.1			Y	NTU	F
0443	Vinyl Chloride	2/4/2019	0.16	0.160	U	N	µg/L	F
		7/22/2019	0.16	0.160	U	N	µg/L	F
0444	*cis*-1,2-Dichloroethene	1/31/2019	0.16	0.160	U	N	µg/L	F
		7/24/2019	0.16	0.160	U	N	µg/L	F
0444	Dissolved Oxygen	1/31/2019	0.6			Y	mg/L	F
		7/24/2019	1.08			Y	mg/L	F
0444	Oxidation Reduction Potential	1/31/2019	8.8			Y	mV	F
		7/24/2019	51.3			Y	mV	F
0444	pH	1/31/2019	7.19			Y	s.u.	F
		7/24/2019	6.98			Y	s.u.	F
0444	Specific Conductance	1/31/2019	1270			Y	µmhos/cm	F
		7/24/2019	1300			Y	µmhos/cm	F
0444	Temperature	1/31/2019	4.1			Y	C	F
		7/24/2019	18.4			Y	C	F

Table D-1. Phase I Groundwater Data (continued)

Location	Analyte	Sample Date	Value	Detection Limit	Laboratory Qualifiers	Validation Qualifiers	Units	Sample Type
0444	Tetrachloroethene	1/31/2019	0.16	0.160	U	N	µg/L	F
		7/24/2019	0.16	0.160	U	N	µg/L	F
0444	*trans*-1,2-Dichloroethene	1/31/2019	0.16	0.160	U	N	µg/L	F
		7/24/2019	0.16	0.160	U	N	µg/L	F
0444	Trichloroethene	1/31/2019	0.16	0.160	U	N	µg/L	F
		7/24/2019	0.16	0.160	U	N	µg/L	F
0444	Turbidity	1/31/2019	99.2			Y	NTU	F
		7/24/2019	3.43			Y	NTU	F
0444	Vinyl Chloride	1/31/2019	0.16	0.160	U	N	µg/L	F
		7/24/2019	0.16	0.160	U	N	µg/L	F
0445	*cis*-1,2-Dichloroethene	1/29/2019	0.16	0.160	U	N	µg/L	F
		7/22/2019	0.16	0.160	U	N	µg/L	F
0445	Dissolved Oxygen	1/29/2019	0.1			Y	mg/L	F
		7/22/2019	0.1			Y	mg/L	F
0445	Oxidation Reduction Potential	1/29/2019	-64.2			Y	mV	F
		7/22/2019	-89.7			Y	mV	F
0445	pH	1/29/2019	7.2			Y	s.u.	F
		7/22/2019	6.91			Y	s.u.	F
0445	Specific Conductance	1/29/2019	22540			Y	µmhos/cm	F
		7/22/2019	27330			Y	µmhos/cm	F
0445	Temperature	1/29/2019	9.9			Y	C	F
		7/22/2019	17.5			Y	C	F
0445	Tetrachloroethene	1/29/2019	0.16	0.160	U	N	µg/L	F
		7/22/2019	0.16	0.160	U	N	µg/L	F
0445	*trans*-1,2-Dichloroethene	1/29/2019	0.16	0.160	U	N	µg/L	F
		7/22/2019	0.16	0.160	U	N	µg/L	F
0445	Trichloroethene	1/29/2019	0.16	0.160	U	N	µg/L	F
		7/22/2019	0.16	0.160	U	N	µg/L	F

Table D-1. Phase I Groundwater Data (continued)

Location	Analyte	Sample Date	Value	Detection Limit	Laboratory Qualifiers	Validation Qualifiers	Units	Sample Type
0445	Turbidity	1/29/2019	36.7			Y	NTU	F
		7/22/2019	6.5			Y	NTU	F
0445	Vinyl Chloride	1/29/2019	0.16	0.160	U	N	µg/L	F
		7/22/2019	0.16	0.160	U	N	µg/L	F
P064	*cis*-1,2-Dichloroethene	1/31/2019	0.16	0.160	U	N	µg/L	D
		1/31/2019	0.16	0.160	U	N	µg/L	F
		7/24/2019	0.16	0.160	U	N	µg/L	F
P064	Dissolved Oxygen	1/31/2019	1.93			Y	mg/L	F
		7/24/2019	2.38			Y	mg/L	F
P064	Oxidation Reduction Potential	1/31/2019	6.3			Y	mV	F
		7/24/2019	32.3			Y	mV	F
P064	pH	1/31/2019	7.19			Y	s.u.	F
		7/24/2019	6.89			Y	s.u.	F
P064	Specific Conductance	1/31/2019	1430			Y	µmhos/cm	F
		7/24/2019	1170			Y	µmhos/cm	F
P064	Temperature	1/31/2019	11.5			Y	C	F
		7/24/2019	13.9			Y	C	F
P064	Tetrachloroethene	1/31/2019	0.78	0.160	J	Y	µg/L	D
		1/31/2019	0.74	0.160	J	Y	µg/L	F
		7/24/2019	0.86	0.160	J	Y	µg/L	F
P064	*trans*-1,2-Dichloroethene	1/31/2019	0.16	0.160	U	N	µg/L	F
		1/31/2019	0.16	0.160	U	N	µg/L	D
		7/24/2019	0.16	0.160	U	N	µg/L	F
P064	Trichloroethene	1/31/2019	0.71	0.160	J	Y	µg/L	D
		1/31/2019	0.71	0.160	J	Y	µg/L	F
		7/24/2019	0.56	0.160	J	Y	µg/L	F
P064	Turbidity	1/31/2019	1.23			Y	NTU	F
		7/24/2019	4.92			Y	NTU	F

Table D-1. Phase I Groundwater Data (continued)

Location	Analyte	Sample Date	Value	Detection Limit	Laboratory Qualifiers	Validation Qualifiers	Units	Sample Type
P064	Vinyl Chloride	1/31/2019	0.16	0.160	U	N	µg/L	F
		1/31/2019	0.16	0.160	U	N	µg/L	D
		7/24/2019	0.16	0.160	U	N	µg/L	F

Abbreviations:
D = analyte determined in diluted sample
F = low flow sampling method used
J = estimated value
mg/L = milligrams per liter
µg/L = micrograms per liter
µmhos/cm = micromhos per centimeter
mV = millivolts
NTU = nephelometric turbidity unit
pCi/L = picocuries per liter
Q = quantitative result due to sampling technique
s.u. = standard unit
U = analytical result below detection limit

Table D-2. Parcels 6, 7, and 8 Groundwater Data

Location	Analyte	Sample Date	Value	Detection Limit	Laboratory Qualifiers	Validation Qualifiers	Units	Sample Type
0118	*cis*-1,2-Dichloroethene	1/28/2019	0.16	0.160	U		µg/L	F
		4/29/2019	0.16	0.160	U		µg/L	F
		7/23/2019	0.16	0.160	U		µg/L	F
		11/4/2019	0.16	0.160	U		µg/L	F
0118	Dissolved Oxygen	1/28/2019	5.65				mg/L	F
		4/29/2019	5.11				mg/L	F
		7/23/2019	5.37				mg/L	F
		11/4/2019	8.07				mg/L	F
0118	Oxidation Reduction Potential	1/28/2019	32.8				mV	F
		4/29/2019	105.5				mV	F
		7/23/2019	59				mV	F
		11/4/2019	54.2				mV	F
0118	pH	1/28/2019	7.38				s.u.	F
		4/29/2019	7.16				s.u.	F
		7/23/2019	7.04				s.u.	F
		11/4/2019	7.21				s.u.	F
0118	Specific Conductance	1/28/2019	1080				µmhos/cm	F
		4/29/2019	1120				µmhos/cm	F
		7/23/2019	1150				µmhos/cm	F
		11/4/2019	1080				µmhos/cm	F
0118	Temperature	1/28/2019	13.6				C	F
		4/29/2019	13.7				C	F
		7/23/2019	14.1				C	F
		11/4/2019	14				C	F
0118	Tetrachloroethene	1/28/2019	0.16	0.160	U		µg/L	F
		4/29/2019	0.16	0.160	U		µg/L	F
		7/23/2019	0.16	0.160	U		µg/L	F
		11/4/2019	0.16	0.160	U		µg/L	F

Table D-2. Parcels 6, 7, and 8 Groundwater Data (continued)

Location	Analyte	Sample Date	Value	Detection Limit	Laboratory Qualifiers	Validation Qualifiers	Units	Sample Type
0118	*trans*-1,2-Dichloroethene	1/28/2019	0.16	0.160	U		µg/L	F
		4/29/2019	0.16	0.160	U		µg/L	F
		7/23/2019	0.16	0.160	U		µg/L	F
		11/4/2019	0.16	0.160	U		µg/L	F
0118	Trichloroethene	1/28/2019	0.16	0.160	U		µg/L	F
		4/29/2019	0.16	0.160	U		µg/L	F
		7/23/2019	0.16	0.160	U		µg/L	F
		11/4/2019	0.16	0.160	U		µg/L	F
0118	Tritium	1/28/2019	65.7		U		pCi/L	F
		7/23/2019	76.7		U		pCi/L	F
0118	Turbidity	1/28/2019	35.7				NTU	F
		4/29/2019	21.6				NTU	F
		7/23/2019	15				NTU	F
		11/4/2019	18.7				NTU	F
0118	Vinyl Chloride	1/28/2019	0.16	0.160	U		µg/L	F
		4/29/2019	0.16	0.160	U		µg/L	F
		7/23/2019	0.16	0.160	U		µg/L	F
		11/4/2019	0.16	0.160	U		µg/L	F
0124	*cis*-1,2-Dichloroethene	1/28/2019	0.16	0.160	U		µg/L	F
		4/29/2019	0.16	0.160	U		µg/L	F
		7/23/2019	0.16	0.160	U		µg/L	F
		11/4/2019	0.16	0.160	U		µg/L	F
0124	Dissolved Oxygen	1/28/2019	2.38				mg/L	F
		4/29/2019	2.51				mg/L	F
		7/23/2019	2.73				mg/L	F
		11/4/2019	6.78				mg/L	F

Table D-2. Parcels 6, 7, and 8 Groundwater Data (continued)

Location	Analyte	Sample Date	Value	Detection Limit	Laboratory Qualifiers	Validation Qualifiers	Units	Sample Type
0124	Oxidation Reduction Potential	1/28/2019	30.1				mV	F
		4/29/2019	130.2				mV	F
		7/23/2019	65.4				mV	F
		11/4/2019	72.4				mV	F
0124	pH	1/28/2019	7.17				s.u.	F
		4/29/2019	6.85				s.u.	F
		7/23/2019	6.75				s.u.	F
		11/4/2019	6.93				s.u.	F
0124	Specific Conductance	1/28/2019	1150				µmhos/cm	F
		4/29/2019	1190				µmhos/cm	F
		7/23/2019	1230				µmhos/cm	F
		11/4/2019	1200				µmhos/cm	F
0124	Temperature	1/28/2019	13.1				C	F
		4/29/2019	13.4				C	F
		7/23/2019	14.1				C	F
		11/4/2019	13.8				C	F
0124	Tetrachloroethene	1/28/2019	0.16	0.160	U		µg/L	F
		4/29/2019	0.31	0.160	J		µg/L	F
		7/23/2019	0.35	0.160	J		µg/L	F
		11/4/2019	0.34	0.160	J		µg/L	F
0124	*trans*-1,2-Dichloroethene	1/28/2019	0.16	0.160	U		µg/L	F
		4/29/2019	0.16	0.160	U		µg/L	F
		7/23/2019	0.16	0.160	U		µg/L	F
		11/4/2019	0.16	0.160	U		µg/L	F
0124	Trichloroethene	1/28/2019	0.16	0.160	U		µg/L	F
		4/29/2019	0.25	0.160	J		µg/L	F
		7/23/2019	0.23	0.160	J		µg/L	F
		11/4/2019	0.16	0.160	U		µg/L	F

Table D-2. Parcels 6, 7, and 8 Groundwater Data (continued)

Location	Analyte	Sample Date	Value	Detection Limit	Laboratory Qualifiers	Validation Qualifiers	Units	Sample Type
0124	Turbidity	1/28/2019	1.64				NTU	F
		4/29/2019	1.29				NTU	F
		7/23/2019	2.98				NTU	F
		11/4/2019	2.3				NTU	F
0124	Vinyl Chloride	1/28/2019	0.16	0.160	U		µg/L	F
		4/29/2019	0.16	0.160	U		µg/L	F
		7/23/2019	0.16	0.160	U		µg/L	F
		11/4/2019	0.16	0.160	U		µg/L	F
0126	*cis*-1,2-Dichloroethene	1/28/2019	0.16	0.160	U		µg/L	F
		4/29/2019	0.16	0.160	U		µg/L	F
		7/23/2019	0.16	0.160	U		µg/L	F
		11/4/2019	0.16	0.160	U		µg/L	F
0126	Dissolved Oxygen	1/28/2019	0.62				mg/L	F
		4/29/2019	1.91				mg/L	F
		7/23/2019	0.43				mg/L	F
		11/4/2019	5.57				mg/L	F
0126	Oxidation Reduction Potential	1/28/2019	13.5				mV	F
		4/29/2019	104.8				mV	F
		7/23/2019	68.4				mV	F
		11/4/2019	63.9				mV	F
0126	pH	1/28/2019	7.17				s.u.	F
		4/29/2019	6.94				s.u.	F
		7/23/2019	6.88				s.u.	F
		11/4/2019	6.95				s.u.	F
0126	Specific Conductance	1/28/2019	1270				µmhos/cm	F
		4/29/2019	1300				µmhos/cm	F
		7/23/2019	1330				µmhos/cm	F
		11/4/2019	1270				µmhos/cm	F

Table D-2. Parcels 6, 7, and 8 Groundwater Data (continued)

Location	Analyte	Sample Date	Value	Detection Limit	Laboratory Qualifiers	Validation Qualifiers	Units	Sample Type
0126	Temperature	1/28/2019	13.2				C	F
		4/29/2019	13.5				C	F
		7/23/2019	14				C	F
		11/4/2019	13.6				C	F
0126	Tetrachloroethene	1/28/2019	0.82	0.160	J		µg/L	F
		4/29/2019	0.8	0.160	J		µg/L	F
		7/23/2019	0.85	0.160	J		µg/L	F
		11/4/2019	0.93	0.160	J		µg/L	F
0126	*trans*-1,2-Dichloroethene	1/28/2019	0.16	0.160	U		µg/L	F
		4/29/2019	0.16	0.160	U		µg/L	F
		7/23/2019	0.16	0.160	U		µg/L	F
		11/4/2019	0.16	0.160	U		µg/L	F
0126	Trichloroethene	1/28/2019	0.16	0.160	U		µg/L	F
		4/29/2019	0.16	0.160	U		µg/L	F
		7/23/2019	0.16	0.160	U		µg/L	F
		11/4/2019	0.16	0.160	U		µg/L	F
0126	Turbidity	1/28/2019	1.13				NTU	F
		4/29/2019	0.66				NTU	F
		7/23/2019	1.48				NTU	F
		11/4/2019	3.27				NTU	F
0126	Vinyl Chloride	1/28/2019	0.16	0.160	U		µg/L	F
		4/29/2019	0.16	0.160	U		µg/L	F
		7/23/2019	0.16	0.160	U		µg/L	F
		11/4/2019	0.16	0.160	U		µg/L	F
0138	*cis*-1,2-Dichloroethene	1/28/2019	0.16	0.160	U		µg/L	F
		4/29/2019	0.16	0.160	U		µg/L	F
		7/23/2019	0.16	0.160	U		µg/L	F
		11/4/2019	0.16	0.160	U		µg/L	F

Table D-2. Parcels 6, 7, and 8 Groundwater Data (continued)

Location	Analyte	Sample Date	Value	Detection Limit	Laboratory Qualifiers	Validation Qualifiers	Units	Sample Type
0138	Dissolved Oxygen	1/28/2019	9.64				mg/L	F
		4/29/2019	5.9				mg/L	F
		7/23/2019	2.61				mg/L	F
		11/4/2019	4.34				mg/L	F
0138	Oxidation Reduction Potential	1/28/2019	10.9				mV	F
		4/29/2019	61.9				mV	F
		7/23/2019	60.6				mV	F
		11/4/2019	62.9				mV	F
0138	pH	1/28/2019	7.12				s.u.	F
		4/29/2019	7.07				s.u.	F
		7/23/2019	6.87				s.u.	F
		11/4/2019	7.11				s.u.	F
0138	Specific Conductance	1/28/2019	1160				µmhos/cm	F
		4/29/2019	1150				µmhos/cm	F
		7/23/2019	1180				µmhos/cm	F
		11/4/2019	1120				µmhos/cm	F
0138	Temperature	1/28/2019	12				C	F
		4/29/2019	12.9				C	F
		7/23/2019	14.3				C	F
		11/4/2019	13.2				C	F
0138	Tetrachloroethene	1/28/2019	0.16	0.160	U		µg/L	F
		4/29/2019	0.16	0.160	U		µg/L	F
		7/23/2019	0.16	0.160	U		µg/L	F
		11/4/2019	0.16	0.160	U		µg/L	F
0138	*trans*-1,2-Dichloroethene	1/28/2019	0.16	0.160	U		µg/L	F
		4/29/2019	0.16	0.160	U		µg/L	F
		7/23/2019	0.16	0.160	U		µg/L	F
		11/4/2019	0.16	0.160	U		µg/L	F

Table D-2. Parcels 6, 7, and 8 Groundwater Data (continued)

Location	Analyte	Sample Date	Value	Detection Limit	Laboratory Qualifiers	Validation Qualifiers	Units	Sample Type
0138	Trichloroethene	1/28/2019	0.16	0.160	U		µg/L	F
		4/29/2019	0.16	0.160	U		µg/L	F
		7/23/2019	0.16	0.160	U		µg/L	F
		11/4/2019	0.16	0.160	U		µg/L	F
0138	Tritium	1/28/2019	309			J	pCi/L	F
		7/23/2019	381			J	pCi/L	F
0138	Turbidity	1/28/2019	9.79				NTU	F
		4/29/2019	3.07				NTU	F
		7/23/2019	6.72				NTU	F
		11/4/2019	6.29				NTU	F
0138	Vinyl Chloride	1/28/2019	0.16	0.160	U		µg/L	F
		4/29/2019	0.16	0.160	U		µg/L	F
		7/23/2019	0.16	0.160	U		µg/L	F
		11/4/2019	0.16	0.160	U		µg/L	F
0315	*cis*-1,2-Dichloroethene	2/4/2019	0.16	0.160	U		µg/L	F
		4/29/2019	0.16	0.160	U		µg/L	F
		7/22/2019	0.16	0.160	U		µg/L	F
		11/4/2019	0.16	0.160	U		µg/L	F
0315	Dissolved Oxygen	2/4/2019	0.11				mg/L	F
		4/29/2019	0.25				mg/L	F
		7/22/2019	0.37				mg/L	F
		11/4/2019	2.41				mg/L	F
0315	Oxidation Reduction Potential	2/4/2019	256.1				mV	F
		4/29/2019	-1.1				mV	F
		7/22/2019	-64.9				mV	F
		11/4/2019	-53.8				mV	F

Table D-2. Parcels 6, 7, and 8 Groundwater Data (continued)

Location	Analyte	Sample Date	Value	Detection Limit	Laboratory Qualifiers	Validation Qualifiers	Units	Sample Type
0315	pH	2/4/2019	7.17				s.u.	F
		4/29/2019	7.11				s.u.	F
		7/22/2019	7.3				s.u.	F
		11/4/2019	7.15				s.u.	F
0315	Specific Conductance	2/4/2019	1700				µmhos/cm	F
		4/29/2019	1690				µmhos/cm	F
		7/22/2019	1670				µmhos/cm	F
		11/4/2019	1670				µmhos/cm	F
0315	Temperature	2/4/2019	13.8				C	F
		4/29/2019	14.2				C	F
		7/22/2019	15.1				C	F
		11/4/2019	14.5				C	F
0315	Tetrachloroethene	2/4/2019	0.16	0.160	U		µg/L	F
		4/29/2019	0.16	0.160	U		µg/L	F
		7/22/2019	0.16	0.160	U		µg/L	F
		11/4/2019	0.16	0.160	U		µg/L	F
0315	*trans*-1,2-Dichloroethene	2/4/2019	0.16	0.160	U		µg/L	F
		4/29/2019	0.16	0.160	U		µg/L	F
		7/22/2019	0.16	0.160	U		µg/L	F
		11/4/2019	0.16	0.160	U		µg/L	F
0315	Trichloroethene	2/4/2019	2.59	0.160			µg/L	F
		4/29/2019	1.15	0.160			µg/L	F
		7/22/2019	0.42	0.160	J		µg/L	F
		11/4/2019	0.95	0.160	J		µg/L	F
0315	Turbidity	2/4/2019	242				NTU	F
		4/29/2019	123				NTU	F
		7/22/2019	122				NTU	F
		11/4/2019	61.6				NTU	F

Table D-2. Parcels 6, 7, and 8 Groundwater Data (continued)

Location	Analyte	Sample Date	Value	Detection Limit	Laboratory Qualifiers	Validation Qualifiers	Units	Sample Type
0315	Vinyl Chloride	2/4/2019	0.16	0.160	U		µg/L	F
		4/29/2019	0.16	0.160	U		µg/L	F
		7/22/2019	0.16	0.160	U		µg/L	F
		11/4/2019	0.16	0.160	U		µg/L	F
0346	*cis*-1,2-Dichloroethene	2/4/2019	0.16	0.160	U		µg/L	F
		4/30/2019	0.16	0.160	U		µg/L	F
		7/24/2019	0.16	0.160	U		µg/L	F
		11/4/2019	0.16	0.160	U		µg/L	F
0346	Dissolved Oxygen	2/4/2019	1.55				mg/L	F
		4/30/2019	8.67				mg/L	F
		7/24/2019	1.51				mg/L	F
		11/4/2019	0.29				mg/L	F
0346	Oxidation Reduction Potential	2/4/2019	228.3				mV	F
		4/30/2019	118				mV	F
		7/24/2019	-78.9				mV	F
		11/4/2019	-56.4				mV	F
0346	pH	2/4/2019	7.31				s.u.	F
		4/30/2019	7.29				s.u.	F
		7/24/2019	7.41				s.u.	F
		11/4/2019	7.21				s.u.	F
0346	Specific Conductance	2/4/2019	1310				µmhos/cm	F
		4/30/2019	596				µmhos/cm	F
		7/24/2019	680				µmhos/cm	F
		11/4/2019	1180				µmhos/cm	F
0346	Temperature	2/4/2019	13.4				C	F
		4/30/2019	13				C	F
		7/24/2019	14.2				C	F
		11/4/2019	14.2				C	F

Table D-2. Parcels 6, 7, and 8 Groundwater Data (continued)

Location	Analyte	Sample Date	Value	Detection Limit	Laboratory Qualifiers	Validation Qualifiers	Units	Sample Type
0346	Tetrachloroethene	2/4/2019	0.16	0.160	U		µg/L	F
		4/30/2019	0.16	0.160	U		µg/L	F
		7/24/2019	0.16	0.160	U		µg/L	F
		11/4/2019	0.16	0.160	U		µg/L	F
0346	*trans*-1,2-Dichloroethene	2/4/2019	0.16	0.160	U		µg/L	F
		4/30/2019	0.16	0.160	U		µg/L	F
		7/24/2019	0.16	0.160	U		µg/L	F
		11/4/2019	0.16	0.160	U		µg/L	F
0346	Trichloroethene	2/4/2019	0.16	0.160	U		µg/L	F
		4/30/2019	0.16	0.160	U		µg/L	F
		7/24/2019	0.16	0.160	U		µg/L	F
		11/4/2019	0.16	0.160	U		µg/L	F
0346	Tritium	2/4/2019	435			J	pCi/L	F
		7/24/2019	5.96		U		pCi/L	F
0346	Turbidity	2/4/2019	18.5				NTU	F
		4/30/2019	11.9				NTU	F
		7/24/2019	17.7				NTU	F
		11/4/2019	4.74				NTU	F
0346	Vinyl Chloride	2/4/2019	0.16	0.160	U		µg/L	F
		4/30/2019	0.16	0.160	U		µg/L	F
		7/24/2019	0.16	0.160	U		µg/L	F
		11/4/2019	0.16	0.160	U		µg/L	F
0347	*cis*-1,2-Dichloroethene	1/31/2019	0.16	0.160	U		µg/L	D
		1/31/2019	0.16	0.160	U		µg/L	F
		4/29/2019	0.16	0.160	U		µg/L	D
		4/29/2019	0.16	0.160	U		µg/L	F
		7/22/2019	0.16	0.160	U		µg/L	F
		11/5/2019	0.16	0.160	U		µg/L	F

Table D-2. Parcels 6, 7, and 8 Groundwater Data (continued)

Location	Analyte	Sample Date	Value	Detection Limit	Laboratory Qualifiers	Validation Qualifiers	Units	Sample Type
0347	Dissolved Oxygen	1/31/2019	0.59				mg/L	F
		4/29/2019	0.2				mg/L	F
		7/22/2019	0.33				mg/L	F
		11/5/2019	0.37				mg/L	F
0347	Oxidation Reduction Potential	1/31/2019	-9.2				mV	F
		4/29/2019	-47.1				mV	F
		7/22/2019	-67.5				mV	F
		11/5/2019	-60				mV	F
0347	pH	1/31/2019	6.99				s.u.	F
		4/29/2019	6.97				s.u.	F
		7/22/2019	7.11				s.u.	F
		11/5/2019	6.92				s.u.	F
0347	Specific Conductance	1/31/2019	1740				µmhos/cm	F
		4/29/2019	1730				µmhos/cm	F
		7/22/2019	1680				µmhos/cm	F
		11/5/2019	1730				µmhos/cm	F
0347	Temperature	1/31/2019	12.9				C	F
		4/29/2019	13.9				C	F
		7/22/2019	14.7				C	F
		11/5/2019	13.9				C	F
0347	Tetrachloroethene	1/31/2019	0.16	0.160	U		µg/L	D
		1/31/2019	0.16	0.160	U		µg/L	F
		4/29/2019	0.16	0.160	U		µg/L	F
		4/29/2019	0.16	0.160	U		µg/L	D
		7/22/2019	0.16	0.160	U		µg/L	F
		11/5/2019	0.16	0.160	U		µg/L	F

Table D-2. Parcels 6, 7, and 8 Groundwater Data (continued)

Location	Analyte	Sample Date	Value	Detection Limit	Laboratory Qualifiers	Validation Qualifiers	Units	Sample Type
0347	*trans*-1,2-Dichloroethene	1/31/2019	0.16	0.160	U		µg/L	F
		1/31/2019	0.16	0.160	U		µg/L	D
		4/29/2019	0.16	0.160	U		µg/L	F
		4/29/2019	0.16	0.160	U		µg/L	D
		7/22/2019	0.16	0.160	U		µg/L	F
		11/5/2019	0.16	0.160	U		µg/L	F
0347	Trichloroethene	1/31/2019	26.1	0.160			µg/L	F
		1/31/2019	25.8	0.160			µg/L	D
		4/29/2019	21.4	0.160			µg/L	D
		4/29/2019	21.3	0.160			µg/L	F
		7/22/2019	5.01	0.160			µg/L	F
		11/5/2019	23.8	0.160			µg/L	F
0347	Tritium	1/31/2019	1180				pCi/L	F
		1/31/2019	1290				pCi/L	D
		7/22/2019	1010			J	pCi/L	F
0347	Turbidity	1/31/2019	87.3				NTU	F
		4/29/2019	13.1				NTU	F
		7/22/2019	29.6				NTU	F
		11/5/2019	16.3				NTU	F
0347	Vinyl Chloride	1/31/2019	0.16	0.160	U		µg/L	D
		1/31/2019	0.16	0.160	U		µg/L	F
		4/29/2019	0.16	0.160	U		µg/L	D
		4/29/2019	0.16	0.160	U		µg/L	F
		7/22/2019	0.16	0.160	U		µg/L	F
		11/5/2019	0.16	0.160	U		µg/L	F

Table D-2. Parcels 6, 7, and 8 Groundwater Data (continued)

Location	Analyte	Sample Date	Value	Detection Limit	Laboratory Qualifiers	Validation Qualifiers	Units	Sample Type
0379	*cis*-1,2-Dichloroethene	1/29/2019	0.16	0.160	U		µg/L	F
		2/5/2019	0.333	0.333	U		µg/L	F
		4/30/2019	0.16	0.160	U		µg/L	F
		5/8/2019	0.333	0.333	U		µg/L	F
		7/24/2019	0.16	0.160	U		µg/L	F
		7/30/2019	0.333	0.333	U		µg/L	F
		10/29/2019	0.333	0.333	U		µg/L	F
		11/5/2019	0.16	0.160	U		µg/L	F
0379	Dissolved Oxygen	1/29/2019	1.61				mg/L	F
		2/5/2019	3.19				mg/L	F
		4/30/2019	1.61				mg/L	F
		5/8/2019	1.19				mg/L	F
		7/24/2019	1.15				mg/L	F
		7/30/2019	1.04				mg/L	F
		10/29/2019	0.67				mg/L	F
		11/5/2019	2.86				mg/L	F
0379	Oxidation Reduction Potential	1/29/2019	1887				mV	F
		2/5/2019	302.5				mV	F
		4/30/2019	6.4				mV	F
		5/8/2019	-13				mV	F
		7/24/2019	4.1				mV	F
		7/30/2019	-3.3				mV	F
		10/29/2019	-6.5				mV	F
		11/5/2019	22.5				mV	F

Table D-2. Parcels 6, 7, and 8 Groundwater Data (continued)

Location	Analyte	Sample Date	Value	Detection Limit	Laboratory Qualifiers	Validation Qualifiers	Units	Sample Type
0379	pH	1/29/2019	7.1				s.u.	F
		2/5/2019	7.12				s.u.	F
		4/30/2019	7.11				s.u.	F
		5/8/2019	7.15				s.u.	F
		7/24/2019	7.27				s.u.	F
		7/30/2019	7.28				s.u.	F
		10/29/2019	7.12				s.u.	F
		11/5/2019	7.09				s.u.	F
0379	Specific Conductance	1/29/2019	1750				µmhos/cm	F
		2/5/2019	1570				µmhos/cm	F
		4/30/2019	1620				µmhos/cm	F
		5/8/2019	1560				µmhos/cm	F
		7/24/2019	1500				µmhos/cm	F
		7/30/2019	1480				µmhos/cm	F
		10/29/2019	1510				µmhos/cm	F
		11/5/2019	1560				µmhos/cm	F
0379	Temperature	1/29/2019	11.9				C	F
		2/5/2019	12.3				C	F
		4/30/2019	14.6				C	F
		5/8/2019	15.1				C	F
		7/24/2019	14.9				C	F
		7/30/2019	15.6				C	F
		10/29/2019	14				C	F
		11/5/2019	13.2				C	F

Table D-2. Parcels 6, 7, and 8 Groundwater Data (continued)

Location	Analyte	Sample Date	Value	Detection Limit	Laboratory Qualifiers	Validation Qualifiers	Units	Sample Type
0379	Tetrachloroethene	1/29/2019	0.36	0.160	J		µg/L	F
		2/5/2019	0.36	0.333	J		µg/L	F
		4/30/2019	0.39	0.160	J		µg/L	F
		5/8/2019	0.42	0.333	J		µg/L	F
		7/24/2019	0.38	0.160	J		µg/L	F
		7/30/2019	0.38	0.333	J		µg/L	F
		10/29/2019	0.333	0.333	U		µg/L	F
		11/5/2019	0.42	0.160	J		µg/L	F
0379	*trans*-1,2-Dichloroethene	1/29/2019	0.16	0.160	U		µg/L	F
		2/5/2019	0.333	0.333	U		µg/L	F
		4/30/2019	0.16	0.160	U		µg/L	F
		5/8/2019	0.333	0.333	U		µg/L	F
		7/24/2019	0.16	0.160	U		µg/L	F
		7/30/2019	0.333	0.333	U		µg/L	F
		10/29/2019	0.333	0.333	U		µg/L	F
		11/5/2019	0.16	0.160	U		µg/L	F
0379	Trichloroethene	1/29/2019	1.56	0.160			µg/L	F
		2/5/2019	1.39	0.333			µg/L	F
		4/30/2019	1.04	0.160			µg/L	F
		5/8/2019	0.92	0.333	J		µg/L	F
		7/24/2019	0.32	0.160	J		µg/L	F
		7/30/2019	0.333	0.333	U		µg/L	F
		10/29/2019	0.333	0.333	U		µg/L	F
		11/5/2019	0.27	0.160	J		µg/L	F
0379	Tritium	1/29/2019	1060				pCi/L	F
		7/24/2019	576			J	pCi/L	F

Table D-2. Parcels 6, 7, and 8 Groundwater Data (continued)

Location	Analyte	Sample Date	Value	Detection Limit	Laboratory Qualifiers	Validation Qualifiers	Units	Sample Type
0379	Turbidity	1/29/2019	35.3				NTU	F
		2/5/2019	7.48				NTU	F
		4/30/2019	4.66				NTU	F
		5/8/2019	1.7				NTU	F
		7/24/2019	26.7				NTU	F
		7/30/2019	34.4				NTU	F
		10/29/2019	5.45				NTU	F
		11/5/2019	20.8				NTU	F
0379	Vinyl Chloride	1/29/2019	0.16	0.160	U		µg/L	F
		2/5/2019	0.333	0.333	U		µg/L	F
		4/30/2019	0.16	0.160	U		µg/L	F
		5/8/2019	0.333	0.333	U		µg/L	F
		7/24/2019	0.16	0.160	U		µg/L	F
		7/30/2019	0.333	0.333	U		µg/L	F
		10/29/2019	0.333	0.333	U		µg/L	F
		11/5/2019	0.16	0.160	U		µg/L	F
0386	*cis*-1,2-Dichloroethene	1/29/2019	0.16	0.160	U		µg/L	F
		4/30/2019	0.16	0.160	U		µg/L	F
		7/22/2019	0.16	0.160	U		µg/L	F
		11/5/2019	0.16	0.160	U	J	µg/L	D
		11/5/2019	0.16	0.160	U	J	µg/L	F
0386	Dissolved Oxygen	1/29/2019	1.38				mg/L	F
		4/30/2019	0.69				mg/L	F
		7/22/2019	0.73				mg/L	F
		11/5/2019	0.77				mg/L	F
0386	Oxidation Reduction Potential	1/29/2019	333.4				mV	F
		4/30/2019	90				mV	F
		7/22/2019	38.7				mV	F
		11/5/2019	21.1				mV	F

Table D-2. Parcels 6, 7, and 8 Groundwater Data (continued)

Location	Analyte	Sample Date	Value	Detection Limit	Laboratory Qualifiers	Validation Qualifiers	Units	Sample Type
0386	pH	1/29/2019	7.05				s.u.	F
		4/30/2019	6.83				s.u.	F
		7/22/2019	6.87				s.u.	F
		11/5/2019	6.89				s.u.	F
0386	Specific Conductance	1/29/2019	1390				µmhos/cm	F
		4/30/2019	1490				µmhos/cm	F
		7/22/2019	1390				µmhos/cm	F
		11/5/2019	1360				µmhos/cm	F
0386	Temperature	1/29/2019	11.5				C	F
		4/30/2019	12.9				C	F
		7/22/2019	14.2				C	F
		11/5/2019	13.3				C	F
0386	Tetrachloroethene	1/29/2019	0.16	0.160	U		µg/L	F
		4/30/2019	0.16	0.160	U		µg/L	F
		7/22/2019	0.2	0.160	J		µg/L	F
		11/5/2019	0.17	0.160	J	J	µg/L	D
		11/5/2019	0.16	0.160	U	J	µg/L	F
0386	*trans*-1,2-Dichloroethene	1/29/2019	0.16	0.160	U		µg/L	F
		4/30/2019	0.16	0.160	U		µg/L	F
		7/22/2019	0.16	0.160	U		µg/L	F
		11/5/2019	0.16	0.160	U	J	µg/L	F
		11/5/2019	0.16	0.160	U	J	µg/L	D
0386	Trichloroethene	1/29/2019	2.59	0.160			µg/L	F
		4/30/2019	2.88	0.160			µg/L	F
		7/22/2019	2.58	0.160			µg/L	F
		11/5/2019	2.42	0.160		J	µg/L	D
		11/5/2019	2.39	0.160		J	µg/L	F

Table D-2. Parcels 6, 7, and 8 Groundwater Data (continued)

Location	Analyte	Sample Date	Value	Detection Limit	Laboratory Qualifiers	Validation Qualifiers	Units	Sample Type
0386	Turbidity	1/29/2019	11.34				NTU	F
		4/30/2019	11.9				NTU	F
		7/22/2019	16.3				NTU	F
		11/5/2019	3.04				NTU	F
0386	Vinyl Chloride	1/29/2019	0.16	0.160	U		µg/L	F
		4/30/2019	0.16	0.160	U		µg/L	F
		7/22/2019	0.16	0.160	U		µg/L	F
		11/5/2019	0.16	0.160	U	J	µg/L	F
		11/5/2019	0.16	0.160	U	J	µg/L	D
0387	*cis*-1,2-Dichloroethene	1/29/2019	0.16	0.160	U		µg/L	F
		4/30/2019	0.16	0.160	U		µg/L	F
		7/22/2019	0.16	0.160	U		µg/L	F
		11/5/2019	0.16	0.160	U		µg/L	F
0387	Dissolved Oxygen	1/29/2019	2.17				mg/L	F
		4/30/2019	0.25				mg/L	F
		7/22/2019	0.33				mg/L	F
		11/5/2019	6.28				mg/L	F
0387	Oxidation Reduction Potential	1/29/2019	297.6				mV	F
		4/30/2019	60				mV	F
		7/22/2019	28.8				mV	F
		11/5/2019	45.5				mV	F
0387	pH	1/29/2019	7.01				s.u.	F
		4/30/2019	6.94				s.u.	F
		7/22/2019	7.05				s.u.	F
		11/5/2019	6.95				s.u.	F

Table D-2. Parcels 6, 7, and 8 Groundwater Data (continued)

Location	Analyte	Sample Date	Value	Detection Limit	Laboratory Qualifiers	Validation Qualifiers	Units	Sample Type
0387	Specific Conductance	1/29/2019	1370				µmhos/cm	F
		4/30/2019	1370				µmhos/cm	F
		7/22/2019	1340				µmhos/cm	F
		11/5/2019	1330				µmhos/cm	F
0387	Temperature	1/29/2019	11.7				C	F
		4/30/2019	13.3				C	F
		7/22/2019	14				C	F
		11/5/2019	13.6				C	F
0387	Tetrachloroethene	1/29/2019	0.16	0.160	U		µg/L	F
		4/30/2019	0.27	0.160	J		µg/L	F
		7/22/2019	0.35	0.160	J		µg/L	F
		11/5/2019	0.29	0.160	J		µg/L	F
0387	*trans*-1,2-Dichloroethene	1/29/2019	0.16	0.160	U		µg/L	F
		4/30/2019	0.16	0.160	U		µg/L	F
		7/22/2019	0.16	0.160	U		µg/L	F
		11/5/2019	0.16	0.160	U		µg/L	F
0387	Trichloroethene	1/29/2019	0.16	0.160	U		µg/L	F
		4/30/2019	0.16	0.160	U		µg/L	F
		7/22/2019	0.16	0.160	U		µg/L	F
		11/5/2019	0.16	0.160	U		µg/L	F
0387	Turbidity	1/29/2019	7.43				NTU	F
		4/30/2019	0.5				NTU	F
		7/22/2019	11.4				NTU	F
		11/5/2019	0.96				NTU	F
0387	Vinyl Chloride	1/29/2019	0.16	0.160	U		µg/L	F
		4/30/2019	0.16	0.160	U		µg/L	F
		7/22/2019	0.16	0.160	U		µg/L	F
		11/5/2019	0.16	0.160	U		µg/L	F

Table D-2. Parcels 6, 7, and 8 Groundwater Data (continued)

Location	Analyte	Sample Date	Value	Detection Limit	Laboratory Qualifiers	Validation Qualifiers	Units	Sample Type
0389	*cis*-1,2-Dichloroethene	1/29/2019	0.16	0.160	U		µg/L	F
		4/30/2019	0.16	0.160	U		µg/L	F
		7/22/2019	0.16	0.160	U		µg/L	F
		11/5/2019	0.16	0.160	U		µg/L	F
0389	Dissolved Oxygen	1/29/2019	2.11				mg/L	F
		4/30/2019	1.33				mg/L	F
		7/22/2019	0.49				mg/L	F
		11/5/2019	0.73				mg/L	F
0389	Oxidation Reduction Potential	1/29/2019	288.7				mV	F
		4/30/2019	100.2				mV	F
		7/22/2019	20.6				mV	F
		11/5/2019	12.6				mV	F
0389	pH	1/29/2019	6.9				s.u.	F
		4/30/2019	6.81				s.u.	F
		7/22/2019	7.02				s.u.	F
		11/5/2019	7.02				s.u.	F
0389	Specific Conductance	1/29/2019	1370				µmhos/cm	F
		4/30/2019	1370				µmhos/cm	F
		7/22/2019	1360				µmhos/cm	F
		11/5/2019	1510				µmhos/cm	F
0389	Temperature	1/29/2019	10.9				C	F
		4/30/2019	13.2				C	F
		7/22/2019	14.8				C	F
		11/5/2019	13.6				C	F
0389	Tetrachloroethene	1/29/2019	0.16	0.160	U		µg/L	F
		4/30/2019	0.16	0.160	U		µg/L	F
		7/22/2019	0.16	0.160	U		µg/L	F
		11/5/2019	0.16	0.160	U		µg/L	F

Table D-2. Parcels 6, 7, and 8 Groundwater Data (continued)

Location	Analyte	Sample Date	Value	Detection Limit	Laboratory Qualifiers	Validation Qualifiers	Units	Sample Type
0389	*trans*-1,2-Dichloroethene	1/29/2019	0.16	0.160	U		µg/L	F
		4/30/2019	0.16	0.160	U		µg/L	F
		7/22/2019	0.16	0.160	U		µg/L	F
		11/5/2019	0.16	0.160	U		µg/L	F
0389	Trichloroethene	1/29/2019	0.16	0.160	U		µg/L	F
		4/30/2019	0.16	0.160	U		µg/L	F
		7/22/2019	0.17	0.160	J		µg/L	F
		11/5/2019	0.53	0.160	J		µg/L	F
0389	Turbidity	1/29/2019	44.1				NTU	F
		4/30/2019	26.1				NTU	F
		7/22/2019	103				NTU	F
		11/5/2019	20				NTU	F
0389	Vinyl Chloride	1/29/2019	0.16	0.160	U		µg/L	F
		4/30/2019	0.16	0.160	U		µg/L	F
		7/22/2019	0.16	0.160	U		µg/L	F
		11/5/2019	0.16	0.160	U		µg/L	F
0392	*cis*-1,2-Dichloroethene	1/31/2019	0.16	0.160	U		µg/L	F
		4/30/2019	0.16	0.160	U		µg/L	F
		7/22/2019	0.16	0.160	U		µg/L	F
		11/5/2019	0.16	0.160	U		µg/L	F
0392	Dissolved Oxygen	1/31/2019	0.76				mg/L	F
		4/30/2019	3.95				mg/L	F
		7/22/2019	3.23				mg/L	F
		11/5/2019	1.17				mg/L	F
0392	Oxidation Reduction Potential	1/31/2019	235.2				mV	F
		4/30/2019	85.3				mV	F
		7/22/2019	38.1				mV	F
		11/5/2019	62.9				mV	F

Table D-2. Parcels 6, 7, and 8 Groundwater Data (continued)

Location	Analyte	Sample Date	Value	Detection Limit	Laboratory Qualifiers	Validation Qualifiers	Units	Sample Type
0392	pH	1/31/2019	6.81				s.u.	F
		4/30/2019	6.82				s.u.	F
		7/22/2019	7.01				s.u.	F
		11/5/2019	6.83				s.u.	F
0392	Specific Conductance	1/31/2019	1380				µmhos/cm	F
		4/30/2019	1390				µmhos/cm	F
		7/22/2019	1340				µmhos/cm	F
		11/5/2019	1300				µmhos/cm	F
0392	Temperature	1/31/2019	11				C	F
		4/30/2019	13.7				C	F
		7/22/2019	16.3				C	F
		11/5/2019	13.2				C	F
0392	Tetrachloroethene	1/31/2019	0.16	0.160	U		µg/L	F
		4/30/2019	0.19	0.160	J		µg/L	F
		7/22/2019	0.24	0.160	J		µg/L	F
		11/5/2019	0.23	0.160	J		µg/L	F
0392	*trans*-1,2-Dichloroethene	1/31/2019	0.16	0.160	U		µg/L	F
		4/30/2019	0.16	0.160	U		µg/L	F
		7/22/2019	0.16	0.160	U		µg/L	F
		11/5/2019	0.16	0.160	U		µg/L	F
0392	Trichloroethene	1/31/2019	0.16	0.160	U		µg/L	F
		4/30/2019	0.16	0.160	U		µg/L	F
		7/22/2019	0.16	0.160	U		µg/L	F
		11/5/2019	0.16	0.160	U		µg/L	F
0392	Turbidity	1/31/2019	19.6				NTU	F
		4/30/2019	2.13				NTU	F
		7/22/2019	15				NTU	F
		11/5/2019	5.79				NTU	F

Table D-2. Parcels 6, 7, and 8 Groundwater Data (continued)

Location	Analyte	Sample Date	Value	Detection Limit	Laboratory Qualifiers	Validation Qualifiers	Units	Sample Type
0392	Vinyl Chloride	1/31/2019	0.16	0.160	U		µg/L	F
		4/30/2019	0.16	0.160	U		µg/L	F
		7/22/2019	0.16	0.160	U		µg/L	F
		11/5/2019	0.16	0.160	U		µg/L	F

Abbreviations:
D = analyte determined in diluted sample
F = low flow sampling method used
J = estimated value
mg/L = milligrams per liter
µg/L = micrograms per liter
µmhos/cm = micromhos per centimeter
mV = millivolts
NTU = nephelometric turbidity unit
pCi/L = picocuries per liter
Q = quantitative result due to sampling technique
s.u. = standard unit
U = analytical result below detection limit

Table D-3. Seep Data

Location	Analyte	Sample Date	Value	Detection Limit	Laboratory Qualifiers	Validation Qualifiers	Units	Sample Type
0601	*cis*-1,2-Dichloroethene	1/28/2019	0.63	0.160	J		µg/L	F
		4/29/2019	0.51	0.160	J		µg/L	F
		7/23/2019	0.47	0.160	J		µg/L	F
		11/6/2019	0.46	0.160	J		µg/L	F
0601	Dissolved Oxygen	1/28/2019	6.73				mg/L	F
		4/29/2019	5.38				mg/L	F
		7/23/2019	3.05				mg/L	F
		11/6/2019	9.06				mg/L	F
0601	Oxidation Reduction Potential	1/28/2019	256.9				mV	F
		4/29/2019	82				mV	F
		7/23/2019	-16.5				mV	F
		11/6/2019	125.1				mV	F
0601	pH	1/28/2019	7.19				s.u.	F
		4/29/2019	7.44				s.u.	F
		7/23/2019	7.45				s.u.	F
		11/6/2019	7.36				s.u.	F
0601	Specific Conductance	1/28/2019	1180				µmhos/cm	F
		4/29/2019	1080				µmhos/cm	F
		7/23/2019	1130				µmhos/cm	F
		11/6/2019	1160				µmhos/cm	F
0601	Temperature	1/28/2019	13.6				C	F
		4/29/2019	13.2				C	F
		7/23/2019	13				C	F
		11/6/2019	14.2				C	F
0601	Tetrachloroethene	1/28/2019	11	0.160			µg/L	F
		4/29/2019	11.3	0.160			µg/L	F
		7/23/2019	8.52	0.160			µg/L	F
		11/6/2019	3.79	0.160			µg/L	F

Table D-3. Seep Data (continued)

Location	Analyte	Sample Date	Value	Detection Limit	Laboratory Qualifiers	Validation Qualifiers	Units	Sample Type
0601	*trans*-1,2-Dichloroethene	1/28/2019	0.16	0.160	U		µg/L	F
		4/29/2019	0.16	0.160	U		µg/L	F
		7/23/2019	0.16	0.160	U		µg/L	F
		11/6/2019	0.16	0.160	U		µg/L	F
0601	Trichloroethene	1/28/2019	1.08	0.160			µg/L	F
		4/29/2019	0.85	0.160	J		µg/L	F
		7/23/2019	1.02	0.160			µg/L	F
		11/6/2019	0.88	0.160	J		µg/L	F
0601	Tritium	1/28/2019	8020				pCi/L	F
		7/23/2019	10900				pCi/L	F
0601	Turbidity	1/28/2019	16.2				NTU	F
		4/29/2019	8.04				NTU	F
		7/23/2019	391				mV	F
		11/6/2019	20.4				NTU	F
0601	Vinyl Chloride	1/28/2019	0.16	0.160	U		µg/L	F
		4/29/2019	0.16	0.160	U		µg/L	F
		7/23/2019	0.16	0.160	U		µg/L	F
		11/6/2019	0.16	0.160	U		µg/L	F
0602	*cis*-1,2-Dichloroethene	1/28/2019	3.64	0.160			µg/L	F
		4/29/2019	5.09	0.160			µg/L	F
		7/23/2019	3.23	0.160			µg/L	F
0602	Dissolved Oxygen	1/28/2019	7.42				mg/L	F
		4/29/2019	10.65				mg/L	F
		7/23/2019	2.81				mg/L	F
0602	Oxidation Reduction Potential	1/28/2019	43.2				mV	F
		4/29/2019	92.4				mV	F
		7/23/2019	-23.2				mV	F

Table D-3. Seep Data (continued)

Location	Analyte	Sample Date	Value	Detection Limit	Laboratory Qualifiers	Validation Qualifiers	Units	Sample Type
0602	pH	1/28/2019	7.12				s.u.	F
		4/29/2019	7.51				s.u.	F
		7/23/2019	7.42				s.u.	F
0602	Specific Conductance	1/28/2019	1030				µmhos/cm	F
		4/29/2019	1000				µmhos/cm	F
		7/23/2019	1160				µmhos/cm	F
0602	Temperature	1/28/2019	3.3				C	F
		4/29/2019	13.3				C	F
		7/23/2019	27.3				C	F
0602	Tetrachloroethene	1/28/2019	0.16	0.160	U		µg/L	F
		4/29/2019	0.16	0.160	U		µg/L	F
		7/23/2019	0.16	0.160	U		µg/L	F
0602	*trans*-1,2-Dichloroethene	1/28/2019	0.16	0.160	U		µg/L	F
		4/29/2019	0.24	0.160	J		µg/L	F
		7/23/2019	0.16	0.160	U		µg/L	F
0602	Trichloroethene	1/28/2019	2.68	0.160			µg/L	F
		4/29/2019	4.67	0.160			µg/L	F
		7/23/2019	2.65	0.160			µg/L	F
0602	Tritium	1/28/2019	1020				pCi/L	F
		7/23/2019	850			J	pCi/L	F
0602	Turbidity	1/28/2019	1000			>	NTU	F
		4/29/2019	23.1				NTU	F
		7/23/2019	146				mV	F
0602	Vinyl Chloride	1/28/2019	0.16	0.160	U		µg/L	F
		4/29/2019	0.16	0.160	U		µg/L	F
		7/23/2019	0.16	0.160	U		µg/L	F

Table D-3. Seep Data (continued)

Location	Analyte	Sample Date	Value	Detection Limit	Laboratory Qualifiers	Validation Qualifiers	Units	Sample Type
0605	*cis*-1,2-Dichloroethene	1/28/2019	1.45	0.160			µg/L	F
		4/29/2019	0.97	0.160	J		µg/L	F
		7/23/2019	0.23	0.160	J		µg/L	F
		11/6/2019	2.34	0.160			µg/L	F
0605	Dissolved Oxygen	1/28/2019	4.05				mg/L	F
		4/29/2019	12.52				mg/L	F
		7/23/2019	6.62				mg/L	F
		11/6/2019	0.36				mg/L	F
0605	Oxidation Reduction Potential	1/28/2019	96.1				mV	F
		4/29/2019	108.1				mV	F
		7/23/2019	-14.7				mV	F
		11/6/2019	-91.5				mV	F
0605	pH	1/28/2019	7.52				s.u.	F
		4/29/2019	6.96				s.u.	F
		7/23/2019	7.76				s.u.	F
		11/6/2019	7.4				s.u.	F
0605	Specific Conductance	1/28/2019	1720				µmhos/cm	F
		4/29/2019	1490				µmhos/cm	F
		7/23/2019	1420				µmhos/cm	F
		11/6/2019	1230				mS/cm	F
0605	Temperature	1/28/2019	8.1				C	F
		4/29/2019	10.5				C	F
		7/23/2019	15.7				C	F
		11/6/2019	11.7				C	F
0605	Tetrachloroethene	1/28/2019	0.16	0.160	U		µg/L	F
		4/29/2019	0.38	0.160	J		µg/L	F
		7/23/2019	0.16	0.160	U		µg/L	F
		11/6/2019	0.16	0.160	U		µg/L	F

Table D-3. Seep Data (continued)

Location	Analyte	Sample Date	Value	Detection Limit	Laboratory Qualifiers	Validation Qualifiers	Units	Sample Type
0605	*trans*-1,2-Dichloroethene	1/28/2019	0.16	0.160	U		µg/L	F
		4/29/2019	0.16	0.160	U		µg/L	F
		7/23/2019	0.16	0.160	U		µg/L	F
		11/6/2019	0.16	0.160	U		µg/L	F
0605	Trichloroethene	1/28/2019	1.66	0.160			µg/L	F
		4/29/2019	1.45	0.160			µg/L	F
		7/23/2019	0.27	0.160	J		µg/L	F
		11/6/2019	1.33	0.160			µg/L	F
0605	Tritium	1/28/2019	2610				pCi/L	F
		7/23/2019	2550				pCi/L	F
0605	Turbidity	1/28/2019	1000			>	NTU	F
		4/29/2019	59.6				NTU	F
		7/23/2019	1000			>	mV	F
		11/6/2019	535				NTU	F
0605	Vinyl Chloride	1/28/2019	0.16	0.160	U		µg/L	F
		4/29/2019	0.16	0.160	U		µg/L	F
		7/23/2019	0.16	0.160	U		µg/L	F
		11/6/2019	0.16	0.160	U		µg/L	F
0606	*cis*-1,2-Dichloroethene	1/28/2019	0.16	0.160	U		µg/L	F
		4/29/2019	0.16	0.160	U		µg/L	F
		7/23/2019	2.46	0.160			µg/L	F
0606	Dissolved Oxygen	1/28/2019	12.83				mg/L	F
		4/29/2019	12.51				mg/L	F
		7/23/2019	5.48				mg/L	F
0606	Oxidation Reduction Potential	1/28/2019	244.4				mV	F
		4/29/2019	89.2				mV	F
		7/23/2019	39.1				mV	F

Table D-3. Seep Data (continued)

Location	Analyte	Sample Date	Value	Detection Limit	Laboratory Qualifiers	Validation Qualifiers	Units	Sample Type
0606	pH	1/28/2019	7.63				s.u.	F
		4/29/2019	7.36				s.u.	F
		7/23/2019	7.6				s.u.	F
0606	Specific Conductance	1/28/2019	1070				µmhos/cm	F
		4/29/2019	1210				µmhos/cm	F
		7/23/2019	1670				µmhos/cm	F
0606	Temperature	1/28/2019	4				C	F
		4/29/2019	9.9				C	F
		7/23/2019	18.9				C	F
0606	Tetrachloroethene	1/28/2019	0.16	0.160	U		µg/L	F
		4/29/2019	0.16	0.160	U		µg/L	F
		7/23/2019	0.31	0.160	J		µg/L	F
0606	*trans*-1,2-Dichloroethene	1/28/2019	0.16	0.160	U		µg/L	F
		4/29/2019	0.16	0.160	U		µg/L	F
		7/23/2019	0.16	0.160	U		µg/L	F
0606	Trichloroethene	1/28/2019	0.16	0.160	U		µg/L	F
		4/29/2019	0.16	0.160	U		µg/L	F
		7/23/2019	1.64	0.160			µg/L	F
0606	Tritium	1/28/2019	1960				pCi/L	F
		7/23/2019	2310				pCi/L	F
0606	Turbidity	1/28/2019	639				NTU	F
		4/29/2019	116				NTU	F
		7/23/2019	656				mV	F
0606	Vinyl Chloride	1/28/2019	0.16	0.160	U		µg/L	F
		4/29/2019	0.16	0.160	U		µg/L	F
		7/23/2019	0.16	0.160	U		µg/L	F

Table D-3. Seep Data (continued)

Location	Analyte	Sample Date	Value	Detection Limit	Laboratory Qualifiers	Validation Qualifiers	Units	Sample Type
0607	*cis*-1,2-Dichloroethene	1/28/2019	0.16	0.160	U		µg/L	F
		4/29/2019	0.18	0.160	J		µg/L	F
		7/23/2019	0.42	0.160	J		µg/L	D
		7/23/2019	0.43	0.160	J		µg/L	F
		11/6/2019	0.47	0.160	J		µg/L	F
0607	Dissolved Oxygen	1/28/2019	10.78				mg/L	F
		4/29/2019	13.21				mg/L	F
		7/23/2019	6.68				mg/L	F
		11/6/2019	9.1				mg/L	F
0607	Oxidation Reduction Potential	1/28/2019	270.6				mV	F
		4/29/2019	98.7				mV	F
		7/23/2019	34.7				mV	F
		11/6/2019	136				mV	F
0607	pH	1/28/2019	7.29				s.u.	F
		4/29/2019	7.2				s.u.	F
		7/23/2019	7.55				s.u.	F
		11/6/2019	7.41				s.u.	F
0607	Specific Conductance	1/28/2019	1810				µmhos/cm	F
		4/29/2019	1270				µmhos/cm	F
		7/23/2019	1180				µmhos/cm	F
		11/6/2019	1170				µmhos/cm	F
0607	Temperature	1/28/2019	12.8				C	F
		4/29/2019	11.8				C	F
		7/23/2019	14.5				C	F
		11/6/2019	15.3				C	F

Table D-3. Seep Data (continued)

Location	Analyte	Sample Date	Value	Detection Limit	Laboratory Qualifiers	Validation Qualifiers	Units	Sample Type
0607	Tetrachloroethene	1/28/2019	0.16	0.160	U		µg/L	F
		4/29/2019	0.16	0.160	U		µg/L	F
		7/23/2019	0.17	0.160	J		µg/L	D
		7/23/2019	0.16	0.160	U		µg/L	F
		11/6/2019	0.16	0.160	U		µg/L	F
0607	*trans*-1,2-Dichloroethene	1/28/2019	0.16	0.160	U		µg/L	F
		4/29/2019	0.16	0.160	U		µg/L	F
		7/23/2019	0.16	0.160	U		µg/L	F
		7/23/2019	0.16	0.160	U		µg/L	D
		11/6/2019	0.16	0.160	U		µg/L	F
0607	Trichloroethene	1/28/2019	0.44	0.160	J		µg/L	F
		4/29/2019	0.44	0.160	J		µg/L	F
		7/23/2019	0.74	0.160	J		µg/L	D
		7/23/2019	0.73	0.160	J		µg/L	F
		11/6/2019	0.69	0.160	J		µg/L	F
0607	Tritium	1/28/2019	1030				pCi/L	F
		7/23/2019	1100				pCi/L	F
		7/23/2019	1060			J	pCi/L	D
0607	Turbidity	1/28/2019	18.6				NTU	F
		4/29/2019	17.5				NTU	F
		7/23/2019	184				mV	F
		11/6/2019	99.2				NTU	F
0607	Vinyl Chloride	1/28/2019	0.16	0.160	U		µg/L	F
		4/29/2019	0.16	0.160	U		µg/L	F
		7/23/2019	0.16	0.160	U		µg/L	F
		7/23/2019	0.16	0.160	U		µg/L	D
		11/6/2019	0.16	0.160	U		µg/L	F
0617	*cis*-1,2-Dichloroethene	1/28/2019	2.05	0.160		J	µg/L	F
		7/23/2019	1.84	0.160			µg/L	F

Table D-3. Seep Data (continued)

Location	Analyte	Sample Date	Value	Detection Limit	Laboratory Qualifiers	Validation Qualifiers	Units	Sample Type
0617	Dissolved Oxygen	1/28/2019	2.42				mg/L	F
		7/23/2019	4.21				mg/L	F
0617	Oxidation Reduction Potential	1/28/2019	27.1				mV	F
		7/23/2019	-21.7				mV	F
0617	pH	1/28/2019	7.19				s.u.	F
		7/23/2019	6.88				s.u.	F
0617	Specific Conductance	1/28/2019	1320000				µmhos/cm	F
		7/23/2019	1560				µmhos/cm	F
0617	Temperature	1/28/2019	8.4				C	F
		7/23/2019	17.2				C	F
0617	Tetrachloroethene	1/28/2019	0.16	0.160	U		µg/L	F
		7/23/2019	0.16	0.160	U		µg/L	F
0617	*trans*-1,2-Dichloroethene	1/28/2019	0.16	0.160	U		µg/L	F
		7/23/2019	0.16	0.160	U		µg/L	F
0617	Trichloroethene	1/28/2019	6.93	0.160		J	µg/L	F
		7/23/2019	7.27	0.160			µg/L	F
0617	Turbidity	1/28/2019	355				NTU	F
		7/23/2019	633				NTU	F
0617	Vinyl Chloride	1/28/2019	0.16	0.160	U		µg/L	F
		7/23/2019	0.16	0.160	U		µg/L	F

Abbreviations:
J = estimated value
mg/L = milligrams per liter
µg/L = micrograms per liter
µmhos/cm = micromhos per centimeter
mV = millivolts
NTU = nephelometric turbidity unit
pCi/L = picocuries per liter
Q = quantitative result due to sampling technique
s.u. = standard unit
U = analytical result below detection limit

Appendix E

Data Assessment Reports

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Contractor to the U.S. Department of Energy Office of Legacy Management

Data Review and Validation Report

General Information

Task ID:	MND01-01.1901006
Sample Event:	January 28-February 4, 2019
Site(s):	Mound LTS&M (Parcel 6-7-8)
Laboratory:	GEL Laboratories, Charleston, South Carolina
Work Order No.:	470013
Analysis:	Organics and Radiochemistry
Validator:	Samantha Tigar
Review Date:	April 4, 2019

This validation was performed according to *Environmental Data Validation Procedure* (LMS/PRO/S15870). The procedure was applied at Level 3, Data Validation.

All analyses were successfully completed. The samples were prepared and analyzed using accepted procedures based on methods specified by line item code, which are listed in Table 1.

Table 1. Analytes and Methods

Analyte	Line Item Code	Prep Method	Analytical Method
Tritium	LSC-A-001	EPA 906.0 Modified	EPA 906.0 Modified
Volatile Organics, VOA	VOA-A-007	SW-846 5030B	SW-846 8260 LL

Data Qualifier Summary

Analytical results were qualified as listed in Table 2. Refer to the attached validation worksheets and the sections below for an explanation of the data qualifiers applied.

Table 2. Data Qualifiers

Sample Number	Location	Analyte	Flag	Reason
MND01-01.1901006-007	0347	1,3,5-Trimethylbenzene	J	Matrix spike result
MND01-01.1901006-018	0347 dup	1,3,5-Trimethylbenzene	J	Matrix spike result
MND01-01.1901006-014	0602	Acetone	U	Less than 10 times the trip blank
MND01-01.1901006-015	0605	Acetone	U	Less than 10 times the trip blank
MND01-01.1901006-007	0347	All organics from 2/8/19	R	Duplicate results
MND01-01.1901006-007	0347	Carbon tetrachloride	J	Drift value greater than 20%

Sample Number	Location	Analyte	Flag	Reason
MND01-01.1901006-008	0379	Carbon tetrachloride	J	Drift value greater than 20%
MND01-01.1901006-018	0347 dup	Carbon tetrachloride	J	Drift value greater than 20%
MND01-01.1901006-007	0347	Hexachlorobutadiene	J	Matrix spike result
MND01-01.1901006-018	0347 dup	Hexachlorobutadiene	J	Matrix spike result
MND01-01.1901006-007	0347	n-Butylbenzene	J	Matrix spike result
MND01-01.1901006-018	0347 dup	n-Butylbenzene	J	Matrix spike result
MND01-01.1901006-007	0347	p-Isopropyltoluene	J	Matrix spike result
MND01-01.1901006-018	0347 dup	p-Isopropyltoluene	J	Matrix spike result
MND01-01.1901006-007	0347	sec-Butylbenzene	J	Matrix spike result
MND01-01.1901006-018	0347 dup	sec-Butylbenzene	J	Matrix spike result
MND01-01.1901006-004	0138	Tritium	J	Less than the determination limit
MND01-01.1901006-006	0346	Tritium	J	Less than the determination limit

Sample Shipping/Receiving

GEL Laboratories in Charleston, South Carolina, received 22 water samples between January 29 and February 5, 2019, accompanied by a Chain of Custody (COC) form. The air waybill number was listed on the Sample Receipt and Review Form. The COC form was checked to confirm that all of the samples were listed with sample collection dates and times, and that signatures and dates were present indicating sample relinquishment and receipt. The COC forms were complete with no errors or omissions.

Preservation and Holding Times

The sample shipments were received intact with the temperatures inside the iced cooler between 3 and 4 °C, which complies with requirements. All samples were received in the correct container types and had been preserved correctly for the requested analyses. All samples were analyzed within the applicable holding times.

Detection and Quantitation Limits

The method detection limit (MDL) was reported for all organic analytes as required. The MDL, as defined in 40 CFR 136, is the minimum concentration of an analyte that can be measured and reported with 99 percent confidence that the analyte concentration is greater than zero. The practical quantitation limit (PQL) for these analytes is the lowest concentration that can be reliably measured, and is defined as 5 times the MDL.

For radiochemical analytes (those measured by radiometric counting) the MDL and PQL are not applicable, and these results are evaluated using the minimum detectable concentration (MDC), the decision level concentration (DLC), and the determination limit (DL). The DLC is the minimum concentration of an analyte that can be measured and reported with 99% confidence that the analyte concentration is greater than zero and is estimated as 3 times the 1-sigma total propagated uncertainty. Results that are greater than the MDC but less than the DLC are qualified with a U flag as not detected. The DL for radiochemical results is the lowest concentration that can be reliably measured and is defined as 3 times the MDC. Results that were

not previously U qualified and are less than the DL are qualified with a J flag as estimated values. The reported MDLs and MDCs demonstrate compliance with contractual requirements.

Laboratory Instrument Calibration

Method requirements for satisfactory instrument calibration are established to ensure that the instrument is capable of producing acceptable qualitative and quantitative data for the analytes of interest. Initial calibration verification demonstrates that the instrument is capable of acceptable performance at the beginning of the analytical run. Continuing calibration verification demonstrates that the initial calibration is still valid by checking the performance of the instrument on a continuing basis. Initial and continuing calibration standards must be prepared from independent sources to ensure the validity of the calibration. All laboratory instrument calibrations and calibration verifications were performed correctly in accordance with the cited methods.

Method SW-846 8260 LL Volatile Organics, VOA
Initial calibration of instrument VOA2 was performed on December 11, 2018 and February 7, 2019 using nine calibration standards. Calibration curves are established using linear regression, quadratic regression, or the average response factor approach. Calibrations using average response factors had relative standard deviations of less than 15 percent. Linear or higher order regression calibrations had correlation coefficient values greater than 0.99 and intercepts less than 3 times the MDL. Initial and continuing calibration verification checks were made at the required frequency. Some target compounds had percent drift values greater than 20% and were detected at concentrations greater than the MDL in the associated samples. Associated results were qualified with a J flag as estimated values. The mass spectrometer calibration and resolution was checked at the beginning of each analytical run in accordance with the procedure.

Method EPA 906.0 Modified Tritium

Liquid scintillation calibrations for instruments GREEN and MOCHA were performed on July 1, 2018. Calibrations resulted in quench curves covering a quench number range of 125 – 322. The sample quench values were all within the calibration range. Daily calibration checks were performed with acceptable results.

Volatiles Internal Standards and Surrogates

The volatile internal standard recoveries and surrogate recoveries were within the acceptance ranges for all samples.

Method Blanks

Method blanks are analyzed to assess any contamination that may have occurred during sample preparation. All method blank results associated with the samples were below the PQL for all analytes. In cases where a blank concentration exceeds or equals the MDL, the associated sample results are qualified with a U flag (not detected) when the sample result is greater than the MDL but less than 5 times the blank concentration.

Matrix Spike Analysis

Matrix spikes are aliquots of environmental samples to which a known concentration of analyte has been added before analysis. Matrix spike and matrix-spike duplicate (MS/MSD) analysis is used to assess the performance of the method by measuring the effects of interferences caused by the sample matrix and reflects the bias of the method for the particular matrix in question. The MS/MSD data are not evaluated when the concentration of the unspiked sample is greater than 4 times the spike. The spikes met the recovery and precision criteria for all analytes evaluated except 1,3,5-trimethylbenzene, hexachlorobutadiene, p-isopropyltoluene, sec-butylbenzene, and n-butylbenzene. All associated results were qualified with a J flag as estimated values.

Laboratory Replicate Analysis

Laboratory replicate analyses are used to determine laboratory precision for each sample matrix. The relative percent difference for non-radiochemical replicate results that are greater than 5 times the PQL should be less than 20 percent. For results that are less than 5 times the PQL, the range should be no greater than the PQL. For the radiochemistry analyses, a laboratory control sample duplicate was analyzed in lieu of a sample duplicate, which is acceptable. The relative error ratio for radiochemical replicate results (calculated using the one-sigma total propagated uncertainty) should be less than 3, indicating acceptable precision. The replicate results met these criteria.

Laboratory Control Sample

Laboratory control samples were analyzed at the correct frequency to provide information on the accuracy of the analytical method and the overall laboratory performance, including sample preparation. Two compounds were below acceptance criteria but were not detected in any of the samples, no qualification needed.

Completeness

Results were reported in the correct units for all analytes requested using contract-required laboratory qualifiers. The analytical report included the MDL (MDC for radiochemistry) and PQL for all analytes and all required supporting documentation.

Sample 0347 was reanalyzed to correspond with analysis of its matrix spike. The reanalysis results correlated to the original results, and were qualified with an R flag in the database to remove duplication of results.

Electronic Data Deliverable (EDD) File

The EDD file arrived on February 26, 2019. The EDD was examined to verify that the file was complete and in compliance with requirements. The contents of the file were compared to the requested analyses to ensure all and only the requested data are delivered. The contents of the EDD were manually examined to verify that the sample results accurately reflect the data contained in the sample data package.

Trip Blank

Trip blanks were prepared and analyzed to document contamination attributable to shipping and field handling procedures. This type of blank is useful in documenting contamination of volatile organic samples. Four trip blanks were submitted with these samples. Acetone, 2-butanone, and methylene chloride were detected in the trip blanks. Associated results greater than the MDL and less than 5 times the trip blank concentration (10 times for common laboratory contaminants) were qualified with a U flag as not detected.

Field Duplicate

Field duplicate samples are collected and analyzed as an indication of overall precision of the measurement process. The precision observed includes both field and laboratory precision and has more variability than laboratory duplicates, which measure only laboratory performance. The relative percent difference for duplicate results that are greater than 5 times the PQL should be less than 20 percent. For results that are less than 5 times the PQL, the range should be no greater than the PQL. For radiochemical measurements, the relative error ratio (the ratio of the absolute difference between the sample and duplicate results and the sum of the 1-sigma uncertainties) is used to evaluate duplicate results and should be less than 3. A duplicate sample was collected from location 0347. The duplicate results met the criteria.

Field Measurements

The pre-sampling purge criteria were met for all wells. A turbidity less than 50NTU could not be achieved at monitoring wells 0315 and 0347.

Potential Outliers

Potential outliers are results that lie outside the historical range, possibly due to transcription errors, data calculation errors, or measurement system problems. However, outliers can also represent true values outside the historical range. Potential outliers are identified by generating the Data Validation Outliers Report from data in the environmental database. The new data are compared to historical values and data that fall outside the historical data range are listed on the report along with the historical minimum and maximum values. The potential outliers are further reviewed and may be subject to statistical evaluation using the ProUCL application developed by the EPA (https://www.epa.gov/land-research/proucl-software). The review also includes an evaluation of any notable trends in the data that may indicate the outliers represent true extreme values. There were no outliers identified and the data for this task are acceptable as qualified.

Report Prepared By: Samantha Tigar Digitally signed by Samantha M. Tigar Date: 2019.04.04 14:19:49 -06'00'

Samantha Tigar
Data Validator

Data Validation Outliers Report - No Field Parameters **Report Date: 04/04/2019**

Comparison to Historical Data Since: 1/1/2008 12:00:00 AM Fraction: Any

Task: MND01-01.1901006

Analyte	Location	Analysis Location	Units	Fraction	Result	Lab Qualifier(s)	Type	HistMIN	HistMAX	HistSetSize	Potential Outlier?
Carbon tetrachloride	0315	LB	ug/L	N	0.310	J	< HistMIN	0.39	2.82	47	No
Trichloroethene	0315	LB	ug/L	N	2.59		< HistMIN	3.5	17.2	47	No
Tritium	0602	LB	pCi/L	T	1020		< HistMIN	1490	27200	19	No
Tritium	0605	LB	pCi/L	T	2610		< HistMIN	2690	27100	30	No
Tritium	0607	LB	pCi/L	T	1030		< HistMIN	2080	14700	33	No
Trichloroethene	0607	LB	ug/L	N	0.440	J	< HistMIN	0.51	11.5	46	No

FRACTION: D = Dissolved N = NA T = Total

General Data Validation Report

Task Code: MND01-01.1901006 **Lab Code:** GEN **Validator:** Samantha Tigar **Validation Date:** 04-04-2019

Project: LTS&M (Parcel 6-7-8) **# Samples:** 22

Analysis Type: [ ] General Chemistry [ ] Metals [X] Organics [X] Radiochemistry

Chain of Custody	*Sample*
Present: OK Signed: OK Dated: OK	Integrity: OK Preservation OK Temperature: OK

Check	Summary
Holding Times:	All analyses were completed within the applicable holding times.
Detection Limits:	The reported detection limits are equal to or below the contract required limits.
Field Blanks:	There were 4 field blanks associated with this task.
Field Duplicates:	There was 1 duplicate evaluated.

Validation Report: Field Duplicates

04-Apr-2019

Project: LTS&M (Parcel 6-7-8) **Task Code:** MND01-01.1901006 Lab Code: GEN

	Duplicate: MND01-01.1901006-018				Sample: MND01-01.1901006-007 0347						
Analyte	**Result**	**Qualifiers**	**Uncert.**	**Dilution**	**Result**	**Qualifiers**	**Uncert.**	**Dilution**	**RPD**	**RER**	**Units**
1,1,1,2-Tetrachloroethane	0.160	U		1	0.160	U		1			ug/L
1,1,1-Trichloroethane	0.160	U		1	0.160	U		1			ug/L
1,1,2,2-Tetrachloroethane	0.160	U		1	0.160	U		1			ug/L
1,1,2-Trichloro-1,2,2-trifluoroethane	1.50	U		1	1.50	U		1			ug/L
1,1,2-Trichloroethane	0.160	U		1	0.160	U		1			ug/L
1,1-Dichloroethane	0.160	U		1	0.160	U		1			ug/L
1,1-Dichloroethene	0.160	U		1	0.160	U		1			ug/L
1,1-Dichloropropene	0.160	U		1	0.160	U		1			ug/L
1,2,3-Trichlorobenzene	0.200	U		1	0.200	U		1			ug/L
1,2,3-Trichloropropane	0.160	U		1	0.160	U		1			ug/L
1,2,4-Trichlorobenzene	0.160	U		1	0.160	U		1			ug/L
1,2,4-Trimethylbenzene	0.160	U		1	0.160	U		1			ug/L
1,2-Dibromo-3-chloropropane	0.160	U		1	0.160	U		1			ug/L
1,2-Dibromoethane	0.160	U		1	0.160	U		1			ug/L
1,2-Dichlorobenzene	0.160	U		1	0.160	U		1			ug/L
1,2-Dichloroethane	0.160	U		1	0.160	U		1			ug/L
1,2-Dichloropropane	0.160	U		1	0.160	U		1			ug/L
1,3,5-Trimethylbenzene	0.160	U		1	0.160	U		1			ug/L

QC Checks: RPD: Relative Percent Difference RER: Relative Error Ratio

Validation Report: Field Duplicates

04-Apr-2019

Project: LTS&M (Parcel 6-7-8) **Task Code:** MND01-01.1901006 Lab Code: GEN

	Duplicate: MND01-01.1901006-018				Sample: MND01-01.1901006-007 0347						
Analyte	**Result**	**Qualifiers**	**Uncert.**	**Dilution**	**Result**	**Qualifiers**	**Uncert.**	**Dilution**	**RPD**	**RER**	**Units**
1,3-Dichlorobenzene	0.160	U		1	0.160	U		1			ug/L
1,3-Dichloropropane	0.160	U		1	0.160	U		1			ug/L
1,4-Dichlorobenzene	0.160	U		1	0.160	U		1			ug/L
2,2-Dichloropropane	0.160	U		1	0.160	U		1			ug/L
2-Butanone	0.500	U		1	0.500	U		1			ug/L
2-Chlorotoluene	0.160	U		1	0.160	U		1			ug/L
2-Hexanone	0.500	U		1	0.500	U		1			ug/L
4-Chlorotoluene	0.160	U		1	0.160	U		1			ug/L
4-Methyl-2-Pentanone	0.500	U		1	0.500	U		1			ug/L
Acetone	0.500	U		1	0.500	U		1			ug/L
Benzene	0.160	U		1	0.160	U		1			ug/L
Bromobenzene	0.160	U		1	0.160	U		1			ug/L
Bromochloromethane	0.160	U		1	0.160	U		1			ug/L
Bromodichloromethane	0.160	U		1	0.160	U		1			ug/L
Bromoform	0.160	U		1	0.160	U		1			ug/L
Bromomethane	0.160	U		1	0.160	U		1			ug/L
Carbon Disulfide	0.500	U		1	0.500	U		1			ug/L
Carbon tetrachloride	1.30			1	1.38			1	6.0		ug/L
Chlorobenzene	0.160	U		1	0.160	U		1			ug/L
Chlorodibromomethane	0.160	U		1	0.160	U		1			ug/L

QC Checks: RPD: Relative Percent Difference RER: Relative Error Ratio

Validation Report: Field Duplicates

04-Apr-2019

Project: LTS&M (Parcel 6-7-8) **Task Code:** MND01-01.1901006 Lab Code: GEN

	Duplicate: MND01-01.1901006-018				Sample: MND01-01.1901006-007 0347						
Analyte	**Result**	**Qualifiers**	**Uncert.**	**Dilution**	**Result**	**Qualifiers**	**Uncert.**	**Dilution**	**RPD**	**RER**	**Units**
Chloroethane	0.160	U		1	0.160	U		1			ug/L
Chloroform	0.430	J		1	0.410	U		1			ug/L
Chloromethane	0.160	U		1	0.160	U		1			ug/L
cis-1,2-Dichloroethene	0.160	U		1	0.160	U		1			ug/L
cis-1,3-Dichloropropene	0.160	U		1	0.160	U		1			ug/L
Dibromomethane	0.160	U		1	0.160	U		1			ug/L
Dichlorodifluoromethane	0.160	U		1	0.160	U		1			ug/L
Ethylbenzene	0.160	U		1	0.160	U		1			ug/L
Hexachlorobutadiene	0.160	U		1	0.160	U		1			ug/L
Isopropylbenzene	0.160	U		1	0.160	U		1			ug/L
Methylene chloride	0.160	U		1	0.160	U		1			ug/L
n-Butylbenzene	0.160	U		1	0.160	U		1			ug/L
n-Propylbenzene	0.160	U		1	0.160	U		1			ug/L
Naphthalene	0.160	U		1	0.160	U		1			ug/L
p-Isopropyltoluene	0.160	U		1	0.160	U		1			ug/L
sec-Butylbenzene	0.160	U		1	0.160	U		1			ug/L
Styrene	0.160	U		1	0.160	U		1			ug/L
tert-Butylbenzene	0.160	U		1	0.160	U		1			ug/L
Tetrachloroethene	0.160	U		1	0.160	U		1			ug/L
Toluene	0.160	U		1	0.160	U		1			ug/L

QC Checks: RPD: Relative Percent Difference RER: Relative Error Ratio

Validation Report: Field Duplicates

04-Apr-2019

Project: LTS&M (Parcel 6-7-8) **Task Code:** MND01-01.1901006 Lab Code: GEN

	Duplicate: MND01-01.1901006-018				Sample: MND01-01.1901006-007 0347						
Analyte	**Result**	**Qualifiers**	**Uncert.**	**Dilution**	**Result**	**Qualifiers**	**Uncert.**	**Dilution**	**RPD**	**RER**	**Units**
Total Xylenes	0.160	U		1	0.160	U		1			ug/L
trans-1,2-Dichloroethene	0.160	U		1	0.160	U		1			ug/L
trans-1,3-dichloropropene	0.160	U		1	0.160	U		1			ug/L
Trichloroethene	25.8			1	26.1			1	1.2		ug/L
Trichlorofluoromethane	0.160	U		1	0.160	U		1			ug/L
Tritium	1290		347	1	1180		331	1		0.4	pCi/L
Vinyl chloride	0.160	U		1	0.160	U		1			ug/L

QC Checks: RPD: Relative Percent Difference RER: Relative Error Ratio

Validation Report: Field Blanks

04-Apr-2019

Project: LTS&M (Parcel 6-7-8) **Task Code:** MND01-01.1901006 **Lab Code:** GEN

Blank Type	Sample Code	Location	Method	Analyte	Result	Lab Qualifiers
TB	MND01-01.1901006-019	0999	SW-846 8260	2-Butanone	4.12	J

Associated Samples:

Sample Code	Location	Result	Dilution	Lab Qualifiers	Validation Qualifier
MND01-01.1901006-001	0118	0.500	1	U	
MND01-01.1901006-002	0124	0.500	1	U	
MND01-01.1901006-003	0126	0.500	1	U	
MND01-01.1901006-004	0138	0.500	1	U	
MND01-01.1901006-013	0601	0.500	1	U	
MND01-01.1901006-014	0602	0.500	1	U	
MND01-01.1901006-015	0605	0.500	1	U	
MND01-01.1901006-016	0606	0.500	1	U	
MND01-01.1901006-017	0607	0.500	1	U	

Validation Report: Field Blanks

04-Apr-2019

Project: LTS&M (Parcel 6-7-8) **Task Code:** MND01-01.1901006 **Lab Code:** GEN

TB	MND01-01.1901006-019	0999	SW-846 8260	Acetone	36.9	

Associated Samples:

Sample Code	Location	Result	Dilution	Lab Qualifiers	Validation Qualifier
MND01-01.1901006-001	0118	0.500	1	U	
MND01-01.1901006-002	0124	0.500	1	U	
MND01-01.1901006-003	0126	0.500	1	U	
MND01-01.1901006-004	0138	0.500	1	U	
MND01-01.1901006-013	0601	0.500	1	U	
MND01-01.1901006-014	0602	5.64	1		U
MND01-01.1901006-015	0605	2.68	1	J	U
MND01-01.1901006-016	0606	0.500	1	U	
MND01-01.1901006-017	0607	0.500	1	U	

Validation Report: Field Blanks

04-Apr-2019

Project: LTS&M (Parcel 6-7-8) **Task Code:** MND01-01.1901006 **Lab Code:** GEN

TB	MND01-01.1901006-019	0999	SW-846 8260	Methylene chloride	1.09	J

Associated Samples:

Sample Code	Location	Result	Dilution	Lab Qualifiers	Validation Qualifier
MND01-01.1901006-001	0118	0.160	1	U	
MND01-01.1901006-002	0124	0.160	1	U	
MND01-01.1901006-003	0126	0.160	1	U	
MND01-01.1901006-004	0138	0.160	1	U	
MND01-01.1901006-013	0601	0.160	1	U	
MND01-01.1901006-014	0602	0.160	1	U	
MND01-01.1901006-015	0605	0.160	1	U	
MND01-01.1901006-016	0606	0.160	1	U	
MND01-01.1901006-017	0607	0.160	1	U	

Validation Report: Field Blanks

04-Apr-2019

Project: LTS&M (Parcel 6-7-8) **Task Code:** MND01-01.1901006 **Lab Code:** GEN

TB	MND01-01.1901006-020	0999	SW-846 8260	2-Butanone	2.05	J

Associated Samples:

Sample Code	Location	Result	Dilution	Lab Qualifiers	Validation Qualifier
MND01-01.1901006-008	0379	0.500	1	U	
MND01-01.1901006-009	0386	0.500	1	U	
MND01-01.1901006-010	0387	0.500	1	U	
MND01-01.1901006-011	0389	0.500	1	U	

Validation Report: Field Blanks

04-Apr-2019

Project: LTS&M (Parcel 6-7-8) **Task Code:** MND01-01.1901006 **Lab Code:** GEN

TB	MND01-01.1901006-020	0999	SW-846 8260	Acetone	19.9	

Associated Samples:

Sample Code	Location	Result	Dilution	Lab Qualifiers	Validation Qualifier
MND01-01.1901006-008	0379	0.500	1	U	
MND01-01.1901006-009	0386	0.500	1	U	
MND01-01.1901006-010	0387	0.500	1	U	
MND01-01.1901006-011	0389	0.500	1	U	

Validation Report: Field Blanks

04-Apr-2019

Project: LTS&M (Parcel 6-7-8) **Task Code:** MND01-01.1901006 **Lab Code:** GEN

TB	MND01-01.1901006-020	0999	SW-846 8260	Methylene chloride	1.18	J

Associated Samples:

Sample Code	Location	Result	Dilution	Lab Qualifiers	Validation Qualifier
MND01-01.1901006-008	0379	0.160	1	U	
MND01-01.1901006-009	0386	0.160	1	U	
MND01-01.1901006-010	0387	0.160	1	U	
MND01-01.1901006-011	0389	0.160	1	U	

Validation Report: Field Blanks

Project: LTS&M (Parcel 6-7-8) **Task Code:** MND01-01.1901006 **Lab Code:** GEN

TB	MND01-01.1901006-021	0999	SW-846 8260	2-Butanone	2.27	J

Associated Samples:

Sample Code	Location	Result	Dilution	Lab Qualifiers	Validation Qualifier
MND01-01.1901006-007	0347	0.500	1	HU	
MND01-01.1901006-007	0347	0.500	1	U	
MND01-01.1901006-012	0392	0.500	1	U	
MND01-01.1901006-018	0347	0.500	1	U	HU

Validation Report: Field Blanks

Project: LTS&M (Parcel 6-7-8) **Task Code:** MND01-01.1901006 **Lab Code:** GEN

TB	MND01-01.1901006-021	0999	SW-846 8260	Acetone	23.1	

Associated Samples:

Sample Code	Location	Result	Dilution	Lab Qualifiers	Validation Qualifier
MND01-01.1901006-007	0347	0.500	1	U	
MND01-01.1901006-007	0347	0.500	1	HU	
MND01-01.1901006-012	0392	0.500	1	U	
MND01-01.1901006-018	0347	0.500	1	U	U

Validation Report: Field Blanks

Project: LTS&M (Parcel 6-7-8) **Task Code:** MND01-01.1901006 **Lab Code:** GEN

TB	MND01-01.1901006-021	0999	SW-846 8260	Methylene chloride	1.02	J

Associated Samples:

Sample Code	Location	Result	Dilution	Lab Qualifiers	Validation Qualifier
MND01-01.1901006-007	0347	0.160	1	HU	
MND01-01.1901006-007	0347	0.160	1	U	
MND01-01.1901006-012	0392	0.160	1	U	
MND01-01.1901006-018	0347	0.160	1	U	HU

Validation Report: Field Blanks

Project: LTS&M (Parcel 6-7-8) **Task Code:** MND01-01.1901006 **Lab Code:** GEN

TB	MND01-01.1901006-022	0999	SW-846 8260	2-Butanone	2.08	J

Associated Samples:

Sample Code	Location	Result	Dilution	Lab Qualifiers	Validation Qualifier
MND01-01.1901006-005	0315	0.500	1	U	
MND01-01.1901006-006	0346	0.500	1	U	

Validation Report: Field Blanks

04-Apr-2019

Project: LTS&M (Parcel 6-7-8) **Task Code:** MND01-01.1901006 **Lab Code:** GEN

TB	MND01-01.1901006-022	0999	SW-846 8260	Acetone	17.3	

Associated Samples:

Sample Code	Location	Result	Dilution	Lab Qualifiers	Validation Qualifier
MND01-01.1901006-005	0315	0.500	1	U	
MND01-01.1901006-006	0346	0.500	1	U	

Organics Data Validation Summary

04-Apr-2019

Project: LTS&M (Parcel 6-7-8)

Task Code: MND01-01.1901006

Lab Code: GEN

Surrogate Recovery:	All surrogate recoveries were within the laboratory acceptance limits.
LCS/LCSD Performance:	There were 4 LCS/LCSD results outside the laboratory acceptance limits.
MS/MSD Performance:	There were 6 MS/MSD results outside the laboratory acceptance limits.
Method Blank Performance:	There were 2 method blank results above the MDL.

Noncompliance Report: LCS/LCSD Performance

04-Apr-2019

Project: LTS&M (Parcel 6-7-8) **Task Code:** MND01-01.1901006 **Lab Code:** GEN

Sample ID	Date Analyzed	Method	Analyte	LCS Recovery	LCSD recovery	Lower Limit	Upper Limit	RPD	RPD Limit	Comment
	02-04-2019	SW-846 8260	1,1,1,2-Tetrachloroethane	78		79	120			
	02-04-2019	SW-846 8260	1,1,1,2-Tetrachloroethane	78		79	120			
	02-04-2019	SW-846 8260	2-Hexanone	62		72	134			
	02-04-2019	SW-846 8260	2-Hexanone	62		72	134			

04-Apr-2019

Noncompliance Report: MS/MSD Performance

Project: LTS&M (Parcel 6-7-8) **Task Code:** MND01-01.1901006 **Lab Code:** GEN

Sample ID	Date Analyzed	Method	Analyte	MS Recovery	MSD Recovery	Lower Limit	Upper Limit	RPD	RPD Limit	Comment
	02-08-2019	SW-846 8260	1,3,5-Trimethylbenzene		70	71	122	10	20	
	02-08-2019	SW-846 8260	Hexachlorobutadiene	63		65	123			
	02-08-2019	SW-846 8260	Hexachlorobutadiene		54	65	123	14	20	
	02-08-2019	SW-846 8260	n-Butylbenzene		56	64	128	15	20	
	02-08-2019	SW-846 8260	p-Isopropyltoluene		64	66	126	12	20	
	02-08-2019	SW-846 8260	sec-Butylbenzene		65	67	126	13	20	

04-Apr-2019

Noncompliance Report: Method Blanks

Project: LTS&M (Parcel 6-7-8) **Task Code:** MND01-01.1901006 **Lab Code:** GEN

Method Blank ID	Date Analyzed	Method	Analyte	Result	Lab Qualifiers	Comment
	02-04-2019	SW-846 8260	Hexachlorobutadiene	0.690	J	
	02-04-2019	SW-846 8260	Hexachlorobutadiene	0.690	J	

Radiochemistry Data Validation Worksheet

04-Apr-2019

Project: LTS&M (Parcel 6-7-8) **Task Code:** MND01-01.1901006 **Lab Code:** GEN

Sample ID	Analyte	Analysis Date	QC Type	Result Type	Result	Flag	TPU	Spike Recovery	Spike Dup Recovery	Lower Limit	Upper Limit	RPD	RPD Limit	RER	Comments
	Tritium	02-01-2019	MB	TRG	-33.8	U	143								
	Tritium	02-01-2019	MS	SC	4110		920	84.1		75	125				
	Tritium	02-01-2019	R	TRG	71.7	U	151					0			RER=0.1
	Tritium	02-02-2019	LCS	SC	2140		473	87.4		75	125				
	Tritium	02-07-2019	LCS	SC	2240		515	91.6		75	125				
	Tritium	02-07-2019	MB	TRG	-10.7	U	188								
	Tritium	02-07-2019	MS	SC	5700		1260	92.4		75	125				
	Tritium	02-07-2019	R	TRG	912		282					26	100		RER=1.2

QC Types: LCS: Laboratory Control Sample LCSD: Laboratory Control Sample Duplicate MB: Method Blank MS: Matrix Spike MSD: Matrix Spike Duplicate R: Replicate

Result Types: IS: Internal Standard SC: Spike Analyte TRG: Target analyte

QC Checks: RPD: Relative Percent Difference RER: Relative Error Ratio TPU: Total Propagated Uncertainty

Contractor to the U.S. Department of Energy Office of Legacy Management

Data Review and Validation Report

General Information

Task ID:	MND01-01.1904007
Sample Event:	April 29 and 30, 2019
Site(s):	Mound, Ohio: LTS&M (Parcel 6-7-8)
Laboratory:	GEL Laboratories, Charleston, South Carolina
Work Order No.:	477893
Analysis:	Organics
Validator:	Stephen Donivan
Review Date:	July 24, 2019

This validation was performed according to *Environmental Data Validation Procedure* (LMS/PRO/S15870). The procedure was applied at Level 2, Data Verification.

All analyses were successfully completed. The samples were prepared and analyzed using accepted procedures based on methods specified by line item code, which are listed in Table 1.

Table 1. Analytes and Methods

Analyte	Line Item Code	Prep Method	Analytical Method
Volatile Organics, VOA	VOA-A-007	SW-846 5030B	SW-846 8260 LL

Data Qualifier Summary

Analytical results were qualified as listed in Table 2. Refer to the attached validation worksheets and the sections below for an explanation of the data qualifiers applied.

Table 2. Data Qualifiers

Sample Number	Location	Analyte	Flag	Reason
All	All	Methylene Chloride	U	Less than 10 times the method blank
MND01-01.1904007-005	0315	Acetone	U	Less than 10 times the trip blank
MND01-01.1904007-007	0347	Acetone	U	Less than 10 times the trip blank
MND01-01.1904007-014	0602	Acetone	U	Less than 10 times the trip blank

Sample Shipping/Receiving

GEL Laboratories in Charleston, South Carolina, received 20 water samples on May 1, 2019, accompanied by a Chain of Custody (COC) form. The air waybill numbers were listed on the Sample Receipt and Review Form. The COC form was checked to confirm that all of the samples were listed with sample collection dates and times, and that signatures and dates were present indicating sample relinquishment and receipt. The COC forms were complete with no errors or omissions.

Preservation and Holding Times

The sample shipments were received intact with the temperatures inside the iced cooler at 3 °C, which complies with requirements. All samples were received in the correct container types and had been preserved correctly for the requested analyses. All samples were analyzed within the applicable holding times.

Detection and Quantitation Limits

The method detection limit (MDL) was reported for all organic analytes as required. The MDL, as defined in 40 CFR 136, is the minimum concentration of an analyte that can be measured and reported with 99 percent confidence that the analyte concentration is greater than zero. The practical quantitation limit (PQL) for these analytes is the lowest concentration that can be reliably measured, and is defined as 5 times the MDL. The reported MDLs demonstrate compliance with contractual requirements.

Laboratory Instrument Calibration

Method requirements for satisfactory instrument calibration are established to ensure that the instrument is capable of producing acceptable qualitative and quantitative data for the analytes of interest. Initial calibration verification demonstrates that the instrument is capable of acceptable performance at the beginning of the analytical run. Continuing calibration verification demonstrates that the initial calibration is still valid by checking the performance of the instrument on a continuing basis. Initial and continuing calibration standards must be prepared from independent sources to ensure the validity of the calibration. All laboratory instrument calibrations and calibration verifications were performed correctly in accordance with the cited methods.

Volatiles Internal Standards and Surrogates

The volatile internal standard recoveries and surrogate recoveries were within the acceptance ranges for all samples.

Method Blanks

Method blanks are analyzed to assess any contamination that may have occurred during sample preparation. All method blank results associated with the samples were below the PQL for all

analytes. In cases where a blank concentration exceeds or equals the MDL, the associated sample results are qualified with a U flag (not detected) when the sample result is greater than the MDL but less than 5 times the blank concentration.

Matrix Spike Analysis

Matrix spikes are aliquots of environmental samples to which a known concentration of analyte has been added before analysis. Matrix spike and matrix-spike duplicate (MS/MSD) analysis is used to assess the performance of the method by measuring the effects of interferences caused by the sample matrix and reflects the bias of the method for the particular matrix in question. The MS/MSD data are not evaluated when the concentration of the unspiked sample is greater than 4 times the spike. The spikes met the recovery and precision criteria for all analytes evaluated with one exception. The hexachlorobutadiene recovery from sample 0347 did not meet the acceptance criteria. Hexachlorobutadiene was not detected in the associated sample, not requiring qualification.

Laboratory Replicate Analysis

Laboratory replicate analyses are used to determine laboratory precision for each sample matrix. The relative percent difference for non-radiochemical replicate results that are greater than 5 times the PQL should be less than 20 percent. For results that are less than 5 times the PQL, the range should be no greater than the PQL. The replicate results met these criteria.

Laboratory Control Sample

Laboratory control samples were analyzed at the correct frequency to provide information on the accuracy of the analytical method and the overall laboratory performance, including sample preparation. Several control sample results exceeded the acceptance criteria. The compounds were not detected at concentrations greater than the MDL in the associated samples and no qualification is needed.

Field Duplicate

Field duplicate samples are collected and analyzed as an indication of overall precision of the measurement process. The precision observed includes both field and laboratory precision and has more variability than laboratory duplicates, which measure only laboratory performance. The relative percent difference for duplicate results that are greater than 5 times the PQL should be less than 20 percent. For results that are less than 5 times the PQL, the range should be no greater than the PQL. A duplicate sample was collected from location 0347. The duplicate results met the criteria for all analytes, demonstrating acceptable overall precision.

Trip Blank

Trip blanks were prepared and analyzed to document contamination attributable to shipping and field handling procedures. This type of blank is useful in documenting contamination of volatile organic samples. Two trip blanks were submitted with these samples. Acetone and 2-butanone

were detected in the trip blanks. All associated results greater than the MDL and less than ten times the trip blank concentrations were qualified with a U flag as not detected.

Completeness

Results were reported in the correct units for all analytes requested using contract-required laboratory qualifiers. The analytical report included the MDL and PQL for all analytes and all required supporting documentation.

Electronic Data Deliverable (EDD) File

A revised EDD file arrived on May 29, 2019. The EDD was examined to verify that the file was complete and in compliance with requirements. The contents of the file were compared to the requested analyses to ensure all and only the requested data are delivered. The contents of the EDD were manually examined to verify that the sample results accurately reflect the data contained in the sample data package.

Potential Outliers

Potential outliers are results that lie outside the historical range, possibly due to transcription errors, data calculation errors, or measurement system problems. However, outliers can also represent true values outside the historical range. Potential outliers are identified by generating the Data Validation Outliers Report from data in the environmental database. The new data are compared to historical values and data that fall outside the historical data range are listed on the report along with the historical minimum and maximum values. The potential outliers are further reviewed and may be subject to statistical evaluation using the ProUCL application developed by the EPA (https://www.epa.gov/land-research/proucl-software). The review also includes an evaluation of any notable trends in the data that may indicate the outliers represent true extreme values. None of the analytical results were identified as potential outliers.

Stephen Donivan

STEPHEN DONIVAN
(Affiliate)
2019.07.24 09:56:58
-06'00'

Report Prepared By: _____

Stephen Donivan
Laboratory Coordinator

Data Validation Outliers Report - No Field Parameters **Report Date: 07/23/2019**

Comparison to Historical Data Since: 1/1/2009 12:00:00 AM Fraction: Any

Task: MND01-01.1904007

Analyte	Location	Analysis Location	Units	Fraction	Result	Lab Qualifier(s)	Type	HistMIN	HistMAX	HistSetSize	Outlier?
Tetrachloroethene	0124	LB	ug/L	N	0.310	J	> HistMAX	0.16	0.2	41	No
Trichloroethene	0124	LB	ug/L	N	0.250	J	> HistMAX	0.11	0.2	41	No
Trichloroethene	0315	LB	ug/L	N	1.15		< HistMIN	2.59	16.6	44	No
Bromofluorobenzene	0379	LB	ug/L	N	51.6		> HistMAX	46.1	51.4	8	No
Tetrachloroethene	0605	LB	ug/L	N	0.380	J	> HistMAX	0.16	0.34	42	No

FRACTION: D = Dissolved N = NA T = Total

General Data Validation Report

Task Code: MND01-01.1904007 **Lab Code:** GEN **Validator:** Stephen Donivan **Validation Date:** 07-23-2019

Project: LTS&M (Parcel 6-7-8) **# Samples:** 20

Analysis Type: [ ] General Chemistry [ ] Metals [X] Organics [ ] Radiochemistry

Chain of Custody	***Sample***
Present: OK Signed: OK Dated: OK	Integrity: OK Preservation OK Temperature: OK

Check	Summary
Holding Times:	All analyses were completed within the applicable holding times.
Detection Limits:	The reported detection limits are equal to or below the contract required limits.
Field Blanks:	There were 2 field blanks associated with this task.
Field Duplicates:	There was 1 duplicate evaluated.

Validation Report: Field Duplicates

23-Jul-2019

Project: LTS&M (Parcel 6-7-8) **Task Code:** MND01-01.1904007 Lab Code: GEN

	Duplicate: MND01-01.1904007-018				Sample: MND01-01.1904007-007 0347						
Analyte	**Result**	**Qualifiers**	**Uncert.**	**Dilution**	**Result**	**Qualifiers**	**Uncert.**	**Dilution**	**RPD**	**RER**	**Units**
1,1,1,2-Tetrachloroethane	0.160	U		1	0.160	U		1			ug/L
1,1,1-Trichloroethane	0.160	U		1	0.160	U		1			ug/L
1,1,2,2-Tetrachloroethane	0.160	U		1	0.160	U		1			ug/L
1,1,2-Trichloro-1,2,2-trifluoroethane	1.50	U		1	1.50	U		1			ug/L
1,1,2-Trichloroethane	0.160	U		1	0.160	U		1			ug/L
1,1-Dichloroethane	0.160	U		1	0.160	U		1			ug/L
1,1-Dichloroethene	0.160	U		1	0.160	U		1			ug/L
1,1-Dichloropropene	0.160	U		1	0.160	U		1			ug/L
1,2,3-Trichlorobenzene	0.200	U		1	0.200	U		1			ug/L
1,2,3-Trichloropropane	0.160	U		1	0.160	U		1			ug/L
1,2,4-Trichlorobenzene	0.160	U		1	0.160	U		1			ug/L
1,2,4-Trimethylbenzene	0.160	U		1	0.160	U		1			ug/L
1,2-Dibromo-3-chloropropane	0.160	U		1	0.160	U		1			ug/L
1,2-Dibromoethane	0.160	U		1	0.160	U		1			ug/L
1,2-Dichlorobenzene	0.160	U		1	0.160	U		1			ug/L
1,2-Dichloroethane	0.160	U		1	0.160	U		1			ug/L
1,2-Dichloropropane	0.160	U		1	0.160	U		1			ug/L
1,3,5-Trimethylbenzene	0.160	U		1	0.160	U		1			ug/L

QC Checks: RPD: Relative Percent Difference RER: Relative Error Ratio

Validation Report: Field Duplicates

23-Jul-2019

Project: LTS&M (Parcel 6-7-8) **Task Code:** MND01-01.1904007 Lab Code: GEN

	Duplicate: MND01-01.1904007-018				Sample: MND01-01.1904007-007 0347						
Analyte	**Result**	**Qualifiers**	**Uncert.**	**Dilution**	**Result**	**Qualifiers**	**Uncert.**	**Dilution**	**RPD**	**RER**	**Units**
1,3-Dichlorobenzene	0.160	U		1	0.160	U		1			ug/L
1,3-Dichloropropane	0.160	U		1	0.160	U		1			ug/L
1,4-Dichlorobenzene	0.160	U		1	0.160	U		1			ug/L
2,2-Dichloropropane	0.160	U		1	0.160	U		1			ug/L
2-Butanone	0.500	U		1	0.500	U		1			ug/L
2-Chlorotoluene	0.160	U		1	0.160	U		1			ug/L
2-Hexanone	0.500	U		1	0.500	U		1			ug/L
4-Chlorotoluene	0.160	U		1	0.160	U		1			ug/L
4-Methyl-2-Pentanone	0.500	U		1	0.500	U		1			ug/L
Acetone	0.810	J		1	0.800	J		1			ug/L
Benzene	0.160	U		1	0.160	U		1			ug/L
Bromobenzene	0.160	U		1	0.160	U		1			ug/L
Bromochloromethane	0.160	U		1	0.160	U		1			ug/L
Bromodichloromethane	0.160	U		1	0.160	U		1			ug/L
Bromoform	0.160	U		1	0.160	U		1			ug/L
Bromomethane	0.160	U		1	0.160	U		1			ug/L
Carbon Disulfide	0.500	U		1	0.500	U		1			ug/L
Carbon tetrachloride	1.24			1	1.22			1	1.6		ug/L
Chlorobenzene	0.160	U		1	0.160	U		1			ug/L
Chlorodibromomethane	0.160	U		1	0.160	U		1			ug/L

QC Checks: RPD: Relative Percent Difference RER: Relative Error Ratio

Validation Report: Field Duplicates

23-Jul-2019

Project: LTS&M (Parcel 6-7-8) **Task Code:** MND01-01.1904007 Lab Code: GEN

	Duplicate: MND01-01.1904007-018				Sample: MND01-01.1904007-007 0347						
Analyte	**Result**	**Qualifiers**	**Uncert.**	**Dilution**	**Result**	**Qualifiers**	**Uncert.**	**Dilution**	**RPD**	**RER**	**Units**
Chloroethane	0.160	U		1	0.160	U		1			ug/L
Chloroform	0.290	J		1	0.300	J		1			ug/L
Chloromethane	0.160	U		1	0.160	U		1			ug/L
cis-1,2-Dichloroethene	0.160	U		1	0.160	U		1			ug/L
cis-1,3-Dichloropropene	0.160	U		1	0.160	U		1			ug/L
Dibromomethane	0.160	U		1	0.160	U		1			ug/L
Dichlorodifluoromethane	0.160	U		1	0.160	U		1			ug/L
Ethylbenzene	0.160	U		1	0.160	U		1			ug/L
Hexachlorobutadiene	0.160	U		1	0.160	U		1			ug/L
Isopropylbenzene	0.160	U		1	0.160	U		1			ug/L
Methylene chloride	1.94	BJ		1	2.09	BJ		1	7.4		ug/L
n-Butylbenzene	0.160	U		1	0.160	U		1			ug/L
n-Propylbenzene	0.160	U		1	0.160	U		1			ug/L
Naphthalene	0.160	U		1	0.160	U		1			ug/L
p-Isopropyltoluene	0.160	U		1	0.160	U		1			ug/L
sec-Butylbenzene	0.160	U		1	0.160	U		1			ug/L
Styrene	0.160	U		1	0.160	U		1			ug/L
tert-Butylbenzene	0.160	U		1	0.160	U		1			ug/L
Tetrachloroethene	0.160	U		1	0.160	U		1			ug/L
Toluene	0.160	U		1	0.160	U		1			ug/L

QC Checks: RPD: Relative Percent Difference RER: Relative Error Ratio

Validation Report: Field Duplicates

23-Jul-2019

Project: LTS&M (Parcel 6-7-8) **Task Code:** MND01-01.1904007 Lab Code: GEN

	Duplicate: MND01-01.1904007-018				Sample: MND01-01.1904007-007 0347						
Analyte	**Result**	**Qualifiers**	**Uncert.**	**Dilution**	**Result**	**Qualifiers**	**Uncert.**	**Dilution**	**RPD**	**RER**	**Units**
Total Xylenes	0.160	U		1	0.160	U		1			ug/L
trans-1,2-Dichloroethene	0.160	U		1	0.160	U		1			ug/L
trans-1,3-dichloropropene	0.160	U		1	0.160	U		1			ug/L
Trichloroethene	21.4			1	21.3			1	0.5		ug/L
Trichlorofluoromethane	0.160	U		1	0.160	U		1			ug/L
Vinyl chloride	0.160	U		1	0.160	U		1			ug/L

QC Checks: RPD: Relative Percent Difference RER: Relative Error Ratio

Validation Report: Field Blanks

23-Jul-2019

Project: LTS&M (Parcel 6-7-8) **Task Code:** MND01-01.1904007 **Lab Code:** GEN

Blank Type	Sample Code	Location	Method	Analyte	Result	Lab Qualifiers
TB	MND01-01.1904007-019	0999	SW-846 8260	2-Butanone	2.00	J

Associated Samples:

Sample Code	Location	Result	Dilution	Lab Qualifiers	Validation Qualifier
MND01-01.1904007-001	0118	0.500	1	U	
MND01-01.1904007-002	0124	0.500	1	U	
MND01-01.1904007-003	0126	0.500	1	U	
MND01-01.1904007-004	0138	0.500	1	U	
MND01-01.1904007-005	0315	0.500	1	U	
MND01-01.1904007-007	0347	0.500	1	U	
MND01-01.1904007-013	0601	0.500	1	U	
MND01-01.1904007-014	0602	0.500	1	U	
MND01-01.1904007-015	0605	0.500	1	U	
MND01-01.1904007-016	0606	0.500	1	U	
MND01-01.1904007-017	0607	0.500	1	U	
MND01-01.1904007-018	0347	0.500	1	U	

Validation Report: Field Blanks

23-Jul-2019

Project: LTS&M (Parcel 6-7-8) **Task Code:** MND01-01.1904007 **Lab Code:** GEN

TB	MND01-01.1904007-019	0999	SW-846 8260	Acetone	18.5	

Associated Samples:

Sample Code	Location	Result	Dilution	Lab Qualifiers	Validation Qualifier
MND01-01.1904007-001	0118	0.500	1	U	
MND01-01.1904007-002	0124	0.500	1	U	
MND01-01.1904007-003	0126	0.500	1	U	
MND01-01.1904007-004	0138	0.500	1	U	
MND01-01.1904007-005	0315	1.87	1	J	U
MND01-01.1904007-007	0347	0.800	1	J	U
MND01-01.1904007-013	0601	0.500	1	U	
MND01-01.1904007-014	0602	1.08	1	J	U
MND01-01.1904007-015	0605	0.500	1	U	
MND01-01.1904007-016	0606	0.500	1	U	
MND01-01.1904007-017	0607	0.500	1	U	
MND01-01.1904007-018	0347	0.810	1	J	U

Validation Report: Field Blanks

23-Jul-2019

Project: LTS&M (Parcel 6-7-8) **Task Code:** MND01-01.1904007 **Lab Code:** GEN

TB	MND01-01.1904007-020	0999	SW-846 8260	2-Butanone	1.87	J

Associated Samples:

Sample Code	Location	Result	Dilution	Lab Qualifiers	Validation Qualifier
MND01-01.1904007-006	0346	0.500	1	U	
MND01-01.1904007-008	0379	0.500	1	U	
MND01-01.1904007-009	0386	0.500	1	U	
MND01-01.1904007-010	0387	0.500	1	U	
MND01-01.1904007-011	0389	0.500	1	U	
MND01-01.1904007-012	0392	0.500	1	U	

Validation Report: Field Blanks

23-Jul-2019

Project: LTS&M (Parcel 6-7-8) **Task Code:** MND01-01.1904007 **Lab Code:** GEN

TB	MND01-01.1904007-020	0999	SW-846 8260	Acetone	18.3	

Associated Samples:

Sample Code	Location	Result	Dilution	Lab Qualifiers	Validation Qualifier
MND01-01.1904007-006	0346	0.500	1	U	
MND01-01.1904007-008	0379	0.500	1	U	
MND01-01.1904007-009	0386	0.500	1	U	
MND01-01.1904007-010	0387	0.500	1	U	
MND01-01.1904007-011	0389	0.500	1	U	
MND01-01.1904007-012	0392	0.500	1	U	

Organics Data Validation Summary

23-Jul-2019

Project: LTS&M (Parcel 6-7-8)

Task Code: MND01-01.1904007

Lab Code: GEN

Surrogate Recovery:	All surrogate recoveries were within the laboratory acceptance limits.
LCS/LCSD Performance:	All LCS/LCSD results were within the laboratory acceptance limits.
MS/MSD Performance:	There was 1 MS/MSD result outside the laboratory acceptance limits.
Method Blank Performance:	There were 3 method blank results above the MDL.

Noncompliance Report: Method Blanks

23-Jul-2019

Project: LTS&M (Parcel 6-7-8) **Task Code:** MND01-01.1904007 **Lab Code:** GEN

Method Blank ID	Date Analyzed	Method	Analyte	Result	Lab Qualifiers	Comment
	05-05-2019	SW-846 8260	Hexachlorobutadiene	0.180	J	
	05-05-2019	SW-846 8260	Methylene chloride	1.14	J	
	05-06-2019	SW-846 8260	Methylene chloride	0.380	J	

23-Jul-2019

Noncompliance Report: MS/MSD Performance

Project: LTS&M (Parcel 6-7-8) **Task Code:** MND01-01.1904007 **Lab Code:** GEN

Sample ID	Date Analyzed	Method	Analyte	MS Recovery	MSD Recovery	Lower Limit	Upper Limit	RPD	RPD Limit	Comment
	05-06-2019	SW-846 8260	2-Hexanone	123		48	120			

Contractor to the U.S. Department of Energy Office of Legacy Management

Data Review and Validation Report

General Information

Task ID:	MND01-01.1907008
Sample Event:	July 22-24, 2019
Site(s):	Mound, Ohio: LTS&M (Parcel 6-7-8)
Laboratory:	GEL Laboratories, Charleston, South Carolina
Work Order No.:	485507
Analysis:	Organics and Radiochemistry
Validator:	Gretchen Baer
Review Date:	October 31, 2019

This validation was performed according to *Environmental Data Validation Procedure* (LMS/PRO/S15870), which is available at https://documentmanagement.share.lm.doe.gov/ControlledDocuments/Controlled%20Documents/S15870_Env_DV_Procedure.pdf. The procedure was applied at Level 3, Data Validation.

This validation includes the evaluation of data quality indicators (DQIs) associated with the data. DQIs are the quantitative and qualitative descriptors that are used to interpret the degree of acceptability or utility of data. Indicators of data quality include the analysis of laboratory control samples to assess accuracy; duplicates and replicates to assess precision; and interference check samples to assess bias (see attached Data Validation Worksheets). The comparability, completeness, and sensitivity of the data are also evaluated in the sections to follow.

All analyses were successfully completed. The samples were prepared and analyzed using accepted procedures based on methods specified by line item code, which are listed in Table 1.

Table 1. Analytes and Methods

Analyte	Line Item Code	Prep Method	Analytical Method
Tritium	LSC-A-001	EPA 906.0 Modified	EPA 906.0 Modified
Volatile Organics, VOA	VOA-A-007	SW-846 5030B	SW-846 8260 LL

Data Qualifier Summary

Analytical results were qualified as listed in Table 2. Refer to the attached validation worksheets and the sections below for an explanation of the data qualifiers applied.

Table 2. Data Qualifiers

Sample Number	Location	Analyte	Flag	Reason
MND01-01.1907008-006	0346	Acetone	U	Less than 10 times the trip blank
MND01-01.1907008-014	0602	Acetone	U	Less than 10 times the trip blank
MND01-01.1907008-015	0605	Acetone	U	Less than 10 times the trip blank
MND01-01.1907008-016	0606	Acetone	U	Less than 10 times the trip blank
All	All	Methylene chloride	U	Less than 10 times the method blank
MND01-01.1907008-004	0138	Tritium	J	Less than the determination limit
MND01-01.1907008-007	0347	Tritium	J	Less than the determination limit
MND01-01.1907008-008	0379	Tritium	J	Less than the determination limit
MND01-01.1907008-014	0602	Tritium	J	Less than the determination limit
MND01-01.1907008-018	0607 Dup	Tritium	J	Less than the determination limit

Sample Shipping/Receiving

GEL Laboratories in Charleston, South Carolina, received 21 water samples between July 24 and 25, 2019, accompanied by a Chain of Custody (COC) form. The air waybill number was listed on the Sample Receipt and Review Form. The COC form was checked to confirm that all of the samples were listed with sample collection dates and times, and that signatures and dates were present indicating sample relinquishment and receipt. The COC forms were complete with no errors or omissions.

Preservation and Holding Times

The sample shipments were received intact with the temperatures inside the iced cooler between 1 and 6 °C, which complies with requirements. All samples were received in the correct container types and had been preserved correctly for the requested analyses. All samples were analyzed within the applicable holding times.

Detection and Quantitation Limits

The method detection limit (MDL) was reported for all organics analytes as required. The MDL, as defined in Title 40 *Code of Federal Regulations* Section 136, is the minimum concentration of an analyte that can be measured and reported with 99% confidence that the analyte concentration is greater than zero. The practical quantitation limit (PQL) for these analytes is the lowest concentration that can be reliably measured and is defined as 5 times the MDL.

For radiochemical analytes (those measured by radiometric counting) the MDL and PQL are not applicable, and these results are evaluated using the minimum detectable concentration (MDC), the decision level concentration (DLC), and the determination limit (DL). The DLC is the minimum concentration of an analyte that can be measured and reported with 99% confidence that the analyte concentration is greater than zero and is estimated as 3 times the 1-sigma total propagated uncertainty. Results that are greater than the MDC but less than the DLC are qualified with a U flag as not detected. The DL for radiochemical results is the lowest concentration that can be reliably measured and is defined as 3 times the MDC. Results that were not previously U qualified and are less than the DL are qualified with a J flag as estimated values.

The reported MDLs for the organics analytes and MDCs for radiochemical analytes met the detection limits requirements.

Laboratory Instrument Calibration

Method requirements for satisfactory instrument calibration are established to ensure that the instrument is capable of producing acceptable qualitative and quantitative data for the analytes of interest. Initial calibration verification demonstrates that the instrument is capable of acceptable performance at the beginning of the analytical run. Continuing calibration verification demonstrates that the initial calibration is still valid by checking the performance of the instrument on a continuing basis. Initial and continuing calibration standards must be prepared from independent sources to ensure the validity of the calibration. All laboratory instrument calibrations and calibration verifications were performed correctly in accordance with the cited methods.

Method SW-846 8260 LL Volatile Organics, VOA
Initial calibration of instrument VOA2 was performed on July 26, 2019, using nine calibration standards. Calibration curves are established using linear regression, quadratic regression, or the average response factor approach. Calibrations using average response factors had relative standard deviations of less than 15 percent. Linear or higher order regression calibrations had correlation coefficient values greater than 0.99 and intercepts less than 3 times the MDL. Initial and continuing calibration verification checks were made at the required frequency. Some target compounds had percent drift values greater than 20% and were detected at concentrations greater than the MDL in the associated samples. Associated results have been qualified with a U flag as not detected and no further qualification is necessary. The mass spectrometer calibration and resolution was checked at the beginning of each analytical run in accordance with the procedure.

Method EPA 906.0 Modified Tritium

Liquid scintillation calibrations for instrument LSCRED were performed on July 1, 2019. Calibrations resulted in quench curves covering a quench number range of 137 – 322. The sample quench values were all within the calibration range. Daily calibration checks were performed with acceptable results.

Volatiles Internal Standards and Surrogates

The volatile internal standard recoveries and surrogate recoveries were within the acceptance ranges for all samples.

Method and Calibration Blanks

Method blanks are analyzed to assess any contamination that may have occurred during sample preparation. Calibration blanks are analyzed to assess instrument contamination prior to and during sample analysis. All method blank and calibration blank results associated with the samples were below the PQL for all analytes. In cases where the blank concentration exceeds the MDL, associated sample results that are greater than the MDL but less than 5 times the blank concentration are qualified with a U flag as not detected. The radiochemistry method blank results were less than the DLC.

Matrix Spike Analysis

Matrix spikes are aliquots of environmental samples to which a known concentration of analyte has been added before analysis. Matrix spike and matrix spike duplicate (MS/MSD) analysis is used to assess the performance of the method by measuring the effects of interferences caused by the sample matrix and reflects the bias of the method for the particular matrix in question. Matrix spike data are not evaluated when the concentration of the unspiked sample is greater than 4 times the spike concentration. The matrix spike recoveries met the acceptance criteria for all analytes evaluated.

Laboratory Replicate Analysis

Laboratory replicate analyses are used to determine laboratory precision for each sample matrix. The relative percent difference for non-radiochemical replicate results that are greater than 5 times the PQL should be less than 20 percent. For results that are less than 5 times the PQL, the range should be no greater than the PQL. The relative error ratio for radiochemical replicate results (calculated using the one-sigma total propagated uncertainty) should be less than 3, indicating acceptable precision. The replicate results met these criteria, with the exception of one MS/MSD pair for 2-butanone. This compound was not detected in any field samples, and no further qualification is necessary.

Laboratory Control Sample

Laboratory control samples were analyzed at the correct frequency to provide information on the accuracy of the analytical method and the overall laboratory performance, including sample preparation. All control sample results were acceptable.

Completeness

Results were reported in the correct units for all analytes requested using contract-required laboratory qualifiers. The analytical report included the MDL (MDC for radiochemistry) and PQL for all analytes and all required supporting documentation.

Electronic Data Deliverable (EDD) File

A revised EDD file arrived on October 25, 2019, in response to RFI 19-035. The EDD was revised to correct laboratory quality control sample recovery errors. The EDD was examined to verify that the file was complete and in compliance with requirements. The contents of the file were compared to the requested analyses to ensure all and only the requested data are delivered. The contents of the EDD were manually examined to verify that the sample results accurately reflect the data contained in the sample data package.

Trip Blank

Trip blanks were prepared and analyzed to document contamination attributable to shipping and field handling procedures. This type of blank is useful in documenting contamination of volatile organic samples. Three trip blanks were submitted with these samples. Acetone, 2-butanone, and toluene were detected in one or more of the the trip blanks. (Methylene chloride was detected in the trip blanks but these results were qualified during data validation with a “U” flag as not detected for the compound’s presence in the method blanks). Associated results greater than the

MDL and less than 5 times the trip blank concentration (10 times for common laboratory contaminants) were qualified with a U flag as not detected.

Field Duplicate

Field duplicate samples are collected and analyzed as an indication of overall precision of the measurement process. The precision observed includes both field and laboratory precision and has more variability than laboratory duplicates, which measure only laboratory performance. Duplicate samples were collected from location 0607. For non-radiochemical measurements, the relative percent difference for duplicate results that are greater than 5 times the PQL should be less than 20 percent. For results less than 5 times the PQL, the range should be no greater than the PQL. For radiochemical measurements, the relative error ratio (the ratio of the absolute difference between the sample and duplicate results and the sum of the 1-sigma uncertainties) is used to evaluate duplicate results and should be less than 3. All duplicate results met these criteria, demonstrating acceptable precision.

Field Measurements

The pre-sampling purge criteria were met for all wells. A turbidity less than 50 NTU could not be achieved at monitoring wells 0315 and 0389.

Outliers Report

Potential outliers are results that lie outside the historical range, possibly due to transcription errors, data calculation errors, or measurement system problems. However, outliers can also represent true values outside the historical range. Potential outliers are identified by generating the Data Validation Outliers Report from data in the environmental database. The new data are compared to historical values and data that fall outside the historical data range are listed on the report along with the historical minimum and maximum values. The potential outliers are further reviewed and may be subject to statistical evaluation using the ProUCL application developed by the EPA (https://www.epa.gov/land-research/proucl-software). The review also includes an evaluation of any notable trends in the data that may indicate the outliers represent true extreme values.

Some laboratory results from this sampling event were identified as potential outliers. The data associated with these results were reviewed in detail with no errors noted. The data for this task are acceptable as qualified..

GRETCHEN BAER (Affiliate)

Digitally signed by GRETCHEN BAER (Affiliate)
Date: 2019.10.31 09:20:33 -06'00'

Report Prepared By: _____

Gretchen Baer
Data Validator

Data Validation Outliers Report - No Field Parameters **Report Date: 10/17/2019**

Comparison to Historical Data Since: 1/1/2009 00:00:00 Fraction: Any

Task: MND01-01.1907008

Analyte	Location	Analysis Location	Units	Fraction	Result	Lab Qualifier(s)	Type	HistMIN	HistMAX	HistSet Size	Outlier?
cis-1,2-Dichloroethene	0606	LB	ug/L	N	2.46		> HistMAX	0.1	1.88	38	Yes
Tetrachloroethene	0124	LB	ug/L	N	0.350	J	> HistMAX	0.16	0.31	42	No
Tetrachloroethene	0387	LB	ug/L	N	0.350	J	> HistMAX	0.16	0.31	42	Yes
Tetrachloroethene	0606	LB	ug/L	N	0.310	J	> HistMAX	0.16	0.2	38	No
Trichloroethene	0315	LB	ug/L	N	0.420	J	< HistMIN	1.15	16.6	45	No
Trichloroethene	0347	LB	ug/L	N	5.01		< HistMIN	9.12	32.4	59	Yes
Trichloroethene	0379	LB	ug/L	N	0.320	J	< HistMIN	0.333	2.49	78	Yes
Trichloroethene	0605	LB	ug/L	N	0.270	J	< HistMIN	0.3	19.8	43	No
Tritium	0346	LB	pCi/L	T	5.96	U	< HistMIN	18.6	2030	28	No
Tritium	0347	LB	pCi/L	T	1010		< HistMIN	1070	6860	42	No
Tritium	0602	LB	pCi/L	T	850		< HistMIN	1020	22500	17	No
Tritium	0605	LB	pCi/L	T	2550		< HistMIN	2610	27100	27	No

FRACTION: D = Dissolved N = NA T = Total

General Data Validation Report

Task Code: MND01-01.1907008 **Lab Code:** GEN **Validator:** Gretchen Baer **Validation Date:** 10-21-2019

Project: LTS&M (Parcel 6-7-8) **# Samples:** 21

Analysis Type: [ ] General Chemistry [ ] Metals [X] Organics [X] Radiochemistry

Chain of Custody

Present: OK Signed: OK Dated: OK

Sample

Integrity: OK Preservation OK Temperature: OK

Check	Summary
Holding Times:	All analyses were completed within the applicable holding times.
Detection Limits:	The reported detection limits are equal to or below the contract required limits.
Field Blanks:	There were 3 field blanks associated with this task.
Field Duplicates:	There was 1 duplicate evaluated.

Validation Report: Field Duplicates

21-Oct-2019

Project: LTS&M (Parcel 6-7-8) **Task Code:** MND01-01.1907008 Lab Code: GEN

	Duplicate: MND01-01.1907008-018				Sample: MND01-01.1907008-017 0607						
Analyte	**Result**	**Qualifiers**	**Uncert.**	**Dilution**	**Result**	**Qualifiers**	**Uncert.**	**Dilution**	**RPD**	**RER**	**Units**
1,1,1,2-Tetrachloroethane	0.160	U		1	0.160	U		1			ug/L
1,1,1-Trichloroethane	0.160	U		1	0.160	U		1			ug/L
1,1,2,2-Tetrachloroethane	0.160	U		1	0.160	U		1			ug/L
1,1,2-Trichloro-1,2,2-trifluoroethane	1.50	U		1	1.50	U		1			ug/L
1,1,2-Trichloroethane	0.160	U		1	0.160	U		1			ug/L
1,1-Dichloroethane	0.160	U		1	0.160	U		1			ug/L
1,1-Dichloroethene	0.160	U		1	0.160	U		1			ug/L
1,1-Dichloropropene	0.160	U		1	0.160	U		1			ug/L
1,2,3-Trichlorobenzene	0.200	U		1	0.200	U		1			ug/L
1,2,3-Trichloropropane	0.160	U		1	0.160	U		1			ug/L
1,2,4-Trichlorobenzene	0.160	U		1	0.160	U		1			ug/L
1,2,4-Trimethylbenzene	0.160	U		1	0.160	U		1			ug/L
1,2-Dibromo-3-chloropropane	0.160	U		1	0.160	U		1			ug/L
1,2-Dibromoethane	0.160	U		1	0.160	U		1			ug/L
1,2-Dichlorobenzene	0.160	U		1	0.160	U		1			ug/L
1,2-Dichloroethane	0.160	U		1	0.160	U		1			ug/L
1,2-Dichloropropane	0.160	U		1	0.160	U		1			ug/L
1,3,5-Trimethylbenzene	0.160	U		1	0.160	U		1			ug/L

QC Checks: RPD: Relative Percent Difference RER: Relative Error Ratio

Validation Report: Field Duplicates

21-Oct-2019

Project: LTS&M (Parcel 6-7-8) **Task Code:** MND01-01.1907008 Lab Code: GEN

	Duplicate: MND01-01.1907008-018				Sample: MND01-01.1907008-017 0607						
Analyte	**Result**	**Qualifiers**	**Uncert.**	**Dilution**	**Result**	**Qualifiers**	**Uncert.**	**Dilution**	**RPD**	**RER**	**Units**
1,3-Dichlorobenzene	0.160	U		1	0.160	U		1			ug/L
1,3-Dichloropropane	0.160	U		1	0.160	U		1			ug/L
1,4-Dichlorobenzene	0.160	U		1	0.160	U		1			ug/L
2,2-Dichloropropane	0.160	U		1	0.160	U		1			ug/L
2-Butanone	0.500	U		1	0.500	U		1			ug/L
2-Chlorotoluene	0.160	U		1	0.160	U		1			ug/L
2-Hexanone	0.500	U		1	0.500	U		1			ug/L
4-Chlorotoluene	0.160	U		1	0.160	U		1			ug/L
4-Methyl-2-Pentanone	0.500	U		1	0.500	U		1			ug/L
Acetone	0.500	U		1	0.500	U		1			ug/L
Benzene	0.160	U		1	0.160	U		1			ug/L
Bromobenzene	0.160	U		1	0.160	U		1			ug/L
Bromochloromethane	0.160	U		1	0.160	U		1			ug/L
Bromodichloromethane	0.160	U		1	0.160	U		1			ug/L
Bromoform	0.160	U		1	0.160	U		1			ug/L
Bromomethane	0.160	U		1	0.160	U		1			ug/L
Carbon Disulfide	0.500	U		1	0.500	U		1			ug/L
Carbon tetrachloride	0.160	U		1	0.160	U		1			ug/L
Chlorobenzene	0.160	U		1	0.160	U		1			ug/L
Chlorodibromomethane	0.160	U		1	0.160	U		1			ug/L

QC Checks: RPD: Relative Percent Difference RER: Relative Error Ratio

Validation Report: Field Duplicates

21-Oct-2019

Project: LTS&M (Parcel 6-7-8) **Task Code:** MND01-01.1907008 Lab Code: GEN

	Duplicate: MND01-01.1907008-018				Sample: MND01-01.1907008-017 0607						
Analyte	**Result**	**Qualifiers**	**Uncert.**	**Dilution**	**Result**	**Qualifiers**	**Uncert.**	**Dilution**	**RPD**	**RER**	**Units**
Chloroethane	0.160	U		1	0.160	U		1			ug/L
Chloroform	0.160	U		1	0.160	U		1			ug/L
Chloromethane	0.160	U		1	0.160	U		1			ug/L
cis-1,2-Dichloroethene	0.420	J		1	0.430	J		1			ug/L
cis-1,3-Dichloropropene	0.160	U		1	0.160	U		1			ug/L
Dibromomethane	0.160	U		1	0.160	U		1			ug/L
Dichlorodifluoromethane	0.160	U		1	0.160	U		1			ug/L
Ethylbenzene	0.160	U		1	0.160	U		1			ug/L
Hexachlorobutadiene	0.160	U		1	0.160	U		1			ug/L
Isopropylbenzene	0.160	U		1	0.160	U		1			ug/L
Methylene chloride	5.32	B		1	5.55	B		1	4.2		ug/L
n-Butylbenzene	0.160	U		1	0.160	U		1			ug/L
n-Propylbenzene	0.160	U		1	0.160	U		1			ug/L
Naphthalene	0.160	U		1	0.160	U		1			ug/L
p-Isopropyltoluene	0.160	U		1	0.160	U		1			ug/L
sec-Butylbenzene	0.160	U		1	0.160	U		1			ug/L
Styrene	0.160	U		1	0.160	U		1			ug/L
tert-Butylbenzene	0.160	U		1	0.160	U		1			ug/L
Tetrachloroethene	0.170	J		1	0.160	U		1			ug/L
Toluene	0.160	U		1	0.160	U		1			ug/L

QC Checks: RPD: Relative Percent Difference RER: Relative Error Ratio

Validation Report: Field Duplicates

21-Oct-2019

Project: LTS&M (Parcel 6-7-8) **Task Code:** MND01-01.1907008 Lab Code: GEN

	Duplicate: MND01-01.1907008-018				Sample: MND01-01.1907008-017 0607						
Analyte	**Result**	**Qualifiers**	**Uncert.**	**Dilution**	**Result**	**Qualifiers**	**Uncert.**	**Dilution**	**RPD**	**RER**	**Units**
Total Xylenes	0.160	U		1	0.160	U		1			ug/L
trans-1,2-Dichloroethene	0.160	U		1	0.160	U		1			ug/L
trans-1,3-dichloropropene	0.160	U		1	0.160	U		1			ug/L
Trichloroethene	0.740	J		1	0.730	J		1			ug/L
Trichlorofluoromethane	0.160	U		1	0.160	U		1			ug/L
Tritium	1060		330	1	1100		334	1		0.2	pCi/L
Vinyl chloride	0.160	U		1	0.160	U		1			ug/L

QC Checks: RPD: Relative Percent Difference RER: Relative Error Ratio

Validation Report: Field Blanks

21-Oct-2019

Project: LTS&M (Parcel 6-7-8) **Task Code:** MND01-01.1907008 **Lab Code:** GEN

Blank Type	Sample Code	Location	Method	Analyte	Result	Lab Qualifiers
TB	MND01-01.1907008-019	0999	SW-846 8260	2-Butanone	1.60	J

Associated Samples:

Sample Code	Location	Result	Dilution	Lab Qualifiers	Validation Qualifier
MND01-01.1907008-005	0315	0.500	1	U	
MND01-01.1907008-007	0347	0.500	1	U	
MND01-01.1907008-009	0386	0.500	1	U	
MND01-01.1907008-010	0387	0.500	1	U	
MND01-01.1907008-011	0389	0.500	1	U	
MND01-01.1907008-012	0392	0.500	1	U	

Validation Report: Field Blanks

21-Oct-2019

Project: LTS&M (Parcel 6-7-8) **Task Code:** MND01-01.1907008 **Lab Code:** GEN

TB	MND01-01.1907008-019	0999	SW-846 8260	Acetone	15.2	

Associated Samples:

Sample Code	Location	Result	Dilution	Lab Qualifiers	Validation Qualifier
MND01-01.1907008-005	0315	0.500	1	U	
MND01-01.1907008-007	0347	0.500	1	U	
MND01-01.1907008-009	0386	0.500	1	U	
MND01-01.1907008-010	0387	0.500	1	U	
MND01-01.1907008-011	0389	0.500	1	U	
MND01-01.1907008-012	0392	0.500	1	U	

Validation Report: Field Blanks

21-Oct-2019

Project: LTS&M (Parcel 6-7-8) **Task Code:** MND01-01.1907008 **Lab Code:** GEN

TB	MND01-01.1907008-019	0999	SW-846 8260	Methylene chloride	5.50	B

Associated Samples:

Sample Code	Location	Result	Dilution	Lab Qualifiers	Validation Qualifier
MND01-01.1907008-005	0315	5.04	1	B	U
MND01-01.1907008-007	0347	5.15	1	B	U
MND01-01.1907008-009	0386	4.89	1	BJ	U
MND01-01.1907008-010	0387	5.55	1	B	U
MND01-01.1907008-011	0389	5.11	1	B	U
MND01-01.1907008-012	0392	5.06	1	B	U

Validation Report: Field Blanks

21-Oct-2019

Project: LTS&M (Parcel 6-7-8) **Task Code:** MND01-01.1907008 **Lab Code:** GEN

TB	MND01-01.1907008-020	0999	SW-846 8260	2-Butanone	0.710	J

Associated Samples:

Sample Code	Location	Result	Dilution	Lab Qualifiers	Validation Qualifier
MND01-01.1907008-001	0118	0.500	1	U	
MND01-01.1907008-002	0124	0.500	1	U	
MND01-01.1907008-003	0126	0.500	1	U	
MND01-01.1907008-004	0138	0.500	1	U	
MND01-01.1907008-013	0601	0.500	1	U	
MND01-01.1907008-014	0602	0.500	1	U	
MND01-01.1907008-015	0605	0.500	1	U	
MND01-01.1907008-016	0606	0.500	1	U	
MND01-01.1907008-017	0607	0.500	1	U	
MND01-01.1907008-018	0607	0.500	1	U	U

Validation Report: Field Blanks

21-Oct-2019

Project: LTS&M (Parcel 6-7-8) **Task Code:** MND01-01.1907008 **Lab Code:** GEN

TB	MND01-01.1907008-020	0999	SW-846 8260	Acetone	7.74	

Associated Samples:

Sample Code	Location	Result	Dilution	Lab Qualifiers	Validation Qualifier
MND01-01.1907008-001	0118	0.500	1	U	
MND01-01.1907008-002	0124	0.500	1	U	
MND01-01.1907008-003	0126	0.500	1	U	
MND01-01.1907008-004	0138	0.500	1	U	
MND01-01.1907008-013	0601	0.500	1	U	
MND01-01.1907008-014	0602	1.12	1	J	U
MND01-01.1907008-015	0605	2.13	1	J	U
MND01-01.1907008-016	0606	1.11	1	J	U
MND01-01.1907008-017	0607	0.500	1	U	
MND01-01.1907008-018	0607	0.500	1	U	U

Validation Report: Field Blanks

21-Oct-2019

Project: LTS&M (Parcel 6-7-8) **Task Code:** MND01-01.1907008 **Lab Code:** GEN

TB	MND01-01.1907008-020	0999	SW-846 8260	Methylene chloride	5.35	B

Associated Samples:

Sample Code	Location	Result	Dilution	Lab Qualifiers	Validation Qualifier
MND01-01.1907008-001	0118	5.23	1	B	U
MND01-01.1907008-002	0124	5.48	1	B	U
MND01-01.1907008-003	0126	2.92	1	BJ	U
MND01-01.1907008-004	0138	2.84	1	BJ	U
MND01-01.1907008-013	0601	5.65	1	B	U
MND01-01.1907008-014	0602	5.26	1	B	U
MND01-01.1907008-015	0605	5.81	1	B	U
MND01-01.1907008-016	0606	5.37	1	B	U
MND01-01.1907008-017	0607	5.55	1	B	U
MND01-01.1907008-018	0607	5.32	1	B	U

Validation Report: Field Blanks

21-Oct-2019

Project: LTS&M (Parcel 6-7-8) **Task Code:** MND01-01.1907008 **Lab Code:** GEN

TB	MND01-01.1907008-021	0999	SW-846 8260	Acetone	4.07	J

Associated Samples:

Sample Code	Location	Result	Dilution	Lab Qualifiers	Validation Qualifier
MND01-01.1907008-006	0346	1.06	1	J	U
MND01-01.1907008-008	0379	0.500	1	U	

Validation Report: Field Blanks

21-Oct-2019

Project: LTS&M (Parcel 6-7-8) **Task Code:** MND01-01.1907008 **Lab Code:** GEN

TB	MND01-01.1907008-021	0999	SW-846 8260	Methylene chloride	2.98	BJ

Associated Samples:

Sample Code	Location	Result	Dilution	Lab Qualifiers	Validation Qualifier
MND01-01.1907008-006	0346	2.98	1	BJ	U
MND01-01.1907008-008	0379	3.25	1	BJ	U

Validation Report: Field Blanks

21-Oct-2019

Project: LTS&M (Parcel 6-7-8) **Task Code:** MND01-01.1907008 **Lab Code:** GEN

TB	MND01-01.1907008-021	0999	SW-846 8260	Toluene	0.160	J

Associated Samples:

Sample Code	Location	Result	Dilution	Lab Qualifiers	Validation Qualifier
MND01-01.1907008-006	0346	0.160	1	U	
MND01-01.1907008-008	0379	0.160	1	U	

Organics Data Validation Summary

31-Oct-2019

Project: LTS&M (Parcel 6-7-8)

Task Code: MND01-01.1907008

Lab Code: GEN

Surrogate Recovery:	All surrogate recoveries were within the laboratory acceptance limits.
LCS/LCSD Performance:	All LCS/LCSD results were within the laboratory acceptance limits.
MS/MSD Performance:	There was 1 MS/MSD result outside the laboratory acceptance limits.
Method Blank Performance:	There were 2 method blank results above the MDL.

31-Oct-2019

Noncompliance Report: MS/MSD Performance

Project: LTS&M (Parcel 6-7-8) **Task Code:** MND01-01.1907008 **Lab Code:** GEN

Sample ID	Date Analyzed	Method	Analyte	MS Recovery	MSD Recovery	Lower Limit	Upper Limit	RPD	RPD Limit	Comment
	07-28-2019	SW-846 8260	2-Butanone		93	29	143	21	20	

31-Oct-2019

Noncompliance Report: Method Blanks

Project: LTS&M (Parcel 6-7-8) **Task Code:** MND01-01.1907008 **Lab Code:** GEN

Method Blank ID	Date Analyzed	Method	Analyte	Result	Lab Qualifiers	Comment
	07-29-2019	SW-846 8260	Methylene chloride	2.58	J	
	07-29-2019	SW-846 8260	Naphthalene	0.680	J	

Radiochemistry Data Validation Worksheet

31-Oct-2019

Project: LTS&M (Parcel 6-7-8) **Task Code:** MND01-01.1907008 **Lab Code:** GEN

Sample ID	Analyte	Analysis Date	QC Type	Result Type	Result	Flag	TPU	Spike Recovery	Spike Dup Recovery	Lower Limit	Upper Limit	RPD	RPD Limit	RER	Comments
	Tritium	08-03-2019	LCS	SC	6050		1250	101		75	125				
	Tritium	08-03-2019	MB	TRG	-67.3	U	207								
	Tritium	08-03-2019	MS	SC	7670		1560	110		75	125				
	Tritium	08-03-2019	R	TRG	901		313					19.5	100		RER=0.9

QC Types: LCS: Laboratory Control Sample LCSD: Laboratory Control Sample Duplicate MB: Method Blank MS: Matrix Spike MSD: Matrix Spike Duplicate R: Replicate

Result Types: IS: Internal Standard SC: Spike Analyte TRG: Target analyte

QC Checks: RPD: Relative Percent Difference RER: Relative Error Ratio TPU: Total Propagated Uncertainty

Contractor to the U.S. Department of Energy Office of Legacy Management

Data Review and Validation Report

General Information

Task ID:	MND01-01.1911009
Sample Event:	November 4-6, 2019
Site(s):	Mound, Ohio: LTS&M (Parcel 6-7-8)
Laboratory:	GEL Laboratories, Charleston, South Carolina
Work Order No.:	495306
Analysis:	Organics
Validator:	Gretchen Baer
Review Date:	January 2, 2020

This validation was performed according to *Environmental Data Validation Procedure* (LMS/PRO/S15870), which is available at https://documentmanagement.share.lm.doe.gov/ControlledDocuments/Controlled%20Documents/S15870_Env_DV_Procedure.pdf. The procedure was applied at Level 3, Data Validation.

This validation includes the evaluation of data quality indicators (DQIs) associated with the data. DQIs are the quantitative and qualitative descriptors that are used to interpret the degree of acceptability or utility of data. Indicators of data quality include the analysis of laboratory control samples to assess accuracy; duplicates and replicates to assess precision; and interference check samples to assess bias (see attached Data Validation Worksheets). The comparability, completeness, and sensitivity of the data are also evaluated in the sections to follow.

All analyses were successfully completed. The samples were prepared and analyzed using accepted procedures based on methods specified by line item code, which are listed in Table 1.

Table 1. Analytes and Methods

Analyte	Line Item Code	Prep Method	Analytical Method
Volatile Organics, VOA	VOA-A-007	SW-846 5030B	SW-846 8260 LL

Data Qualifier Summary

Analytical results were qualified as listed in Table 2. Refer to the attached validation worksheets and the sections below for an explanation of the data qualifiers applied.

Table 2. Data Qualifiers

Sample Number	Location	Analyte	Flag	Reason
MND01-01.1911009-009	0386	All	J	Multiple MS recoveries < lower limit
MND01-01.1911009-012	0392	Acetone	U	Less than 10 times the trip blank
MND01-01.1911009-015	0605	Acetone	U	Less than 10 times the trip blank
MND01-01.1911009-018	0386	All	J	Multiple MS recoveries < lower limit

Sample Shipping/Receiving

GEL Laboratories in Charleston, South Carolina, received 19 water samples on November 6 and 7, 2019, accompanied by a Chain of Custody (COC) form. The air waybill number was listed on the Sample Receipt and Review Form. The COC form was checked to confirm that all of the samples were listed with sample collection dates and times, and that signatures and dates were present indicating sample relinquishment and receipt. The COC forms were complete with no errors or omissions.

Preservation and Holding Times

The sample shipments were received intact with the temperatures inside the iced cooler at 4 °C, which complies with requirements. All samples were received in the correct container types and had been preserved correctly for the requested analyses. All samples were analyzed within the applicable holding times.

Detection and Quantitation Limits

The method detection limit (MDL) was reported for all analytes as required. The MDL, as defined in Title 40 *Code of Federal Regulations* Section 136, is the minimum concentration of an analyte that can be measured and reported with 99% confidence that the analyte concentration is greater than zero. The practical quantitation limit (PQL) for these analytes is the lowest concentration that can be reliably measured and is defined as 5 times the MDL. The reported MDLs for all analytes met the detection limits requirements.

Laboratory Instrument Calibration

Method requirements for satisfactory instrument calibration are established to ensure that the instrument is capable of producing acceptable qualitative and quantitative data for the analytes of interest. Initial calibration verification demonstrates that the instrument is capable of acceptable performance at the beginning of the analytical run. Continuing calibration verification demonstrates that the initial calibration is still valid by checking the performance of the instrument on a continuing basis. Initial and continuing calibration standards must be prepared from independent sources to ensure the validity of the calibration. All laboratory instrument calibrations and calibration verifications were performed correctly in accordance with the cited methods.

Method SW-846 8260 LL Volatile Organics, VOA
Initial calibration of instrument VOA2 was performed on November 7, 2019, using nine calibration standards. Calibration curves are established using linear regression, quadratic regression, or the average response factor approach. Calibrations using average response factors had relative standard deviations of less than 15 percent. Linear or higher order regression

calibrations had correlation coefficient values greater than 0.99 and intercepts less than 3 times the MDL. Initial and continuing calibration verification checks were made at the required frequency. All target compounds had percent drift values less than 20 percent. The mass spectrometer calibration and resolution was checked at the beginning of each analytical run in accordance with the procedure.

Volatiles Internal Standards and Surrogates

The volatile internal standard recoveries and surrogate recoveries were within the acceptance ranges for all samples.

Method and Calibration Blanks

Method blanks are analyzed to assess any contamination that may have occurred during sample preparation. Calibration blanks are analyzed to assess instrument contamination prior to and during sample analysis. All method blank and calibration blank results associated with the samples were below the PQL for all analytes. In cases where the blank concentration exceeds the MDL, associated sample results that are greater than the MDL but less than 5 times the blank concentration are qualified with a U flag as not detected.

Matrix Spike Analysis

Matrix spikes are aliquots of environmental samples to which a known concentration of analyte has been added before analysis. Matrix spike and matrix spike duplicate (MS/MSD) analysis is used to assess the performance of the method by measuring the effects of interferences caused by the sample matrix and reflects the bias of the method for the particular matrix in question. Matrix spike data are not evaluated when the concentration of the unspiked sample is greater than 4 times the spike concentration. The spikes met the recovery and precision criteria for all analytes evaluated with the following exception. Multiple spike recoveries for the sample from location 0386 were below the acceptance range. All affected results are qualified with a J flag (estimated).

Laboratory Replicate Analysis

Laboratory replicate analyses are used to determine laboratory precision for each sample matrix. The relative percent difference for results that are greater than 5 times the PQL should be less than 20 percent (or less than the laboratory-derived control limits for organics). For results that are less than 5 times the PQL, the range should be no greater than the PQL. The replicate results met these criteria, with the following exceptions: The MS/MSD pairs for four compounds were above the RPD criteria at location 0386. All results at this location have been qualified with a J flag as estimated for matrix spike recoveries.

Laboratory Control Sample

Laboratory control samples were analyzed at the correct frequency to provide information on the accuracy of the analytical method and the overall laboratory performance, including sample preparation. All control sample results were acceptable.

Completeness

Results were reported in the correct units for all analytes requested using contract-required laboratory qualifiers. The analytical report included the MDL and PQL for all analytes and all required supporting documentation.

Electronic Data Deliverable (EDD) File

The EDD file arrived on December 3, 2019. The EDD was examined to verify that the file was complete and in compliance with requirements. The contents of the file were compared to the requested analyses to ensure all and only the requested data are delivered. The contents of the EDD were manually examined to verify that the sample results accurately reflect the data contained in the sample data package.

Trip Blank

Trip blanks were prepared and analyzed to document contamination attributable to shipping and field handling procedures. This type of blank is useful in documenting contamination of volatile organic samples. Three trip blanks were submitted with these samples. Acetone and 2-butanone were detected in one or more of the trip blanks. Associated results greater than the MDL and less than 5 times the trip blank concentration (10 times for common laboratory contaminants) were qualified with a U flag as not detected.

Field Duplicate

Field duplicate samples are collected and analyzed as an indication of overall precision of the measurement process. The precision observed includes both field and laboratory precision and has more variability than laboratory duplicates, which measure only laboratory performance. A duplicate sample was collected from location 0386. The relative percent difference for duplicate results that are greater than 5 times the PQL should be less than 20 percent. For results that are less than 5 times the PQL, the range should be no greater than the PQL. The duplicate results met the criteria, demonstrating acceptable overall precision.

Field Measurements

The pre-sampling purge criteria were met for all wells. A turbidity less than 50 NTU could not be achieved at monitoring well 0315.

Outliers Report

Potential outliers are results that lie outside the historical range, possibly due to transcription errors, data calculation errors, or measurement system problems. However, outliers can also represent true values outside the historical range. Potential outliers are identified by generating the Data Validation Outliers Report from data in the environmental database. The new data are compared to historical values and data that fall outside the historical data range are listed on the report along with the historical minimum and maximum values. The potential outliers are further reviewed and may be subject to statistical evaluation using the ProUCL application developed by the EPA (https://www.epa.gov/land-research/proucl-software). The review also includes an evaluation of any notable trends in the data that may indicate the outliers represent true extreme values.

Some laboratory results from this sampling event were identified as potential outliers. The data associated with these results were reviewed in detail with no errors noted. The data for this task are acceptable as qualified.

Report Prepared By: GRETCHEN BAER (Affiliate) Digitally signed by GRETCHEN BAER (Affiliate) Date: 2020.01.02 11:55:28 -07'00'

Gretchen Baer
Data Validator

Data Validation Outliers Report - No Field Parameters **Report Date: 01/02/2020**

Comparison to Historical Data Since: 1/1/2009 12:00:00 AM Fraction: Any

Task: MND01-01.1911009

Analyte	Location	Analysis Location	Units	Fraction	Result	Lab Qualifier(s)	Type	HistMIN	HistMAX	HistSet Size	Outlier?
Trichloroethene	0379	LB	ug/L	N	0.270	J	< HistMIN	0.32	2.49	80	No

FRACTION: D = Dissolved N = NA T = Total

General Data Validation Report

Task Code: MND01-01.1911009 **Lab Code:** GEN **Validator:** Gretchen Baer **Validation Date:** 01-02-2020

Project: LTS&M (Parcel 6-7-8) **# Samples:** 21

Analysis Type: [ ] General Chemistry [ ] Metals [X] Organics [ ] Radiochemistry

Chain of Custody

Present: OK Signed: OK Dated: OK

Sample

Integrity: OK Preservation OK Temperature: OK

Check	Summary
Holding Times:	All analyses were completed within the applicable holding times.
Detection Limits:	The reported detection limits are equal to or below the contract required limits.
Field Blanks:	There were 3 field blanks associated with this task.
Field Duplicates:	There was 1 duplicate evaluated.

Validation Report: Field Blanks

02-Jan-2020

Project: LTS&M (Parcel 6-7-8) **Task Code:** MND01-01.1911009 **Lab Code:** GEN

Blank Type	Sample Code	Location	Method	Analyte	Result	Lab Qualifiers
TB	MND01-01.1911009-020	0999	SW-846 8260	2-Butanone	0.720	J

Associated Samples:

Sample Code	Location	Result	Dilution	Lab Qualifiers	Validation Qualifier
MND01-01.1911009-007	0347	0.500	1	U	
MND01-01.1911009-008	0379	0.500	1	U	
MND01-01.1911009-009	0386	0.500	1	U	
MND01-01.1911009-010	0387	0.500	1	U	
MND01-01.1911009-011	0389	0.500	1	U	
MND01-01.1911009-012	0392	0.500	1	U	
MND01-01.1911009-018	0386	0.500	1	U	U

Validation Report: Field Blanks

02-Jan-2020

Project: LTS&M (Parcel 6-7-8) **Task Code:** MND01-01.1911009 **Lab Code:** GEN

TB	MND01-01.1911009-020	0999	SW-846 8260	Acetone	5.75	

Associated Samples:

Sample Code	Location	Result	Dilution	Lab Qualifiers	Validation Qualifier
MND01-01.1911009-007	0347	0.500	1	U	
MND01-01.1911009-008	0379	0.500	1	U	
MND01-01.1911009-009	0386	0.500	1	U	
MND01-01.1911009-010	0387	0.500	1	U	
MND01-01.1911009-011	0389	0.500	1	U	
MND01-01.1911009-012	0392	0.980	1	J	U
MND01-01.1911009-018	0386	0.500	1	U	U

Validation Report: Field Blanks

02-Jan-2020

Project: LTS&M (Parcel 6-7-8) **Task Code:** MND01-01.1911009 **Lab Code:** GEN

TB	MND01-01.1911009-021	0999	SW-846 8260	Acetone	4.20	J

Associated Samples:

Sample Code	Location	Result	Dilution	Lab Qualifiers	Validation Qualifier
MND01-01.1911009-013	0601	0.500	1	U	
MND01-01.1911009-015	0605	2.62	1	J	U
MND01-01.1911009-017	0607	0.500	1	U	

Validation Report: Field Duplicates

02-Jan-2020

Project: LTS&M (Parcel 6-7-8) **Task Code:** MND01-01.1911009 Lab Code: GEN

	Duplicate: MND01-01.1911009-018				Sample: MND01-01.1911009-009 0386						
Analyte	**Result**	**Qualifiers**	**Uncert.**	**Dilution**	**Result**	**Qualifiers**	**Uncert.**	**Dilution**	**RPD**	**RER**	**Units**
1,1,1,2-Tetrachloroethane	0.160	U		1	0.160	U		1			ug/L
1,1,1-Trichloroethane	0.160	U		1	0.160	U		1			ug/L
1,1,2,2-Tetrachloroethane	0.160	U		1	0.160	U		1			ug/L
1,1,2-Trichloro-1,2,2-trifluoroethane	1.50	U		1	1.50	U		1			ug/L
1,1,2-Trichloroethane	0.160	U		1	0.160	U		1			ug/L
1,1-Dichloroethane	0.160	U		1	0.160	U		1			ug/L
1,1-Dichloroethene	0.160	U		1	0.160	U		1			ug/L
1,1-Dichloropropene	0.160	U		1	0.160	U		1			ug/L
1,2,3-Trichlorobenzene	0.200	U		1	0.200	U		1			ug/L
1,2,3-Trichloropropane	0.160	U		1	0.160	U		1			ug/L
1,2,4-Trichlorobenzene	0.160	U		1	0.160	U		1			ug/L
1,2,4-Trimethylbenzene	0.160	U		1	0.160	U		1			ug/L
1,2-Dibromo-3-chloropropane	0.160	U		1	0.160	U		1			ug/L
1,2-Dibromoethane	0.160	U		1	0.160	U		1			ug/L
1,2-Dichlorobenzene	0.160	U		1	0.160	U		1			ug/L
1,2-Dichloroethane	0.160	U		1	0.160	U		1			ug/L
1,2-Dichloropropane	0.160	U		1	0.160	U		1			ug/L
1,3,5-Trimethylbenzene	0.160	U		1	0.160	U		1			ug/L

QC Checks: RPD: Relative Percent Difference RER: Relative Error Ratio

Validation Report: Field Duplicates

02-Jan-2020

Project: LTS&M (Parcel 6-7-8) **Task Code:** MND01-01.1911009 Lab Code: GEN

	Duplicate: MND01-01.1911009-018				Sample: MND01-01.1911009-009 0386						
Analyte	**Result**	**Qualifiers**	**Uncert.**	**Dilution**	**Result**	**Qualifiers**	**Uncert.**	**Dilution**	**RPD**	**RER**	**Units**
1,3-Dichlorobenzene	0.160	U		1	0.160	U		1			ug/L
1,3-Dichloropropane	0.160	U		1	0.160	U		1			ug/L
1,4-Dichlorobenzene	0.160	U		1	0.160	U		1			ug/L
2,2-Dichloropropane	0.160	U		1	0.160	U		1			ug/L
2-Butanone	0.500	U		1	0.500	U		1			ug/L
2-Chlorotoluene	0.160	U		1	0.160	U		1			ug/L
2-Hexanone	0.500	U		1	0.500	U		1			ug/L
4-Chlorotoluene	0.160	U		1	0.160	U		1			ug/L
4-Methyl-2-Pentanone	0.500	U		1	0.500	U		1			ug/L
Acetone	0.500	U		1	0.500	U		1			ug/L
Benzene	0.160	U		1	0.160	U		1			ug/L
Bromobenzene	0.160	U		1	0.160	U		1			ug/L
Bromochloromethane	0.160	U		1	0.160	U		1			ug/L
Bromodichloromethane	0.160	U		1	0.160	U		1			ug/L
Bromoform	0.160	U		1	0.160	U		1			ug/L
Bromomethane	0.160	U		1	0.160	U		1			ug/L
Carbon Disulfide	0.500	U		1	0.500	U		1			ug/L
Carbon tetrachloride	0.160	U		1	0.160	U		1			ug/L
Chlorobenzene	0.160	U		1	0.160	U		1			ug/L
Chlorodibromomethane	0.160	U		1	0.160	U		1			ug/L

QC Checks: RPD: Relative Percent Difference RER: Relative Error Ratio

Validation Report: Field Duplicates

02-Jan-2020

Project: LTS&M (Parcel 6-7-8) **Task Code:** MND01-01.1911009 Lab Code: GEN

	Duplicate: MND01-01.1911009-018				Sample: MND01-01.1911009-009 0386						
Analyte	**Result**	**Qualifiers**	**Uncert.**	**Dilution**	**Result**	**Qualifiers**	**Uncert.**	**Dilution**	**RPD**	**RER**	**Units**
Chloroethane	0.160	U		1	0.160	U		1			ug/L
Chloroform	0.160	U		1	0.160	U		1			ug/L
Chloromethane	0.160	U		1	0.160	U		1			ug/L
cis-1,2-Dichloroethene	0.160	U		1	0.160	U		1			ug/L
cis-1,3-Dichloropropene	0.160	U		1	0.160	U		1			ug/L
Dibromomethane	0.160	U		1	0.160	U		1			ug/L
Dichlorodifluoromethane	0.160	U		1	0.160	U		1			ug/L
Ethylbenzene	0.160	U		1	0.160	U		1			ug/L
Hexachlorobutadiene	0.160	U		1	0.160	U		1			ug/L
Isopropylbenzene	0.160	U		1	0.160	U		1			ug/L
Methylene chloride	0.160	U		1	0.160	U		1			ug/L
n-Butylbenzene	0.160	U		1	0.160	U		1			ug/L
n-Propylbenzene	0.160	U		1	0.160	U		1			ug/L
Naphthalene	0.160	U		1	0.160	U		1			ug/L
p-Isopropyltoluene	0.160	U		1	0.160	U		1			ug/L
sec-Butylbenzene	0.160	U		1	0.160	U		1			ug/L
Styrene	0.160	U		1	0.160	U		1			ug/L
tert-Butylbenzene	0.160	U		1	0.160	U		1			ug/L
Tetrachloroethene	0.170	J		1	0.160	U		1			ug/L
Toluene	0.160	U		1	0.160	U		1			ug/L

QC Checks: RPD: Relative Percent Difference RER: Relative Error Ratio

Validation Report: Field Duplicates

02-Jan-2020

Project: LTS&M (Parcel 6-7-8) **Task Code:** MND01-01.1911009 Lab Code: GEN

	Duplicate: MND01-01.1911009-018				Sample: MND01-01.1911009-009 0386						
Analyte	**Result**	**Qualifiers**	**Uncert.**	**Dilution**	**Result**	**Qualifiers**	**Uncert.**	**Dilution**	**RPD**	**RER**	**Units**
Total Xylenes	0.160	U		1	0.160	U		1			ug/L
trans-1,2-Dichloroethene	0.160	U		1	0.160	U		1			ug/L
trans-1,3-dichloropropene	0.160	U		1	0.160	U		1			ug/L
Trichloroethene	2.42			1	2.39			1	1.2		ug/L
Trichlorofluoromethane	0.160	U		1	0.160	U		1			ug/L
Vinyl chloride	0.160	U		1	0.160	U		1			ug/L

QC Checks: RPD: Relative Percent Difference RER: Relative Error Ratio

Organics Data Validation Summary

02-Jan-2020

Project: LTS&M (Parcel 6-7-8)

Task Code: MND01-01.1911009

Lab Code: GEN

Surrogate Recovery:	All surrogate recoveries were within the laboratory acceptance limits.
LCS/LCSD Performance:	All LCS/LCSD results were within the laboratory acceptance limits.
MS/MSD Performance:	There were 39 MS/MSD results outside the laboratory acceptance limits.
Method Blank Performance:	All method blanks were below the MDL.

Noncompliance Report: MS/MSD Performance

Project: LTS&M (Parcel 6-7-8) **Task Code:** MND01-01.1911009 **Lab Code:** GEN

Sample ID	Date Analyzed	Method	Analyte	MS Recovery	MSD Recovery	Lower Limit	Upper Limit	RPD	RPD Limit	Comment
	11-12-2019	SW-846 8260	1,2,3-Trichlorobenzene	69		70	120			
	11-12-2019	SW-846 8260	1,2,3-Trichlorobenzene		62	70	120	11	20	
	11-12-2019	SW-846 8260	1,2,4-Trichlorobenzene	63		66	120			
	11-12-2019	SW-846 8260	1,2,4-Trichlorobenzene		54	66	120	15	20	
	11-12-2019	SW-846 8260	1,2,4-Trimethylbenzene	60		66	122			
	11-12-2019	SW-846 8260	1,2,4-Trimethylbenzene		50	66	122	18	20	
	11-12-2019	SW-846 8260	1,2-Dichlorobenzene		63	70	120	12	20	
	11-12-2019	SW-846 8260	1,3,5-Trimethylbenzene	59		71	122			
	11-12-2019	SW-846 8260	1,3,5-Trimethylbenzene		49	71	122	18	20	
	11-12-2019	SW-846 8260	1,3-Dichlorobenzene	64		68	120			
	11-12-2019	SW-846 8260	1,3-Dichlorobenzene		54	68	120	16	20	
	11-12-2019	SW-846 8260	1,4-Dichlorobenzene	63		67	120			
	11-12-2019	SW-846 8260	1,4-Dichlorobenzene		54	67	120	16	20	
	11-12-2019	SW-846 8260	2-Chlorotoluene	66		68	120			
	11-12-2019	SW-846 8260	2-Chlorotoluene		57	68	120	15	20	
	11-12-2019	SW-846 8260	4-Chlorotoluene	62		68	120			
	11-12-2019	SW-846 8260	4-Chlorotoluene		52	68	120	17	20	
	11-12-2019	SW-846 8260	Bromobenzene		67	72	120	9	20	
	11-12-2019	SW-846 8260	Chlorobenzene		69	73	120	7	20	
	11-12-2019	SW-846 8260	Ethylbenzene	68		72	122			
	11-12-2019	SW-846 8260	Ethylbenzene		60	72	122	11	20	
	11-12-2019	SW-846 8260	Hexachlorobutadiene	45		65	123			
	11-12-2019	SW-846 8260	Hexachlorobutadiene		33	65	123	29	20	
	11-12-2019	SW-846 8260	Isopropylbenzene	66		67	124			
	11-12-2019	SW-846 8260	Isopropylbenzene		57	67	124	15	20	

Noncompliance Report: MS/MSD Performance

Project: LTS&M (Parcel 6-7-8) **Task Code:** MND01-01.1911009 **Lab Code:** GEN

	11-12-2019	SW-846 8260	n-Butylbenzene	46		64	128			
	11-12-2019	SW-846 8260	n-Butylbenzene		35	64	128	28	20	
	11-12-2019	SW-846 8260	n-Propylbenzene	55		66	124			
	11-12-2019	SW-846 8260	n-Propylbenzene		45	66	124	20	20	
	11-12-2019	SW-846 8260	p-Isopropyltoluene	53		66	126			
	11-12-2019	SW-846 8260	p-Isopropyltoluene		41	66	126	24	20	
	11-12-2019	SW-846 8260	sec-Butylbenzene	55		67	126			
	11-12-2019	SW-846 8260	sec-Butylbenzene		44	67	126	22	20	
	11-12-2019	SW-846 8260	Styrene	71		75	125			
	11-12-2019	SW-846 8260	Styrene		65	75	125	9	20	
	11-12-2019	SW-846 8260	tert-Butylbenzene	63		68	124			
	11-12-2019	SW-846 8260	tert-Butylbenzene		52	68	124	18	20	
	11-12-2019	SW-846 8260	Tetrachloroethene		65	67	122	9	20	
	11-12-2019	SW-846 8260	Total Xylenes		62	68	127	12	20	

Contractor to the U.S. Department of Energy Office of Legacy Management

Data Review and Validation Report

General Information

Task ID:	MND01-02.1901004
Sample Event:	January 28-February 4, 2019
Site(s):	Mound LTS&M (Phase 1)
Laboratory:	GEL Laboratories, Charleston, South Carolina
Work Order No.:	470015
Analysis:	Organics
Validator:	Samantha Tigar
Review Date:	April 4, 2019

This validation was performed according to *Environmental Data Validation Procedure* (LMS/PRO/S15870). The procedure was applied at Level 3, Data Validation.

All analyses were successfully completed. The samples were prepared and analyzed using accepted procedures based on methods specified by line item code, which are listed in Table 1.

Table 1. Analytes and Methods

Analyte	Line Item Code	Prep Method	Analytical Method
Volatile Organics, VOA	VOA-A-007	SW-846 5030B	SW-846 8260 LL

Data Qualifier Summary

Analytical results were qualified as listed in Table 2. Refer to the attached validation worksheets and the sections below for an explanation of the data qualifiers applied.

Table 2. Data Qualifiers

Sample ID	Location	Analyte	Flag	Reason
MND01-02.1901004-015	0888 (Eq Blank)	2-Butanone	J	Exceeded replicate analysis criteria
MND01-02.1901004-015	0888 (Eq Blank)	Acetone	U	Less than 10 times the trip blank
MND01-02.1901004-012	P064	All from 2/8/19 run	R	Redundant results for location
MND01-02.1901004-008	0617	cis-1,2-Dichloroethene	J	Drift value greater than 20%
MND01-02.1901004-008	0617	Trichloroethene	J	Drift value greater than 20%

Sample Shipping/Receiving

GEL Laboratories in Charleston, South Carolina, received 12 water samples between January 29 and February 5, 2019, accompanied by a Chain of Custody (COC) form. The air waybill number was listed on the Sample Receipt and Review Form. The COC form was checked to confirm that all of the samples were listed with sample collection dates and times, and that signatures and dates were present indicating sample relinquishment and receipt. The COC forms were complete with no errors or omissions.

Preservation and Holding Times

The sample shipments were received intact with the temperatures inside the iced coolers between 3 and 4 °C, which complies with requirements. All samples were received in the correct container types and had been preserved correctly for the requested analyses. All samples were analyzed within the applicable holding times.

Detection and Quantitation Limits

The method detection limit (MDL) was reported for all organic analytes as required. The MDL, as defined in 40 CFR 136, is the minimum concentration of an analyte that can be measured and reported with 99 percent confidence that the analyte concentration is greater than zero. The practical quantitation limit (PQL) for these analytes is the lowest concentration that can be reliably measured, and is defined as 5 times the MDL. The reported MDLs demonstrate compliance with contractual requirements.

Laboratory Instrument Calibration

Method requirements for satisfactory instrument calibration are established to ensure that the instrument is capable of producing acceptable qualitative and quantitative data for the analytes of interest. Initial calibration verification demonstrates that the instrument is capable of acceptable performance at the beginning of the analytical run. Continuing calibration verification demonstrates that the initial calibration is still valid by checking the performance of the instrument on a continuing basis. Initial and continuing calibration standards must be prepared from independent sources to ensure the validity of the calibration. All laboratory instrument calibrations and calibration verifications were performed correctly in accordance with the cited methods.

Method SW-846 8260 LL, Volatile Organics
Initial calibration of instrument VOA2 was performed on December 11, 2018 and February 7, 2019 using nine calibration standards. Calibration curves are established using linear regression, quadratic regression, or the average response factor approach. Calibrations using average response factors had relative standard deviations of less than 15 percent. Linear or higher order regression calibrations had correlation coefficient values greater than 0.99 and intercepts less than 3 times the MDL. Initial and continuing calibration verification checks were made at the required frequency. Several target compounds had percent drift values greater than 20% and were detected at concentrations greater than the MDL in the associated samples. Associated

results were qualified with a J flag as estimated values. The mass spectrometer calibration and resolution was checked at the beginning of each analytical run in accordance with the procedure.

Volatiles Internal Standards and Surrogates

The volatile internal standard recoveries and surrogate recoveries were within the acceptance ranges for all samples.

Method Blanks

Method blanks are analyzed to assess any contamination that may have occurred during sample preparation. All method blank results associated with the samples were below the PQL for all analytes. In cases where a blank concentration exceeds or equals the MDL, the associated sample results are qualified with a U flag (not detected) when the sample result is greater than the MDL but less than 5 times the blank concentration.

Matrix Spike Analysis

Matrix spikes are aliquots of environmental samples to which a known concentration of analyte has been added before analysis. Matrix spike and matrix-spike duplicate (MS/MSD) analysis is used to assess the performance of the method by measuring the effects of interferences caused by the sample matrix and reflects the bias of the method for the particular matrix in question. The MS/MSD data are not evaluated when the concentration of the unspiked sample is greater than 4 times the spike. The spike recoveries on the MSD for P064 did not meet the acceptance criteria for most analytes evaluated. This indicates a poor spiking technique and the results were not qualified. All other spike recoveries met the acceptance criteria.

Laboratory Replicate Analysis

Laboratory replicate analyses are used to determine laboratory precision for each sample matrix. The relative percent difference for results that are greater than 5 times the PQL should be less than 20 percent (or less than the laboratory-derived control limits for organics). For results that are less than 5 times the PQL, the range should be no greater than the PQL. The replicate results met these criteria with the exception of 2-butanone. The associated result was qualified with a J flag as an estimated value. Naphthalene and trichloroethene did not meet the criteria but were associated with the sample with poor MSD technique and were not qualified.

Laboratory Control Sample

Laboratory control samples were analyzed at the correct frequency to provide information on the accuracy of the analytical method and the overall laboratory performance, including sample preparation. Two compounds were below acceptance criteria but were not detected in any of the samples, no qualification needed.

Completeness

Results were reported in the correct units for all analytes requested using contract-required laboratory qualifiers. The analytical report included the MDL and PQL for all analytes and all required supporting documentation.

Sample P064 was reanalyzed to correspond with analysis of its matrix spike. The reanalysis results correlated to the original results, and were qualified with an R flag in the database to remove duplication of results.

Electronic Data Deliverable (EDD) File

The EDD file arrived on February 26, 2019. The EDD was examined to verify that the file was complete and in compliance with requirements. The contents of the file were compared to the requested analyses to ensure all and only the requested data are delivered. The contents of the EDD were manually examined to verify that the sample results accurately reflect the data contained in the sample data package.

Trip Blank

Trip blanks were prepared and analyzed to document contamination attributable to shipping and field handling procedures. This type of blank is useful in documenting contamination of volatile organic samples. Three trip blanks were submitted with these samples. Acetone, 2-butanone, and methylene chloride were detected in the trip blanks. Associated results greater than the MDL and less than 5 times the trip blank concentration (10 times for common laboratory contaminants) were qualified with a U flag as not detected. Surface water location 0617 did not have an associated trip blank.

Equipment Blank

Equipment blanks are prepared and analyzed to document contamination attributable to the sample collection process. An equipment blank was collected after decontamination of non-dedicated equipment. Acetone was detected in the equipment blank but was qualified during validation with a U flag as not detected.

Field Duplicate

Field duplicate samples are collected and analyzed as an indication of overall precision of the measurement process. The precision observed includes both field and laboratory precision and has more variability than laboratory duplicates, which measure only laboratory performance. The relative percent difference for duplicate results that are greater than 5 times the PQL should be less than 20 percent. For results that are less than 5 times the PQL, the range should be no greater than the PQL. A duplicate sample was collected from location P064.The duplicate results met the criteria.

Field Measurements

The pre-sampling purge criteria were met for all wells.

Potential Outliers

Potential outliers are results that lie outside the historical range, possibly due to transcription errors, data calculation errors, or measurement system problems. However, outliers can also represent true values outside the historical range. Potential outliers are identified by generating the Data Validation Outliers Report from data in the environmental database. The new data are compared to historical values and data that fall outside the historical data range are listed on the report along with the historical minimum and maximum values. The potential outliers are further reviewed and may be subject to statistical evaluation using the ProUCL application developed by the EPA (https://www.epa.gov/land-research/proucl-software). The review also includes an evaluation of any notable trends in the data that may indicate the outliers represent true extreme values. There were no potential outliers identified and the data for this task are acceptable as qualified.

Report Prepared By: Samantha Tigar Digitally signed by Samantha M. Tigar Date: 2019.04.04 10:09:25 -06'00'

Samantha Tigar
Data Validator

Data Validation Outliers Report - No Field Parameters **Report Date: 03/21/2019**

Comparison to Historical Data Since: 1/1/2008 12:00:00 AM Fraction: Any

Task: MND01-02.1901004

Analyte	Location	Analysis Location	Units	Fraction	Result	Lab Qualifier(s)	Type	HistMIN	HistMAX	HistSetSize	Potential Outlier?
cis-1,2-Dichloroethene	0443	LB	ug/L	N	0.160	U	< HistMIN	0.22	1.14	26	No

FRACTION: D = Dissolved N = NA T = Total

General Data Validation Report

Task Code: MND01-02.1901004 **Lab Code:** GEN **Validator:** Samantha Tigar **Validation Date:** 03-21-2019

Project: LTS&M (Phase I) **# Samples:** 12

Analysis Type: [ ] General Chemistry [ ] Metals [X] Organics [ ] Radiochemistry

Chain of Custody	*Sample*
Present: OK Signed: OK Dated: OK	Integrity: OK Preservation OK Temperature: OK

Check	Summary
Holding Times:	All analyses were completed within the applicable holding times.
Detection Limits:	The reported detection limits are equal to or below the contract required limits.
Field Blanks:	There were 4 field blanks associated with this task.
Field Duplicates:	There was 1 duplicate evaluated.

Validation Report: Field Blanks

21-Mar-2019

Project: LTS&M (Phase I) **Task Code:** MND01-02.1901004 **Lab Code:** GEN

Blank Type	Sample Code	Location	Method	Analyte	Result	Lab Qualifiers
E	MND01-02.1901004-015	0888	SW-846 8260	Acetone	11.1	

Associated Samples:

Sample Code	Location	Result	Dilution	Lab Qualifiers	Validation Qualifier
MND01-02.1901004-004	0411	0.500	1	U	

Validation Report: Field Blanks

21-Mar-2019

Project: LTS&M (Phase I) **Task Code:** MND01-02.1901004 **Lab Code:** GEN

TB	MND01-02.1901004-010	0999	SW-846 8260	Acetone	19.9	

Associated Samples:

Sample Code	Location	Result	Dilution	Lab Qualifiers	Validation Qualifier
MND01-02.1901004-001	0353	0.500	1	U	
MND01-02.1901004-007	0445	0.500	1	U	

Validation Report: Field Blanks

21-Mar-2019

Project: LTS&M (Phase I) **Task Code:** MND01-02.1901004 **Lab Code:** GEN

TB	MND01-02.1901004-010	0999	SW-846 8260	Methylene chloride	1.17	J

Associated Samples:

Sample Code	Location	Result	Dilution	Lab Qualifiers	Validation Qualifier
MND01-02.1901004-001	0353	0.160	1	U	
MND01-02.1901004-007	0445	0.160	1	U	

Validation Report: Field Blanks

Project: LTS&M (Phase I) **Task Code:** MND01-02.1901004 **Lab Code:** GEN

TB	MND01-02.1901004-011	0999	SW-846 8260	2-Butanone	2.57	J

Associated Samples:

Sample Code	Location	Result	Dilution	Lab Qualifiers	Validation Qualifier
MND01-02.1901004-006	0444	0.500	1	U	
MND01-02.1901004-012	P064	0.500	1	U	
MND01-02.1901004-012	P064	0.500	1	HU	
MND01-02.1901004-013	P064	0.500	1	U	U

Validation Report: Field Blanks

21-Mar-2019

Project: LTS&M (Phase I) **Task Code:** MND01-02.1901004 **Lab Code:** GEN

TB	MND01-02.1901004-011	0999	SW-846 8260	Acetone	25.9	

Associated Samples:

Sample Code	Location	Result	Dilution	Lab Qualifiers	Validation Qualifier
MND01-02.1901004-006	0444	0.500	1	U	
MND01-02.1901004-012	P064	0.500	1	HU	
MND01-02.1901004-012	P064	0.500	1	U	
MND01-02.1901004-013	P064	0.500	1	U	HU

Validation Report: Field Blanks

Project: LTS&M (Phase I) **Task Code:** MND01-02.1901004 **Lab Code:** GEN

TB	MND01-02.1901004-011	0999	SW-846 8260	Methylene chloride	1.08	J

Associated Samples:

Sample Code	Location	Result	Dilution	Lab Qualifiers	Validation Qualifier
MND01-02.1901004-006	0444	0.160	1	U	
MND01-02.1901004-012	P064	0.160	1	U	
MND01-02.1901004-012	P064	0.160	1	HU	
MND01-02.1901004-013	P064	0.160	1	U	U

Validation Report: Field Blanks

21-Mar-2019

Project: LTS&M (Phase I) **Task Code:** MND01-02.1901004 **Lab Code:** GEN

TB	MND01-02.1901004-014	0999	SW-846 8260	Acetone	15.7	

Associated Samples:

Sample Code	Location	Result	Dilution	Lab Qualifiers	Validation Qualifier
MND01-02.1901004-005	0443	0.500	1	U	

Validation Report: Field Duplicates

21-Mar-2019

Project: LTS&M (Phase I) **Task Code:** MND01-02.1901004 Lab Code: GEN

	Duplicate: MND01-02.1901004-013				Sample: MND01-02.1901004-012 P064						
Analyte	**Result**	**Qualifiers**	**Uncert.**	**Dilution**	**Result**	**Qualifiers**	**Uncert.**	**Dilution**	**RPD**	**RER**	**Units**
1,1,1,2-Tetrachloroethane	0.160	U		1	0.160	HU		1			ug/L
1,1,1-Trichloroethane	0.160	U		1	0.160	U		1			ug/L
1,1,2,2-Tetrachloroethane	0.160	U		1	0.160	HU		1			ug/L
1,1,2-Trichloro-1,2,2-trifluoroethane	1.50	U		1	1.50	U		1			ug/L
1,1,2-Trichloroethane	0.160	U		1	0.160	HU		1			ug/L
1,1-Dichloroethane	0.160	U		1	0.160	U		1			ug/L
1,1-Dichloroethene	0.160	U		1	0.160	HU		1			ug/L
1,1-Dichloropropene	0.160	U		1	0.160	U		1			ug/L
1,2,3-Trichlorobenzene	0.200	U		1	0.200	HU		1			ug/L
1,2,3-Trichloropropane	0.160	U		1	0.160	U		1			ug/L
1,2,4-Trichlorobenzene	0.160	U		1	0.160	HU		1			ug/L
1,2,4-Trimethylbenzene	0.160	U		1	0.160	U		1			ug/L
1,2-Dibromo-3-chloropropane	0.160	U		1	0.160	HU		1			ug/L
1,2-Dibromoethane	0.160	U		1	0.160	U		1			ug/L
1,2-Dichlorobenzene	0.160	U		1	0.160	U		1			ug/L
1,2-Dichloroethane	0.160	U		1	0.160	HU		1			ug/L
1,2-Dichloropropane	0.160	U		1	0.160	U		1			ug/L
1,3,5-Trimethylbenzene	0.160	U		1	0.160	HU		1			ug/L

QC Checks: RPD: Relative Percent Difference RER: Relative Error Ratio

Validation Report: Field Duplicates

21-Mar-2019

Project: LTS&M (Phase I) **Task Code:** MND01-02.1901004 Lab Code: GEN

	Duplicate: MND01-02.1901004-013				Sample: MND01-02.1901004-012 P064						
Analyte	**Result**	**Qualifiers**	**Uncert.**	**Dilution**	**Result**	**Qualifiers**	**Uncert.**	**Dilution**	**RPD**	**RER**	**Units**
1,3-Dichlorobenzene	0.160	U		1	0.160	U		1			ug/L
1,3-Dichloropropane	0.160	U		1	0.160	HU		1			ug/L
1,4-Dichlorobenzene	0.160	U		1	0.160	U		1			ug/L
2,2-Dichloropropane	0.160	U		1	0.160	HU		1			ug/L
2-Butanone	0.500	U		1	0.500	U		1			ug/L
2-Chlorotoluene	0.160	U		1	0.160	HU		1			ug/L
2-Hexanone	0.500	U		1	0.500	U		1			ug/L
4-Chlorotoluene	0.160	U		1	0.160	HU		1			ug/L
4-Methyl-2-Pentanone	0.500	U		1	0.500	U		1			ug/L
Acetone	0.500	U		1	0.500	HU		1			ug/L
Benzene	0.160	U		1	0.160	U		1			ug/L
Bromobenzene	0.160	U		1	0.160	HU		1			ug/L
Bromochloromethane	0.160	U		1	0.160	U		1			ug/L
Bromodichloromethane	0.160	U		1	0.160	HU		1			ug/L
Bromoform	0.160	U		1	0.160	U		1			ug/L
Bromomethane	0.160	U		1	0.160	HU		1			ug/L
Carbon Disulfide	0.500	U		1	0.500	U		1			ug/L
Carbon tetrachloride	0.160	U		1	0.160	HU		1			ug/L
Chlorobenzene	0.160	U		1	0.160	U		1			ug/L
Chlorodibromomethane	0.160	U		1	0.160	HU		1			ug/L

QC Checks: RPD: Relative Percent Difference RER: Relative Error Ratio

Validation Report: Field Duplicates

21-Mar-2019

Project: LTS&M (Phase I) **Task Code:** MND01-02.1901004 Lab Code: GEN

	Duplicate: MND01-02.1901004-013				Sample: MND01-02.1901004-012 P064						
Analyte	**Result**	**Qualifiers**	**Uncert.**	**Dilution**	**Result**	**Qualifiers**	**Uncert.**	**Dilution**	**RPD**	**RER**	**Units**
Chloroethane	0.160	U		1	0.160	U		1			ug/L
Chloroform	0.160	U		1	0.160	HU		1			ug/L
Chloromethane	0.160	U		1	0.160	U		1			ug/L
cis-1,2-Dichloroethene	0.160	U		1	0.160	HU		1			ug/L
cis-1,3-Dichloropropene	0.160	U		1	0.160	U		1			ug/L
Dibromomethane	0.160	U		1	0.160	HU		1			ug/L
Dichlorodifluoromethane	0.160	U		1	0.160	U		1			ug/L
Ethylbenzene	0.160	U		1	0.160	HU		1			ug/L
Hexachlorobutadiene	0.160	U		1	0.160	U		1			ug/L
Isopropylbenzene	0.160	U		1	0.160	HU		1			ug/L
Methylene chloride	0.160	U		1	0.160	U		1			ug/L
n-Butylbenzene	0.160	U		1	0.160	HU		1			ug/L
n-Propylbenzene	0.160	U		1	0.160	U		1			ug/L
Naphthalene	0.160	U		1	0.160	HU		1			ug/L
p-Isopropyltoluene	0.160	U		1	0.160	U		1			ug/L
sec-Butylbenzene	0.160	U		1	0.160	HU		1			ug/L
Styrene	0.160	U		1	0.160	U		1			ug/L
tert-Butylbenzene	0.160	U		1	0.160	HU		1			ug/L
Tetrachloroethene	0.780	J		1	0.740	U		1			ug/L
Toluene	0.160	U		1	0.160	HU		1			ug/L

QC Checks: RPD: Relative Percent Difference RER: Relative Error Ratio

Validation Report: Field Duplicates

21-Mar-2019

Project: LTS&M (Phase I) **Task Code:** MND01-02.1901004 Lab Code: GEN

	Duplicate: MND01-02.1901004-013				Sample: MND01-02.1901004-012 P064						
Analyte	**Result**	**Qualifiers**	**Uncert.**	**Dilution**	**Result**	**Qualifiers**	**Uncert.**	**Dilution**	**RPD**	**RER**	**Units**
Total Xylenes	0.160	U		1	0.160	U		1			ug/L
trans-1,2-Dichloroethene	0.160	U		1	0.160	HU		1			ug/L
trans-1,3-dichloropropene	0.160	U		1	0.160	U		1			ug/L
Trichloroethene	0.710	J		1	0.660	U		1			ug/L
Trichlorofluoromethane	0.160	U		1	0.160	U		1			ug/L
Vinyl chloride	0.160	U		1	0.160	HU		1			ug/L

QC Checks: RPD: Relative Percent Difference RER: Relative Error Ratio

Organics Data Validation Summary

21-Mar-2019

Project: LTS&M (Phase I)

Task Code: MND01-02.1901004

Lab Code: GEN

Surrogate Recovery:	All surrogate recoveries were within the laboratory acceptance limits.
LCS/LCSD Performance:	All LCS/LCSD results were within the laboratory acceptance limits.
MS/MSD Performance:	There were 27 MS/MSD results outside the laboratory acceptance limits.
Method Blank Performance:	All method blanks were below the MDL.

Noncompliance Report: MS/MSD Performance

Project: LTS&M (Phase I) **Task Code:** MND01-02.1901004 **Lab Code:** GEN

Sample ID	Date Analyzed	Method	Analyte	MS Recovery	MSD Recovery	Lower Limit	Upper Limit	RPD	RPD Limit	Comment
	02-08-2019	SW-846 8260	1,1,1,2-Tetrachloroethane		74	78	120	22	20	
	02-08-2019	SW-846 8260	1,2,3-Trichlorobenzene		58	70	120	37	20	
	02-08-2019	SW-846 8260	1,2,4-Trichlorobenzene		52	66	120	42	20	
	02-08-2019	SW-846 8260	1,2,4-Trimethylbenzene		46	66	122	60	20	
	02-08-2019	SW-846 8260	1,2-Dichlorobenzene		57	70	120	42	20	
	02-08-2019	SW-846 8260	1,3,5-Trimethylbenzene		46	71	122	63	20	
	02-08-2019	SW-846 8260	1,3-Dichlorobenzene		50	68	120	52	20	
	02-08-2019	SW-846 8260	1,4-Dichlorobenzene		49	67	120	50	20	
	02-08-2019	SW-846 8260	2-Butanone		84	29	143	23	20	
	02-08-2019	SW-846 8260	2-Chlorotoluene		49	68	120	57	20	
	02-08-2019	SW-846 8260	4-Chlorotoluene		48	68	120	57	20	
	02-08-2019	SW-846 8260	Bromobenzene		63	72	120	39	20	
	02-08-2019	SW-846 8260	Chlorobenzene		63	73	120	35	20	
	02-08-2019	SW-846 8260	Ethylbenzene		57	72	122	46	20	
	02-08-2019	SW-846 8260	Hexachlorobutadiene		29	65	123	81	20	
	02-08-2019	SW-846 8260	Isopropylbenzene		49	67	124	59	20	
	02-08-2019	SW-846 8260	Naphthalene		81	67	120	23	20	
	02-08-2019	SW-846 8260	n-Butylbenzene		32	64	128	79	20	
	02-08-2019	SW-846 8260	n-Propylbenzene		41	66	124	68	20	
	02-08-2019	SW-846 8260	p-Isopropyltoluene		37	66	126	75	20	
	02-08-2019	SW-846 8260	sec-Butylbenzene		38	67	126	75	20	
	02-08-2019	SW-846 8260	Styrene		58	75	125	40	20	
	02-08-2019	SW-846 8260	tert-Butylbenzene		45	68	124	66	20	
	02-08-2019	SW-846 8260	Tetrachloroethene		58	67	122	41	20	
	02-08-2019	SW-846 8260	Toluene		69	71	120	28	20	

Noncompliance Report: MS/MSD Performance

Project: LTS&M (Phase I) **Task Code:** MND01-02.1901004 **Lab Code:** GEN

	02-08-2019	SW-846 8260	Total Xylenes		58	68	127	47	20	
	02-08-2019	SW-846 8260	Trichloroethene		75	72	122	23	20	

Contractor to the U.S. Department of Energy Office of Legacy Management

Data Review and Validation Report

General Information

Task ID:	MND01-02.1907005
Sample Event:	July 22-24, 2019
Site(s):	Mound LTS&M (Phase 1)
Laboratory:	GEL Laboratories, Charleston, South Carolina
Work Order No.:	485520
Analysis:	Organics
Validator:	Gretchen Baer
Review Date:	November 3, 2019

This validation was performed according to *Environmental Data Validation Procedure* (LMS/PRO/S15870), which is available at https://documentmanagement.share.lm.doe.gov/ControlledDocuments/Controlled%20Documents/S15870_Env_DV_Procedure.pdf. The procedure was applied at Level 3, Data Validation.

This validation includes the evaluation of data quality indicators (DQIs) associated with the data. DQIs are the quantitative and qualitative descriptors that are used to interpret the degree of acceptability or utility of data. Indicators of data quality include the analysis of laboratory control samples to assess accuracy; duplicates and replicates to assess precision; and interference check samples to assess bias (see attached Data Validation Worksheets). The comparability, completeness, and sensitivity of the data are also evaluated in the sections to follow.

All analyses were successfully completed. The samples were prepared and analyzed using accepted procedures based on methods specified by line item code, which are listed in Table 1.

Table 1. Analytes and Methods

Analyte	Line Item Code	Prep Method	Analytical Method
Volatile Organics, VOA	VOA-A-007	SW-846 5030B	SW-846 8260 LL

Data Qualifier Summary

Analytical results were qualified as listed in Table 2. Refer to the attached validation worksheets and the sections below for an explanation of the data qualifiers applied.

Table 2. Data Qualifiers

Sample ID	Location	Analyte	Flag	Reason
MND01-02.1907005-007	0445	Acetone	U	Less than 10 times the trip blank
MND01-02.1907005-008	0617	Acetone	U	Less than 10 times the trip blank
All	All	Methylene chloride	U	Less than 10 times the method blank

Sample Shipping/Receiving

GEL Laboratories in Charleston, South Carolina, received 10 water samples on July 24, 2019 and July 25, 2019, accompanied by a Chain of Custody (COC) form. The air waybill number was listed on the Sample Receipt and Review Form. The COC form was checked to confirm that all of the samples were listed with sample collection dates and times, and that signatures and dates were present indicating sample relinquishment and receipt. The COC forms were complete with no errors or omissions.

Preservation and Holding Times

The sample shipments were received intact with the temperatures inside the iced coolers between 1 °C and 6 °C, which complies with requirements. All samples were received in the correct container types and had been preserved correctly for the requested analyses. All samples were analyzed within the applicable holding times.

Detection and Quantitation Limits

The method detection limit (MDL) was reported for all organics analytes as required. The MDL, as defined in Title 40 *Code of Federal Regulations* Section 136, is the minimum concentration of an analyte that can be measured and reported with 99% confidence that the analyte concentration is greater than zero. The practical quantitation limit (PQL) for these analytes is the lowest concentration that can be reliably measured and is defined as 5 times the MDL. The reported MDLs demonstrate compliance with contractual requirements.

Laboratory Instrument Calibration

Method requirements for satisfactory instrument calibration are established to ensure that the instrument is capable of producing acceptable qualitative and quantitative data for the analytes of interest. Initial calibration verification demonstrates that the instrument is capable of acceptable performance at the beginning of the analytical run. Continuing calibration verification demonstrates that the initial calibration is still valid by checking the performance of the instrument on a continuing basis. Initial and continuing calibration standards must be prepared from independent sources to ensure the validity of the calibration. All laboratory instrument calibrations and calibration verifications were performed correctly in accordance with the cited methods.

Method SW-846 8260 LL, Volatile Organics
Initial calibration of instrument VOA2 was performed on July 26, 2019, using nine calibration standards. Calibration curves are established using linear regression, quadratic regression, or the

average response factor approach. Calibrations using average response factors had relative standard deviations of less than 15 percent. Linear or higher order regression calibrations had correlation coefficient values greater than 0.99 and intercepts less than 3 times the MDL. Initial and continuing calibration verification checks were made at the required frequency. Some target compounds had percent drift values greater than 20% and were detected at concentrations greater than the MDL in the associated samples. Associated results have been qualified with a U flag as not detected and no further qualification is necessary. The mass spectrometer calibration and resolution was checked at the beginning of each analytical run in accordance with the procedure.

Volatiles Internal Standards and Surrogates

The volatile internal standard recoveries and surrogate recoveries were within the acceptance ranges for all samples.

Method Blanks

Method blanks are analyzed to assess any contamination that may have occurred during sample preparation. All method blank results associated with the samples were below the PQL for all analytes. In cases where a blank concentration exceeds or equals the MDL, the associated sample results are qualified with a U flag (not detected) when the sample result is greater than the MDL but less than 5 times the blank concentration.

Matrix Spike Analysis

Matrix spikes are aliquots of environmental samples to which a known concentration of analyte has been added before analysis. Matrix spike and matrix spike duplicate (MS/MSD) analysis is used to assess the performance of the method by measuring the effects of interferences caused by the sample matrix and reflects the bias of the method for the particular matrix in question. Matrix spike data are not evaluated when the concentration of the unspiked sample is greater than 4 times the spike concentration. The matrix spike recoveries met the acceptance criteria for all analytes evaluated.

Laboratory Replicate Analysis

Laboratory replicate analyses are used to determine laboratory precision for each sample matrix. The relative percent difference for non-radiochemical replicate results that are greater than 5 times the PQL should be less than 20 percent. For results that are less than 5 times the PQL, the range should be no greater than the PQL. The replicate results met these criteria, with the exception of one MS/MSD pair for 2-butanone. This compound was not detected in any field samples, and no further qualification is necessary.

Laboratory Control Sample

Laboratory control samples were analyzed at the correct frequency to provide information on the accuracy of the analytical method and the overall laboratory performance, including sample preparation. Two compounds were slightly out of acceptance criteria but were not detected in any of the samples; no qualification is necessary.

Completeness

Results were reported in the correct units for all analytes requested using contract-required laboratory qualifiers. The analytical report included the MDL and PQL for all analytes and all required supporting documentation.

Electronic Data Deliverable (EDD) File

A revised EDD file arrived on October 25, 2019, in response to RFI 19-035. The EDD was revised to correct laboratory quality control sample recovery errors. The EDD was examined to verify that the file was complete and in compliance with requirements. The contents of the file were compared to the requested analyses to ensure all and only the requested data are delivered. The contents of the EDD were manually examined to verify that the sample results accurately reflect the data contained in the sample data package.

Trip Blank

Trip blanks were prepared and analyzed to document contamination attributable to shipping and field handling procedures. This type of blank is useful in documenting contamination of volatile organic samples. Two trip blanks were submitted with these samples. Acetone and 2-butanone were detected in the the trip blanks. (Methylene chloride was detected in the trip blanks but these results were qualified during data validation with a "U" flag as not detected for the compound's presence in the method blanks). Associated results greater than the MDL and less than 5 times the trip blank concentration (10 times for common laboratory contaminants) were qualified with a U flag as not detected

Field Duplicate

Field duplicate samples are collected and analyzed as an indication of overall precision of the measurement process. The precision observed includes both field and laboratory precision and has more variability than laboratory duplicates, which measure only laboratory performance. Duplicate samples were collected from location 0411. The relative percent difference for duplicate results that are greater than 5 times the PQL should be less than 20 percent. For results less than 5 times the PQL, the range should be no greater than the PQL. All duplicate results met these criteria, demonstrating acceptable precision.

Field Measurements

The pre-sampling purge criteria were met for all wells.

Potential Outliers

Potential outliers are results that lie outside the historical range, possibly due to transcription errors, data calculation errors, or measurement system problems. However, outliers can also represent true values outside the historical range. Potential outliers are identified by generating the Data Validation Outliers Report from data in the environmental database. The new data are compared to historical values and data that fall outside the historical data range are listed on the report along with the historical minimum and maximum values. The potential outliers are further reviewed and may be subject to statistical evaluation using the ProUCL application developed by

the EPA (https://www.epa.gov/land-research/proucl-software). The review also includes an evaluation of any notable trends in the data that may indicate the outliers represent true extreme values.

There were no potential outliers identified and the data for this task are acceptable as qualified.

GRETCHEN BAER (Affiliate)

Digitally signed by GRETCHEN BAER (Affiliate)
Date: 2019.11.03 18:58:12 -07'00'

Report Prepared By: _____

Gretchen Baer
Data Validator

Data Validation Outliers Report - No Field Parameters **Report Date: 11/03/2019**

Comparison to Historical Data Since: 1/1/2009 12:00:00 AM Fraction: Any

Task: MND01-02.1907005

Analyte	Location	Analysis Location	Units	Fraction	Result	Lab Qualifier(s)	Type	HistMIN	HistMAX	HistSet Size	Outlier?
Tetrachloroethene	P064	LB	ug/L	N	0.860	J	> HistMAX	0.67	0.8	8	No
Trichloroethene	P064	LB	ug/L	N	0.560	J	< HistMIN	0.71	1.54	8	No

FRACTION: D = Dissolved N = NA T = Total

General Data Validation Report

Task Code: MND01-02.1907005 **Lab Code:** GEN **Validator:** Gretchen Baer **Validation Date:** 11-03-2019

Project: LTS&M (Phase I) **# Samples:** 10

Analysis Type: [ ] General Chemistry [ ] Metals [X] Organics [ ] Radiochemistry

Chain of Custody

Present: OK Signed: OK Dated: OK

Sample

Integrity: OK Preservation OK Temperature: OK

Check	Summary
Holding Times:	All analyses were completed within the applicable holding times.
Detection Limits:	The reported detection limits are equal to or below the contract required limits.
Field Blanks:	There were 2 field blanks associated with this task.
Field Duplicates:	There was 1 duplicate evaluated.

Validation Report: Field Blanks

03-Nov-2019

Project: LTS&M (Phase I) **Task Code:** MND01-02.1907005 **Lab Code:** GEN

Blank Type	Sample Code	Location	Method	Analyte	Result	Lab Qualifiers
TB	MND01-02.1907005-010	0999	SW-846 8260	2-Butanone	1.74	J

Associated Samples:

Sample Code	Location	Result	Dilution	Lab Qualifiers	Validation Qualifier
MND01-02.1907005-001	0353	0.500	1	U	
MND01-02.1907005-005	0443	0.500	1	U	
MND01-02.1907005-007	0445	0.500	1	U	
MND01-02.1907005-008	0617	0.500	1	U	

Validation Report: Field Blanks

03-Nov-2019

Project: LTS&M (Phase I) **Task Code:** MND01-02.1907005 **Lab Code:** GEN

TB	MND01-02.1907005-010	0999	SW-846 8260	Acetone	14.2	

Associated Samples:

Sample Code	Location	Result	Dilution	Lab Qualifiers	Validation Qualifier
MND01-02.1907005-001	0353	0.500	1	U	
MND01-02.1907005-005	0443	0.500	1	U	
MND01-02.1907005-007	0445	1.10	1	J	U
MND01-02.1907005-008	0617	1.23	1	J	U

Validation Report: Field Blanks

03-Nov-2019

Project: LTS&M (Phase I) **Task Code:** MND01-02.1907005 **Lab Code:** GEN

TB	MND01-02.1907005-010	0999	SW-846 8260	Methylene chloride	5.29	B

Associated Samples:

Sample Code	Location	Result	Dilution	Lab Qualifiers	Validation Qualifier
MND01-02.1907005-001	0353	5.20	1	B	U
MND01-02.1907005-005	0443	5.48	1	B	U
MND01-02.1907005-007	0445	5.56	1	B	U
MND01-02.1907005-008	0617	3.04	1	BJ	U

Validation Report: Field Blanks

03-Nov-2019

Project: LTS&M (Phase I) **Task Code:** MND01-02.1907005 **Lab Code:** GEN

TB	MND01-02.1907005-011	0999	SW-846 8260	2-Butanone	0.610	J

Associated Samples:

Sample Code	Location	Result	Dilution	Lab Qualifiers	Validation Qualifier
MND01-02.1907005-004	0411	0.500	1	U	
MND01-02.1907005-006	0444	0.500	1	U	
MND01-02.1907005-012	P064	0.500	1	U	
MND01-02.1907005-013	0411	0.500	1	U	U

Validation Report: Field Blanks

03-Nov-2019

Project: LTS&M (Phase I) **Task Code:** MND01-02.1907005 **Lab Code:** GEN

TB	MND01-02.1907005-011	0999	SW-846 8260	Acetone	4.20	J

Associated Samples:

Sample Code	Location	Result	Dilution	Lab Qualifiers	Validation Qualifier
MND01-02.1907005-004	0411	0.500	1	U	
MND01-02.1907005-006	0444	0.500	1	U	
MND01-02.1907005-012	P064	0.500	1	U	
MND01-02.1907005-013	0411	0.500	1	U	U

Validation Report: Field Blanks

03-Nov-2019

Project: LTS&M (Phase I) **Task Code:** MND01-02.1907005 **Lab Code:** GEN

TB	MND01-02.1907005-011	0999	SW-846 8260	Methylene chloride	3.43	BJ

Associated Samples:

Sample Code	Location	Result	Dilution	Lab Qualifiers	Validation Qualifier
MND01-02.1907005-004	0411	3.09	1	BJ	U
MND01-02.1907005-006	0444	3.27	1	BJ	U
MND01-02.1907005-012	P064	3.24	1	BJ	U
MND01-02.1907005-013	0411	3.27	1	BJ	U

Validation Report: Field Duplicates

03-Nov-2019

Project: LTS&M (Phase I) **Task Code:** MND01-02.1907005 Lab Code: GEN

	Duplicate: MND01-02.1907005-013				Sample: MND01-02.1907005-004 0411						
Analyte	**Result**	**Qualifiers**	**Uncert.**	**Dilution**	**Result**	**Qualifiers**	**Uncert.**	**Dilution**	**RPD**	**RER**	**Units**
1,1,1,2-Tetrachloroethane	0.160	U		1	0.160	U		1			ug/L
1,1,1-Trichloroethane	0.160	U		1	0.160	U		1			ug/L
1,1,2,2-Tetrachloroethane	0.160	U		1	0.160	U		1			ug/L
1,1,2-Trichloro-1,2,2-trifluoroethane	1.50	U		1	1.50	U		1			ug/L
1,1,2-Trichloroethane	0.160	U		1	0.160	U		1			ug/L
1,1-Dichloroethane	0.160	U		1	0.160	U		1			ug/L
1,1-Dichloroethene	0.160	U		1	0.160	U		1			ug/L
1,1-Dichloropropene	0.160	U		1	0.160	U		1			ug/L
1,2,3-Trichlorobenzene	0.200	U		1	0.200	U		1			ug/L
1,2,3-Trichloropropane	0.160	U		1	0.160	U		1			ug/L
1,2,4-Trichlorobenzene	0.160	U		1	0.160	U		1			ug/L
1,2,4-Trimethylbenzene	0.160	U		1	0.160	U		1			ug/L
1,2-Dibromo-3-chloropropane	0.160	U		1	0.160	U		1			ug/L
1,2-Dibromoethane	0.160	U		1	0.160	U		1			ug/L
1,2-Dichlorobenzene	0.160	U		1	0.160	U		1			ug/L
1,2-Dichloroethane	0.160	U		1	0.160	U		1			ug/L
1,2-Dichloropropane	0.160	U		1	0.160	U		1			ug/L
1,3,5-Trimethylbenzene	0.160	U		1	0.160	U		1			ug/L

QC Checks: RPD: Relative Percent Difference RER: Relative Error Ratio

Validation Report: Field Duplicates

03-Nov-2019

Project: LTS&M (Phase I) **Task Code:** MND01-02.1907005 Lab Code: GEN

	Duplicate: MND01-02.1907005-013				Sample: MND01-02.1907005-004 0411						
Analyte	**Result**	**Qualifiers**	**Uncert.**	**Dilution**	**Result**	**Qualifiers**	**Uncert.**	**Dilution**	**RPD**	**RER**	**Units**
1,3-Dichlorobenzene	0.160	U		1	0.160	U		1			ug/L
1,3-Dichloropropane	0.160	U		1	0.160	U		1			ug/L
1,4-Dichlorobenzene	0.160	U		1	0.160	U		1			ug/L
2,2-Dichloropropane	0.160	U		1	0.160	U		1			ug/L
2-Butanone	0.500	U		1	0.500	U		1			ug/L
2-Chlorotoluene	0.160	U		1	0.160	U		1			ug/L
2-Hexanone	0.500	U		1	0.500	U		1			ug/L
4-Chlorotoluene	0.160	U		1	0.160	U		1			ug/L
4-Methyl-2-Pentanone	0.500	U		1	0.500	U		1			ug/L
Acetone	0.500	U		1	0.500	U		1			ug/L
Benzene	0.160	U		1	0.160	U		1			ug/L
Bromobenzene	0.160	U		1	0.160	U		1			ug/L
Bromochloromethane	0.160	U		1	0.160	U		1			ug/L
Bromodichloromethane	0.160	U		1	0.160	U		1			ug/L
Bromoform	0.160	U		1	0.160	U		1			ug/L
Bromomethane	0.160	U		1	0.160	U		1			ug/L
Carbon Disulfide	0.500	U		1	0.500	U		1			ug/L
Carbon tetrachloride	0.160	U		1	0.160	U		1			ug/L
Chlorobenzene	0.160	U		1	0.160	U		1			ug/L
Chlorodibromomethane	0.160	U		1	0.160	U		1			ug/L

QC Checks: RPD: Relative Percent Difference RER: Relative Error Ratio

Validation Report: Field Duplicates

03-Nov-2019

Project: LTS&M (Phase I) **Task Code:** MND01-02.1907005 Lab Code: GEN

	Duplicate: MND01-02.1907005-013				Sample: MND01-02.1907005-004 0411						
Analyte	**Result**	**Qualifiers**	**Uncert.**	**Dilution**	**Result**	**Qualifiers**	**Uncert.**	**Dilution**	**RPD**	**RER**	**Units**
Chloroethane	0.160	U		1	0.160	U		1			ug/L
Chloroform	0.160	U		1	0.160	U		1			ug/L
Chloromethane	0.160	U		1	0.160	U		1			ug/L
cis-1,2-Dichloroethene	0.980	J		1	0.960	J		1	2.1		ug/L
cis-1,3-Dichloropropene	0.160	U		1	0.160	U		1			ug/L
Dibromomethane	0.160	U		1	0.160	U		1			ug/L
Dichlorodifluoromethane	0.160	U		1	0.160	U		1			ug/L
Ethylbenzene	0.160	U		1	0.160	U		1			ug/L
Hexachlorobutadiene	0.160	U		1	0.160	U		1			ug/L
Isopropylbenzene	0.160	U		1	0.160	U		1			ug/L
Methylene chloride	3.27	BJ		1	3.09	U		1	5.7		ug/L
n-Butylbenzene	0.160	U		1	0.160	U		1			ug/L
n-Propylbenzene	0.160	U		1	0.160	U		1			ug/L
Naphthalene	0.160	U		1	0.160	U		1			ug/L
p-Isopropyltoluene	0.160	U		1	0.160	U		1			ug/L
sec-Butylbenzene	0.160	U		1	0.160	U		1			ug/L
Styrene	0.160	U		1	0.160	U		1			ug/L
tert-Butylbenzene	0.160	U		1	0.160	U		1			ug/L
Tetrachloroethene	0.160	U		1	0.160	U		1			ug/L
Toluene	0.160	U		1	0.160	U		1			ug/L

QC Checks: RPD: Relative Percent Difference RER: Relative Error Ratio

Validation Report: Field Duplicates

03-Nov-2019

Project: LTS&M (Phase I) **Task Code:** MND01-02.1907005 Lab Code: GEN

	Duplicate: MND01-02.1907005-013				Sample: MND01-02.1907005-004 0411						
Analyte	**Result**	**Qualifiers**	**Uncert.**	**Dilution**	**Result**	**Qualifiers**	**Uncert.**	**Dilution**	**RPD**	**RER**	**Units**
Total Xylenes	0.160	U		1	0.160	U		1			ug/L
trans-1,2-Dichloroethene	0.160	U		1	0.160	U		1			ug/L
trans-1,3-dichloropropene	0.160	U		1	0.160	U		1			ug/L
Trichloroethene	10.1			1	9.80			1	3.0		ug/L
Trichlorofluoromethane	0.160	U		1	0.160	U		1			ug/L
Vinyl chloride	0.160	U		1	0.160	U		1			ug/L

QC Checks: RPD: Relative Percent Difference RER: Relative Error Ratio

Organics Data Validation Summary

03-Nov-2019

Project: LTS&M (Phase I)

Task Code: MND01-02.1907005

Lab Code: GEN

Surrogate Recovery:	All surrogate recoveries were within the laboratory acceptance limits.
LCS/LCSD Performance:	There were 4 LCS/LCSD results outside the laboratory acceptance limits.
MS/MSD Performance:	There was 1 MS/MSD result outside the laboratory acceptance limits.
Method Blank Performance:	There were 6 method blank results above the MDL.

Noncompliance Report: LCS/LCSD Performance

03-Nov-2019

Project: LTS&M (Phase I) **Task Code:** MND01-02.1907005 **Lab Code:** GEN

Sample ID	Date Analyzed	Method	Analyte	LCS Recovery	LCSD recovery	Lower Limit	Upper Limit	RPD	RPD Limit	Comment
	07-28-2019	SW-846 8260	1,2,3-Trichlorobenzene	122		72	120			
	07-28-2019	SW-846 8260	1,2,3-Trichlorobenzene	122		72	120			
	07-28-2019	SW-846 8260	1,2,4-Trichlorobenzene	128		71	121			
	07-28-2019	SW-846 8260	1,2,4-Trichlorobenzene	128		71	121			

Noncompliance Report: MS/MSD Performance

03-Nov-2019

Project: LTS&M (Phase I) **Task Code:** MND01-02.1907005 **Lab Code:** GEN

Sample ID	Date Analyzed	Method	Analyte	MS Recovery	MSD Recovery	Lower Limit	Upper Limit	RPD	RPD Limit	Comment
	07-28-2019	SW-846 8260	2-Butanone		135	29	143	26	20	

Noncompliance Report: Method Blanks

03-Nov-2019

Project: LTS&M (Phase I) **Task Code:** MND01-02.1907005 **Lab Code:** GEN

Method Blank ID	Date Analyzed	Method	Analyte	Result	Lab Qualifiers	Comment
	07-28-2019	SW-846 8260	Methylene chloride	4.49	J	
	07-28-2019	SW-846 8260	Methylene chloride	4.49	J	
	07-29-2019	SW-846 8260	Methylene chloride	2.58	J	
	07-28-2019	SW-846 8260	Naphthalene	0.670	J	
	07-28-2019	SW-846 8260	Naphthalene	0.670	J	
	07-29-2019	SW-846 8260	Naphthalene	0.680	J	

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