LCSWMA

1299 HARRISBURG PIKE | PO BOX 4425 | LANCASTER, PA 17604
PHONE: 717-397-9968 | FAX: 717-397-9973
www.lcswma.org

December 27, 2019

Ms. Kelly Kinkaid PG; Licensed Professional Geologist
Pennsylvania Department of Environmental Protection
Bureau of Waste Management
909 Elmerton Avenue
Harrisburg, PA 17110-8200

REF: Creswell Landfill (BWM Permit #100008)
Groundwater Monitoring; 4th Quarter 2019

Dear Ms. Kinkaid:

Enclosed are the Form 19 reports for the sampling period completed at the above referenced facility. The laboratory results were reviewed by ARM Group to evaluate the quality of the data and historic trends.

- This sampling event was for the "Quarterly" Form 19 parameters, all the thirteen (13) GWMP locations were sampled.
- Enclosed, on CD, is a data export .csv file that should be in the format compatible with your LandLinks software. Additionally, the CD includes a PDF file of all the Forms 19 and PDF files of the laboratory reports.

Please do not hesitate in contacting me if you have any questions or concerns at dbrown@lcswma.org.

Respectfully Submitted,

Daniel A. Brown
Environmental Compliance Manager

Enclosures

cc: LCSWMA: Michelle Marsh, Nick Rogers; Jeff Musser; Jordan Gallagher
ARM Group: Scott Wendling, Ryan Brandon
PA DEP: Randy Weiss

ARM Group Inc.
Engineers and Scientists

December 20, 2019

Mr. Daniel Brown
Environmental Compliance Manager
Lancaster County Solid Waste
Management Authority
1299 Harrisburg Pike
PO Box 4425
Lancaster, PA 17604

Re: LCSWMA Creswell Landfill
Permit No. 100008
Manor Township
Lancaster County, Pennsylvania
Fourth Quarter 2019 Water Quality Data Review
ARM Project 190848

Dear Mr. Brown:

ARM Group Inc. (ARM) has prepared this assessment at the request of the Lancaster County Solid Waste Management Authority (LCSWMA) to provide an evaluation of the Fourth Quarter 2019 water quality monitoring results for Creswell Landfill (CWLF). As part of this evaluation, ARM reviewed the historic and Fourth Quarter 2019 laboratory analytical results for the sampled upgradient and downgradient Form 19 groundwater monitoring wells and surface water monitoring points.

The groundwater and surface water samples collected by LCSWMA during the Fourth Quarter 2019 were analyzed for quarterly Form 19 parameters. The following narrative provides a summary of noteworthy observations of the results for the Fourth Quarter of 2019, as well as a general discussion of recent data trends.

Background/Upgradient Parameter Concentrations

To determine if the concentration of a given parameter at each monitoring location is elevated compared to the background/upgradient concentration, ARM calculated the 95% upper prediction limits (UPLs) using historical data from the upgradient well, CWMP001W, using laboratory analytical results from the Fourth Quarter 1987 through the most recent quarter (Fourth Quarter 2019).

The UPL approach is used to predict the upper limit of possible future values based on a background data set. A 95% UPL established from background data represents the upper limit which will predict if an independently obtained future sample result exceeds background levels with 95% confidence. If the concentration of a given parameter in a downgradient well exceeds its established UPL, this represents a statistically significant exceedance of background groundwater quality.

To calculate the UPLs, ARM first applied the Rosner's Test for outliers in ChemStat® statistical analysis software (version 6.3.0.2, Starpoint Software, Inc., ©1996-2013) to identify potential historical anomalous concentrations in MP-1. ARM identified 82 statistical outliers at a 95% significance level in the historical dataset which did not appear to be part of a long-term concentration trend. No outliers were identified from the Fourth Quarter 2019 analytical results.

The most appropriate method of calculating a UPL varies according to the distribution of each dataset. After removing outliers, ARM assessed the remaining historical MP-1 concentration data for each parameter to determine the best fitting statistical distribution (i.e., normal, lognormal, gamma or no distribution) at a 95% significance level using the EPA's ProUCL statistical analysis software (version 5.1.002, EPA, 2015). ARM then used ProUCL to calculate the UPLs for each parameter, which are summarized in the enclosed **Attachment 1**. The exported ProUCL statistical calculation sheets are included in the enclosed **Attachment 2**.

For pH, a one-sided UPL is not appropriate because of the double-sided nature of this parameter. ARM assessed the downgradient pH data by investigating time-series concentration plots for identifiable trends and comparing the Fourth Quarter 2019 results to the historical range of concentrations in both the sampled well and the upgradient well.

The Interstate Technology and Regulatory Council (ITRC) recommends that a UPL should only be applied for background populations of at least 8-10 observations. Use of smaller populations containing either fewer measurements or multiple non-detections can result in skewed datasets and statistically flawed UPL calculations.

The background population is less than 8 for all volatile organic compounds (VOCs) because of a historical lack of detections in MP-1. In the upgradient well, toluene was detected twice, in the Third and Fourth Quarters 1988 at 86 µg/L and 3.6 µg/L, respectively. There have been no other detections of VOCs noted in the upgradient well. A background level could therefore not be calculated for these parameters, which are labeled with asterisks in the enclosed **Attachment 1**. ARM substituted the laboratory reporting detection limit for the statistical background standard when assessing VOCs in the downgradient wells.

The attached **Table 1** summarizes the background exceedances in the downgradient wells during the Fourth Quarter 2019. Background exceedances shown in **Table 1** denote a statistically significant increase of concentrations relative to those observed historically in the upgradient well MP-1. Close attention should be paid to results from the monitoring locations with noted water quality changes during future sampling events to evaluate the presence of any positive or negative trends for the parameters of concern.

Individual Well Summary

- MP-1 – Ammonia-N (0.14 mg/L) is slightly above the statistical background level (0.12 mg/L) in this upgradient well for the Fourth Quarter 2019. No other parameters are above statistical background, indicating that groundwater quality appears relatively stable upgradient of the site. Chloride and sodium levels appear to be slowly increasing over time, potentially because of road salt runoff from River Road. pH fluctuates over a range of approximately 1.5 units and appears to be trending slightly higher over time. All other Form 19 analytical parameters appear to be stable and within historical concentration ranges.

- MP-2 – 1,1,1-trichloroethane and 1,1-dichloroethane were detected in the Fourth Quarter 2019 and are, therefore, above background levels. Both VOCs appear to be decreasing over time, although 1,1-DCA levels increased in 2012 and 2018.

  Other parameters above background in MP-2 include alkalinity (bicarbonate and total), ammonia-N, calcium, chloride, magnesium, manganese, potassium, sodium, specific conductance (SpC), sulfate, total dissolved solids (TDS), and total organic carbon (TOC). Concentrations of these parameters generally appear to be stable since an observed increase in 2012. Alkalinity and TOC experienced an abrupt increase in the First Quarter 2018 but have since returned to typical post-2012 levels. pH appears to mimic the trend observed in the upgradient well at levels approximately 0.4 unit higher, on average, while fluctuating over a slightly wider range.

- MP-3 – 1,1-dichloroethane was detected in the Fourth Quarter 2019 and is, therefore, above background levels. The concentration of this VOC appears to be decreasing over time, apart from a higher detection in 2018.

  Other parameters above background in MP-3 include alkalinity (bicarbonate and total), ammonia-N, calcium, chloride, sodium, SpC, sulfate, and TOC. Concentrations of these parameters appear to be stable long-term with short-term fluctuations. Alkalinity and TOC experienced an abrupt increase in the First Quarter 2018 but have since returned to typical historical levels. pH appears to mimic the trend observed in the upgradient well at levels approximately 0.3 unit higher, on average.

- MP-4 – Parameters above background in this well include alkalinity (bicarbonate and total), chloride, sodium, SpC, and sulfate. Concentrations of these parameters appear to be increasing slowly long-term with short-term fluctuations. Alkalinity and TOC experienced an abrupt increase in the First Quarter 2019 but have since returned to near-average historical levels. pH appears to be trending slightly lower over time with a long-term average value approximately 0.6 unit higher than background.

- MP-5 – Parameters above background in this well include alkalinity (bicarbonate and total), ammonia-N, chloride, sodium, and sulfate. Concentrations of most of these parameters generally appear to be stable long-term with short-term fluctuations. Chloride appears to be stable, apart from minor fluctuations, since an increasing trend appeared to end in 2010. pH

appears to be stable over time with a long-term average value approximately 0.2 unit higher than background.

- MP-7 – Parameters above background in this well include alkalinity (bicarbonate and total), ammonia-N, chloride, sodium, SpC, and sulfate. Sulfate appears to be slowly increasing over time at a rate of approximately 1 mg/L per year. Concentrations of the other noted parameters appear to be steady long-term with minor short-term fluctuations. pH appears to mimic the trend observed in the upgradient well at levels approximately 0.2 unit higher, on average.

- MP-8 – 1,1-dichloroethane and benzene were detected in the Fourth Quarter 2019 and are, therefore, above background levels. Both VOCs appear to be decreasing over time with minor fluctuations that appear seasonal in nature.

  Other parameters above background in MP-8 include alkalinity (bicarbonate and total), ammonia-N, calcium, chloride, chemical oxygen demand (COD), iron, magnesium, manganese, potassium, sodium, SpC, sulfate, TDS, and TOC. Manganese levels appear to be slowly increasing over time. Concentrations of the other noted parameters generally appear to be steady long-term with minor fluctuations. pH appears to mimic the trend observed in the upgradient well at levels approximately 0.8 unit higher, on average, while fluctuating over a slightly narrower range.

- MP-9 – 1,1-dichloroethane and benzene were detected in the Fourth Quarter 2019 and are, therefore, above background levels. Both VOCs appear to be decreasing over time with minor fluctuations that appear seasonal in nature.

  Other parameters above background in MP-9 include alkalinity (bicarbonate and total), ammonia-N, calcium, chloride, chemical oxygen demand (COD), iron, magnesium, manganese, potassium, sodium, SpC, sulfate, TDS, and TOC. Ammonia-N, calcium, chloride, magnesium, manganese, potassium, sodium, SpC, and TDS levels appear to be slowly increasing over time. Concentrations of the other noted parameters generally appear to be steady long-term with minor fluctuations. pH appears to be trending slightly lower over time with a long-term average value approximately 0.9 unit higher than background.

- MP-10 – Parameters above background in this well include alkalinity (bicarbonate and total), calcium, chloride, magnesium, potassium, sodium, SpC, sulfate, TDS, and TOC. Concentrations of these parameters generally appear to be stable long-term with short-term fluctuations that generally mirror those observed in the upgradient well. pH appears to mimic the trend observed in the upgradient well at levels approximately 1.3 units higher, on average.

- MP-12 – Parameters above background in this well include alkalinity (bicarbonate and total), calcium, chloride, iron, manganese, SpC, sulfate, and TOC. Iron and manganese levels fluctuate over a relatively wide range of values but appear to be stable or decreasing over time. Concentrations of the other noted parameters generally appear to be stable long-term with short-term fluctuations that generally mirror those observed in the upgradient well. pH

appears to be stable over time with a long-term average value approximately 0.7 unit higher than background.

- MP-16 – Parameters above background in this well include alkalinity (bicarbonate and total) and sulfate. Concentrations of these parameters appear to be stable long-term. pH appears to be stable over time with a long-term average value approximately 0.7 unit higher than background.

- MP-17S – Surface-water grab samples are taken from Mann's Run at this location and analyzed for Form 19 parameters. Because of its upstream location relative to the majority of CWLF, this sampling point should be interpreted, to some extent, as a background evaluation point for evaluating downstream conditions in Mann's Run (i.e., at MP-18S).

  Parameters above statistical groundwater background levels at MP-17S include alkalinity (bicarbonate and total), calcium, chloride, COD, magnesium, nitrate-N, potassium, sodium, SpC, sulfate, TDS, and TOC. COD, potassium, nitrate-N, and sulfate appear to be stable or decreasing over time. Concentrations of the other noted parameters could be increasing over time, but identification of any long-term trend is challenging due to the wide range of fluctuation in the historical results. pH appears to mimic the trend observed in the upgradient well at levels approximately 2.0 units higher, on average, while fluctuating over a slightly wider range.

- MP-18S – Surface-water grab samples are taken from Mann's Run at this downstream location and analyzed for Form 19 parameters. Parameters above statistical groundwater background levels at MP-18S include calcium, chloride, COD, magnesium, manganese, nitrate-N, potassium, sodium, SpC, sulfate, TDS, and TOC. However, only COD, manganese, and TOC levels exceed those observed at the upstream sampling location MP-17S. COD levels are decreasing overall since 2001. Manganese concentrations do not appear to have a discernible long-term trend and fluctuate over a range of 0.5 mg/L. TOC levels appear to be gradually increasing since 2009. pH appears to mimic the trend observed in the upgradient well at levels approximately 2.6 units higher, on average.

Trend plots for the VOCs noted above are included in **Attachment 3**. Parameters not noted above are either at or below background levels. Overall, the groundwater quality at CWLF appears to be improving, especially with respect to VOC concentrations. Some metal and ion concentrations (e.g., calcium, sodium, and chloride) appear to be increasing slowly in some wells over time, but these water quality changes are generally gradual and do not appear to be a cause for concern at this time.

Trip and Field Blank Analyses

Three (3) trip blank samples for VOCs were received by the laboratory on October 14, 16, and 18, 2019 and analyzed on October 16, 18, and 21, 2019, respectively. No constituents were detected in the trip blank analyses.

Three (3) field blank samples were received by the laboratory on October 14, 16, and 18, 2019. The October 14 field blank was analyzed on October 16, 2019 for VOCs only. The October 16 field blank was analyzed on October 18, 2019 for VOCs only. The October 18 field blank was analyzed on October 22, 2019 for VOCs; October 22, 2019 for total metals; and between October 19-31, 2019 for wet chemistry parameters. All parameters in the field blanks were either not detected or were detected at concentrations less than the laboratory criteria.

Closing

If you have any questions regarding this water quality data evaluation, please contact the undersigned at 717-533-8600. ARM appreciates the opportunity to assist LCSWMA with its assessment of quarterly water quality data collected at CWLF.

Sincerely,
ARM Group Inc.

Ryan A. Brandon

Ryan Brandon
Project Hydrogeologist II

Scott H. Wendling

Scott Wendling, P.G.
Vice President, Sr. Project Manager

Enclosed: Table 1
Attachments 1-3

TABLE

Table 1. LCSWMA Creswell Landfill Form 19 Groundwater Monitoring Well Background Standard Comparisons - 4th Quarter 2019

Parameter	Background Standard	Units	CWMP001W	CWMP002W	CWMP003W	CWMP004W	CWMP005W	CWMP007W	CWMP008W	CWMP009W	CWMP010W	CWMP012W	CWMP016W	CWMP017S	CWMP018S
1,1,1-TRICHLOROETHANE	1*	µg/L	<1.0	1.1	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
1,1-DICHLOROETHANE	1*	µg/L	<1.0	13.2	1.3	<1.0	<1.0	<1.0	3.9	1.6	<1.0	<1.0	<1.0	<1.0	<1.0
1,1-DICHLOROETHENE	1*	µg/L	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
1,2-DIBROMOETHANE (EDB) (ETHYLENE DIBROMIDE)	1*	µg/L	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
1,2-DICHLOROETHANE	1*	µg/L	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
ALKALINITY	7	mg/L	<5	68	19	21	18	14	377	377	377	79	12	380	<5
AMMONIA-NITROGEN	0.12	mg/L	0.14	0.18	<0.100	<0.100	0.14	0.18	10	31.6	<0.100	<0.100	<0.100	<0.100	<0.100
BENZENE	1*	µg/L	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	1.9	2.7	<1.0	<1.0	<1.0	<1.0	<1.0
BICARBONATE	8.025	mg/L	<5	68	19	21	18	14	377	377	377	79	12	373	<5
CALCIUM, TOTAL	20.1	mg/L	14.7	47.6	24.5	18.2	12.7	17.3	86.2	147	84	31.1	4.9	84.2	71.2
CHLORIDE	32.6	mg/L	28.6	106	75.2	50.6	55.1	66.0	79.5	441	607	32.7	2.4	956	632
cis 1,2-DICHLOROETHENE	1*	µg/L	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
COD (CHEMICAL OXYGEN DEMAND)	11.91**	mg/L	<15	<15	<15	<15	<15	<15	46	95	<15	<15	<15	16	20
ETHYLBENZENE	1*	µg/L	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
FLUORIDE	0.2*	mg/L	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20
IRON, TOTAL	3.778	mg/L	0.660	<0.067	<0.067	<0.067	<0.067	<0.067	31.6	31	<0.067	36.5	0.52	0.79	0.37
MAGNESIUM, TOTAL	12.4	mg/L	10.0	15.5	8.6	6.7	6.8	8.7	41.6	64.9	72.3	8.3	1.1	133	83.4
MANGANESE, TOTAL	0.127	mg/L	0.055	0.95	<0.0056	0.010	0.040	0.0064	16.7	11.5	0.020	0.22	0.0058	0.11	0.17
METHYLENE CHLORIDE	1*	µg/L	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
NITRATE-NITROGEN	23.57	mg/L	19.5	4.2	7.9	6.7	8.4	9.2	<0.2	<0.2	18.5	9.8	0.48	33.0	24.4
POTASSIUM, TOTAL	2.886	mg/L	2.4	3	1.7	1.5	2.3	2.4	11.3	29.3	15.7	1.4	<0.56	16.7	15.6
SODIUM, TOTAL	15.54	mg/L	12.7	25	22.8	17.8	25.1	31	71	150	321	12.3	3	495	293
SPEC. COND., FIELD	328.3	µmho/cm	272	373	397	302	277	3,710	1,172	2,340	2,640	311	58	4,040	2,580
SPEC. COND., LAB	299.4	µmho/cm	244	557	397	306	299	336	1,230	2,420	2,840	346	63	4,410	2,840
SULFATE	2.755	mg/L	2.0	20.6	5.3	6.3	5	20.6	4.0	4.8	44.8	4.3	9.3	28.7	26.5
TDS (TOTAL DISSOLVED SOLIDS)	295	mg/L	146	302	264	200	184	178	662	1,230	1,330	266	100	2,330	1,480
TETRACHLOROETHENE	1*	µg/L	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
TOC (TOTAL ORGANIC CARBON)	1.138	mg/L	<0.50	3.8	1.2	0.67	0.60	<0.50	17.7	33.1	5.2	1.7	<0.50	5	7.9
TOLUENE	1*	µg/L	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
TOTAL PHENOLICS	0.005*	mg/L	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
trans 1,2-DICHLOROETHENE	1*	µg/L	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
TRICHLOROETHENE	1*	µg/L	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
TURBIDITY	181	NTU	30.5	0.74	0.62	0.10	0.41	0.27	37.4	39.8	0.56	98.5	6.49	2.33	5.72
VINYL CHLORIDE	1*	µg/L	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
XYLENES (TOTAL)	3*	µg/L	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0

Notes:
*Reporting limit substituted for background standard due to lack of historical detections in CWMP001W.
**COD historical background standard is lower than the current lab reporting limits.

ATTACHMENT 1

BACKGROUND UPPER PREDICTION LIMITS

LCSWMA Creswell Landfill 4th Quarter 2019 - Background Upper Prediction Limits (MP-1)			
Parameter	**Distribution**	**Upper Prediction Limit**	**Unit**
1,1,1-Trichloroethane	NA	1*	µg/L
1,1-Dichloroethane	NA	1*	µg/L
1,1-Dichloroethene	NA	1*	µg/L
1,2-Dibromoethane	NA	1*	µg/L
1,2-Dichloroethane	NA	1*	µg/L
Alkalinity	No Distribution	7	mg/L
Ammonia-Nitrogen	No Distribution	0.12	mg/L
Benzene	NA	1*	µg/L
Bicarbonate Alkalinity	No Distribution	8.025	mg/L
Calcium, Dissolved	No Distribution	19.2	mg/L
Calcium, Total	No Distribution	20.1	mg/L
Chloride	No Distribution	32.6	mg/L
Cis 1,2-Dichloroethene	NA	1*	µg/L
Chemical Oxygen Demand	Normal	11.91	mg/L
Ethylbenzene	NA	1*	µg/L
Fluoride	NA	0.2*	mg/L
Iron, Dissolved	Lognormal	0.258	mg/L
Iron, Total	Lognormal	3.778	mg/L
Magnesium, Dissolved	No Distribution	12.43	mg/L
Magnesium, Total	No Distribution	12.4	mg/L
Manganese, Dissolved	No Distribution	0.128	mg/L
Manganese, Total	No Distribution	0.127	mg/L
Methylene Chloride	NA	1*	µg/L
Nitrate-Nitrogen	No Distribution	23.57	mg/L
pH-Field	No Distribution	None**	S.U.
pH-Lab	Normal	None**	S.U.
Potassium, Dissolved	No Distribution	3.064	mg/L
Potassium, Total	Normal	2.886	mg/L
Sodium, Dissolved	Normal	15.12	mg/L
Sodium, Total	Normal	15.54	mg/L
Spec. Cond., Field	Normal	328.3	µmhos/cm
Spec. Cond., Lab	No Distribution	299.4	µmhos/cm
Sulfate	Normal	2.755	mg/L
Total Dissolved Solids	Normal	259	mg/L
Tetrachloroethene	NA	1*	µg/L
Total Organic Carbon	Normal	1.138	mg/L
Toluene	NA	1*	µg/L
Total Phenolics	NA	0.005*	mg/L
Trans 1,2-Dichloroethene	NA	1*	µg/L
Trichloroethene	NA	1*	µg/L
Turbidity	Lognormal	181	NTU
Vinyl Chloride	NA	1*	µg/L
Total Xylenes	NA	3*	µg/L

Notes:

"NA" denotes parameter not detected or not enough detections in MP-1 over course of historical data to develop tolerance limits.

* Reporting limit substituted for background standard due to lack of historical detections.

** One-sided background standards are not appropriate for pH. Other analysis used in report.

ATTACHMENT 2

STATISTICAL CALCULATION SHEETS

1				Background Statistics for Data Sets with Non-Detects								
2		User Selected Options										
3		Date/Time of Computation		ProUCL 5.112/18/2019 3:35:44 PM								
4		From File		MW-7 ProUCL Entry.xls								
5		Full Precision		OFF								
6		Confidence Coefficient		95%								
7		Coverage		95%								
8		Different or Future K Observations		1								
9		Number of Bootstrap Operations		2000								
10												
11	1,1,1-TRICHLOROETHANE (ug/L)											
12												
13					General Statistics							
14				Total Number of Observations	25			Number of Missing Observations	0			
15				Number of Distinct Observations	2							
16				Number of Detects	0			Number of Non-Detects	25			
17				Number of Distinct Detects	0			Number of Distinct Non-Detects	2			
18				Minimum Detect	N/A			Minimum Non-Detect	0.5			
19				Maximum Detect	N/A			Maximum Non-Detect	1			
20				Variance Detected	N/A			Percent Non-Detects	100%			
21				Mean Detected	N/A			SD Detected	N/A			
22				Mean of Detected Logged Data	N/A			SD of Detected Logged Data	N/A			
23												
24				Warning: All observations are Non-Detects (NDs), therefore all statistics and estimates should also be NDs!								
25				Specifically, sample mean, UCLs, UPLs, and other statistics are also NDs lying below the largest detection limit!								
26				The Project Team may decide to use alternative site specific values to estimate environmental parameters (e.g., EPC, BTV).								
27												
28				The data set for variable 1,1,1-TRICHLOROETHANE (ug/L) was not processed!								
29												
30												
31	1,1-DICHLOROETHANE (ug/L)											
32												
33					General Statistics							
34				Total Number of Observations	25			Number of Missing Observations	0			
35				Number of Distinct Observations	2							
36				Number of Detects	0			Number of Non-Detects	25			
37				Number of Distinct Detects	0			Number of Distinct Non-Detects	2			
38				Minimum Detect	N/A			Minimum Non-Detect	0.5			
39				Maximum Detect	N/A			Maximum Non-Detect	1			
40				Variance Detected	N/A			Percent Non-Detects	100%			
41				Mean Detected	N/A			SD Detected	N/A			
42				Mean of Detected Logged Data	N/A			SD of Detected Logged Data	N/A			
43												
44				Warning: All observations are Non-Detects (NDs), therefore all statistics and estimates should also be NDs!								
45				Specifically, sample mean, UCLs, UPLs, and other statistics are also NDs lying below the largest detection limit!								
46				The Project Team may decide to use alternative site specific values to estimate environmental parameters (e.g., EPC, BTV).								
47												
48				The data set for variable 1,1-DICHLOROETHANE (ug/L) was not processed!								
49												
50												

	A	B	C	D	E	F	G	H	I	J	K	L
51	1,1-DICHLOROETHENE (ug/L)											
52												
53	General Statistics											
54	Total Number of Observations					25	Number of Missing Observations					0
55	Number of Distinct Observations					2						
56	Number of Detects					0	Number of Non-Detects					25
57	Number of Distinct Detects					0	Number of Distinct Non-Detects					2
58	Minimum Detect					N/A	Minimum Non-Detect					0.5
59	Maximum Detect					N/A	Maximum Non-Detect					1
60	Variance Detected					N/A	Percent Non-Detects					100%
61	Mean Detected					N/A	SD Detected					N/A
62	Mean of Detected Logged Data					N/A	SD of Detected Logged Data					N/A
63												
64	Warning: All observations are Non-Detects (NDs), therefore all statistics and estimates should also be NDs!											
65	Specifically, sample mean, UCLs, UPLs, and other statistics are also NDs lying below the largest detection limit!											
66	The Project Team may decide to use alternative site specific values to estimate environmental parameters (e.g., EPC, BTV).											
67												
68	The data set for variable 1,1-DICHLOROETHENE (ug/L) was not processed!											
69												
70												
71	1,2-DIBROMOETHANE (ug/L)											
72												
73	General Statistics											
74	Total Number of Observations					25	Number of Missing Observations					0
75	Number of Distinct Observations					2						
76	Number of Detects					0	Number of Non-Detects					25
77	Number of Distinct Detects					0	Number of Distinct Non-Detects					2
78	Minimum Detect					N/A	Minimum Non-Detect					0.5
79	Maximum Detect					N/A	Maximum Non-Detect					1
80	Variance Detected					N/A	Percent Non-Detects					100%
81	Mean Detected					N/A	SD Detected					N/A
82	Mean of Detected Logged Data					N/A	SD of Detected Logged Data					N/A
83												
84	Warning: All observations are Non-Detects (NDs), therefore all statistics and estimates should also be NDs!											
85	Specifically, sample mean, UCLs, UPLs, and other statistics are also NDs lying below the largest detection limit!											
86	The Project Team may decide to use alternative site specific values to estimate environmental parameters (e.g., EPC, BTV).											
87												
88	The data set for variable 1,2-DIBROMOETHANE (ug/L) was not processed!											
89												
90												
91	1,2-DICHLOROETHANE											
92												
93	General Statistics											
94	Total Number of Observations					25	Number of Missing Observations					0
95	Number of Distinct Observations					2						
96	Number of Detects					0	Number of Non-Detects					25
97	Number of Distinct Detects					0	Number of Distinct Non-Detects					2
98	Minimum Detect					N/A	Minimum Non-Detect					0.5
99	Maximum Detect					N/A	Maximum Non-Detect					1
100	Variance Detected					N/A	Percent Non-Detects					100%

101					Mean Detected	N/A					SD Detected	N/A
102					Mean of Detected Logged Data	N/A					SD of Detected Logged Data	N/A
103												
104	**Warning: All observations are Non-Detects (NDs), therefore all statistics and estimates should also be NDs!**											
105	**Specifically, sample mean, UCLs, UPLs, and other statistics are also NDs lying below the largest detection limit!**											
106	**The Project Team may decide to use alternative site specific values to estimate environmental parameters (e.g., EPC, BTV).**											
107												
108	**The data set for variable 1,2-DICHLOROETHANE was not processed!**											
109												
110												
111	**ALKALINITY (mg/L)**											
112												
113	**General Statistics**											
114					Total Number of Observations	25					Number of Distinct Observations	23
115					Minimum	244					First Quartile	273
116					Second Largest	326					Median	287
117					Maximum	332					Third Quartile	302
118					Mean	286.9					SD	24.7
119					Coefficient of Variation	0.0861					Skewness	-0.013
120					Mean of logged Data	5.656					SD of logged Data	0.0867
121												
122	**Critical Values for Background Threshold Values (BTVs)**											
123					Tolerance Factor K (For UTL)	2.292					d2max (for USL)	2.663
124												
125	**Normal GOF Test**											
126					Shapiro Wilk Test Statistic	0.968					**Shapiro Wilk GOF Test**	
127					5% Shapiro Wilk Critical Value	0.918					Data appear Normal at 5% Significance Level	
128					Lilliefors Test Statistic	0.0871					**Lilliefors GOF Test**	
129					5% Lilliefors Critical Value	0.173					Data appear Normal at 5% Significance Level	
130	**Data appear Normal at 5% Significance Level**											
131												
132	**Background Statistics Assuming Normal Distribution**											
133					95% UTL with 95% Coverage	343.6					90% Percentile (z)	318.6
134					95% UPL (t)	330					95% Percentile (z)	327.6
135					95% USL	352.7					99% Percentile (z)	344.4
136												
137	**Gamma GOF Test**											
138					A-D Test Statistic	0.254					**Anderson-Darling Gamma GOF Test**	
139					5% A-D Critical Value	0.742					Detected data appear Gamma Distributed at 5% Significance Level	
140					K-S Test Statistic	0.0954					**Kolmogorov-Smirnov Gamma GOF Test**	
141					5% K-S Critical Value	0.174					Detected data appear Gamma Distributed at 5% Significance Level	
142	**Detected data appear Gamma Distributed at 5% Significance Level**											
143												
144	**Gamma Statistics**											
145					k hat (MLE)	139.5					k star (bias corrected MLE)	122.8
146					Theta hat (MLE)	2.057					Theta star (bias corrected MLE)	2.337
147					nu hat (MLE)	6976					nu star (bias corrected)	6140
148					MLE Mean (bias corrected)	286.9					MLE Sd (bias corrected)	25.89
149												
150	**Background Statistics Assuming Gamma Distribution**											

151	95% Wilson Hilferty (WH) Approx. Gamma UPL					331.7	90% Percentile					320.6
152	95% Hawkins Wixley (HW) Approx. Gamma UPL					331.9	95% Percentile					330.8
153	95% WH Approx. Gamma UTL with 95% Coverage					346.8	99% Percentile					350.6
154	95% HW Approx. Gamma UTL with 95% Coverage					347.3						
155	95% WH USL					357.4	95% HW USL					358
156												
157	**Lognormal GOF Test**											
158	Shapiro Wilk Test Statistic					0.965	**Shapiro Wilk Lognormal GOF Test**					
159	5% Shapiro Wilk Critical Value					0.918	Data appear Lognormal at 5% Significance Level					
160	Lilliefors Test Statistic					0.0955	**Lilliefors Lognormal GOF Test**					
161	5% Lilliefors Critical Value					0.173	Data appear Lognormal at 5% Significance Level					
162	**Data appear Lognormal at 5% Significance Level**											
163												
164	**Background Statistics assuming Lognormal Distribution**											
165	95% UTL with 95% Coverage					348.7	90% Percentile (z)					319.5
166	95% UPL (t)					332.6	95% Percentile (z)					329.7
167	95% USL					360.1	99% Percentile (z)					349.8
168												
169	**Nonparametric Distribution Free Background Statistics**											
170	**Data appear Normal at 5% Significance Level**											
171												
172	**Nonparametric Upper Limits for Background Threshold Values**											
173	Order of Statistic, r					25	95% UTL with 95% Coverage					332
174	Approx, f used to compute achieved CC					1.316	Approximate Actual Confidence Coefficient achieved by UTL					0.723
175							Approximate Sample Size needed to achieve specified CC					59
176	95% Percentile Bootstrap UTL with 95% Coverage					332	95% BCA Bootstrap UTL with 95% Coverage					332
177	95% UPL					330.2	90% Percentile					321.2
178	90% Chebyshev UPL					362.5	95% Percentile					325.2
179	95% Chebyshev UPL					396.7	99% Percentile					330.6
180	95% USL					332						
181												
182	Note: The use of USL tends to yield a conservative estimate of BTV, especially when the sample size starts exceeding 20.											
183	Therefore, one may use USL to estimate a BTV only when the data set represents a background data set free of outliers											
184	and consists of observations collected from clean unimpacted locations.											
185	The use of USL tends to provide a balance between false positives and false negatives provided the data											
186	represents a background data set and when many onsite observations need to be compared with the BTV.											
187												
188	**AMMONIA-NITROGEN (mg/L)**											
189												
190	**General Statistics**											
191	Total Number of Observations					25	Number of Missing Observations					0
192	Number of Distinct Observations					15						
193	Number of Detects					18	Number of Non-Detects					7
194	Number of Distinct Detects					15	Number of Distinct Non-Detects					1
195	Minimum Detect					0.1	Minimum Non-Detect					0.1
196	Maximum Detect					0.33	Maximum Non-Detect					0.1
197	Variance Detected					0.00585	Percent Non-Detects					28%
198	Mean Detected					0.192	SD Detected					0.0765
199	Mean of Detected Logged Data					-1.727	SD of Detected Logged Data					0.411
200												

201	**Critical Values for Background Threshold Values (BTVs)**											
202					Tolerance Factor K (For UTL)	2.292				d2max (for USL)		2.663
203												
204	**Normal GOF Test on Detects Only**											
205					Shapiro Wilk Test Statistic	0.908	**Shapiro Wilk GOF Test**					
206					5% Shapiro Wilk Critical Value	0.897	Detected Data appear Normal at 5% Significance Level					
207					Lilliefors Test Statistic	0.197	**Lilliefors GOF Test**					
208					5% Lilliefors Critical Value	0.202	Detected Data appear Normal at 5% Significance Level					
209	**Detected Data appear Normal at 5% Significance Level**											
210												
211	**Kaplan Meier (KM) Background Statistics Assuming Normal Distribution**											
212					KM Mean	0.166				KM SD		0.0755
213					95% UTL95% Coverage	0.339				95% KM UPL (t)		0.298
214					90% KM Percentile (z)	0.263				95% KM Percentile (z)		0.291
215					99% KM Percentile (z)	0.342				95% KM USL		0.367
216												
217	**DL/2 Substitution Background Statistics Assuming Normal Distribution**											
218					Mean	0.152				SD		0.0916
219					95% UTL95% Coverage	0.362				95% UPL (t)		0.312
220					90% Percentile (z)	0.27				95% Percentile (z)		0.303
221					99% Percentile (z)	0.366				95% USL		0.396
222	**DL/2 is not a recommended method. DL/2 provided for comparisons and historical reasons**											
223												
224	**Gamma GOF Tests on Detected Observations Only**											
225					A-D Test Statistic	0.669	**Anderson-Darling GOF Test**					
226					5% A-D Critical Value	0.742	Detected data appear Gamma Distributed at 5% Significance Level					
227					K-S Test Statistic	0.183	**Kolmogorov-Smirnov GOF**					
228					5% K-S Critical Value	0.204	Detected data appear Gamma Distributed at 5% Significance Level					
229	**Detected data appear Gamma Distributed at 5% Significance Level**											
230												
231	**Gamma Statistics on Detected Data Only**											
232					k hat (MLE)	6.566				k star (bias corrected MLE)		5.509
233					Theta hat (MLE)	0.0293				Theta star (bias corrected MLE)		0.0349
234					nu hat (MLE)	236.4				nu star (bias corrected)		198.3
235					MLE Mean (bias corrected)	0.192						
236					MLE Sd (bias corrected)	0.0819				95% Percentile of Chisquare (2kstar)		19.7
237												
238	**Gamma ROS Statistics using Imputed Non-Detects**											
239	GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs											
240	GROS may not be used when kstar of detects is small such as <1.0, especially when the sample size is small (e.g., <15-20)											
241	For such situations, GROS method may yield incorrect values of UCLs and BTVs											
242	This is especially true when the sample size is small.											
243	For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates											
244					Minimum	0.01				Mean		0.151
245					Maximum	0.33				Median		0.13
246					SD	0.0938				CV		0.621
247					k hat (MLE)	2.001				k star (bias corrected MLE)		1.788
248					Theta hat (MLE)	0.0756				Theta star (bias corrected MLE)		0.0846
249					nu hat (MLE)	100				nu star (bias corrected)		89.38
250					MLE Mean (bias corrected)	0.151				MLE Sd (bias corrected)		0.113

251	95% Percentile of Chisquare (2kstar)					8.79	90% Percentile					0.302
252	95% Percentile					0.372	99% Percentile					0.528
253	**The following statistics are computed using Gamma ROS Statistics on Imputed Data**											
254	**Upper Limits using Wilson Hilferty (WH) and Hawkins Wixley (HW) Methods**											
255					WH	HW					WH	HW
256	95% Approx. Gamma UTL with 95% Coverage				0.504	0.549	95% Approx. Gamma UPL				0.383	0.405
257	95% Gamma USL				0.599	0.668						
258												
259	**Estimates of Gamma Parameters using KM Estimates**											
260	Mean (KM)					0.166	SD (KM)					0.0755
261	Variance (KM)					0.0057	SE of Mean (KM)					0.0155
262	k hat (KM)					4.862	k star (KM)					4.305
263	nu hat (KM)					243.1	nu star (KM)					215.3
264	theta hat (KM)					0.0342	theta star (KM)					0.0387
265	80% gamma percentile (KM)					0.227	90% gamma percentile (KM)					0.274
266	95% gamma percentile (KM)					0.316	99% gamma percentile (KM)					0.407
267												
268	**The following statistics are computed using gamma distribution and KM estimates**											
269	**Upper Limits using Wilson Hilferty (WH) and Hawkins Wixley (HW) Methods**											
270					WH	HW					WH	HW
271	95% Approx. Gamma UTL with 95% Coverage				0.372	0.378	95% Approx. Gamma UPL				0.309	0.311
272	95% KM Gamma Percentile				0.298	0.3	95% Gamma USL				0.419	0.43
273												
274	**Lognormal GOF Test on Detected Observations Only**											
275	Shapiro Wilk Test Statistic					0.909	**Shapiro Wilk GOF Test**					
276	5% Shapiro Wilk Critical Value					0.897	Detected Data appear Lognormal at 5% Significance Level					
277	Lilliefors Test Statistic					0.166	**Lilliefors GOF Test**					
278	5% Lilliefors Critical Value					0.202	Detected Data appear Lognormal at 5% Significance Level					
279	**Detected Data appear Lognormal at 5% Significance Level**											
280												
281	**Background Lognormal ROS Statistics Assuming Lognormal Distribution Using Imputed Non-Detects**											
282	Mean in Original Scale					0.158	Mean in Log Scale					-2.002
283	SD in Original Scale					0.0862	SD in Log Scale					0.581
284	95% UTL95% Coverage					0.511	95% BCA UTL95% Coverage					0.33
285	95% Bootstrap (%) UTL95% Coverage					0.33	95% UPL (t)					0.372
286	90% Percentile (z)					0.284	95% Percentile (z)					0.351
287	99% Percentile (z)					0.521	95% USL					0.634
288												
289	**Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution**											
290	KM Mean of Logged Data					-1.888	95% KM UTL (Lognormal)95% Coverage					0.402
291	KM SD of Logged Data					0.426	95% KM UPL (Lognormal)					0.318
292	95% KM Percentile Lognormal (z)					0.305	95% KM USL (Lognormal)					0.471
293												
294	**Background DL/2 Statistics Assuming Lognormal Distribution**											
295	Mean in Original Scale					0.152	Mean in Log Scale					-2.082
296	SD in Original Scale					0.0916	SD in Log Scale					0.676
297	95% UTL95% Coverage					0.588	95% UPL (t)					0.406
298	90% Percentile (z)					0.297	95% Percentile (z)					0.379
299	99% Percentile (z)					0.601	95% USL					0.755
300	**DL/2 is not a Recommended Method. DL/2 provided for comparisons and historical reasons.**											

	A	B	C	D	E	F	G	H	I	J	K	L
301												
302	**Nonparametric Distribution Free Background Statistics**											
303	**Data appear to follow a Discernible Distribution at 5% Significance Level**											
304												
305	**Nonparametric Upper Limits for BTVs(no distinction made between detects and nondetects)**											
306	Order of Statistic, r					25	95% UTL with95% Coverage					0.33
307	Approx, f used to compute achieved CC					1.316	Approximate Actual Confidence Coefficient achieved by UTL					0.723
308	Approximate Sample Size needed to achieve specified CC					59	95% UPL					0.321
309	95% USL					0.33	95% KM Chebyshev UPL					0.502
310												
311	Note: The use of USL tends to yield a conservative estimate of BTV, especially when the sample size starts exceeding 20.											
312	Therefore, one may use USL to estimate a BTV only when the data set represents a background data set free of outliers											
313	and consists of observations collected from clean unimpacted locations.											
314	The use of USL tends to provide a balance between false positives and false negatives provided the data											
315	represents a background data set and when many onsite observations need to be compared with the BTV.											
316												
317	**BENZENE (ug/L)**											
318												
319	**General Statistics**											
320	Total Number of Observations					25	Number of Missing Observations					0
321	Number of Distinct Observations					2						
322	Number of Detects					0	Number of Non-Detects					25
323	Number of Distinct Detects					0	Number of Distinct Non-Detects					2
324	Minimum Detect					N/A	Minimum Non-Detect					0.5
325	Maximum Detect					N/A	Maximum Non-Detect					1
326	Variance Detected					N/A	Percent Non-Detects					100%
327	Mean Detected					N/A	SD Detected					N/A
328	Mean of Detected Logged Data					N/A	SD of Detected Logged Data					N/A
329												
330	**Warning: All observations are Non-Detects (NDs), therefore all statistics and estimates should also be NDs!**											
331	**Specifically, sample mean, UCLs, UPLs, and other statistics are also NDs lying below the largest detection limit!**											
332	**The Project Team may decide to use alternative site specific values to estimate environmental parameters (e.g., EPC, BTV).**											
333												
334	**The data set for variable BENZENE (ug/L) was not processed!**											
335												
336												
337	**BICARBONATE ALKALINITY (mg/L)**											
338												
339	**General Statistics**											
340	Total Number of Observations					25	Number of Distinct Observations					23
341	Minimum					244	First Quartile					273
342	Second Largest					326	Median					287
343	Maximum					332	Third Quartile					302
344	Mean					286.9	SD					24.7
345	Coefficient of Variation					0.0861	Skewness					-0.013
346	Mean of logged Data					5.656	SD of logged Data					0.0867
347												
348	**Critical Values for Background Threshold Values (BTVs)**											
349	Tolerance Factor K (For UTL)					2.292	d2max (for USL)					2.663
350												

	A	B	C	D	E	F	G	H	I	J	K	L
351	**Normal GOF Test**											
352					Shapiro Wilk Test Statistic	0.968	**Shapiro Wilk GOF Test**					
353					5% Shapiro Wilk Critical Value	0.918	Data appear Normal at 5% Significance Level					
354					Lilliefors Test Statistic	0.0871	**Lilliefors GOF Test**					
355					5% Lilliefors Critical Value	0.173	Data appear Normal at 5% Significance Level					
356	**Data appear Normal at 5% Significance Level**											
357												
358	**Background Statistics Assuming Normal Distribution**											
359				95% UTL with	95% Coverage	343.6			90% Percentile (z)	318.6		
360					95% UPL (t)	330			95% Percentile (z)	327.6		
361					95% USL	352.7			99% Percentile (z)	344.4		
362												
363	**Gamma GOF Test**											
364					A-D Test Statistic	0.254	**Anderson-Darling Gamma GOF Test**					
365					5% A-D Critical Value	0.742	Detected data appear Gamma Distributed at 5% Significance Level					
366					K-S Test Statistic	0.0954	**Kolmogorov-Smirnov Gamma GOF Test**					
367					5% K-S Critical Value	0.174	Detected data appear Gamma Distributed at 5% Significance Level					
368	**Detected data appear Gamma Distributed at 5% Significance Level**											
369												
370	**Gamma Statistics**											
371					k hat (MLE)	139.5			k star (bias corrected MLE)	122.8		
372					Theta hat (MLE)	2.057			Theta star (bias corrected MLE)	2.337		
373					nu hat (MLE)	6976			nu star (bias corrected)	6140		
374					MLE Mean (bias corrected)	286.9			MLE Sd (bias corrected)	25.89		
375												
376	**Background Statistics Assuming Gamma Distribution**											
377				95% Wilson Hilferty (WH) Approx. Gamma UPL		331.7			90% Percentile	320.6		
378				95% Hawkins Wixley (HW) Approx. Gamma UPL		331.9			95% Percentile	330.8		
379				95% WH Approx. Gamma UTL with	95% Coverage	346.8			99% Percentile	350.6		
380				95% HW Approx. Gamma UTL with	95% Coverage	347.3						
381					95% WH USL	357.4			95% HW USL	358		
382												
383	**Lognormal GOF Test**											
384					Shapiro Wilk Test Statistic	0.965	**Shapiro Wilk Lognormal GOF Test**					
385					5% Shapiro Wilk Critical Value	0.918	Data appear Lognormal at 5% Significance Level					
386					Lilliefors Test Statistic	0.0955	**Lilliefors Lognormal GOF Test**					
387					5% Lilliefors Critical Value	0.173	Data appear Lognormal at 5% Significance Level					
388	**Data appear Lognormal at 5% Significance Level**											
389												
390	**Background Statistics assuming Lognormal Distribution**											
391				95% UTL with	95% Coverage	348.7			90% Percentile (z)	319.5		
392					95% UPL (t)	332.6			95% Percentile (z)	329.7		
393					95% USL	360.1			99% Percentile (z)	349.8		
394												
395	**Nonparametric Distribution Free Background Statistics**											
396	**Data appear Normal at 5% Significance Level**											
397												
398	**Nonparametric Upper Limits for Background Threshold Values**											
399					Order of Statistic, r	25			95% UTL with	95% Coverage	332	
400					Approx, f used to compute achieved CC	1.316			Approximate Actual Confidence Coefficient achieved by UTL	0.723		

401							Approximate Sample Size needed to achieve specified CC					59
402	95% Percentile Bootstrap UTL with 95% Coverage					332	95% BCA Bootstrap UTL with 95% Coverage					330.8
403	95% UPL					330.2	90% Percentile					321.2
404	90% Chebyshev UPL					362.5	95% Percentile					325.2
405	95% Chebyshev UPL					396.7	99% Percentile					330.6
406	95% USL					332						
407												
408	Note: The use of USL tends to yield a conservative estimate of BTV, especially when the sample size starts exceeding 20.											
409	Therefore, one may use USL to estimate a BTV only when the data set represents a background data set free of outliers											
410	and consists of observations collected from clean unimpacted locations.											
411	The use of USL tends to provide a balance between false positives and false negatives provided the data											
412	represents a background data set and when many onsite observations need to be compared with the BTV.											
413												
414	**CALCIUM, TOTAL (mg/L)**											
415												
416	**General Statistics**											
417	Total Number of Observations					25	Number of Distinct Observations					20
418	Minimum					85.5	First Quartile					103
419	Second Largest					156	Median					113
420	Maximum					156	Third Quartile					135
421	Mean					117.5	SD					21.91
422	Coefficient of Variation					0.186	Skewness					0.472
423	Mean of logged Data					4.75	SD of logged Data					0.183
424												
425	**Critical Values for Background Threshold Values (BTVs)**											
426	Tolerance Factor K (For UTL)					2.292	d2max (for USL)					2.663
427												
428	**Normal GOF Test**											
429	Shapiro Wilk Test Statistic					0.919	**Shapiro Wilk GOF Test**					
430	5% Shapiro Wilk Critical Value					0.918	Data appear Normal at 5% Significance Level					
431	Lilliefors Test Statistic					0.185	**Lilliefors GOF Test**					
432	5% Lilliefors Critical Value					0.173	Data Not Normal at 5% Significance Level					
433	**Data appear Approximate Normal at 5% Significance Level**											
434												
435	**Background Statistics Assuming Normal Distribution**											
436	95% UTL with 95% Coverage					167.7	90% Percentile (z)					145.6
437	95% UPL (t)					155.7	95% Percentile (z)					153.5
438	95% USL					175.8	99% Percentile (z)					168.4
439												
440	**Gamma GOF Test**											
441	A-D Test Statistic					0.616	**Anderson-Darling Gamma GOF Test**					
442	5% A-D Critical Value					0.743	Detected data appear Gamma Distributed at 5% Significance Level					
443	K-S Test Statistic					0.163	**Kolmogorov-Smirnov Gamma GOF Test**					
444	5% K-S Critical Value					0.174	Detected data appear Gamma Distributed at 5% Significance Level					
445	**Detected data appear Gamma Distributed at 5% Significance Level**											
446												
447	**Gamma Statistics**											
448	k hat (MLE)					30.82	k star (bias corrected MLE)					27.15
449	Theta hat (MLE)					3.811	Theta star (bias corrected MLE)					4.327
450	nu hat (MLE)					1541	nu star (bias corrected)					1358

451					MLE Mean (bias corrected)	117.5				MLE Sd (bias corrected)		22.55
452												
453					**Background Statistics Assuming Gamma Distribution**							
454				95% Wilson Hilferty (WH) Approx. Gamma UPL		157.8				90% Percentile		147.1
455				95% Hawkins Wixley (HW) Approx. Gamma UPL		158.1				95% Percentile		156.9
456				95% WH Approx. Gamma UTL with 95% Coverage		172.6				99% Percentile		176.2
457				95% HW Approx. Gamma UTL with 95% Coverage		173.4						
458					95% WH USL	183.2				95% HW USL		184.4
459												
460					**Lognormal GOF Test**							
461					Shapiro Wilk Test Statistic	0.939				**Shapiro Wilk Lognormal GOF Test**		
462					5% Shapiro Wilk Critical Value	0.918				Data appear Lognormal at 5% Significance Level		
463					Lilliefors Test Statistic	0.151				**Lilliefors Lognormal GOF Test**		
464					5% Lilliefors Critical Value	0.173				Data appear Lognormal at 5% Significance Level		
465					**Data appear Lognormal at 5% Significance Level**							
466												
467					**Background Statistics assuming Lognormal Distribution**							
468					95% UTL with 95% Coverage	176				90% Percentile (z)		146.2
469					95% UPL (t)	159.2				95% Percentile (z)		156.3
470					95% USL	188.4				99% Percentile (z)		177.1
471												
472					**Nonparametric Distribution Free Background Statistics**							
473					**Data appear Approximate Normal at 5% Significance Level**							
474												
475					**Nonparametric Upper Limits for Background Threshold Values**							
476					Order of Statistic, r	25				95% UTL with 95% Coverage		156
477					Approx, f used to compute achieved CC	1.316				Approximate Actual Confidence Coefficient achieved by UTL		0.723
478										Approximate Sample Size needed to achieve specified CC		59
479				95% Percentile Bootstrap UTL with 95% Coverage		156				95% BCA Bootstrap UTL with 95% Coverage		156
480					95% UPL	156				90% Percentile		149.6
481					90% Chebyshev UPL	184.5				95% Percentile		154.8
482					95% Chebyshev UPL	214.9				99% Percentile		156
483					95% USL	156						
484												
485					Note: The use of USL tends to yield a conservative estimate of BTV, especially when the sample size starts exceeding 20.							
486					Therefore, one may use USL to estimate a BTV only when the data set represents a background data set free of outliers							
487					and consists of observations collected from clean unimpacted locations.							
488					The use of USL tends to provide a balance between false positives and false negatives provided the data							
489					represents a background data set and when many onsite observations need to be compared with the BTV.							
490												
491	**CHLORIDE (mg/L)**											
492												
493	**General Statistics**											
494					Total Number of Observations	25				Number of Distinct Observations		23
495					Minimum	95.5				First Quartile		136
496					Second Largest	182				Median		143.7
497					Maximum	188				Third Quartile		158
498					Mean	145.3				SD		26.06
499					Coefficient of Variation	0.179				Skewness		-0.248
500					Mean of logged Data	4.962				SD of logged Data		0.189

	A	B	C	D	E	F	G	H	I	J	K	L
501												
502	**Critical Values for Background Threshold Values (BTVs)**											
503					Tolerance Factor K (For UTL)	2.292				d2max (for USL)		2.663
504												
505	**Normal GOF Test**											
506					Shapiro Wilk Test Statistic	0.952	**Shapiro Wilk GOF Test**					
507					5% Shapiro Wilk Critical Value	0.918	Data appear Normal at 5% Significance Level					
508					Lilliefors Test Statistic	0.121	**Lilliefors GOF Test**					
509					5% Lilliefors Critical Value	0.173	Data appear Normal at 5% Significance Level					
510	**Data appear Normal at 5% Significance Level**											
511												
512	**Background Statistics Assuming Normal Distribution**											
513				95% UTL with	95% Coverage	205				90% Percentile (z)		178.7
514					95% UPL (t)	190.7				95% Percentile (z)		188.1
515					95% USL	214.7				99% Percentile (z)		205.9
516												
517	**Gamma GOF Test**											
518					A-D Test Statistic	0.544	**Anderson-Darling Gamma GOF Test**					
519					5% A-D Critical Value	0.743	Detected data appear Gamma Distributed at 5% Significance Level					
520					K-S Test Statistic	0.142	**Kolmogorov-Smirnov Gamma GOF Test**					
521					5% K-S Critical Value	0.174	Detected data appear Gamma Distributed at 5% Significance Level					
522	**Detected data appear Gamma Distributed at 5% Significance Level**											
523												
524	**Gamma Statistics**											
525					k hat (MLE)	30.47				k star (bias corrected MLE)		26.84
526					Theta hat (MLE)	4.768				Theta star (bias corrected MLE)		5.413
527					nu hat (MLE)	1523				nu star (bias corrected)		1342
528					MLE Mean (bias corrected)	145.3				MLE Sd (bias corrected)		28.04
529												
530	**Background Statistics Assuming Gamma Distribution**											
531				95% Wilson Hilferty (WH) Approx. Gamma UPL		195.4				90% Percentile		182.2
532				95% Hawkins Wixley (HW) Approx. Gamma UPL		196.2				95% Percentile		194.3
533				95% WH Approx. Gamma UTL with	95% Coverage	213.9				99% Percentile		218.3
534				95% HW Approx. Gamma UTL with	95% Coverage	215.4						
535					95% WH USL	227.1				95% HW USL		229.1
536												
537	**Lognormal GOF Test**											
538					Shapiro Wilk Test Statistic	0.931	**Shapiro Wilk Lognormal GOF Test**					
539					5% Shapiro Wilk Critical Value	0.918	Data appear Lognormal at 5% Significance Level					
540					Lilliefors Test Statistic	0.157	**Lilliefors Lognormal GOF Test**					
541					5% Lilliefors Critical Value	0.173	Data appear Lognormal at 5% Significance Level					
542	**Data appear Lognormal at 5% Significance Level**											
543												
544	**Background Statistics assuming Lognormal Distribution**											
545				95% UTL with	95% Coverage	220.3				90% Percentile (z)		182
546					95% UPL (t)	198.7				95% Percentile (z)		195
547					95% USL	236.3				99% Percentile (z)		221.7
548												
549	**Nonparametric Distribution Free Background Statistics**											
550	**Data appear Normal at 5% Significance Level**											

551												
552	**Nonparametric Upper Limits for Background Threshold Values**											
553					Order of Statistic, r	25			95% UTL with 95% Coverage		188	
554					Approx, f used to compute achieved CC	1.316			Approximate Actual Confidence Coefficient achieved by UTL		0.723	
555									Approximate Sample Size needed to achieve specified CC		59	
556					95% Percentile Bootstrap UTL with 95% Coverage	188			95% BCA Bootstrap UTL with 95% Coverage		186.8	
557					95% UPL	186.2			90% Percentile		180	
558					90% Chebyshev UPL	225			95% Percentile		182	
559					95% Chebyshev UPL	261.1			99% Percentile		186.6	
560					95% USL	188						
561												
562	Note: The use of USL tends to yield a conservative estimate of BTV, especially when the sample size starts exceeding 20.											
563	Therefore, one may use USL to estimate a BTV only when the data set represents a background data set free of outliers											
564	and consists of observations collected from clean unimpacted locations.											
565	The use of USL tends to provide a balance between false positives and false negatives provided the data											
566	represents a background data set and when many onsite observations need to be compared with the BTV.											
567												
568	**CIS 1,2-DICHLOROETHENE (ug/L)**											
569												
570	**General Statistics**											
571					Total Number of Observations	25			Number of Missing Observations		0	
572					Number of Distinct Observations	2						
573					Number of Detects	0			Number of Non-Detects		25	
574					Number of Distinct Detects	0			Number of Distinct Non-Detects		2	
575					Minimum Detect	N/A			Minimum Non-Detect		0.5	
576					Maximum Detect	N/A			Maximum Non-Detect		1	
577					Variance Detected	N/A			Percent Non-Detects		100%	
578					Mean Detected	N/A			SD Detected		N/A	
579					Mean of Detected Logged Data	N/A			SD of Detected Logged Data		N/A	
580												
581	**Warning: All observations are Non-Detects (NDs), therefore all statistics and estimates should also be NDs!**											
582	**Specifically, sample mean, UCLs, UPLs, and other statistics are also NDs lying below the largest detection limit!**											
583	**The Project Team may decide to use alternative site specific values to estimate environmental parameters (e.g., EPC, BTV).**											
584												
585	**The data set for variable CIS 1,2-DICHLOROETHENE (ug/L) was not processed!**											
586												
587												
588	**Chemical Oxygen Demand (mg/L)**											
589												
590	**General Statistics**											
591					Total Number of Observations	25			Number of Missing Observations		0	
592					Number of Distinct Observations	11						
593					Number of Detects	9			Number of Non-Detects		16	
594					Number of Distinct Detects	8			Number of Distinct Non-Detects		3	
595					Minimum Detect	6			Minimum Non-Detect		5	
596					Maximum Detect	53.4			Maximum Non-Detect		15	
597					Variance Detected	247.5			Percent Non-Detects		64%	
598					Mean Detected	19.18			SD Detected		15.73	
599					Mean of Detected Logged Data	2.675			SD of Detected Logged Data		0.785	
600												

	A	B	C	D	E	F	G	H	I	J	K	L
601	**Critical Values for Background Threshold Values (BTVs)**											
602					Tolerance Factor K (For UTL)	2.292				d2max (for USL)		2.663
603												
604	**Normal GOF Test on Detects Only**											
605					Shapiro Wilk Test Statistic	0.829	**Shapiro Wilk GOF Test**					
606					5% Shapiro Wilk Critical Value	0.829	Detected Data appear Normal at 5% Significance Level					
607					Lilliefors Test Statistic	0.231	**Lilliefors GOF Test**					
608					5% Lilliefors Critical Value	0.274	Detected Data appear Normal at 5% Significance Level					
609	**Detected Data appear Normal at 5% Significance Level**											
610												
611	**Kaplan Meier (KM) Background Statistics Assuming Normal Distribution**											
612					KM Mean	10.47				KM SD		11.09
613					95% UTL95% Coverage	35.89				95% KM UPL (t)		29.82
614					90% KM Percentile (z)	24.68				95% KM Percentile (z)		28.71
615					99% KM Percentile (z)	36.27				95% KM USL		40
616												
617	**DL/2 Substitution Background Statistics Assuming Normal Distribution**											
618					Mean	9.944				SD		11.64
619					95% UTL95% Coverage	36.63				95% UPL (t)		30.26
620					90% Percentile (z)	24.87				95% Percentile (z)		29.1
621					99% Percentile (z)	37.03				95% USL		40.95
622	**DL/2 is not a recommended method. DL/2 provided for comparisons and historical reasons**											
623												
624	**Gamma GOF Tests on Detected Observations Only**											
625					A-D Test Statistic	0.423	**Anderson-Darling GOF Test**					
626					5% A-D Critical Value	0.73	Detected data appear Gamma Distributed at 5% Significance Level					
627					K-S Test Statistic	0.197	**Kolmogorov-Smirnov GOF**					
628					5% K-S Critical Value	0.283	Detected data appear Gamma Distributed at 5% Significance Level					
629	**Detected data appear Gamma Distributed at 5% Significance Level**											
630												
631	**Gamma Statistics on Detected Data Only**											
632					k hat (MLE)	1.943				k star (bias corrected MLE)		1.369
633					Theta hat (MLE)	9.87				Theta star (bias corrected MLE)		14
634					nu hat (MLE)	34.97				nu star (bias corrected)		24.65
635					MLE Mean (bias corrected)	19.18						
636					MLE Sd (bias corrected)	16.39				95% Percentile of Chisquare (2kstar)		7.357
637												
638	**Gamma ROS Statistics using Imputed Non-Detects**											
639	GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs											
640	GROS may not be used when kstar of detects is small such as <1.0, especially when the sample size is small (e.g., <15-20)											
641	For such situations, GROS method may yield incorrect values of UCLs and BTVs											
642	This is especially true when the sample size is small.											
643	For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates											
644					Minimum	0.01				Mean		7.531
645					Maximum	53.4				Median		0.01
646					SD	12.89				CV		1.712
647					k hat (MLE)	0.221				k star (bias corrected MLE)		0.221
648					Theta hat (MLE)	34.08				Theta star (bias corrected MLE)		34.06
649					nu hat (MLE)	11.05				nu star (bias corrected)		11.06
650					MLE Mean (bias corrected)	7.531				MLE Sd (bias corrected)		16.02

	A	B	C	D	E	F	G	H	I	J	K	L
651	95% Percentile of Chisquare (2kstar)					2.218	90% Percentile					22.75
652	95% Percentile					37.77	99% Percentile					78.47
653	**The following statistics are computed using Gamma ROS Statistics on Imputed Data**											
654	**Upper Limits using Wilson Hilferty (WH) and Hawkins Wixley (HW) Methods**											
655					WH	HW					WH	HW
656	95% Approx. Gamma UTL with 95% Coverage				59.26	78	95% Approx. Gamma UPL				34.59	39.93
657	95% Gamma USL				81.35	116.1						
658												
659	**Estimates of Gamma Parameters using KM Estimates**											
660	Mean (KM)					10.47	SD (KM)					11.09
661	Variance (KM)					123	SE of Mean (KM)					2.366
662	k hat (KM)					0.892	k star (KM)					0.812
663	nu hat (KM)					44.6	nu star (KM)					40.58
664	theta hat (KM)					11.74	theta star (KM)					12.9
665	80% gamma percentile (KM)					17.1	90% gamma percentile (KM)					25.38
666	95% gamma percentile (KM)					33.8	99% gamma percentile (KM)					53.66
667												
668	**The following statistics are computed using gamma distribution and KM estimates**											
669	**Upper Limits using Wilson Hilferty (WH) and Hawkins Wixley (HW) Methods**											
670					WH	HW					WH	HW
671	95% Approx. Gamma UTL with 95% Coverage				34.7	34.76	95% Approx. Gamma UPL				26.17	25.76
672	95% KM Gamma Percentile				24.78	24.33	95% Gamma USL				41.43	42.07
673												
674	**Lognormal GOF Test on Detected Observations Only**											
675	Shapiro Wilk Test Statistic					0.918	**Shapiro Wilk GOF Test**					
676	5% Shapiro Wilk Critical Value					0.829	Detected Data appear Lognormal at 5% Significance Level					
677	Lilliefors Test Statistic					0.173	**Lilliefors GOF Test**					
678	5% Lilliefors Critical Value					0.274	Detected Data appear Lognormal at 5% Significance Level					
679	**Detected Data appear Lognormal at 5% Significance Level**											
680												
681	**Background Lognormal ROS Statistics Assuming Lognormal Distribution Using Imputed Non-Detects**											
682	Mean in Original Scale					8.873	Mean in Log Scale					1.518
683	SD in Original Scale					12.17	SD in Log Scale					1.155
684	95% UTL95% Coverage					64.47	95% BCA UTL95% Coverage					53.4
685	95% Bootstrap (%) UTL95% Coverage					53.4	95% UPL (t)					34.26
686	90% Percentile (z)					20.06	95% Percentile (z)					30.53
687	99% Percentile (z)					67.08	95% USL					98.96
688												
689	**Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution**											
690	KM Mean of Logged Data					2.05	95% KM UTL (Lognormal)95% Coverage					35.4
691	KM SD of Logged Data					0.662	95% KM UPL (Lognormal)					24.65
692	95% KM Percentile Lognormal (z)					23.07	95% KM USL (Lognormal)					45.25
693												
694	**Background DL/2 Statistics Assuming Lognormal Distribution**											
695	Mean in Original Scale					9.944	Mean in Log Scale					1.894
696	SD in Original Scale					11.64	SD in Log Scale					0.837
697	95% UTL95% Coverage					45.22	95% UPL (t)					28.6
698	90% Percentile (z)					19.41	95% Percentile (z)					26.31
699	99% Percentile (z)					46.53	95% USL					61.67
700	**DL/2 is not a Recommended Method. DL/2 provided for comparisons and historical reasons.**											

701												
702	**Nonparametric Distribution Free Background Statistics**											
703	**Data appear to follow a Discernible Distribution at 5% Significance Level**											
704												
705	**Nonparametric Upper Limits for BTVs(no distinction made between detects and nondetects)**											
706						Order of Statistic, r	25			95% UTL with95% Coverage	53.4	
707						Approx, f used to compute achieved CC	1.316			Approximate Actual Confidence Coefficient achieved by UTL	0.723	
708						Approximate Sample Size needed to achieve specified CC	59			95% UPL	46.14	
709						95% USL	53.4			95% KM Chebyshev UPL	59.76	
710												
711	Note: The use of USL tends to yield a conservative estimate of BTV, especially when the sample size starts exceeding 20.											
712	Therefore, one may use USL to estimate a BTV only when the data set represents a background data set free of outliers											
713	and consists of observations collected from clean unimpacted locations.											
714	The use of USL tends to provide a balance between false positives and false negatives provided the data											
715	represents a background data set and when many onsite observations need to be compared with the BTV.											
716												
717	**ETHYLBENZENE (mg/L)**											
718												
719	**General Statistics**											
720						Total Number of Observations	25			Number of Missing Observations	0	
721						Number of Distinct Observations	2					
722						Number of Detects	0			Number of Non-Detects	25	
723						Number of Distinct Detects	0			Number of Distinct Non-Detects	2	
724						Minimum Detect	N/A			Minimum Non-Detect	0.5	
725						Maximum Detect	N/A			Maximum Non-Detect	1	
726						Variance Detected	N/A			Percent Non-Detects	100%	
727						Mean Detected	N/A			SD Detected	N/A	
728						Mean of Detected Logged Data	N/A			SD of Detected Logged Data	N/A	
729												
730	**Warning: All observations are Non-Detects (NDs), therefore all statistics and estimates should also be NDs!**											
731	**Specifically, sample mean, UCLs, UPLs, and other statistics are also NDs lying below the largest detection limit!**											
732	**The Project Team may decide to use alternative site specific values to estimate environmental parameters (e.g., EPC, BTV).**											
733												
734	**The data set for variable ETHYLBENZENE (mg/L) was not processed!**											
735												
736												
737	**FLUORIDE (mg/L)**											
738												
739	**General Statistics**											
740						Total Number of Observations	25			Number of Missing Observations	0	
741						Number of Distinct Observations	2					
742						Number of Detects	1			Number of Non-Detects	24	
743						Number of Distinct Detects	1			Number of Distinct Non-Detects	2	
744						Minimum Detect	0.2			Minimum Non-Detect	0.2	
745						Maximum Detect	0.2			Maximum Non-Detect	0.5	
746						Variance Detected	N/A			Percent Non-Detects	96%	
747						Mean Detected	0.2			SD Detected	N/A	
748						Mean of Detected Logged Data	-1.609			SD of Detected Logged Data	N/A	
749												
750	**Warning: Only one distinct data value was detected! ProUCL (or any other software) should not be used on such a data set!**											

	A	B	C	D	E	F	G	H	I	J	K	L
751	**It is suggested to use alternative site specific values determined by the Project Team to estimate environmental parameters (e.g., EPC, BTV).**											
752												
753	**The data set for variable FLUORIDE (mg/L) was not processed!**											
754												
755												
756	**IRON, TOTAL (mg/L)**											
757												
758	**General Statistics**											
759						Total Number of Observations	25				Number of Distinct Observations	22
760						Minimum	0.76				First Quartile	3.4
761						Second Largest	9.7				Median	4.4
762						Maximum	10.1				Third Quartile	5.8
763						Mean	4.647				SD	2.275
764						Coefficient of Variation	0.49				Skewness	0.694
765						Mean of logged Data	1.397				SD of logged Data	0.591
766												
767	**Critical Values for Background Threshold Values (BTVs)**											
768						Tolerance Factor K (For UTL)	2.292				d2max (for USL)	2.663
769												
770	**Normal GOF Test**											
771						Shapiro Wilk Test Statistic	0.95				**Shapiro Wilk GOF Test**	
772						5% Shapiro Wilk Critical Value	0.918				Data appear Normal at 5% Significance Level	
773						Lilliefors Test Statistic	0.131				**Lilliefors GOF Test**	
774						5% Lilliefors Critical Value	0.173				Data appear Normal at 5% Significance Level	
775	**Data appear Normal at 5% Significance Level**											
776												
777	**Background Statistics Assuming Normal Distribution**											
778						95% UTL with 95% Coverage	9.86				90% Percentile (z)	7.562
779						95% UPL (t)	8.615				95% Percentile (z)	8.388
780						95% USL	10.7				99% Percentile (z)	9.938
781												
782	**Gamma GOF Test**											
783						A-D Test Statistic	0.389				**Anderson-Darling Gamma GOF Test**	
784						5% A-D Critical Value	0.749				Detected data appear Gamma Distributed at 5% Significance Level	
785						K-S Test Statistic	0.119				**Kolmogorov-Smirnov Gamma GOF Test**	
786						5% K-S Critical Value	0.175				Detected data appear Gamma Distributed at 5% Significance Level	
787	**Detected data appear Gamma Distributed at 5% Significance Level**											
788												
789	**Gamma Statistics**											
790						k hat (MLE)	3.747				k star (bias corrected MLE)	3.324
791						Theta hat (MLE)	1.24				Theta star (bias corrected MLE)	1.398
792						nu hat (MLE)	187.3				nu star (bias corrected)	166.2
793						MLE Mean (bias corrected)	4.647				MLE Sd (bias corrected)	2.549
794												
795	**Background Statistics Assuming Gamma Distribution**											
796						95% Wilson Hilferty (WH) Approx. Gamma UPL	9.669				90% Percentile	8.064
797						95% Hawkins Wixley (HW) Approx. Gamma UPL	9.957				95% Percentile	9.472
798						95% WH Approx. Gamma UTL with 95% Coverage	12.01				99% Percentile	12.51
799						95% HW Approx. Gamma UTL with 95% Coverage	12.61					
800						95% WH USL	13.8				95% HW USL	14.68

801												
802	**Lognormal GOF Test**											
803					Shapiro Wilk Test Statistic	0.919	**Shapiro Wilk Lognormal GOF Test**					
804					5% Shapiro Wilk Critical Value	0.918	Data appear Lognormal at 5% Significance Level					
805					Lilliefors Test Statistic	0.156	**Lilliefors Lognormal GOF Test**					
806					5% Lilliefors Critical Value	0.173	Data appear Lognormal at 5% Significance Level					
807	**Data appear Lognormal at 5% Significance Level**											
808												
809	**Background Statistics assuming Lognormal Distribution**											
810					95% UTL with 95% Coverage	15.65				90% Percentile (z)	8.616	
811					95% UPL (t)	11.33				95% Percentile (z)	10.68	
812					95% USL	19.48				99% Percentile (z)	15.97	
813												
814	**Nonparametric Distribution Free Background Statistics**											
815	**Data appear Normal at 5% Significance Level**											
816												
817	**Nonparametric Upper Limits for Background Threshold Values**											
818					Order of Statistic, r	25				95% UTL with 95% Coverage	10.1	
819					Approx, f used to compute achieved CC	1.316				Approximate Actual Confidence Coefficient achieved by UTL	0.723	
820										Approximate Sample Size needed to achieve specified CC	59	
821					95% Percentile Bootstrap UTL with 95% Coverage	10.1				95% BCA Bootstrap UTL with 95% Coverage	10.1	
822					95% UPL	9.98				90% Percentile	7.18	
823					90% Chebyshev UPL	11.61				95% Percentile	9.26	
824					95% Chebyshev UPL	14.76				99% Percentile	10	
825					95% USL	10.1						
826												
827	Note: The use of USL tends to yield a conservative estimate of BTV, especially when the sample size starts exceeding 20.											
828	Therefore, one may use USL to estimate a BTV only when the data set represents a background data set free of outliers											
829	and consists of observations collected from clean unimpacted locations.											
830	The use of USL tends to provide a balance between false positives and false negatives provided the data											
831	represents a background data set and when many onsite observations need to be compared with the BTV.											
832												
833	**MAGNESIUM, TOTAL (mg/L)**											
834												
835	**General Statistics**											
836					Total Number of Observations	25				Number of Distinct Observations	17	
837					Minimum	14.5				First Quartile	16.9	
838					Second Largest	19.6				Median	17.7	
839					Maximum	19.6				Third Quartile	18.8	
840					Mean	17.76				SD	1.195	
841					Coefficient of Variation	0.0673				Skewness	-0.587	
842					Mean of logged Data	2.875				SD of logged Data	0.069	
843												
844	**Critical Values for Background Threshold Values (BTVs)**											
845					Tolerance Factor K (For UTL)	2.292				d2max (for USL)	2.663	
846												
847	**Normal GOF Test**											
848					Shapiro Wilk Test Statistic	0.953	**Shapiro Wilk GOF Test**					
849					5% Shapiro Wilk Critical Value	0.918	Data appear Normal at 5% Significance Level					
850					Lilliefors Test Statistic	0.107	**Lilliefors GOF Test**					

	A	B	C	D	E	F	G	H	I	J	K	L
851					5% Lilliefors Critical Value	0.173	Data appear Normal at 5% Significance Level					
852	**Data appear Normal at 5% Significance Level**											
853												
854	**Background Statistics Assuming Normal Distribution**											
855				95% UTL with	95% Coverage	20.5				90% Percentile (z)		19.29
856					95% UPL (t)	19.85				95% Percentile (z)		19.73
857					95% USL	20.94				99% Percentile (z)		20.54
858												
859	**Gamma GOF Test**											
860					A-D Test Statistic	0.339	**Anderson-Darling Gamma GOF Test**					
861					5% A-D Critical Value	0.742	Detected data appear Gamma Distributed at 5% Significance Level					
862					K-S Test Statistic	0.107	**Kolmogorov-Smirnov Gamma GOF Test**					
863					5% K-S Critical Value	0.174	Detected data appear Gamma Distributed at 5% Significance Level					
864	**Detected data appear Gamma Distributed at 5% Significance Level**											
865												
866	**Gamma Statistics**											
867					k hat (MLE)	223.1				k star (bias corrected MLE)		196.4
868					Theta hat (MLE)	0.0796				Theta star (bias corrected MLE)		0.0905
869					nu hat (MLE)	11156				nu star (bias corrected)		9819
870					MLE Mean (bias corrected)	17.76				MLE Sd (bias corrected)		1.268
871												
872	**Background Statistics Assuming Gamma Distribution**											
873					95% Wilson Hilferty (WH) Approx. Gamma UPL	19.94				90% Percentile		19.41
874					95% Hawkins Wixley (HW) Approx. Gamma UPL	19.95				95% Percentile		19.9
875					95% WH Approx. Gamma UTL with 95% Coverage	20.66				99% Percentile		20.84
876					95% HW Approx. Gamma UTL with 95% Coverage	20.69						
877					95% WH USL	21.16				95% HW USL		21.2
878												
879	**Lognormal GOF Test**											
880					Shapiro Wilk Test Statistic	0.939	**Shapiro Wilk Lognormal GOF Test**					
881					5% Shapiro Wilk Critical Value	0.918	Data appear Lognormal at 5% Significance Level					
882					Lilliefors Test Statistic	0.114	**Lilliefors Lognormal GOF Test**					
883					5% Lilliefors Critical Value	0.173	Data appear Lognormal at 5% Significance Level					
884	**Data appear Lognormal at 5% Significance Level**											
885												
886	**Background Statistics assuming Lognormal Distribution**											
887				95% UTL with	95% Coverage	20.76				90% Percentile (z)		19.36
888					95% UPL (t)	19.99				95% Percentile (z)		19.85
889					95% USL	21.3				99% Percentile (z)		20.81
890												
891	**Nonparametric Distribution Free Background Statistics**											
892	**Data appear Normal at 5% Significance Level**											
893												
894	**Nonparametric Upper Limits for Background Threshold Values**											
895					Order of Statistic, r	25				95% UTL with 95% Coverage		19.6
896					Approx, f used to compute achieved CC	1.316	Approximate Actual Confidence Coefficient achieved by UTL					0.723
897							Approximate Sample Size needed to achieve specified CC					59
898				95% Percentile Bootstrap UTL with	95% Coverage	19.6				95% BCA Bootstrap UTL with 95% Coverage		19.6
899					95% UPL	19.6				90% Percentile		19.22
900					90% Chebyshev UPL	21.42				95% Percentile		19.58

901					95% Chebyshev UPL	23.07					99% Percentile	19.6
902					95% USL	19.6						
903												
904	Note: The use of USL tends to yield a conservative estimate of BTV, especially when the sample size starts exceeding 20.											
905	Therefore, one may use USL to estimate a BTV only when the data set represents a background data set free of outliers											
906	and consists of observations collected from clean unimpacted locations.											
907	The use of USL tends to provide a balance between false positives and false negatives provided the data											
908	represents a background data set and when many onsite observations need to be compared with the BTV.											
909												
910	**MANGANESE, TOTAL (mg/L)**											
911												
912	**General Statistics**											
913					Total Number of Observations	25					Number of Distinct Observations	21
914					Minimum	4.3					First Quartile	6.6
915					Second Largest	9.1					Median	8
916					Maximum	9.2					Third Quartile	8.7
917					Mean	7.501					SD	1.547
918					Coefficient of Variation	0.206					Skewness	-0.973
919					Mean of logged Data	1.991					SD of logged Data	0.236
920												
921	**Critical Values for Background Threshold Values (BTVs)**											
922					Tolerance Factor K (For UTL)	2.292					d2max (for USL)	2.663
923												
924	**Normal GOF Test**											
925					Shapiro Wilk Test Statistic	0.852	**Shapiro Wilk GOF Test**					
926					5% Shapiro Wilk Critical Value	0.918	Data Not Normal at 5% Significance Level					
927					Lilliefors Test Statistic	0.191	**Lilliefors GOF Test**					
928					5% Lilliefors Critical Value	0.173	Data Not Normal at 5% Significance Level					
929	**Data Not Normal at 5% Significance Level**											
930												
931	**Background Statistics Assuming Normal Distribution**											
932					95% UTL with 95% Coverage	11.05					90% Percentile (z)	9.483
933					95% UPL (t)	10.2					95% Percentile (z)	10.05
934					95% USL	11.62					99% Percentile (z)	11.1
935												
936	**Gamma GOF Test**											
937					A-D Test Statistic	1.736	**Anderson-Darling Gamma GOF Test**					
938					5% A-D Critical Value	0.743	Data Not Gamma Distributed at 5% Significance Level					
939					K-S Test Statistic	0.216	**Kolmogorov-Smirnov Gamma GOF Test**					
940					5% K-S Critical Value	0.174	Data Not Gamma Distributed at 5% Significance Level					
941	**Data Not Gamma Distributed at 5% Significance Level**											
942												
943	**Gamma Statistics**											
944					k hat (MLE)	20.68					k star (bias corrected MLE)	18.23
945					Theta hat (MLE)	0.363					Theta star (bias corrected MLE)	0.412
946					nu hat (MLE)	1034					nu star (bias corrected)	911.4
947					MLE Mean (bias corrected)	7.501					MLE Sd (bias corrected)	1.757
948												
949	**Background Statistics Assuming Gamma Distribution**											
950					95% Wilson Hilferty (WH) Approx. Gamma UPL	10.69					90% Percentile	9.823

951	95% Hawkins Wixley (HW) Approx. Gamma UPL					10.77				95% Percentile		10.61
952	95% WH Approx. Gamma UTL with 95% Coverage					11.9				99% Percentile		12.18
953	95% HW Approx. Gamma UTL with 95% Coverage					12.04						
954					95% WH USL	12.77				95% HW USL		12.97
955												
956	**Lognormal GOF Test**											
957					Shapiro Wilk Test Statistic	0.81	**Shapiro Wilk Lognormal GOF Test**					
958					5% Shapiro Wilk Critical Value	0.918	Data Not Lognormal at 5% Significance Level					
959					Lilliefors Test Statistic	0.225	**Lilliefors Lognormal GOF Test**					
960					5% Lilliefors Critical Value	0.173	Data Not Lognormal at 5% Significance Level					
961	**Data Not Lognormal at 5% Significance Level**											
962												
963	**Background Statistics assuming Lognormal Distribution**											
964					95% UTL with 95% Coverage	12.57				90% Percentile (z)		9.903
965					95% UPL (t)	11.05				95% Percentile (z)		10.79
966					95% USL	13.72				99% Percentile (z)		12.67
967												
968	**Nonparametric Distribution Free Background Statistics**											
969	**Data do not follow a Discernible Distribution (0.05)**											
970												
971	**Nonparametric Upper Limits for Background Threshold Values**											
972					Order of Statistic, r	25				95% UTL with 95% Coverage		9.2
973					Approx, f used to compute achieved CC	1.316	Approximate Actual Confidence Coefficient achieved by UTL					0.723
974							Approximate Sample Size needed to achieve specified CC					59
975	95% Percentile Bootstrap UTL with 95% Coverage					9.2				95% BCA Bootstrap UTL with 95% Coverage		9.2
976					95% UPL	9.17				90% Percentile		8.911
977					90% Chebyshev UPL	12.23				95% Percentile		9.064
978					95% Chebyshev UPL	14.38				99% Percentile		9.176
979					95% USL	9.2						
980												
981	Note: The use of USL tends to yield a conservative estimate of BTV, especially when the sample size starts exceeding 20.											
982	Therefore, one may use USL to estimate a BTV only when the data set represents a background data set free of outliers											
983	and consists of observations collected from clean unimpacted locations.											
984	The use of USL tends to provide a balance between false positives and false negatives provided the data											
985	represents a background data set and when many onsite observations need to be compared with the BTV.											
986												
987	**METHYLENE CHLORIDE (ug/L)**											
988												
989	**General Statistics**											
990					Total Number of Observations	25				Number of Missing Observations		0
991					Number of Distinct Observations	2						
992					Number of Detects	1				Number of Non-Detects		24
993					Number of Distinct Detects	1				Number of Distinct Non-Detects		2
994					Minimum Detect	1				Minimum Non-Detect		0.5
995					Maximum Detect	1				Maximum Non-Detect		1
996					Variance Detected	N/A				Percent Non-Detects		96%
997					Mean Detected	1				SD Detected		N/A
998					Mean of Detected Logged Data	0				SD of Detected Logged Data		N/A
999												
1000	**Warning: Only one distinct data value was detected! ProUCL (or any other software) should not be used on such a data set!**											

	A	B	C	D	E	F	G	H	I	J	K	L
1001	**It is suggested to use alternative site specific values determined by the Project Team to estimate environmental parameters (e.g., EPC, BTV).**											
1002												
1003	**The data set for variable METHYLENE CHLORIDE (ug/L) was not processed!**											
1004												
1005												
1006	**NITRATE-NITROGEN (mg/L)**											
1007												
1008	**General Statistics**											
1009	Total Number of Observations					25	Number of Missing Observations					0
1010	Number of Distinct Observations					3						
1011	Number of Detects					0	Number of Non-Detects					25
1012	Number of Distinct Detects					0	Number of Distinct Non-Detects					3
1013	Minimum Detect					N/A	Minimum Non-Detect					0.04
1014	Maximum Detect					N/A	Maximum Non-Detect					0.5
1015	Variance Detected					N/A	Percent Non-Detects					100%
1016	Mean Detected					N/A	SD Detected					N/A
1017	Mean of Detected Logged Data					N/A	SD of Detected Logged Data					N/A
1018												
1019	**Warning: All observations are Non-Detects (NDs), therefore all statistics and estimates should also be NDs!**											
1020	**Specifically, sample mean, UCLs, UPLs, and other statistics are also NDs lying below the largest detection limit!**											
1021	**The Project Team may decide to use alternative site specific values to estimate environmental parameters (e.g., EPC, BTV).**											
1022												
1023	**The data set for variable NITRATE-NITROGEN (mg/L) was not processed!**											
1024												
1025												
1026	**pH-LAB (SU)**											
1027												
1028	**General Statistics**											
1029	Total Number of Observations					25	Number of Distinct Observations					21
1030	Minimum					6.88	First Quartile					7.04
1031	Second Largest					7.9	Median					7.24
1032	Maximum					7.93	Third Quartile					7.42
1033	Mean					7.269	SD					0.28
1034	Coefficient of Variation					0.0385	Skewness					0.857
1035	Mean of logged Data					1.983	SD of logged Data					0.038
1036												
1037	**Critical Values for Background Threshold Values (BTVs)**											
1038	Tolerance Factor K (For UTL)					2.292	d2max (for USL)					2.663
1039												
1040	**Normal GOF Test**											
1041	Shapiro Wilk Test Statistic					0.932	**Shapiro Wilk GOF Test**					
1042	5% Shapiro Wilk Critical Value					0.918	Data appear Normal at 5% Significance Level					
1043	Lilliefors Test Statistic					0.113	**Lilliefors GOF Test**					
1044	5% Lilliefors Critical Value					0.173	Data appear Normal at 5% Significance Level					
1045	**Data appear Normal at 5% Significance Level**											
1046												
1047	**Background Statistics Assuming Normal Distribution**											
1048	95% UTL with 95% Coverage					7.911	90% Percentile (z)					7.628
1049	95% UPL (t)					7.758	95% Percentile (z)					7.73
1050	95% USL					8.015	99% Percentile (z)					7.921

1051												
1052	**Gamma GOF Test**											
1053					A-D Test Statistic	0.418	**Anderson-Darling Gamma GOF Test**					
1054					5% A-D Critical Value	0.742	Detected data appear Gamma Distributed at 5% Significance Level					
1055					K-S Test Statistic	0.109	**Kolmogorov-Smirnov Gamma GOF Test**					
1056					5% K-S Critical Value	0.174	Detected data appear Gamma Distributed at 5% Significance Level					
1057	**Detected data appear Gamma Distributed at 5% Significance Level**											
1058												
1059	**Gamma Statistics**											
1060					k hat (MLE)	714.9	k star (bias corrected MLE)	629.2				
1061					Theta hat (MLE)	0.0102	Theta star (bias corrected MLE)	0.0116				
1062					nu hat (MLE)	35746	nu star (bias corrected)	31458				
1063					MLE Mean (bias corrected)	7.269	MLE Sd (bias corrected)	0.29				
1064												
1065	**Background Statistics Assuming Gamma Distribution**											
1066					95% Wilson Hilferty (WH) Approx. Gamma UPL	7.761	90% Percentile	7.643				
1067					95% Hawkins Wixley (HW) Approx. Gamma UPL	7.761	95% Percentile	7.752				
1068					95% WH Approx. Gamma UTL with 95% Coverage	7.92	99% Percentile	7.96				
1069					95% HW Approx. Gamma UTL with 95% Coverage	7.922						
1070					95% WH USL	8.03	95% HW USL	8.032				
1071												
1072	**Lognormal GOF Test**											
1073					Shapiro Wilk Test Statistic	0.941	**Shapiro Wilk Lognormal GOF Test**					
1074					5% Shapiro Wilk Critical Value	0.918	Data appear Lognormal at 5% Significance Level					
1075					Lilliefors Test Statistic	0.106	**Lilliefors Lognormal GOF Test**					
1076					5% Lilliefors Critical Value	0.173	Data appear Lognormal at 5% Significance Level					
1077	**Data appear Lognormal at 5% Significance Level**											
1078												
1079	**Background Statistics assuming Lognormal Distribution**											
1080					95% UTL with 95% Coverage	7.925	90% Percentile (z)	7.627				
1081					95% UPL (t)	7.762	95% Percentile (z)	7.733				
1082					95% USL	8.038	99% Percentile (z)	7.936				
1083												
1084	**Nonparametric Distribution Free Background Statistics**											
1085	**Data appear Normal at 5% Significance Level**											
1086												
1087	**Nonparametric Upper Limits for Background Threshold Values**											
1088					Order of Statistic, r	25	95% UTL with 95% Coverage	7.93				
1089					Approx, f used to compute achieved CC	1.316	Approximate Actual Confidence Coefficient achieved by UTL	0.723				
1090							Approximate Sample Size needed to achieve specified CC	59				
1091					95% Percentile Bootstrap UTL with 95% Coverage	7.93	95% BCA Bootstrap UTL with 95% Coverage	7.93				
1092					95% UPL	7.921	90% Percentile	7.582				
1093					90% Chebyshev UPL	8.126	95% Percentile	7.846				
1094					95% Chebyshev UPL	8.514	99% Percentile	7.923				
1095					95% USL	7.93						
1096												
1097	Note: The use of USL tends to yield a conservative estimate of BTV, especially when the sample size starts exceeding 20.											
1098	Therefore, one may use USL to estimate a BTV only when the data set represents a background data set free of outliers											
1099	and consists of observations collected from clean unimpacted locations.											
1100	The use of USL tends to provide a balance between false positives and false negatives provided the data											

	A	B	C	D	E	F	G	H	I	J	K	L
1101	represents a background data set and when many onsite observations need to be compared with the BTV.											
1102												
1103	**POTASSIUM, TOTAL (mg/L)**											
1104												
1105	**General Statistics**											
1106					Total Number of Observations	25				Number of Distinct Observations		16
1107					Minimum	0.55				First Quartile		0.66
1108					Second Largest	1.1				Median		0.73
1109					Maximum	2.8				Third Quartile		0.92
1110					Mean	0.844				SD		0.439
1111					Coefficient of Variation	0.52				Skewness		3.966
1112					Mean of logged Data	-0.24				SD of logged Data		0.335
1113												
1114	**Critical Values for Background Threshold Values (BTVs)**											
1115					Tolerance Factor K (For UTL)	2.292				d2max (for USL)		2.663
1116												
1117	**Normal GOF Test**											
1118					Shapiro Wilk Test Statistic	0.536				**Shapiro Wilk GOF Test**		
1119					5% Shapiro Wilk Critical Value	0.918				Data Not Normal at 5% Significance Level		
1120					Lilliefors Test Statistic	0.252				**Lilliefors GOF Test**		
1121					5% Lilliefors Critical Value	0.173				Data Not Normal at 5% Significance Level		
1122	**Data Not Normal at 5% Significance Level**											
1123												
1124	**Background Statistics Assuming Normal Distribution**											
1125					95% UTL with 95% Coverage	1.849				90% Percentile (z)		1.406
1126					95% UPL (t)	1.609				95% Percentile (z)		1.565
1127					95% USL	2.012				99% Percentile (z)		1.864
1128												
1129	**Gamma GOF Test**											
1130					A-D Test Statistic	1.896				**Anderson-Darling Gamma GOF Test**		
1131					5% A-D Critical Value	0.746				Data Not Gamma Distributed at 5% Significance Level		
1132					K-S Test Statistic	0.214				**Kolmogorov-Smirnov Gamma GOF Test**		
1133					5% K-S Critical Value	0.175				Data Not Gamma Distributed at 5% Significance Level		
1134	**Data Not Gamma Distributed at 5% Significance Level**											
1135												
1136	**Gamma Statistics**											
1137					k hat (MLE)	7.287				k star (bias corrected MLE)		6.439
1138					Theta hat (MLE)	0.116				Theta star (bias corrected MLE)		0.131
1139					nu hat (MLE)	364.4				nu star (bias corrected)		322
1140					MLE Mean (bias corrected)	0.844				MLE Sd (bias corrected)		0.332
1141												
1142	**Background Statistics Assuming Gamma Distribution**											
1143					95% Wilson Hilferty (WH) Approx. Gamma UPL	1.463				90% Percentile		1.288
1144					95% Hawkins Wixley (HW) Approx. Gamma UPL	1.448				95% Percentile		1.454
1145					95% WH Approx. Gamma UTL with 95% Coverage	1.728				99% Percentile		1.802
1146					95% HW Approx. Gamma UTL with 95% Coverage	1.717						
1147					95% WH USL	1.924				95% HW USL		1.919
1148												
1149	**Lognormal GOF Test**											
1150					Shapiro Wilk Test Statistic	0.784				**Shapiro Wilk Lognormal GOF Test**		

1151				5% Shapiro Wilk Critical Value		0.918	Data Not Lognormal at 5% Significance Level					
1152				Lilliefors Test Statistic		0.19	**Lilliefors Lognormal GOF Test**					
1153				5% Lilliefors Critical Value		0.173	Data Not Lognormal at 5% Significance Level					
1154	**Data Not Lognormal at 5% Significance Level**											
1155												
1156	**Background Statistics assuming Lognormal Distribution**											
1157				95% UTL with 95% Coverage		1.693				90% Percentile (z)		1.207
1158				95% UPL (t)		1.41				95% Percentile (z)		1.363
1159				95% USL		1.917				99% Percentile (z)		1.713
1160												
1161	**Nonparametric Distribution Free Background Statistics**											
1162	**Data do not follow a Discernible Distribution (0.05)**											
1163												
1164	**Nonparametric Upper Limits for Background Threshold Values**											
1165				Order of Statistic, r		25				95% UTL with 95% Coverage		2.8
1166				Approx, f used to compute achieved CC		1.316				Approximate Actual Confidence Coefficient achieved by UTL		0.723
1167										Approximate Sample Size needed to achieve specified CC		59
1168				95% Percentile Bootstrap UTL with 95% Coverage		2.8				95% BCA Bootstrap UTL with 95% Coverage		2.46
1169				95% UPL		2.29				90% Percentile		1.06
1170				90% Chebyshev UPL		2.186				95% Percentile		1.1
1171				95% Chebyshev UPL		2.794				99% Percentile		2.392
1172				95% USL		2.8						
1173												
1174	Note: The use of USL tends to yield a conservative estimate of BTV, especially when the sample size starts exceeding 20.											
1175	Therefore, one may use USL to estimate a BTV only when the data set represents a background data set free of outliers											
1176	and consists of observations collected from clean unimpacted locations.											
1177	The use of USL tends to provide a balance between false positives and false negatives provided the data											
1178	represents a background data set and when many onsite observations need to be compared with the BTV.											
1179												
1180	**SODIUM, TOTAL (mg/L)**											
1181												
1182	**General Statistics**											
1183				Total Number of Observations		24				Number of Distinct Observations		24
1184				Minimum		58				First Quartile		79.65
1185				Second Largest		93.7				Median		84.4
1186				Maximum		100				Third Quartile		89.49
1187				Mean		83.76				SD		9.125
1188				Coefficient of Variation		0.109				Skewness		-0.928
1189				Mean of logged Data		4.422				SD of logged Data		0.116
1190												
1191	**Critical Values for Background Threshold Values (BTVs)**											
1192				Tolerance Factor K (For UTL)		2.309				d2max (for USL)		2.644
1193												
1194	**Normal GOF Test**											
1195				Shapiro Wilk Test Statistic		0.947	**Shapiro Wilk GOF Test**					
1196				5% Shapiro Wilk Critical Value		0.916	Data appear Normal at 5% Significance Level					
1197				Lilliefors Test Statistic		0.162	**Lilliefors GOF Test**					
1198				5% Lilliefors Critical Value		0.177	Data appear Normal at 5% Significance Level					
1199	**Data appear Normal at 5% Significance Level**											
1200												

1201	**Background Statistics Assuming Normal Distribution**											
1202				95% UTL with	95% Coverage	104.8				90% Percentile (z)	95.45	
1203					95% UPL (t)	99.72				95% Percentile (z)	98.77	
1204					95% USL	107.9				99% Percentile (z)	105	
1205												
1206	**Gamma GOF Test**											
1207					A-D Test Statistic	0.603	**Anderson-Darling Gamma GOF Test**					
1208					5% A-D Critical Value	0.742	Detected data appear Gamma Distributed at 5% Significance Level					
1209					K-S Test Statistic	0.178	**Kolmogorov-Smirnov Gamma GOF Test**					
1210					5% K-S Critical Value	0.177	Data Not Gamma Distributed at 5% Significance Level					
1211	**Detected data follow Appr. Gamma Distribution at 5% Significance Level**											
1212												
1213	**Gamma Statistics**											
1214					k hat (MLE)	80.83				k star (bias corrected MLE)	70.75	
1215					Theta hat (MLE)	1.036				Theta star (bias corrected MLE)	1.184	
1216					nu hat (MLE)	3880				nu star (bias corrected)	3396	
1217					MLE Mean (bias corrected)	83.76				MLE Sd (bias corrected)	9.958	
1218												
1219	**Background Statistics Assuming Gamma Distribution**											
1220				95% Wilson Hilferty (WH) Approx. Gamma UPL		101.1				90% Percentile	96.75	
1221				95% Hawkins Wixley (HW) Approx. Gamma UPL		101.4				95% Percentile	100.8	
1222				95% WH Approx. Gamma UTL with	95% Coverage	107.3				99% Percentile	108.7	
1223				95% HW Approx. Gamma UTL with	95% Coverage	107.7						
1224					95% WH USL	111.1				95% HW USL	111.6	
1225												
1226	**Lognormal GOF Test**											
1227					Shapiro Wilk Test Statistic	0.906	**Shapiro Wilk Lognormal GOF Test**					
1228					5% Shapiro Wilk Critical Value	0.916	Data Not Lognormal at 5% Significance Level					
1229					Lilliefors Test Statistic	0.186	**Lilliefors Lognormal GOF Test**					
1230					5% Lilliefors Critical Value	0.177	Data Not Lognormal at 5% Significance Level					
1231	**Data Not Lognormal at 5% Significance Level**											
1232												
1233	**Background Statistics assuming Lognormal Distribution**											
1234				95% UTL with	95% Coverage	108.9				90% Percentile (z)	96.64	
1235					95% UPL (t)	102.1				95% Percentile (z)	100.8	
1236					95% USL	113.3				99% Percentile (z)	109.1	
1237												
1238	**Nonparametric Distribution Free Background Statistics**											
1239	**Data appear Normal at 5% Significance Level**											
1240												
1241	**Nonparametric Upper Limits for Background Threshold Values**											
1242					Order of Statistic, r	24				95% UTL with	95% Coverage	100
1243					Approx, f used to compute achieved CC	1.263				Approximate Actual Confidence Coefficient achieved by UTL		0.708
1244										Approximate Sample Size needed to achieve specified CC		59
1245				95% Percentile Bootstrap UTL with	95% Coverage	100				95% BCA Bootstrap UTL with	95% Coverage	100
1246					95% UPL	98.43				90% Percentile		93.09
1247					90% Chebyshev UPL	111.7				95% Percentile		93.64
1248					95% Chebyshev UPL	124.4				99% Percentile		98.55
1249					95% USL	100						
1250												

	A	B	C	D	E	F	G	H	I	J	K	L
1251	Note: The use of USL tends to yield a conservative estimate of BTV, especially when the sample size starts exceeding 20.											
1252	Therefore, one may use USL to estimate a BTV only when the data set represents a background data set free of outliers											
1253	and consists of observations collected from clean unimpacted locations.											
1254	The use of USL tends to provide a balance between false positives and false negatives provided the data											
1255	represents a background data set and when many onsite observations need to be compared with the BTV.											
1256												
1257	**SPEC. COND., LAB (umhos/cm)**											
1258												
1259	**General Statistics**											
1260						Total Number of Observations	25			Number of Distinct Observations	18	
1261						Minimum	910			First Quartile	1075	
1262						Second Largest	1250			Median	1140	
1263						Maximum	1270			Third Quartile	1210	
1264						Mean	1135			SD	87.18	
1265						Coefficient of Variation	0.0768			Skewness	-0.532	
1266						Mean of logged Data	7.031			SD of logged Data	0.0788	
1267												
1268	**Critical Values for Background Threshold Values (BTVs)**											
1269						Tolerance Factor K (For UTL)	2.292			d2max (for USL)	2.663	
1270												
1271	**Normal GOF Test**											
1272						Shapiro Wilk Test Statistic	0.951			**Shapiro Wilk GOF Test**		
1273						5% Shapiro Wilk Critical Value	0.918			Data appear Normal at 5% Significance Level		
1274						Lilliefors Test Statistic	0.165			**Lilliefors GOF Test**		
1275						5% Lilliefors Critical Value	0.173			Data appear Normal at 5% Significance Level		
1276	**Data appear Normal at 5% Significance Level**											
1277												
1278	**Background Statistics Assuming Normal Distribution**											
1279						95% UTL with 95% Coverage	1335			90% Percentile (z)	1247	
1280						95% UPL (t)	1287			95% Percentile (z)	1278	
1281						95% USL	1367			99% Percentile (z)	1338	
1282												
1283	**Gamma GOF Test**											
1284						A-D Test Statistic	0.462			**Anderson-Darling Gamma GOF Test**		
1285						5% A-D Critical Value	0.742			Detected data appear Gamma Distributed at 5% Significance Level		
1286						K-S Test Statistic	0.168			**Kolmogorov-Smirnov Gamma GOF Test**		
1287						5% K-S Critical Value	0.174			Detected data appear Gamma Distributed at 5% Significance Level		
1288	**Detected data appear Gamma Distributed at 5% Significance Level**											
1289												
1290	**Gamma Statistics**											
1291						k hat (MLE)	170.9			k star (bias corrected MLE)	150.4	
1292						Theta hat (MLE)	6.641			Theta star (bias corrected MLE)	7.546	
1293						nu hat (MLE)	8545			nu star (bias corrected)	7521	
1294						MLE Mean (bias corrected)	1135			MLE Sd (bias corrected)	92.54	
1295												
1296	**Background Statistics Assuming Gamma Distribution**											
1297						95% Wilson Hilferty (WH) Approx. Gamma UPL	1294			90% Percentile	1255	
1298						95% Hawkins Wixley (HW) Approx. Gamma UPL	1295			95% Percentile	1291	
1299						95% WH Approx. Gamma UTL with 95% Coverage	1348			99% Percentile	1361	
1300						95% HW Approx. Gamma UTL with 95% Coverage	1350					

1301					95% WH USL	1385					95% HW USL	1388
1302												
1303						Lognormal GOF Test						
1304					Shapiro Wilk Test Statistic	0.939						
1305					5% Shapiro Wilk Critical Value	0.918						
1306					Lilliefors Test Statistic	0.162						
1307					5% Lilliefors Critical Value	0.173						
1308												
1309												
1310												
1311					95% UTL with 95% Coverage	1356					90% Percentile (z)	1252
1312					95% UPL (t)	1299					95% Percentile (z)	1288
1313					95% USL	1396					99% Percentile (z)	1359
1314												
1315												
1316												
1317												
1318												
1319					Order of Statistic, r	25					95% UTL with 95% Coverage	1270
1320					Approx, f used to compute achieved CC	1.316					Approximate Actual Confidence Coefficient achieved by UTL	0.723
1321											Approximate Sample Size needed to achieve specified CC	59
1322					95% Percentile Bootstrap UTL with 95% Coverage	1270					95% BCA Bootstrap UTL with 95% Coverage	1266
1323					95% UPL	1264					90% Percentile	1230
1324					90% Chebyshev UPL	1402					95% Percentile	1246
1325					95% Chebyshev UPL	1523					99% Percentile	1265
1326					95% USL	1270						
1327												
1328												
1329												
1330												
1331												
1332												
1333												
1334												
1335												
1336												
1337					Total Number of Observations	25					Number of Distinct Observations	24
1338					Minimum	66.1					First Quartile	80.7
1339					Second Largest	114					Median	91.3
1340					Maximum	116					Third Quartile	97.7
1341					Mean	90.41					SD	13.26
1342					Coefficient of Variation	0.147					Skewness	0.089
1343					Mean of logged Data	4.494					SD of logged Data	0.149
1344												
1345												
1346					Tolerance Factor K (For UTL)	2.292					d2max (for USL)	2.663
1347												
1348												
1349					Shapiro Wilk Test Statistic	0.971						
1350					5% Shapiro Wilk Critical Value	0.918						

Note: The use of USL tends to yield a conservative estimate of BTV, especially when the sample size starts exceeding 20.
Therefore, one may use USL to estimate a BTV only when the data set represents a background data set free of outliers and consists of observations collected from clean unimpacted locations.
The use of USL tends to provide a balance between false positives and false negatives provided the data represents a background data set and when many onsite observations need to be compared with the BTV.

SULFATE (mg/L)

General Statistics

Background Statistics assuming Lognormal Distribution

Nonparametric Distribution Free Background Statistics

Data appear Normal at 5% Significance Level

Nonparametric Upper Limits for Background Threshold Values

Critical Values for Background Threshold Values (BTVs)

Lognormal GOF Test

Shapiro Wilk Lognormal GOF Test

Data appear Lognormal at 5% Significance Level

Lilliefors Lognormal GOF Test

Data appear Lognormal at 5% Significance Level

Data appear Lognormal at 5% Significance Level

Normal GOF Test

Shapiro Wilk GOF Test

Data appear Normal at 5% Significance Level

1351					Lilliefors Test Statistic	0.0947	**Lilliefors GOF Test**					
1352					5% Lilliefors Critical Value	0.173	Data appear Normal at 5% Significance Level					
1353	**Data appear Normal at 5% Significance Level**											
1354												
1355	**Background Statistics Assuming Normal Distribution**											
1356				95% UTL with	95% Coverage	120.8				90% Percentile (z)	107.4	
1357					95% UPL (t)	113.5				95% Percentile (z)	112.2	
1358					95% USL	125.7				99% Percentile (z)	121.3	
1359												
1360	**Gamma GOF Test**											
1361					A-D Test Statistic	0.263	**Anderson-Darling Gamma GOF Test**					
1362					5% A-D Critical Value	0.742	Detected data appear Gamma Distributed at 5% Significance Level					
1363					K-S Test Statistic	0.113	**Kolmogorov-Smirnov Gamma GOF Test**					
1364					5% K-S Critical Value	0.174	Detected data appear Gamma Distributed at 5% Significance Level					
1365	**Detected data appear Gamma Distributed at 5% Significance Level**											
1366												
1367	**Gamma Statistics**											
1368					k hat (MLE)	47.67				k star (bias corrected MLE)	41.98	
1369					Theta hat (MLE)	1.897				Theta star (bias corrected MLE)	2.154	
1370					nu hat (MLE)	2383				nu star (bias corrected)	2099	
1371					MLE Mean (bias corrected)	90.41				MLE Sd (bias corrected)	13.95	
1372												
1373	**Background Statistics Assuming Gamma Distribution**											
1374				95% Wilson Hilferty (WH) Approx. Gamma UPL		115				90% Percentile	108.7	
1375				95% Hawkins Wixley (HW) Approx. Gamma UPL		115.3				95% Percentile	114.5	
1376				95% WH Approx. Gamma UTL with	95% Coverage	123.9				99% Percentile	126	
1377				95% HW Approx. Gamma UTL with	95% Coverage	124.3						
1378					95% WH USL	130.1				95% HW USL	130.8	
1379												
1380	**Lognormal GOF Test**											
1381					Shapiro Wilk Test Statistic	0.967	**Shapiro Wilk Lognormal GOF Test**					
1382					5% Shapiro Wilk Critical Value	0.918	Data appear Lognormal at 5% Significance Level					
1383					Lilliefors Test Statistic	0.123	**Lilliefors Lognormal GOF Test**					
1384					5% Lilliefors Critical Value	0.173	Data appear Lognormal at 5% Significance Level					
1385	**Data appear Lognormal at 5% Significance Level**											
1386												
1387	**Background Statistics assuming Lognormal Distribution**											
1388				95% UTL with	95% Coverage	125.9				90% Percentile (z)	108.3	
1389					95% UPL (t)	116				95% Percentile (z)	114.3	
1390					95% USL	133.1				99% Percentile (z)	126.5	
1391												
1392	**Nonparametric Distribution Free Background Statistics**											
1393	**Data appear Normal at 5% Significance Level**											
1394												
1395	**Nonparametric Upper Limits for Background Threshold Values**											
1396					Order of Statistic, r	25				95% UTL with	95% Coverage	116
1397				Approx, f used to compute achieved CC		1.316				Approximate Actual Confidence Coefficient achieved by UTL		0.723
1398										Approximate Sample Size needed to achieve specified CC		59
1399				95% Percentile Bootstrap UTL with	95% Coverage	116				95% BCA Bootstrap UTL with	95% Coverage	116
1400					95% UPL	115.4				90% Percentile		108.4

1401				90% Chebyshev UPL	131					95% Percentile	113.6	
1402				95% Chebyshev UPL	149.4					99% Percentile	115.5	
1403				95% USL	116							
1404												
1405	Note: The use of USL tends to yield a conservative estimate of BTV, especially when the sample size starts exceeding 20.											
1406	Therefore, one may use USL to estimate a BTV only when the data set represents a background data set free of outliers											
1407	and consists of observations collected from clean unimpacted locations.											
1408	The use of USL tends to provide a balance between false positives and false negatives provided the data											
1409	represents a background data set and when many onsite observations need to be compared with the BTV.											
1410												
1411	**Total Dissolved Solids (mg/L)**											
1412												
1413	**General Statistics**											
1414				Total Number of Observations	25					Number of Distinct Observations	23	
1415				Minimum	562					First Quartile	666	
1416				Second Largest	749					Median	683	
1417				Maximum	772					Third Quartile	702	
1418				Mean	675					SD	50.54	
1419				Coefficient of Variation	0.0749					Skewness	-0.74	
1420				Mean of logged Data	6.512					SD of logged Data	0.0773	
1421												
1422	**Critical Values for Background Threshold Values (BTVs)**											
1423				Tolerance Factor K (For UTL)	2.292					d2max (for USL)	2.663	
1424												
1425	**Normal GOF Test**											
1426				Shapiro Wilk Test Statistic	0.912					**Shapiro Wilk GOF Test**		
1427				5% Shapiro Wilk Critical Value	0.918					Data Not Normal at 5% Significance Level		
1428				Lilliefors Test Statistic	0.189					**Lilliefors GOF Test**		
1429				5% Lilliefors Critical Value	0.173					Data Not Normal at 5% Significance Level		
1430	**Data Not Normal at 5% Significance Level**											
1431												
1432	**Background Statistics Assuming Normal Distribution**											
1433				95% UTL with 95% Coverage	790.9					90% Percentile (z)	739.8	
1434				95% UPL (t)	763.2					95% Percentile (z)	758.2	
1435				95% USL	809.6					99% Percentile (z)	792.6	
1436												
1437	**Gamma GOF Test**											
1438				A-D Test Statistic	1.138					**Anderson-Darling Gamma GOF Test**		
1439				5% A-D Critical Value	0.742					Data Not Gamma Distributed at 5% Significance Level		
1440				K-S Test Statistic	0.199					**Kolmogorov-Smirnov Gamma GOF Test**		
1441				5% K-S Critical Value	0.174					Data Not Gamma Distributed at 5% Significance Level		
1442	**Data Not Gamma Distributed at 5% Significance Level**											
1443												
1444	**Gamma Statistics**											
1445				k hat (MLE)	178.3					k star (bias corrected MLE)	156.9	
1446				Theta hat (MLE)	3.787					Theta star (bias corrected MLE)	4.302	
1447				nu hat (MLE)	8914					nu star (bias corrected)	7845	
1448				MLE Mean (bias corrected)	675					MLE Sd (bias corrected)	53.89	
1449												
1450	**Background Statistics Assuming Gamma Distribution**											

1451	95% Wilson Hilferty (WH) Approx. Gamma UPL					767.8	90% Percentile					745
1452	95% Hawkins Wixley (HW) Approx. Gamma UPL					768.4	95% Percentile					766.1
1453	95% WH Approx. Gamma UTL with 95% Coverage					798.9	99% Percentile					806.7
1454	95% HW Approx. Gamma UTL with 95% Coverage					800.1						
1455	95% WH USL					820.5	95% HW USL					822.1
1456												
1457	**Lognormal GOF Test**											
1458	Shapiro Wilk Test Statistic					0.893	**Shapiro Wilk Lognormal GOF Test**					
1459	5% Shapiro Wilk Critical Value					0.918	Data Not Lognormal at 5% Significance Level					
1460	Lilliefors Test Statistic					0.205	**Lilliefors Lognormal GOF Test**					
1461	5% Lilliefors Critical Value					0.173	Data Not Lognormal at 5% Significance Level					
1462	**Data Not Lognormal at 5% Significance Level**											
1463												
1464	**Background Statistics assuming Lognormal Distribution**											
1465	95% UTL with 95% Coverage					803.7	90% Percentile (z)					743.3
1466	95% UPL (t)					770.4	95% Percentile (z)					764.5
1467	95% USL					827.1	99% Percentile (z)					805.8
1468												
1469	**Nonparametric Distribution Free Background Statistics**											
1470	**Data do not follow a Discernible Distribution (0.05)**											
1471												
1472	**Nonparametric Upper Limits for Background Threshold Values**											
1473	Order of Statistic, r					25	95% UTL with 95% Coverage					772
1474	Approx, f used to compute achieved CC					1.316	Approximate Actual Confidence Coefficient achieved by UTL					0.723
1475							Approximate Sample Size needed to achieve specified CC					59
1476	95% Percentile Bootstrap UTL with 95% Coverage					772	95% BCA Bootstrap UTL with 95% Coverage					772
1477	95% UPL					765.1	90% Percentile					716.8
1478	90% Chebyshev UPL					829.6	95% Percentile					743.6
1479	95% Chebyshev UPL					899.7	99% Percentile					766.5
1480	95% USL					772						
1481												
1482	Note: The use of USL tends to yield a conservative estimate of BTV, especially when the sample size starts exceeding 20.											
1483	Therefore, one may use USL to estimate a BTV only when the data set represents a background data set free of outliers											
1484	and consists of observations collected from clean unimpacted locations.											
1485	The use of USL tends to provide a balance between false positives and false negatives provided the data											
1486	represents a background data set and when many onsite observations need to be compared with the BTV.											
1487												
1488	**TETRACHLOROETHENE (ug/L)**											
1489												
1490	**General Statistics**											
1491	Total Number of Observations					25	Number of Missing Observations					0
1492	Number of Distinct Observations					2						
1493	Number of Detects					0	Number of Non-Detects					25
1494	Number of Distinct Detects					0	Number of Distinct Non-Detects					2
1495	Minimum Detect					N/A	Minimum Non-Detect					0.5
1496	Maximum Detect					N/A	Maximum Non-Detect					1
1497	Variance Detected					N/A	Percent Non-Detects					100%
1498	Mean Detected					N/A	SD Detected					N/A
1499	Mean of Detected Logged Data					N/A	SD of Detected Logged Data					N/A
1500												

1501	**Warning: All observations are Non-Detects (NDs), therefore all statistics and estimates should also be NDs!**											
1502	**Specifically, sample mean, UCLs, UPLs, and other statistics are also NDs lying below the largest detection limit!**											
1503	**The Project Team may decide to use alternative site specific values to estimate environmental parameters (e.g., EPC, BTV).**											
1504												
1505	**The data set for variable TETRACHLOROETHENE (ug/L) was not processed!**											
1506												
1507												
1508	**TOTAL ORGANIC CARBON (mg/L)**											
1509												
1510	**General Statistics**											
1511	Total Number of Observations					24	Number of Missing Observations					0
1512	Number of Distinct Observations					17						
1513	Number of Detects					23	Number of Non-Detects					1
1514	Number of Distinct Detects					17	Number of Distinct Non-Detects					1
1515	Minimum Detect					0.96	Minimum Non-Detect					1
1516	Maximum Detect					3.3	Maximum Non-Detect					1
1517	Variance Detected					0.409	Percent Non-Detects					4.167%
1518	Mean Detected					1.645	SD Detected					0.64
1519	Mean of Detected Logged Data					0.438	SD of Detected Logged Data					0.341
1520												
1521	**Critical Values for Background Threshold Values (BTVs)**											
1522	Tolerance Factor K (For UTL)					2.309	d2max (for USL)					2.644
1523												
1524	**Normal GOF Test on Detects Only**											
1525	Shapiro Wilk Test Statistic					0.829	**Shapiro Wilk GOF Test**					
1526	5% Shapiro Wilk Critical Value					0.914	Data Not Normal at 5% Significance Level					
1527	Lilliefors Test Statistic					0.18	**Lilliefors GOF Test**					
1528	5% Lilliefors Critical Value					0.18	Data Not Normal at 5% Significance Level					
1529	**Data Not Normal at 5% Significance Level**											
1530												
1531	**Kaplan Meier (KM) Background Statistics Assuming Normal Distribution**											
1532	KM Mean					1.617	KM SD					0.627
1533	95% UTL95% Coverage					3.065	95% KM UPL (t)					2.714
1534	90% KM Percentile (z)					2.42	95% KM Percentile (z)					2.648
1535	99% KM Percentile (z)					3.076	95% KM USL					3.275
1536												
1537	**DL/2 Substitution Background Statistics Assuming Normal Distribution**											
1538	Mean					1.597	SD					0.668
1539	95% UTL95% Coverage					3.139	95% UPL (t)					2.765
1540	90% Percentile (z)					2.453	95% Percentile (z)					2.696
1541	99% Percentile (z)					3.151	95% USL					3.363
1542	**DL/2 is not a recommended method. DL/2 provided for comparisons and historical reasons**											
1543												
1544	**Gamma GOF Tests on Detected Observations Only**											
1545	A-D Test Statistic					0.663	**Anderson-Darling GOF Test**					
1546	5% A-D Critical Value					0.745	Detected data appear Gamma Distributed at 5% Significance Level					
1547	K-S Test Statistic					0.155	**Kolmogorov-Smirnov GOF**					
1548	5% K-S Critical Value					0.182	Detected data appear Gamma Distributed at 5% Significance Level					
1549	**Detected data appear Gamma Distributed at 5% Significance Level**											
1550												

1551	**Gamma Statistics on Detected Data Only**											
1552					k hat (MLE)	8.502			k star (bias corrected MLE)			7.422
1553					Theta hat (MLE)	0.193			Theta star (bias corrected MLE)			0.222
1554					nu hat (MLE)	391.1			nu star (bias corrected)			341.4
1555					MLE Mean (bias corrected)	1.645						
1556					MLE Sd (bias corrected)	0.604			95% Percentile of Chisquare (2kstar)			24.79
1557												
1558	**Gamma ROS Statistics using Imputed Non-Detects**											
1559	GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs											
1560	GROS may not be used when kstar of detects is small such as <1.0, especially when the sample size is small (e.g., <15-20)											
1561	For such situations, GROS method may yield incorrect values of UCLs and BTVs											
1562	This is especially true when the sample size is small.											
1563	For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates											
1564					Minimum	0.694			Mean			1.605
1565					Maximum	3.3			Median			1.4
1566					SD	0.655			CV			0.408
1567					k hat (MLE)	7.407			k star (bias corrected MLE)			6.509
1568					Theta hat (MLE)	0.217			Theta star (bias corrected MLE)			0.247
1569					nu hat (MLE)	355.5			nu star (bias corrected)			312.4
1570					MLE Mean (bias corrected)	1.605			MLE Sd (bias corrected)			0.629
1571					95% Percentile of Chisquare (2kstar)	22.39			90% Percentile			2.446
1572					95% Percentile	2.76			99% Percentile			3.417
1573	**The following statistics are computed using Gamma ROS Statistics on Imputed Data**											
1574	**Upper Limits using Wilson Hilferty (WH) and Hawkins Wixley (HW) Methods**											
1575						WH	HW				WH	HW
1576					95% Approx. Gamma UTL with 95% Coverage	3.314	3.357		95% Approx. Gamma UPL		2.797	2.81
1577					95% Gamma USL	3.652	3.72					
1578												
1579	**Estimates of Gamma Parameters using KM Estimates**											
1580					Mean (KM)	1.617			SD (KM)			0.627
1581					Variance (KM)	0.393			SE of Mean (KM)			0.131
1582					k hat (KM)	6.644			k star (KM)			5.842
1583					nu hat (KM)	318.9			nu star (KM)			280.4
1584					theta hat (KM)	0.243			theta star (KM)			0.277
1585					80% gamma percentile (KM)	2.136			90% gamma percentile (KM)			2.511
1586					95% gamma percentile (KM)	2.85			99% gamma percentile (KM)			3.563
1587												
1588	**The following statistics are computed using gamma distribution and KM estimates**											
1589	**Upper Limits using Wilson Hilferty (WH) and Hawkins Wixley (HW) Methods**											
1590						WH	HW				WH	HW
1591					95% Approx. Gamma UTL with 95% Coverage	3.193	3.22		95% Approx. Gamma UPL		2.721	2.726
1592					95% KM Gamma Percentile	2.638	2.641		95% Gamma USL		3.5	3.546
1593												
1594	**Lognormal GOF Test on Detected Observations Only**											
1595					Shapiro Wilk Test Statistic	0.935			**Shapiro Wilk GOF Test**			
1596					5% Shapiro Wilk Critical Value	0.914			Detected Data appear Lognormal at 5% Significance Level			
1597					Lilliefors Test Statistic	0.139			**Lilliefors GOF Test**			
1598					5% Lilliefors Critical Value	0.18			Detected Data appear Lognormal at 5% Significance Level			
1599	**Detected Data appear Lognormal at 5% Significance Level**											
1600												

	A	B	C	D	E	F	G	H	I	J	K	L
1601	**Background Lognormal ROS Statistics Assuming Lognormal Distribution Using Imputed Non-Detects**											
1602					Mean in Original Scale	1.612				Mean in Log Scale		0.413
1603					SD in Original Scale	0.646				SD in Log Scale		0.355
1604					95% UTL95% Coverage	3.427				95% BCA UTL95% Coverage		3.3
1605					95% Bootstrap (%) UTL95% Coverage	3.3				95% UPL (t)		2.81
1606					90% Percentile (z)	2.38				95% Percentile (z)		2.708
1607					99% Percentile (z)	3.448				95% USL		3.859
1608												
1609	**Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution**											
1610					KM Mean of Logged Data	0.418				95% KM UTL (Lognormal)95% Coverage		3.325
1611					KM SD of Logged Data	0.339				95% KM UPL (Lognormal)		2.75
1612					95% KM Percentile Lognormal (z)	2.654				95% KM USL (Lognormal)		3.725
1613												
1614	**Background DL/2 Statistics Assuming Lognormal Distribution**											
1615					Mean in Original Scale	1.597				Mean in Log Scale		0.391
1616					SD in Original Scale	0.668				SD in Log Scale		0.405
1617					95% UTL95% Coverage	3.767				95% UPL (t)		3.003
1618					90% Percentile (z)	2.484				95% Percentile (z)		2.878
1619					99% Percentile (z)	3.794				95% USL		4.315
1620	**DL/2 is not a Recommended Method. DL/2 provided for comparisons and historical reasons.**											
1621												
1622	**Nonparametric Distribution Free Background Statistics**											
1623	**Data appear to follow a Discernible Distribution at 5% Significance Level**											
1624												
1625	**Nonparametric Upper Limits for BTVs(no distinction made between detects and nondetects)**											
1626					Order of Statistic, r	24				95% UTL with95% Coverage		3.3
1627					Approx, f used to compute achieved CC	1.263				Approximate Actual Confidence Coefficient achieved by UTL		0.708
1628					Approximate Sample Size needed to achieve specified CC	59				95% UPL		3.3
1629					95% USL	3.3				95% KM Chebyshev UPL		4.407
1630												
1631	Note: The use of USL tends to yield a conservative estimate of BTV, especially when the sample size starts exceeding 20.											
1632	Therefore, one may use USL to estimate a BTV only when the data set represents a background data set free of outliers											
1633	and consists of observations collected from clean unimpacted locations.											
1634	The use of USL tends to provide a balance between false positives and false negatives provided the data											
1635	represents a background data set and when many onsite observations need to be compared with the BTV.											
1636												
1637	**TOLUENE (mg/)**											
1638												
1639	**General Statistics**											
1640					Total Number of Observations	25				Number of Missing Observations		0
1641					Number of Distinct Observations	2						
1642					Number of Detects	0				Number of Non-Detects		25
1643					Number of Distinct Detects	0				Number of Distinct Non-Detects		2
1644					Minimum Detect	N/A				Minimum Non-Detect		0.5
1645					Maximum Detect	N/A				Maximum Non-Detect		1
1646					Variance Detected	N/A				Percent Non-Detects		100%
1647					Mean Detected	N/A				SD Detected		N/A
1648					Mean of Detected Logged Data	N/A				SD of Detected Logged Data		N/A
1649												
1650	**Warning: All observations are Non-Detects (NDs), therefore all statistics and estimates should also be NDs!**											

	A	B	C	D	E	F	G	H	I	J	K	L
1651	**Specifically, sample mean, UCLs, UPLs, and other statistics are also NDs lying below the largest detection limit!**											
1652	**The Project Team may decide to use alternative site specific values to estimate environmental parameters (e.g., EPC, BTV).**											
1653												
1654	**The data set for variable TOLUENE (mg/) was not processed!**											
1655												
1656												
1657	**TOTAL PHENOLICS (mg/L)**											
1658												
1659	**General Statistics**											
1660	Total Number of Observations					23	Number of Missing Observations					0
1661	Number of Distinct Observations					2						
1662	Number of Detects					0	Number of Non-Detects					23
1663	Number of Distinct Detects					0	Number of Distinct Non-Detects					2
1664	Minimum Detect					N/A	Minimum Non-Detect					0.005
1665	Maximum Detect					N/A	Maximum Non-Detect					0.01
1666	Variance Detected					N/A	Percent Non-Detects					100%
1667	Mean Detected					N/A	SD Detected					N/A
1668	Mean of Detected Logged Data					N/A	SD of Detected Logged Data					N/A
1669												
1670	**Warning: All observations are Non-Detects (NDs), therefore all statistics and estimates should also be NDs!**											
1671	**Specifically, sample mean, UCLs, UPLs, and other statistics are also NDs lying below the largest detection limit!**											
1672	**The Project Team may decide to use alternative site specific values to estimate environmental parameters (e.g., EPC, BTV).**											
1673												
1674	**The data set for variable TOTAL PHENOLICS (mg/L) was not processed!**											
1675												
1676												
1677	**TRANS 1,2-DICHLOROETHENE (ug/L)**											
1678												
1679	**General Statistics**											
1680	Total Number of Observations					25	Number of Missing Observations					0
1681	Number of Distinct Observations					2						
1682	Number of Detects					0	Number of Non-Detects					25
1683	Number of Distinct Detects					0	Number of Distinct Non-Detects					2
1684	Minimum Detect					N/A	Minimum Non-Detect					0.5
1685	Maximum Detect					N/A	Maximum Non-Detect					1
1686	Variance Detected					N/A	Percent Non-Detects					100%
1687	Mean Detected					N/A	SD Detected					N/A
1688	Mean of Detected Logged Data					N/A	SD of Detected Logged Data					N/A
1689												
1690	**Warning: All observations are Non-Detects (NDs), therefore all statistics and estimates should also be NDs!**											
1691	**Specifically, sample mean, UCLs, UPLs, and other statistics are also NDs lying below the largest detection limit!**											
1692	**The Project Team may decide to use alternative site specific values to estimate environmental parameters (e.g., EPC, BTV).**											
1693												
1694	**The data set for variable TRANS 1,2-DICHLOROETHENE (ug/L) was not processed!**											
1695												
1696												
1697	**TRICHLOROETHENE (ug/L)**											
1698												
1699	**General Statistics**											
1700	Total Number of Observations					25	Number of Missing Observations					0

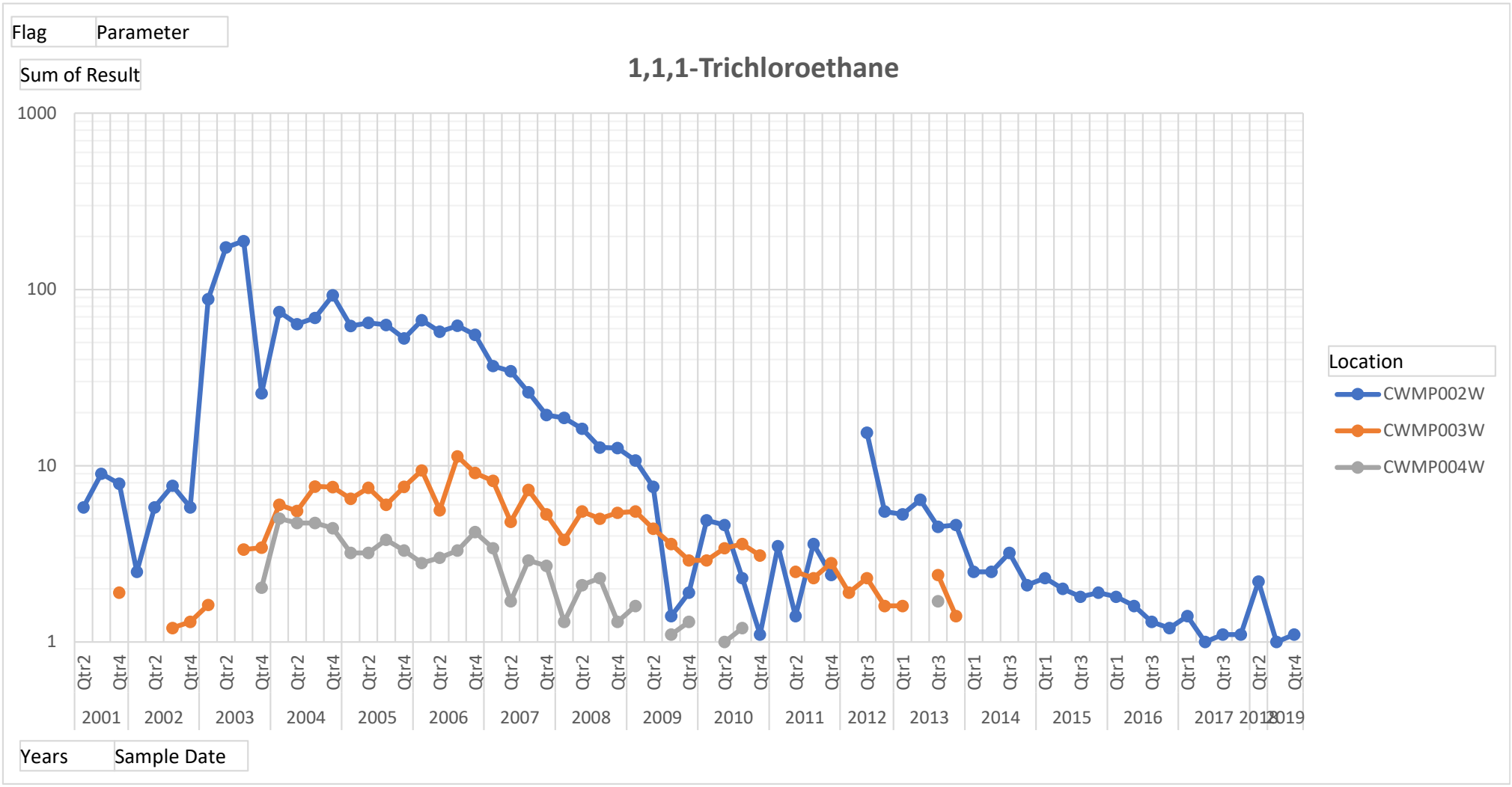
1701					Number of Distinct Observations	2						
1702					Number of Detects	0				Number of Non-Detects		25
1703					Number of Distinct Detects	0				Number of Distinct Non-Detects		2
1704					Minimum Detect	N/A				Minimum Non-Detect		0.5
1705					Maximum Detect	N/A				Maximum Non-Detect		1
1706					Variance Detected	N/A				Percent Non-Detects		100%
1707					Mean Detected	N/A				SD Detected		N/A
1708					Mean of Detected Logged Data	N/A				SD of Detected Logged Data		N/A
1709												
1710	**Warning: All observations are Non-Detects (NDs), therefore all statistics and estimates should also be NDs!**											
1711	**Specifically, sample mean, UCLs, UPLs, and other statistics are also NDs lying below the largest detection limit!**											
1712	**The Project Team may decide to use alternative site specific values to estimate environmental parameters (e.g., EPC, BTV).**											
1713												
1714	**The data set for variable TRICHLOROETHENE (ug/L) was not processed!**											
1715												
1716												
1717	**TURBIDITY (NTU)**											
1718												
1719	**General Statistics**											
1720					Total Number of Observations	25				Number of Distinct Observations		25
1721					Minimum	2.46				First Quartile		6.78
1722					Second Largest	124				Median		18.8
1723					Maximum	305				Third Quartile		39.16
1724					Mean	40.4				SD		64.15
1725					Coefficient of Variation	1.588				Skewness		3.26
1726					Mean of logged Data	2.936				SD of logged Data		1.214
1727												
1728	**Critical Values for Background Threshold Values (BTVs)**											
1729					Tolerance Factor K (For UTL)	2.292				d2max (for USL)		2.663
1730												
1731	**Normal GOF Test**											
1732					Shapiro Wilk Test Statistic	0.587				**Shapiro Wilk GOF Test**		
1733					5% Shapiro Wilk Critical Value	0.918				Data Not Normal at 5% Significance Level		
1734					Lilliefors Test Statistic	0.303				**Lilliefors GOF Test**		
1735					5% Lilliefors Critical Value	0.173				Data Not Normal at 5% Significance Level		
1736	**Data Not Normal at 5% Significance Level**											
1737												
1738	**Background Statistics Assuming Normal Distribution**											
1739					95% UTL with 95% Coverage	187.4				90% Percentile (z)		122.6
1740					95% UPL (t)	152.3				95% Percentile (z)		145.9
1741					95% USL	211.2				99% Percentile (z)		189.6
1742												
1743	**Gamma GOF Test**											
1744					A-D Test Statistic	1.002				**Anderson-Darling Gamma GOF Test**		
1745					5% A-D Critical Value	0.782				Data Not Gamma Distributed at 5% Significance Level		
1746					K-S Test Statistic	0.202				**Kolmogorov-Smirnov Gamma GOF Test**		
1747					5% K-S Critical Value	0.181				Data Not Gamma Distributed at 5% Significance Level		
1748	**Data Not Gamma Distributed at 5% Significance Level**											
1749												
1750	**Gamma Statistics**											

1751					k hat (MLE)	0.781				k star (bias corrected MLE)		0.714
1752					Theta hat (MLE)	51.73				Theta star (bias corrected MLE)		56.59
1753					nu hat (MLE)	39.05				nu star (bias corrected)		35.7
1754					MLE Mean (bias corrected)	40.4				MLE Sd (bias corrected)		47.81
1755												
1756					**Background Statistics Assuming Gamma Distribution**							
1757					95% Wilson Hilferty (WH) Approx. Gamma UPL	135				90% Percentile		100.9
1758					95% Hawkins Wixley (HW) Approx. Gamma UPL	136.6				95% Percentile		136.5
1759					95% WH Approx. Gamma UTL with 95% Coverage	198.4				99% Percentile		221.4
1760					95% HW Approx. Gamma UTL with 95% Coverage	210.1						
1761					95% WH USL	251				95% HW USL		274.4
1762												
1763					**Lognormal GOF Test**							
1764					Shapiro Wilk Test Statistic	0.967				**Shapiro Wilk Lognormal GOF Test**		
1765					5% Shapiro Wilk Critical Value	0.918				Data appear Lognormal at 5% Significance Level		
1766					Lilliefors Test Statistic	0.112				**Lilliefors Lognormal GOF Test**		
1767					5% Lilliefors Critical Value	0.173				Data appear Lognormal at 5% Significance Level		
1768					**Data appear Lognormal at 5% Significance Level**							
1769												
1770					**Background Statistics assuming Lognormal Distribution**							
1771					95% UTL with 95% Coverage	304.3				90% Percentile (z)		89.27
1772					95% UPL (t)	156.6				95% Percentile (z)		138.7
1773					95% USL	477.3				99% Percentile (z)		317.2
1774												
1775					**Nonparametric Distribution Free Background Statistics**							
1776					**Data appear Lognormal at 5% Significance Level**							
1777												
1778					**Nonparametric Upper Limits for Background Threshold Values**							
1779					Order of Statistic, r	25				95% UTL with 95% Coverage		305
1780					Approx, f used to compute achieved CC	1.316				Approximate Actual Confidence Coefficient achieved by UTL		0.723
1781										Approximate Sample Size needed to achieve specified CC		59
1782					95% Percentile Bootstrap UTL with 95% Coverage	305				95% BCA Bootstrap UTL with 95% Coverage		305
1783					95% UPL	250.7				90% Percentile		96.04
1784					90% Chebyshev UPL	236.7				95% Percentile		119.4
1785					95% Chebyshev UPL	325.6				99% Percentile		261.6
1786					95% USL	305						
1787												
1788					Note: The use of USL tends to yield a conservative estimate of BTV, especially when the sample size starts exceeding 20.							
1789					Therefore, one may use USL to estimate a BTV only when the data set represents a background data set free of outliers							
1790					and consists of observations collected from clean unimpacted locations.							
1791					The use of USL tends to provide a balance between false positives and false negatives provided the data							
1792					represents a background data set and when many onsite observations need to be compared with the BTV.							
1793												
1794	**VINYL CHLORIDE (ug/L)**											
1795												
1796					**General Statistics**							
1797					Total Number of Observations	25				Number of Missing Observations		0
1798					Number of Distinct Observations	2						
1799					Number of Detects	0				Number of Non-Detects		25
1800					Number of Distinct Detects	0				Number of Distinct Non-Detects		2

1801					Minimum Detect	N/A				Minimum Non-Detect		0.5
1802					Maximum Detect	N/A				Maximum Non-Detect		1
1803					Variance Detected	N/A				Percent Non-Detects		100%
1804					Mean Detected	N/A				SD Detected		N/A
1805					Mean of Detected Logged Data	N/A				SD of Detected Logged Data		N/A
1806												
1807	**Warning: All observations are Non-Detects (NDs), therefore all statistics and estimates should also be NDs!**											
1808	**Specifically, sample mean, UCLs, UPLs, and other statistics are also NDs lying below the largest detection limit!**											
1809	**The Project Team may decide to use alternative site specific values to estimate environmental parameters (e.g., EPC, BTV).**											
1810												
1811	**The data set for variable VINYL CHLORIDE (ug/L) was not processed!**											
1812												
1813												
1814	**TOTAL XYLENES (ug/L)**											
1815												
1816	**General Statistics**											
1817					Total Number of Observations	25				Number of Missing Observations		0
1818					Number of Distinct Observations	2						
1819					Number of Detects	0				Number of Non-Detects		25
1820					Number of Distinct Detects	0				Number of Distinct Non-Detects		2
1821					Minimum Detect	N/A				Minimum Non-Detect		1
1822					Maximum Detect	N/A				Maximum Non-Detect		3
1823					Variance Detected	N/A				Percent Non-Detects		100%
1824					Mean Detected	N/A				SD Detected		N/A
1825					Mean of Detected Logged Data	N/A				SD of Detected Logged Data		N/A
1826												
1827	**Warning: All observations are Non-Detects (NDs), therefore all statistics and estimates should also be NDs!**											
1828	**Specifically, sample mean, UCLs, UPLs, and other statistics are also NDs lying below the largest detection limit!**											
1829	**The Project Team may decide to use alternative site specific values to estimate environmental parameters (e.g., EPC, BTV).**											
1830												
1831	**The data set for variable TOTAL XYLENES (ug/L) was not processed!**											
1832												
1833												

ATTACHMENT 3

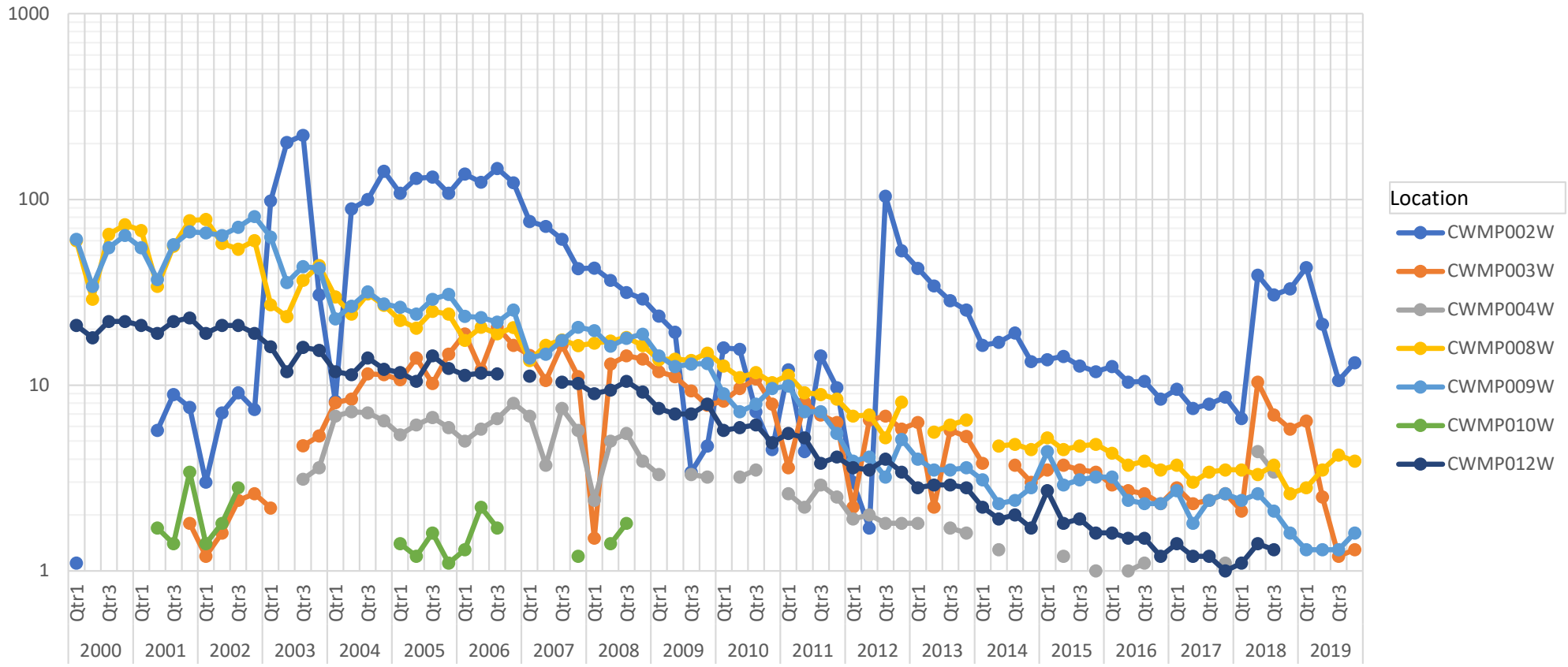
VOC TREND PLOTS


Flag
Parameter
Sum of Result
1,1,1-Trichloroethane
1000
100
10
1
Location
CWMP002W
CWMP003W
CWMP004W
Qtr2
Qtr4
Qtr1
Qtr3
2001
2002
2003
2004
2005
2006
2007
2008
2009
2010
2011
2012
2013
2014
2015
2016
2017
2018
2019
Years
Sample Date

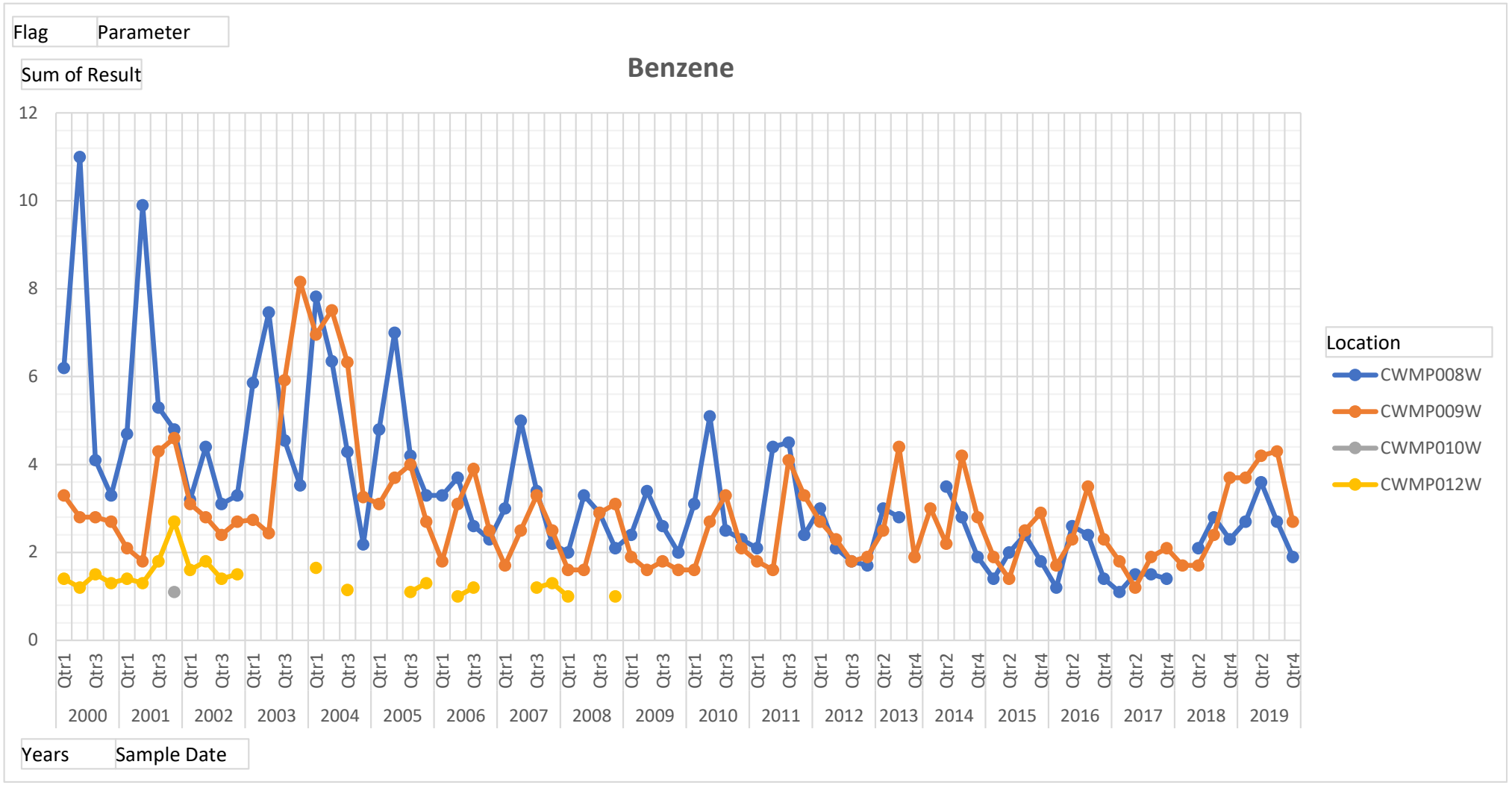
Flag | Parameter

Sum of Result

1,1-Dichloroethane



Years | Sample Date


Flag
Parameter
Sum of Result
Benzene
12
10
8
6
4
2
0
Qtr1
Qtr3
Qtr2
Qtr4
2000
2001
2002
2003
2004
2005
2006
2007
2008
2009
2010
2011
2012
2013
2014
2015
2016
2017
2018
2019
Location
CWMP008W
CWMP009W
CWMP010W
CWMP012W
Years
Sample Date

2540-FM-BWM0041 Rev. 6/2005

COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF ENVIRONMENTAL PROTECTION
BUREAU OF WASTE MANAGEMENT

Date Prepared/Revised
11/13/2019
DEP USE ONLY
Date Received

FORM 19

MUNICIPAL WASTE LANDFILL
QUARTERLY AND ANNUAL WATER QUALITY ANALYSES

This form must be fully and accurately completed. All required information must be typed or legibly printed in the spaces provided. If additional space is necessary, identify each attached sheet as Form 19, reference the item number and identify the date prepared. The "date prepared/revised" on any attached sheets needs to match the "date prepared/revised" on this page.

General Reference: Section 273.284
Federal Regulations, Subtitle D: 258.54 and Appendix I to Part 258.

SECTION A. APPLICANT IDENTIFIER

Applicant/permittee: Lancaster County Solid Waste Mana

Site Name: Creswell Landfill

Facitlity ID (as issued by DEP): 100008

SECTION B. FACILITY INFORMATION

Monitoring Wells must be designed and constructed in accordance with Department Standards. INDICATE THE LATITUDE AND LONGITUDE TO THE NEAREST ONE TENTH OF A SECOND (D° MM' SS.S")

Monitoring Point Number: CWMP007W — X Well ___ Spring ___ Stream ___ Other

___ Upgradient/Upstream X Downgradient/Downstream

Location (County): Lancaster County — Municipality: Manor Township

Sampling Point: Latitude: 39 ° 57 ' 24.53 " — Longitude: 76 ° 26 ' 33.28 "

Depth to Water Level: 8.2 ft — Measured from: ___ Land Surface X TOC

Casing Stickup: 1.50 ft — Elevation of Water Level: 445.2 ft./MSL

Sampling Depth: 33 ft — Volume of Water Column: 41.56 gal

Total Well Depth: 36.5 ft — Sampling Method: X Pumped ___ Bailed ___ Grab

Well Purged: X Yes ___ No — Well Volumes Purged: 2.9

Sample Field Filtered (must be 0.45 micron)?: ___ Yes X No

Spring Flow Rate: ___ gpm

Sample Date (mm/dd/yy): 10/14/2019 — Sample Collection Time: 10:58

Sample Collector's Name: Mr. Brian G Shade

Sample Collector's Affiliation: ALS

Laboratory(ies) Performing Analysis: ALS Environmental

Were any holding times exceeded?: ___ Yes X No If yes, please explain in comments field.

Lab Accreditation Number(s): 22-293

Lab Sample Number(s): 3063693001 — Final Lab Analysis CompletionDate: 10/23/2019

Name/Affiliation of Person who Filled Out Form: Nick R. Rogers

Comments:

I.D. No	100008
Monitoring Point No.	CWMP007W
Sample Date	10/14/2019

FORM 19

QUARTERLY AND ANNUAL WATER QUALITY ANALYSES

ANALYTES

1-Q. Inorganics (Enter all data in mg/l except as noted)

ANALYTE	VALUE[T]	ANALYSIS METHOD NUMBER
AMMONIA-NITROGEN	0.187	EPA 350.3
BICARBONATE	14	SM18-2321
CALCIUM, TOTAL	17.3	SW846 6010B
CALCIUM, DISSOLVED		SW 8466010B
COD (CHEMICAL OXYGEN DEMAND)	15 ND	EPA 410.4
CHLORIDE	66	EPA 300.0
FLUORIDE	0.2 ND	EPA 300.0
IRON, TOTAL (ug/l)	67 ND	SW846 6010B
IRON, DISSOLVED (ug/l)		SW846 6010B
MAGNESIUM, TOTAL	8.7	SW846 6010B
MAGNESIUM, DISSOLVED		SW846 6010B
MANGANESE, TOTAL (ug/l)	6.4	SW846 6010B
MANGANESE, DISSOLVED (ug/l)		SW846 6010B
NITRATE-NITROGEN	9.2	EPA 300.0
pH-FIELD (SU)	5.02	FIELD
pH-LAB (SU)	6.39	EPA 150.1
POTASSIUM, TOTAL	2.4	SW846 6010B
POTASSIUM, DISSOLVED		SW846 6010B
SODIUM, TOTAL	31	SW846 6010B
SODIUM, DISSOLVED		SW846 6010B
SPEC. COND., FIELD (umhos/cm)	3710	FIELD
SPEC. COND., LAB (umhos/cm)	336	EPA 120.1
SULFATE	20.6	EPA 300.0
ALKALINITY	14	SM18-2320B
TDS (TOTAL DISSOLVED SOLIDS)	178	SM18-2540C
TOC (TOTAL ORGANIC CARBON)	0.5 ND	SM18-5310B
TOTAL PHENOLICS (ug/l)	5 ND	SW846 9066
TURBIDITY (N.T.U.)	0.27	SM 2130B

* Indicator Analyte - For comparison with detection zone analytes.
T Please indicate detection limit if analyte is not detected.
** Total and dissolved analysis required only in conjunction with additional annual metals sampling (see page 4).
Remaining quarterly samples only require total metals analysis.

I.D. No	100008
Monitoring Point No.	CWMP007W
Sample Date	10/14/2019

FORM 19

QUARTERLY AND ANNUAL WATER QUALITY ANALYSES

2-Q. Organics (Enter all data in ug/l)

ANALYTE	VALUE[T]	ANALYSIS METHOD NUMBER
BENZENE	1 ND	SW846 8260B
1,2-DIBROMOETHANE (EDB) (ETHYLENE D	1 ND	SW846 8260B
1,1-DICHLOROETHANE	1 ND	SW846 8260B
1,1-DICHLOROETHENE	1 ND	SW846 8260B
1,2-DICHLOROETHANE	1 ND	SW846 8260B
cis 1,2-DICHLOROETHENE	1 ND	SW846 8260B
trans 1,2-DICHLOROETHENE	1 ND	SW846 8260B
ETHYLBENZENE	1 ND	SW846 8260B
METHYLENE CHLORIDE	1 ND	SW846 8260B
TETRACHLOROETHENE	1 ND	SW846 8260B
TOLUENE	1 ND	SW846 8260B
1,1,1-TRICHLOROETHANE	1 ND	SW846 8260B
TRICHLOROETHENE	1 ND	SW846 8260B
VINYL CHLORIDE	1 ND	SW846 8260B
XYLENES (TOTAL)	3 ND	SW846 8260B

T Please indicate detection limit if analyte is not detected.

2540-FM-BWM0041 Rev. 6/2005

COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF ENVIRONMENTAL PROTECTION
BUREAU OF WASTE MANAGEMENT

Date Prepared/Revised
11/13/2019
DEP USE ONLY
Date Received

FORM 19

MUNICIPAL WASTE LANDFILL
QUARTERLY AND ANNUAL WATER QUALITY ANALYSES

This form must be fully and accurately completed. All required information must be typed or legibly printed in the spaces provided. If additional space is necessary, identify each attached sheet as Form 19, reference the item number and identify the date prepared. The "date prepared/revised" on any attached sheets needs to match the "date prepared/revised" on this page.

General Reference: Section 273.284
Federal Regulations, Subtitle D: 258.54 and Appendix I to Part 258.

SECTION A. APPLICANT IDENTIFIER

Applicant/permittee: Lancaster County Solid Waste Mana

Site Name: Creswell Landfill

Facitlity ID (as issued by DEP): 100008

SECTION B. FACILITY INFORMATION

Monitoring Wells must be designed and constructed in accordance with Department Standards. INDICATE THE LATITUDE AND LONGITUDE TO THE NEAREST ONE TENTH OF A SECOND (D° MM' SS.S")

Monitoring Point Number: CWMP001W — X Well ___ Spring ___ Stream ___ Other

X Upgradient/Upstream ___ Downgradient/Downstream

Location (County): Lancaster County — Municipality: Manor Township

Sampling Point: Latitude: 39 ° 57 ' 27.43 " — Longitude: 76 ° 26 ' 14.4 "

Depth to Water Level: 27.42 ft — Measured from: ___ Land Surface X TOC

Casing Stickup: 1.23 ft — Elevation of Water Level: 487.71 ft./MSL

Sampling Depth: 57 ft — Volume of Water Column: 57.10 gal

Total Well Depth: 66.3 ft — Sampling Method: X Pumped ___ Bailed ___ Grab

Well Purged: X Yes ___ No — Well Volumes Purged: 2.0

Sample Field Filtered (must be 0.45 micron)?: ___ Yes X No

Spring Flow Rate: ___ gpm

Sample Date (mm/dd/yy): 10/14/2019 — Sample Collection Time: 12:12

Sample Collector's Name: Mr. Brian G Shade

Sample Collector's Affiliation: ALS

Laboratory(ies) Performing Analysis: ALS Environmental

Were any holding times exceeded?: ___ Yes X No If yes, please explain in comments field.

Lab Accreditation Number(s): 22-293

Lab Sample Number(s): 3063693002 — Final Lab Analysis CompletionDate: 10/23/2019

Name/Affiliation of Person who Filled Out Form: Nick R. Rogers

Comments:

I.D. No	100008
Monitoring Point No.	CWMP001W
Sample Date	10/14/2019

FORM 19

QUARTERLY AND ANNUAL WATER QUALITY ANALYSES

ANALYTES

1-Q. Inorganics (Enter all data in mg/l except as noted)

ANALYTE	VALUE[T]	ANALYSIS METHOD NUMBER
AMMONIA-NITROGEN	0.149	EPA 350.3
BICARBONATE	5	SM18-2321
CALCIUM, TOTAL	14.7	SW846 6010B
CALCIUM, DISSOLVED		SW 8466010B
COD (CHEMICAL OXYGEN DEMAND)	15 ND	EPA 410.4
CHLORIDE	28.6	EPA 300.0
FLUORIDE	0.2 ND	EPA 300.0
IRON, TOTAL (ug/l)	660	SW846 6010B
IRON, DISSOLVED (ug/l)		SW846 6010B
MAGNESIUM, TOTAL	10	SW846 6010B
MAGNESIUM, DISSOLVED		SW846 6010B
MANGANESE, TOTAL (ug/l)	55	SW846 6010B
MANGANESE, DISSOLVED (ug/l)		SW846 6010B
NITRATE-NITROGEN	19.5	EPA 300.0
pH-FIELD (SU)	4.84	FIELD
pH-LAB (SU)	6.41	EPA 150.1
POTASSIUM, TOTAL	2.4	SW846 6010B
POTASSIUM, DISSOLVED		SW846 6010B
SODIUM, TOTAL	12.7	SW846 6010B
SODIUM, DISSOLVED		SW846 6010B
SPEC. COND., FIELD (umhos/cm)	272	FIELD
SPEC. COND., LAB (umhos/cm)	244	EPA 120.1
SULFATE	2	EPA 300.0
ALKALINITY	5	SM18-2320B
TDS (TOTAL DISSOLVED SOLIDS)	146	SM18-2540C
TOC (TOTAL ORGANIC CARBON)	0.5 ND	SM18-5310B
TOTAL PHENOLICS (ug/l)	5 ND	SW846 9066
TURBIDITY (N.T.U.)	30.5	SM 2130B

* Indicator Analyte - For comparison with detection zone analytes.
T Please indicate detection limit if analyte is not detected.
** Total and dissolved analysis required only in conjunction with additional annual metals sampling (see page 4).
Remaining quarterly samples only require total metals analysis.

I.D. No	100008
Monitoring Point No.	CWMP001W
Sample Date	10/14/2019

FORM 19

QUARTERLY AND ANNUAL WATER QUALITY ANALYSES

2-Q. Organics (Enter all data in ug/l)

ANALYTE	VALUE[T]	ANALYSIS METHOD NUMBER
BENZENE	1 ND	SW846 8260B
1,2-DIBROMOETHANE (EDB) (ETHYLENE D	1 ND	SW846 8260B
1,1-DICHLOROETHANE	1 ND	SW846 8260B
1,1-DICHLOROETHENE	1 ND	SW846 8260B
1,2-DICHLOROETHANE	1 ND	SW846 8260B
cis 1,2-DICHLOROETHENE	1 ND	SW846 8260B
trans 1,2-DICHLOROETHENE	1 ND	SW846 8260B
ETHYLBENZENE	1 ND	SW846 8260B
METHYLENE CHLORIDE	1 ND	SW846 8260B
TETRACHLOROETHENE	1 ND	SW846 8260B
TOLUENE	1 ND	SW846 8260B
1,1,1-TRICHLOROETHANE	1 ND	SW846 8260B
TRICHLOROETHENE	1 ND	SW846 8260B
VINYL CHLORIDE	1 ND	SW846 8260B
XYLENES (TOTAL)	3 ND	SW846 8260B

T Please indicate detection limit if analyte is not detected.

2540-FM-BWM0041 Rev. 6/2005

COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF ENVIRONMENTAL PROTECTION
BUREAU OF WASTE MANAGEMENT

Date Prepared/Revised
11/13/2019
DEP USE ONLY
Date Received

FORM 19

MUNICIPAL WASTE LANDFILL
QUARTERLY AND ANNUAL WATER QUALITY ANALYSES

This form must be fully and accurately completed. All required information must be typed or legibly printed in the spaces provided. If additional space is necessary, identify each attached sheet as Form 19, reference the item number and identify the date prepared. The "date prepared/revised" on any attached sheets needs to match the "date prepared/revised" on this page.

General Reference: Section 273.284
Federal Regulations, Subtitle D: 258.54 and Appendix I to Part 258.

SECTION A. APPLICANT IDENTIFIER

Applicant/permittee: Lancaster County Solid Waste Mana

Site Name: Creswell Landfill

Facitlity ID (as issued by DEP): 100008

SECTION B. FACILITY INFORMATION

Monitoring Wells must be designed and constructed in accordance with Department Standards. INDICATE THE LATITUDE AND LONGITUDE TO THE NEAREST ONE TENTH OF A SECOND (D° MM' SS.S")

Monitoring Point Number: CWMP002W — X Well ___ Spring ___ Stream ___ Other

___ Upgradient/Upstream X Downgradient/Downstream

Location (County): Lancaster County — Municipality: Manor Township

Sampling Point: Latitude: 39 ° 57 ' 19.97 " — Longitude: 76 ° 26 ' 12.3 "

Depth to Water Level: 67.31 ft — Measured from: ___ Land Surface X TOC

Casing Stickup: -1.19 ft — Elevation of Water Level: 458.5 ft./MSL

Sampling Depth: 85 ft — Volume of Water Column: 48.01 gal

Total Well Depth: 100 ft — Sampling Method: X Pumped ___ Bailed ___ Grab

Well Purged: X Yes ___ No — Well Volumes Purged: ___

Sample Field Filtered (must be 0.45 micron)?: ___ Yes X No

Spring Flow Rate: ___ gpm

Sample Date (mm/dd/yy): 10/14/2019 — Sample Collection Time: 15:37

Sample Collector's Name: Mr. Brian G Shade

Sample Collector's Affiliation: ALS

Laboratory(ies) Performing Analysis: ALS Environmental

Were any holding times exceeded?: ___ Yes X No If yes, please explain in comments field.

Lab Accreditation Number(s): 22-293

Lab Sample Number(s): 3063693003 — Final Lab Analysis CompletionDate: 10/23/2019

Name/Affiliation of Person who Filled Out Form: Nick R. Rogers

Comments:

I.D. No	100008
Monitoring Point No.	CWMP002W
Sample Date	10/14/2019

FORM 19

QUARTERLY AND ANNUAL WATER QUALITY ANALYSES

ANALYTES

1-Q. Inorganics (Enter all data in mg/l except as noted)

ANALYTE	VALUE[T]	ANALYSIS METHOD NUMBER
AMMONIA-NITROGEN	0.183	EPA 350.3
BICARBONATE	68	SM18-2321
CALCIUM, TOTAL	47.6	SW846 6010B
CALCIUM, DISSOLVED		SW 8466010B
COD (CHEMICAL OXYGEN DEMAND)	15 ND	EPA 410.4
CHLORIDE	106	EPA 300.0
FLUORIDE	0.2 ND	EPA 300.0
IRON, TOTAL (ug/l)	67 ND	SW846 6010B
IRON, DISSOLVED (ug/l)		SW846 6010B
MAGNESIUM, TOTAL	15.5	SW846 6010B
MAGNESIUM, DISSOLVED		SW846 6010B
MANGANESE, TOTAL (ug/l)	950	SW846 6010B
MANGANESE, DISSOLVED (ug/l)		SW846 6010B
NITRATE-NITROGEN	4.2	EPA 300.0
pH-FIELD (SU)	5.49	FIELD
pH-LAB (SU)	6.8	EPA 150.1
POTASSIUM, TOTAL	3	SW846 6010B
POTASSIUM, DISSOLVED		SW846 6010B
SODIUM, TOTAL	25	SW846 6010B
SODIUM, DISSOLVED		SW846 6010B
SPEC. COND., FIELD (umhos/cm)	373	FIELD
SPEC. COND., LAB (umhos/cm)	557	EPA 120.1
SULFATE	20.6	EPA 300.0
ALKALINITY	68	SM18-2320B
TDS (TOTAL DISSOLVED SOLIDS)	302	SM18-2540C
TOC (TOTAL ORGANIC CARBON)	3.8	SM18-5310B
TOTAL PHENOLICS (ug/l)	5 ND	SW846 9066
TURBIDITY (N.T.U.)	0.74	SM 2130B

* Indicator Analyte - For comparison with detection zone analytes.
T Please indicate detection limit if analyte is not detected.
** Total and dissolved analysis required only in conjunction with additional annual metals sampling (see page 4).
Remaining quarterly samples only require total metals analysis.

I.D. No	100008
Monitoring Point No.	CWMP002W
Sample Date	10/14/2019

FORM 19

QUARTERLY AND ANNUAL WATER QUALITY ANALYSES

2-Q. Organics (Enter all data in ug/l)

ANALYTE	VALUE[T]	ANALYSIS METHOD NUMBER
BENZENE	1 ND	SW846 8260B
1,2-DIBROMOETHANE (EDB) (ETHYLENE D	1 ND	SW846 8260B
1,1-DICHLOROETHANE	13.2	SW846 8260B
1,1-DICHLOROETHENE	1 ND	SW846 8260B
1,2-DICHLOROETHANE	1 ND	SW846 8260B
cis 1,2-DICHLOROETHENE	1 ND	SW846 8260B
trans 1,2-DICHLOROETHENE	1 ND	SW846 8260B
ETHYLBENZENE	1 ND	SW846 8260B
METHYLENE CHLORIDE	1 ND	SW846 8260B
TETRACHLOROETHENE	1 ND	SW846 8260B
TOLUENE	1 ND	SW846 8260B
1,1,1-TRICHLOROETHANE	1.1	SW846 8260B
TRICHLOROETHENE	1 ND	SW846 8260B
VINYL CHLORIDE	1 ND	SW846 8260B
XYLENES (TOTAL)	3 ND	SW846 8260B

T Please indicate detection limit if analyte is not detected.

2540-FM-BWM0041 Rev. 6/2005

COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF ENVIRONMENTAL PROTECTION
BUREAU OF WASTE MANAGEMENT

Date Prepared/Revised
11/13/2019
DEP USE ONLY
Date Received

FORM 19

MUNICIPAL WASTE LANDFILL
QUARTERLY AND ANNUAL WATER QUALITY ANALYSES

This form must be fully and accurately completed. All required information must be typed or legibly printed in the spaces provided. If additional space is necessary, identify each attached sheet as Form 19, reference the item number and identify the date prepared. The "date prepared/revised" on any attached sheets needs to match the "date prepared/revised" on this page.

General Reference: Section 273.284
Federal Regulations, Subtitle D: 258.54 and Appendix I to Part 258.

SECTION A. APPLICANT IDENTIFIER

Applicant/permittee: Lancaster County Solid Waste Mana

Site Name: Creswell Landfill

Facitlity ID (as issued by DEP): 100008

SECTION B. FACILITY INFORMATION

Monitoring Wells must be designed and constructed in accordance with Department Standards. INDICATE THE LATITUDE AND LONGITUDE TO THE NEAREST ONE TENTH OF A SECOND (D° MM' SS.S")

Monitoring Point Number: CWMP005W — X Well ___ Spring ___ Stream ___ Other

X Upgradient/Upstream ___ Downgradient/Downstream

Location (County): Lancaster County — Municipality: Manor Township

Sampling Point: Latitude: 39 ° 57 ' 11.17 " — Longitude: 76 ° 26 ' 7.08 "

Depth to Water Level: 41.51 ft — Measured from: ___ Land Surface X TOC

Casing Stickup: -0.37 ft — Elevation of Water Level: 471.92 ft./MSL

Sampling Depth: 130 ft — Volume of Water Column: 144.65 gal

Total Well Depth: 140 ft — Sampling Method: X Pumped ___ Bailed ___ Grab

Well Purged: X Yes ___ No — Well Volumes Purged: 2.5

Sample Field Filtered (must be 0.45 micron)?: ___ Yes X No

Spring Flow Rate: ___ gpm

Sample Date (mm/dd/yy): 10/15/2019 — Sample Collection Time: 12:15

Sample Collector's Name: Mr. Brian G Shade

Sample Collector's Affiliation: ALS

Laboratory(ies) Performing Analysis: ALS Environmental

Were any holding times exceeded?: ___ Yes X No If yes, please explain in comments field.

Lab Accreditation Number(s): 22-293

Lab Sample Number(s): 3063861001 — Final Lab Analysis CompletionDate: 10/25/2019

Name/Affiliation of Person who Filled Out Form: Nick R. Rogers

Comments:

I.D. No	100008
Monitoring Point No.	CWMP005W
Sample Date	10/15/2019

FORM 19

QUARTERLY AND ANNUAL WATER QUALITY ANALYSES

ANALYTES

1-Q. Inorganics (Enter all data in mg/l except as noted)

ANALYTE	VALUE[T]	ANALYSIS METHOD NUMBER
AMMONIA-NITROGEN	0.142	EPA 350.3
BICARBONATE	18	SM18-2321
CALCIUM, TOTAL	12.7	SW846 6010B
CALCIUM, DISSOLVED		SW 8466010B
COD (CHEMICAL OXYGEN DEMAND)	15 ND	EPA 410.4
CHLORIDE	55.1	EPA 300.0
FLUORIDE	0.2 ND	EPA 300.0
IRON, TOTAL (ug/l)	67 ND	SW846 6010B
IRON, DISSOLVED (ug/l)		SW846 6010B
MAGNESIUM, TOTAL	6.8	SW846 6010B
MAGNESIUM, DISSOLVED		SW846 6010B
MANGANESE, TOTAL (ug/l)	44	SW846 6010B
MANGANESE, DISSOLVED (ug/l)		SW846 6010B
NITRATE-NITROGEN	8.4	EPA 300.0
pH-FIELD (SU)	5.18	FIELD
pH-LAB (SU)	6.28	EPA 150.1
POTASSIUM, TOTAL	2.3	SW846 6010B
POTASSIUM, DISSOLVED		SW846 6010B
SODIUM, TOTAL	25.1	SW846 6010B
SODIUM, DISSOLVED		SW846 6010B
SPEC. COND., FIELD (umhos/cm)	277	FIELD
SPEC. COND., LAB (umhos/cm)	299	EPA 120.1
SULFATE	5	EPA 300.0
ALKALINITY	18	SM18-2320B
TDS (TOTAL DISSOLVED SOLIDS)	184	SM18-2540C
TOC (TOTAL ORGANIC CARBON)	0.6	SM18-5310B
TOTAL PHENOLICS (ug/l)	5 ND	SW846 9066
TURBIDITY (N.T.U.)	0.41	SM 2130B

* Indicator Analyte - For comparison with detection zone analytes.
T Please indicate detection limit if analyte is not detected.
** Total and dissolved analysis required only in conjunction with additional annual metals sampling (see page 4).
Remaining quarterly samples only require total metals analysis.

I.D. No	100008
Monitoring Point No.	CWMP005W
Sample Date	10/15/2019

FORM 19

QUARTERLY AND ANNUAL WATER QUALITY ANALYSES

2-Q. Organics (Enter all data in ug/l)

ANALYTE	VALUE[T]	ANALYSIS METHOD NUMBER
BENZENE	1 ND	SW846 8260B
1,2-DIBROMOETHANE (EDB) (ETHYLENE D	1 ND	SW846 8260B
1,1-DICHLOROETHANE	1 ND	SW846 8260B
1,1-DICHLOROETHENE	1 ND	SW846 8260B
1,2-DICHLOROETHANE	1 ND	SW846 8260B
cis 1,2-DICHLOROETHENE	1 ND	SW846 8260B
trans 1,2-DICHLOROETHENE	1 ND	SW846 8260B
ETHYLBENZENE	1 ND	SW846 8260B
METHYLENE CHLORIDE	1 ND	SW846 8260B
TETRACHLOROETHENE	1 ND	SW846 8260B
TOLUENE	1 ND	SW846 8260B
1,1,1-TRICHLOROETHANE	1 ND	SW846 8260B
TRICHLOROETHENE	1 ND	SW846 8260B
VINYL CHLORIDE	1 ND	SW846 8260B
XYLENES (TOTAL)	3 ND	SW846 8260B

T Please indicate detection limit if analyte is not detected.

2540-FM-BWM0041 Rev. 6/2005

COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF ENVIRONMENTAL PROTECTION
BUREAU OF WASTE MANAGEMENT

Date Prepared/Revised
11/13/2019
DEP USE ONLY
Date Received

FORM 19

MUNICIPAL WASTE LANDFILL
QUARTERLY AND ANNUAL WATER QUALITY ANALYSES

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General Reference: Section 273.284
Federal Regulations, Subtitle D: 258.54 and Appendix I to Part 258.

SECTION A. APPLICANT IDENTIFIER

Applicant/permittee: Lancaster County Solid Waste Mana

Site Name: Creswell Landfill

Facitlity ID (as issued by DEP): 100008

SECTION B. FACILITY INFORMATION

Monitoring Wells must be designed and constructed in accordance with Department Standards. INDICATE THE LATITUDE AND LONGITUDE TO THE NEAREST ONE TENTH OF A SECOND (D° MM' SS.S")

Monitoring Point Number: CWMP012W — X Well ___ Spring ___ Stream ___ Other

___ Upgradient/Upstream X Downgradient/Downstream

Location (County): Lancaster County — Municipality: Manor Township

Sampling Point: Latitude: 39 ° 57 ' 1.48 " — Longitude: 76 ° 26 ' 36.02 "

Depth to Water Level: 51.41 ft — Measured from: ___ Land Surface X TOC

Casing Stickup: 1.90 ft — Elevation of Water Level: 331.29 ft./MSL

Sampling Depth: 0 ft — Volume of Water Column: 74.15 gal

Total Well Depth: 101.9 ft — Sampling Method: ___Pumped ___Bailed X Grab

Well Purged: X Yes ___ No — Well Volumes Purged: ___

Sample Field Filtered (must be 0.45 micron)?: ___ Yes X No

Spring Flow Rate: ___ gpm

Sample Date (mm/dd/yy): 10/16/2019 — Sample Collection Time: 10:24

Sample Collector's Name: Mr. Brian G Shade

Sample Collector's Affiliation: ALS

Laboratory(ies) Performing Analysis: ALS Environmental

Were any holding times exceeded?: ___ Yes X No If yes, please explain in comments field.

Lab Accreditation Number(s): 22-293

Lab Sample Number(s): 3064194001 — Final Lab Analysis CompletionDate: 10/25/2019

Name/Affiliation of Person who Filled Out Form: Nick R. Rogers

Comments:

I.D. No	100008
Monitoring Point No.	CWMP012W
Sample Date	10/16/2019

FORM 19

QUARTERLY AND ANNUAL WATER QUALITY ANALYSES

ANALYTES

1-Q. Inorganics (Enter all data in mg/l except as noted)

ANALYTE	VALUE[T]	ANALYSIS METHOD NUMBER
AMMONIA-NITROGEN	0.1 ND	EPA 350.3
BICARBONATE	79	SM18-2321
CALCIUM, TOTAL	31.1	SW846 6010B
CALCIUM, DISSOLVED		SW 8466010B
COD (CHEMICAL OXYGEN DEMAND)	15 ND	EPA 410.4
CHLORIDE	32.7	EPA 300.0
FLUORIDE	0.2 ND	EPA 300.0
IRON, TOTAL (ug/l)	36500	SW846 6010B
IRON, DISSOLVED (ug/l)		SW846 6010B
MAGNESIUM, TOTAL	8.3	SW846 6010B
MAGNESIUM, DISSOLVED		SW846 6010B
MANGANESE, TOTAL (ug/l)	220	SW846 6010B
MANGANESE, DISSOLVED (ug/l)		SW846 6010B
NITRATE-NITROGEN	9.8	EPA 300.0
pH-FIELD (SU)	5.67	FIELD
pH-LAB (SU)	6.46	EPA 150.1
POTASSIUM, TOTAL	1.4	SW846 6010B
POTASSIUM, DISSOLVED		SW846 6010B
SODIUM, TOTAL	12.3	SW846 6010B
SODIUM, DISSOLVED		SW846 6010B
SPEC. COND., FIELD (umhos/cm)	311	FIELD
SPEC. COND., LAB (umhos/cm)	346	EPA 120.1
SULFATE	4.3	EPA 300.0
ALKALINITY	79	SM18-2320B
TDS (TOTAL DISSOLVED SOLIDS)	266	SM18-2540C
TOC (TOTAL ORGANIC CARBON)	1.7	SM18-5310B
TOTAL PHENOLICS (ug/l)	5 ND	SW846 9066
TURBIDITY (N.T.U.)	98.5	SM 2130B

* Indicator Analyte - For comparison with detection zone analytes.
T Please indicate detection limit if analyte is not detected.
** Total and dissolved analysis required only in conjunction with additional annual metals sampling (see page 4).
Remaining quarterly samples only require total metals analysis.

I.D. No	100008
Monitoring Point No.	CWMP012W
Sample Date	10/16/2019

FORM 19

QUARTERLY AND ANNUAL WATER QUALITY ANALYSES

2-Q. Organics (Enter all data in ug/l)

ANALYTE	VALUE[T]	ANALYSIS METHOD NUMBER
BENZENE	1 ND	SW846 8260B
1,2-DIBROMOETHANE (EDB) (ETHYLENE D	1 ND	SW846 8260B
1,1-DICHLOROETHANE	1 ND	SW846 8260B
1,1-DICHLOROETHENE	1 ND	SW846 8260B
1,2-DICHLOROETHANE	1 ND	SW846 8260B
cis 1,2-DICHLOROETHENE	1 ND	SW846 8260B
trans 1,2-DICHLOROETHENE	1 ND	SW846 8260B
ETHYLBENZENE	1 ND	SW846 8260B
METHYLENE CHLORIDE	1 ND	SW846 8260B
TETRACHLOROETHENE	1 ND	SW846 8260B
TOLUENE	1 ND	SW846 8260B
1,1,1-TRICHLOROETHANE	1 ND	SW846 8260B
TRICHLOROETHENE	1 ND	SW846 8260B
VINYL CHLORIDE	1 ND	SW846 8260B
XYLENES (TOTAL)	3 ND	SW846 8260B

T Please indicate detection limit if analyte is not detected.

2540-FM-BWM0041 Rev. 6/2005

COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF ENVIRONMENTAL PROTECTION
BUREAU OF WASTE MANAGEMENT

Date Prepared/Revised
11/13/2019
DEP USE ONLY
Date Received

FORM 19

MUNICIPAL WASTE LANDFILL
QUARTERLY AND ANNUAL WATER QUALITY ANALYSES

This form must be fully and accurately completed. All required information must be typed or legibly printed in the spaces provided. If additional space is necessary, identify each attached sheet as Form 19, reference the item number and identify the date prepared. The "date prepared/revised" on any attached sheets needs to match the "date prepared/revised" on this page.

General Reference: Section 273.284
Federal Regulations, Subtitle D: 258.54 and Appendix I to Part 258.

SECTION A. APPLICANT IDENTIFIER

Applicant/permittee: Lancaster County Solid Waste Mana

Site Name: Creswell Landfill

Facitlity ID (as issued by DEP): 100008

SECTION B. FACILITY INFORMATION

Monitoring Wells must be designed and constructed in accordance with Department Standards. INDICATE THE LATITUDE AND LONGITUDE TO THE NEAREST ONE TENTH OF A SECOND (D° MM' SS.S")

Monitoring Point Number: CWMP016W — X Well ___ Spring ___ Stream ___ Other

___ Upgradient/Upstream X Downgradient/Downstream

Location (County): Lancaster County — Municipality: Manor Township

Sampling Point: Latitude: 39 ° 56 ' 55.57 " — Longitude: 76 ° 26 ' 50.59 "

Depth to Water Level: 14.23 ft — Measured from: ___ Land Surface X TOC

Casing Stickup: 2.53 ft — Elevation of Water Level: 297.74 ft./MSL

Sampling Depth: 71 ft — Volume of Water Column: ___ gal

Total Well Depth: 78.03 ft — Sampling Method: X Pumped ___ Bailed ___ Grab

Well Purged: X Yes ___ No — Well Volumes Purged: 1.9

Sample Field Filtered (must be 0.45 micron)?: ___ Yes X No

Spring Flow Rate: ___ gpm

Sample Date (mm/dd/yy): 10/17/2019 — Sample Collection Time: 10:29

Sample Collector's Name: Mr. Brian G Shade

Sample Collector's Affiliation: ALS

Laboratory(ies) Performing Analysis: ALS Environmental

Were any holding times exceeded?: ___ Yes X No If yes, please explain in comments field.

Lab Accreditation Number(s): 22-293

Lab Sample Number(s): 3064477001 — Final Lab Analysis CompletionDate: 10/31/2019

Name/Affiliation of Person who Filled Out Form: Nick R. Rogers

Comments:

I.D. No	100008
Monitoring Point No.	CWMP016W
Sample Date	10/17/2019

FORM 19

QUARTERLY AND ANNUAL WATER QUALITY ANALYSES

ANALYTES

1-Q. Inorganics (Enter all data in mg/l except as noted)

ANALYTE	VALUE[T]	ANALYSIS METHOD NUMBER
AMMONIA-NITROGEN	0.1 ND	EPA 350.3
BICARBONATE	12	SM18-2321
CALCIUM, TOTAL	4.9	SW846 6010B
CALCIUM, DISSOLVED		SW 8466010B
COD (CHEMICAL OXYGEN DEMAND)	15 ND	EPA 410.4
CHLORIDE	2.4	EPA 300.0
FLUORIDE	0.2 ND	EPA 300.0
IRON, TOTAL (ug/l)	520	SW846 6010B
IRON, DISSOLVED (ug/l)		SW846 6010B
MAGNESIUM, TOTAL	1.1	SW846 6010B
MAGNESIUM, DISSOLVED		SW846 6010B
MANGANESE, TOTAL (ug/l)	5.8	SW846 6010B
MANGANESE, DISSOLVED (ug/l)		SW846 6010B
NITRATE-NITROGEN	0.48	EPA 300.0
pH-FIELD (SU)	4.93	FIELD
pH-LAB (SU)	6.39	EPA 150.1
POTASSIUM, TOTAL	0.56 ND	SW846 6010B
POTASSIUM, DISSOLVED		SW846 6010B
SODIUM, TOTAL	3	SW846 6010B
SODIUM, DISSOLVED		SW846 6010B
SPEC. COND., FIELD (umhos/cm)	58	FIELD
SPEC. COND., LAB (umhos/cm)	63	EPA 120.1
SULFATE	9.3	EPA 300.0
ALKALINITY	12	SM18-2320B
TDS (TOTAL DISSOLVED SOLIDS)	100	SM18-2540C
TOC (TOTAL ORGANIC CARBON)	0.5 ND	SM18-5310B
TOTAL PHENOLICS (ug/l)	5 ND	SW846 9066
TURBIDITY (N.T.U.)	6.49	SM 2130B

* Indicator Analyte - For comparison with detection zone analytes.
T Please indicate detection limit if analyte is not detected.
** Total and dissolved analysis required only in conjunction with additional annual metals sampling (see page 4).
Remaining quarterly samples only require total metals analysis.

I.D. No	100008
Monitoring Point No.	CWMP016W
Sample Date	10/17/2019

FORM 19

QUARTERLY AND ANNUAL WATER QUALITY ANALYSES

2-Q. Organics (Enter all data in ug/l)

ANALYTE	VALUE[T]	ANALYSIS METHOD NUMBER
BENZENE	1 ND	SW846 8260B
1,2-DIBROMOETHANE (EDB) (ETHYLENE D	1 ND	SW846 8260B
1,1-DICHLOROETHANE	1 ND	SW846 8260B
1,1-DICHLOROETHENE	1 ND	SW846 8260B
1,2-DICHLOROETHANE	1 ND	SW846 8260B
cis 1,2-DICHLOROETHENE	1 ND	SW846 8260B
trans 1,2-DICHLOROETHENE	1 ND	SW846 8260B
ETHYLBENZENE	1 ND	SW846 8260B
METHYLENE CHLORIDE	1 ND	SW846 8260B
TETRACHLOROETHENE	1 ND	SW846 8260B
TOLUENE	1 ND	SW846 8260B
1,1,1-TRICHLOROETHANE	1 ND	SW846 8260B
TRICHLOROETHENE	1 ND	SW846 8260B
VINYL CHLORIDE	1 ND	SW846 8260B
XYLENES (TOTAL)	3 ND	SW846 8260B

T Please indicate detection limit if analyte is not detected.

2540-FM-BWM0041 Rev. 6/2005

COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF ENVIRONMENTAL PROTECTION
BUREAU OF WASTE MANAGEMENT

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FORM 19

MUNICIPAL WASTE LANDFILL
QUARTERLY AND ANNUAL WATER QUALITY ANALYSES

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General Reference: Section 273.284
Federal Regulations, Subtitle D: 258.54 and Appendix I to Part 258.

SECTION A. APPLICANT IDENTIFIER

Applicant/permittee: Lancaster County Solid Waste Mana

Site Name: Creswell Landfill

Facitlity ID (as issued by DEP): 100008

SECTION B. FACILITY INFORMATION

Monitoring Wells must be designed and constructed in accordance with Department Standards. INDICATE THE LATITUDE AND LONGITUDE TO THE NEAREST ONE TENTH OF A SECOND (D° MM' SS.S")

Monitoring Point Number: CWMP010W — X Well ___ Spring ___ Stream ___ Other

___ Upgradient/Upstream X Downgradient/Downstream

Location (County): Lancaster County — Municipality: Manor Township

Sampling Point: Latitude: 39 ° 57 ' 2.38 " — Longitude: 76 ° 26 ' 57.92 "

Depth to Water Level: 11.01 ft — Measured from: ___ Land Surface X TOC

Casing Stickup: 2.10 ft — Elevation of Water Level: 349.89 ft./MSL

Sampling Depth: 17 ft — Volume of Water Column: 5.61 gal

Total Well Depth: 19.6 ft — Sampling Method: X Pumped ___ Bailed ___ Grab

Well Purged: X Yes ___ No — Well Volumes Purged: 2.0

Sample Field Filtered (must be 0.45 micron)?: ___ Yes X No

Spring Flow Rate: ___ gpm

Sample Date (mm/dd/yy): 10/17/2019 — Sample Collection Time: 11:21

Sample Collector's Name: Mr. Brian G Shade

Sample Collector's Affiliation: ALS

Laboratory(ies) Performing Analysis: ALS Environmental

Were any holding times exceeded?: ___ Yes X No If yes, please explain in comments field.

Lab Accreditation Number(s): 22-293

Lab Sample Number(s): 3064477002 — Final Lab Analysis CompletionDate: 10/26/2019

Name/Affiliation of Person who Filled Out Form: Nick R. Rogers

Comments:

I.D. No	100008
Monitoring Point No.	CWMP010W
Sample Date	10/17/2019

FORM 19

QUARTERLY AND ANNUAL WATER QUALITY ANALYSES

ANALYTES

1-Q. Inorganics (Enter all data in mg/l except as noted)

ANALYTE	VALUE[T]	ANALYSIS METHOD NUMBER
AMMONIA-NITROGEN	0.1 ND	EPA 350.3
BICARBONATE	377	SM18-2321
CALCIUM, TOTAL	84	SW846 6010B
CALCIUM, DISSOLVED		SW 8466010B
COD (CHEMICAL OXYGEN DEMAND)	15 ND	EPA 410.4
CHLORIDE	607	EPA 300.0
FLUORIDE	0.2 ND	EPA 300.0
IRON, TOTAL (ug/l)	67 ND	SW846 6010B
IRON, DISSOLVED (ug/l)		SW846 6010B
MAGNESIUM, TOTAL	72.3	SW846 6010B
MAGNESIUM, DISSOLVED		SW846 6010B
MANGANESE, TOTAL (ug/l)	23	SW846 6010B
MANGANESE, DISSOLVED (ug/l)		SW846 6010B
NITRATE-NITROGEN	18.5	EPA 300.0
pH-FIELD (SU)	6.05	FIELD
pH-LAB (SU)	7.24	EPA 150.1
POTASSIUM, TOTAL	15.7	SW846 6010B
POTASSIUM, DISSOLVED		SW846 6010B
SODIUM, TOTAL	321	SW846 6010B
SODIUM, DISSOLVED		SW846 6010B
SPEC. COND., FIELD (umhos/cm)	2640	FIELD
SPEC. COND., LAB (umhos/cm)	2840	EPA 120.1
SULFATE	44.8	EPA 300.0
ALKALINITY	377	SM18-2320B
TDS (TOTAL DISSOLVED SOLIDS)	1330	SM18-2540C
TOC (TOTAL ORGANIC CARBON)	5.2	SM18-5310B
TOTAL PHENOLICS (ug/l)	5 ND	SW846 9066
TURBIDITY (N.T.U.)	0.56	SM 2130B

* Indicator Analyte - For comparison with detection zone analytes.
T Please indicate detection limit if analyte is not detected.
** Total and dissolved analysis required only in conjunction with additional annual metals sampling (see page 4). Remaining quarterly samples only require total metals analysis.

I.D. No	100008
Monitoring Point No.	CWMP010W
Sample Date	10/17/2019

FORM 19

QUARTERLY AND ANNUAL WATER QUALITY ANALYSES

2-Q. Organics (Enter all data in ug/l)

ANALYTE	VALUE[T]	ANALYSIS METHOD NUMBER
BENZENE	1 ND	SW846 8260B
1,2-DIBROMOETHANE (EDB) (ETHYLENE D	1 ND	SW846 8260B
1,1-DICHLOROETHANE	1 ND	SW846 8260B
1,1-DICHLOROETHENE	1 ND	SW846 8260B
1,2-DICHLOROETHANE	1 ND	SW846 8260B
cis 1,2-DICHLOROETHENE	1 ND	SW846 8260B
trans 1,2-DICHLOROETHENE	1 ND	SW846 8260B
ETHYLBENZENE	1 ND	SW846 8260B
METHYLENE CHLORIDE	1 ND	SW846 8260B
TETRACHLOROETHENE	1 ND	SW846 8260B
TOLUENE	1 ND	SW846 8260B
1,1,1-TRICHLOROETHANE	1 ND	SW846 8260B
TRICHLOROETHENE	1 ND	SW846 8260B
VINYL CHLORIDE	1 ND	SW846 8260B
XYLENES (TOTAL)	3 ND	SW846 8260B

T Please indicate detection limit if analyte is not detected.

2540-FM-BWM0041 Rev. 6/2005

COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF ENVIRONMENTAL PROTECTION
BUREAU OF WASTE MANAGEMENT

Date Prepared/Revised
11/13/2019
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Date Received

FORM 19

MUNICIPAL WASTE LANDFILL
QUARTERLY AND ANNUAL WATER QUALITY ANALYSES

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General Reference: Section 273.284
Federal Regulations, Subtitle D: 258.54 and Appendix I to Part 258.

SECTION A. APPLICANT IDENTIFIER

Applicant/permittee: Lancaster County Solid Waste Mana

Site Name: Creswell Landfill

Facitlity ID (as issued by DEP): 100008

SECTION B. FACILITY INFORMATION

Monitoring Wells must be designed and constructed in accordance with Department Standards. INDICATE THE LATITUDE AND LONGITUDE TO THE NEAREST ONE TENTH OF A SECOND (D° MM' SS.S")

Monitoring Point Number: CWMP009W — X Well ___ Spring ___ Stream ___ Other

___ Upgradient/Upstream X Downgradient/Downstream

Location (County): Lancaster County — Municipality: Manor Township

Sampling Point: Latitude: 39 ° 57 ' 10.82 " — Longitude: 76 ° 26 ' 55.8 "

Depth to Water Level: 9.27 ft — Measured from: ___ Land Surface X TOC

Casing Stickup: 2.70 ft — Elevation of Water Level: 394.93 ft./MSL

Sampling Depth: 16 ft — Volume of Water Column: 6.81 gal

Total Well Depth: 19.7 ft — Sampling Method: X Pumped ___ Bailed ___ Grab

Well Purged: X Yes ___ No — Well Volumes Purged: 4.6

Sample Field Filtered (must be 0.45 micron)?: ___ Yes X No

Spring Flow Rate: ___ gpm

Sample Date (mm/dd/yy): 10/17/2019 — Sample Collection Time: 12:00

Sample Collector's Name: Mr. Brian G Shade

Sample Collector's Affiliation: ALS

Laboratory(ies) Performing Analysis: ALS Environmental

Were any holding times exceeded?: ___ Yes X No If yes, please explain in comments field.

Lab Accreditation Number(s): 22-293

Lab Sample Number(s): 3064477003 — Final Lab Analysis CompletionDate: 10/26/2019

Name/Affiliation of Person who Filled Out Form: Nick R. Rogers

Comments:

I.D. No	100008
Monitoring Point No.	CWMP009W
Sample Date	10/17/2019

FORM 19

QUARTERLY AND ANNUAL WATER QUALITY ANALYSES

ANALYTES

1-Q. Inorganics (Enter all data in mg/l except as noted)

ANALYTE	VALUE[T]	ANALYSIS METHOD NUMBER
AMMONIA-NITROGEN	31.6	EPA 350.3
BICARBONATE	377	SM18-2321
CALCIUM, TOTAL	147	SW846 6010B
CALCIUM, DISSOLVED		SW 8466010B
COD (CHEMICAL OXYGEN DEMAND)	95	EPA 410.4
CHLORIDE	441	EPA 300.0
FLUORIDE	0.2 ND	EPA 300.0
IRON, TOTAL (ug/l)	31000	SW846 6010B
IRON, DISSOLVED (ug/l)		SW846 6010B
MAGNESIUM, TOTAL	64.9	SW846 6010B
MAGNESIUM, DISSOLVED		SW846 6010B
MANGANESE, TOTAL (ug/l)	11500	SW846 6010B
MANGANESE, DISSOLVED (ug/l)		SW846 6010B
NITRATE-NITROGEN	0.2 ND	EPA 300.0
pH-FIELD (SU)	5.57	FIELD
pH-LAB (SU)	6.56	EPA 150.1
POTASSIUM, TOTAL	29.3	SW846 6010B
POTASSIUM, DISSOLVED		SW846 6010B
SODIUM, TOTAL	150	SW846 6010B
SODIUM, DISSOLVED		SW846 6010B
SPEC. COND., FIELD (umhos/cm)	2340	FIELD
SPEC. COND., LAB (umhos/cm)	2420	EPA 120.1
SULFATE	4.8	EPA 300.0
ALKALINITY	377	SM18-2320B
TDS (TOTAL DISSOLVED SOLIDS)	1230	SM18-2540C
TOC (TOTAL ORGANIC CARBON)	33.1	SM18-5310B
TOTAL PHENOLICS (ug/l)	5 ND	SW846 9066
TURBIDITY (N.T.U.)	39.8	SM 2130B

* Indicator Analyte - For comparison with detection zone analytes.
T Please indicate detection limit if analyte is not detected.
** Total and dissolved analysis required only in conjunction with additional annual metals sampling (see page 4).
Remaining quarterly samples only require total metals analysis.

I.D. No	100008
Monitoring Point No.	CWMP009W
Sample Date	10/17/2019

FORM 19

QUARTERLY AND ANNUAL WATER QUALITY ANALYSES

2-Q. Organics (Enter all data in ug/l)

ANALYTE	VALUE[T]	ANALYSIS METHOD NUMBER
BENZENE	2.7	SW846 8260B
1,2-DIBROMOETHANE (EDB) (ETHYLENE D	1 ND	SW846 8260B
1,1-DICHLOROETHANE	1.6	SW846 8260B
1,1-DICHLOROETHENE	1 ND	SW846 8260B
1,2-DICHLOROETHANE	1 ND	SW846 8260B
cis 1,2-DICHLOROETHENE	1 ND	SW846 8260B
trans 1,2-DICHLOROETHENE	1 ND	SW846 8260B
ETHYLBENZENE	1 ND	SW846 8260B
METHYLENE CHLORIDE	1 ND	SW846 8260B
TETRACHLOROETHENE	1 ND	SW846 8260B
TOLUENE	1 ND	SW846 8260B
1,1,1-TRICHLOROETHANE	1 ND	SW846 8260B
TRICHLOROETHENE	1 ND	SW846 8260B
VINYL CHLORIDE	1 ND	SW846 8260B
XYLENES (TOTAL)	3 ND	SW846 8260B

T Please indicate detection limit if analyte is not detected.

2540-FM-BWM0041 Rev. 6/2005

COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF ENVIRONMENTAL PROTECTION
BUREAU OF WASTE MANAGEMENT

Date Prepared/Revised
11/13/2019
DEP USE ONLY
Date Received

FORM 19

MUNICIPAL WASTE LANDFILL
QUARTERLY AND ANNUAL WATER QUALITY ANALYSES

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General Reference: Section 273.284
Federal Regulations, Subtitle D: 258.54 and Appendix I to Part 258.

SECTION A. APPLICANT IDENTIFIER

Applicant/permittee: Lancaster County Solid Waste Mana

Site Name: Creswell Landfill

Facitlity ID (as issued by DEP): 100008

SECTION B. FACILITY INFORMATION

Monitoring Wells must be designed and constructed in accordance with Department Standards. INDICATE THE LATITUDE AND LONGITUDE TO THE NEAREST ONE TENTH OF A SECOND (D° MM' SS.S")

Monitoring Point Number: CWMP008W — X Well ___ Spring ___ Stream ___ Other

___ Upgradient/Upstream X Downgradient/Downstream

Location (County): Lancaster County — Municipality: Manor Township

Sampling Point: Latitude: 39 ° 57 ' 16.97 " — Longitude: 76 ° 26 ' 47.58 "

Depth to Water Level: 3.69 ft — Measured from: ___ Land Surface X TOC

Casing Stickup: 2.80 ft — Elevation of Water Level: 418.61 ft./MSL

Sampling Depth: 19 ft — Volume of Water Column: 3.12 gal

Total Well Depth: 22.8 ft — Sampling Method: X Pumped ___ Bailed ___ Grab

Well Purged: X Yes ___ No — Well Volumes Purged: 5.9

Sample Field Filtered (must be 0.45 micron)?: ___ Yes X No

Spring Flow Rate: ___ gpm

Sample Date (mm/dd/yy): 10/17/2019 — Sample Collection Time: 12:48

Sample Collector's Name: Mr. Brian G Shade

Sample Collector's Affiliation: ALS

Laboratory(ies) Performing Analysis: ALS Environmental

Were any holding times exceeded?: ___ Yes X No If yes, please explain in comments field.

Lab Accreditation Number(s): 22-293

Lab Sample Number(s): 3064477004 — Final Lab Analysis CompletionDate: 10/28/2019

Name/Affiliation of Person who Filled Out Form: Nick R. Rogers

Comments:

I.D. No	100008
Monitoring Point No.	CWMP008W
Sample Date	10/17/2019

FORM 19

QUARTERLY AND ANNUAL WATER QUALITY ANALYSES

ANALYTES

1-Q. Inorganics (Enter all data in mg/l except as noted)

ANALYTE	VALUE[T]	ANALYSIS METHOD NUMBER
AMMONIA-NITROGEN	10	EPA 350.3
BICARBONATE	377	SM18-2321
CALCIUM, TOTAL	86.2	SW846 6010B
CALCIUM, DISSOLVED		SW 8466010B
COD (CHEMICAL OXYGEN DEMAND)	46	EPA 410.4
CHLORIDE	79.5	EPA 300.0
FLUORIDE	0.2 ND	EPA 300.0
IRON, TOTAL (ug/l)	31600	SW846 6010B
IRON, DISSOLVED (ug/l)		SW846 6010B
MAGNESIUM, TOTAL	41.6	SW846 6010B
MAGNESIUM, DISSOLVED		SW846 6010B
MANGANESE, TOTAL (ug/l)	16700	SW846 6010B
MANGANESE, DISSOLVED (ug/l)		SW846 6010B
NITRATE-NITROGEN	0.2 ND	EPA 300.0
pH-FIELD (SU)	5.64	FIELD
pH-LAB (SU)	6.41	EPA 150.1
POTASSIUM, TOTAL	11.3	SW846 6010B
POTASSIUM, DISSOLVED		SW846 6010B
SODIUM, TOTAL	71	SW846 6010B
SODIUM, DISSOLVED		SW846 6010B
SPEC. COND., FIELD (umhos/cm)	1172	FIELD
SPEC. COND., LAB (umhos/cm)	1230	EPA 120.1
SULFATE	4	EPA 300.0
ALKALINITY	377	SM18-2320B
TDS (TOTAL DISSOLVED SOLIDS)	662	SM18-2540C
TOC (TOTAL ORGANIC CARBON)	17.7	SM18-5310B
TOTAL PHENOLICS (ug/l)	5 ND	SW846 9066
TURBIDITY (N.T.U.)	37.4	SM 2130B

* Indicator Analyte - For comparison with detection zone analytes.
T Please indicate detection limit if analyte is not detected.
** Total and dissolved analysis required only in conjunction with additional annual metals sampling (see page 4).
Remaining quarterly samples only require total metals analysis.

I.D. No	100008
Monitoring Point No.	CWMP008W
Sample Date	10/17/2019

FORM 19

QUARTERLY AND ANNUAL WATER QUALITY ANALYSES

2-Q. Organics (Enter all data in ug/l)

ANALYTE	VALUE[T]	ANALYSIS METHOD NUMBER
BENZENE	1.9	SW846 8260B
1,2-DIBROMOETHANE (EDB) (ETHYLENE D	1 ND	SW846 8260B
1,1-DICHLOROETHANE	3.9	SW846 8260B
1,1-DICHLOROETHENE	1 ND	SW846 8260B
1,2-DICHLOROETHANE	1 ND	SW846 8260B
cis 1,2-DICHLOROETHENE	1 ND	SW846 8260B
trans 1,2-DICHLOROETHENE	1 ND	SW846 8260B
ETHYLBENZENE	1 ND	SW846 8260B
METHYLENE CHLORIDE	1 ND	SW846 8260B
TETRACHLOROETHENE	1 ND	SW846 8260B
TOLUENE	1 ND	SW846 8260B
1,1,1-TRICHLOROETHANE	1 ND	SW846 8260B
TRICHLOROETHENE	1 ND	SW846 8260B
VINYL CHLORIDE	1 ND	SW846 8260B
XYLENES (TOTAL)	3 ND	SW846 8260B

T Please indicate detection limit if analyte is not detected.

2540-FM-BWM0041 Rev. 6/2005

COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF ENVIRONMENTAL PROTECTION
BUREAU OF WASTE MANAGEMENT

Date Prepared/Revised
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MUNICIPAL WASTE LANDFILL
QUARTERLY AND ANNUAL WATER QUALITY ANALYSES

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Federal Regulations, Subtitle D: 258.54 and Appendix I to Part 258.

SECTION A. APPLICANT IDENTIFIER

Applicant/permittee: Lancaster County Solid Waste Mana

Site Name: Creswell Landfill

Facitlity ID (as issued by DEP): 100008

SECTION B. FACILITY INFORMATION

Monitoring Wells must be designed and constructed in accordance with Department Standards. INDICATE THE LATITUDE AND LONGITUDE TO THE NEAREST ONE TENTH OF A SECOND (D° MM' SS.S")

Monitoring Point Number: CWMP018S — X Well ___ Spring ___ Stream ___ Other

___ Upgradient/Upstream X Downgradient/Downstream

Location (County): Lancaster County — Municipality: Manor

Sampling Point: Latitude: 39 ° 56 ' 55.11 " — Longitude: 76 ° 26 ' 51.66 "

Depth to Water Level: ___ ft — Measured from: ___ Land Surface X TOC

Casing Stickup: ___ ft — Elevation of Water Level: #Error ft./MSL

Sampling Depth: 0 ft — Volume of Water Column: #Error gal

Total Well Depth: ___ ft — Sampling Method: X Pumped ___ Bailed ___ Grab

Well Purged: X Yes ___ No — Well Volumes Purged: ___

Sample Field Filtered (must be 0.45 micron)?: ___ Yes X No

Spring Flow Rate: ___ gpm

Sample Date (mm/dd/yy): 10/18/2019 — Sample Collection Time: 10:23

Sample Collector's Name: Mr. Brian G Shade

Sample Collector's Affiliation: ALS

Laboratory(ies) Performing Analysis: ALS Environmental

Were any holding times exceeded?: ___ Yes X No If yes, please explain in comments field.

Lab Accreditation Number(s): 22-293

Lab Sample Number(s): 3064943001 — Final Lab Analysis CompletionDate: 10/26/2019

Name/Affiliation of Person who Filled Out Form: Nick R. Rogers

Comments:

I.D. No	100008
Monitoring Point No.	CWMP018S
Sample Date	10/18/2019

FORM 19

QUARTERLY AND ANNUAL WATER QUALITY ANALYSES

ANALYTES

1-Q. Inorganics (Enter all data in mg/l except as noted)

ANALYTE	VALUE[T]	ANALYSIS METHOD NUMBER
AMMONIA-NITROGEN	0.1 ND	EPA 350.3
BICARBONATE	5 ND	SM18-2321
CALCIUM, TOTAL	71.2	SW846 6010B
CALCIUM, DISSOLVED		SW 8466010B
COD (CHEMICAL OXYGEN DEMAND)	20	EPA 410.4
CHLORIDE	632	EPA 300.0
FLUORIDE	0.2 ND	EPA 300.0
IRON, TOTAL (ug/l)	370	SW846 6010B
IRON, DISSOLVED (ug/l)		SW846 6010B
MAGNESIUM, TOTAL	83.4	SW846 6010B
MAGNESIUM, DISSOLVED		SW846 6010B
MANGANESE, TOTAL (ug/l)	170	SW846 6010B
MANGANESE, DISSOLVED (ug/l)		SW846 6010B
NITRATE-NITROGEN	24.4	EPA 300.0
pH-FIELD (SU)	8.18	FIELD
pH-LAB (SU)	8.51	EPA 150.1
POTASSIUM, TOTAL	15.6	SW846 6010B
POTASSIUM, DISSOLVED		SW846 6010B
SODIUM, TOTAL	293	SW846 6010B
SODIUM, DISSOLVED		SW846 6010B
SPEC. COND., FIELD (umhos/cm)	2580	FIELD
SPEC. COND., LAB (umhos/cm)	2840	EPA 120.1
SULFATE	26.5	EPA 300.0
ALKALINITY	5 ND	SM18-2320B
TDS (TOTAL DISSOLVED SOLIDS)	1480	SM18-2540C
TOC (TOTAL ORGANIC CARBON)	7.9	SM18-5310B
TOTAL PHENOLICS (ug/l)	5 ND	SW846 9066
TURBIDITY (N.T.U.)	5.72	SM 2130B

* Indicator Analyte - For comparison with detection zone analytes.
T Please indicate detection limit if analyte is not detected.
** Total and dissolved analysis required only in conjunction with additional annual metals sampling (see page 4).
Remaining quarterly samples only require total metals analysis.

I.D. No	100008
Monitoring Point No.	CWMP018S
Sample Date	10/18/2019

FORM 19

QUARTERLY AND ANNUAL WATER QUALITY ANALYSES

2-Q. Organics (Enter all data in ug/l)

ANALYTE	VALUE[T]	ANALYSIS METHOD NUMBER
BENZENE	1 ND	SW846 8260B
1,2-DIBROMOETHANE (EDB) (ETHYLENE D	1 ND	SW846 8260B
1,1-DICHLOROETHANE	1 ND	SW846 8260B
1,1-DICHLOROETHENE	1 ND	SW846 8260B
1,2-DICHLOROETHANE	1 ND	SW846 8260B
cis 1,2-DICHLOROETHENE	1 ND	SW846 8260B
trans 1,2-DICHLOROETHENE	1 ND	SW846 8260B
ETHYLBENZENE	1 ND	SW846 8260B
METHYLENE CHLORIDE	1 ND	SW846 8260B
TETRACHLOROETHENE	1 ND	SW846 8260B
TOLUENE	1 ND	SW846 8260B
1,1,1-TRICHLOROETHANE	1 ND	SW846 8260B
TRICHLOROETHENE	1 ND	SW846 8260B
VINYL CHLORIDE	1 ND	SW846 8260B
XYLENES (TOTAL)	3 ND	SW846 8260B

T Please indicate detection limit if analyte is not detected.

2540-FM-BWM0041 Rev. 6/2005

COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF ENVIRONMENTAL PROTECTION
BUREAU OF WASTE MANAGEMENT

Date Prepared/Revised
11/13/2019
DEP USE ONLY
Date Received

FORM 19

MUNICIPAL WASTE LANDFILL
QUARTERLY AND ANNUAL WATER QUALITY ANALYSES

This form must be fully and accurately completed. All required information must be typed or legibly printed in the spaces provided. If additional space is necessary, identify each attached sheet as Form 19, reference the item number and identify the date prepared. The "date prepared/revised" on any attached sheets needs to match the "date prepared/revised" on this page.

General Reference: Section 273.284
Federal Regulations, Subtitle D: 258.54 and Appendix I to Part 258.

SECTION A. APPLICANT IDENTIFIER

Applicant/permittee: Lancaster County Solid Waste Mana

Site Name: Creswell Landfill

Facitlity ID (as issued by DEP): 100008

SECTION B. FACILITY INFORMATION

Monitoring Wells must be designed and constructed in accordance with Department Standards. INDICATE THE LATITUDE AND LONGITUDE TO THE NEAREST ONE TENTH OF A SECOND (D° MM' SS.S")

Monitoring Point Number: CWMP017S — X Well ___ Spring ___ Stream ___ Other

___ Upgradient/Upstream X Downgradient/Downstream

Location (County): Lancaster County — Municipality: Manor Township

Sampling Point: Latitude: 39 ° 57 ' 20.41 " — Longitude: 76 ° 26 ' 45.1 "

Depth to Water Level: _____ ft — Measured from: ___ Land Surface X TOC

Casing Stickup: _____ ft — Elevation of Water Level: #Error ft./MSL

Sampling Depth: 0 ft — Volume of Water Column: #Error gal

Total Well Depth: _____ ft — Sampling Method: X Pumped ___ Bailed ___ Grab

Well Purged: X Yes ___ No — Well Volumes Purged: _____

Sample Field Filtered (must be 0.45 micron)?: ___ Yes X No

Spring Flow Rate: _ gpm

Sample Date (mm/dd/yy): 10/18/2019 — Sample Collection Time: 10:50

Sample Collector's Name: Mr. Brian G Shade

Sample Collector's Affiliation: ALS

Laboratory(ies) Performing Analysis: ALS Environmental

Were any holding times exceeded?: ___ Yes X No If yes, please explain in comments field.

Lab Accreditation Number(s): 22-293

Lab Sample Number(s): 3064943002 — Final Lab Analysis CompletionDate: 10/26/2019

Name/Affiliation of Person who Filled Out Form: Nick R. Rogers

Comments:

I.D. No	100008
Monitoring Point No.	CWMP017S
Sample Date	10/18/2019

FORM 19

QUARTERLY AND ANNUAL WATER QUALITY ANALYSES

ANALYTES

1-Q. Inorganics (Enter all data in mg/l except as noted)

ANALYTE	VALUE[T]	ANALYSIS METHOD NUMBER
AMMONIA-NITROGEN	0.1 ND	EPA 350.3
BICARBONATE	373	SM18-2321
CALCIUM, TOTAL	84.2	SW846 6010B
CALCIUM, DISSOLVED		SW 8466010B
COD (CHEMICAL OXYGEN DEMAND)	16	EPA 410.4
CHLORIDE	956	EPA 300.0
FLUORIDE	0.2 ND	EPA 300.0
IRON, TOTAL (ug/l)	790	SW846 6010B
IRON, DISSOLVED (ug/l)		SW846 6010B
MAGNESIUM, TOTAL	133	SW846 6010B
MAGNESIUM, DISSOLVED		SW846 6010B
MANGANESE, TOTAL (ug/l)	110	SW846 6010B
MANGANESE, DISSOLVED (ug/l)		SW846 6010B
NITRATE-NITROGEN	33	EPA 300.0
pH-FIELD (SU)	7.69	FIELD
pH-LAB (SU)	8.32	EPA 150.1
POTASSIUM, TOTAL	16.7	SW846 6010B
POTASSIUM, DISSOLVED		SW846 6010B
SODIUM, TOTAL	495	SW846 6010B
SODIUM, DISSOLVED		SW846 6010B
SPEC. COND., FIELD (umhos/cm)	4040	FIELD
SPEC. COND., LAB (umhos/cm)	4410	EPA 120.1
SULFATE	28.7	EPA 300.0
ALKALINITY	380	SM18-2320B
TDS (TOTAL DISSOLVED SOLIDS)	2330	SM18-2540C
TOC (TOTAL ORGANIC CARBON)	5	SM18-5310B
TOTAL PHENOLICS (ug/l)	5 ND	SW846 9066
TURBIDITY (N.T.U.)	2.33	SM 2130B

* Indicator Analyte - For comparison with detection zone analytes.
T Please indicate detection limit if analyte is not detected.
** Total and dissolved analysis required only in conjunction with additional annual metals sampling (see page 4). Remaining quarterly samples only require total metals analysis.

I.D. No	100008
Monitoring Point No.	CWMP017S
Sample Date	10/18/2019

FORM 19

QUARTERLY AND ANNUAL WATER QUALITY ANALYSES

2-Q. Organics (Enter all data in ug/l)

ANALYTE	VALUE[T]	ANALYSIS METHOD NUMBER
BENZENE	1 ND	SW846 8260B
1,2-DIBROMOETHANE (EDB) (ETHYLENE D	1 ND	SW846 8260B
1,1-DICHLOROETHANE	1 ND	SW846 8260B
1,1-DICHLOROETHENE	1 ND	SW846 8260B
1,2-DICHLOROETHANE	1 ND	SW846 8260B
cis 1,2-DICHLOROETHENE	1 ND	SW846 8260B
trans 1,2-DICHLOROETHENE	1 ND	SW846 8260B
ETHYLBENZENE	1 ND	SW846 8260B
METHYLENE CHLORIDE	1 ND	SW846 8260B
TETRACHLOROETHENE	1 ND	SW846 8260B
TOLUENE	1 ND	SW846 8260B
1,1,1-TRICHLOROETHANE	1 ND	SW846 8260B
TRICHLOROETHENE	1 ND	SW846 8260B
VINYL CHLORIDE	1 ND	SW846 8260B
XYLENES (TOTAL)	3 ND	SW846 8260B

T Please indicate detection limit if analyte is not detected.

2540-FM-BWM0041 Rev. 6/2005

COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF ENVIRONMENTAL PROTECTION
BUREAU OF WASTE MANAGEMENT

Date Prepared/Revised
11/13/2019
DEP USE ONLY
Date Received

FORM 19

MUNICIPAL WASTE LANDFILL
QUARTERLY AND ANNUAL WATER QUALITY ANALYSES

This form must be fully and accurately completed. All required information must be typed or legibly printed in the spaces provided. If additional space is necessary, identify each attached sheet as Form 19, reference the item number and identify the date prepared. The "date prepared/revised" on any attached sheets needs to match the "date prepared/revised" on this page.

General Reference: Section 273.284
Federal Regulations, Subtitle D: 258.54 and Appendix I to Part 258.

SECTION A. APPLICANT IDENTIFIER

Applicant/permittee: Lancaster County Solid Waste Mana

Site Name: Creswell Landfill

Facitlity ID (as issued by DEP): 100008

SECTION B. FACILITY INFORMATION

Monitoring Wells must be designed and constructed in accordance with Department Standards. INDICATE THE LATITUDE AND LONGITUDE TO THE NEAREST ONE TENTH OF A SECOND (D° MM' SS.S")

Monitoring Point Number: CWMP004W — X Well ___ Spring ___ Stream ___ Other

___ Upgradient/Upstream X Downgradient/Downstream

Location (County): Lancaster County — Municipality: Manor Township

Sampling Point: Latitude: 39 ° 57 ' 17.9 " — Longitude: 76 ° 26 ' 7.05 "

Depth to Water Level: 99.57 ft — Measured from: ___ Land Surface X TOC

Casing Stickup: -1.37 ft — Elevation of Water Level: 429.96 ft./MSL

Sampling Depth: 130 ft — Volume of Water Column: 59.38 gal

Total Well Depth: 140 ft — Sampling Method: X Pumped ___ Bailed ___ Grab

Well Purged: X Yes ___ No — Well Volumes Purged: ___

Sample Field Filtered (must be 0.45 micron)?: ___ Yes X No

Spring Flow Rate: ___ gpm

Sample Date (mm/dd/yy): 10/18/2019 — Sample Collection Time: 12:15

Sample Collector's Name: Mr. Brian G Shade

Sample Collector's Affiliation: ALS

Laboratory(ies) Performing Analysis: ALS Environmental

Were any holding times exceeded?: ___ Yes X No If yes, please explain in comments field.

Lab Accreditation Number(s): 22-293

Lab Sample Number(s): 3064943003 — Final Lab Analysis CompletionDate: 10/26/2019

Name/Affiliation of Person who Filled Out Form: Nick R. Rogers

Comments:

I.D. No	100008
Monitoring Point No.	CWMP004W
Sample Date	10/18/2019

FORM 19

QUARTERLY AND ANNUAL WATER QUALITY ANALYSES

ANALYTES

1-Q. Inorganics (Enter all data in mg/l except as noted)

ANALYTE	VALUE[T]	ANALYSIS METHOD NUMBER
AMMONIA-NITROGEN	0.1 ND	EPA 350.3
BICARBONATE	21	SM18-2321
CALCIUM, TOTAL	18.2	SW846 6010B
CALCIUM, DISSOLVED		SW 8466010B
COD (CHEMICAL OXYGEN DEMAND)	15 ND	EPA 410.4
CHLORIDE	50.6	EPA 300.0
FLUORIDE	0.2 ND	EPA 300.0
IRON, TOTAL (ug/l)	67 ND	SW846 6010B
IRON, DISSOLVED (ug/l)		SW846 6010B
MAGNESIUM, TOTAL	6.7	SW846 6010B
MAGNESIUM, DISSOLVED		SW846 6010B
MANGANESE, TOTAL (ug/l)	14	SW846 6010B
MANGANESE, DISSOLVED (ug/l)		SW846 6010B
NITRATE-NITROGEN	6.7	EPA 300.0
pH-FIELD (SU)	5.83	FIELD
pH-LAB (SU)	6.5	EPA 150.1
POTASSIUM, TOTAL	1.5	SW846 6010B
POTASSIUM, DISSOLVED		SW846 6010B
SODIUM, TOTAL	17.8	SW846 6010B
SODIUM, DISSOLVED		SW846 6010B
SPEC. COND., FIELD (umhos/cm)	302	FIELD
SPEC. COND., LAB (umhos/cm)	306	EPA 120.1
SULFATE	6.3	EPA 300.0
ALKALINITY	21	SM18-2320B
TDS (TOTAL DISSOLVED SOLIDS)	200	SM18-2540C
TOC (TOTAL ORGANIC CARBON)	0.67	SM18-5310B
TOTAL PHENOLICS (ug/l)	5 ND	SW846 9066
TURBIDITY (N.T.U.)	0.1	SM 2130B

* Indicator Analyte - For comparison with detection zone analytes.
T Please indicate detection limit if analyte is not detected.
** Total and dissolved analysis required only in conjunction with additional annual metals sampling (see page 4).
Remaining quarterly samples only require total metals analysis.

I.D. No	100008
Monitoring Point No.	CWMP004W
Sample Date	10/18/2019

FORM 19

QUARTERLY AND ANNUAL WATER QUALITY ANALYSES

2-Q. Organics (Enter all data in ug/l)

ANALYTE	VALUE[T]	ANALYSIS METHOD NUMBER
BENZENE	1 ND	SW846 8260B
1,2-DIBROMOETHANE (EDB) (ETHYLENE D	1 ND	SW846 8260B
1,1-DICHLOROETHANE	1 ND	SW846 8260B
1,1-DICHLOROETHENE	1 ND	SW846 8260B
1,2-DICHLOROETHANE	1 ND	SW846 8260B
cis 1,2-DICHLOROETHENE	1 ND	SW846 8260B
trans 1,2-DICHLOROETHENE	1 ND	SW846 8260B
ETHYLBENZENE	1 ND	SW846 8260B
METHYLENE CHLORIDE	1 ND	SW846 8260B
TETRACHLOROETHENE	1 ND	SW846 8260B
TOLUENE	1 ND	SW846 8260B
1,1,1-TRICHLOROETHANE	1 ND	SW846 8260B
TRICHLOROETHENE	1 ND	SW846 8260B
VINYL CHLORIDE	1 ND	SW846 8260B
XYLENES (TOTAL)	3 ND	SW846 8260B

T Please indicate detection limit if analyte is not detected.

2540-FM-BWM0041 Rev. 6/2005

COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF ENVIRONMENTAL PROTECTION
BUREAU OF WASTE MANAGEMENT

Date Prepared/Revised
11/13/2019
DEP USE ONLY
Date Received

FORM 19

MUNICIPAL WASTE LANDFILL
QUARTERLY AND ANNUAL WATER QUALITY ANALYSES

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SECTION A. APPLICANT IDENTIFIER

Applicant/permittee: Lancaster County Solid Waste Mana

Site Name: Creswell Landfill

Facitlity ID (as issued by DEP): 100008

SECTION B. FACILITY INFORMATION

Monitoring Wells must be designed and constructed in accordance with Department Standards. INDICATE THE LATITUDE AND LONGITUDE TO THE NEAREST ONE TENTH OF A SECOND (D° MM' SS.S")

Monitoring Point Number: CWMP003W — X Well ___ Spring ___ Stream ___ Other

___ Upgradient/Upstream X Downgradient/Downstream

Location (County): Lancaster County — Municipality: Manor Township

Sampling Point: Latitude: 39 ° 57 ' 20.17 " — Longitude: 76 ° 26 ' 8.37 "

Depth to Water Level: 55.78 ft — Measured from: ___ Land Surface X TOC

Casing Stickup: -1.29 ft — Elevation of Water Level: 468.43 ft./MSL

Sampling Depth: 100 ft — Volume of Water Column: 28.23 gal

Total Well Depth: 75 ft — Sampling Method: X Pumped ___ Bailed ___ Grab

Well Purged: X Yes ___ No — Well Volumes Purged: ___

Sample Field Filtered (must be 0.45 micron)?: ___ Yes X No

Spring Flow Rate: ___ gpm

Sample Date (mm/dd/yy): 10/18/2019 — Sample Collection Time: 12:24

Sample Collector's Name: Mr. Brian G Shade

Sample Collector's Affiliation: ALS

Laboratory(ies) Performing Analysis: ALS Environmental

Were any holding times exceeded?: ___ Yes X No If yes, please explain in comments field.

Lab Accreditation Number(s): 22-293

Lab Sample Number(s): 3064943004 — Final Lab Analysis CompletionDate: 10/31/2019

Name/Affiliation of Person who Filled Out Form: Nick R. Rogers

Comments:

I.D. No	100008
Monitoring Point No.	CWMP003W
Sample Date	10/18/2019

FORM 19

QUARTERLY AND ANNUAL WATER QUALITY ANALYSES

ANALYTES

1-Q. Inorganics (Enter all data in mg/l except as noted)

ANALYTE	VALUE[T]	ANALYSIS METHOD NUMBER
AMMONIA-NITROGEN	0.1 ND	EPA 350.3
BICARBONATE	19	SM18-2321
CALCIUM, TOTAL	24.5	SW846 6010B
CALCIUM, DISSOLVED		SW 8466010B
COD (CHEMICAL OXYGEN DEMAND)	15 ND	EPA 410.4
CHLORIDE	75.2	EPA 300.0
FLUORIDE	0.2 ND	EPA 300.0
IRON, TOTAL (ug/l)	67 ND	SW846 6010B
IRON, DISSOLVED (ug/l)		SW846 6010B
MAGNESIUM, TOTAL	8.6	SW846 6010B
MAGNESIUM, DISSOLVED		SW846 6010B
MANGANESE, TOTAL (ug/l)	5.6 ND	SW846 6010B
MANGANESE, DISSOLVED (ug/l)		SW846 6010B
NITRATE-NITROGEN	7.9	EPA 300.0
pH-FIELD (SU)	5.78	FIELD
pH-LAB (SU)	6.28	EPA 150.1
POTASSIUM, TOTAL	1.7	SW846 6010B
POTASSIUM, DISSOLVED		SW846 6010B
SODIUM, TOTAL	22.8	SW846 6010B
SODIUM, DISSOLVED		SW846 6010B
SPEC. COND., FIELD (umhos/cm)	397	FIELD
SPEC. COND., LAB (umhos/cm)	397	EPA 120.1
SULFATE	5.3	EPA 300.0
ALKALINITY	19	SM18-2320B
TDS (TOTAL DISSOLVED SOLIDS)	264	SM18-2540C
TOC (TOTAL ORGANIC CARBON)	1.2	SM18-5310B
TOTAL PHENOLICS (ug/l)	5 ND	SW846 9066
TURBIDITY (N.T.U.)	0.62	SM 2130B

* Indicator Analyte - For comparison with detection zone analytes.
T Please indicate detection limit if analyte is not detected.
** Total and dissolved analysis required only in conjunction with additional annual metals sampling (see page 4).
Remaining quarterly samples only require total metals analysis.

I.D. No	100008
Monitoring Point No.	CWMP003W
Sample Date	10/18/2019

FORM 19

QUARTERLY AND ANNUAL WATER QUALITY ANALYSES

2-Q. Organics (Enter all data in ug/l)

ANALYTE	VALUE[T]	ANALYSIS METHOD NUMBER
BENZENE	1 ND	SW846 8260B
1,2-DIBROMOETHANE (EDB) (ETHYLENE D	1 ND	SW846 8260B
1,1-DICHLOROETHANE	1.3	SW846 8260B
1,1-DICHLOROETHENE	1 ND	SW846 8260B
1,2-DICHLOROETHANE	1 ND	SW846 8260B
cis 1,2-DICHLOROETHENE	1 ND	SW846 8260B
trans 1,2-DICHLOROETHENE	1 ND	SW846 8260B
ETHYLBENZENE	1 ND	SW846 8260B
METHYLENE CHLORIDE	1 ND	SW846 8260B
TETRACHLOROETHENE	1 ND	SW846 8260B
TOLUENE	1 ND	SW846 8260B
1,1,1-TRICHLOROETHANE	1 ND	SW846 8260B
TRICHLOROETHENE	1 ND	SW846 8260B
VINYL CHLORIDE	1 ND	SW846 8260B
XYLENES (TOTAL)	3 ND	SW846 8260B

T Please indicate detection limit if analyte is not detected.

ALS Environmental

301 Fulling Mill Road - Middletown, PA 17057 - Phone: 717-944-5541 - Fax: 717-944-1430 - www.alsglobal.com

NELAP Certifications: NJ PA010 , NY 11759 , PA 22-293 DoD ELAP: PJLA 74618
State Certifications: FL E871113 , WA C999 , MD 128 , VA 460157 , WV DW 9961-C , WV 343

October 28, 2019

Mr. Daniel Brown
Lancaster County Solid Waste Authority
1299 Hbg Pike, P.O. Box 4425
Lancaster, PA 17604

Certificate of Analysis

Project Name:	**CRESWELL**	Workorder:	**3063693**
Purchase Order:	**PO1000127**	Workorder ID:	**4TH QTR 2019 CWMP-FORM 19Q**

Dear Mr. Brown:

Enclosed are the analytical results for samples received by the laboratory on Monday, October 14, 2019.

The ALS Environmental laboratory in Middletown, Pennsylvania is a National Environmental Laboratory Accreditation Program (NELAP) accredited laboratory and as such, certifies that all applicable test results meet the requirements of NELAP.

If you have any questions regarding this certificate of analysis, please contact Ms. Susan J Scherer (Project Coordinator) at (717) 944-5541.

Analyses were performed according to our laboratory's NELAP-approved quality assurance program and any applicable state requirements. The test results meet requirements of the current NELAP standards or state requirements, where applicable. For a specific list of accredited analytes, refer to the certifications section of the ALS website at www.alsglobal.com/en/Our-Services/Life-Sciences/Environmental/Downloads.

ALS Spring City: 10 Riverside Drive, Spring City, PA 19475 610-948-4903

CC: Mr. Nicholas Rogers , Ms. Jordan Gallagher , Mr. Jeff Musser

This page is included as part of the Analytical Report and must be retained as a permanent record thereof.

Ms. Susan J Scherer
Project Coordinator

ALS Environmental

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State Certifications: FL E871113 , WA C999 , MD 128 , VA 460157 , WV DW 9961-C , WV 343

SAMPLE SUMMARY

Workorder: 3063693 4TH QTR 2019 CWMP-FORM 19Q

Lab ID	Sample ID	Matrix	Date Collected	Date Received	Collected By
3063693001	CWMP007W	Ground Water	10/14/2019 10:58	10/14/2019 16:44	Mr. Brian G Shade
3063693002	CWMP001W	Ground Water	10/14/2019 12:12	10/14/2019 16:44	Mr. Brian G Shade
3063693003	CWMP002W	Ground Water	10/14/2019 15:37	10/14/2019 16:44	Mr. Brian G Shade
3063693004	Field Blank	Water	10/14/2019 15:07	10/14/2019 16:44	Mr. Brian G Shade
3063693005	Trip Blank	Water	10/14/2019 16:44	10/14/2019 16:44	Mr. Brian G Shade

ALS Environmental

301 Fulling Mill Road - Middletown, PA 17057 - Phone: 717-944-5541 - Fax: 717-944-1430 - www.alsglobal.com

NELAP Certifications: NJ PA010 , NY 11759 , PA 22-293 DoD ELAP: PJLA 74618
State Certifications: FL E871113 , WA C999 , MD 128 , VA 460157 , WV DW 9961-C , WV 343

SAMPLE SUMMARY

Workorder: 3063693 4TH QTR 2019 CWMP-FORM 19Q

Notes

-- Samples collected by ALS personnel are done so in accordance with the procedures set forth in the ALS Field Sampling Plan (20 - Field Services Sampling Plan).
-- All Waste Water analyses comply with methodology requirements of 40 CFR Part 136.
-- All Drinking Water analyses comply with methodology requirements of 40 CFR Part 141.
-- Unless otherwise noted, all quantitative results for soils are reported on a dry weight basis.
-- The Chain of Custody document is included as part of this report.
-- All Library Search analytes should be regarded as tentative identifications based on the presumptive evidence of the mass spectra. Concentrations reported are estimated values.
-- Parameters identified as "analyze immediately" require analysis within 15 minutes of collection. Any "analyze immediately" parameters not listed under the header "Field Parameters" are preformed in the laboratory and are therefore analyzed out of hold time.
-- Method references listed on this report beginning with the prefix “S” followed by a method number (such as S2310B-97) refer to methods from “Standard Methods for the Examination of Water and Wastewater”.
-- For microbiological analyses, the "Prepared" value is the date/time into the incubator and the "Analyzed" value is the date/time out the incubator.
-- An Analysis-Prep Method Cross Reference Table is included after Analytical Results & Qualifiers section in this report.

Standard Acronyms/Flags

J	Indicates an estimated value between the Method Detection Limit (MDL) and the Practical Quantitation Limit (PQL) for the analyte
U	Indicates that the analyte was Not Detected (ND)
N	Indicates presumptive evidence of the presence of a compound
MDL	Method Detection Limit
PQL	Practical Quantitation Limit
RDL	Reporting Detection Limit
ND	Not Detected - indicates that the analyte was Not Detected at the RDL
Cntr	Analysis was performed using this container
RegLmt	Regulatory Limit
LCS	Laboratory Control Sample
MS	Matrix Spike
MSD	Matrix Spike Duplicate
DUP	Sample Duplicate
%Rec	Percent Recovery
RPD	Relative Percent Difference
LOD	DoD Limit of Detection
LOQ	DoD Limit of Quantitation
DL	DoD Detection Limit
I	Indicates reported value is greater than or equal to the Method Detection Limit (MDL) but less than the Report Detection Limit (RDL)
(S)	Surrogate Compound
NC	Not Calculated
*	Result outside of QC limits

ALS Environmental

301 Fulling Mill Road - Middletown, PA 17057 - Phone: 717-944-5541 - Fax: 717-944-1430 - www.alsglobal.com

NELAP Certifications: NJ PA010 , NY 11759 , PA 22-293 DoD ELAP: PJLA 74618
State Certifications: FL E871113 , WA C999 , MD 128 , VA 460157 , WV DW 9961-C , WV 343

ANALYTICAL RESULTS

Workorder: 3063693 4TH QTR 2019 CWMP-FORM 19Q

Lab ID: **3063693001** Date Collected: 10/14/2019 10:58 Matrix: Ground Water

Sample ID: **CWMP007W** Date Received: 10/14/2019 16:44

Parameters	Results	Flag	Units	RDL	Method	Prepared	By	Analyzed	By	Cntr
VOLATILE ORGANICS										
Benzene	ND		ug/L	1.0	SW846 8260B			10/16/19 02:52	PDK	G
1,2-Dibromoethane	ND		ug/L	1.0	SW846 8260B			10/16/19 02:52	PDK	G
1,1-Dichloroethane	ND		ug/L	1.0	SW846 8260B			10/16/19 02:52	PDK	G
1,2-Dichloroethane	ND		ug/L	1.0	SW846 8260B			10/16/19 02:52	PDK	G
1,1-Dichloroethene	ND		ug/L	1.0	SW846 8260B			10/16/19 02:52	PDK	G
cis-1,2-Dichloroethene	ND		ug/L	1.0	SW846 8260B			10/16/19 02:52	PDK	G
trans-1,2-Dichloroethene	ND		ug/L	1.0	SW846 8260B			10/16/19 02:52	PDK	G
Ethylbenzene	ND		ug/L	1.0	SW846 8260B			10/16/19 02:52	PDK	G
Methylene Chloride	ND		ug/L	1.0	SW846 8260B			10/16/19 02:52	PDK	G
Tetrachloroethene	ND		ug/L	1.0	SW846 8260B			10/16/19 02:52	PDK	G
Toluene	ND		ug/L	1.0	SW846 8260B			10/16/19 02:52	PDK	G
Total Xylenes	ND		ug/L	3.0	SW846 8260B			10/16/19 02:52	PDK	G
1,1,1-Trichloroethane	ND		ug/L	1.0	SW846 8260B			10/16/19 02:52	PDK	G
Trichloroethene	ND		ug/L	1.0	SW846 8260B			10/16/19 02:52	PDK	G
Vinyl Chloride	ND		ug/L	1.0	SW846 8260B			10/16/19 02:52	PDK	G
Surrogate Recoveries	*Results*	*Flag*	*Units*	*Limits*	*Method*	*Prepared*	*By*	*Analyzed*	*By*	*Cntr*
1,2-Dichloroethane-d4 (S)	115		%	62 - 133	SW846 8260B			10/16/19 02:52	PDK	G
4-Bromofluorobenzene (S)	98.6		%	79 - 114	SW846 8260B			10/16/19 02:52	PDK	G
Dibromofluoromethane (S)	113		%	78 - 116	SW846 8260B			10/16/19 02:52	PDK	G
Toluene-d8 (S)	101		%	76 - 127	SW846 8260B			10/16/19 02:52	PDK	G
WET CHEMISTRY										
Alkalinity, Bicarbonate	14		mg/L	5	SM2320B-2011			10/15/19 22:36	MBW	B
Alkalinity, Total	14	2	mg/L	5	SM2320B-2011			10/15/19 22:36	MBW	B
Ammonia-N	0.187		mg/L	0.100	D6919-09			10/23/19 01:30	AK	A
Chemical Oxygen Demand (COD)	ND		mg/L	15	EPA 410.4			10/21/19 12:09	AK	A
Chloride	66.0		mg/L	2.0	EPA 300.0			10/15/19 05:06	CHW	B
Fluoride	ND		mg/L	0.20	EPA 300.0			10/15/19 05:06	CHW	B
Nitrate-N	9.2		mg/L	0.20	EPA 300.0			10/15/19 05:06	CHW	B
pH	6.39	1	pH_Units		S4500HB-11			10/15/19 22:36	MBW	B
Phenolics	ND		mg/L	0.005	SW846 9066	10/16/19 04:37	C_D	10/16/19 05:54	C_D	F
Specific Conductance	336		umhos/cm	1	SW846 9050A			10/15/19 22:36	MBW	B
Sulfate	20.6		mg/L	2.0	EPA 300.0			10/15/19 05:06	CHW	B
Total Dissolved Solids	178		mg/L	5	S2540C-11			10/17/19 12:19	D1C	B
Total Organic Carbon (TOC)	ND		mg/L	0.50	SW846 9060A			10/16/19 13:40	PAG	D
Turbidity	0.27		NTU	0.10	SM2130B-2011			10/15/19 05:00	MBW	B

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ANALYTICAL RESULTS

Workorder: 3063693 4TH QTR 2019 CWMP-FORM 19Q

Lab ID: **3063693001** Date Collected: 10/14/2019 10:58 Matrix: Ground Water

Sample ID: **CWMP007W** Date Received: 10/14/2019 16:44

Parameters	Results	Flag	Units	RDL	Method	Prepared	By	Analyzed	By	*Cntr*
METALS										
Calcium, Total	17.3		mg/L	0.11	SW846 6010C	10/17/19 18:35	AHI	10/18/19 12:20	SRT	J
Iron, Total	ND		mg/L	0.067	SW846 6010C	10/17/19 18:35	AHI	10/18/19 12:20	SRT	J
Magnesium, Total	8.7		mg/L	0.11	SW846 6010C	10/17/19 18:35	AHI	10/18/19 12:20	SRT	J
Manganese, Total	0.0064		mg/L	0.0056	SW846 6010C	10/17/19 18:35	AHI	10/18/19 12:20	SRT	J
Potassium, Total	2.4		mg/L	0.56	SW846 6010C	10/17/19 18:35	AHI	10/18/19 12:20	SRT	J
Sodium, Total	31.0		mg/L	0.56	SW846 6010C	10/17/19 18:35	AHI	10/18/19 12:20	SRT	J
FIELD PARAMETERS										
Depth to Water Level	8.20		Feet		Field			10/14/19 10:58	BGS	C
Elev Top MW Casing above MSL	453.40		Feet		Field			10/14/19 10:58	BGS	C
Flow Rate	1.72		gal/min		Field			10/14/19 10:58	BGS	C
Ground Water Elevation	445.20		ft/MSL		Field			10/14/19 10:58	BGS	C
pH, Field (SM4500B)	5.02		pH_Units		Field			10/14/19 10:58	BGS	C
Sample Depth	33.00		Feet		Field			10/14/19 10:58	BGS	C
Specific Conductance, Field	3710		umhos/cm	1	Field			10/14/19 10:58	BGS	C
Temperature	10.78		Deg. C		Field			10/14/19 10:58	BGS	C
Total Well Depth	36.50		Feet		Field			10/14/19 10:58	BGS	C
Volume in Water Column	41.60		Gallons		Field			10/14/19 10:58	BGS	C
Water Level After Purge	8.32		Feet		Field			10/14/19 10:58	BGS	C
Well Volumes Purged	2.89		Vol		Field			10/14/19 10:58	BGS	C

Ms. Susan J Scherer
Project Coordinator

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ANALYTICAL RESULTS

Workorder: 3063693 4TH QTR 2019 CWMP-FORM 19Q

Lab ID: **3063693002** Date Collected: 10/14/2019 12:12 Matrix: Ground Water

Sample ID: **CWMP001W** Date Received: 10/14/2019 16:44

Parameters	Results	Flag	Units	RDL	Method	Prepared	By	Analyzed	By	Cntr
VOLATILE ORGANICS										
Benzene	ND	11	ug/L	1.0	SW846 8260B			10/16/19 03:14	PDK	G
1,2-Dibromoethane	ND		ug/L	1.0	SW846 8260B			10/16/19 03:14	PDK	G
1,1-Dichloroethane	ND	8	ug/L	1.0	SW846 8260B			10/16/19 03:14	PDK	G
1,2-Dichloroethane	ND		ug/L	1.0	SW846 8260B			10/16/19 03:14	PDK	G
1,1-Dichloroethene	ND	2,3	ug/L	1.0	SW846 8260B			10/16/19 03:14	PDK	G
cis-1,2-Dichloroethene	ND		ug/L	1.0	SW846 8260B			10/16/19 03:14	PDK	G
trans-1,2-Dichloroethene	ND	6,7	ug/L	1.0	SW846 8260B			10/16/19 03:14	PDK	G
Ethylbenzene	ND		ug/L	1.0	SW846 8260B			10/16/19 03:14	PDK	G
Methylene Chloride	ND	4,5	ug/L	1.0	SW846 8260B			10/16/19 03:14	PDK	G
Tetrachloroethene	ND		ug/L	1.0	SW846 8260B			10/16/19 03:14	PDK	G
Toluene	ND		ug/L	1.0	SW846 8260B			10/16/19 03:14	PDK	G
Total Xylenes	ND		ug/L	3.0	SW846 8260B			10/16/19 03:14	PDK	G
1,1,1-Trichloroethane	ND	10,9	ug/L	1.0	SW846 8260B			10/16/19 03:14	PDK	G
Trichloroethene	ND	12	ug/L	1.0	SW846 8260B			10/16/19 03:14	PDK	G
Vinyl Chloride	ND		ug/L	1.0	SW846 8260B			10/16/19 03:14	PDK	G
Surrogate Recoveries	*Results*	*Flag*	*Units*	*Limits*	*Method*	*Prepared*	*By*	*Analyzed*	*By*	*Cntr*
1,2-Dichloroethane-d4 (S)	115		%	62 - 133	SW846 8260B			10/16/19 03:14	PDK	G
4-Bromofluorobenzene (S)	100		%	79 - 114	SW846 8260B			10/16/19 03:14	PDK	G
Dibromofluoromethane (S)	111		%	78 - 116	SW846 8260B			10/16/19 03:14	PDK	G
Toluene-d8 (S)	102		%	76 - 127	SW846 8260B			10/16/19 03:14	PDK	G
WET CHEMISTRY										
Alkalinity, Bicarbonate	5		mg/L	5	SM2320B-2011			10/15/19 22:54	MBW	B
Alkalinity, Total	5	13	mg/L	5	SM2320B-2011			10/15/19 22:54	MBW	B
Ammonia-N	0.149		mg/L	0.100	D6919-09			10/23/19 02:13	AK	A
Chemical Oxygen Demand (COD)	ND		mg/L	15	EPA 410.4			10/21/19 12:09	AK	A
Chloride	28.6		mg/L	2.0	EPA 300.0			10/15/19 05:23	CHW	B
Fluoride	ND		mg/L	0.20	EPA 300.0			10/15/19 05:23	CHW	B
Nitrate-N	19.5		mg/L	0.20	EPA 300.0			10/15/19 05:23	CHW	B
pH	6.41	1	pH_Units		S4500HB-11			10/15/19 22:54	MBW	B
Phenolics	ND		mg/L	0.005	SW846 9066	10/16/19 04:37	C_D	10/16/19 05:54	C_D	F
Specific Conductance	244		umhos/cm	1	SW846 9050A			10/15/19 22:54	MBW	B
Sulfate	2.0		mg/L	2.0	EPA 300.0			10/15/19 05:23	CHW	B
Total Dissolved Solids	146		mg/L	5	S2540C-11			10/17/19 12:19	D1C	B
Total Organic Carbon (TOC)	ND		mg/L	0.50	SW846 9060A			10/16/19 13:40	PAG	D
Turbidity	30.5		NTU	0.10	SM2130B-2011			10/15/19 05:00	MBW	B

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ANALYTICAL RESULTS

Workorder: 3063693 4TH QTR 2019 CWMP-FORM 19Q

Lab ID: **3063693002** Date Collected: 10/14/2019 12:12 Matrix: Ground Water

Sample ID: **CWMP001W** Date Received: 10/14/2019 16:44

Parameters	Results	Flag	Units	RDL	Method	Prepared	By	Analyzed	By	*Cntr*
METALS										
Calcium, Total	14.7		mg/L	0.11	SW846 6010C	10/17/19 18:35	AHI	10/18/19 12:24	SRT	J
Iron, Total	0.66		mg/L	0.067	SW846 6010C	10/17/19 18:35	AHI	10/18/19 12:24	SRT	J
Magnesium, Total	10		mg/L	0.11	SW846 6010C	10/17/19 18:35	AHI	10/18/19 12:24	SRT	J
Manganese, Total	0.055		mg/L	0.0056	SW846 6010C	10/17/19 18:35	AHI	10/18/19 12:24	SRT	J
Potassium, Total	2.4		mg/L	0.56	SW846 6010C	10/17/19 18:35	AHI	10/18/19 12:24	SRT	J
Sodium, Total	12.7		mg/L	0.56	SW846 6010C	10/17/19 18:35	AHI	10/18/19 12:24	SRT	J
FIELD PARAMETERS										
Depth to Water Level	27.42		Feet		Field			10/14/19 12:12	BGS	C
Elev Top MW Casing above MSL	515.13		Feet		Field			10/14/19 12:12	BGS	C
Flow Rate	1.91		gal/min		Field			10/14/19 12:12	BGS	C
Ground Water Elevation	487.71		ft/MSL		Field			10/14/19 12:12	BGS	C
pH, Field (SM4500B)	4.84		pH_Units		Field			10/14/19 12:12	BGS	C
Sample Depth	57.00		Feet		Field			10/14/19 12:12	BGS	C
Specific Conductance, Field	272		umhos/cm	1	Field			10/14/19 12:12	BGS	C
Temperature	10.83		Deg. C		Field			10/14/19 12:12	BGS	C
Total Well Depth	66.30		Feet		Field			10/14/19 12:12	BGS	C
Volume in Water Column	57.15		Gallons		Field			10/14/19 12:12	BGS	C
Water Level After Purge	50.04		Feet		Field			10/14/19 12:12	BGS	C
Well Volumes Purged	2.01		Vol		Field			10/14/19 12:12	BGS	C

Susan J. Scherer

Ms. Susan J Scherer
Project Coordinator

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ANALYTICAL RESULTS

Workorder: 3063693 4TH QTR 2019 CWMP-FORM 19Q

Lab ID: **3063693003** Date Collected: 10/14/2019 15:37 Matrix: Ground Water

Sample ID: **CWMP002W** Date Received: 10/14/2019 16:44

Parameters	Results	Flag	Units	RDL	Method	Prepared	By	Analyzed	By	Cntr
VOLATILE ORGANICS										
Benzene	ND		ug/L	1.0	SW846 8260B			10/16/19 03:36	PDK	G
Bromodichloromethane	ND		ug/L	1.0	SW846 8260B			10/16/19 03:36	PDK	G
Bromoform	ND		ug/L	1.0	SW846 8260B			10/16/19 03:36	PDK	G
Bromomethane	ND		ug/L	1.0	SW846 8260B			10/16/19 03:36	PDK	G
Carbon Tetrachloride	ND		ug/L	1.0	SW846 8260B			10/16/19 03:36	PDK	G
Chlorobenzene	ND		ug/L	1.0	SW846 8260B			10/16/19 03:36	PDK	G
Chlorodibromomethane	ND		ug/L	1.0	SW846 8260B			10/16/19 03:36	PDK	G
Chloroethane	28.7		ug/L	1.0	SW846 8260B			10/16/19 03:36	PDK	G
Chloroform	ND		ug/L	1.0	SW846 8260B			10/16/19 03:36	PDK	G
Chloromethane	ND		ug/L	1.0	SW846 8260B			10/16/19 03:36	PDK	G
1,2-Dibromoethane	ND		ug/L	1.0	SW846 8260B			10/16/19 03:36	PDK	G
1,2-Dichlorobenzene	ND		ug/L	1.0	SW846 8260B			10/16/19 03:36	PDK	G
1,3-Dichlorobenzene	ND		ug/L	1.0	SW846 8260B			10/16/19 03:36	PDK	G
1,4-Dichlorobenzene	ND		ug/L	1.0	SW846 8260B			10/16/19 03:36	PDK	G
1,1-Dichloroethane	13.2		ug/L	1.0	SW846 8260B			10/16/19 03:36	PDK	G
1,2-Dichloroethane	ND		ug/L	1.0	SW846 8260B			10/16/19 03:36	PDK	G
1,1-Dichloroethene	ND		ug/L	1.0	SW846 8260B			10/16/19 03:36	PDK	G
cis-1,2-Dichloroethene	ND		ug/L	1.0	SW846 8260B			10/16/19 03:36	PDK	G
trans-1,2-Dichloroethene	ND		ug/L	1.0	SW846 8260B			10/16/19 03:36	PDK	G
1,2-Dichloropropane	ND		ug/L	1.0	SW846 8260B			10/16/19 03:36	PDK	G
1,3-Dichloropropene, Total	ND		ug/L	2.0	SW846 8260B			10/16/19 03:36	PDK	G
Ethylbenzene	ND		ug/L	1.0	SW846 8260B			10/16/19 03:36	PDK	G
Methylene Chloride	ND		ug/L	1.0	SW846 8260B			10/16/19 03:36	PDK	G
Styrene	ND		ug/L	1.0	SW846 8260B			10/16/19 03:36	PDK	G
1,1,2,2-Tetrachloroethane	ND	2	ug/L	1.0	SW846 8260B			10/16/19 03:36	PDK	G
Tetrachloroethene	ND		ug/L	1.0	SW846 8260B			10/16/19 03:36	PDK	G
Toluene	ND		ug/L	1.0	SW846 8260B			10/16/19 03:36	PDK	G
Total Xylenes	ND		ug/L	3.0	SW846 8260B			10/16/19 03:36	PDK	G
1,2,4-Trichlorobenzene	ND		ug/L	2.0	SW846 8260B			10/16/19 03:36	PDK	G
1,1,1-Trichloroethane	1.1		ug/L	1.0	SW846 8260B			10/16/19 03:36	PDK	G
1,1,2-Trichloroethane	ND		ug/L	1.0	SW846 8260B			10/16/19 03:36	PDK	G
Trichloroethene	ND		ug/L	1.0	SW846 8260B			10/16/19 03:36	PDK	G
Trichlorofluoromethane	ND		ug/L	1.0	SW846 8260B			10/16/19 03:36	PDK	G
1,2,3-Trichloropropane	ND		ug/L	2.0	SW846 8260B			10/16/19 03:36	PDK	G
Vinyl Chloride	ND		ug/L	1.0	SW846 8260B			10/16/19 03:36	PDK	G

Surrogate Recoveries	*Results*	*Flag*	*Units*	*Limits*	*Method*	*Prepared*	*By*	*Analyzed*	*By*	*Cntr*

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ANALYTICAL RESULTS

Workorder: 3063693 4TH QTR 2019 CWMP-FORM 19Q

Lab ID: **3063693003** Date Collected: 10/14/2019 15:37 Matrix: Ground Water

Sample ID: **CWMP002W** Date Received: 10/14/2019 16:44

Parameters	Results	Flag	Units	RDL	Method	Prepared	By	Analyzed	By	*Cntr*
1,2-Dichloroethane-d4 (S)	118		%	62 - 133	SW846 8260B			10/16/19 03:36	PDK	G
4-Bromofluorobenzene (S)	103		%	79 - 114	SW846 8260B			10/16/19 03:36	PDK	G
Dibromofluoromethane (S)	112		%	78 - 116	SW846 8260B			10/16/19 03:36	PDK	G
Toluene-d8 (S)	101		%	76 - 127	SW846 8260B			10/16/19 03:36	PDK	G
WET CHEMISTRY										
Alkalinity, Bicarbonate	68		mg/L	5	SM2320B-2011			10/15/19 23:55	MBW	B
Alkalinity, Total	68	3	mg/L	5	SM2320B-2011			10/15/19 23:55	MBW	B
Ammonia-N	0.183		mg/L	0.100	D6919-09			10/23/19 02:27	AK	A
Chemical Oxygen Demand (COD)	ND		mg/L	15	EPA 410.4			10/21/19 12:09	AK	A
Chloride	106		mg/L	2.0	EPA 300.0			10/15/19 05:40	CHW	B
Fluoride	ND		mg/L	0.20	EPA 300.0			10/15/19 05:40	CHW	B
Nitrate-N	4.2		mg/L	0.20	EPA 300.0			10/15/19 05:40	CHW	B
pH	6.80	1	pH_Units		S4500HB-11			10/15/19 23:55	MBW	B
Phenolics	ND		mg/L	0.005	SW846 9066	10/16/19 04:37	C_D	10/16/19 05:54	C_D	F
Specific Conductance	557		umhos/cm	1	SW846 9050A			10/15/19 23:55	MBW	B
Sulfate	20.6		mg/L	2.0	EPA 300.0			10/15/19 05:40	CHW	B
Total Dissolved Solids	302		mg/L	5	S2540C-11			10/17/19 12:19	D1C	B
Total Organic Carbon (TOC)	3.8		mg/L	0.50	SW846 9060A			10/16/19 13:40	PAG	D
Turbidity	0.74		NTU	0.10	SM2130B-2011			10/15/19 05:00	MBW	B
METALS										
Calcium, Total	47.6		mg/L	0.11	SW846 6010C	10/17/19 18:35	AHI	10/18/19 12:27	SRT	J
Iron, Total	ND		mg/L	0.067	SW846 6010C	10/17/19 18:35	AHI	10/18/19 12:27	SRT	J
Magnesium, Total	15.5		mg/L	0.11	SW846 6010C	10/17/19 18:35	AHI	10/18/19 12:27	SRT	J
Manganese, Total	0.95		mg/L	0.0056	SW846 6010C	10/17/19 18:35	AHI	10/18/19 12:27	SRT	J
Potassium, Total	3.0		mg/L	0.56	SW846 6010C	10/17/19 18:35	AHI	10/18/19 12:27	SRT	J
Sodium, Total	25.0		mg/L	0.56	SW846 6010C	10/17/19 18:35	AHI	10/18/19 12:27	SRT	J
FIELD PARAMETERS										
Depth to Water Level	67.31		Feet		Field			10/14/19 15:37	BGS	C
Elev Top MW Casing above MSL	525.81		Feet		Field			10/14/19 15:37	BGS	C
Ground Water Elevation	458.50		ft/MSL		Field			10/14/19 15:37	BGS	C
pH, Field (SM4500B)	5.49		pH_Units		Field			10/14/19 15:37	BGS	C
Sample Depth	85.00		Feet		Field			10/14/19 15:37	BGS	C
Specific Conductance, Field	373		umhos/cm	1	Field			10/14/19 15:37	BGS	C
Temperature	10.99		Deg. C		Field			10/14/19 15:37	BGS	C
Total Well Depth	100.00		Feet		Field			10/14/19 15:37	BGS	C

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State Certifications: FL E871113 , WA C999 , MD 128 , VA 460157 , WV DW 9961-C , WV 343

ANALYTICAL RESULTS

Workorder: 3063693 4TH QTR 2019 CWMP-FORM 19Q

Lab ID:	**3063693003**	Date Collected:	10/14/2019 15:37	Matrix:	Ground Water
Sample ID:	**CWMP002W**	Date Received:	10/14/2019 16:44		

Parameters	Results	Flag	Units	RDL	Method	Prepared	By	Analyzed	By	*Cntr*

Ms. Susan J Scherer
Project Coordinator

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ANALYTICAL RESULTS

Workorder: 3063693 4TH QTR 2019 CWMP-FORM 19Q

Lab ID: **3063693004** Date Collected: 10/14/2019 15:07 Matrix: Water

Sample ID: **Field Blank** Date Received: 10/14/2019 16:44

Parameters	Results	Flag	Units	RDL	Method	Prepared	By	Analyzed	By	Cntr
VOLATILE ORGANICS										
Benzene	ND		ug/L	1.0	SW846 8260B			10/16/19 01:45	PDK	A
1,2-Dibromoethane	ND		ug/L	1.0	SW846 8260B			10/16/19 01:45	PDK	A
1,1-Dichloroethane	ND		ug/L	1.0	SW846 8260B			10/16/19 01:45	PDK	A
1,2-Dichloroethane	ND		ug/L	1.0	SW846 8260B			10/16/19 01:45	PDK	A
1,1-Dichloroethene	ND		ug/L	1.0	SW846 8260B			10/16/19 01:45	PDK	A
cis-1,2-Dichloroethene	ND		ug/L	1.0	SW846 8260B			10/16/19 01:45	PDK	A
trans-1,2-Dichloroethene	ND		ug/L	1.0	SW846 8260B			10/16/19 01:45	PDK	A
Ethylbenzene	ND		ug/L	1.0	SW846 8260B			10/16/19 01:45	PDK	A
Methylene Chloride	ND		ug/L	1.0	SW846 8260B			10/16/19 01:45	PDK	A
Tetrachloroethene	ND		ug/L	1.0	SW846 8260B			10/16/19 01:45	PDK	A
Toluene	ND		ug/L	1.0	SW846 8260B			10/16/19 01:45	PDK	A
Total Xylenes	ND		ug/L	3.0	SW846 8260B			10/16/19 01:45	PDK	A
1,1,1-Trichloroethane	ND		ug/L	1.0	SW846 8260B			10/16/19 01:45	PDK	A
Trichloroethene	ND		ug/L	1.0	SW846 8260B			10/16/19 01:45	PDK	A
Vinyl Chloride	ND		ug/L	1.0	SW846 8260B			10/16/19 01:45	PDK	A
Surrogate Recoveries	*Results*	*Flag*	*Units*	*Limits*	*Method*	*Prepared*	*By*	*Analyzed*	*By*	*Cntr*
1,2-Dichloroethane-d4 (S)	111		%	62 - 133	SW846 8260B			10/16/19 01:45	PDK	A
4-Bromofluorobenzene (S)	100		%	79 - 114	SW846 8260B			10/16/19 01:45	PDK	A
Dibromofluoromethane (S)	110		%	78 - 116	SW846 8260B			10/16/19 01:45	PDK	A
Toluene-d8 (S)	102		%	76 - 127	SW846 8260B			10/16/19 01:45	PDK	A

Susan J. Scherer

Ms. Susan J Scherer
Project Coordinator

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ANALYTICAL RESULTS

Workorder: 3063693 4TH QTR 2019 CWMP-FORM 19Q

Lab ID: **3063693005** Date Collected: 10/14/2019 16:44 Matrix: Water

Sample ID: **Trip Blank** Date Received: 10/14/2019 16:44

Parameters	Results	Flag	Units	RDL	Method	Prepared	By	Analyzed	By	Cntr
VOLATILE ORGANICS										
Benzene	ND		ug/L	1.0	SW846 8260B			10/16/19 01:23	PDK	A
1,2-Dibromoethane	ND		ug/L	1.0	SW846 8260B			10/16/19 01:23	PDK	A
1,1-Dichloroethane	ND		ug/L	1.0	SW846 8260B			10/16/19 01:23	PDK	A
1,2-Dichloroethane	ND		ug/L	1.0	SW846 8260B			10/16/19 01:23	PDK	A
1,1-Dichloroethene	ND		ug/L	1.0	SW846 8260B			10/16/19 01:23	PDK	A
cis-1,2-Dichloroethene	ND		ug/L	1.0	SW846 8260B			10/16/19 01:23	PDK	A
trans-1,2-Dichloroethene	ND		ug/L	1.0	SW846 8260B			10/16/19 01:23	PDK	A
Ethylbenzene	ND		ug/L	1.0	SW846 8260B			10/16/19 01:23	PDK	A
Methylene Chloride	ND		ug/L	1.0	SW846 8260B			10/16/19 01:23	PDK	A
Tetrachloroethene	ND		ug/L	1.0	SW846 8260B			10/16/19 01:23	PDK	A
Toluene	ND		ug/L	1.0	SW846 8260B			10/16/19 01:23	PDK	A
Total Xylenes	ND		ug/L	3.0	SW846 8260B			10/16/19 01:23	PDK	A
1,1,1-Trichloroethane	ND		ug/L	1.0	SW846 8260B			10/16/19 01:23	PDK	A
Trichloroethene	ND		ug/L	1.0	SW846 8260B			10/16/19 01:23	PDK	A
Vinyl Chloride	ND		ug/L	1.0	SW846 8260B			10/16/19 01:23	PDK	A
Surrogate Recoveries	*Results*	*Flag*	*Units*	*Limits*	*Method*	*Prepared*	*By*	*Analyzed*	*By*	*Cntr*
1,2-Dichloroethane-d4 (S)	112		%	62 - 133	SW846 8260B			10/16/19 01:23	PDK	A
4-Bromofluorobenzene (S)	101		%	79 - 114	SW846 8260B			10/16/19 01:23	PDK	A
Dibromofluoromethane (S)	110		%	78 - 116	SW846 8260B			10/16/19 01:23	PDK	A
Toluene-d8 (S)	102		%	76 - 127	SW846 8260B			10/16/19 01:23	PDK	A

Susan J. Scherer

Ms. Susan J Scherer
Project Coordinator

ANALYTICAL RESULTS

Workorder: 3063693 4TH QTR 2019 CWMP-FORM 19Q

PARAMETER QUALIFIERS

Lab ID	#	Sample ID	Analytical Method	Analyte
3063693001	1	CWMP007W	S4500HB-11	pH
The pH analysis is an "analyze immediately" analysis. Parameters identified as "analyze immediately" require analysis within 15 minutes of collection, and are therefore analyzed outside of the method holding time when analyzed in the laboratory.				
3063693001	2	CWMP007W	SM2320B-2011	Alkalinity, Total
The Total Alkalinity is titrated to a pH of 4.5 and reported as mg CaCO3/L.				
3063693002	1	CWMP001W	S4500HB-11	pH
The pH analysis is an "analyze immediately" analysis. Parameters identified as "analyze immediately" require analysis within 15 minutes of collection, and are therefore analyzed outside of the method holding time when analyzed in the laboratory.				
3063693002	2	CWMP001W	SW846 8260B	1,1-Dichloroethene
The QC sample type MS for method SW846 8260B was outside the control limits for the analyte 1,1-Dichloroethene. The % Recovery was reported as 140 and the control limits were 63 to 128.				
3063693002	3	CWMP001W	SW846 8260B	1,1-Dichloroethene
The QC sample type MSD for method SW846 8260B was outside the control limits for the analyte 1,1-Dichloroethene. The % Recovery was reported as 129 and the control limits were 63 to 128.				
3063693002	4	CWMP001W	SW846 8260B	Methylene Chloride
The QC sample type MS for method SW846 8260B was outside the control limits for the analyte Methylene Chloride. The % Recovery was reported as 127 and the control limits were 76 to 121.				
3063693002	5	CWMP001W	SW846 8260B	Methylene Chloride
The QC sample type MSD for method SW846 8260B was outside the control limits for the analyte Methylene Chloride. The % Recovery was reported as 123 and the control limits were 76 to 121.				
3063693002	6	CWMP001W	SW846 8260B	trans-1,2-Dichloroethene
The QC sample type MS for method SW846 8260B was outside the control limits for the analyte trans-1,2-Dichloroethene. The % Recovery was reported as 136 and the control limits were 71 to 122.				
3063693002	7	CWMP001W	SW846 8260B	trans-1,2-Dichloroethene
The QC sample type MSD for method SW846 8260B was outside the control limits for the analyte trans-1,2-Dichloroethene. The % Recovery was reported as 127 and the control limits were 71 to 122.				
3063693002	8	CWMP001W	SW846 8260B	1,1-Dichloroethane
The QC sample type MS for method SW846 8260B was outside the control limits for the analyte 1,1-Dichloroethane. The % Recovery was reported as 130 and the control limits were 78 to 124.				
3063693002	9	CWMP001W	SW846 8260B	1,1,1-Trichloroethane
The QC sample type MS for method SW846 8260B was outside the control limits for the analyte 1,1,1-Trichloroethane. The % Recovery was reported as 156 and the control limits were 66 to 130.				
3063693002	10	CWMP001W	SW846 8260B	1,1,1-Trichloroethane
The QC sample type MSD for method SW846 8260B was outside the control limits for the analyte 1,1,1-Trichloroethane. The % Recovery was reported as 142 and the control limits were 66 to 130.				
3063693002	11	CWMP001W	SW846 8260B	Benzene
The QC sample type MS for method SW846 8260B was outside the control limits for the analyte Benzene. The % Recovery was reported as 125 and the control limits were 80 to 124.				
3063693002	12	CWMP001W	SW846 8260B	Trichloroethene
The QC sample type MS for method SW846 8260B was outside the control limits for the analyte Trichloroethene. The % Recovery was reported as 132 and the control limits were 77 to 124.				
3063693002	13	CWMP001W	SM2320B-2011	Alkalinity, Total
The Total Alkalinity is titrated to a pH of 4.5 and reported as mg CaCO3/L.				

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ANALYTICAL RESULTS

Workorder: 3063693 4TH QTR 2019 CWMP-FORM 19Q

3063693003	1	CWMP002W	S4500HB-11	pH

The pH analysis is an "analyze immediately" analysis. Parameters identified as "analyze immediately" require analysis within 15 minutes of collection, and are therefore analyzed outside of the method holding time when analyzed in the laboratory.

3063693003	2	CWMP002W	SW846 8260B	1,1,2,2-Tetrachloroethane

The QC sample type LCS for method SW846 8260B was outside the control limits for the analyte 1,1,2,2-Tetrachloroethane. The % Recovery was reported as 69.5 and the control limits were 74 to 135.

3063693003	3	CWMP002W	SM2320B-2011	Alkalinity, Total

The Total Alkalinity is titrated to a pH of 4.5 and reported as mg CaCO3/L.

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ANALYSIS - PREP METHOD CROSS REFERENCE TABLE

Workorder: 3063693 4TH QTR 2019 CWMP-FORM 19Q

Lab ID	Sample ID	Analysis Method	Prep Method
3063693001	CWMP007W	D6919-09	
3063693001	CWMP007W	EPA 300.0	
3063693001	CWMP007W	EPA 410.4	
3063693001	CWMP007W	Field	
3063693001	CWMP007W	S2540C-11	
3063693001	CWMP007W	S4500HB-11	
3063693001	CWMP007W	SM2130B-2011	
3063693001	CWMP007W	SM2320B-2011	
3063693001	CWMP007W	SW846 6010C	SW846 3015
3063693001	CWMP007W	SW846 8260B	
3063693001	CWMP007W	SW846 9050A	
3063693001	CWMP007W	SW846 9060A	
3063693001	CWMP007W	SW846 9066	420.4/9066
3063693002	CWMP001W	D6919-09	
3063693002	CWMP001W	EPA 300.0	
3063693002	CWMP001W	EPA 410.4	
3063693002	CWMP001W	Field	
3063693002	CWMP001W	S2540C-11	
3063693002	CWMP001W	S4500HB-11	
3063693002	CWMP001W	SM2130B-2011	
3063693002	CWMP001W	SM2320B-2011	
3063693002	CWMP001W	SW846 6010C	SW846 3015
3063693002	CWMP001W	SW846 8260B	
3063693002	CWMP001W	SW846 9050A	
3063693002	CWMP001W	SW846 9060A	
3063693002	CWMP001W	SW846 9066	420.4/9066
3063693003	CWMP002W	D6919-09	
3063693003	CWMP002W	EPA 300.0	
3063693003	CWMP002W	EPA 410.4	
3063693003	CWMP002W	Field	
3063693003	CWMP002W	S2540C-11	
3063693003	CWMP002W	S4500HB-11	
3063693003	CWMP002W	SM2130B-2011	
3063693003	CWMP002W	SM2320B-2011	
3063693003	CWMP002W	SW846 6010C	SW846 3015
3063693003	CWMP002W	SW846 8260B	
3063693003	CWMP002W	SW846 9050A	
3063693003	CWMP002W	SW846 9060A	
3063693003	CWMP002W	SW846 9066	420.4/9066
3063693004	Field Blank	SW846 8260B	
3063693005	Trip Blank	SW846 8260B	

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CHAIN OF CUSTODY/ REQUEST FOR ANALYSIS

Generated by ALS

3063693

1 of 1

ALL SHADED AREAS MUST BE COMPLETED BY THE CLIENT / SAMPLER. INSTRUCTIONS ON THE BACK.

Client Name: Lancaster County Solid Waste MA

Address: 1299 Harrisburg Pike, P.O. Box 4424
Lancaster, PA 17604

Contact: Mark Reider

Phone#: (717) 735-0193

Project Name/#: Creswell/GWMP Form 19Q Wells

Bill To: Lancaster County Solid Waste MA

TAT [X] Normal-Standard TAT is 10-12 business days.
[ ] Rush-Subject to ALS approval and surcharges.

Date Required: _____ Approved By: _____

Email? [X] -Y mreider@LCSWMA.com

Fax? [X] -Y No.: (717) 397-9973

Container Type	AG	AN	CG	---	---	PL	PL	PL	PL	
Container Size	40 ml	125 ml	40 ml	---	---	250 ml	125 ml	500 ml	500 ml	
Preservative	HCl	H2SO4	HCl	---	---	H2SO4	HNO3	None	None	

ANALYSES/METHOD REQUESTED

Sample Description/Location (as it will appear on the lab report)	Sample Date	Time	*G or C	**Matrix	TOC	O-OH	8260 VOCs - Form 19Q	Field Measurements	Sample Depth for AUX Data	NH3-N, COD	Total Metals: Ca, Fe, Mn, Mg, K, Na	pH, NO3, Cl, F, SpC, SO4, Turb, TDS	Alkalinity, HCO3	
					Enter Number of Containers Per Sample or Field Results Below.									
1. CWMP007W	10/14/19	1058	G	GW	2	1	2	X	X	1	1	1	1	
2. CWMP001W	10/14/19	1212	G	GW	2	1	2	X	X	1	1	1	1	
3. CWMP002W	10/14/19	1537	G	GW	2	1	2	X	X	1	1	1	1	
4. Field Blank	10/14/19	1507	G	GW			2							
5. Trip Blank	10/14/19	1644	G	GW			2							
6														
7														
8														
9														
10														

(Lab Use Only)

Cooler Temp: 11°C Therm ID: 402

No. of Coolers: _____

	Y	N	Initial
Custody Seals Present?			
(If present) Seals Intact?			
Received on Ice?			
COC/Labels Complete/Accurate?			
Cont. in Good Cond.?			
Correct Containers?			
Correct Sample Volumes?			
Correct Preservation?			
Headspace/Volatiles?			

Courier/Tracking #:

Sample/COC Comments

ALS Field Services: ☐Pickup ☐Labor ☐Composite_Sampling ☐Rental_Equipment ☐Other:

Project Comments:

LOGGED BY(signature): Date: Time:

REVIEWED BY(signature): Date: Time:

Relinquished By / Company Name	Date	Time	Received By / Company Name	Date	Time
1 [signature] ALS	10-14-19	1644	2 GSM	10/14/19	1644
3			4		
5			6		
7			8		
9			10		

Data Deliverables: ☐Standard ☐CLP-like ☐USACE ☐

Special Processing: USACE ☐ Navy ☐ ☐

State Samples Collected In: ☐NY ☐NJ [X]PA ☐NC ☐

Reportable to PADEP? Yes ☐ PWSID # _____

Sample Disposal: Lab [X] Special ☐

EDDS: Format Type-

* G=Grab; C=Composite **Matrix - Ai=Air; DW=Drinking Water; GW=Groundwater; Oi=Oil; OL=Other Liquid; SL=Sludge; SO=Soil; WP=Wipe; WW=Wastewater

ALS ENVIRONMENTAL SHIPPING ADDRESS: 34 DOGWOOD LANE, MIDDLETOWN, PA 17057

Rev 8/04

301 Fulling Mill Road
Middletown, PA 17057
P: (717) 944-5541
F: (717) 944-1430

Condition of Sample Receipt Form

Client:	Work Order #:	Initials:	Date:
Lancaster County Solid Waste	3063693	GDM	10/14/19

1. Were airbills / tracking numbers present and recorded?	(NONE)	YES	NO
Tracking number: _____			
2. Are Custody Seals on shipping containers intact?	(NONE)	YES	NO
3. Are Custody Seals on sample containers intact?	(NONE)	YES	NO
4. Is there a COC (Chain-of-Custody) present?		(YES)	NO
5. Are the COC and bottle labels complete, legible and in agreement?		YES	(NO)
5a. Does the COC contain sample locations?		(YES)	NO
5b. Does the COC contain date and time of sample collection for all samples?		(YES)	NO
5c. Does the COC contain sample collectors name? Client		YES	(NO)
5d. Does the COC note the type(s) of preservation for all bottles?		(YES)	NO
5e. Does the COC note the number of bottles submitted for each sample?		(YES)	NO
5f. Does the COC note the type of sample, composite or grab?		(YES)	NO
5g. Does the COC note the matrix of the sample(s)?		(YES)	NO
6. Are all aqueous samples requiring preservation preserved correctly?	N/A	(YES)	NO
7. Were all samples placed in the proper containers for the requested analyses, with sufficient volume?		(YES)	NO
8. Are all samples within holding times for the requested analyses? Pt cnt of hold		YES	(NO)
9. Were all sample containers received intact and headspace free when required? (not broken, leaking, frozen, etc.)		(YES)	NO
10. Did we receive trip blanks (applies only for methods EPA 504, EPA 524.2 and 1631E (LL Hg)?	(N/A)	YES	NO
11. Were the samples received on ice?		(YES)	NO
12. Were sample temperatures measured at 0.0-6.0°C. Same day		YES	(NO)
13. Are the samples DW matrix ? If YES, fill out Reportable Drinking Water questions below		YES	(NO)
13a. Are the samples required for SDWA compliance reporting?	N/A	YES	NO
13b. Did the client provide a SDWA PWS ID#?	N/A	YES	NO
13c. Are all aqueous unpreserved SDWA samples pH 5-9?	N/A	YES	NO
13d. Did the client provide the SDWA sample location ID/Description?	N/A	YES	NO
13e. Did the client provide the SDWA sample type (D, E, R, C, P, S)?	N/A	YES	NO

Cooler #: _____

Temperature (°C): 11°C

Thermometer ID: 402

COMMENTS (Required for all NO responses above and any sample non-conformance):

Rev. 1/10/2019

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November 6, 2019

Mr. Daniel Brown
Lancaster County Solid Waste Authority
1299 Hbg Pike, P.O. Box 4425
Lancaster, PA 17604

Certificate of Analysis

Project Name:	**CRESWELL**	Workorder:	**3064943**
Purchase Order:	**PO1000127**	Workorder ID:	**4TH QTR 2019 CWMP-FORM 19Q**

Dear Mr. Brown:

Enclosed are the analytical results for samples received by the laboratory on Friday, October 18, 2019.

The ALS Environmental laboratory in Middletown, Pennsylvania is a National Environmental Laboratory Accreditation Program (NELAP) accredited laboratory and as such, certifies that all applicable test results meet the requirements of NELAP.

If you have any questions regarding this certificate of analysis, please contact Ms. Susan J Scherer (Project Coordinator) at (717) 944-5541.

Analyses were performed according to our laboratory's NELAP-approved quality assurance program and any applicable state requirements. The test results meet requirements of the current NELAP standards or state requirements, where applicable. For a specific list of accredited analytes, refer to the certifications section of the ALS website at www.alsglobal.com/en/Our-Services/Life-Sciences/Environmental/Downloads.

ALS Spring City: 10 Riverside Drive, Spring City, PA 19475 610-948-4903

CC: Mr. Nicholas Rogers , Ms. Jordan Gallagher , Mr. Jeff Musser

This page is included as part of the Analytical Report and must be retained as a permanent record thereof.

Ms. Susan J Scherer
Project Coordinator

ALS Environmental

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SAMPLE SUMMARY

Workorder: 3064943 4TH QTR 2019 CWMP-FORM 19Q

Lab ID	Sample ID	Matrix	Date Collected	Date Received	Collected By
3064943001	CWMP018S	Ground Water	10/18/2019 10:23	10/18/2019 14:02	Mr. Brian G Shade
3064943002	CWMP017S	Ground Water	10/18/2019 10:50	10/18/2019 14:02	Mr. Brian G Shade
3064943003	CWMP004W	Ground Water	10/18/2019 12:15	10/18/2019 14:02	Mr. Brian G Shade
3064943004	CWMP003W	Ground Water	10/18/2019 12:24	10/18/2019 14:02	Mr. Brian G Shade
3064943005	Field Blank	Water	10/18/2019 12:40	10/18/2019 14:02	Mr. Brian G Shade
3064943006	Trip Blank	Water	10/18/2019 14:02	10/18/2019 14:02	Mr. Brian G Shade

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SAMPLE SUMMARY

Workorder: 3064943 4TH QTR 2019 CWMP-FORM 19Q

Notes

-- Samples collected by ALS personnel are done so in accordance with the procedures set forth in the ALS Field Sampling Plan (20 - Field Services Sampling Plan).
-- All Waste Water analyses comply with methodology requirements of 40 CFR Part 136.
-- All Drinking Water analyses comply with methodology requirements of 40 CFR Part 141.
-- Unless otherwise noted, all quantitative results for soils are reported on a dry weight basis.
-- The Chain of Custody document is included as part of this report.
-- All Library Search analytes should be regarded as tentative identifications based on the presumptive evidence of the mass spectra. Concentrations reported are estimated values.
-- Parameters identified as "analyze immediately" require analysis within 15 minutes of collection. Any "analyze immediately" parameters not listed under the header "Field Parameters" are preformed in the laboratory and are therefore analyzed out of hold time.
-- Method references listed on this report beginning with the prefix “S” followed by a method number (such as S2310B-97) refer to methods from “Standard Methods for the Examination of Water and Wastewater”.
-- For microbiological analyses, the "Prepared" value is the date/time into the incubator and the "Analyzed" value is the date/time out the incubator.
-- An Analysis-Prep Method Cross Reference Table is included after Analytical Results & Qualifiers section in this report.

Standard Acronyms/Flags

J	Indicates an estimated value between the Method Detection Limit (MDL) and the Practical Quantitation Limit (PQL) for the analyte
U	Indicates that the analyte was Not Detected (ND)
N	Indicates presumptive evidence of the presence of a compound
MDL	Method Detection Limit
PQL	Practical Quantitation Limit
RDL	Reporting Detection Limit
ND	Not Detected - indicates that the analyte was Not Detected at the RDL
Cntr	Analysis was performed using this container
RegLmt	Regulatory Limit
LCS	Laboratory Control Sample
MS	Matrix Spike
MSD	Matrix Spike Duplicate
DUP	Sample Duplicate
%Rec	Percent Recovery
RPD	Relative Percent Difference
LOD	DoD Limit of Detection
LOQ	DoD Limit of Quantitation
DL	DoD Detection Limit
I	Indicates reported value is greater than or equal to the Method Detection Limit (MDL) but less than the Report Detection Limit (RDL)
(S)	Surrogate Compound
NC	Not Calculated
*	Result outside of QC limits

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ANALYTICAL RESULTS

Workorder: 3064943 4TH QTR 2019 CWMP-FORM 19Q

Lab ID: **3064943001** Date Collected: 10/18/2019 10:23 Matrix: Ground Water

Sample ID: **CWMP018S** Date Received: 10/18/2019 14:02

Parameters	Results	Flag	Units	RDL	Method	Prepared	By	Analyzed	By	Cntr
VOLATILE ORGANICS										
Benzene	ND		ug/L	1.0	SW846 8260B			10/22/19 04:34	PDK	E
1,2-Dibromoethane	ND		ug/L	1.0	SW846 8260B			10/22/19 04:34	PDK	E
1,1-Dichloroethane	ND		ug/L	1.0	SW846 8260B			10/22/19 04:34	PDK	E
1,2-Dichloroethane	ND		ug/L	1.0	SW846 8260B			10/22/19 04:34	PDK	E
1,1-Dichloroethene	ND		ug/L	1.0	SW846 8260B			10/22/19 04:34	PDK	E
cis-1,2-Dichloroethene	ND		ug/L	1.0	SW846 8260B			10/22/19 04:34	PDK	E
trans-1,2-Dichloroethene	ND		ug/L	1.0	SW846 8260B			10/22/19 04:34	PDK	E
Ethylbenzene	ND		ug/L	1.0	SW846 8260B			10/22/19 04:34	PDK	E
Methylene Chloride	ND		ug/L	1.0	SW846 8260B			10/22/19 04:34	PDK	E
Tetrachloroethene	ND		ug/L	1.0	SW846 8260B			10/22/19 04:34	PDK	E
Toluene	ND		ug/L	1.0	SW846 8260B			10/22/19 04:34	PDK	E
Total Xylenes	ND		ug/L	3.0	SW846 8260B			10/22/19 04:34	PDK	E
1,1,1-Trichloroethane	ND		ug/L	1.0	SW846 8260B			10/22/19 04:34	PDK	E
Trichloroethene	ND		ug/L	1.0	SW846 8260B			10/22/19 04:34	PDK	E
Vinyl Chloride	ND		ug/L	1.0	SW846 8260B			10/22/19 04:34	PDK	E
Surrogate Recoveries	*Results*	*Flag*	*Units*	*Limits*	*Method*	*Prepared*	*By*	*Analyzed*	*By*	*Cntr*
1,2-Dichloroethane-d4 (S)	113		%	62 - 133	SW846 8260B			10/22/19 04:34	PDK	E
4-Bromofluorobenzene (S)	98.6		%	79 - 114	SW846 8260B			10/22/19 04:34	PDK	E
Dibromofluoromethane (S)	102		%	78 - 116	SW846 8260B			10/22/19 04:34	PDK	E
Toluene-d8 (S)	101		%	76 - 127	SW846 8260B			10/22/19 04:34	PDK	E
WET CHEMISTRY										
Alkalinity, Bicarbonate	ND		mg/L	5	SM2320B-2011			10/26/19 06:38	MXO	C
Alkalinity, Total	ND	1	mg/L	5	SM2320B-2011			10/26/19 06:38	MXO	D
Ammonia-N	ND		mg/L	0.100	D6919-09			10/26/19 11:12	AK	A
Chemical Oxygen Demand (COD)	20		mg/L	15	EPA 410.4			10/25/19 12:31	AK	A
Chloride	632		mg/L	10.0	EPA 300.0			10/23/19 14:30	CHW	C
Fluoride	ND		mg/L	0.20	EPA 300.0			10/19/19 06:58	CHW	C
Nitrate-N	24.4	3	mg/L	1.0	EPA 300.0			10/23/19 14:30	CHW	C
pH	8.51	2	pH_Units		S4500HB-11			10/26/19 06:38	MXO	C
Phenolics	ND		mg/L	0.005	SW846 9066	10/23/19 15:09	C_D	10/24/19 05:31	C_D	I
Specific Conductance	2840		umhos/cm	1	SM2510B-2011			10/26/19 06:38	MXO	C
Sulfate	26.5		mg/L	2.0	EPA 300.0			10/19/19 06:58	CHW	C
Total Dissolved Solids	1480		mg/L	25	S2540C-11			10/23/19 16:23	D1C	C
Total Organic Carbon (TOC)	7.9		mg/L	0.50	SM5310B-2011			10/23/19 01:12	PAG	G
Turbidity	5.72		NTU	0.10	SM2130B-2011			10/19/19 05:50	R2B	C

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ANALYTICAL RESULTS

Workorder: 3064943 4TH QTR 2019 CWMP-FORM 19Q

Lab ID: **3064943001** Date Collected: 10/18/2019 10:23 Matrix: Ground Water

Sample ID: **CWMP018S** Date Received: 10/18/2019 14:02

Parameters	Results	Flag	Units	RDL	Method	Prepared	By	Analyzed	By	*Cntr*
METALS										
Calcium, Total	71.2		mg/L	0.11	SW846 6010C	10/21/19 18:10	SXC	10/22/19 16:23	SRT	J1
Iron, Total	0.37		mg/L	0.067	SW846 6010C	10/21/19 18:10	SXC	10/22/19 16:23	SRT	J1
Magnesium, Total	83.4		mg/L	0.11	SW846 6010C	10/21/19 18:10	SXC	10/22/19 16:23	SRT	J1
Manganese, Total	0.17		mg/L	0.0056	SW846 6010C	10/21/19 18:10	SXC	10/22/19 16:23	SRT	J1
Potassium, Total	15.6		mg/L	0.56	SW846 6010C	10/21/19 18:10	SXC	10/22/19 16:23	SRT	J1
Sodium, Total	293		mg/L	0.56	SW846 6010C	10/21/19 18:10	SXC	10/22/19 16:23	SRT	J1
FIELD PARAMETERS										
Dissolved Oxygen	9.19		mg/L	0.01	Field			10/18/19 10:23	BGS	B
pH, Field (SM4500B)	8.18		pH_Units		Field			10/18/19 10:23	BGS	B
Specific Conductance, Field	2580		umhos/cm	1	Field			10/18/19 10:23	BGS	B
Temperature	12.16		Deg. C		Field			10/18/19 10:23	BGS	B

Susan J. Scherer

Ms. Susan J Scherer
Project Coordinator

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ANALYTICAL RESULTS

Workorder: 3064943 4TH QTR 2019 CWMP-FORM 19Q

Lab ID: **3064943002** Date Collected: 10/18/2019 10:50 Matrix: Ground Water

Sample ID: **CWMP017S** Date Received: 10/18/2019 14:02

Parameters	Results	Flag	Units	RDL	Method	Prepared	By	Analyzed	By	Cntr
VOLATILE ORGANICS										
Benzene	ND		ug/L	1.0	SW846 8260B			10/22/19 04:57	PDK	E
1,2-Dibromoethane	ND		ug/L	1.0	SW846 8260B			10/22/19 04:57	PDK	E
1,1-Dichloroethane	ND		ug/L	1.0	SW846 8260B			10/22/19 04:57	PDK	E
1,2-Dichloroethane	ND		ug/L	1.0	SW846 8260B			10/22/19 04:57	PDK	E
1,1-Dichloroethene	ND		ug/L	1.0	SW846 8260B			10/22/19 04:57	PDK	E
cis-1,2-Dichloroethene	ND		ug/L	1.0	SW846 8260B			10/22/19 04:57	PDK	E
trans-1,2-Dichloroethene	ND		ug/L	1.0	SW846 8260B			10/22/19 04:57	PDK	E
Ethylbenzene	ND		ug/L	1.0	SW846 8260B			10/22/19 04:57	PDK	E
Methylene Chloride	ND		ug/L	1.0	SW846 8260B			10/22/19 04:57	PDK	E
Tetrachloroethene	ND		ug/L	1.0	SW846 8260B			10/22/19 04:57	PDK	E
Toluene	ND		ug/L	1.0	SW846 8260B			10/22/19 04:57	PDK	E
Total Xylenes	ND		ug/L	3.0	SW846 8260B			10/22/19 04:57	PDK	E
1,1,1-Trichloroethane	ND		ug/L	1.0	SW846 8260B			10/22/19 04:57	PDK	E
Trichloroethene	ND		ug/L	1.0	SW846 8260B			10/22/19 04:57	PDK	E
Vinyl Chloride	ND		ug/L	1.0	SW846 8260B			10/22/19 04:57	PDK	E
Surrogate Recoveries	*Results*	*Flag*	*Units*	*Limits*	*Method*	*Prepared*	*By*	*Analyzed*	*By*	*Cntr*
1,2-Dichloroethane-d4 (S)	113		%	62 - 133	SW846 8260B			10/22/19 04:57	PDK	E
4-Bromofluorobenzene (S)	97.3		%	79 - 114	SW846 8260B			10/22/19 04:57	PDK	E
Dibromofluoromethane (S)	99.4		%	78 - 116	SW846 8260B			10/22/19 04:57	PDK	E
Toluene-d8 (S)	101		%	76 - 127	SW846 8260B			10/22/19 04:57	PDK	E
WET CHEMISTRY										
Alkalinity, Bicarbonate	373		mg/L	5	SM2320B-2011			10/26/19 06:38	MXO	C
Alkalinity, Total	380	1	mg/L	5	SM2320B-2011			10/26/19 06:38	MXO	D
Ammonia-N	ND		mg/L	0.100	D6919-09			10/26/19 11:24	AK	A
Chemical Oxygen Demand (COD)	16		mg/L	15	EPA 410.4			10/25/19 12:31	AK	A
Chloride	956		mg/L	25.0	EPA 300.0			10/23/19 16:11	CHW	C
Fluoride	ND		mg/L	0.20	EPA 300.0			10/19/19 08:22	CHW	C
Nitrate-N	33.0	3	mg/L	2.5	EPA 300.0			10/23/19 16:11	CHW	C
pH	8.32	2	pH_Units		S4500HB-11			10/26/19 06:38	MXO	C
Phenolics	ND		mg/L	0.005	SW846 9066	10/23/19 15:09	C_D	10/24/19 05:31	C_D	I
Specific Conductance	4410		umhos/cm	1	SM2510B-2011			10/26/19 06:38	MXO	C
Sulfate	28.7		mg/L	2.0	EPA 300.0			10/19/19 08:22	CHW	C
Total Dissolved Solids	2330		mg/L	25	S2540C-11			10/23/19 16:23	D1C	C
Total Organic Carbon (TOC)	5.0		mg/L	0.50	SM5310B-2011			10/23/19 01:12	PAG	G
Turbidity	2.33		NTU	0.10	SM2130B-2011			10/19/19 05:50	R2B	C

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ANALYTICAL RESULTS

Workorder: 3064943 4TH QTR 2019 CWMP-FORM 19Q

Lab ID: **3064943002** Date Collected: 10/18/2019 10:50 Matrix: Ground Water

Sample ID: **CWMP017S** Date Received: 10/18/2019 14:02

Parameters	Results	Flag	Units	RDL	Method	Prepared	By	Analyzed	By	*Cntr*
METALS										
Calcium, Total	84.2		mg/L	0.11	SW846 6010C	10/21/19 18:10	SXC	10/22/19 16:34	SRT	J1
Iron, Total	0.79		mg/L	0.067	SW846 6010C	10/21/19 18:10	SXC	10/22/19 16:34	SRT	J1
Magnesium, Total	133		mg/L	0.11	SW846 6010C	10/21/19 18:10	SXC	10/22/19 16:34	SRT	J1
Manganese, Total	0.11		mg/L	0.0056	SW846 6010C	10/21/19 18:10	SXC	10/22/19 16:34	SRT	J1
Potassium, Total	16.7		mg/L	0.56	SW846 6010C	10/21/19 18:10	SXC	10/22/19 16:34	SRT	J1
Sodium, Total	495		mg/L	0.56	SW846 6010C	10/21/19 18:10	SXC	10/22/19 16:34	SRT	J1
FIELD PARAMETERS										
Dissolved Oxygen	8.00		mg/L	0.01	Field			10/18/19 10:50	BGS	B
pH, Field (SM4500B)	7.69		pH_Units		Field			10/18/19 10:50	BGS	B
Specific Conductance, Field	4040		umhos/cm	1	Field			10/18/19 10:50	BGS	B
Temperature	16.52		Deg. C		Field			10/18/19 10:50	BGS	B

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Project Coordinator

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ANALYTICAL RESULTS

Workorder: 3064943 4TH QTR 2019 CWMP-FORM 19Q

Lab ID: **3064943003** Date Collected: 10/18/2019 12:15 Matrix: Ground Water

Sample ID: **CWMP004W** Date Received: 10/18/2019 14:02

Parameters	Results	Flag	Units	RDL	Method	Prepared	By	Analyzed	By	Cntr
VOLATILE ORGANICS										
Benzene	ND		ug/L	1.0	SW846 8260B			10/22/19 05:19	PDK	E
Bromodichloromethane	ND		ug/L	1.0	SW846 8260B			10/22/19 05:19	PDK	E
Bromoform	ND		ug/L	1.0	SW846 8260B			10/22/19 05:19	PDK	E
Bromomethane	ND		ug/L	1.0	SW846 8260B			10/22/19 05:19	PDK	E
Carbon Tetrachloride	ND		ug/L	1.0	SW846 8260B			10/22/19 05:19	PDK	E
Chlorobenzene	ND		ug/L	1.0	SW846 8260B			10/22/19 05:19	PDK	E
Chlorodibromomethane	ND		ug/L	1.0	SW846 8260B			10/22/19 05:19	PDK	E
Chloroethane	ND		ug/L	1.0	SW846 8260B			10/22/19 05:19	PDK	E
Chloroform	ND		ug/L	1.0	SW846 8260B			10/22/19 05:19	PDK	E
Chloromethane	ND		ug/L	1.0	SW846 8260B			10/22/19 05:19	PDK	E
1,2-Dibromoethane	ND		ug/L	1.0	SW846 8260B			10/22/19 05:19	PDK	E
1,2-Dichlorobenzene	ND		ug/L	1.0	SW846 8260B			10/22/19 05:19	PDK	E
1,3-Dichlorobenzene	ND		ug/L	1.0	SW846 8260B			10/22/19 05:19	PDK	E
1,4-Dichlorobenzene	ND		ug/L	1.0	SW846 8260B			10/22/19 05:19	PDK	E
1,1-Dichloroethane	ND		ug/L	1.0	SW846 8260B			10/22/19 05:19	PDK	E
1,2-Dichloroethane	ND		ug/L	1.0	SW846 8260B			10/22/19 05:19	PDK	E
1,1-Dichloroethene	ND		ug/L	1.0	SW846 8260B			10/22/19 05:19	PDK	E
cis-1,2-Dichloroethene	ND		ug/L	1.0	SW846 8260B			10/22/19 05:19	PDK	E
trans-1,2-Dichloroethene	ND		ug/L	1.0	SW846 8260B			10/22/19 05:19	PDK	E
1,2-Dichloropropane	ND		ug/L	1.0	SW846 8260B			10/22/19 05:19	PDK	E
1,3-Dichloropropene, Total	ND		ug/L	2.0	SW846 8260B			10/22/19 05:19	PDK	E
Ethylbenzene	ND		ug/L	1.0	SW846 8260B			10/22/19 05:19	PDK	E
Methylene Chloride	ND		ug/L	1.0	SW846 8260B			10/22/19 05:19	PDK	E
Styrene	ND		ug/L	1.0	SW846 8260B			10/22/19 05:19	PDK	E
1,1,2,2-Tetrachloroethane	ND		ug/L	1.0	SW846 8260B			10/22/19 05:19	PDK	E
Tetrachloroethene	ND		ug/L	1.0	SW846 8260B			10/22/19 05:19	PDK	E
Toluene	ND		ug/L	1.0	SW846 8260B			10/22/19 05:19	PDK	E
Total Xylenes	ND		ug/L	3.0	SW846 8260B			10/22/19 05:19	PDK	E
1,2,4-Trichlorobenzene	ND		ug/L	2.0	SW846 8260B			10/22/19 05:19	PDK	E
1,1,1-Trichloroethane	ND		ug/L	1.0	SW846 8260B			10/22/19 05:19	PDK	E
1,1,2-Trichloroethane	ND		ug/L	1.0	SW846 8260B			10/22/19 05:19	PDK	E
Trichloroethene	ND		ug/L	1.0	SW846 8260B			10/22/19 05:19	PDK	E
Trichlorofluoromethane	ND		ug/L	1.0	SW846 8260B			10/22/19 05:19	PDK	E
1,2,3-Trichloropropane	ND		ug/L	2.0	SW846 8260B			10/22/19 05:19	PDK	E
Vinyl Chloride	ND		ug/L	1.0	SW846 8260B			10/22/19 05:19	PDK	E

Surrogate Recoveries	*Results*	*Flag*	*Units*	*Limits*	*Method*	*Prepared*	*By*	*Analyzed*	*By*	*Cntr*

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ANALYTICAL RESULTS

Workorder: 3064943 4TH QTR 2019 CWMP-FORM 19Q

Lab ID: **3064943003** Date Collected: 10/18/2019 12:15 Matrix: Ground Water

Sample ID: **CWMP004W** Date Received: 10/18/2019 14:02

Parameters	Results	Flag	Units	RDL	Method	Prepared	By	Analyzed	By	*Cntr*
1,2-Dichloroethane-d4 (S)	112		%	62 - 133	SW846 8260B			10/22/19 05:19	PDK	E
4-Bromofluorobenzene (S)	97.6		%	79 - 114	SW846 8260B			10/22/19 05:19	PDK	E
Dibromofluoromethane (S)	101		%	78 - 116	SW846 8260B			10/22/19 05:19	PDK	E
Toluene-d8 (S)	100		%	76 - 127	SW846 8260B			10/22/19 05:19	PDK	E
WET CHEMISTRY										
Alkalinity, Bicarbonate	21		mg/L	5	SM2320B-2011			10/26/19 06:38	MXO	C
Alkalinity, Total	21	1	mg/L	5	SM2320B-2011			10/26/19 06:38	MXO	D
Ammonia-N	ND		mg/L	0.100	D6919-09			10/26/19 11:37	AK	A
Chemical Oxygen Demand (COD)	ND		mg/L	15	EPA 410.4			10/25/19 12:31	AK	A
Chloride	50.6		mg/L	2.0	EPA 300.0			10/19/19 08:35	CHW	C
Fluoride	ND		mg/L	0.20	EPA 300.0			10/19/19 08:35	CHW	C
Nitrate-N	6.7		mg/L	0.20	EPA 300.0			10/19/19 08:35	CHW	C
pH	6.50	2	pH_Units		S4500HB-11			10/26/19 06:38	MXO	C
Phenolics	ND		mg/L	0.005	SW846 9066	10/23/19 15:09	C_D	10/24/19 05:31	C_D	I
Specific Conductance	306		umhos/cm	1	SM2510B-2011			10/26/19 06:38	MXO	C
Sulfate	6.3		mg/L	2.0	EPA 300.0			10/19/19 08:35	CHW	C
Total Dissolved Solids	200		mg/L	25	S2540C-11			10/23/19 16:23	D1C	C
Total Organic Carbon (TOC)	0.67		mg/L	0.50	SM5310B-2011			10/23/19 01:12	PAG	G
Turbidity	0.10		NTU	0.10	SM2130B-2011			10/19/19 05:50	R2B	C
METALS										
Calcium, Total	18.2		mg/L	0.11	SW846 6010C	10/21/19 18:10	SXC	10/22/19 16:38	SRT	J1
Iron, Total	ND		mg/L	0.067	SW846 6010C	10/21/19 18:10	SXC	10/22/19 16:38	SRT	J1
Magnesium, Total	6.7		mg/L	0.11	SW846 6010C	10/21/19 18:10	SXC	10/22/19 16:38	SRT	J1
Manganese, Total	0.014		mg/L	0.0056	SW846 6010C	10/21/19 18:10	SXC	10/22/19 16:38	SRT	J1
Potassium, Total	1.5		mg/L	0.56	SW846 6010C	10/21/19 18:10	SXC	10/22/19 16:38	SRT	J1
Sodium, Total	17.8		mg/L	0.56	SW846 6010C	10/21/19 18:10	SXC	10/22/19 16:38	SRT	J1
FIELD PARAMETERS										
Depth to Water Level	99.57		Feet		Field			10/18/19 12:15	BGS	B
Elev Top MW Casing above MSL	529.53		Feet		Field			10/18/19 12:15	BGS	B
Ground Water Elevation	429.96		ft/MSL		Field			10/18/19 12:15	BGS	B
pH, Field (SM4500B)	5.83		pH_Units		Field			10/18/19 12:15	BGS	B
Sample Depth	130.00		Feet		Field			10/18/19 12:15	BGS	B
Specific Conductance, Field	302		umhos/cm	1	Field			10/18/19 12:15	BGS	B
Temperature	11.60		Deg. C		Field			10/18/19 12:15	BGS	B
Total Well Depth	140.00		Feet		Field			10/18/19 12:15	BGS	B

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ANALYTICAL RESULTS

Workorder: 3064943 4TH QTR 2019 CWMP-FORM 19Q

Lab ID:	**3064943003**	Date Collected:	10/18/2019 12:15	Matrix:	Ground Water
Sample ID:	**CWMP004W**	Date Received:	10/18/2019 14:02		

Parameters	Results	Flag	Units	RDL	Method	Prepared	By	Analyzed	By	*Cntr*

Ms. Susan J Scherer
Project Coordinator

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ANALYTICAL RESULTS

Workorder: 3064943 4TH QTR 2019 CWMP-FORM 19Q

Lab ID: **3064943004** Date Collected: 10/18/2019 12:24 Matrix: Ground Water

Sample ID: **CWMP003W** Date Received: 10/18/2019 14:02

Parameters	Results	Flag	Units	RDL	Method	Prepared	By	Analyzed	By	Cntr
VOLATILE ORGANICS										
Benzene	ND		ug/L	1.0	SW846 8260B			10/22/19 05:41	PDK	E
Bromodichloromethane	ND		ug/L	1.0	SW846 8260B			10/22/19 05:41	PDK	E
Bromoform	ND		ug/L	1.0	SW846 8260B			10/22/19 05:41	PDK	E
Bromomethane	ND		ug/L	1.0	SW846 8260B			10/22/19 05:41	PDK	E
Carbon Tetrachloride	ND		ug/L	1.0	SW846 8260B			10/22/19 05:41	PDK	E
Chlorobenzene	ND		ug/L	1.0	SW846 8260B			10/22/19 05:41	PDK	E
Chlorodibromomethane	ND		ug/L	1.0	SW846 8260B			10/22/19 05:41	PDK	E
Chloroethane	ND		ug/L	1.0	SW846 8260B			10/22/19 05:41	PDK	E
Chloroform	ND		ug/L	1.0	SW846 8260B			10/22/19 05:41	PDK	E
Chloromethane	ND		ug/L	1.0	SW846 8260B			10/22/19 05:41	PDK	E
1,2-Dibromoethane	ND		ug/L	1.0	SW846 8260B			10/22/19 05:41	PDK	E
1,2-Dichlorobenzene	ND		ug/L	1.0	SW846 8260B			10/22/19 05:41	PDK	E
1,3-Dichlorobenzene	ND		ug/L	1.0	SW846 8260B			10/22/19 05:41	PDK	E
1,4-Dichlorobenzene	ND		ug/L	1.0	SW846 8260B			10/22/19 05:41	PDK	E
1,1-Dichloroethane	1.3		ug/L	1.0	SW846 8260B			10/22/19 05:41	PDK	E
1,2-Dichloroethane	ND		ug/L	1.0	SW846 8260B			10/22/19 05:41	PDK	E
1,1-Dichloroethene	ND		ug/L	1.0	SW846 8260B			10/22/19 05:41	PDK	E
cis-1,2-Dichloroethene	ND		ug/L	1.0	SW846 8260B			10/22/19 05:41	PDK	E
trans-1,2-Dichloroethene	ND		ug/L	1.0	SW846 8260B			10/22/19 05:41	PDK	E
1,2-Dichloropropane	ND		ug/L	1.0	SW846 8260B			10/22/19 05:41	PDK	E
1,3-Dichloropropene, Total	ND		ug/L	2.0	SW846 8260B			10/22/19 05:41	PDK	E
Ethylbenzene	ND		ug/L	1.0	SW846 8260B			10/22/19 05:41	PDK	E
Methylene Chloride	ND		ug/L	1.0	SW846 8260B			10/22/19 05:41	PDK	E
Styrene	ND		ug/L	1.0	SW846 8260B			10/22/19 05:41	PDK	E
1,1,2,2-Tetrachloroethane	ND		ug/L	1.0	SW846 8260B			10/22/19 05:41	PDK	E
Tetrachloroethene	ND		ug/L	1.0	SW846 8260B			10/22/19 05:41	PDK	E
Toluene	ND		ug/L	1.0	SW846 8260B			10/22/19 05:41	PDK	E
Total Xylenes	ND		ug/L	3.0	SW846 8260B			10/22/19 05:41	PDK	E
1,2,4-Trichlorobenzene	ND		ug/L	2.0	SW846 8260B			10/22/19 05:41	PDK	E
1,1,1-Trichloroethane	ND		ug/L	1.0	SW846 8260B			10/22/19 05:41	PDK	E
1,1,2-Trichloroethane	ND		ug/L	1.0	SW846 8260B			10/22/19 05:41	PDK	E
Trichloroethene	ND		ug/L	1.0	SW846 8260B			10/22/19 05:41	PDK	E
Trichlorofluoromethane	ND		ug/L	1.0	SW846 8260B			10/22/19 05:41	PDK	E
1,2,3-Trichloropropane	ND		ug/L	2.0	SW846 8260B			10/22/19 05:41	PDK	E
Vinyl Chloride	ND		ug/L	1.0	SW846 8260B			10/22/19 05:41	PDK	E

Surrogate Recoveries	*Results*	*Flag*	*Units*	*Limits*	*Method*	*Prepared*	*By*	*Analyzed*	*By*	*Cntr*

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ANALYTICAL RESULTS

Workorder: 3064943 4TH QTR 2019 CWMP-FORM 19Q

Lab ID: **3064943004** Date Collected: 10/18/2019 12:24 Matrix: Ground Water

Sample ID: **CWMP003W** Date Received: 10/18/2019 14:02

Parameters	Results	Flag	Units	RDL	Method	Prepared	By	Analyzed	By	*Cntr*
1,2-Dichloroethane-d4 (S)	115		%	62 - 133	SW846 8260B			10/22/19 05:41	PDK	E
4-Bromofluorobenzene (S)	98.1		%	79 - 114	SW846 8260B			10/22/19 05:41	PDK	E
Dibromofluoromethane (S)	101		%	78 - 116	SW846 8260B			10/22/19 05:41	PDK	E
Toluene-d8 (S)	100		%	76 - 127	SW846 8260B			10/22/19 05:41	PDK	E
WET CHEMISTRY										
Alkalinity, Bicarbonate	19		mg/L	5	SM2320B-2011			10/26/19 06:38	MXO	C
Alkalinity, Total	19	1	mg/L	5	SM2320B-2011			10/26/19 06:38	MXO	D
Ammonia-N	ND		mg/L	0.100	D6919-09			10/26/19 11:50	AK	A
Chemical Oxygen Demand (COD)	ND		mg/L	15	EPA 410.4			10/25/19 12:31	AK	A
Chloride	75.2		mg/L	2.0	EPA 300.0			10/19/19 08:49	CHW	C
Fluoride	ND		mg/L	0.20	EPA 300.0			10/19/19 08:49	CHW	C
Nitrate-N	7.9		mg/L	0.20	EPA 300.0			10/19/19 08:49	CHW	C
pH	6.28	2	pH_Units		S4500HB-11			10/26/19 06:38	MXO	C
Phenolics	ND		mg/L	0.005	SW846 9066	10/23/19 15:09	C_D	10/24/19 05:31	C_D	I
Specific Conductance	397		umhos/cm	1	SM2510B-2011			10/26/19 06:38	MXO	C
Sulfate	5.3		mg/L	2.0	EPA 300.0			10/19/19 08:49	CHW	C
Total Dissolved Solids	264		mg/L	25	S2540C-11			10/23/19 16:23	D1C	C
Total Organic Carbon (TOC)	1.2		mg/L	0.50	SM5310B-2011			10/31/19 03:20	PAG	G
Turbidity	0.62		NTU	0.10	SM2130B-2011			10/19/19 05:50	R2B	C
METALS										
Calcium, Total	24.5		mg/L	0.11	SW846 6010C	10/21/19 18:10	SXC	10/22/19 16:42	SRT	J1
Iron, Total	ND		mg/L	0.067	SW846 6010C	10/21/19 18:10	SXC	10/22/19 16:42	SRT	J1
Magnesium, Total	8.6		mg/L	0.11	SW846 6010C	10/21/19 18:10	SXC	10/22/19 16:42	SRT	J1
Manganese, Total	ND		mg/L	0.0056	SW846 6010C	10/21/19 18:10	SXC	10/22/19 16:42	SRT	J1
Potassium, Total	1.7		mg/L	0.56	SW846 6010C	10/21/19 18:10	SXC	10/22/19 16:42	SRT	J1
Sodium, Total	22.8		mg/L	0.56	SW846 6010C	10/21/19 18:10	SXC	10/22/19 16:42	SRT	J1
FIELD PARAMETERS										
Depth to Water Level	55.78		Feet		Field			10/18/19 12:24	BGS	B
Elev Top MW Casing above MSL	524.21		Feet		Field			10/18/19 12:24	BGS	B
Ground Water Elevation	468.43		ft/MSL		Field			10/18/19 12:24	BGS	B
pH, Field (SM4500B)	5.78		pH_Units		Field			10/18/19 12:24	BGS	B
Sample Depth	100.00		Feet		Field			10/18/19 12:24	BGS	B
Specific Conductance, Field	397		umhos/cm	1	Field			10/18/19 12:24	BGS	B
Temperature	11.20		Deg. C		Field			10/18/19 12:24	BGS	B
Total Well Depth	140.00		Feet		Field			10/18/19 12:24	BGS	B

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ANALYTICAL RESULTS

Workorder: 3064943 4TH QTR 2019 CWMP-FORM 19Q

Lab ID:	**3064943004**	Date Collected:	10/18/2019 12:24	Matrix:	Ground Water
Sample ID:	**CWMP003W**	Date Received:	10/18/2019 14:02		

Parameters	Results	Flag	Units	RDL	Method	Prepared	By	Analyzed	By	*Cntr*

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Project Coordinator

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ANALYTICAL RESULTS

Workorder: 3064943 4TH QTR 2019 CWMP-FORM 19Q

Lab ID: **3064943005** Date Collected: 10/18/2019 12:40 Matrix: Water

Sample ID: **Field Blank** Date Received: 10/18/2019 14:02

Parameters	Results	Flag	Units	RDL	Method	Prepared	By	Analyzed	By	Cntr
VOLATILE ORGANICS										
Benzene	ND		ug/L	1.0	SW846 8260B			10/22/19 00:05	PDK	D
Bromodichloromethane	ND		ug/L	1.0	SW846 8260B			10/22/19 00:05	PDK	D
Bromoform	ND		ug/L	1.0	SW846 8260B			10/22/19 00:05	PDK	D
Bromomethane	ND		ug/L	1.0	SW846 8260B			10/22/19 00:05	PDK	D
Carbon Tetrachloride	ND		ug/L	1.0	SW846 8260B			10/22/19 00:05	PDK	D
Chlorobenzene	ND		ug/L	1.0	SW846 8260B			10/22/19 00:05	PDK	D
Chlorodibromomethane	ND		ug/L	1.0	SW846 8260B			10/22/19 00:05	PDK	D
Chloroethane	ND		ug/L	1.0	SW846 8260B			10/22/19 00:05	PDK	D
Chloroform	ND		ug/L	1.0	SW846 8260B			10/22/19 00:05	PDK	D
Chloromethane	ND		ug/L	1.0	SW846 8260B			10/22/19 00:05	PDK	D
1,2-Dibromoethane	ND		ug/L	1.0	SW846 8260B			10/22/19 00:05	PDK	D
1,2-Dichlorobenzene	ND		ug/L	1.0	SW846 8260B			10/22/19 00:05	PDK	D
1,3-Dichlorobenzene	ND		ug/L	1.0	SW846 8260B			10/22/19 00:05	PDK	D
1,4-Dichlorobenzene	ND		ug/L	1.0	SW846 8260B			10/22/19 00:05	PDK	D
1,1-Dichloroethane	ND		ug/L	1.0	SW846 8260B			10/22/19 00:05	PDK	D
1,2-Dichloroethane	ND		ug/L	1.0	SW846 8260B			10/22/19 00:05	PDK	D
1,1-Dichloroethene	ND		ug/L	1.0	SW846 8260B			10/22/19 00:05	PDK	D
cis-1,2-Dichloroethene	ND		ug/L	1.0	SW846 8260B			10/22/19 00:05	PDK	D
trans-1,2-Dichloroethene	ND		ug/L	1.0	SW846 8260B			10/22/19 00:05	PDK	D
1,2-Dichloropropane	ND		ug/L	1.0	SW846 8260B			10/22/19 00:05	PDK	D
1,3-Dichloropropene, Total	ND		ug/L	2.0	SW846 8260B			10/22/19 00:05	PDK	D
Ethylbenzene	ND		ug/L	1.0	SW846 8260B			10/22/19 00:05	PDK	D
Methylene Chloride	ND		ug/L	1.0	SW846 8260B			10/22/19 00:05	PDK	D
Styrene	ND		ug/L	1.0	SW846 8260B			10/22/19 00:05	PDK	D
1,1,2,2-Tetrachloroethane	ND		ug/L	1.0	SW846 8260B			10/22/19 00:05	PDK	D
Tetrachloroethene	ND		ug/L	1.0	SW846 8260B			10/22/19 00:05	PDK	D
Toluene	ND		ug/L	1.0	SW846 8260B			10/22/19 00:05	PDK	D
Total Xylenes	ND		ug/L	3.0	SW846 8260B			10/22/19 00:05	PDK	D
1,2,4-Trichlorobenzene	ND		ug/L	2.0	SW846 8260B			10/22/19 00:05	PDK	D
1,1,1-Trichloroethane	ND		ug/L	1.0	SW846 8260B			10/22/19 00:05	PDK	D
1,1,2-Trichloroethane	ND		ug/L	1.0	SW846 8260B			10/22/19 00:05	PDK	D
Trichloroethene	ND		ug/L	1.0	SW846 8260B			10/22/19 00:05	PDK	D
Trichlorofluoromethane	ND		ug/L	1.0	SW846 8260B			10/22/19 00:05	PDK	D
1,2,3-Trichloropropane	ND		ug/L	2.0	SW846 8260B			10/22/19 00:05	PDK	D
Vinyl Chloride	ND		ug/L	1.0	SW846 8260B			10/22/19 00:05	PDK	D

Surrogate Recoveries	*Results*	*Flag*	*Units*	*Limits*	*Method*	*Prepared*	*By*	*Analyzed*	*By*	*Cntr*

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ANALYTICAL RESULTS

Workorder: 3064943 4TH QTR 2019 CWMP-FORM 19Q

Lab ID: **3064943005** Date Collected: 10/18/2019 12:40 Matrix: Water

Sample ID: **Field Blank** Date Received: 10/18/2019 14:02

Parameters	Results	Flag	Units	RDL	Method	Prepared	By	Analyzed	By	*Cntr*
1,2-Dichloroethane-d4 (S)	102		%	62 - 133	SW846 8260B			10/22/19 00:05	PDK	D
4-Bromofluorobenzene (S)	99.4		%	79 - 114	SW846 8260B			10/22/19 00:05	PDK	D
Dibromofluoromethane (S)	96.6		%	78 - 116	SW846 8260B			10/22/19 00:05	PDK	D
Toluene-d8 (S)	102		%	76 - 127	SW846 8260B			10/22/19 00:05	PDK	D
WET CHEMISTRY										
Alkalinity, Bicarbonate	ND		mg/L	5	SM2320B-2011			10/26/19 06:38	MXO	B
Alkalinity, Total	ND	1	mg/L	5	SM2320B-2011			10/26/19 06:38	MXO	C
Ammonia-N	ND		mg/L	0.100	D6919-09			10/26/19 12:02	AK	A
Chemical Oxygen Demand (COD)	ND		mg/L	15	EPA 410.4			10/25/19 12:31	AK	A
Chloride	ND		mg/L	1.0	EPA 300.0			10/19/19 09:03	CHW	B
Fluoride	ND		mg/L	0.10	EPA 300.0			10/19/19 09:03	CHW	B
Nitrate-N	ND		mg/L	0.10	EPA 300.0			10/19/19 09:03	CHW	B
pH	5.58	2	pH_Units		S4500HB-11			10/26/19 06:38	MXO	B
Phenolics	ND		mg/L	0.005	SW846 9066	10/23/19 15:09	C_D	10/24/19 05:31	C_D	H
Specific Conductance	2		umhos/cm	1	SM2510B-2011			10/26/19 06:38	MXO	B
Sulfate	ND		mg/L	1.0	EPA 300.0			10/19/19 09:03	CHW	B
Total Dissolved Solids	ND		mg/L	25	S2540C-11			10/23/19 16:23	D1C	B
Total Organic Carbon (TOC)	ND		mg/L	0.50	SM5310B-2011			10/31/19 03:20	PAG	F
Turbidity	ND		NTU	0.10	SM2130B-2011			10/19/19 05:50	R2B	B
METALS										
Calcium, Total	ND		mg/L	0.11	SW846 6010C	10/21/19 18:10	SXC	10/22/19 16:45	SRT	I1
Iron, Total	ND		mg/L	0.067	SW846 6010C	10/21/19 18:10	SXC	10/22/19 16:45	SRT	I1
Magnesium, Total	ND		mg/L	0.11	SW846 6010C	10/21/19 18:10	SXC	10/22/19 16:45	SRT	I1
Manganese, Total	ND		mg/L	0.0056	SW846 6010C	10/21/19 18:10	SXC	10/22/19 16:45	SRT	I1
Potassium, Total	ND		mg/L	0.56	SW846 6010C	10/21/19 18:10	SXC	10/22/19 16:45	SRT	I1
Sodium, Total	ND		mg/L	0.56	SW846 6010C	10/21/19 18:10	SXC	10/22/19 16:45	SRT	I1

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Project Coordinator

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ANALYTICAL RESULTS

Workorder: 3064943 4TH QTR 2019 CWMP-FORM 19Q

Lab ID: **3064943006** Date Collected: 10/18/2019 14:02 Matrix: Water

Sample ID: **Trip Blank** Date Received: 10/18/2019 14:02

Parameters	Results	Flag	Units	RDL	Method	Prepared	By	Analyzed	By	Cntr
VOLATILE ORGANICS										
Benzene	ND		ug/L	1.0	SW846 8260B			10/21/19 23:43	PDK	A
1,2-Dibromoethane	ND		ug/L	1.0	SW846 8260B			10/21/19 23:43	PDK	A
1,1-Dichloroethane	ND		ug/L	1.0	SW846 8260B			10/21/19 23:43	PDK	A
1,2-Dichloroethane	ND		ug/L	1.0	SW846 8260B			10/21/19 23:43	PDK	A
1,1-Dichloroethene	ND		ug/L	1.0	SW846 8260B			10/21/19 23:43	PDK	A
cis-1,2-Dichloroethene	ND		ug/L	1.0	SW846 8260B			10/21/19 23:43	PDK	A
trans-1,2-Dichloroethene	ND		ug/L	1.0	SW846 8260B			10/21/19 23:43	PDK	A
Ethylbenzene	ND		ug/L	1.0	SW846 8260B			10/21/19 23:43	PDK	A
Methylene Chloride	ND		ug/L	1.0	SW846 8260B			10/21/19 23:43	PDK	A
Tetrachloroethene	ND		ug/L	1.0	SW846 8260B			10/21/19 23:43	PDK	A
Toluene	ND		ug/L	1.0	SW846 8260B			10/21/19 23:43	PDK	A
Total Xylenes	ND		ug/L	3.0	SW846 8260B			10/21/19 23:43	PDK	A
1,1,1-Trichloroethane	ND		ug/L	1.0	SW846 8260B			10/21/19 23:43	PDK	A
Trichloroethene	ND		ug/L	1.0	SW846 8260B			10/21/19 23:43	PDK	A
Vinyl Chloride	ND		ug/L	1.0	SW846 8260B			10/21/19 23:43	PDK	A
Surrogate Recoveries	*Results*	*Flag*	*Units*	*Limits*	*Method*	*Prepared*	*By*	*Analyzed*	*By*	*Cntr*
1,2-Dichloroethane-d4 (S)	103		%	62 - 133	SW846 8260B			10/21/19 23:43	PDK	A
4-Bromofluorobenzene (S)	98.9		%	79 - 114	SW846 8260B			10/21/19 23:43	PDK	A
Dibromofluoromethane (S)	97.6		%	78 - 116	SW846 8260B			10/21/19 23:43	PDK	A
Toluene-d8 (S)	101		%	76 - 127	SW846 8260B			10/21/19 23:43	PDK	A

Ms. Susan J Scherer
Project Coordinator

ANALYTICAL RESULTS

Workorder: 3064943 4TH QTR 2019 CWMP-FORM 19Q

PARAMETER QUALIFIERS

Lab ID	#	Sample ID	Analytical Method	Analyte
3064943001	1	CWMP018S	SM2320B-2011	Alkalinity, Total
The Total Alkalinity is titrated to a pH of 4.5 and reported as mg CaCO3/L.				
3064943001	2	CWMP018S	S4500HB-11	pH
The pH analysis is an "analyze immediately" analysis. Parameters identified as "analyze immediately" require analysis within 15 minutes of collection, and are therefore analyzed outside of the method holding time when analyzed in the laboratory.				
3064943001	3	CWMP018S	EPA 300.0	Nitrate-N
The sample was originally run within hold time, but required further analysis that exceeded hold time.				
3064943002	1	CWMP017S	SM2320B-2011	Alkalinity, Total
The Total Alkalinity is titrated to a pH of 4.5 and reported as mg CaCO3/L.				
3064943002	2	CWMP017S	S4500HB-11	pH
The pH analysis is an "analyze immediately" analysis. Parameters identified as "analyze immediately" require analysis within 15 minutes of collection, and are therefore analyzed outside of the method holding time when analyzed in the laboratory.				
3064943002	3	CWMP017S	EPA 300.0	Nitrate-N
The sample was originally run within hold time, but required further analysis that exceeded hold time.				
3064943003	1	CWMP004W	SM2320B-2011	Alkalinity, Total
The Total Alkalinity is titrated to a pH of 4.5 and reported as mg CaCO3/L.				
3064943003	2	CWMP004W	S4500HB-11	pH
The pH analysis is an "analyze immediately" analysis. Parameters identified as "analyze immediately" require analysis within 15 minutes of collection, and are therefore analyzed outside of the method holding time when analyzed in the laboratory.				
3064943004	1	CWMP003W	SM2320B-2011	Alkalinity, Total
The Total Alkalinity is titrated to a pH of 4.5 and reported as mg CaCO3/L.				
3064943004	2	CWMP003W	S4500HB-11	pH
The pH analysis is an "analyze immediately" analysis. Parameters identified as "analyze immediately" require analysis within 15 minutes of collection, and are therefore analyzed outside of the method holding time when analyzed in the laboratory.				
3064943005	1	Field Blank	SM2320B-2011	Alkalinity, Total
The Total Alkalinity is titrated to a pH of 4.5 and reported as mg CaCO3/L.				
3064943005	2	Field Blank	S4500HB-11	pH
The pH analysis is an "analyze immediately" analysis. Parameters identified as "analyze immediately" require analysis within 15 minutes of collection, and are therefore analyzed outside of the method holding time when analyzed in the laboratory.				

ANALYSIS - PREP METHOD CROSS REFERENCE TABLE

Workorder: 3064943 4TH QTR 2019 CWMP-FORM 19Q

Lab ID	Sample ID	Analysis Method	Prep Method
3064943001	CWMP018S	D6919-09	
3064943001	CWMP018S	EPA 300.0	
3064943001	CWMP018S	EPA 410.4	
3064943001	CWMP018S	Field	
3064943001	CWMP018S	S2540C-11	
3064943001	CWMP018S	S4500HB-11	
3064943001	CWMP018S	SM2130B-2011	
3064943001	CWMP018S	SM2320B-2011	
3064943001	CWMP018S	SM2510B-2011	
3064943001	CWMP018S	SM5310B-2011	
3064943001	CWMP018S	SW846 6010C	SW846 3015
3064943001	CWMP018S	SW846 8260B	
3064943001	CWMP018S	SW846 9066	420.4/9066
3064943002	CWMP017S	D6919-09	
3064943002	CWMP017S	EPA 300.0	
3064943002	CWMP017S	EPA 410.4	
3064943002	CWMP017S	Field	
3064943002	CWMP017S	S2540C-11	
3064943002	CWMP017S	S4500HB-11	
3064943002	CWMP017S	SM2130B-2011	
3064943002	CWMP017S	SM2320B-2011	
3064943002	CWMP017S	SM2510B-2011	
3064943002	CWMP017S	SM5310B-2011	
3064943002	CWMP017S	SW846 6010C	SW846 3015
3064943002	CWMP017S	SW846 8260B	
3064943002	CWMP017S	SW846 9066	420.4/9066
3064943003	CWMP004W	D6919-09	
3064943003	CWMP004W	EPA 300.0	
3064943003	CWMP004W	EPA 410.4	
3064943003	CWMP004W	Field	
3064943003	CWMP004W	S2540C-11	
3064943003	CWMP004W	S4500HB-11	
3064943003	CWMP004W	SM2130B-2011	
3064943003	CWMP004W	SM2320B-2011	
3064943003	CWMP004W	SM2510B-2011	
3064943003	CWMP004W	SM5310B-2011	
3064943003	CWMP004W	SW846 6010C	SW846 3015
3064943003	CWMP004W	SW846 8260B	
3064943003	CWMP004W	SW846 9066	420.4/9066
3064943004	CWMP003W	D6919-09	
3064943004	CWMP003W	EPA 300.0	
3064943004	CWMP003W	EPA 410.4	
3064943004	CWMP003W	Field	
3064943004	CWMP003W	S2540C-11	
3064943004	CWMP003W	S4500HB-11	
3064943004	CWMP003W	SM2130B-2011	

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ANALYSIS - PREP METHOD CROSS REFERENCE TABLE

Workorder: 3064943 4TH QTR 2019 CWMP-FORM 19Q

Lab ID	Sample ID	Analysis Method	Prep Method
3064943004	CWMP003W	SM2320B-2011	
3064943004	CWMP003W	SM2510B-2011	
3064943004	CWMP003W	SM5310B-2011	
3064943004	CWMP003W	SW846 6010C	SW846 3015
3064943004	CWMP003W	SW846 8260B	
3064943004	CWMP003W	SW846 9066	420.4/9066
3064943005	Field Blank	D6919-09	
3064943005	Field Blank	EPA 300.0	
3064943005	Field Blank	EPA 410.4	
3064943005	Field Blank	S2540C-11	
3064943005	Field Blank	S4500HB-11	
3064943005	Field Blank	SM2130B-2011	
3064943005	Field Blank	SM2320B-2011	
3064943005	Field Blank	SM2510B-2011	
3064943005	Field Blank	SM5310B-2011	
3064943005	Field Blank	SW846 6010C	SW846 3015
3064943005	Field Blank	SW846 8260B	
3064943005	Field Blank	SW846 9066	420.4/9066
3064943006	Trip Blank	SW846 8260B	

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CHAIN OF CUSTODY/ REQUEST FOR ANALYSIS

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1 of 1

ALL SHADED AREAS MUST BE COMPLETED BY THE CLIENT / SAMPLER. INSTRUCTIONS ON THE BACK.

* 3 0 6 4 9 4 3 *

(eiving Lab)

Client Name: Lancaster County Solid Waste MA

Address: 1299 Harrisburg Pike, P.O. Box 4424
Lancaster, PA 17604

Contact: Mark Reider

Phone#: (717) 735-0193

Project Name/#: Creswell/GWMP Form 19Q Wells

Bill To: Lancaster County Solid Waste MA

TAT [X] Normal-Standard TAT is 10-12 business days.
[ ] Rush-Subject to ALS approval and surcharges.

Date Required: _____ Approved By: _____

Email? [X] -Y mreider@LCSWMA.com

Fax? [X] -Y No.: (717) 397-9973

Container Type	AG	AN	CG	—	—	PL	PL	PL	PL
Container Size	40 ml	125 ml	40 ml	—	—	250 ml	125 ml	500 ml	500 ml
Preservative	HCl	H2SO4	HCl	—	—	H2SO4	HNO3	None	None

ANALYSES/METHOD REQUESTED

Sample Description/Location (as it will appear on the lab report)	Sample Date	Time	*G or C	**Matrix	TOC	O-OH	8260 VOCs - Form 19Q	Field Measurements	Sample Depth for AUX Data	NH3-N, COD	Total Metals: Ca, Fe, Mn, Mg, K, Na	pH, NO3, Cl, F, SpC, SO4, Turb, TDS	Alkalinity, HCO3	
					Enter Number of Containers Per Sample or Field Results Below.									
1. CWMP018S	10/18/19	1023	G	GW	2	1	2	x	x	1	1	1	1	
2. CWMP017S	10/18/19	1050	G	GW	2	1	2	x	x	1	1	1	1	
3. CWMP004W	10/18/19	1215	G	GW	2	1	2	x	x	1	1	1	1	
4. CWMP003W	10/18/19	1224	G	GW	2	1	2	x	x	1	1	1	1	
5. Field Blank	10/18/19	1240	G	GW	2	1	2			1	1	1	1	
6. Trip Blank	10/18/19	1402	G	GW			2							
7														
8														
9														
10														

	Y	N	Initial
Custody Seals Present?			
(if present) Seals Intact?			
Received on Ice?			
COC/Labels Complete/Accurate?			
Cont. in Good Cond.?			
Correct Containers?			
Correct Sample Volumes?			
Correct Preservation?			
Headspace/Volatiles?			

Cooler Temp: 3 Therm ID: 403

No. of Coolers: _____

Courier/Tracking #:

Sample/COC Comments

ALS Field Services: ☐Pickup ☐Labor
☐Composite_Sampling ☐Rental_Equipment
☐Other:_____

Project Comments:

LOGGED BY(signature): DATE TIME

REVIEWED BY(signature): DATE TIME

Data Deliverables: [ ] Standard [ ] CLP-like [ ] USACE [ ]

Special Processing: USACE [ ] Navy [ ]

State Samples Collected In: [ ] NY [ ] NJ [X] PA [ ] NC [ ]

Relinquished By / Company Name	Date	Time	Received By / Company Name	Date	Time
1 [illegible] ALS	10-18-19	1402	2 [illegible]	10/18	[illegible]
3			4		1422
5			6		
7			8		
9			10		

Reportable to PADEP? Yes [ ]

PWSID # _____

Sample Disposal: Lab [X] Special [ ]

EDDS: Format Type-

* G=Grab; C=Composite

**Matrix - Al=Air; DW=Drinking Water; GW=Groundwater; OI=Oil; OL=Other Liquid; SL=Sludge; SO=Soil; WP=Wipe; WW=Wastewater

ALS ENVIRONMENTAL SHIPPING ADDRESS: 34 DOGWOOD LANE, MIDDLETOWN, PA 17057

Rev 8/04

ALS

301 Fulling Mill Road
Middletown, PA 17057
P: (717) 944-5541
F: (717) 944-1430

Condition of Sample Receipt Form

Client: LCSWMA | Work Order #: 3064943 | Initials: QW | Date: 10/19/19

1. Were airbills / tracking numbers present and recorded?	(NONE)	YES	NO
Tracking number: _____			
2. Are Custody Seals on shipping containers intact?	(NONE)	YES	NO
3. Are Custody Seals on sample containers intact?	(NONE)	YES	NO
4. Is there a COC (Chain-of-Custody) present?		(YES)	NO
5. Are the COC and bottle labels complete, legible and in agreement?		(YES)	NO
5a. Does the COC contain sample locations?		(YES)	NO
5b. Does the COC contain date and time of sample collection for all samples?		(YES)	NO
5c. Does the COC contain sample collectors name?		(YES)	NO
5d. Does the COC note the type(s) of preservation for all bottles?		(YES)	NO
5e. Does the COC note the number of bottles submitted for each sample?		(YES)	NO
5f. Does the COC note the type of sample, composite or grab?		(YES)	NO
5g. Does the COC note the matrix of the sample(s)?		(YES)	NO
6. Are all aqueous samples requiring preservation preserved correctly?	N/A	(YES)	NO
7. Were all samples placed in the proper containers for the requested analyses, with sufficient volume?		(YES)	NO
8. Are all samples within holding times for the requested analyses? pH analyzed past hold		(YES)	(NO)
9. Were all sample containers received intact and headspace free when required? (not broken, leaking, frozen, etc.)		(YES)	NO
10. Did we receive trip blanks (applies only for methods EPA 504, EPA 524.2 and 1631E (LL Hg)?	N/A	(YES)	NO
11. Were the samples received on ice?		(YES)	NO
12. Were sample temperatures measured at 0.0-6.0°C		(YES)	NO
13. Are the samples DW matrix ? If YES, fill out Reportable Drinking Water questions below		YES	(NO)
13a. Are the samples required for SDWA compliance reporting?	(N/A)	YES	NO
13b. Did the client provide a SDWA PWS ID#?	(N/A)	YES	NO
13c. Are all aqueous unpreserved SDWA samples pH 5-9?	(N/A)	YES	NO
13d. Did the client provide the SDWA sample location ID/Description?	(N/A)	YES	NO
13e. Did the client provide the SDWA sample type (D, E, R, C, P, S)?	(N/A)	YES	NO

Cooler #: _____

Temperature (°C): 3

Thermometer ID: 403

Radiological (µCi): _____

COMMENTS (Required for all NO responses above and any sample non-conformance):

Rev. 4/29/2019

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October 28, 2019

Mr. Daniel Brown
Lancaster County Solid Waste Authority
1299 Hbg Pike, P.O. Box 4425
Lancaster, PA 17604

Certificate of Analysis

Project Name:	**CRESWELL**	Workorder:	**3063861**
Purchase Order:	**PO1000127**	Workorder ID:	**4TH QTR 2019 CWMP-FORM 19Q**

Dear Mr. Brown:

Enclosed are the analytical results for samples received by the laboratory on Tuesday, October 15, 2019.

The ALS Environmental laboratory in Middletown, Pennsylvania is a National Environmental Laboratory Accreditation Program (NELAP) accredited laboratory and as such, certifies that all applicable test results meet the requirements of NELAP.

If you have any questions regarding this certificate of analysis, please contact Ms. Susan J Scherer (Project Coordinator) at (717) 944-5541.

Analyses were performed according to our laboratory's NELAP-approved quality assurance program and any applicable state requirements. The test results meet requirements of the current NELAP standards or state requirements, where applicable. For a specific list of accredited analytes, refer to the certifications section of the ALS website at www.alsglobal.com/en/Our-Services/Life-Sciences/Environmental/Downloads.

ALS Spring City: 10 Riverside Drive, Spring City, PA 19475 610-948-4903

CC: Mr. Nicholas Rogers , Ms. Jordan Gallagher , Mr. Jeff Musser

This page is included as part of the Analytical Report and must be retained as a permanent record thereof.

Ms. Susan J Scherer
Project Coordinator

ALS Environmental

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SAMPLE SUMMARY

Workorder: 3063861 4TH QTR 2019 CWMP-FORM 19Q

Lab ID	Sample ID	Matrix	Date Collected	Date Received	Collected By
3063861001	CWMP005W	Ground Water	10/15/2019 12:15	10/15/2019 17:13	Mr. Brian G Shade

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SAMPLE SUMMARY

Workorder: 3063861 4TH QTR 2019 CWMP-FORM 19Q

Notes

-- Samples collected by ALS personnel are done so in accordance with the procedures set forth in the ALS Field Sampling Plan (20 - Field Services Sampling Plan).
-- All Waste Water analyses comply with methodology requirements of 40 CFR Part 136.
-- All Drinking Water analyses comply with methodology requirements of 40 CFR Part 141.
-- Unless otherwise noted, all quantitative results for soils are reported on a dry weight basis.
-- The Chain of Custody document is included as part of this report.
-- All Library Search analytes should be regarded as tentative identifications based on the presumptive evidence of the mass spectra. Concentrations reported are estimated values.
-- Parameters identified as "analyze immediately" require analysis within 15 minutes of collection. Any "analyze immediately" parameters not listed under the header "Field Parameters" are preformed in the laboratory and are therefore analyzed out of hold time.
-- Method references listed on this report beginning with the prefix “S” followed by a method number (such as S2310B-97) refer to methods from “Standard Methods for the Examination of Water and Wastewater”.
-- For microbiological analyses, the "Prepared" value is the date/time into the incubator and the "Analyzed" value is the date/time out the incubator.
-- An Analysis-Prep Method Cross Reference Table is included after Analytical Results & Qualifiers section in this report.

Standard Acronyms/Flags

J	Indicates an estimated value between the Method Detection Limit (MDL) and the Practical Quantitation Limit (PQL) for the analyte
U	Indicates that the analyte was Not Detected (ND)
N	Indicates presumptive evidence of the presence of a compound
MDL	Method Detection Limit
PQL	Practical Quantitation Limit
RDL	Reporting Detection Limit
ND	Not Detected - indicates that the analyte was Not Detected at the RDL
Cntr	Analysis was performed using this container
RegLmt	Regulatory Limit
LCS	Laboratory Control Sample
MS	Matrix Spike
MSD	Matrix Spike Duplicate
DUP	Sample Duplicate
%Rec	Percent Recovery
RPD	Relative Percent Difference
LOD	DoD Limit of Detection
LOQ	DoD Limit of Quantitation
DL	DoD Detection Limit
I	Indicates reported value is greater than or equal to the Method Detection Limit (MDL) but less than the Report Detection Limit (RDL)
(S)	Surrogate Compound
NC	Not Calculated
*	Result outside of QC limits

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ANALYTICAL RESULTS

Workorder: 3063861 4TH QTR 2019 CWMP-FORM 19Q

Lab ID: **3063861001** Date Collected: 10/15/2019 12:15 Matrix: Ground Water
Sample ID: **CWMP005W** Date Received: 10/15/2019 17:13

Parameters	Results	Flag	Units	RDL	Method	Prepared	By	Analyzed	By	Cntr
VOLATILE ORGANICS										
Benzene	ND		ug/L	1.0	SW846 8260B			10/17/19 03:04	VLM	G
1,2-Dibromoethane	ND		ug/L	1.0	SW846 8260B			10/17/19 03:04	VLM	G
1,1-Dichloroethane	ND		ug/L	1.0	SW846 8260B			10/17/19 03:04	VLM	G
1,2-Dichloroethane	ND		ug/L	1.0	SW846 8260B			10/17/19 03:04	VLM	G
1,1-Dichloroethene	ND		ug/L	1.0	SW846 8260B			10/17/19 03:04	VLM	G
cis-1,2-Dichloroethene	ND		ug/L	1.0	SW846 8260B			10/17/19 03:04	VLM	G
trans-1,2-Dichloroethene	ND		ug/L	1.0	SW846 8260B			10/17/19 03:04	VLM	G
Ethylbenzene	ND		ug/L	1.0	SW846 8260B			10/17/19 03:04	VLM	G
Methylene Chloride	ND		ug/L	1.0	SW846 8260B			10/17/19 03:04	VLM	G
Tetrachloroethene	ND		ug/L	1.0	SW846 8260B			10/17/19 03:04	VLM	G
Toluene	ND		ug/L	1.0	SW846 8260B			10/17/19 03:04	VLM	G
Total Xylenes	ND		ug/L	3.0	SW846 8260B			10/17/19 03:04	VLM	G
1,1,1-Trichloroethane	ND		ug/L	1.0	SW846 8260B			10/17/19 03:04	VLM	G
Trichloroethene	ND		ug/L	1.0	SW846 8260B			10/17/19 03:04	VLM	G
Vinyl Chloride	ND		ug/L	1.0	SW846 8260B			10/17/19 03:04	VLM	G
Surrogate Recoveries	*Results*	*Flag*	*Units*	*Limits*	*Method*	*Prepared*	*By*	*Analyzed*	*By*	*Cntr*
1,2-Dichloroethane-d4 (S)	115		%	62 - 133	SW846 8260B			10/17/19 03:04	VLM	G
4-Bromofluorobenzene (S)	113		%	79 - 114	SW846 8260B			10/17/19 03:04	VLM	G
Dibromofluoromethane (S)	106		%	78 - 116	SW846 8260B			10/17/19 03:04	VLM	G
Toluene-d8 (S)	106		%	76 - 127	SW846 8260B			10/17/19 03:04	VLM	G
WET CHEMISTRY										
Alkalinity, Bicarbonate	18		mg/L	5	SM2320B-2011			10/25/19 02:34	MXO	B
Alkalinity, Total	18	2	mg/L	5	SM2320B-2011			10/25/19 02:34	MXO	I
Ammonia-N	0.142		mg/L	0.100	D6919-09			10/23/19 16:43	AK	A
Chemical Oxygen Demand (COD)	ND		mg/L	15	EPA 410.4			10/22/19 13:52	AK	A
Chloride	55.1		mg/L	2.0	EPA 300.0			10/16/19 06:19	CHW	B
Fluoride	ND		mg/L	0.20	EPA 300.0			10/16/19 06:19	CHW	B
Nitrate-N	8.4		mg/L	0.20	EPA 300.0			10/16/19 06:19	CHW	B
pH	6.28	1	pH_Units		S4500HB-11			10/25/19 03:04	MBW	B
Phenolics	ND		mg/L	0.005	SW846 9066	10/16/19 04:37	C_D	10/16/19 05:54	C_D	F
Specific Conductance	299		umhos/cm	1	SW846 9050A			10/25/19 02:34	MXO	B
Sulfate	5.0		mg/L	2.0	EPA 300.0			10/16/19 06:19	CHW	B
Total Dissolved Solids	184		mg/L	5	S2540C-11			10/17/19 15:38	D1C	B
Total Organic Carbon (TOC)	0.60		mg/L	0.50	SW846 9060A			10/17/19 08:10	PAG	D
Turbidity	0.41		NTU	0.10	SM2130B-2011			10/16/19 06:47	R2B	B

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ANALYTICAL RESULTS

Workorder: 3063861 4TH QTR 2019 CWMP-FORM 19Q

Lab ID: **3063861001** Date Collected: 10/15/2019 12:15 Matrix: Ground Water

Sample ID: **CWMP005W** Date Received: 10/15/2019 17:13

Parameters	Results	Flag	Units	RDL	Method	Prepared	By	Analyzed	By	*Cntr*
METALS										
Calcium, Total	12.7		mg/L	0.11	SW846 6010C	10/17/19 18:35	AHI	10/18/19 13:23	SRT	J
Iron, Total	ND		mg/L	0.067	SW846 6010C	10/17/19 18:35	AHI	10/18/19 13:23	SRT	J
Magnesium, Total	6.8		mg/L	0.11	SW846 6010C	10/17/19 18:35	AHI	10/18/19 13:23	SRT	J
Manganese, Total	0.044		mg/L	0.0056	SW846 6010C	10/17/19 18:35	AHI	10/18/19 13:23	SRT	J
Potassium, Total	2.3		mg/L	0.56	SW846 6010C	10/17/19 18:35	AHI	10/18/19 13:23	SRT	J
Sodium, Total	25.1		mg/L	0.56	SW846 6010C	10/17/19 18:35	AHI	10/18/19 13:23	SRT	J
FIELD PARAMETERS										
Depth to Water Level	41.51		Feet		Field			10/15/19 12:12	BGS	C
Elev Top MW Casing above MSL	513.43		Feet		Field			10/15/19 12:12	BGS	C
Flow Rate	5.14		gal/min		Field			10/15/19 12:12	BGS	C
Ground Water Elevation	471.92		ft/MSL		Field			10/15/19 12:12	BGS	C
pH, Field (SM4500B)	5.18		pH_Units		Field			10/15/19 12:12	BGS	C
Sample Depth	130.00		Feet		Field			10/15/19 12:12	BGS	C
Specific Conductance, Field	277		umhos/cm	1	Field			10/15/19 12:12	BGS	C
Temperature	13.13		Deg. C		Field			10/15/19 12:12	BGS	C
Total Well Depth	138.92		Feet		Field			10/15/19 12:12	BGS	C
Volume in Water Column	143.19		Gallons		Field			10/15/19 12:12	BGS	C
Water Level After Purge	43.11		Feet		Field			10/15/19 12:12	BGS	C
Well Volumes Purged	2.51		Vol		Field			10/15/19 12:12	BGS	C

Susan J. Scherer

Ms. Susan J Scherer
Project Coordinator

ALS Environmental

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ANALYTICAL RESULTS

Workorder: 3063861 4TH QTR 2019 CWMP-FORM 19Q

PARAMETER QUALIFIERS

Lab ID	#	Sample ID	Analytical Method	Analyte
3063861001	1	CWMP005W	S4500HB-11	pH
The pH analysis is an "analyze immediately" analysis. Parameters identified as "analyze immediately" require analysis within 15 minutes of collection, and are therefore analyzed outside of the method holding time when analyzed in the laboratory.				
3063861001	2	CWMP005W	SM2320B-2011	Alkalinity, Total
The Total Alkalinity is titrated to a pH of 4.5 and reported as mg CaCO3/L.				

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ANALYSIS - PREP METHOD CROSS REFERENCE TABLE

Workorder: 3063861 4TH QTR 2019 CWMP-FORM 19Q

Lab ID	Sample ID	Analysis Method	Prep Method
3063861001	CWMP005W	D6919-09	
3063861001	CWMP005W	EPA 300.0	
3063861001	CWMP005W	EPA 410.4	
3063861001	CWMP005W	Field	
3063861001	CWMP005W	S2540C-11	
3063861001	CWMP005W	S4500HB-11	
3063861001	CWMP005W	SM2130B-2011	
3063861001	CWMP005W	SM2320B-2011	
3063861001	CWMP005W	SW846 6010C	SW846 3015
3063861001	CWMP005W	SW846 8260B	
3063861001	CWMP005W	SW846 9050A	
3063861001	CWMP005W	SW846 9060A	
3063861001	CWMP005W	SW846 9066	420.4/9066

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CHAIN OF CUSTODY/ REQUEST FOR ANALYSIS

Generated by ALS

3063861

1 of 1

ALL SHADED AREAS MUST BE COMPLETED BY THE CLIENT / SAMPLER. INSTRUCTIONS ON THE BACK.

Client Name: Lancaster County Solid Waste MA

Address: 1299 Harrisburg Pike, P.O. Box 4424
Lancaster, PA 17604

Contact: Mark Reider

Phone#: (717) 735-0193

Project Name/#: Creswell/GWMP Form 19Q Wells

Bill To: Lancaster County Solid Waste MA

TAT [X] Normal-Standard TAT is 10-12 business days. [ ] Rush-Subject to ALS approval and surcharges.

Date Required: _____ Approved By: _____

Email? [X] -Y mreider@LCSWMA.com

Fax? [X] -Y No.: (717) 397-9973

Container Type	AG	AN	CG	—	—	PL	PL	PL	
Container Size	40 ml	125 ml	40 ml	—	—	250 ml	125 ml	500 ml	500 ml
Preservative	HCl	H2SO4	HCl	—	—	H2SO4	HNO3	None	None

ANALYSES/METHOD REQUESTED

Sample Description/Location (as it will appear on the lab report)	Sample Date	Time	*G or C	**Matrix	TOC	O-OH	8260 VOCs - Form 19Q	Field Measurements	Sample Depth for AUX Data	NH3-N, COD	Total Metals: Ca, Fe, Mn, Mg, K, Na	pH, NO3, Cl, F, SpC, SO4, Turb, TDS	Alkalinity, HCO3	
					Enter Number of Containers Per Sample or Field Results Below.									
1. CWMP005W	10/15/19	1215	G	GW	2	1	2	X	X	1	1	1	1	
2														
3														
4														
5														
6														
7														
8														
9														
10														

Project Comments:

LOGGED BY(signature): DATE TIME

REVIEWED BY(signature): DATE TIME

Relinquished By / Company Name	Date	Time	Received By / Company Name	Date	Time
1 [signature] DBY ALS	10-15-19	1713	2 GONA IC	10-15-19	1713
3			4		
5			6		
7			8		
9			10		

* G=Grab; C=Composite

**Matrix - AI=Air; DW=Drinking Water; GW=Groundwater; OI=Oil; OL=Other Liquid; SL=Sludge; SO=Soil; WP=Wipe; WW=Wastewater

Cooler Temp: 2°c Therm ID: 403

No. of Coolers: _____

	Y	N	Initial
Custody Seals Present?			
(if present) Seals Intact?			
Received on Ice?			
COC/Labels Complete/Accurate?			
Cont. in Good Cond.?			
Correct Containers?			
Correct Sample Volumes?			
Correct Preservation?			
Headspace/Volatiles?			

Courier/Tracking #:

Sample/COC Comments

ALS Field Services: ☐Pickup ☐Labor ☐Composite_Sampling ☐Rental_Equipment ☐Other:_____

Data Deliverables: [ ] Standard [ ] CLP-like [ ] USACE

Special Processing: USACE [ ] Navy [ ]

State Samples Collected In: [ ] NY [ ] NJ [X] PA [ ] NC

Reportable to PADEP? Yes [ ] PWSID # _____

Sample Disposal: Lab [X] Special [ ]

EDDS: Format Type- _____

ALS ENVIRONMENTAL SHIPPING ADDRESS: 34 DOGWOOD LANE, MIDDLETOWN, PA 17057

Rev 8/04

301 Fulling Mill Road
Middletown, PA 17057
P: (717) 944-5541
F: (717) 944-1430

Condition of Sample Receipt Form

Client:	Work Order #:	Initials:	Date:
LCSWMA	3063861	GOM	10/15/19

1. Were airbills / tracking numbers present and recorded?	(NONE)	YES	NO
Tracking number:			
2. Are Custody Seals on shipping containers intact?	(NONE)	YES	NO
3. Are Custody Seals on sample containers intact?	(NONE)	YES	NO
4. Is there a COC (Chain-of-Custody) present?		(YES)	NO
5. Are the COC and bottle labels complete, legible and in agreement?		YES	(NO)
5a. Does the COC contain sample locations?		(YES)	NO
5b. Does the COC contain date and time of sample collection for all samples?		(YES)	NO
5c. Does the COC contain sample collectors name? Client		YES	(NO)
5d. Does the COC note the type(s) of preservation for all bottles?		(YES)	NO
5e. Does the COC note the number of bottles submitted for each sample?		(YES)	NO
5f. Does the COC note the type of sample, composite or grab?		(YES)	NO
5g. Does the COC note the matrix of the sample(s)?		(YES)	NO
6. Are all aqueous samples requiring preservation preserved correctly?	N/A	(YES)	NO
7. Were all samples placed in the proper containers for the requested analyses, with sufficient volume?		(YES)	NO
8. Are all samples within holding times for the requested analyses? pH out of hold		YES	(NO)
9. Were all sample containers received intact and headspace free when required? (not broken, leaking, frozen, etc.)		(YES)	NO
10. Did we receive trip blanks (applies only for methods EPA 504, EPA 524.2 and 1631E (LL Hg)?	(N/A)	YES	NO
11. Were the samples received on ice?		(YES)	NO
12. Were sample temperatures measured at 0.0-6.0°C		(YES)	NO
13. Are the samples DW matrix ? If YES, fill out Reportable Drinking Water questions below		YES	(NO)
13a. Are the samples required for SDWA compliance reporting?	N/A	YES	NO
13b. Did the client provide a SDWA PWS ID#?	N/A	YES	NO
13c. Are all aqueous unpreserved SDWA samples pH 5-9?	N/A	YES	NO
13d. Did the client provide the SDWA sample location ID/Description?	N/A	YES	NO
13e. Did the client provide the SDWA sample type (D, E, R, C, P, S)?	N/A	YES	NO

Cooler #: _____

Temperature (°C): 2°C

Thermometer ID: 102

Radiological (µCi): _____

COMMENTS (Required for all NO responses above and any sample non-conformance):

Rev. 4/29/2019

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November 6, 2019

Mr. Daniel Brown
Lancaster County Solid Waste Authority
1299 Hbg Pike, P.O. Box 4425
Lancaster, PA 17604

Certificate of Analysis

Project Name:	**CRESWELL**	Workorder:	**3064477**
Purchase Order:	**PO1000127**	Workorder ID:	**4TH QTR 2019 CWMP-FORM 19Q**

Dear Mr. Brown:

Enclosed are the analytical results for samples received by the laboratory on Thursday, October 17, 2019.

The ALS Environmental laboratory in Middletown, Pennsylvania is a National Environmental Laboratory Accreditation Program (NELAP) accredited laboratory and as such, certifies that all applicable test results meet the requirements of NELAP.

If you have any questions regarding this certificate of analysis, please contact Ms. Susan J Scherer (Project Coordinator) at (717) 944-5541.

Analyses were performed according to our laboratory's NELAP-approved quality assurance program and any applicable state requirements. The test results meet requirements of the current NELAP standards or state requirements, where applicable. For a specific list of accredited analytes, refer to the certifications section of the ALS website at www.alsglobal.com/en/Our-Services/Life-Sciences/Environmental/Downloads.

ALS Spring City: 10 Riverside Drive, Spring City, PA 19475 610-948-4903

CC: Mr. Nicholas Rogers , Ms. Jordan Gallagher , Mr. Jeff Musser

This page is included as part of the Analytical Report and must be retained as a permanent record thereof.

Ms. Susan J Scherer
Project Coordinator

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SAMPLE SUMMARY

Workorder: 3064477 4TH QTR 2019 CWMP-FORM 19Q

Lab ID	Sample ID	Matrix	Date Collected	Date Received	Collected By
3064477001	CWMP016W	Ground Water	10/17/2019 10:29	10/17/2019 15:29	Mr. Brian G Shade
3064477002	CWMP010W	Ground Water	10/17/2019 11:21	10/17/2019 15:29	Mr. Brian G Shade
3064477003	CWMP009W	Ground Water	10/17/2019 12:00	10/17/2019 15:29	Mr. Brian G Shade
3064477004	CWMP008W	Ground Water	10/17/2019 12:48	10/17/2019 15:29	Mr. Brian G Shade

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SAMPLE SUMMARY

Workorder: 3064477 4TH QTR 2019 CWMP-FORM 19Q

Notes

-- Samples collected by ALS personnel are done so in accordance with the procedures set forth in the ALS Field Sampling Plan (20 - Field Services Sampling Plan).
-- All Waste Water analyses comply with methodology requirements of 40 CFR Part 136.
-- All Drinking Water analyses comply with methodology requirements of 40 CFR Part 141.
-- Unless otherwise noted, all quantitative results for soils are reported on a dry weight basis.
-- The Chain of Custody document is included as part of this report.
-- All Library Search analytes should be regarded as tentative identifications based on the presumptive evidence of the mass spectra. Concentrations reported are estimated values.
-- Parameters identified as "analyze immediately" require analysis within 15 minutes of collection. Any "analyze immediately" parameters not listed under the header "Field Parameters" are preformed in the laboratory and are therefore analyzed out of hold time.
-- Method references listed on this report beginning with the prefix “S” followed by a method number (such as S2310B-97) refer to methods from “Standard Methods for the Examination of Water and Wastewater”.
-- For microbiological analyses, the "Prepared" value is the date/time into the incubator and the "Analyzed" value is the date/time out the incubator.
-- An Analysis-Prep Method Cross Reference Table is included after Analytical Results & Qualifiers section in this report.

Standard Acronyms/Flags

J	Indicates an estimated value between the Method Detection Limit (MDL) and the Practical Quantitation Limit (PQL) for the analyte
U	Indicates that the analyte was Not Detected (ND)
N	Indicates presumptive evidence of the presence of a compound
MDL	Method Detection Limit
PQL	Practical Quantitation Limit
RDL	Reporting Detection Limit
ND	Not Detected - indicates that the analyte was Not Detected at the RDL
Cntr	Analysis was performed using this container
RegLmt	Regulatory Limit
LCS	Laboratory Control Sample
MS	Matrix Spike
MSD	Matrix Spike Duplicate
DUP	Sample Duplicate
%Rec	Percent Recovery
RPD	Relative Percent Difference
LOD	DoD Limit of Detection
LOQ	DoD Limit of Quantitation
DL	DoD Detection Limit
I	Indicates reported value is greater than or equal to the Method Detection Limit (MDL) but less than the Report Detection Limit (RDL)
(S)	Surrogate Compound
NC	Not Calculated
*	Result outside of QC limits

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ANALYTICAL RESULTS

Workorder: 3064477 4TH QTR 2019 CWMP-FORM 19Q

Lab ID: **3064477001** Date Collected: 10/17/2019 10:29 Matrix: Ground Water
Sample ID: **CWMP016W** Date Received: 10/17/2019 15:29

Parameters	Results	Flag	Units	RDL	Method	Prepared	By	Analyzed	By	Cntr
VOLATILE ORGANICS										
Benzene	ND		ug/L	1.0	SW846 8260B			10/18/19 23:47	PDK	E
1,2-Dibromoethane	ND		ug/L	1.0	SW846 8260B			10/18/19 23:47	PDK	E
1,1-Dichloroethane	ND		ug/L	1.0	SW846 8260B			10/18/19 23:47	PDK	E
1,2-Dichloroethane	ND		ug/L	1.0	SW846 8260B			10/18/19 23:47	PDK	E
1,1-Dichloroethene	ND		ug/L	1.0	SW846 8260B			10/18/19 23:47	PDK	E
cis-1,2-Dichloroethene	ND		ug/L	1.0	SW846 8260B			10/18/19 23:47	PDK	E
trans-1,2-Dichloroethene	ND		ug/L	1.0	SW846 8260B			10/18/19 23:47	PDK	E
Ethylbenzene	ND		ug/L	1.0	SW846 8260B			10/18/19 23:47	PDK	E
Methylene Chloride	ND		ug/L	1.0	SW846 8260B			10/18/19 23:47	PDK	E
Tetrachloroethene	ND		ug/L	1.0	SW846 8260B			10/18/19 23:47	PDK	E
Toluene	ND		ug/L	1.0	SW846 8260B			10/18/19 23:47	PDK	E
Total Xylenes	ND		ug/L	3.0	SW846 8260B			10/18/19 23:47	PDK	E
1,1,1-Trichloroethane	ND		ug/L	1.0	SW846 8260B			10/18/19 23:47	PDK	E
Trichloroethene	ND		ug/L	1.0	SW846 8260B			10/18/19 23:47	PDK	E
Vinyl Chloride	ND		ug/L	1.0	SW846 8260B			10/18/19 23:47	PDK	E
Surrogate Recoveries	*Results*	*Flag*	*Units*	*Limits*	*Method*	*Prepared*	*By*	*Analyzed*	*By*	*Cntr*
1,2-Dichloroethane-d4 (S)	103		%	62 - 133	SW846 8260B			10/18/19 23:47	PDK	E
4-Bromofluorobenzene (S)	97.8		%	79 - 114	SW846 8260B			10/18/19 23:47	PDK	E
Dibromofluoromethane (S)	94.9		%	78 - 116	SW846 8260B			10/18/19 23:47	PDK	E
Toluene-d8 (S)	101		%	76 - 127	SW846 8260B			10/18/19 23:47	PDK	E
WET CHEMISTRY										
Alkalinity, Bicarbonate	12		mg/L	5	SM2320B-2011			10/26/19 06:38	MXO	C
Alkalinity, Total	12	1	mg/L	5	SM2320B-2011			10/26/19 06:38	MXO	D
Ammonia-N	ND		mg/L	0.100	D6919-09			10/24/19 15:08	AK	B
Chemical Oxygen Demand (COD)	ND		mg/L	15	EPA 410.4			10/23/19 13:18	AK	B
Chloride	2.4		mg/L	2.0	EPA 300.0			10/18/19 11:37	CHW	C
Fluoride	ND		mg/L	0.20	EPA 300.0			10/18/19 11:37	CHW	C
Nitrate-N	0.48		mg/L	0.20	EPA 300.0			10/18/19 11:37	CHW	C
pH	6.39	4	pH_Units		S4500HB-11			10/26/19 06:38	MXO	C
Phenolics	ND		mg/L	0.005	SW846 9066	10/21/19 11:17	C_D	10/22/19 05:28	C_D	I
Specific Conductance	63	5	umhos/cm	1	SM2510B-2011			10/26/19 06:38	MXO	C
Sulfate	9.3		mg/L	2.0	EPA 300.0			10/18/19 11:37	CHW	C
Total Dissolved Solids	100		mg/L	25	S2540C-11			10/22/19 13:12	D1C	C
Total Organic Carbon (TOC)	ND		mg/L	0.50	SM5310B-2011			10/31/19 03:20	PAG	G
Turbidity	6.49		NTU	0.10	SM2130B-2011			10/18/19 06:56	R2B	C

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ANALYTICAL RESULTS

Workorder: 3064477 4TH QTR 2019 CWMP-FORM 19Q

Lab ID: **3064477001** Date Collected: 10/17/2019 10:29 Matrix: Ground Water

Sample ID: **CWMP016W** Date Received: 10/17/2019 15:29

Parameters	Results	Flag	Units	RDL	Method	Prepared	By	Analyzed	By	*Cntr*
METALS										
Calcium, Total	4.9		mg/L	0.11	SW846 6010C	10/21/19 16:45	SXC	10/22/19 14:50	SRT	J1
Iron, Total	0.52		mg/L	0.067	SW846 6010C	10/21/19 16:45	SXC	10/22/19 14:50	SRT	J1
Magnesium, Total	1.1		mg/L	0.11	SW846 6010C	10/21/19 16:45	SXC	10/22/19 14:50	SRT	J1
Manganese, Total	0.0058		mg/L	0.0056	SW846 6010C	10/21/19 16:45	SXC	10/22/19 14:50	SRT	J1
Potassium, Total	ND		mg/L	0.56	SW846 6010C	10/21/19 16:45	SXC	10/22/19 14:50	SRT	J1
Sodium, Total	3.0		mg/L	0.56	SW846 6010C	10/21/19 16:45	SXC	10/22/19 14:50	SRT	J1
FIELD PARAMETERS										
Depth to Water Level	14.23		Feet		Field			10/17/19 10:29	BGS	A
Elev Top MW Casing above MSL	311.97		Feet		Field			10/17/19 10:29	BGS	A
Flow Rate	2.80		gal/min		Field			10/17/19 10:29	BGS	A
Ground Water Elevation	297.74		ft/MSL		Field			10/17/19 10:29	BGS	A
pH, Field (SM4500B)	4.93		pH_Units		Field			10/17/19 10:29	BGS	A
Sample Depth	71.00		Feet		Field			10/17/19 10:29	BGS	A
Specific Conductance, Field	58		umhos/cm	1	Field			10/17/19 10:29	BGS	A
Temperature	12.36		Deg. C		Field			10/17/19 10:29	BGS	A
Total Well Depth	73.52		Feet		Field			10/17/19 10:29	BGS	A
Volume in Water Column	87.16		Gallons		Field			10/17/19 10:29	BGS	A
Water Level After Purge	22.02		Feet		Field			10/17/19 10:29	BGS	A
Well Volumes Purged	1.92		Vol		Field			10/17/19 10:29	BGS	A

Susan J. Scherer

Ms. Susan J Scherer
Project Coordinator

ALS Environmental

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ANALYTICAL RESULTS

Workorder: 3064477 4TH QTR 2019 CWMP-FORM 19Q

Lab ID: **3064477002** Date Collected: 10/17/2019 11:21 Matrix: Ground Water

Sample ID: **CWMP010W** Date Received: 10/17/2019 15:29

Parameters	Results	Flag	Units	RDL	Method	Prepared	By	Analyzed	By	Cntr
VOLATILE ORGANICS										
Benzene	ND		ug/L	1.0	SW846 8260B			10/19/19 00:09	PDK	E
1,2-Dibromoethane	ND		ug/L	1.0	SW846 8260B			10/19/19 00:09	PDK	E
1,1-Dichloroethane	ND		ug/L	1.0	SW846 8260B			10/19/19 00:09	PDK	E
1,2-Dichloroethane	ND		ug/L	1.0	SW846 8260B			10/19/19 00:09	PDK	E
1,1-Dichloroethene	ND		ug/L	1.0	SW846 8260B			10/19/19 00:09	PDK	E
cis-1,2-Dichloroethene	ND		ug/L	1.0	SW846 8260B			10/19/19 00:09	PDK	E
trans-1,2-Dichloroethene	ND		ug/L	1.0	SW846 8260B			10/19/19 00:09	PDK	E
Ethylbenzene	ND		ug/L	1.0	SW846 8260B			10/19/19 00:09	PDK	E
Methylene Chloride	ND		ug/L	1.0	SW846 8260B			10/19/19 00:09	PDK	E
Tetrachloroethene	ND		ug/L	1.0	SW846 8260B			10/19/19 00:09	PDK	E
Toluene	ND		ug/L	1.0	SW846 8260B			10/19/19 00:09	PDK	E
Total Xylenes	ND		ug/L	3.0	SW846 8260B			10/19/19 00:09	PDK	E
1,1,1-Trichloroethane	ND		ug/L	1.0	SW846 8260B			10/19/19 00:09	PDK	E
Trichloroethene	ND		ug/L	1.0	SW846 8260B			10/19/19 00:09	PDK	E
Vinyl Chloride	ND		ug/L	1.0	SW846 8260B			10/19/19 00:09	PDK	E
Surrogate Recoveries	*Results*	*Flag*	*Units*	*Limits*	*Method*	*Prepared*	*By*	*Analyzed*	*By*	*Cntr*
1,2-Dichloroethane-d4 (S)	105		%	62 - 133	SW846 8260B			10/19/19 00:09	PDK	E
4-Bromofluorobenzene (S)	100		%	79 - 114	SW846 8260B			10/19/19 00:09	PDK	E
Dibromofluoromethane (S)	97.5		%	78 - 116	SW846 8260B			10/19/19 00:09	PDK	E
Toluene-d8 (S)	102		%	76 - 127	SW846 8260B			10/19/19 00:09	PDK	E
WET CHEMISTRY										
Alkalinity, Bicarbonate	377		mg/L	5	SM2320B-2011			10/26/19 06:38	MXO	C
Alkalinity, Total	377	1	mg/L	5	SM2320B-2011			10/26/19 06:38	MXO	D
Ammonia-N	ND		mg/L	0.100	D6919-09			10/24/19 14:05	AK	A
Chemical Oxygen Demand (COD)	ND		mg/L	15	EPA 410.4			10/23/19 13:18	AK	A
Chloride	607		mg/L	10.0	EPA 300.0			10/22/19 12:10	CHW	C
Fluoride	ND		mg/L	0.20	EPA 300.0			10/18/19 11:54	CHW	C
Nitrate-N	18.5		mg/L	0.20	EPA 300.0			10/18/19 11:54	CHW	C
pH	7.24	2	pH_Units		S4500HB-11			10/26/19 06:38	MXO	C
Phenolics	ND		mg/L	0.005	SW846 9066	10/21/19 11:17	C_D	10/22/19 05:28	C_D	I
Specific Conductance	2840		umhos/cm	1	SM2510B-2011			10/26/19 06:38	MXO	C
Sulfate	44.8		mg/L	2.0	EPA 300.0			10/18/19 11:54	CHW	C
Total Dissolved Solids	1330		mg/L	25	S2540C-11			10/22/19 13:12	D1C	C
Total Organic Carbon (TOC)	5.2		mg/L	0.50	SM5310B-2011			10/22/19 21:05	PAG	G
Turbidity	0.56		NTU	0.10	SM2130B-2011			10/18/19 06:56	R2B	C

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ANALYTICAL RESULTS

Workorder: 3064477 4TH QTR 2019 CWMP-FORM 19Q

Lab ID: **3064477002** Date Collected: 10/17/2019 11:21 Matrix: Ground Water

Sample ID: **CWMP010W** Date Received: 10/17/2019 15:29

Parameters	Results	Flag	Units	RDL	Method	Prepared	By	Analyzed	By	*Cntr*
METALS										
Calcium, Total	84.0		mg/L	0.11	SW846 6010C	10/21/19 16:45	SXC	10/22/19 14:53	SRT	J1
Iron, Total	ND		mg/L	0.067	SW846 6010C	10/21/19 16:45	SXC	10/22/19 14:53	SRT	J1
Magnesium, Total	72.3		mg/L	0.11	SW846 6010C	10/21/19 16:45	SXC	10/22/19 14:53	SRT	J1
Manganese, Total	0.023		mg/L	0.0056	SW846 6010C	10/21/19 16:45	SXC	10/22/19 14:53	SRT	J1
Potassium, Total	15.7		mg/L	0.56	SW846 6010C	10/21/19 16:45	SXC	10/22/19 14:53	SRT	J1
Sodium, Total	321		mg/L	0.56	SW846 6010C	10/21/19 16:45	SXC	10/22/19 14:53	SRT	J1
FIELD PARAMETERS										
Depth to Water Level	11.01		Feet		Field			10/17/19 11:24	BGS	B
Elev Top MW Casing above MSL	360.90		Feet		Field			10/17/19 11:24	BGS	B
Flow Rate	1.13		gal/min		Field			10/17/19 11:24	BGS	B
Ground Water Elevation	349.89		ft/MSL		Field			10/17/19 11:24	BGS	B
pH, Field (SM4500B)	6.05		pH_Units		Field			10/17/19 11:24	BGS	B
Sample Depth	17.00		Feet		Field			10/17/19 11:24	BGS	B
Specific Conductance, Field	2640		umhos/cm	1	Field			10/17/19 11:24	BGS	B
Temperature	16.62		Deg. C		Field			10/17/19 11:24	BGS	B
Total Well Depth	19.60		Feet		Field			10/17/19 11:24	BGS	B
Volume in Water Column	5.58		Gallons		Field			10/17/19 11:24	BGS	B
Water Level After Purge	16.21		Feet		Field			10/17/19 11:24	BGS	B
Well Volumes Purged	2.03		Vol		Field			10/17/19 11:24	BGS	B

Susan J. Scherer

Ms. Susan J Scherer
Project Coordinator

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ANALYTICAL RESULTS

Workorder: 3064477 4TH QTR 2019 CWMP-FORM 19Q

Lab ID: **3064477003** Date Collected: 10/17/2019 12:00 Matrix: Ground Water
Sample ID: **CWMP009W** Date Received: 10/17/2019 15:29

Parameters	Results	Flag	Units	RDL	Method	Prepared	By	Analyzed	By	Cntr
VOLATILE ORGANICS										
Benzene	2.7		ug/L	1.0	SW846 8260B			10/19/19 00:32	PDK	E
1,2-Dibromoethane	ND		ug/L	1.0	SW846 8260B			10/19/19 00:32	PDK	E
1,1-Dichloroethane	1.6		ug/L	1.0	SW846 8260B			10/19/19 00:32	PDK	E
1,2-Dichloroethane	ND		ug/L	1.0	SW846 8260B			10/19/19 00:32	PDK	E
1,1-Dichloroethene	ND		ug/L	1.0	SW846 8260B			10/19/19 00:32	PDK	E
cis-1,2-Dichloroethene	ND		ug/L	1.0	SW846 8260B			10/19/19 00:32	PDK	E
trans-1,2-Dichloroethene	ND		ug/L	1.0	SW846 8260B			10/19/19 00:32	PDK	E
Ethylbenzene	ND		ug/L	1.0	SW846 8260B			10/19/19 00:32	PDK	E
Methylene Chloride	ND		ug/L	1.0	SW846 8260B			10/19/19 00:32	PDK	E
Tetrachloroethene	ND		ug/L	1.0	SW846 8260B			10/19/19 00:32	PDK	E
Toluene	ND		ug/L	1.0	SW846 8260B			10/19/19 00:32	PDK	E
Total Xylenes	ND		ug/L	3.0	SW846 8260B			10/19/19 00:32	PDK	E
1,1,1-Trichloroethane	ND		ug/L	1.0	SW846 8260B			10/19/19 00:32	PDK	E
Trichloroethene	ND		ug/L	1.0	SW846 8260B			10/19/19 00:32	PDK	E
Vinyl Chloride	ND		ug/L	1.0	SW846 8260B			10/19/19 00:32	PDK	E
Surrogate Recoveries	*Results*	*Flag*	*Units*	*Limits*	*Method*	*Prepared*	*By*	*Analyzed*	*By*	*Cntr*
1,2-Dichloroethane-d4 (S)	107		%	62 - 133	SW846 8260B			10/19/19 00:32	PDK	E
4-Bromofluorobenzene (S)	102		%	79 - 114	SW846 8260B			10/19/19 00:32	PDK	E
Dibromofluoromethane (S)	103		%	78 - 116	SW846 8260B			10/19/19 00:32	PDK	E
Toluene-d8 (S)	102		%	76 - 127	SW846 8260B			10/19/19 00:32	PDK	E
WET CHEMISTRY										
Alkalinity, Bicarbonate	377		mg/L	5	SM2320B-2011			10/26/19 06:38	MXO	C
Alkalinity, Total	377	1	mg/L	5	SM2320B-2011			10/26/19 06:38	MXO	D
Ammonia-N	31.6		mg/L	0.100	D6919-09			10/26/19 00:47	AK	A
Chemical Oxygen Demand (COD)	95		mg/L	15	EPA 410.4			10/23/19 13:18	AK	A
Chloride	441		mg/L	10.0	EPA 300.0			10/22/19 12:23	CHW	C
Fluoride	ND		mg/L	0.20	EPA 300.0			10/18/19 12:11	CHW	C
Nitrate-N	ND		mg/L	0.20	EPA 300.0			10/18/19 12:11	CHW	C
pH	6.56	2	pH_Units		S4500HB-11			10/26/19 06:38	MXO	C
Phenolics	ND		mg/L	0.005	SW846 9066	10/21/19 11:17	C_D	10/22/19 05:28	C_D	I
Specific Conductance	2420		umhos/cm	1	SM2510B-2011			10/26/19 06:38	MXO	C
Sulfate	4.8		mg/L	2.0	EPA 300.0			10/18/19 12:11	CHW	C
Total Dissolved Solids	1230		mg/L	25	S2540C-11			10/22/19 13:12	D1C	C
Total Organic Carbon (TOC)	33.1		mg/L	2.5	SM5310B-2011			10/22/19 21:05	PAG	G
Turbidity	39.8		NTU	0.10	SM2130B-2011			10/18/19 06:56	R2B	C

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ANALYTICAL RESULTS

Workorder: 3064477 4TH QTR 2019 CWMP-FORM 19Q

Lab ID: **3064477003** Date Collected: 10/17/2019 12:00 Matrix: Ground Water

Sample ID: **CWMP009W** Date Received: 10/17/2019 15:29

Parameters	Results	Flag	Units	RDL	Method	Prepared	By	Analyzed	By	*Cntr*
METALS										
Calcium, Total	147		mg/L	0.11	SW846 6010C	10/21/19 16:45	SXC	10/22/19 15:05	SRT	J1
Iron, Total	31.0		mg/L	0.067	SW846 6010C	10/21/19 16:45	SXC	10/22/19 15:05	SRT	J1
Magnesium, Total	64.9		mg/L	0.11	SW846 6010C	10/21/19 16:45	SXC	10/22/19 15:05	SRT	J1
Manganese, Total	11.5		mg/L	0.0056	SW846 6010C	10/21/19 16:45	SXC	10/22/19 15:05	SRT	J1
Potassium, Total	29.3		mg/L	0.56	SW846 6010C	10/21/19 16:45	SXC	10/22/19 15:05	SRT	J1
Sodium, Total	150		mg/L	0.56	SW846 6010C	10/21/19 16:45	SXC	10/22/19 15:05	SRT	J1
FIELD PARAMETERS										
Depth to Water Level	9.27		Feet		Field			10/17/19 12:00	BGS	B
Elev Top MW Casing above MSL	404.20		Feet		Field			10/17/19 12:00	BGS	B
Flow Rate	1.55		gal/min		Field			10/17/19 12:00	BGS	B
Ground Water Elevation	394.93		ft/MSL		Field			10/17/19 12:00	BGS	B
pH, Field (SM4500B)	5.57		pH_Units		Field			10/17/19 12:00	BGS	B
Sample Depth	16.00		Feet		Field			10/17/19 12:00	BGS	B
Specific Conductance, Field	2340		umhos/cm	1	Field			10/17/19 12:00	BGS	B
Temperature	15.52		Deg. C		Field			10/17/19 12:00	BGS	B
Total Well Depth	19.70		Feet		Field			10/17/19 12:00	BGS	B
Volume in Water Column	6.78		Gallons		Field			10/17/19 12:00	BGS	B
Water Level After Purge	10.65		Feet		Field			10/17/19 12:00	BGS	B
Well Volumes Purged	4.56		Vol		Field			10/17/19 12:00	BGS	B

Susan J. Scherer

Ms. Susan J Scherer
Project Coordinator

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ANALYTICAL RESULTS

Workorder: 3064477 4TH QTR 2019 CWMP-FORM 19Q

Lab ID: **3064477004** Date Collected: 10/17/2019 12:48 Matrix: Ground Water

Sample ID: **CWMP008W** Date Received: 10/17/2019 15:29

Parameters	Results	Flag	Units	RDL	Method	Prepared	By	Analyzed	By	Cntr
VOLATILE ORGANICS										
Benzene	1.9		ug/L	1.0	SW846 8260B			10/19/19 00:54	PDK	E
1,2-Dibromoethane	ND		ug/L	1.0	SW846 8260B			10/19/19 00:54	PDK	E
1,1-Dichloroethane	3.9		ug/L	1.0	SW846 8260B			10/19/19 00:54	PDK	E
1,2-Dichloroethane	ND		ug/L	1.0	SW846 8260B			10/19/19 00:54	PDK	E
1,1-Dichloroethene	ND		ug/L	1.0	SW846 8260B			10/19/19 00:54	PDK	E
cis-1,2-Dichloroethene	ND		ug/L	1.0	SW846 8260B			10/19/19 00:54	PDK	E
trans-1,2-Dichloroethene	ND		ug/L	1.0	SW846 8260B			10/19/19 00:54	PDK	E
Ethylbenzene	ND		ug/L	1.0	SW846 8260B			10/19/19 00:54	PDK	E
Methylene Chloride	ND		ug/L	1.0	SW846 8260B			10/19/19 00:54	PDK	E
Tetrachloroethene	ND		ug/L	1.0	SW846 8260B			10/19/19 00:54	PDK	E
Toluene	ND		ug/L	1.0	SW846 8260B			10/19/19 00:54	PDK	E
Total Xylenes	ND		ug/L	3.0	SW846 8260B			10/19/19 00:54	PDK	E
1,1,1-Trichloroethane	ND		ug/L	1.0	SW846 8260B			10/19/19 00:54	PDK	E
Trichloroethene	ND		ug/L	1.0	SW846 8260B			10/19/19 00:54	PDK	E
Vinyl Chloride	ND		ug/L	1.0	SW846 8260B			10/19/19 00:54	PDK	E
Surrogate Recoveries	*Results*	*Flag*	*Units*	*Limits*	*Method*	*Prepared*	*By*	*Analyzed*	*By*	*Cntr*
1,2-Dichloroethane-d4 (S)	106		%	62 - 133	SW846 8260B			10/19/19 00:54	PDK	E
4-Bromofluorobenzene (S)	98.8		%	79 - 114	SW846 8260B			10/19/19 00:54	PDK	E
Dibromofluoromethane (S)	99.3		%	78 - 116	SW846 8260B			10/19/19 00:54	PDK	E
Toluene-d8 (S)	102		%	76 - 127	SW846 8260B			10/19/19 00:54	PDK	E
WET CHEMISTRY										
Alkalinity, Bicarbonate	377		mg/L	5	SM2320B-2011			10/26/19 06:38	MXO	C
Alkalinity, Total	377	1	mg/L	5	SM2320B-2011			10/26/19 06:38	MXO	D
Ammonia-N	10.0		mg/L	0.100	D6919-09			10/28/19 03:57	NJA	A
Chemical Oxygen Demand (COD)	46		mg/L	15	EPA 410.4			10/22/19 13:52	AK	A
Chloride	79.5		mg/L	2.0	EPA 300.0			10/18/19 12:28	CHW	C
Fluoride	ND		mg/L	0.20	EPA 300.0			10/18/19 12:28	CHW	C
Nitrate-N	ND		mg/L	0.20	EPA 300.0			10/18/19 12:28	CHW	C
pH	6.41	2	pH_Units		S4500HB-11			10/26/19 06:38	MXO	C
Phenolics	ND		mg/L	0.005	SW846 9066	10/21/19 11:17	C_D	10/22/19 05:28	C_D	I
Specific Conductance	1230		umhos/cm	1	SM2510B-2011			10/26/19 06:38	MXO	C
Sulfate	4.0		mg/L	2.0	EPA 300.0			10/18/19 12:28	CHW	C
Total Dissolved Solids	662		mg/L	25	S2540C-11			10/22/19 13:12	D1C	C
Total Organic Carbon (TOC)	17.7		mg/L	2.5	SM5310B-2011			10/22/19 21:05	PAG	G
Turbidity	37.4		NTU	0.10	SM2130B-2011			10/18/19 06:56	R2B	C

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ANALYTICAL RESULTS

Workorder: 3064477 4TH QTR 2019 CWMP-FORM 19Q

Lab ID: **3064477004** Date Collected: 10/17/2019 12:48 Matrix: Ground Water

Sample ID: **CWMP008W** Date Received: 10/17/2019 15:29

Parameters	Results	Flag	Units	RDL	Method	Prepared	By	Analyzed	By	*Cntr*
METALS										
Calcium, Total	86.2		mg/L	0.11	SW846 6010C	10/23/19 08:35	SRT	10/23/19 15:41	SRT	J1
Iron, Total	31.6		mg/L	0.067	SW846 6010C	10/23/19 08:35	SRT	10/23/19 15:41	SRT	J1
Magnesium, Total	41.6		mg/L	0.11	SW846 6010C	10/23/19 08:35	SRT	10/23/19 15:41	SRT	J1
Manganese, Total	16.7		mg/L	0.0056	SW846 6010C	10/23/19 08:35	SRT	10/23/19 15:41	SRT	J1
Potassium, Total	11.3		mg/L	0.56	SW846 6010C	10/23/19 08:35	SRT	10/23/19 15:41	SRT	J1
Sodium, Total	71.0		mg/L	0.56	SW846 6010C	10/23/19 08:35	SRT	10/23/19 15:41	SRT	J1
FIELD PARAMETERS										
Depth to Water Level	3.69		Feet		Field			10/17/19 12:48	BGS	B
Elev Top MW Casing above MSL	422.30		Feet		Field			10/17/19 12:48	BGS	B
Flow Rate	0.90		gal/min		Field			10/17/19 12:48	BGS	B
Ground Water Elevation	418.61		ft/MSL		Field			10/17/19 12:48	BGS	B
pH, Field (SM4500B)	5.64		pH_Units		Field			10/17/19 12:48	BGS	B
Sample Depth	19.00		Feet		Field			10/17/19 12:48	BGS	B
Specific Conductance, Field	1172		umhos/cm	1	Field			10/17/19 12:48	BGS	B
Temperature	16.14		Deg. C		Field			10/17/19 12:48	BGS	B
Total Well Depth	22.80		Feet		Field			10/17/19 12:48	BGS	B
Volume in Water Column	3.06		Gallons		Field			10/17/19 12:48	BGS	B
Water Level After Purge	11.69		Feet		Field			10/17/19 12:48	BGS	B
Well Volumes Purged	5.90		Vol		Field			10/17/19 12:48	BGS	B

Ms. Susan J Scherer
Project Coordinator

ANALYTICAL RESULTS

Workorder: 3064477 4TH QTR 2019 CWMP-FORM 19Q

PARAMETER QUALIFIERS

Lab ID	#	Sample ID	Analytical Method	Analyte
3064477001	1	CWMP016W	SM2320B-2011	Alkalinity, Total
The Total Alkalinity is titrated to a pH of 4.5 and reported as mg CaCO3/L.				
3064477001	4	CWMP016W	S4500HB-11	pH
The pH analysis is an "analyze immediately" analysis. Parameters identified as "analyze immediately" require analysis within 15 minutes of collection, and are therefore analyzed outside of the method holding time when analyzed in the laboratory.				
3064477001	5	CWMP016W	SM2510B-2011	Specific Conductance
The result reported for the TDS analysis is higher than the result reported for the specific conductance analysis.				
3064477002	1	CWMP010W	SM2320B-2011	Alkalinity, Total
The Total Alkalinity is titrated to a pH of 4.5 and reported as mg CaCO3/L.				
3064477002	2	CWMP010W	S4500HB-11	pH
The pH analysis is an "analyze immediately" analysis. Parameters identified as "analyze immediately" require analysis within 15 minutes of collection, and are therefore analyzed outside of the method holding time when analyzed in the laboratory.				
3064477003	1	CWMP009W	SM2320B-2011	Alkalinity, Total
The Total Alkalinity is titrated to a pH of 4.5 and reported as mg CaCO3/L.				
3064477003	2	CWMP009W	S4500HB-11	pH
The pH analysis is an "analyze immediately" analysis. Parameters identified as "analyze immediately" require analysis within 15 minutes of collection, and are therefore analyzed outside of the method holding time when analyzed in the laboratory.				
3064477004	1	CWMP008W	SM2320B-2011	Alkalinity, Total
The Total Alkalinity is titrated to a pH of 4.5 and reported as mg CaCO3/L.				
3064477004	2	CWMP008W	S4500HB-11	pH
The pH analysis is an "analyze immediately" analysis. Parameters identified as "analyze immediately" require analysis within 15 minutes of collection, and are therefore analyzed outside of the method holding time when analyzed in the laboratory.				

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ANALYSIS - PREP METHOD CROSS REFERENCE TABLE

Workorder: 3064477 4TH QTR 2019 CWMP-FORM 19Q

Lab ID	Sample ID	Analysis Method	Prep Method
3064477001	CWMP016W	D6919-09	
3064477001	CWMP016W	EPA 300.0	
3064477001	CWMP016W	EPA 410.4	
3064477001	CWMP016W	Field	
3064477001	CWMP016W	S2540C-11	
3064477001	CWMP016W	S4500HB-11	
3064477001	CWMP016W	SM2130B-2011	
3064477001	CWMP016W	SM2320B-2011	
3064477001	CWMP016W	SM2510B-2011	
3064477001	CWMP016W	SM5310B-2011	
3064477001	CWMP016W	SW846 6010C	SW846 3015
3064477001	CWMP016W	SW846 8260B	
3064477001	CWMP016W	SW846 9066	420.4/9066
3064477002	CWMP010W	D6919-09	
3064477002	CWMP010W	EPA 300.0	
3064477002	CWMP010W	EPA 410.4	
3064477002	CWMP010W	Field	
3064477002	CWMP010W	S2540C-11	
3064477002	CWMP010W	S4500HB-11	
3064477002	CWMP010W	SM2130B-2011	
3064477002	CWMP010W	SM2320B-2011	
3064477002	CWMP010W	SM2510B-2011	
3064477002	CWMP010W	SM5310B-2011	
3064477002	CWMP010W	SW846 6010C	SW846 3015
3064477002	CWMP010W	SW846 8260B	
3064477002	CWMP010W	SW846 9066	420.4/9066
3064477003	CWMP009W	D6919-09	
3064477003	CWMP009W	EPA 300.0	
3064477003	CWMP009W	EPA 410.4	
3064477003	CWMP009W	Field	
3064477003	CWMP009W	S2540C-11	
3064477003	CWMP009W	S4500HB-11	
3064477003	CWMP009W	SM2130B-2011	
3064477003	CWMP009W	SM2320B-2011	
3064477003	CWMP009W	SM2510B-2011	
3064477003	CWMP009W	SM5310B-2011	
3064477003	CWMP009W	SW846 6010C	SW846 3015
3064477003	CWMP009W	SW846 8260B	
3064477003	CWMP009W	SW846 9066	420.4/9066
3064477004	CWMP008W	D6919-09	
3064477004	CWMP008W	EPA 300.0	
3064477004	CWMP008W	EPA 410.4	
3064477004	CWMP008W	Field	
3064477004	CWMP008W	S2540C-11	
3064477004	CWMP008W	S4500HB-11	
3064477004	CWMP008W	SM2130B-2011	

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ANALYSIS - PREP METHOD CROSS REFERENCE TABLE

Workorder: 3064477 4TH QTR 2019 CWMP-FORM 19Q

Lab ID	Sample ID	Analysis Method	Prep Method
3064477004	CWMP008W	SM2320B-2011	
3064477004	CWMP008W	SM2510B-2011	
3064477004	CWMP008W	SM5310B-2011	
3064477004	CWMP008W	SW846 6010C	SW846 3015
3064477004	CWMP008W	SW846 8260B	
3064477004	CWMP008W	SW846 9066	420.4/9066

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CHAIN OF CUSTODY/ REQUEST FOR ANALYSIS

Generated by ALS

COC

ALS

1 of 1

ALL SHADED AREAS MUST BE COMPLETED BY THE CLIENT / SAMPLER. INSTRUCTIONS ON THE BACK.

Client Name: Lancaster County Solid Waste MA

Address: 1299 Harrisburg Pike, P.O. Box 4424
Lancaster, PA 17604

Contact: Mark Reider

Phone#: (717) 735-0193

Project Name/#: Creswell/GWMP Form 19Q Wells

Bill To: Lancaster County Solid Waste MA

TAT [X] Normal-Standard TAT is 10-12 business days.
[ ] Rush-Subject to ALS approval and surcharges.

Date Required: _____ Approved By: _____

Email? [X] -Y mreider@LCSWMA.com

Fax? [X] -Y No.: (717) 397-9973

Container Type	AG	AN	CG	—	—	PL	PL	PL	PL	
Container Size	40 ml	125 ml	40 ml	---	---	250 ml	125 ml	500 ml	500 ml	
Preservative	HCl	H2SO4	HCl	---	---	H2SO4	HNO3	None	None	

ANALYSES/METHOD REQUESTED

Sample Description/Location (as it will appear on the lab report)	Sample Date	Time	*G or C	**Matrix	TOC	O-OH	8260 VOCs - Form 19Q	Field Measurements	Sample Depth for AUX Data	NH3-N, COD	Total Metals: Ca, Fe, Mn, Mg, K, Na	pH, NO3, Cl, F, SpC, SO4, Turb., TDS	Alkalinity, HCO3	
					Enter Number of Containers Per Sample or Field Results Below.									
1. CWMP016W	10/17/19	1029	G	GW	2	1	2	x	x	1	1	1	1	
2. CWMP010W	10/17/19	1121	G	GW	2	1	2	x	x	1	1	1	1	
3. CWMP009W	10/17/19	1200	G	GW	2	1	2	x	x	1	1	1	1	
4. CWMP008W	10/17/19	1248	G	GW	2	1	2	x	x	1	1	1	1	
5														
6														
7														
8														
9														
10														

Receipt Information (completed by Receiving Lab)

Cooler Temp: 4 Therm ID: 402

No. of Coolers: _____

	Y	N	Initial
Custody Seals Present?			
(If present) Seals Intact?			
Received on Ice?			
COC/Labels Complete/Accurate?			
Cont. in Good Cond.?			
Correct Containers?			
Correct Sample Volumes?			
Correct Preservation?			
Headspace/Volatiles?			

Courier/Tracking #:

Sample/COC Comments

ALS Field Services: ☐Pickup ☐Labor ☐Composite_Sampling ☐Rental_Equipment ☐Other:_____

Project Comments:

LOGGED BY(signature): DATE TIME

REVIEWED BY(signature): DATE TIME

Relinquished By / Company Name	Date	Time	Received By / Company Name	Date	Time
1 [signature] ALS	10/17/19	1529	2 [signature]	10/17/19	1529
3			4		
5			6		
7			8		
9			10		

Data Deliverables: [ ] Standard [ ] CLP-like [ ] USACE [ ]

Special Processing: USACE [ ] Navy [ ]

State Samples Collected In: [ ] NY [ ] NJ [X] PA [ ] NC [ ]

Reportable to PADEP? Yes [ ] PWSID # _____

Sample Disposal: Lab [X] Special [ ]

EDDS: Format Type- _____

* G=Grab; C=Composite **Matrix - Al=Air; DW=Drinking Water; GW=Groundwater; Oi=Oil; OL=Other Liquid; SL=Sludge; SO=Soil; WP=Wipe; WW=Wastewater

ALS ENVIRONMENTAL SHIPPING ADDRESS: 34 DOGWOOD LANE, MIDDLETOWN, PA 17057

Rev 8/04

ALS

301 Fulling Mill Road
Middletown, PA 17057
P: (717) 944-5541
F: (717) 944-1430

Condition of Sample Receipt Form

Client: Lancaster County SWMA Work Order #: 3064477 Initials: CD Date: 10/17/19

1. Were airbills / tracking numbers present and recorded?	(NONE)	YES	NO
Tracking number:			
2. Are Custody Seals on shipping containers intact?	(NONE)	YES	NO
3. Are Custody Seals on sample containers intact?	(NONE)	YES	NO
4. Is there a COC (Chain-of-Custody) present?		(YES)	NO
5. Are the COC and bottle labels complete, legible and in agreement?		(YES)	NO
5a. Does the COC contain sample locations?		(YES)	NO
5b. Does the COC contain date and time of sample collection for all samples?		(YES)	NO
5c. Does the COC contain sample collectors name?		(YES)	NO
5d. Does the COC note the type(s) of preservation for all bottles?		(YES)	NO
5e. Does the COC note the number of bottles submitted for each sample?		(YES)	NO
5f. Does the COC note the type of sample, composite or grab?		(YES)	NO
5g. Does the COC note the matrix of the sample(s)?		(YES)	NO
6. Are all aqueous samples requiring preservation preserved correctly?	N/A	(YES)	NO
7. Were all samples placed in the proper containers for the requested analyses, with sufficient volume?		(YES)	NO
8. Are all samples within holding times for the requested analyses?		YES	(NO)
9. Were all sample containers received intact and headspace free when required? (not broken, leaking, frozen, etc.)		(YES)	NO
10. Did we receive trip blanks (applies only for methods EPA 504, EPA 524.2 and 1631E (LL Hg)?	(N/A)	YES	NO
11. Were the samples received on ice?		(YES)	NO
12. Were sample temperatures measured at 0.0-6.0°C		(YES)	NO
13. Are the samples DW matrix ? If YES, fill out Reportable Drinking Water questions below		YES	(NO)
13a. Are the samples required for SDWA compliance reporting?	(N/A)	YES	NO
13b. Did the client provide a SDWA PWS ID#?	(N/A)	YES	NO
13c. Are all aqueous unpreserved SDWA samples pH 5-9?	(N/A)	YES	NO
13d. Did the client provide the SDWA sample location ID/Description?	(N/A)	YES	NO
13e. Did the client provide the SDWA sample type (D, E, R, C, P, S)?	(N/A)	YES	NO

Cooler #: _____

Temperature (°C): 4

Thermometer ID: D102

Radiological (µCi): _____

COMMENTS (Required for all NO responses above and any sample non-conformance):

Ph is expired, but will be analyzed with a grab/fire

CD 10/17/19

Rev. 4/29/2019

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October 29, 2019

Mr. Daniel Brown
Lancaster County Solid Waste Authority
1299 Hbg Pike, P.O. Box 4425
Lancaster, PA 17604

Certificate of Analysis

Project Name:	**CRESWELL**	Workorder:	**3064194**
Purchase Order:	**PO1000127**	Workorder ID:	**4TH QTR 2019 CWMP-FORM 19Q**

Dear Mr. Brown:

Enclosed are the analytical results for samples received by the laboratory on Wednesday, October 16, 2019.

The ALS Environmental laboratory in Middletown, Pennsylvania is a National Environmental Laboratory Accreditation Program (NELAP) accredited laboratory and as such, certifies that all applicable test results meet the requirements of NELAP.

If you have any questions regarding this certificate of analysis, please contact Ms. Susan J Scherer (Project Coordinator) at (717) 944-5541.

Analyses were performed according to our laboratory's NELAP-approved quality assurance program and any applicable state requirements. The test results meet requirements of the current NELAP standards or state requirements, where applicable. For a specific list of accredited analytes, refer to the certifications section of the ALS website at www.alsglobal.com/en/Our-Services/Life-Sciences/Environmental/Downloads.

ALS Spring City: 10 Riverside Drive, Spring City, PA 19475 610-948-4903

CC: Mr. Nicholas Rogers , Ms. Jordan Gallagher , Mr. Jeff Musser

This page is included as part of the Analytical Report and must be retained as a permanent record thereof.

Ms. Susan J Scherer
Project Coordinator

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SAMPLE SUMMARY

Workorder: 3064194 4TH QTR 2019 CWMP-FORM 19Q

Lab ID	Sample ID	Matrix	Date Collected	Date Received	Collected By
3064194001	CWMP012W	Ground Water	10/16/2019 10:24	10/16/2019 15:08	Mr. Brian G Shade
3064194002	Field Blank	Water	10/16/2019 12:00	10/16/2019 15:08	Mr. Brian G Shade
3064194003	Trip Blank	Water	10/16/2019 15:08	10/16/2019 15:08	Mr. Brian G Shade

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SAMPLE SUMMARY

Workorder: 3064194 4TH QTR 2019 CWMP-FORM 19Q

Notes

-- Samples collected by ALS personnel are done so in accordance with the procedures set forth in the ALS Field Sampling Plan (20 - Field Services Sampling Plan).
-- All Waste Water analyses comply with methodology requirements of 40 CFR Part 136.
-- All Drinking Water analyses comply with methodology requirements of 40 CFR Part 141.
-- Unless otherwise noted, all quantitative results for soils are reported on a dry weight basis.
-- The Chain of Custody document is included as part of this report.
-- All Library Search analytes should be regarded as tentative identifications based on the presumptive evidence of the mass spectra. Concentrations reported are estimated values.
-- Parameters identified as "analyze immediately" require analysis within 15 minutes of collection. Any "analyze immediately" parameters not listed under the header "Field Parameters" are preformed in the laboratory and are therefore analyzed out of hold time.
-- Method references listed on this report beginning with the prefix “S” followed by a method number (such as S2310B-97) refer to methods from “Standard Methods for the Examination of Water and Wastewater”.
-- For microbiological analyses, the "Prepared" value is the date/time into the incubator and the "Analyzed" value is the date/time out the incubator.
-- An Analysis-Prep Method Cross Reference Table is included after Analytical Results & Qualifiers section in this report.

Standard Acronyms/Flags

J	Indicates an estimated value between the Method Detection Limit (MDL) and the Practical Quantitation Limit (PQL) for the analyte
U	Indicates that the analyte was Not Detected (ND)
N	Indicates presumptive evidence of the presence of a compound
MDL	Method Detection Limit
PQL	Practical Quantitation Limit
RDL	Reporting Detection Limit
ND	Not Detected - indicates that the analyte was Not Detected at the RDL
Cntr	Analysis was performed using this container
RegLmt	Regulatory Limit
LCS	Laboratory Control Sample
MS	Matrix Spike
MSD	Matrix Spike Duplicate
DUP	Sample Duplicate
%Rec	Percent Recovery
RPD	Relative Percent Difference
LOD	DoD Limit of Detection
LOQ	DoD Limit of Quantitation
DL	DoD Detection Limit
I	Indicates reported value is greater than or equal to the Method Detection Limit (MDL) but less than the Report Detection Limit (RDL)
(S)	Surrogate Compound
NC	Not Calculated
*	Result outside of QC limits

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ANALYTICAL RESULTS

Workorder: 3064194 4TH QTR 2019 CWMP-FORM 19Q

Lab ID: **3064194001** Date Collected: 10/16/2019 10:24 Matrix: Ground Water
Sample ID: **CWMP012W** Date Received: 10/16/2019 15:08

Parameters	Results	Flag	Units	RDL	Method	Prepared	By	Analyzed	By	Cntr
VOLATILE ORGANICS										
Benzene	ND		ug/L	1.0	SW846 8260B			10/18/19 03:46	PDK	G
1,2-Dibromoethane	ND		ug/L	1.0	SW846 8260B			10/18/19 03:46	PDK	G
1,1-Dichloroethane	ND		ug/L	1.0	SW846 8260B			10/18/19 03:46	PDK	G
1,2-Dichloroethane	ND		ug/L	1.0	SW846 8260B			10/18/19 03:46	PDK	G
1,1-Dichloroethene	ND		ug/L	1.0	SW846 8260B			10/18/19 03:46	PDK	G
cis-1,2-Dichloroethene	ND		ug/L	1.0	SW846 8260B			10/18/19 03:46	PDK	G
trans-1,2-Dichloroethene	ND		ug/L	1.0	SW846 8260B			10/18/19 03:46	PDK	G
Ethylbenzene	ND		ug/L	1.0	SW846 8260B			10/18/19 03:46	PDK	G
Methylene Chloride	ND		ug/L	1.0	SW846 8260B			10/18/19 03:46	PDK	G
Tetrachloroethene	ND		ug/L	1.0	SW846 8260B			10/18/19 03:46	PDK	G
Toluene	ND		ug/L	1.0	SW846 8260B			10/18/19 03:46	PDK	G
Total Xylenes	ND		ug/L	3.0	SW846 8260B			10/18/19 03:46	PDK	G
1,1,1-Trichloroethane	ND		ug/L	1.0	SW846 8260B			10/18/19 03:46	PDK	G
Trichloroethene	ND		ug/L	1.0	SW846 8260B			10/18/19 03:46	PDK	G
Vinyl Chloride	ND		ug/L	1.0	SW846 8260B			10/18/19 03:46	PDK	G
Surrogate Recoveries	*Results*	*Flag*	*Units*	*Limits*	*Method*	*Prepared*	*By*	*Analyzed*	*By*	*Cntr*
1,2-Dichloroethane-d4 (S)	114		%	62 - 133	SW846 8260B			10/18/19 03:46	PDK	G
4-Bromofluorobenzene (S)	114		%	79 - 114	SW846 8260B			10/18/19 03:46	PDK	G
Dibromofluoromethane (S)	103		%	78 - 116	SW846 8260B			10/18/19 03:46	PDK	G
Toluene-d8 (S)	113		%	76 - 127	SW846 8260B			10/18/19 03:46	PDK	G
WET CHEMISTRY										
Alkalinity, Bicarbonate	79		mg/L	5	SM2320B-2011			10/25/19 02:34	MXO	B
Alkalinity, Total	79	2	mg/L	5	SM2320B-2011			10/25/19 02:34	MXO	I
Ammonia-N	ND		mg/L	0.100	D6919-09			10/23/19 23:51	NJA	A
Chemical Oxygen Demand (COD)	ND		mg/L	15	EPA 410.4			10/23/19 13:18	AK	A
Chloride	32.7		mg/L	2.0	EPA 300.0			10/17/19 06:25	CHW	B
Fluoride	ND		mg/L	0.20	EPA 300.0			10/17/19 06:25	CHW	B
Nitrate-N	9.8		mg/L	0.20	EPA 300.0			10/17/19 06:25	CHW	B
pH	6.46	1	pH_Units		S4500HB-11			10/25/19 02:34	MXO	B
Phenolics	ND		mg/L	0.005	SW846 9066	10/21/19 11:16	C_D	10/22/19 05:28	C_D	F
Specific Conductance	346		umhos/cm	1	SW846 9050A			10/25/19 02:34	MXO	B
Sulfate	4.3		mg/L	2.0	EPA 300.0			10/17/19 06:25	CHW	B
Total Dissolved Solids	266		mg/L	5	S2540C-11			10/21/19 12:15	D1C	B
Total Organic Carbon (TOC)	1.7		mg/L	0.50	SW846 9060A			10/17/19 18:06	PAG	D
Turbidity	98.5		NTU	0.10	SM2130B-2011			10/17/19 07:06	R2B	B

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ANALYTICAL RESULTS

Workorder: 3064194 4TH QTR 2019 CWMP-FORM 19Q

Lab ID: **3064194001** Date Collected: 10/16/2019 10:24 Matrix: Ground Water
Sample ID: **CWMP012W** Date Received: 10/16/2019 15:08

Parameters	Results	Flag	Units	RDL	Method	Prepared	By	Analyzed	By	*Cntr*
METALS										
Calcium, Total	31.1		mg/L	0.11	SW846 6010C	10/21/19 16:45	SXC	10/22/19 14:39	SRT	J1
Iron, Total	36.5		mg/L	0.067	SW846 6010C	10/21/19 16:45	SXC	10/22/19 14:39	SRT	J1
Magnesium, Total	8.3		mg/L	0.11	SW846 6010C	10/21/19 16:45	SXC	10/22/19 14:39	SRT	J1
Manganese, Total	0.22		mg/L	0.0056	SW846 6010C	10/21/19 16:45	SXC	10/22/19 14:39	SRT	J1
Potassium, Total	1.4		mg/L	0.56	SW846 6010C	10/21/19 16:45	SXC	10/22/19 14:39	SRT	J1
Sodium, Total	12.3		mg/L	0.56	SW846 6010C	10/21/19 16:45	SXC	10/22/19 14:39	SRT	J1
FIELD PARAMETERS										
Depth to Water Level	51.41		Feet		Field			10/16/19 10:24	BGS	C
pH, Field (SM4500B)	5.67		pH_Units		Field			10/16/19 10:24	BGS	C
Specific Conductance, Field	311		umhos/cm	1	Field			10/16/19 10:24	BGS	C
Temperature	14.50		Deg. C		Field			10/16/19 10:24	BGS	C

Susan J. Scherer

Ms. Susan J Scherer
Project Coordinator

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ANALYTICAL RESULTS

Workorder: 3064194 4TH QTR 2019 CWMP-FORM 19Q

Lab ID: **3064194002** Date Collected: 10/16/2019 12:00 Matrix: Water

Sample ID: **Field Blank** Date Received: 10/16/2019 15:08

Parameters	Results	Flag	Units	RDL	Method	Prepared	By	Analyzed	By	Cntr
VOLATILE ORGANICS										
Benzene	ND		ug/L	1.0	SW846 8260B			10/18/19 03:01	PDK	A
1,2-Dibromoethane	ND		ug/L	1.0	SW846 8260B			10/18/19 03:01	PDK	A
1,1-Dichloroethane	ND		ug/L	1.0	SW846 8260B			10/18/19 03:01	PDK	A
1,2-Dichloroethane	ND		ug/L	1.0	SW846 8260B			10/18/19 03:01	PDK	A
1,1-Dichloroethene	ND		ug/L	1.0	SW846 8260B			10/18/19 03:01	PDK	A
cis-1,2-Dichloroethene	ND		ug/L	1.0	SW846 8260B			10/18/19 03:01	PDK	A
trans-1,2-Dichloroethene	ND		ug/L	1.0	SW846 8260B			10/18/19 03:01	PDK	A
Ethylbenzene	ND		ug/L	1.0	SW846 8260B			10/18/19 03:01	PDK	A
Methylene Chloride	ND		ug/L	1.0	SW846 8260B			10/18/19 03:01	PDK	A
Tetrachloroethene	ND		ug/L	1.0	SW846 8260B			10/18/19 03:01	PDK	A
Toluene	ND		ug/L	1.0	SW846 8260B			10/18/19 03:01	PDK	A
Total Xylenes	ND		ug/L	3.0	SW846 8260B			10/18/19 03:01	PDK	A
1,1,1-Trichloroethane	ND		ug/L	1.0	SW846 8260B			10/18/19 03:01	PDK	A
Trichloroethene	ND		ug/L	1.0	SW846 8260B			10/18/19 03:01	PDK	A
Vinyl Chloride	ND		ug/L	1.0	SW846 8260B			10/18/19 03:01	PDK	A

Surrogate Recoveries	*Results*	*Flag*	*Units*	*Limits*	*Method*	*Prepared*	*By*	*Analyzed*	*By*	*Cntr*
1,2-Dichloroethane-d4 (S)	110		%	62 - 133	SW846 8260B			10/18/19 03:01	PDK	A
4-Bromofluorobenzene (S)	113		%	79 - 114	SW846 8260B			10/18/19 03:01	PDK	A
Dibromofluoromethane (S)	102		%	78 - 116	SW846 8260B			10/18/19 03:01	PDK	A
Toluene-d8 (S)	111		%	76 - 127	SW846 8260B			10/18/19 03:01	PDK	A

Susan J. Scherer

Ms. Susan J Scherer
Project Coordinator

ALS Environmental

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ANALYTICAL RESULTS

Workorder: 3064194 4TH QTR 2019 CWMP-FORM 19Q

Lab ID: **3064194003** Date Collected: 10/16/2019 15:08 Matrix: Water

Sample ID: **Trip Blank** Date Received: 10/16/2019 15:08

Parameters	Results	Flag	Units	RDL	Method	Prepared	By	Analyzed	By	Cntr
VOLATILE ORGANICS										
Benzene	ND		ug/L	1.0	SW846 8260B			10/18/19 03:24	PDK	A
1,2-Dibromoethane	ND		ug/L	1.0	SW846 8260B			10/18/19 03:24	PDK	A
1,1-Dichloroethane	ND		ug/L	1.0	SW846 8260B			10/18/19 03:24	PDK	A
1,2-Dichloroethane	ND		ug/L	1.0	SW846 8260B			10/18/19 03:24	PDK	A
1,1-Dichloroethene	ND		ug/L	1.0	SW846 8260B			10/18/19 03:24	PDK	A
cis-1,2-Dichloroethene	ND		ug/L	1.0	SW846 8260B			10/18/19 03:24	PDK	A
trans-1,2-Dichloroethene	ND		ug/L	1.0	SW846 8260B			10/18/19 03:24	PDK	A
Ethylbenzene	ND		ug/L	1.0	SW846 8260B			10/18/19 03:24	PDK	A
Methylene Chloride	ND		ug/L	1.0	SW846 8260B			10/18/19 03:24	PDK	A
Tetrachloroethene	ND		ug/L	1.0	SW846 8260B			10/18/19 03:24	PDK	A
Toluene	ND		ug/L	1.0	SW846 8260B			10/18/19 03:24	PDK	A
Total Xylenes	ND		ug/L	3.0	SW846 8260B			10/18/19 03:24	PDK	A
1,1,1-Trichloroethane	ND		ug/L	1.0	SW846 8260B			10/18/19 03:24	PDK	A
Trichloroethene	ND		ug/L	1.0	SW846 8260B			10/18/19 03:24	PDK	A
Vinyl Chloride	ND		ug/L	1.0	SW846 8260B			10/18/19 03:24	PDK	A
Surrogate Recoveries	*Results*	*Flag*	*Units*	*Limits*	*Method*	*Prepared*	*By*	*Analyzed*	*By*	*Cntr*
1,2-Dichloroethane-d4 (S)	113		%	62 - 133	SW846 8260B			10/18/19 03:24	PDK	A
4-Bromofluorobenzene (S)	114		%	79 - 114	SW846 8260B			10/18/19 03:24	PDK	A
Dibromofluoromethane (S)	104		%	78 - 116	SW846 8260B			10/18/19 03:24	PDK	A
Toluene-d8 (S)	113		%	76 - 127	SW846 8260B			10/18/19 03:24	PDK	A

Ms. Susan J Scherer
Project Coordinator

ALS Environmental

301 Fulling Mill Road - Middletown, PA 17057 - Phone: 717-944-5541 - Fax: 717-944-1430 - www.alsglobal.com

NELAP Certifications: NJ PA010 , NY 11759 , PA 22-293 DoD ELAP: PJLA 74618
State Certifications: FL E871113 , WA C999 , MD 128 , VA 460157 , WV DW 9961-C , WV 343

ANALYTICAL RESULTS

Workorder: 3064194 4TH QTR 2019 CWMP-FORM 19Q

PARAMETER QUALIFIERS

Lab ID	#	Sample ID	Analytical Method	Analyte
3064194001	1	CWMP012W	S4500HB-11	pH
The pH analysis is an "analyze immediately" analysis. Parameters identified as "analyze immediately" require analysis within 15 minutes of collection, and are therefore analyzed outside of the method holding time when analyzed in the laboratory.				
3064194001	2	CWMP012W	SM2320B-2011	Alkalinity, Total
The Total Alkalinity is titrated to a pH of 4.5 and reported as mg CaCO3/L.				

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ANALYSIS - PREP METHOD CROSS REFERENCE TABLE

Workorder: 3064194 4TH QTR 2019 CWMP-FORM 19Q

Lab ID	Sample ID	Analysis Method	Prep Method
3064194001	CWMP012W	D6919-09	
3064194001	CWMP012W	EPA 300.0	
3064194001	CWMP012W	EPA 410.4	
3064194001	CWMP012W	Field	
3064194001	CWMP012W	S2540C-11	
3064194001	CWMP012W	S4500HB-11	
3064194001	CWMP012W	SM2130B-2011	
3064194001	CWMP012W	SM2320B-2011	
3064194001	CWMP012W	SW846 6010C	SW846 3015
3064194001	CWMP012W	SW846 8260B	
3064194001	CWMP012W	SW846 9050A	
3064194001	CWMP012W	SW846 9060A	
3064194001	CWMP012W	SW846 9066	420.4/9066
3064194002	Field Blank	SW846 8260B	
3064194003	Trip Blank	SW846 8260B	

ALS Environmental
34 Dogwood Lane • Middletown, PA 17057 • 717.944.5541 • Fax: 717.944.1430

CHAIN OF CUSTODY/ REQUEST FOR ANALYSIS

Generated by ALS

3064194

1 of 1

ALL SHADED AREAS MUST BE COMPLETED BY THE CLIENT / SAMPLER. INSTRUCTIONS ON THE BACK.

Client Name: Lancaster County Solid Waste MA

Address: 1299 Harrisburg Pike, P.O. Box 4424
Lancaster, PA 17604

Contact: Mark Reider

Phone#: (717) 735-0193

Project Name/#: Creswell/GWMP Form 19Q Wells

Bill To: Lancaster County Solid Waste MA

TAT [X] Normal-Standard TAT is 10-12 business days.
[ ] Rush-Subject to ALS approval and surcharges.

Date Required: _____ Approved By: _____

Email? [X] -Y mreider@LCSWMA.com

Fax? [X] -Y No.: (717) 397-9973

Container Type	AG	AN	CG	—	—	PL	PL	PL	P
Container Size	40 ml	500 ml	40 ml	—	—	500 ml	500 ml	1 L	500 ml
Preservative	HCl	H2SO4	HCl	—	—	H2SO4	HNO3	None	None

ANALYSES/METHOD REQUESTED

Sample Description/Location (as it will appear on the lab report)	Sample Date	Time	*G or C	**Matrix	TOC	O-OH	8260 VOCs - Form 19Q	Field Measurements	Sample Depth for AUX Data	NH3-N, COD	Total Metals: Ca, Fe, Mn, Mg, K, Na	pH, NO3, Cl, F, SpC, SO4, Turb, TDS	Alkalinity, HCO3
					Enter Number of Containers Per Sample or Field Results Below.								
1. CWMP012W	10/16/19	1024	G	GW	2	1	2	X	X	1	1	1	1
2. Field Blank	10/16/19	1200	G	GW			2						
3. Trip Blank	10/16/19	1608	G	GW			2						
4													
5													
6													
7													
8													
9													
10													

(Completed by Receiving Lab)

Cooler Temp: _____ Therm ID: _____

No. of Coolers: _____

	Y	N	Initial
Custody Seals Present?			
(If present) Seals Intact?			
Received on Ice?			
COC/Labels Complete/Accurate?			
Cont. in Good Cond.?			
Correct Containers?			
Correct Sample Volumes?			
Correct Preservation?			
Headspace/Volatiles?			

Courier/Tracking #:

Sample/COC Comments

ALS Field Services: ☐Pickup ☐Labor ☐Composite_Sampling ☐Rental_Equipment ☐Other: _____

Project Comments:

LOGGED BY(signature): DATE TIME

REVIEWED BY(signature): DATE TIME

	Relinquished By / Company Name	Date	Time		Received By / Company Name	Date	Time
1	[signature] ALS	10/16/19	1607	2	[signature]	10/17/19	1580
3				4			
5				6			
7				8			
9				10			

Data Deliverables: [ ] Standard [ ] CLP-like [ ] USACE [ ]

Special Processing: USACE [ ] Navy [ ] [ ]

State Samples Collected In: [ ] NY [ ] NJ [X] PA [ ] NC [ ]

Reportable to PADEP? Yes [ ] PWSID # _____

Sample Disposal: Lab [X] Special [ ]

EDDS: Format Type- _____

* G=Grab; C=Composite **Matrix - AI=Air; DW=Drinking Water; GW=Groundwater; OI=Oil; OL=Other Liquid; SL=Sludge; SO=Soil; WP=Wipe; WW=Wastewater

ALS ENVIRONMENTAL SHIPPING ADDRESS: 34 DOGWOOD LANE, MIDDLETOWN, PA 17057

Rev 8/04

301 Fulling Mill Road
Middletown, PA 17057
P: (717) 944-5541
F: (717) 944-1430

Condition of Sample Receipt Form

Client: LCSWMA Work Order #: 3064194 Initials: DN Date: 10/1C

1. Were airbills / tracking numbers present and recorded?	(NONE)	YES	NO
Tracking number:			
2. Are Custody Seals on shipping containers intact?	(NONE)	YES	NO
3. Are Custody Seals on sample containers intact?	(NONE)	YES	NO
4. Is there a COC (Chain-of-Custody) present?		(YES)	NO
5. Are the COC and bottle labels complete, legible and in agreement?		(YES)	NO
5a. Does the COC contain sample locations?		(YES)	NO
5b. Does the COC contain date and time of sample collection for all samples?		(YES)	NO
5c. Does the COC contain sample collectors name?		(YES)	NO
5d. Does the COC note the type(s) of preservation for all bottles?		(YES)	NO
5e. Does the COC note the number of bottles submitted for each sample?		(YES)	NO
5f. Does the COC note the type of sample, composite or grab?		(YES)	NO
5g. Does the COC note the matrix of the sample(s)?		(YES)	NO
6. Are all aqueous samples requiring preservation preserved correctly?	(N/A)	YES	NO
7. Were all samples placed in the proper containers for the requested analyses, with sufficient volume?		(YES)	NO
8. Are all samples within holding times for the requested analyses?		(YES)	NO
9. Were all sample containers received intact and headspace free when required? (not broken, leaking, frozen, etc.)		(YES)	NO
10. Did we receive trip blanks (applies only for methods EPA 504, EPA 524.2 and 1631E (LL Hg)?	(N/A)	YES	NO
11. Were the samples received on ice?		(YES)	NO
12. Were sample temperatures measured at 0.0-6.0°C		(YES)	NO
13. Are the samples DW matrix ? If YES, fill out Reportable Drinking Water questions below		YES	(NO)
13a. Are the samples required for SDWA compliance reporting?	N/A	YES	NO
13b. Did the client provide a SDWA PWS ID#?	N/A	YES	NO
13c. Are all aqueous unpreserved SDWA samples pH 5-9?	N/A	YES	NO
13d. Did the client provide the SDWA sample location ID/Description?	N/A	YES	NO
13e. Did the client provide the SDWA sample type (D, E, R, C, P, S)?	N/A	YES	NO

Cooler #: _____

Temperature (°C): 6

Thermometer ID: L/C2

Radiological (µCi): _____

COMMENTS (Required for all NO responses above and any sample non-conformance):

Rev. 4/29/2019