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

August 13, 2021

Ms. Kelly Lee 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; 1st Quarter 2021

Dear Ms. Kinkaid:

Enclosed are the Form 19 reports for the sampling period completed at the above referenced facility. The laboratory results are being reviewed by ARM Group to evaluate the quality of the data and historic trends. This review will be submitted upon completion.

- This sampling event was for the "Quarterly" Form 19 parameters, all the thirteen (13) GWMP locations were sampled.

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

cc: LCSWMA: Environmental

ARM Group: Scott Wendling, Ryan Brandon, Jeremy Fleming

PA DEP: Randy Weiss

ARM Group LLC
Engineers and Scientists

August 4, 2021

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
First Quarter 2021 Water Quality Data Review
ARM Project 190848

Dear Mr. Brown:

ARM Group LLC (ARM) has prepared this assessment at the request of the Lancaster County Solid Waste Management Authority (LCSWMA) to provide an evaluation of the First Quarter 2021 water quality monitoring results for Creswell Landfill (CWLF). As part of this evaluation, ARM reviewed the historic and First Quarter 2021 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 First Quarter 2021 were analyzed for quarterly Form 19 parameters. The following narrative provides a summary of noteworthy observations of the results for the First Quarter 2021, 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 (First Quarter 2021).

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 previously 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. The First Quarter 2021 analytical result in MP-1 for field specific conductance [SpC (f)] (394 µmhos/cm) was determined to be a statistical outlier at 95% significance and was removed from the UPL calculation.

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 First Quarter 2021 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. In these cases, ARM substituted the laboratory reporting detection limit for the statistical background standard.

The attached **Table 1** summarizes the background exceedances in the downgradient wells during the First Quarter 2021. Background exceedances shown in **Table 1** denote either (1) a statistically significant increase of concentrations relative to those observed historically in the upgradient well MP-1, or (2) a detection of a parameter for which a statistically valid background standard could not be calculated. 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 – All Form 19 analytical parameters appear to be stable and within historical concentration ranges except for field specific conductance [SpC (f)], which exceeded its statistical background standard with a concentration of 394 µmhos/cm. This result was determined to be a statistical outlier at 95% significance, and ARM will continue to assess future SpC results to determine if any apparent trends develop. pH appears to have a slightly increasing trend over time.

- MP-2 – 1,1-dichloroethane was detected at 13.6 µg/L during this event and is, therefore, above background levels.

  Other parameters above background in this well include ammonia-N, alkalinity (bicarbonate and total), total calcium, chemical oxygen demand (COD), chloride, total magnesium, total manganese, total sodium, SpC (f), sulfate, total dissolved solids (TDS), and total organic carbon (TOC). Many of these parameters appear to be slowly increasing over time, except for calcium and 1,1-dichloroethane, which both appear to be decreasing. pH appears to mimic the trend observed in the upgradient well at levels approximately 0.94 unit higher, on average, while fluctuating over a slightly wider range.

- MP-3 – 1,1-dichloroethane was detected at 1.4 µg/L during this event and is, therefore, above background levels. Concentrations continue to decrease from the 2006 historical maximum of 20.5 µg/L.

  Other parameters above background in this well include ammonia-N, alkalinity (bicarbonate and total), total calcium, chloride, total sodium, SpC (f), and sulfate. Sulfate appeared to abruptly increase above the historical average during the Fourth Quarter 2020, but the First Quarter 2021 result appears to show a return to historical average levels. The other noted parameters appear to be increasing over time with short term fluctuations. pH appears to mimic the trend observed in the upgradient well at levels approximately 0.29 unit higher, on average.

- MP-4 – Parameters above background in this well include alkalinity (bicarbonate and total), chloride, and sulfate. All noted parameters generally appear to be slowly increasing with short-term fluctuations. pH appears to be slightly decreasing over time with a long-term average value approximately 0.60 unit higher than background.

- MP-5 – Parameters above background in this well include alkalinity (bicarbonate and total), chloride, total sodium, SpC (f), laboratory SpC (SpC [l]), and sulfate. Concentrations of alkalinity (bicarbonate and total), chloride, total sodium, and SpC (f) appear to be increasing over time with short-term fluctuations. Sulfate concentrations appear to fluctuate between approximately 2-6 mg/L and appear to be decreasing since July 2019. pH appears to be stable over time with a long-term average value approximately 0.22 unit higher than background.

- MP-7 – Parameters above background in this well include alkalinity (bicarbonate and total), chloride, total sodium, SpC (f), SpC (l), and sulfate. Concentrations of alkalinity (bicarbonate and total), total sodium, sulfate, and SpC (f) appear to be increasing over time with short-term fluctuations. Chloride and SpC (l) appear to be stable over time. Sulfate concentrations appear to be decreasing since a historical high concentration was noted in the Third Quarter 2020. pH appears to be stable over time with a long-term average value approximately 0.20 unit higher than background.

- MP-8 – Benzene (1.4 µg/L) and 1,1-dichloroethane (2.8 µg/L) were detected during this event, and are, therefore, above background levels. Concentrations of both parameters appear to be decreasing over time.

  Other parameters above background in this well include ammonia-N, alkalinity (bicarbonate and total), total calcium, chloride, total iron, total magnesium, total manganese, total potassium, total sodium, SpC (f), SpC (l), sulfate, TDS, and TOC. Ammonia-N, alkalinity (bicarbonate and total), total iron, and total manganese appear to be slowly increasing over time. Chloride and total potassium appear to be slowly decreasing over time. Concentrations of the other noted parameters generally appear to be stable long-term, apart from minor fluctuations. pH appears to mimic the trend observed in the upgradient well at levels approximately 0.57 unit higher, on average, while fluctuating over a slightly narrower range.

- MP-9 – Benzene; 1,1-dichloroethane; and cis 1,2-dichloroethene were detected during this event, and are, therefore, above background levels. Concentrations of both parameters appear to be decreasing over time.

  Other parameters above background in this well include ammonia-N, alkalinity (bicarbonate and total), total calcium, COD, chloride, total iron, total magnesium, total manganese, total potassium, total sodium, SpC (f), SpC (l), sulfate, TDS, and TOC. All parameters noted above background appear to be increasing over time except alkalinity (bicarbonate and total), which both appear to be decreasing after a Second Quarter 2012 historical high, apart from minor fluctuations. pH appears to be slightly decreasing over time with a long-term average value approximately 0.92 unit higher than background.

- MP-10 – Parameters above background in this well include ammonia-N, alkalinity (bicarbonate and total), total calcium, chloride, total magnesium, total potassium, total sodium, SpC (f), SpC (l), sulfate, TDS, and TOC. Concentrations of alkalinity (bicarbonate and total), chloride, magnesium, sodium, SpC (f) and sulfate appear to be increasing with apparently seasonal fluctuations. Total calcium, SpC (l), and TDS concentrations appear to be stable over time. Concentrations of ammonia-N, COD, total potassium, and TOC appear to be decreasing over time. pH appears to mimic the trend observed in the upgradient well at levels approximately 1.27 units higher, on average.

- MP-12 – Parameters above background in this well include alkalinity (bicarbonate and total, total calcium, total iron, total manganese, SpC (f), sulfate, and TOC. Concentrations of chloride, total iron, and TOC appear to be increasing over time, with iron displaying fluctuations across a relatively wide range (approximately 1-168 mg/L) since 2010.

Concentrations of the other noted parameters generally appear to be decreasing. pH appears to mimic the trend observed in the upgradient well at levels approximately 0.67 units higher, on average.

- MP-16 – Alkalinity (bicarbonate and total) and sulfate were the only parameters detected above background in this well. Concentrations of alkalinity (bicarbonate and total) appear to be stable over time, apart from apparently anomalous results in the Third Quarter 2020. ARM will continue to monitor alkalinity concentrations during the next few sampling events to confirm if this result was indeed anomalous. Sulfate concentrations appear to be stable over time and have been decreasing since a historical maximum concentration of 14.6 mg/L was observed during the Second Quarter 2007. pH appears to be stable over time with a long-term average value approximately 0.68 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 monitoring point for evaluating downstream conditions in Mann's Run (i.e., at MP-18S).

  Parameters above background levels at MP-17S include ammonia-N, alkalinity (bicarbonate and total), total calcium, chloride, total magnesium, nitrate-N, total potassium, total sodium, SpC (f), SpC (l), sulfate, TDS, and TOC. Concentrations of COD, total manganese, total potassium, and TOC appear to be decreasing over time, while concentrations of the other noted parameters show a wide range of fluctuation in the historical results and appear to demonstrate increasing long-term trends. Nitrate-N and magnesium concentration fluctuations appear to be seasonal. pH appears to mimic the trend observed in the upgradient well at levels approximately 2.00 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 background levels at MP-18S include ammonia-N, alkalinity (bicarbonate and total), total calcium, chloride, total magnesium, total manganese, total potassium, total sodium, SpC (f), SpC (l), sulfate, TDS, and TOC. Concentrations of ammonia-N and total potassium appear to be decreasing over time, while concentrations of the other noted parameters show a wide range of fluctuation in the historical results and appear to demonstrate increasing long-term trends. pH appears to mimic the trend observed in the upgradient well at levels approximately 2.47 units higher, on average.

Trend plots for the detected VOCs noted above (benzene and 1,1-dichloroethane) 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 largely gradual. These increases may be the result of temporary changes and do not currently appear to be a cause for concern.

Trip and Field Blank Analyses

One (1) trip blank sample and one (1) field blank sample were received by the laboratory on January 22, 2021. Both trip blank and field blank samples were analyzed for VOCs. The field blank was also analyzed for wet chemistry and metal parameters.

Laboratory analysis of the trip blank and field blank samples was completed on January 26, 2021. The field blank wet chemistry and metals analysis were completed on February 6, 2021. SpC was detected at 2 µmhos/cm and pH at 5.92 units. No VOC or metal constituents were detected in any of the blank samples.

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.

COMMONWEALTH OF PENNSYLVANIA
REGISTERED PROFESSIONAL
RYAN ALLEN BRANDON
GEOLOGIST
No. PG005465
8/4/2021

Sincerely,
ARM Group LLC

Jeremy Fleming
Project Geologist II

Ryan A. Brandon, P.G.
Project Manager

Enclosed: Table 1
Attachments 1-3

TABLE

Table 1. LCSWMA Creswell Landfill Form 19 Groundwater Monitoring Well Background Standard Comparisons - 1st Quarter 2021

Parameter	Background Standard	Units	CWMP001W	CWMP002W	CWMP003W	CWMP004W	CWMP005W	CWMP007W	CWMP008W	CWMP009W	CWMP010W	CWMP012W	CWMP016W	CWMP017S	CWMP018S
Quarterly Analytes															
AMMONIA-NITROGEN	**0.120**	mg/L	<0.100	0.205	0.121	0.109	<0.100	<0.100	6.3	31.7	0.608	<0.100	<0.100	0.695	0.273
BICARBONATE	**8**	mg/L	5	11	18	24	15	13	344	540	138	69	9	606	378
CALCIUM, TOTAL	**20.01**	mg/L	15.4	50.8	21.8	19.2	15	19	64.1	166	31.9	31.1	5.5	75.2	71.9
COD (CHEMICAL OXYGEN DEMAND)	**12****	mg/L	<15	22	<15	<15	<15	<15	<15	94	<15	<15	<15	<15	<15
CHLORIDE	**32.6**	mg/L	27.1	94.2	54.8	41.5	62.2	63.4	32.9	558	181	32.5	2.7	580	433
FLUORIDE	**0.20***	mg/L	<0.2	<0.20	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.5	<0.5
IRON, TOTAL	**3.41**	mg/L	0.69	<0.006	<0.06	<0.06	<0.06	<0.06	24.1	36.1	0.31	14.1	0.11	0.35	1.0
MAGNESIUM, TOTAL	**12.48**	mg/L	10.5	16.3	7.9	6.4	7.9	9.6	28.3	75	28.9	8.8	1.3	90.2	65.2
MANGANESE, TOTAL	**0.124**	mg/L	0.05	1.0	0.013	0.0096	0.050	0.0072	15.6	13.1	0.21	0.14	0.0082	0.12	0.55
NITRATE-NITROGEN	**23.55**	mg/L	17.9	3.9	7.0	5.6	7.7	9.7	<0.2	<0.2	15.1	8	1.4	30.0	21.6
pH-FIELD	**None*****	S.U.	5.07	5.78	5.11	5.38	8.06	5.00	6.27	6.15	6.62	5.84	5.62	8.08	8.64
pH-LAB	**None*****	S.U.	6.52	6.96	6.79	7.02	5.90	6.96	8.39	8.23	7.73	7.07	6.47	8.45	8.71
POTASSIUM, TOTAL	**2.90**	mg/L	2.3	2.8	1.8	1.4	2.2	2.4	8.2	33.6	6.8	1.4	<0.56	19.2	17.6
SODIUM, TOTAL	**15.58**	mg/L	13.2	31.2	19.2	14.9	31.3	33.5	33.9	177	116	13.4	3.2	364	248
SPEC. COND., FIELD	**328.0**	µmho/cm	394	552	396	253	482	558	1,184	3,576	1,584	332	92	3,144	2,142
SPEC. COND., LAB	**299.0**	µmho/cm	266	39	278	226	341	360	661	2,280	1,010	291	65	2,750	1,970
SULFATE	**2.79**	mg/L	2.3	20.4	5.0	5.7	4.7	21.2	7.1	5.7	27.8	4.8	10.0	63.6	51.4
TOTAL ALKALINITY	**7**	mg/L	5	11	18	24	15	13	344	540	141	69	9	606	351
TDS (TOTAL DISSOLVED SOLIDS)	**261**	mg/L	208	346	228	140	232	242	478	1,540	568	226	65	1,730	1,170
TOC (TOTAL ORGANIC CARBON)	**1.12**	mg/L	0.60	5.0	0.8	0.67	0.72	0.71	7.0	37.3	3.4	2.8	<0.5	6.3	8.1
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
TURBIDITY	**169.9**	NTU	15.9	0.15	0.74	<0.1	0.31	<0.1	8.6	29	2.25	45	0.88	1.26	1.44
BENZENE	**1.0***	µg/L	<1	<1	<1	<1	<1	<1	1.4	2.5	<1	<1	<1	<1	<1
1,2-DIBROMOETHANE (EDB) (ETHYLENE DIBROMIDE)	**1.0***	µg/L	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
1,1-DICHLOROETHANE	**1.0***	µg/L	<1	13.6	1.4	<1	<1	<1	2.8	1.5	<1	<1	<1	<1	<1
1,1-DICHLOROETHENE	**1.0***	µg/L	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
1,2-DICHLOROETHANE	**1.0***	µg/L	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
cis 1,2-DICHLOROETHENE	**1.0***	µg/L	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
trans 1,2-DICHLOROETHENE	**1.0***	µg/L	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
ETHYLBENZENE	**1.0***	µg/L	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
METHYLENE CHLORIDE	**1.0***	µg/L	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
TETRACHLOROETHENE	**1.0***	µg/L	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
TOLUENE	**1.0***	µg/L	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
1,1,1-TRICHLOROETHANE	**1.0***	µg/L	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
TRICHLOROETHENE	**1.0***	µg/L	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
VINYL CHLORIDE	**1.0***	µg/L	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
XYLENES (TOTAL)	**3.0***	µg/L	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3

Notes:

Gray text indicates a parameter non-detection.

Shaded text indicates a background standard exceedance.

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

** COD background standard is lower than the current reporting limit.

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

ATTACHMENT 1

BACKGROUND UPPER PREDICTION LIMITS

LCSWMA Creswell Landfill
1st Quarter 2021 - Background Upper Prediction Limits (MP-1)

Parameter	Distribution	Upper Prediction Limit	Unit
ammonia-nitrogen	No Distribution	0.120	mg/L
bicarbonate	No Distribution	8	mg/L
calcium, total	Lognormal	20.01	mg/L
cod (chemical oxygen demand)	Normal	11.77**	mg/L
chloride	No Distribution	32.6	mg/L
fluoride	NA	0.20*	mg/L
iron, total	Lognormal	3.41	mg/L
magnesium, total	No Distribution	12.48	mg/L
manganese, total	No Distribution	0.124	mg/L
nitrate-nitrogen	No Distribution	23.55	mg/L
ph-field	No Distribution	None***	S.U.
ph-lab	Normal	None***	S.U.
potassium, total	Normal	2.90	mg/L
sodium, total	Normal	15.58	mg/L
spec. cond., field	Normal	328	µmhos/cm
spec. cond., lab	No Distribution	299	µmhos/cm
sulfate	Normal	2.79	mg/L
total alkalinity	No Distribution	7	mg/L
tds (total dissolved solids)	Normal	261	mg/L
toc (total organic carbon)	Normal	1.12	mg/L
total phenolics	NA	0.005*	mg/L
turbidity	Lognormal	169.9	NTU
benzene	NA	1.0*	µg/L
1,2-dibromoethane (edb) (ethylene dibromide)	NA	1.0*	µg/L
1,1-dichloroethane	NA	1.0*	µg/L
1,1-dichloroethene	NA	1.0*	µg/L
1,2-dichloroethane	NA	1.0*	µg/L
cis 1,2-dichloroethene	NA	1.0*	µg/L
trans 1,2-dichloroethene	NA	1.0*	µg/L
ethylbenzene	NA	1.0*	µg/L
methylene chloride	NA	1.0*	µg/L
tetrachloroethene	NA	1.0*	µg/L
toluene	NA	1.0*	µg/L
1,1,1-trichloroethane	NA	1.0*	µg/L
trichloroethene	NA	1.0*	µg/L
vinyl chloride	NA	1.0*	µg/L
xylenes (total)	NA	3.0*	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.

** COD background standard is lower than the current reporting limit.

*** 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 5.15/6/2021 3:49:17 PM								
4		From File		1Q21 CWMP001W UCL Input Table.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	AMMONIA-NITROGEN											
12												
13					General Statistics							
14				Total Number of Observations	122			Number of Missing Observations	12			
15				Number of Distinct Observations	6							
16				Number of Detects	10			Number of Non-Detects	112			
17				Number of Distinct Detects	5			Number of Distinct Non-Detects	1			
18				Minimum Detect	0.11			Minimum Non-Detect	0.1			
19				Maximum Detect	0.23			Maximum Non-Detect	0.1			
20				Variance Detected	0.00134			Percent Non-Detects	91.8%			
21				Mean Detected	0.136			SD Detected	0.0366			
22				Mean of Detected Logged Data	-2.021			SD of Detected Logged Data	0.229			
23												
24					Critical Values for Background Threshold Values (BTVs)							
25				Tolerance Factor K (For UTL)	1.894			d2max (for USL)	3.276			
26												
27					Normal GOF Test on Detects Only							
28				Shapiro Wilk Test Statistic	0.719			Shapiro Wilk GOF Test				
29				5% Shapiro Wilk Critical Value	0.842			Data Not Normal at 5% Significance Level				
30				Lilliefors Test Statistic	0.269			Lilliefors GOF Test				
31				5% Lilliefors Critical Value	0.262			Data Not Normal at 5% Significance Level				
32					Data Not Normal at 5% Significance Level							
33												
34					Kaplan Meier (KM) Background Statistics Assuming Normal Distribution							
35				KM Mean	0.103			KM SD	0.014			
36				95% UTL95% Coverage	0.129			95% KM UPL (t)	0.126			
37				90% KM Percentile (z)	0.121			95% KM Percentile (z)	0.126			
38				99% KM Percentile (z)	0.136			95% KM USL	0.149			
39												
40					DL/2 Substitution Background Statistics Assuming Normal Distribution							
41				Mean	0.057			SD	0.0257			
42				95% UTL95% Coverage	0.106			95% UPL (t)	0.0998			
43				90% Percentile (z)	0.09			95% Percentile (z)	0.0993			
44				99% Percentile (z)	0.117			95% USL	0.141			
45					DL/2 is not a recommended method. DL/2 provided for comparisons and historical reasons							
46												
47					Gamma GOF Tests on Detected Observations Only							
48				A-D Test Statistic	0.912			Anderson-Darling GOF Test				
49				5% A-D Critical Value	0.725			Data Not Gamma Distributed at 5% Significance Level				
50				K-S Test Statistic	0.278			Kolmogorov-Smirnov GOF				
51				5% K-S Critical Value	0.266			Data Not Gamma Distributed at 5% Significance Level				
52					Data Not Gamma Distributed at 5% Significance Level							

53												
54	**Gamma Statistics on Detected Data Only**											
55					k hat (MLE)	19.28			k star (bias corrected MLE)		13.56	
56					Theta hat (MLE)	0.00706			Theta star (bias corrected MLE)		0.01	
57					nu hat (MLE)	385.5			nu star (bias corrected)		271.2	
58					MLE Mean (bias corrected)	0.136						
59					MLE Sd (bias corrected)	0.0369			95% Percentile of Chisquare (2kstar)		40.26	
60												
61	**Gamma ROS Statistics using Imputed Non-Detects**											
62	GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs											
63	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)											
64	For such situations, GROS method may yield incorrect values of UCLs and BTVs											
65	This is especially true when the sample size is small.											
66	For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates											
67					Minimum	0.01			Mean		0.0279	
68					Maximum	0.23			Median		0.01	
69					SD	0.0382			CV		1.371	
70					k hat (MLE)	1.101			k star (bias corrected MLE)		1.08	
71					Theta hat (MLE)	0.0253			Theta star (bias corrected MLE)		0.0258	
72					nu hat (MLE)	268.7			nu star (bias corrected)		263.4	
73					MLE Mean (bias corrected)	0.0279			MLE Sd (bias corrected)		0.0268	
74					95% Percentile of Chisquare (2kstar)	6.296			90% Percentile		0.063	
75					95% Percentile	0.0812			99% Percentile		0.123	
76	**The following statistics are computed using Gamma ROS Statistics on Imputed Data**											
77	**Upper Limits using Wilson Hilferty (WH) and Hawkins Wixley (HW) Methods**											
78						WH	HW				WH	HW
79					95% Approx. Gamma UTL with 95% Coverage	0.09	0.0891		95% Approx. Gamma UPL		0.0774	0.0758
80					95% Gamma USL	0.195	0.209					
81												
82	**Estimates of Gamma Parameters using KM Estimates**											
83					Mean (KM)	0.103			SD (KM)		0.014	
84					Variance (KM)	1.9621E-4			SE of Mean (KM)		0.00134	
85					k hat (KM)	54.02			k star (KM)		52.69	
86					nu hat (KM)	13180			nu star (KM)		12858	
87					theta hat (KM)	0.00191			theta star (KM)		0.00195	
88					80% gamma percentile (KM)	0.115			90% gamma percentile (KM)		0.121	
89					95% gamma percentile (KM)	0.127			99% gamma percentile (KM)		0.139	
90												
91	**The following statistics are computed using gamma distribution and KM estimates**											
92	**Upper Limits using Wilson Hilferty (WH) and Hawkins Wixley (HW) Methods**											
93						WH	HW				WH	HW
94					95% Approx. Gamma UTL with 95% Coverage	0.125	0.125		95% Approx. Gamma UPL		0.122	0.122
95					95% KM Gamma Percentile	0.122	0.122		95% Gamma USL		0.144	0.143
96												
97	**Lognormal GOF Test on Detected Observations Only**											
98					Shapiro Wilk Test Statistic	0.791			**Shapiro Wilk GOF Test**			
99					5% Shapiro Wilk Critical Value	0.842			Data Not Lognormal at 5% Significance Level			
100					Lilliefors Test Statistic	0.267			**Lilliefors GOF Test**			
101					5% Lilliefors Critical Value	0.262			Data Not Lognormal at 5% Significance Level			
102	Data Not Lognormal at 5% Significance Level											
103												
104	**Background Lognormal ROS Statistics Assuming Lognormal Distribution Using Imputed Non-Detects**											

105				Mean in Original Scale		0.0479				Mean in Log Scale		-3.261
106				SD in Original Scale		0.0349				SD in Log Scale		0.669
107				95% UTL95% Coverage		0.136				95% BCA UTL95% Coverage		0.139
108				95% Bootstrap (%) UTL95% Coverage		0.14				95% UPL (t)		0.117
109				90% Percentile (z)		0.0904				95% Percentile (z)		0.115
110				99% Percentile (z)		0.182				95% USL		0.344
111												
112	**Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution**											
113				KM Mean of Logged Data		-2.28				95% KM UTL (Lognormal)95% Coverage		0.123
114				KM SD of Logged Data		0.0991				95% KM UPL (Lognormal)		0.121
115				95% KM Percentile Lognormal (z)		0.12				95% KM USL (Lognormal)		0.142
116												
117	**Background DL/2 Statistics Assuming Lognormal Distribution**											
118				Mean in Original Scale		0.057				Mean in Log Scale		-2.916
119				SD in Original Scale		0.0257				SD in Log Scale		0.276
120				95% UTL95% Coverage		0.0913				95% UPL (t)		0.0857
121				90% Percentile (z)		0.0771				95% Percentile (z)		0.0852
122				99% Percentile (z)		0.103				95% USL		0.134
123	DL/2 is not a Recommended Method. DL/2 provided for comparisons and historical reasons.											
124												
125	**Nonparametric Distribution Free Background Statistics**											
126	Data do not follow a Discernible Distribution (0.05)											
127												
128	**Nonparametric Upper Limits for BTVs(no distinction made between detects and nondetects)**											
129				Order of Statistic, r		119				95% UTL with95% Coverage		0.14
130				Approx, f used to compute achieved CC		1.566				Approximate Actual Confidence Coefficient achieved by UTL		0.864
131				Approximate Sample Size needed to achieve specified CC		153				95% UPL		0.12
132				95% USL		0.23				95% KM Chebyshev UPL		0.164
133												
134	Note: The use of USL tends to yield a conservative estimate of BTV, especially when the sample size starts exceeding 20.											
135	Therefore, one may use USL to estimate a BTV only when the data set represents a background data set free of outliers											
136	and consists of observations collected from clean unimpacted locations.											
137	The use of USL tends to provide a balance between false positives and false negatives provided the data											
138	represents a background data set and when many onsite observations need to be compared with the BTV.											
139												
140	**BICARBONATE**											
141												
142	**General Statistics**											
143				Total Number of Observations		119				Number of Missing Observations		15
144				Number of Distinct Observations		21						
145				Number of Detects		77				Number of Non-Detects		42
146				Number of Distinct Detects		19				Number of Distinct Non-Detects		3
147				Minimum Detect		4.7				Minimum Non-Detect		5
148				Maximum Detect		9.5				Maximum Non-Detect		6.2
149				Variance Detected		1.284				Percent Non-Detects		35.29%
150				Mean Detected		6.295				SD Detected		1.133
151				Mean of Detected Logged Data		1.824				SD of Detected Logged Data		0.174
152												
153	**Critical Values for Background Threshold Values (BTVs)**											
154				Tolerance Factor K (For UTL)		1.898				d2max (for USL)		3.268
155												
156	**Normal GOF Test on Detects Only**											

157				Shapiro Wilk Test Statistic		0.885	**Normal GOF Test on Detected Observations Only**					
158				5% Shapiro Wilk P Value		8.3955E-8	Data Not Normal at 5% Significance Level					
159				Lilliefors Test Statistic		0.252	**Lilliefors GOF Test**					
160				5% Lilliefors Critical Value		0.101	Data Not Normal at 5% Significance Level					
161				Data Not Normal at 5% Significance Level								
162												
163				**Kaplan Meier (KM) Background Statistics Assuming Normal Distribution**								
164				KM Mean		5.737	KM SD					1.181
165				95% UTL95% Coverage		7.979	95% KM UPL (t)					7.703
166				90% KM Percentile (z)		7.251	95% KM Percentile (z)					7.68
167				99% KM Percentile (z)		8.485	95% KM USL					9.597
168												
169				**DL/2 Substitution Background Statistics Assuming Normal Distribution**								
170				Mean		4.962	SD					2.029
171				95% UTL95% Coverage		8.812	95% UPL (t)					8.339
172				90% Percentile (z)		7.562	95% Percentile (z)					8.299
173				99% Percentile (z)		9.681	95% USL					11.59
174				DL/2 is not a recommended method. DL/2 provided for comparisons and historical reasons								
175												
176				**Gamma GOF Tests on Detected Observations Only**								
177				A-D Test Statistic		2.955	**Anderson-Darling GOF Test**					
178				5% A-D Critical Value		0.75	Data Not Gamma Distributed at 5% Significance Level					
179				K-S Test Statistic		0.234	**Kolmogorov-Smirnov GOF**					
180				5% K-S Critical Value		0.101	Data Not Gamma Distributed at 5% Significance Level					
181				Data Not Gamma Distributed at 5% Significance Level								
182												
183				**Gamma Statistics on Detected Data Only**								
184				k hat (MLE)		32.92	k star (bias corrected MLE)					31.64
185				Theta hat (MLE)		0.191	Theta star (bias corrected MLE)					0.199
186				nu hat (MLE)		5069	nu star (bias corrected)					4873
187				MLE Mean (bias corrected)		6.295						
188				MLE Sd (bias corrected)		1.119	95% Percentile of Chisquare (2kstar)					82.86
189												
190				**Gamma ROS Statistics using Imputed Non-Detects**								
191				GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs								
192				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)								
193				For such situations, GROS method may yield incorrect values of UCLs and BTVs								
194				This is especially true when the sample size is small.								
195				For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates								
196				Minimum		2.285	Mean					5.479
197				Maximum		9.5	Median					5
198				SD		1.486	CV					0.271
199				k hat (MLE)		13.37	k star (bias corrected MLE)					13.03
200				Theta hat (MLE)		0.41	Theta star (bias corrected MLE)					0.42
201				nu hat (MLE)		3181	nu star (bias corrected)					3102
202				MLE Mean (bias corrected)		5.479	MLE Sd (bias corrected)					1.517
203				95% Percentile of Chisquare (2kstar)		38.97	90% Percentile					7.491
204				95% Percentile		8.19	99% Percentile					9.611
205				**The following statistics are computed using Gamma ROS Statistics on Imputed Data**								
206				**Upper Limits using Wilson Hilferty (WH) and Hawkins Wixley (HW) Methods**								
207					WH	HW					WH	HW
208				95% Approx. Gamma UTL with 95% Coverage	8.673	8.742	95% Approx. Gamma UPL				8.206	8.253

209			95% Gamma USL		11.79	12.08						
210												
211	**Estimates of Gamma Parameters using KM Estimates**											
212			Mean (KM)		5.737			SD (KM)			1.181	
213			Variance (KM)		1.395			SE of Mean (KM)			0.109	
214			k hat (KM)		23.58			k star (KM)			23	
215			nu hat (KM)		5613			nu star (KM)			5473	
216			theta hat (KM)		0.243			theta star (KM)			0.249	
217			80% gamma percentile (KM)		6.712			90% gamma percentile (KM)			7.313	
218			95% gamma percentile (KM)		7.836			99% gamma percentile (KM)			8.88	
219												
220	**The following statistics are computed using gamma distribution and KM estimates**											
221	**Upper Limits using Wilson Hilferty (WH) and Hawkins Wixley (HW) Methods**											
222				WH	HW					WH	HW	
223			95% Approx. Gamma UTL with 95% Coverage	8.046	8.057			95% Approx. Gamma UPL		7.723	7.727	
224			95% KM Gamma Percentile	7.696	7.699			95% Gamma USL		10.13	10.22	
225												
226	**Lognormal GOF Test on Detected Observations Only**											
227			Shapiro Wilk Approximate Test Statistic		0.898			**Shapiro Wilk GOF Test**				
228			5% Shapiro Wilk P Value		8.3938E-7			Data Not Lognormal at 5% Significance Level				
229			Lilliefors Test Statistic		0.224			**Lilliefors GOF Test**				
230			5% Lilliefors Critical Value		0.101			Data Not Lognormal at 5% Significance Level				
231	Data Not Lognormal at 5% Significance Level											
232												
233	**Background Lognormal ROS Statistics Assuming Lognormal Distribution Using Imputed Non-Detects**											
234			Mean in Original Scale		5.562			Mean in Log Scale			1.686	
235			SD in Original Scale		1.381			SD in Log Scale			0.246	
236			95% UTL95% Coverage		8.611			95% BCA UTL95% Coverage			8	
237			95% Bootstrap (%) UTL95% Coverage		8.15			95% UPL (t)			8.131	
238			90% Percentile (z)		7.399			95% Percentile (z)			8.091	
239			99% Percentile (z)		9.568			95% USL			12.06	
240												
241	**Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution**											
242			KM Mean of Logged Data		1.728			95% KM UTL (Lognormal)95% Coverage			8.096	
243			KM SD of Logged Data		0.192			95% KM UPL (Lognormal)			7.742	
244			95% KM Percentile Lognormal (z)		7.712			95% KM USL (Lognormal)			10.53	
245												
246	**Background DL/2 Statistics Assuming Lognormal Distribution**											
247			Mean in Original Scale		4.962			Mean in Log Scale			1.506	
248			SD in Original Scale		2.029			SD in Log Scale			0.455	
249			95% UTL95% Coverage		10.7			95% UPL (t)			9.621	
250			90% Percentile (z)		8.081			95% Percentile (z)			9.534	
251			99% Percentile (z)		13			95% USL			19.96	
252	DL/2 is not a Recommended Method. DL/2 provided for comparisons and historical reasons.											
253												
254	**Nonparametric Distribution Free Background Statistics**											
255	Data do not follow a Discernible Distribution (0.05)											
256												
257	**Nonparametric Upper Limits for BTVs(no distinction made between detects and nondetects)**											
258			Order of Statistic, r		116			95% UTL with95% Coverage			8.1	
259			Approx, f used to compute achieved CC		1.526			Approximate Actual Confidence Coefficient achieved by UTL			0.851	
260			Approximate Sample Size needed to achieve specified CC		153			95% UPL			8	

261					95% USL	9.5				95% KM Chebyshev UPL		10.91
262												
263	Note: The use of USL tends to yield a conservative estimate of BTV, especially when the sample size starts exceeding 20.											
264	Therefore, one may use USL to estimate a BTV only when the data set represents a background data set free of outliers											
265	and consists of observations collected from clean unimpacted locations.											
266	The use of USL tends to provide a balance between false positives and false negatives provided the data											
267	represents a background data set and when many onsite observations need to be compared with the BTV.											
268												
269	**CALCIUM, TOTAL**											
270												
271	**General Statistics**											
272					Total Number of Observations	60				Number of Distinct Observations		30
273										Number of Missing Observations		74
274					Minimum	12				First Quartile		14
275					Second Largest	20.1				Median		15.4
276					Maximum	21				Third Quartile		17.4
277					Mean	16.07				SD		2.189
278					Coefficient of Variation	0.136				Skewness		0.307
279					Mean of logged Data	2.768				SD of logged Data		0.136
280												
281	**Critical Values for Background Threshold Values (BTVs)**											
282					Tolerance Factor K (For UTL)	2.017				d2max (for USL)		3.027
283												
284	**Normal GOF Test**											
285					Shapiro Wilk Test Statistic	0.949				**Normal GOF Test**		
286					5% Shapiro Wilk P Value	0.0273				Data Not Normal at 5% Significance Level		
287					Lilliefors Test Statistic	0.138				**Lilliefors GOF Test**		
288					5% Lilliefors Critical Value	0.114				Data Not Normal at 5% Significance Level		
289	Data Not Normal at 5% Significance Level											
290												
291	**Background Statistics Assuming Normal Distribution**											
292					95% UTL with 95% Coverage	20.49				90% Percentile (z)		18.88
293					95% UPL (t)	19.76				95% Percentile (z)		19.67
294					95% USL	22.7				99% Percentile (z)		21.16
295												
296	**Gamma GOF Test**											
297					A-D Test Statistic	0.89				**Anderson-Darling Gamma GOF Test**		
298					5% A-D Critical Value	0.748				Data Not Gamma Distributed at 5% Significance Level		
299					K-S Test Statistic	0.128				**Kolmogorov-Smirnov Gamma GOF Test**		
300					5% K-S Critical Value	0.114				Data Not Gamma Distributed at 5% Significance Level		
301	Data Not Gamma Distributed at 5% Significance Level											
302												
303	**Gamma Statistics**											
304					k hat (MLE)	55.39				k star (bias corrected MLE)		52.63
305					Theta hat (MLE)	0.29				Theta star (bias corrected MLE)		0.305
306					nu hat (MLE)	6647				nu star (bias corrected)		6316
307					MLE Mean (bias corrected)	16.07				MLE Sd (bias corrected)		2.215
308												
309	**Background Statistics Assuming Gamma Distribution**											
310					95% Wilson Hilferty (WH) Approx. Gamma UPL	19.91				90% Percentile		18.97
311					95% Hawkins Wixley (HW) Approx. Gamma UPL	19.94				95% Percentile		19.88
312					95% WH Approx. Gamma UTL with 95% Coverage	20.76				99% Percentile		21.67

313			95% HW Approx. Gamma UTL with		95% Coverage	20.8						
314					95% WH USL	23.48				95% HW USL		23.6
315												
316						**Lognormal GOF Test**						
317					Shapiro Wilk Test Statistic	0.955				**Shapiro Wilk Lognormal GOF Test**		
318					5% Shapiro Wilk P Value	0.061				Data appear Lognormal at 5% Significance Level		
319					Lilliefors Test Statistic	0.121				**Lilliefors Lognormal GOF Test**		
320					5% Lilliefors Critical Value	0.114				Data Not Lognormal at 5% Significance Level		
321						Data appear Approximate Lognormal at 5% Significance Level						
322												
323						**Background Statistics assuming Lognormal Distribution**						
324					95% UTL with	95% Coverage	20.93			90% Percentile (z)		18.95
325					95% UPL (t)	20.01				95% Percentile (z)		19.9
326					95% USL	24				99% Percentile (z)		21.83
327												
328						**Nonparametric Distribution Free Background Statistics**						
329						Data appear Approximate Lognormal at 5% Significance Level						
330												
331						**Nonparametric Upper Limits for Background Threshold Values**						
332					Order of Statistic, r	59				95% UTL with	95% Coverage	20.1
333					Approx, f used to compute achieved CC	1.553				Approximate Actual Confidence Coefficient achieved by UTL		0.808
334										Approximate Sample Size needed to achieve specified CC		93
335			95% Percentile Bootstrap UTL with		95% Coverage	20.15				95% BCA Bootstrap UTL with	95% Coverage	20.15
336					95% UPL	20.08				90% Percentile		19.23
337					90% Chebyshev UPL	22.69				95% Percentile		19.72
338					95% Chebyshev UPL	25.69				99% Percentile		20.47
339					95% USL	21						
340												
341						Note: The use of USL tends to yield a conservative estimate of BTV, especially when the sample size starts exceeding 20.						
342						Therefore, one may use USL to estimate a BTV only when the data set represents a background data set free of outliers						
343						and consists of observations collected from clean unimpacted locations.						
344						The use of USL tends to provide a balance between false positives and false negatives provided the data						
345						represents a background data set and when many onsite observations need to be compared with the BTV.						
346												
347	**CALCIUM, DISSOLVED**											
348												
349	**General Statistics**											
350					Total Number of Observations	94				Number of Distinct Observations		43
351										Number of Missing Observations		37
352					Minimum	10.4				First Quartile		14
353					Second Largest	20.1				Median		16.4
354					Maximum	20.1				Third Quartile		17.4
355					Mean	15.91				SD		2.217
356					Coefficient of Variation	0.139				Skewness		-0.339
357					Mean of logged Data	2.757				SD of logged Data		0.145
358												
359						**Critical Values for Background Threshold Values (BTVs)**						
360					Tolerance Factor K (For UTL)	1.933				d2max (for USL)		3.188
361												
362						**Normal GOF Test**						
363					Shapiro Wilk Test Statistic	0.948				**Normal GOF Test**		
364					5% Shapiro Wilk P Value	0.00267				Data Not Normal at 5% Significance Level		

365				Lilliefors Test Statistic		0.12	**Lilliefors GOF Test**					
366				5% Lilliefors Critical Value		0.0916	Data Not Normal at 5% Significance Level					
367	Data Not Normal at 5% Significance Level											
368												
369	**Background Statistics Assuming Normal Distribution**											
370			95% UTL with	95% Coverage		20.19			90% Percentile (z)		18.75	
371				95% UPL (t)		19.61			95% Percentile (z)		19.55	
372				95% USL		22.97			99% Percentile (z)		21.06	
373												
374	**Gamma GOF Test**											
375				A-D Test Statistic		1.881	**Anderson-Darling Gamma GOF Test**					
376				5% A-D Critical Value		0.751	Data Not Gamma Distributed at 5% Significance Level					
377				K-S Test Statistic		0.136	**Kolmogorov-Smirnov Gamma GOF Test**					
378				5% K-S Critical Value		0.092	Data Not Gamma Distributed at 5% Significance Level					
379	Data Not Gamma Distributed at 5% Significance Level											
380												
381	**Gamma Statistics**											
382				k hat (MLE)		49.47			k star (bias corrected MLE)		47.9	
383				Theta hat (MLE)		0.322			Theta star (bias corrected MLE)		0.332	
384				nu hat (MLE)		9301			nu star (bias corrected)		9006	
385				MLE Mean (bias corrected)		15.91			MLE Sd (bias corrected)		2.298	
386												
387	**Background Statistics Assuming Gamma Distribution**											
388			95% Wilson Hilferty (WH) Approx. Gamma UPL			19.89			90% Percentile		18.91	
389			95% Hawkins Wixley (HW) Approx. Gamma UPL			19.93			95% Percentile		19.87	
390			95% WH Approx. Gamma UTL with	95% Coverage		20.59			99% Percentile		21.74	
391			95% HW Approx. Gamma UTL with	95% Coverage		20.65						
392				95% WH USL		24.17			95% HW USL		24.36	
393												
394	**Lognormal GOF Test**											
395				Shapiro Wilk Test Statistic		0.933	**Shapiro Wilk Lognormal GOF Test**					
396				5% Shapiro Wilk P Value		9.7820E-5	Data Not Lognormal at 5% Significance Level					
397				Lilliefors Test Statistic		0.142	**Lilliefors Lognormal GOF Test**					
398				5% Lilliefors Critical Value		0.0916	Data Not Lognormal at 5% Significance Level					
399	Data Not Lognormal at 5% Significance Level											
400												
401	**Background Statistics assuming Lognormal Distribution**											
402			95% UTL with	95% Coverage		20.85			90% Percentile (z)		18.97	
403				95% UPL (t)		20.07			95% Percentile (z)		20	
404				95% USL		25.02			99% Percentile (z)		22.08	
405												
406	**Nonparametric Distribution Free Background Statistics**											
407	Data do not follow a Discernible Distribution (0.05)											
408												
409	**Nonparametric Upper Limits for Background Threshold Values**											
410				Order of Statistic, r		92			95% UTL with	95% Coverage	19.4	
411			Approx, f used to compute achieved CC			1.614			Approximate Actual Confidence Coefficient achieved by UTL		0.855	
412									Approximate Sample Size needed to achieve specified CC		124	
413			95% Percentile Bootstrap UTL with	95% Coverage		19.4			95% BCA Bootstrap UTL with	95% Coverage	19.52	
414				95% UPL		19.2			90% Percentile		18.5	
415				90% Chebyshev UPL		22.59			95% Percentile		19.14	
416				95% Chebyshev UPL		25.62			99% Percentile		20.1	

417					95% USL	20.1						
418												
419	Note: The use of USL tends to yield a conservative estimate of BTV, especially when the sample size starts exceeding 20.											
420	Therefore, one may use USL to estimate a BTV only when the data set represents a background data set free of outliers											
421	and consists of observations collected from clean unimpacted locations.											
422	The use of USL tends to provide a balance between false positives and false negatives provided the data											
423	represents a background data set and when many onsite observations need to be compared with the BTV.											
424												
425	**COD (CHEMICAL OXYGEN DEMAND)**											
426												
427	**General Statistics**											
428					Total Number of Observations	130			Number of Missing Observations	4		
429					Number of Distinct Observations	9						
430					Number of Detects	6			Number of Non-Detects	124		
431					Number of Distinct Detects	6			Number of Distinct Non-Detects	4		
432					Minimum Detect	5			Minimum Non-Detect	5		
433					Maximum Detect	31			Maximum Non-Detect	20		
434					Variance Detected	149.5			Percent Non-Detects	95.38%		
435					Mean Detected	17.67			SD Detected	12.23		
436					Mean of Detected Logged Data	2.61			SD of Detected Logged Data	0.838		
437												
438	**Critical Values for Background Threshold Values (BTVs)**											
439					Tolerance Factor K (For UTL)	1.886			d2max (for USL)	3.297		
440												
441	**Normal GOF Test on Detects Only**											
442					Shapiro Wilk Test Statistic	0.814			**Shapiro Wilk GOF Test**			
443					5% Shapiro Wilk Critical Value	0.788			Detected Data appear Normal at 5% Significance Level			
444					Lilliefors Test Statistic	0.261			**Lilliefors GOF Test**			
445					5% Lilliefors Critical Value	0.325			Detected Data appear Normal at 5% Significance Level			
446	Detected Data appear Normal at 5% Significance Level											
447												
448	**Kaplan Meier (KM) Background Statistics Assuming Normal Distribution**											
449					KM Mean	5.749			KM SD	3.622		
450					95% UTL95% Coverage	12.58			95% KM UPL (t)	11.77		
451					90% KM Percentile (z)	10.39			95% KM Percentile (z)	11.71		
452					99% KM Percentile (z)	14.17			95% KM USL	17.69		
453												
454	**DL/2 Substitution Background Statistics Assuming Normal Distribution**											
455					Mean	8.504			SD	4.122		
456					95% UTL95% Coverage	16.28			95% UPL (t)	15.36		
457					90% Percentile (z)	13.79			95% Percentile (z)	15.28		
458					99% Percentile (z)	18.09			95% USL	22.09		
459	DL/2 is not a recommended method. DL/2 provided for comparisons and historical reasons											
460												
461	**Gamma GOF Tests on Detected Observations Only**											
462					A-D Test Statistic	0.61			**Anderson-Darling GOF Test**			
463					5% A-D Critical Value	0.704			Detected data appear Gamma Distributed at 5% Significance Level			
464					K-S Test Statistic	0.294			**Kolmogorov-Smirnov GOF**			
465					5% K-S Critical Value	0.336			Detected data appear Gamma Distributed at 5% Significance Level			
466	Detected data appear Gamma Distributed at 5% Significance Level											
467												
468	**Gamma Statistics on Detected Data Only**											

	A	B	C	D	E	F	G	H	I	J	K	L
469					k hat (MLE)	2.059				k star (bias corrected MLE)		1.141
470					Theta hat (MLE)	8.579				Theta star (bias corrected MLE)		15.49
471					nu hat (MLE)	24.71				nu star (bias corrected)		13.69
472					MLE Mean (bias corrected)	17.67						
473					MLE Sd (bias corrected)	16.54				95% Percentile of Chisquare (2kstar)		6.526
474												
475	**Gamma ROS Statistics using Imputed Non-Detects**											
476	GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs											
477	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)											
478	For such situations, GROS method may yield incorrect values of UCLs and BTVs											
479	This is especially true when the sample size is small.											
480	For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates											
481					Minimum	0.01				Mean		1.545
482					Maximum	31				Median		0.01
483					SD	4.984				CV		3.225
484					k hat (MLE)	0.185				k star (bias corrected MLE)		0.186
485					Theta hat (MLE)	8.336				Theta star (bias corrected MLE)		8.298
486					nu hat (MLE)	48.2				nu star (bias corrected)		48.42
487					MLE Mean (bias corrected)	1.545				MLE Sd (bias corrected)		3.581
488					95% Percentile of Chisquare (2kstar)	1.954				90% Percentile		4.667
489					95% Percentile	8.107				99% Percentile		17.69
490	**The following statistics are computed using Gamma ROS Statistics on Imputed Data**											
491	**Upper Limits using Wilson Hilferty (WH) and Hawkins Wixley (HW) Methods**											
492					WH	HW					WH	HW
493				95% Approx. Gamma UTL with 95% Coverage	5.593	4.824				95% Approx. Gamma UPL	4.277	3.512
494				95% Gamma USL	20.49	23.34						
495												
496	**Estimates of Gamma Parameters using KM Estimates**											
497					Mean (KM)	5.749				SD (KM)		3.622
498					Variance (KM)	13.12				SE of Mean (KM)		0.379
499					k hat (KM)	2.52				k star (KM)		2.467
500					nu hat (KM)	655.1				nu star (KM)		641.3
501					theta hat (KM)	2.282				theta star (KM)		2.331
502					80% gamma percentile (KM)	8.394				90% gamma percentile (KM)		10.65
503					95% gamma percentile (KM)	12.78				99% gamma percentile (KM)		17.44
504												
505	**The following statistics are computed using gamma distribution and KM estimates**											
506	**Upper Limits using Wilson Hilferty (WH) and Hawkins Wixley (HW) Methods**											
507					WH	HW					WH	HW
508				95% Approx. Gamma UTL with 95% Coverage	10.1	9.847				95% Approx. Gamma UPL	9.455	9.22
509				95% KM Gamma Percentile	9.403	9.17				95% Gamma USL	14.93	14.59
510												
511	**Lognormal GOF Test on Detected Observations Only**											
512					Shapiro Wilk Test Statistic	0.831	**Shapiro Wilk GOF Test**					
513					5% Shapiro Wilk Critical Value	0.788	Detected Data appear Lognormal at 5% Significance Level					
514					Lilliefors Test Statistic	0.28	**Lilliefors GOF Test**					
515					5% Lilliefors Critical Value	0.325	Detected Data appear Lognormal at 5% Significance Level					
516	Detected Data appear Lognormal at 5% Significance Level											
517												
518	**Background Lognormal ROS Statistics Assuming Lognormal Distribution Using Imputed Non-Detects**											
519					Mean in Original Scale	2.381				Mean in Log Scale		-0.0972
520					SD in Original Scale	4.659				SD in Log Scale		1.388

521				95% UTL95% Coverage		12.43				95% BCA UTL95% Coverage		12.54
522				95% Bootstrap (%) UTL95% Coverage		12.54				95% UPL (t)		9.121
523				90% Percentile (z)		5.371				95% Percentile (z)		8.893
524				99% Percentile (z)		22.89				95% USL		88.02
525												
526	**Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution**											
527				KM Mean of Logged Data		1.681				95% KM UTL (Lognormal)95% Coverage		9.154
528				KM SD of Logged Data		0.283				95% KM UPL (Lognormal)		8.595
529				95% KM Percentile Lognormal (z)		8.551				95% KM USL (Lognormal)		13.64
530												
531	**Background DL/2 Statistics Assuming Lognormal Distribution**											
532				Mean in Original Scale		8.504				Mean in Log Scale		2.023
533				SD in Original Scale		4.122				SD in Log Scale		0.52
534				95% UTL95% Coverage		20.16				95% UPL (t)		17.96
535				90% Percentile (z)		14.73				95% Percentile (z)		17.79
536				99% Percentile (z)		25.35				95% USL		41.99
537	DL/2 is not a Recommended Method. DL/2 provided for comparisons and historical reasons.											
538												
539	**Nonparametric Distribution Free Background Statistics**											
540	Data appear to follow a Discernible Distribution at 5% Significance Level											
541												
542	**Nonparametric Upper Limits for BTVs(no distinction made between detects and nondetects)**											
543				Order of Statistic, r		127				95% UTL with95% Coverage		20
544				Approx, f used to compute achieved CC		1.671				Approximate Actual Confidence Coefficient achieved by UTL		0.894
545				Approximate Sample Size needed to achieve specified CC		153				95% UPL		20
546				95% USL		31				95% KM Chebyshev UPL		21.6
547												
548	Note: The use of USL tends to yield a conservative estimate of BTV, especially when the sample size starts exceeding 20.											
549	Therefore, one may use USL to estimate a BTV only when the data set represents a background data set free of outliers											
550	and consists of observations collected from clean unimpacted locations.											
551	The use of USL tends to provide a balance between false positives and false negatives provided the data											
552	represents a background data set and when many onsite observations need to be compared with the BTV.											
553												
554	**CHLORIDE**											
555												
556	**General Statistics**											
557				Total Number of Observations		132				Number of Missing Observations		2
558				Number of Distinct Observations		64						
559				Number of Detects		129				Number of Non-Detects		3
560				Number of Distinct Detects		63				Number of Distinct Non-Detects		3
561				Minimum Detect		15				Minimum Non-Detect		18
562				Maximum Detect		33.2				Maximum Non-Detect		41
563				Variance Detected		19.75				Percent Non-Detects		2.273%
564				Mean Detected		25.09				SD Detected		4.444
565				Mean of Detected Logged Data		3.206				SD of Detected Logged Data		0.188
566												
567	**Critical Values for Background Threshold Values (BTVs)**											
568				Tolerance Factor K (For UTL)		1.884				d2max (for USL)		3.302
569												
570	**Normal GOF Test on Detects Only**											
571				Shapiro Wilk Test Statistic		0.954				**Normal GOF Test on Detected Observations Only**		
572				5% Shapiro Wilk P Value		0.00141				Data Not Normal at 5% Significance Level		

	A	B	C	D	E	F	G	H	I	J	K	L
573					Lilliefors Test Statistic	0.0932	**Lilliefors GOF Test**					
574					5% Lilliefors Critical Value	0.0784	Data Not Normal at 5% Significance Level					
575					Data Not Normal at 5% Significance Level							
576												
577					**Kaplan Meier (KM) Background Statistics Assuming Normal Distribution**							
578					KM Mean	24.97	KM SD	4.498				
579					95% UTL95% Coverage	33.44	95% KM UPL (t)	32.45				
580					90% KM Percentile (z)	30.73	95% KM Percentile (z)	32.37				
581					99% KM Percentile (z)	35.43	95% KM USL	39.82				
582												
583					**DL/2 Substitution Background Statistics Assuming Normal Distribution**							
584					Mean	24.82	SD	4.795				
585					95% UTL95% Coverage	33.85	95% UPL (t)	32.79				
586					90% Percentile (z)	30.97	95% Percentile (z)	32.71				
587					99% Percentile (z)	35.98	95% USL	40.65				
588					DL/2 is not a recommended method. DL/2 provided for comparisons and historical reasons							
589												
590					**Gamma GOF Tests on Detected Observations Only**							
591					A-D Test Statistic	1.611	**Anderson-Darling GOF Test**					
592					5% A-D Critical Value	0.75	Data Not Gamma Distributed at 5% Significance Level					
593					K-S Test Statistic	0.119	**Kolmogorov-Smirnov GOF**					
594					5% K-S Critical Value	0.0818	Data Not Gamma Distributed at 5% Significance Level					
595					Data Not Gamma Distributed at 5% Significance Level							
596												
597					**Gamma Statistics on Detected Data Only**							
598					k hat (MLE)	29.96	k star (bias corrected MLE)	29.26				
599					Theta hat (MLE)	0.837	Theta star (bias corrected MLE)	0.857				
600					nu hat (MLE)	7729	nu star (bias corrected)	7550				
601					MLE Mean (bias corrected)	25.09						
602					MLE Sd (bias corrected)	4.638	95% Percentile of Chisquare (2kstar)	77.39				
603												
604					**Gamma ROS Statistics using Imputed Non-Detects**							
605					GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs							
606					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)							
607					For such situations, GROS method may yield incorrect values of UCLs and BTVs							
608					This is especially true when the sample size is small.							
609					For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates							
610					Minimum	15	Mean	24.99				
611					Maximum	33.2	Median	25.5				
612					SD	4.466	CV	0.179				
613					k hat (MLE)	29.53	k star (bias corrected MLE)	28.86				
614					Theta hat (MLE)	0.846	Theta star (bias corrected MLE)	0.866				
615					nu hat (MLE)	7796	nu star (bias corrected)	7620				
616					MLE Mean (bias corrected)	24.99	MLE Sd (bias corrected)	4.651				
617					95% Percentile of Chisquare (2kstar)	76.46	90% Percentile	31.1				
618					95% Percentile	33.1	99% Percentile	37.06				
619					**The following statistics are computed using Gamma ROS Statistics on Imputed Data**							
620					**Upper Limits using Wilson Hilferty (WH) and Hawkins Wixley (HW) Methods**							
621						WH	HW				WH	HW
622					95% Approx. Gamma UTL with 95% Coverage	34.38	34.54	95% Approx. Gamma UPL			33.14	33.25
623					95% Gamma USL	43.13	43.73					
624												

	A	B	C	D	E	F	G	H	I	J	K	L
625	**Estimates of Gamma Parameters using KM Estimates**											
626					Mean (KM)	24.97				SD (KM)		4.498
627					Variance (KM)	20.23				SE of Mean (KM)		0.395
628					k hat (KM)	30.81				k star (KM)		30.12
629					nu hat (KM)	8135				nu star (KM)		7951
630					theta hat (KM)	0.81				theta star (KM)		0.829
631					80% gamma percentile (KM)	28.7				90% gamma percentile (KM)		30.95
632					95% gamma percentile (KM)	32.89				99% gamma percentile (KM)		36.75
633												
634	**The following statistics are computed using gamma distribution and KM estimates**											
635	**Upper Limits using Wilson Hilferty (WH) and Hawkins Wixley (HW) Methods**											
636					WH	HW					WH	HW
637				95% Approx. Gamma UTL with 95% Coverage	34.46	34.62				95% Approx. Gamma UPL	33.2	33.31
638				95% KM Gamma Percentile	33.09	33.21				95% Gamma USL	43.31	43.91
639												
640	**Lognormal GOF Test on Detected Observations Only**											
641					Shapiro Wilk Approximate Test Statistic	0.932	**Shapiro Wilk GOF Test**					
642					5% Shapiro Wilk P Value	9.0713E-7	Data Not Lognormal at 5% Significance Level					
643					Lilliefors Test Statistic	0.132	**Lilliefors GOF Test**					
644					5% Lilliefors Critical Value	0.0784	Data Not Lognormal at 5% Significance Level					
645	Data Not Lognormal at 5% Significance Level											
646												
647	**Background Lognormal ROS Statistics Assuming Lognormal Distribution Using Imputed Non-Detects**											
648					Mean in Original Scale	24.98				Mean in Log Scale		3.201
649					SD in Original Scale	4.469				SD in Log Scale		0.189
650					95% UTL95% Coverage	35.08				95% BCA UTL95% Coverage		32.78
651					95% Bootstrap (%) UTL95% Coverage	32.8				95% UPL (t)		33.64
652					90% Percentile (z)	31.3				95% Percentile (z)		33.53
653					99% Percentile (z)	38.14				95% USL		45.87
654												
655	**Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution**											
656					KM Mean of Logged Data	3.2				95% KM UTL (Lognormal)95% Coverage		35.16
657					KM SD of Logged Data	0.191				95% KM UPL (Lognormal)		33.71
658					95% KM Percentile Lognormal (z)	33.59				95% KM USL (Lognormal)		46.1
659												
660	**Background DL/2 Statistics Assuming Lognormal Distribution**											
661					Mean in Original Scale	24.82				Mean in Log Scale		3.19
662					SD in Original Scale	4.795				SD in Log Scale		0.219
663					95% UTL95% Coverage	36.68				95% UPL (t)		34.94
664					90% Percentile (z)	32.15				95% Percentile (z)		34.81
665					99% Percentile (z)	40.4				95% USL		50.01
666	DL/2 is not a Recommended Method. DL/2 provided for comparisons and historical reasons.											
667												
668	**Nonparametric Distribution Free Background Statistics**											
669	Data do not follow a Discernible Distribution (0.05)											
670												
671	**Nonparametric Upper Limits for BTVs(no distinction made between detects and nondetects)**											
672					Order of Statistic, r	129				95% UTL with95% Coverage		33
673					Approx, f used to compute achieved CC	1.697				Approximate Actual Confidence Coefficient achieved by UTL		0.901
674				Approximate Sample Size needed to achieve specified CC		153				95% UPL		32.6
675					95% USL	41				95% KM Chebyshev UPL		44.65
676												

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.

FLUORIDE

General Statistics

Total Number of Observations	94	Number of Missing Observations	40
Number of Distinct Observations	4		
Number of Detects	0	Number of Non-Detects	94
Number of Distinct Detects	0	Number of Distinct Non-Detects	4
Minimum Detect	N/A	Minimum Non-Detect	0.1
Maximum Detect	N/A	Maximum Non-Detect	0.5
Variance Detected	N/A	Percent Non-Detects	100%
Mean Detected	N/A	SD Detected	N/A
Mean of Detected Logged Data	N/A	SD of Detected Logged Data	N/A

Warning: All observations are Non-Detects (NDs), therefore all statistics and estimates should also be NDs!

Specifically, sample mean, UCLs, UPLs, and other statistics are also NDs lying below the largest detection limit!

The Project Team may decide to use alternative site specific values to estimate environmental parameters (e.g., EPC, BTV).

The data set for variable FLUORIDE was not processed!

IRON, TOTAL

General Statistics

Total Number of Observations	68	Number of Missing Observations	66
Number of Distinct Observations	46		
Number of Detects	65	Number of Non-Detects	3
Number of Distinct Detects	43	Number of Distinct Non-Detects	3
Minimum Detect	0.06	Minimum Non-Detect	0.12
Maximum Detect	3.5	Maximum Non-Detect	0.34
Variance Detected	0.717	Percent Non-Detects	4.412%
Mean Detected	1.13	SD Detected	0.847
Mean of Detected Logged Data	-0.174	SD of Detected Logged Data	0.83

Critical Values for Background Threshold Values (BTVs)

Tolerance Factor K (For UTL)	1.991	d2max (for USL)	3.073

Normal GOF Test on Detects Only

Shapiro Wilk Test Statistic	0.872	**Normal GOF Test on Detected Observations Only**	
5% Shapiro Wilk P Value	2.4030E-7	Data Not Normal at 5% Significance Level	
Lilliefors Test Statistic	0.153	**Lilliefors GOF Test**	
5% Lilliefors Critical Value	0.11	Data Not Normal at 5% Significance Level	

Data Not Normal at 5% Significance Level

Kaplan Meier (KM) Background Statistics Assuming Normal Distribution

KM Mean	1.086	KM SD	0.847
95% UTL95% Coverage	2.772	95% KM UPL (t)	2.509

	A	B	C	D	E	F	G	H	I	J	K	L
729					90% KM Percentile (z)	2.172				95% KM Percentile (z)		2.479
730					99% KM Percentile (z)	3.056				95% KM USL		3.689
731												
732					**DL/2 Substitution Background Statistics Assuming Normal Distribution**							
733					Mean	1.085				SD		0.854
734					95% UTL95% Coverage	2.786				95% UPL (t)		2.52
735					90% Percentile (z)	2.18				95% Percentile (z)		2.49
736					99% Percentile (z)	3.072				95% USL		3.711
737					DL/2 is not a recommended method. DL/2 provided for comparisons and historical reasons							
738												
739					**Gamma GOF Tests on Detected Observations Only**							
740					A-D Test Statistic	0.587	**Anderson-Darling GOF Test**					
741					5% A-D Critical Value	0.765	Detected data appear Gamma Distributed at 5% Significance Level					
742					K-S Test Statistic	0.0751	**Kolmogorov-Smirnov GOF**					
743					5% K-S Critical Value	0.112	Detected data appear Gamma Distributed at 5% Significance Level					
744					Detected data appear Gamma Distributed at 5% Significance Level							
745												
746					**Gamma Statistics on Detected Data Only**							
747					k hat (MLE)	1.832				k star (bias corrected MLE)		1.758
748					Theta hat (MLE)	0.617				Theta star (bias corrected MLE)		0.643
749					nu hat (MLE)	238.2				nu star (bias corrected)		228.5
750					MLE Mean (bias corrected)	1.13						
751					MLE Sd (bias corrected)	0.853				95% Percentile of Chisquare (2kstar)		8.691
752												
753					**Gamma ROS Statistics using Imputed Non-Detects**							
754					GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs							
755					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)							
756					For such situations, GROS method may yield incorrect values of UCLs and BTVs							
757					This is especially true when the sample size is small.							
758					For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates							
759					Minimum	0.0196				Mean		1.083
760					Maximum	3.5				Median		0.8
761					SD	0.857				CV		0.791
762					k hat (MLE)	1.424				k star (bias corrected MLE)		1.371
763					Theta hat (MLE)	0.761				Theta star (bias corrected MLE)		0.79
764					nu hat (MLE)	193.7				nu star (bias corrected)		186.5
765					MLE Mean (bias corrected)	1.083				MLE Sd (bias corrected)		0.925
766					95% Percentile of Chisquare (2kstar)	7.362				90% Percentile		2.308
767					95% Percentile	2.909				99% Percentile		4.274
768					**The following statistics are computed using Gamma ROS Statistics on Imputed Data**							
769					**Upper Limits using Wilson Hilferty (WH) and Hawkins Wixley (HW) Methods**							
770						WH	HW				WH	HW
771					95% Approx. Gamma UTL with 95% Coverage	3.481	3.758			95% Approx. Gamma UPL	2.908	3.072
772					95% Gamma USL	6.054	7.068					
773												
774					**Estimates of Gamma Parameters using KM Estimates**							
775					Mean (KM)	1.086				SD (KM)		0.847
776					Variance (KM)	0.717				SE of Mean (KM)		0.104
777					k hat (KM)	1.646				k star (KM)		1.583
778					nu hat (KM)	223.8				nu star (KM)		215.3
779					theta hat (KM)	0.66				theta star (KM)		0.686
780					80% gamma percentile (KM)	1.671				90% gamma percentile (KM)		2.234

781				95% gamma percentile (KM)		2.78				99% gamma percentile (KM)		4.007
782												
783	**The following statistics are computed using gamma distribution and KM estimates**											
784	**Upper Limits using Wilson Hilferty (WH) and Hawkins Wixley (HW) Methods**											
785					WH	HW					WH	HW
786				95% Approx. Gamma UTL with 95% Coverage	3.338	3.535				95% Approx. Gamma UPL	2.806	2.917
787				95% KM Gamma Percentile	2.75	2.853				95% Gamma USL	5.707	6.471
788												
789	**Lognormal GOF Test on Detected Observations Only**											
790				Shapiro Wilk Approximate Test Statistic		0.963	**Shapiro Wilk GOF Test**					
791				5% Shapiro Wilk P Value		0.118	Detected Data appear Lognormal at 5% Significance Level					
792				Lilliefors Test Statistic		0.0792	**Lilliefors GOF Test**					
793				5% Lilliefors Critical Value		0.11	Detected Data appear Lognormal at 5% Significance Level					
794	Detected Data appear Lognormal at 5% Significance Level											
795												
796	**Background Lognormal ROS Statistics Assuming Lognormal Distribution Using Imputed Non-Detects**											
797				Mean in Original Scale		1.088	Mean in Log Scale					-0.244
798				SD in Original Scale		0.851	SD in Log Scale					0.876
799				95% UTL95% Coverage		4.479	95% BCA UTL95% Coverage					3.13
800				95% Bootstrap (%) UTL95% Coverage		3.2	95% UPL (t)					3.411
801				90% Percentile (z)		2.406	95% Percentile (z)					3.308
802				99% Percentile (z)		6.008	95% USL					11.56
803												
804	**Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution**											
805				KM Mean of Logged Data		-0.265	95% KM UTL (Lognormal)95% Coverage					4.77
806				KM SD of Logged Data		0.918	95% KM UPL (Lognormal)					3.586
807				95% KM Percentile Lognormal (z)		3.472	95% KM USL (Lognormal)					12.88
808												
809	**Background DL/2 Statistics Assuming Lognormal Distribution**											
810				Mean in Original Scale		1.085	Mean in Log Scale					-0.27
811				SD in Original Scale		0.854	SD in Log Scale					0.93
812				95% UTL95% Coverage		4.865	95% UPL (t)					3.643
813				90% Percentile (z)		2.515	95% Percentile (z)					3.526
814				99% Percentile (z)		6.645	95% USL					13.31
815	DL/2 is not a Recommended Method. DL/2 provided for comparisons and historical reasons.											
816												
817	**Nonparametric Distribution Free Background Statistics**											
818	Data appear to follow a Discernible Distribution at 5% Significance Level											
819												
820	**Nonparametric Upper Limits for BTVs(no distinction made between detects and nondetects)**											
821				Order of Statistic, r		67	95% UTL with95% Coverage					3.2
822				Approx, f used to compute achieved CC		1.763	Approximate Actual Confidence Coefficient achieved by UTL					0.86
823				Approximate Sample Size needed to achieve specified CC		93	95% UPL					3
824				95% USL		3.5	95% KM Chebyshev UPL					4.805
825												
826	Note: The use of USL tends to yield a conservative estimate of BTV, especially when the sample size starts exceeding 20.											
827	Therefore, one may use USL to estimate a BTV only when the data set represents a background data set free of outliers											
828	and consists of observations collected from clean unimpacted locations.											
829	The use of USL tends to provide a balance between false positives and false negatives provided the data											
830	represents a background data set and when many onsite observations need to be compared with the BTV.											
831												
832	**IRON, DISSOLVED**											

833												
834	**General Statistics**											
835					Total Number of Observations	105			Number of Missing Observations	26		
836					Number of Distinct Observations	15						
837					Number of Detects	16			Number of Non-Detects	89		
838					Number of Distinct Detects	13			Number of Distinct Non-Detects	3		
839					Minimum Detect	0.06			Minimum Non-Detect	0.02		
840					Maximum Detect	1.2			Maximum Non-Detect	0.06		
841					Variance Detected	0.139			Percent Non-Detects	84.76%		
842					Mean Detected	0.344			SD Detected	0.373		
843					Mean of Detected Logged Data	-1.598			SD of Detected Logged Data	1.058		
844												
845	**Critical Values for Background Threshold Values (BTVs)**											
846					Tolerance Factor K (For UTL)	1.916			d2max (for USL)	3.226		
847												
848	**Normal GOF Test on Detects Only**											
849					Shapiro Wilk Test Statistic	0.767			**Shapiro Wilk GOF Test**			
850					5% Shapiro Wilk Critical Value	0.887			Data Not Normal at 5% Significance Level			
851					Lilliefors Test Statistic	0.27			**Lilliefors GOF Test**			
852					5% Lilliefors Critical Value	0.213			Data Not Normal at 5% Significance Level			
853	Data Not Normal at 5% Significance Level											
854												
855	**Kaplan Meier (KM) Background Statistics Assuming Normal Distribution**											
856					KM Mean	0.0694			KM SD	0.183		
857					95% UTL95% Coverage	0.42			95% KM UPL (t)	0.375		
858					90% KM Percentile (z)	0.304			95% KM Percentile (z)	0.371		
859					99% KM Percentile (z)	0.495			95% KM USL	0.66		
860												
861	**DL/2 Substitution Background Statistics Assuming Normal Distribution**											
862					Mean	0.0775			SD	0.182		
863					95% UTL95% Coverage	0.426			95% UPL (t)	0.381		
864					90% Percentile (z)	0.31			95% Percentile (z)	0.377		
865					99% Percentile (z)	0.5			95% USL	0.664		
866	DL/2 is not a recommended method. DL/2 provided for comparisons and historical reasons											
867												
868	**Gamma GOF Tests on Detected Observations Only**											
869					A-D Test Statistic	0.88			**Anderson-Darling GOF Test**			
870					5% A-D Critical Value	0.762			Data Not Gamma Distributed at 5% Significance Level			
871					K-S Test Statistic	0.243			**Kolmogorov-Smirnov GOF**			
872					5% K-S Critical Value	0.221			Data Not Gamma Distributed at 5% Significance Level			
873	Data Not Gamma Distributed at 5% Significance Level											
874												
875	**Gamma Statistics on Detected Data Only**											
876					k hat (MLE)	1.075			k star (bias corrected MLE)	0.915		
877					Theta hat (MLE)	0.32			Theta star (bias corrected MLE)	0.376		
878					nu hat (MLE)	34.4			nu star (bias corrected)	29.29		
879					MLE Mean (bias corrected)	0.344						
880					MLE Sd (bias corrected)	0.36			95% Percentile of Chisquare (2kstar)	5.659		
881												
882	**Gamma ROS Statistics using Imputed Non-Detects**											
883	GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs											
884	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)											

885	For such situations, GROS method may yield incorrect values of UCLs and BTVs											
886	This is especially true when the sample size is small.											
887	For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates											
888					Minimum	0.01				Mean	0.061	
889					Maximum	1.2				Median	0.01	
890					SD	0.186				CV	3.056	
891					k hat (MLE)	0.475				k star (bias corrected MLE)	0.467	
892					Theta hat (MLE)	0.128				Theta star (bias corrected MLE)	0.13	
893					nu hat (MLE)	99.66				nu star (bias corrected)	98.15	
894					MLE Mean (bias corrected)	0.061				MLE Sd (bias corrected)	0.0892	
895					95% Percentile of Chisquare (2kstar)	3.678				90% Percentile	0.167	
896					95% Percentile	0.24				99% Percentile	0.42	
897	**The following statistics are computed using Gamma ROS Statistics on Imputed Data**											
898	**Upper Limits using Wilson Hilferty (WH) and Hawkins Wixley (HW) Methods**											
899				WH	HW					WH	HW	
900			95% Approx. Gamma UTL with 95% Coverage	0.223	0.201			95% Approx. Gamma UPL		0.179	0.159	
901			95% Gamma USL	0.574	0.578							
902												
903	**Estimates of Gamma Parameters using KM Estimates**											
904					Mean (KM)	0.0694				SD (KM)	0.183	
905					Variance (KM)	0.0335				SE of Mean (KM)	0.0185	
906					k hat (KM)	0.144				k star (KM)	0.146	
907					nu hat (KM)	30.2				nu star (KM)	30.67	
908					theta hat (KM)	0.483				theta star (KM)	0.475	
909					80% gamma percentile (KM)	0.0739				90% gamma percentile (KM)	0.205	
910					95% gamma percentile (KM)	0.384				99% gamma percentile (KM)	0.906	
911												
912	**The following statistics are computed using gamma distribution and KM estimates**											
913	**Upper Limits using Wilson Hilferty (WH) and Hawkins Wixley (HW) Methods**											
914				WH	HW					WH	HW	
915			95% Approx. Gamma UTL with 95% Coverage	0.238	0.218			95% Approx. Gamma UPL		0.197	0.178	
916			95% KM Gamma Percentile	0.193	0.175			95% Gamma USL		0.554	0.548	
917												
918	**Lognormal GOF Test on Detected Observations Only**											
919					Shapiro Wilk Test Statistic	0.892				**Shapiro Wilk GOF Test**		
920					5% Shapiro Wilk Critical Value	0.887				Detected Data appear Lognormal at 5% Significance Level		
921					Lilliefors Test Statistic	0.198				**Lilliefors GOF Test**		
922					5% Lilliefors Critical Value	0.213				Detected Data appear Lognormal at 5% Significance Level		
923	Detected Data appear Lognormal at 5% Significance Level											
924												
925	**Background Lognormal ROS Statistics Assuming Lognormal Distribution Using Imputed Non-Detects**											
926					Mean in Original Scale	0.058				Mean in Log Scale	-5.725	
927					SD in Original Scale	0.187				SD in Log Scale	2.624	
928					95% UTL95% Coverage	0.498				95% BCA UTL95% Coverage	0.67	
929					95% Bootstrap (%) UTL95% Coverage	0.67				95% UPL (t)	0.259	
930					90% Percentile (z)	0.0942				95% Percentile (z)	0.244	
931					99% Percentile (z)	1.461				95% USL	15.49	
932												
933	**Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution**											
934					KM Mean of Logged Data	-3.559				95% KM UTL (Lognormal)95% Coverage	0.167	
935					KM SD of Logged Data	0.923				95% KM UPL (Lognormal)	0.133	
936					95% KM Percentile Lognormal (z)	0.13				95% KM USL (Lognormal)	0.558	

937												
938	**Background DL/2 Statistics Assuming Lognormal Distribution**											
939					Mean in Original Scale	0.0775				Mean in Log Scale	-3.235	
940					SD in Original Scale	0.182				SD in Log Scale	0.813	
941					95% UTL95% Coverage	0.187				95% UPL (t)	0.153	
942					90% Percentile (z)	0.112				95% Percentile (z)	0.15	
943					99% Percentile (z)	0.261				95% USL	0.541	
944	DL/2 is not a Recommended Method. DL/2 provided for comparisons and historical reasons.											
945												
946	**Nonparametric Distribution Free Background Statistics**											
947	Data appear to follow a Discernible Distribution at 5% Significance Level											
948												
949	**Nonparametric Upper Limits for BTVs(no distinction made between detects and nondetects)**											
950					Order of Statistic, r	103				95% UTL with95% Coverage	0.69	
951					Approx, f used to compute achieved CC	1.807				Approximate Actual Confidence Coefficient achieved by UTL	0.901	
952					Approximate Sample Size needed to achieve specified CC	124				95% UPL	0.453	
953					95% USL	1.2				95% KM Chebyshev UPL	0.871	
954												
955	Note: The use of USL tends to yield a conservative estimate of BTV, especially when the sample size starts exceeding 20.											
956	Therefore, one may use USL to estimate a BTV only when the data set represents a background data set free of outliers											
957	and consists of observations collected from clean unimpacted locations.											
958	The use of USL tends to provide a balance between false positives and false negatives provided the data											
959	represents a background data set and when many onsite observations need to be compared with the BTV.											
960												
961	**MAGNESIUM, TOTAL**											
962												
963	**General Statistics**											
964					Total Number of Observations	44				Number of Distinct Observations	26	
965										Number of Missing Observations	90	
966					Minimum	8.9				First Quartile	10	
967					Second Largest	12.5				Median	11	
968					Maximum	12.5				Third Quartile	11.8	
969					Mean	10.99				SD	0.987	
970					Coefficient of Variation	0.0897				Skewness	-0.298	
971					Mean of logged Data	2.393				SD of logged Data	0.0915	
972												
973	**Critical Values for Background Threshold Values (BTVs)**											
974					Tolerance Factor K (For UTL)	2.091				d2max (for USL)	2.906	
975												
976	**Normal GOF Test**											
977					Shapiro Wilk Test Statistic	0.941				**Shapiro Wilk GOF Test**		
978					5% Shapiro Wilk Critical Value	0.944				Data Not Normal at 5% Significance Level		
979					Lilliefors Test Statistic	0.14				**Lilliefors GOF Test**		
980					5% Lilliefors Critical Value	0.132				Data Not Normal at 5% Significance Level		
981	Data Not Normal at 5% Significance Level											
982												
983	**Background Statistics Assuming Normal Distribution**											
984					95% UTL with 95% Coverage	13.06				90% Percentile (z)	12.26	
985					95% UPL (t)	12.67				95% Percentile (z)	12.62	
986					95% USL	13.86				99% Percentile (z)	13.29	
987												
988	**Gamma GOF Test**											

	A	B	C	D	E	F	G	H	I	J	K	L
989					A-D Test Statistic	0.8	**Anderson-Darling Gamma GOF Test**					
990					5% A-D Critical Value	0.747	Data Not Gamma Distributed at 5% Significance Level					
991					K-S Test Statistic	0.146	**Kolmogorov-Smirnov Gamma GOF Test**					
992					5% K-S Critical Value	0.133	Data Not Gamma Distributed at 5% Significance Level					
993					Data Not Gamma Distributed at 5% Significance Level							
994												
995					**Gamma Statistics**							
996					k hat (MLE)	124.1				k star (bias corrected MLE)	115.6	
997					Theta hat (MLE)	0.0886				Theta star (bias corrected MLE)	0.0951	
998					nu hat (MLE)	10918				nu star (bias corrected)	10175	
999					MLE Mean (bias corrected)	10.99				MLE Sd (bias corrected)	1.022	
1000												
1001					**Background Statistics Assuming Gamma Distribution**							
1002				95% Wilson Hilferty (WH) Approx. Gamma UPL		12.75				90% Percentile	12.32	
1003				95% Hawkins Wixley (HW) Approx. Gamma UPL		12.76				95% Percentile	12.73	
1004				95% WH Approx. Gamma UTL with	95% Coverage	13.18				99% Percentile	13.51	
1005				95% HW Approx. Gamma UTL with	95% Coverage	13.2						
1006					95% WH USL	14.12				95% HW USL	14.16	
1007												
1008					**Lognormal GOF Test**							
1009					Shapiro Wilk Test Statistic	0.936	**Shapiro Wilk Lognormal GOF Test**					
1010					5% Shapiro Wilk Critical Value	0.944	Data Not Lognormal at 5% Significance Level					
1011					Lilliefors Test Statistic	0.145	**Lilliefors Lognormal GOF Test**					
1012					5% Lilliefors Critical Value	0.132	Data Not Lognormal at 5% Significance Level					
1013					Data Not Lognormal at 5% Significance Level							
1014												
1015					**Background Statistics assuming Lognormal Distribution**							
1016					95% UTL with	95% Coverage	13.26			90% Percentile (z)	12.31	
1017					95% UPL (t)	12.79				95% Percentile (z)	12.73	
1018					95% USL	14.28				99% Percentile (z)	13.55	
1019												
1020					**Nonparametric Distribution Free Background Statistics**							
1021					Data do not follow a Discernible Distribution (0.05)							
1022												
1023					**Nonparametric Upper Limits for Background Threshold Values**							
1024					Order of Statistic, r	44				95% UTL with	95% Coverage	12.5
1025					Approx, f used to compute achieved CC	2.316				Approximate Actual Confidence Coefficient achieved by UTL		0.895
1026										Approximate Sample Size needed to achieve specified CC		59
1027				95% Percentile Bootstrap UTL with	95% Coverage	12.5				95% BCA Bootstrap UTL with	95% Coverage	12.5
1028					95% UPL	12.48				90% Percentile	12.1	
1029					90% Chebyshev UPL	13.99				95% Percentile	12.39	
1030					95% Chebyshev UPL	15.34				99% Percentile	12.5	
1031					95% USL	12.5						
1032												
1033					Note: The use of USL tends to yield a conservative estimate of BTV, especially when the sample size starts exceeding 20.							
1034					Therefore, one may use USL to estimate a BTV only when the data set represents a background data set free of outliers							
1035					and consists of observations collected from clean unimpacted locations.							
1036					The use of USL tends to provide a balance between false positives and false negatives provided the data							
1037					represents a background data set and when many onsite observations need to be compared with the BTV.							
1038												
1039	**MAGNESIUM, DISSOLVED**											
1040												

1041	**General Statistics**											
1042					Total Number of Observations	77			Number of Distinct Observations		34	
1043									Number of Missing Observations		54	
1044					Minimum	7.9			First Quartile		10.6	
1045					Second Largest	12.9			Median		11.1	
1046					Maximum	12.9			Third Quartile		11.5	
1047					Mean	10.94			SD		0.972	
1048					Coefficient of Variation	0.0888			Skewness		-0.837	
1049					Mean of logged Data	2.388			SD of logged Data		0.0934	
1050												
1051	**Critical Values for Background Threshold Values (BTVs)**											
1052					Tolerance Factor K (For UTL)	1.967			d2max (for USL)		3.118	
1053												
1054	**Normal GOF Test**											
1055					Shapiro Wilk Test Statistic	0.941			**Normal GOF Test**			
1056					5% Shapiro Wilk P Value	0.00243			Data Not Normal at 5% Significance Level			
1057					Lilliefors Test Statistic	0.144			**Lilliefors GOF Test**			
1058					5% Lilliefors Critical Value	0.101			Data Not Normal at 5% Significance Level			
1059	Data Not Normal at 5% Significance Level											
1060												
1061	**Background Statistics Assuming Normal Distribution**											
1062					95% UTL with 95% Coverage	12.85			90% Percentile (z)		12.18	
1063					95% UPL (t)	12.57			95% Percentile (z)		12.54	
1064					95% USL	13.97			99% Percentile (z)		13.2	
1065												
1066	**Gamma GOF Test**											
1067					A-D Test Statistic	1.913			**Anderson-Darling Gamma GOF Test**			
1068					5% A-D Critical Value	0.749			Data Not Gamma Distributed at 5% Significance Level			
1069					K-S Test Statistic	0.158			**Kolmogorov-Smirnov Gamma GOF Test**			
1070					5% K-S Critical Value	0.101			Data Not Gamma Distributed at 5% Significance Level			
1071	Data Not Gamma Distributed at 5% Significance Level											
1072												
1073	**Gamma Statistics**											
1074					k hat (MLE)	120.4			k star (bias corrected MLE)		115.8	
1075					Theta hat (MLE)	0.0908			Theta star (bias corrected MLE)		0.0945	
1076					nu hat (MLE)	18547			nu star (bias corrected)		17826	
1077					MLE Mean (bias corrected)	10.94			MLE Sd (bias corrected)		1.017	
1078												
1079	**Background Statistics Assuming Gamma Distribution**											
1080					95% Wilson Hilferty (WH) Approx. Gamma UPL	12.68			90% Percentile		12.26	
1081					95% Hawkins Wixley (HW) Approx. Gamma UPL	12.69			95% Percentile		12.66	
1082					95% WH Approx. Gamma UTL with 95% Coverage	13			99% Percentile		13.44	
1083					95% HW Approx. Gamma UTL with 95% Coverage	13.02						
1084					95% WH USL	14.34			95% HW USL		14.4	
1085												
1086	**Lognormal GOF Test**											
1087					Shapiro Wilk Test Statistic	0.911			**Shapiro Wilk Lognormal GOF Test**			
1088					5% Shapiro Wilk P Value	1.0804E-5			Data Not Lognormal at 5% Significance Level			
1089					Lilliefors Test Statistic	0.164			**Lilliefors Lognormal GOF Test**			
1090					5% Lilliefors Critical Value	0.101			Data Not Lognormal at 5% Significance Level			
1091	Data Not Lognormal at 5% Significance Level											
1092												

1093	**Background Statistics assuming Lognormal Distribution**											
1094				95% UTL with	95% Coverage	13.09				90% Percentile (z)	12.28	
1095					95% UPL (t)	12.74				95% Percentile (z)	12.7	
1096					95% USL	14.58				99% Percentile (z)	13.54	
1097												
1098	**Nonparametric Distribution Free Background Statistics**											
1099	Data do not follow a Discernible Distribution (0.05)											
1100												
1101	**Nonparametric Upper Limits for Background Threshold Values**											
1102					Order of Statistic, r	76				95% UTL with 95% Coverage	12.9	
1103					Approx, f used to compute achieved CC	2				Approximate Actual Confidence Coefficient achieved by UTL	0.903	
1104										Approximate Sample Size needed to achieve specified CC	93	
1105				95% Percentile Bootstrap UTL with	95% Coverage	12.9				95% BCA Bootstrap UTL with 95% Coverage	12.66	
1106					95% UPL	12.42				90% Percentile	12	
1107					90% Chebyshev UPL	13.87				95% Percentile	12.32	
1108					95% Chebyshev UPL	15.2				99% Percentile	12.9	
1109					95% USL	12.9						
1110												
1111	Note: The use of USL tends to yield a conservative estimate of BTV, especially when the sample size starts exceeding 20.											
1112	Therefore, one may use USL to estimate a BTV only when the data set represents a background data set free of outliers											
1113	and consists of observations collected from clean unimpacted locations.											
1114	The use of USL tends to provide a balance between false positives and false negatives provided the data											
1115	represents a background data set and when many onsite observations need to be compared with the BTV.											
1116												
1117	**MANGANESE, TOTAL**											
1118												
1119	**General Statistics**											
1120					Total Number of Observations	71				Number of Missing Observations	63	
1121					Number of Distinct Observations	12						
1122					Number of Detects	68				Number of Non-Detects	3	
1123					Number of Distinct Detects	12				Number of Distinct Non-Detects	3	
1124					Minimum Detect	0.03				Minimum Non-Detect	0.04	
1125					Maximum Detect	0.15				Maximum Non-Detect	0.06	
1126					Variance Detected	8.0430E-4				Percent Non-Detects	4.225%	
1127					Mean Detected	0.0668				SD Detected	0.0284	
1128					Mean of Detected Logged Data	-2.785				SD of Detected Logged Data	0.388	
1129												
1130	**Critical Values for Background Threshold Values (BTVs)**											
1131					Tolerance Factor K (For UTL)	1.983				d2max (for USL)	3.089	
1132												
1133	**Normal GOF Test on Detects Only**											
1134					Shapiro Wilk Test Statistic	0.858				**Normal GOF Test on Detected Observations Only**		
1135					5% Shapiro Wilk P Value	1.1078E-8				Data Not Normal at 5% Significance Level		
1136					Lilliefors Test Statistic	0.208				**Lilliefors GOF Test**		
1137					5% Lilliefors Critical Value	0.107				Data Not Normal at 5% Significance Level		
1138	Data Not Normal at 5% Significance Level											
1139												
1140	**Kaplan Meier (KM) Background Statistics Assuming Normal Distribution**											
1141					KM Mean	0.0655				KM SD	0.0282	
1142					95% UTL95% Coverage	0.121				95% KM UPL (t)	0.113	
1143					90% KM Percentile (z)	0.102				95% KM Percentile (z)	0.112	
1144					99% KM Percentile (z)	0.131				95% KM USL	0.153	

1145											
1146	**DL/2 Substitution Background Statistics Assuming Normal Distribution**										
1147					Mean	0.065				SD	0.029
1148					95% UTL95% Coverage	0.123				95% UPL (t)	0.114
1149					90% Percentile (z)	0.102				95% Percentile (z)	0.113
1150					99% Percentile (z)	0.133				95% USL	0.155
1151	DL/2 is not a recommended method. DL/2 provided for comparisons and historical reasons										
1152											
1153	**Gamma GOF Tests on Detected Observations Only**										
1154					A-D Test Statistic	2.15	**Anderson-Darling GOF Test**				
1155					5% A-D Critical Value	0.753	Data Not Gamma Distributed at 5% Significance Level				
1156					K-S Test Statistic	0.202	**Kolmogorov-Smirnov GOF**				
1157					5% K-S Critical Value	0.108	Data Not Gamma Distributed at 5% Significance Level				
1158	Data Not Gamma Distributed at 5% Significance Level										
1159											
1160	**Gamma Statistics on Detected Data Only**										
1161					k hat (MLE)	6.573				k star (bias corrected MLE)	6.293
1162					Theta hat (MLE)	0.0102				Theta star (bias corrected MLE)	0.0106
1163					nu hat (MLE)	894				nu star (bias corrected)	855.9
1164					MLE Mean (bias corrected)	0.0668					
1165					MLE Sd (bias corrected)	0.0266				95% Percentile of Chisquare (2kstar)	21.81
1166											
1167	**Gamma ROS Statistics using Imputed Non-Detects**										
1168	GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs										
1169	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)										
1170	For such situations, GROS method may yield incorrect values of UCLs and BTVs										
1171	This is especially true when the sample size is small.										
1172	For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates										
1173					Minimum	0.0193				Mean	0.0653
1174					Maximum	0.15				Median	0.05
1175					SD	0.0287				CV	0.439
1176					k hat (MLE)	5.997				k star (bias corrected MLE)	5.753
1177					Theta hat (MLE)	0.0109				Theta star (bias corrected MLE)	0.0114
1178					nu hat (MLE)	851.5				nu star (bias corrected)	816.9
1179					MLE Mean (bias corrected)	0.0653				MLE Sd (bias corrected)	0.0272
1180					95% Percentile of Chisquare (2kstar)	20.36				90% Percentile	0.102
1181					95% Percentile	0.116				99% Percentile	0.145
1182	**The following statistics are computed using Gamma ROS Statistics on Imputed Data**										
1183	**Upper Limits using Wilson Hilferty (WH) and Hawkins Wixley (HW) Methods**										
1184						WH	HW			WH	HW
1185					95% Approx. Gamma UTL with 95% Coverage	0.128	0.13	95% Approx. Gamma UPL		0.116	0.117
1186					95% Gamma USL	0.181	0.187				
1187											
1188	**Estimates of Gamma Parameters using KM Estimates**										
1189					Mean (KM)	0.0655				SD (KM)	0.0282
1190					Variance (KM)	7.9596E-4				SE of Mean (KM)	0.00337
1191					k hat (KM)	5.395				k star (KM)	5.176
1192					nu hat (KM)	766.1				nu star (KM)	735
1193					theta hat (KM)	0.0121				theta star (KM)	0.0127
1194					80% gamma percentile (KM)	0.0877				90% gamma percentile (KM)	0.104
1195					95% gamma percentile (KM)	0.119				99% gamma percentile (KM)	0.15
1196											

	A	B	C	D	E	F	G	H	I	J	K	L
1197	**The following statistics are computed using gamma distribution and KM estimates**											
1198	**Upper Limits using Wilson Hilferty (WH) and Hawkins Wixley (HW) Methods**											
1199					WH	HW					WH	HW
1200	95% Approx. Gamma UTL with 95% Coverage				0.126	0.127	95% Approx. Gamma UPL				0.115	0.115
1201	95% KM Gamma Percentile				0.113	0.114	95% Gamma USL				0.177	0.182
1202												
1203	**Lognormal GOF Test on Detected Observations Only**											
1204	Shapiro Wilk Approximate Test Statistic					0.928	**Shapiro Wilk GOF Test**					
1205	5% Shapiro Wilk P Value					6.8457E-4	Data Not Lognormal at 5% Significance Level					
1206	Lilliefors Test Statistic					0.192	**Lilliefors GOF Test**					
1207	5% Lilliefors Critical Value					0.107	Data Not Lognormal at 5% Significance Level					
1208	Data Not Lognormal at 5% Significance Level											
1209												
1210	**Background Lognormal ROS Statistics Assuming Lognormal Distribution Using Imputed Non-Detects**											
1211	Mean in Original Scale					0.0655	Mean in Log Scale					-2.807
1212	SD in Original Scale					0.0284	SD in Log Scale					0.398
1213	95% UTL95% Coverage					0.133	95% BCA UTL95% Coverage					0.135
1214	95% Bootstrap (%) UTL95% Coverage					0.14	95% UPL (t)					0.118
1215	90% Percentile (z)					0.1	95% Percentile (z)					0.116
1216	99% Percentile (z)					0.152	95% USL					0.206
1217												
1218	**Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution**											
1219	KM Mean of Logged Data					-2.806	95% KM UTL (Lognormal)95% Coverage					0.132
1220	KM SD of Logged Data					0.393	95% KM UPL (Lognormal)					0.117
1221	95% KM Percentile Lognormal (z)					0.115	95% KM USL (Lognormal)					0.203
1222												
1223	**Background DL/2 Statistics Assuming Lognormal Distribution**											
1224	Mean in Original Scale					0.065	Mean in Log Scale					-2.823
1225	SD in Original Scale					0.029	SD in Log Scale					0.424
1226	95% UTL95% Coverage					0.138	95% UPL (t)					0.121
1227	90% Percentile (z)					0.102	95% Percentile (z)					0.119
1228	99% Percentile (z)					0.159	95% USL					0.22
1229	DL/2 is not a Recommended Method. DL/2 provided for comparisons and historical reasons.											
1230												
1231	**Nonparametric Distribution Free Background Statistics**											
1232	Data do not follow a Discernible Distribution (0.05)											
1233												
1234	**Nonparametric Upper Limits for BTVs(no distinction made between detects and nondetects)**											
1235	Order of Statistic, r					70	95% UTL with95% Coverage					0.15
1236	Approx, f used to compute achieved CC					1.842	Approximate Actual Confidence Coefficient achieved by UTL					0.876
1237	Approximate Sample Size needed to achieve specified CC					93	95% UPL					0.124
1238	95% USL					0.15	95% KM Chebyshev UPL					0.189
1239												
1240	Note: The use of USL tends to yield a conservative estimate of BTV, especially when the sample size starts exceeding 20.											
1241	Therefore, one may use USL to estimate a BTV only when the data set represents a background data set free of outliers											
1242	and consists of observations collected from clean unimpacted locations.											
1243	The use of USL tends to provide a balance between false positives and false negatives provided the data											
1244	represents a background data set and when many onsite observations need to be compared with the BTV.											
1245												
1246	**MANGANESE, DISSOLVED**											
1247												
1248	**General Statistics**											

1249				Total Number of Observations		105				Number of Distinct Observations		15
1250										Number of Missing Observations		26
1251				Minimum		0.03				First Quartile		0.05
1252				Second Largest		0.16				Median		0.06
1253				Maximum		0.17				Third Quartile		0.07
1254				Mean		0.0654				SD		0.0266
1255				Coefficient of Variation		0.407				Skewness		1.815
1256				Mean of logged Data		-2.792				SD of logged Data		0.347
1257												
1258				**Critical Values for Background Threshold Values (BTVs)**								
1259				Tolerance Factor K (For UTL)		1.916				d2max (for USL)		3.226
1260												
1261				**Normal GOF Test**								
1262				Shapiro Wilk Test Statistic		0.807				**Normal GOF Test**		
1263				5% Shapiro Wilk P Value		0				Data Not Normal at 5% Significance Level		
1264				Lilliefors Test Statistic		0.266				**Lilliefors GOF Test**		
1265				5% Lilliefors Critical Value		0.0867				Data Not Normal at 5% Significance Level		
1266				Data Not Normal at 5% Significance Level								
1267												
1268				**Background Statistics Assuming Normal Distribution**								
1269				95% UTL with 95% Coverage		0.116				90% Percentile (z)		0.0996
1270				95% UPL (t)		0.11				95% Percentile (z)		0.109
1271				95% USL		0.151				99% Percentile (z)		0.127
1272												
1273				**Gamma GOF Test**								
1274				A-D Test Statistic		4.063				**Anderson-Darling Gamma GOF Test**		
1275				5% A-D Critical Value		0.753				Data Not Gamma Distributed at 5% Significance Level		
1276				K-S Test Statistic		0.233				**Kolmogorov-Smirnov Gamma GOF Test**		
1277				5% K-S Critical Value		0.0882				Data Not Gamma Distributed at 5% Significance Level		
1278				Data Not Gamma Distributed at 5% Significance Level								
1279												
1280				**Gamma Statistics**								
1281				k hat (MLE)		7.822				k star (bias corrected MLE)		7.604
1282				Theta hat (MLE)		0.00837				Theta star (bias corrected MLE)		0.0086
1283				nu hat (MLE)		1643				nu star (bias corrected)		1597
1284				MLE Mean (bias corrected)		0.0654				MLE Sd (bias corrected)		0.0237
1285												
1286				**Background Statistics Assuming Gamma Distribution**								
1287				95% Wilson Hilferty (WH) Approx. Gamma UPL		0.109				90% Percentile		0.0971
1288				95% Hawkins Wixley (HW) Approx. Gamma UPL		0.109				95% Percentile		0.109
1289				95% WH Approx. Gamma UTL with 95% Coverage		0.117				99% Percentile		0.133
1290				95% HW Approx. Gamma UTL with 95% Coverage		0.118						
1291				95% WH USL		0.169				95% HW USL		0.172
1292												
1293				**Lognormal GOF Test**								
1294				Shapiro Wilk Test Statistic		0.919				**Shapiro Wilk Lognormal GOF Test**		
1295				5% Shapiro Wilk P Value		4.7463E-7				Data Not Lognormal at 5% Significance Level		
1296				Lilliefors Test Statistic		0.21				**Lilliefors Lognormal GOF Test**		
1297				5% Lilliefors Critical Value		0.0867				Data Not Lognormal at 5% Significance Level		
1298				Data Not Lognormal at 5% Significance Level								
1299												
1300				**Background Statistics assuming Lognormal Distribution**								

1301				95% UTL with	95% Coverage	0.119				90% Percentile (z)		0.0957
1302					95% UPL (t)	0.109				95% Percentile (z)		0.109
1303					95% USL	0.188				99% Percentile (z)		0.138
1304												
1305						**Nonparametric Distribution Free Background Statistics**							
1306						Data do not follow a Discernible Distribution (0.05)							
1307												
1308						**Nonparametric Upper Limits for Background Threshold Values**							
1309					Order of Statistic, r	103				95% UTL with	95% Coverage	0.15
1310					Approx, f used to compute achieved CC	1.807				Approximate Actual Confidence Coefficient achieved by UTL		0.901
1311										Approximate Sample Size needed to achieve specified CC		124
1312				95% Percentile Bootstrap UTL with	95% Coverage	0.148				95% BCA Bootstrap UTL with	95% Coverage	0.148
1313					95% UPL	0.127				90% Percentile		0.1
1314					90% Chebyshev UPL	0.146				95% Percentile		0.118
1315					95% Chebyshev UPL	0.182				99% Percentile		0.16
1316					95% USL	0.17						
1317												
1318						Note: The use of USL tends to yield a conservative estimate of BTV, especially when the sample size starts exceeding 20.							
1319						Therefore, one may use USL to estimate a BTV only when the data set represents a background data set free of outliers							
1320						and consists of observations collected from clean unimpacted locations.							
1321						The use of USL tends to provide a balance between false positives and false negatives provided the data							
1322						represents a background data set and when many onsite observations need to be compared with the BTV.							
1323												
1324	**NITRATE-NITROGEN**											
1325												
1326						**General Statistics**							
1327					Total Number of Observations	130				Number of Missing Observations		4
1328					Number of Distinct Observations	49						
1329					Number of Detects	127				Number of Non-Detects		3
1330					Number of Distinct Detects	49				Number of Distinct Non-Detects		3
1331					Minimum Detect	13.6				Minimum Non-Detect		21
1332					Maximum Detect	24.9				Maximum Non-Detect		23
1333					Variance Detected	4.486				Percent Non-Detects		2.308%
1334					Mean Detected	20.58				SD Detected		2.118
1335					Mean of Detected Logged Data	3.019				SD of Detected Logged Data		0.108
1336												
1337						**Critical Values for Background Threshold Values (BTVs)**							
1338					Tolerance Factor K (For UTL)	1.886				d2max (for USL)		3.297
1339												
1340						**Normal GOF Test on Detects Only**							
1341					Shapiro Wilk Test Statistic	0.964				**Normal GOF Test on Detected Observations Only**		
1342					5% Shapiro Wilk P Value	0.0219				Data Not Normal at 5% Significance Level		
1343					Lilliefors Test Statistic	0.0975				**Lilliefors GOF Test**		
1344					5% Lilliefors Critical Value	0.079				Data Not Normal at 5% Significance Level		
1345						Data Not Normal at 5% Significance Level						
1346												
1347						**Kaplan Meier (KM) Background Statistics Assuming Normal Distribution**							
1348					KM Mean	20.56				KM SD		2.109
1349					95% UTL95% Coverage	24.54				95% KM UPL (t)		24.07
1350					90% KM Percentile (z)	23.26				95% KM Percentile (z)		24.03
1351					99% KM Percentile (z)	25.47				95% KM USL		27.51
1352												

	A	B	C	D	E	F	G	H	I	J	K	L
1353	**DL/2 Substitution Background Statistics Assuming Normal Distribution**											
1354					Mean	20.36				SD		2.544
1355					95% UTL95% Coverage	25.16				95% UPL (t)		24.59
1356					90% Percentile (z)	23.62				95% Percentile (z)		24.55
1357					99% Percentile (z)	26.28				95% USL		28.75
1358	DL/2 is not a recommended method. DL/2 provided for comparisons and historical reasons											
1359												
1360	**Gamma GOF Tests on Detected Observations Only**											
1361					A-D Test Statistic	1.442	**Anderson-Darling GOF Test**					
1362					5% A-D Critical Value	0.75	Data Not Gamma Distributed at 5% Significance Level					
1363					K-S Test Statistic	0.109	**Kolmogorov-Smirnov GOF**					
1364					5% K-S Critical Value	0.0822	Data Not Gamma Distributed at 5% Significance Level					
1365	Data Not Gamma Distributed at 5% Significance Level											
1366												
1367	**Gamma Statistics on Detected Data Only**											
1368					k hat (MLE)	89.92				k star (bias corrected MLE)		87.8
1369					Theta hat (MLE)	0.229				Theta star (bias corrected MLE)		0.234
1370					nu hat (MLE)	22840				nu star (bias corrected)		22301
1371					MLE Mean (bias corrected)	20.58						
1372					MLE Sd (bias corrected)	2.197				95% Percentile of Chisquare (2kstar)		207.5
1373												
1374	**Gamma ROS Statistics using Imputed Non-Detects**											
1375	GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs											
1376	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)											
1377	For such situations, GROS method may yield incorrect values of UCLs and BTVs											
1378	This is especially true when the sample size is small.											
1379	For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates											
1380					Minimum	13.6				Mean		20.56
1381					Maximum	24.9				Median		21
1382					SD	2.099				CV		0.102
1383					k hat (MLE)	91.52				k star (bias corrected MLE)		89.42
1384					Theta hat (MLE)	0.225				Theta star (bias corrected MLE)		0.23
1385					nu hat (MLE)	23796				nu star (bias corrected)		23248
1386					MLE Mean (bias corrected)	20.56				MLE Sd (bias corrected)		2.175
1387					95% Percentile of Chisquare (2kstar)	211				90% Percentile		23.39
1388					95% Percentile	24.27				99% Percentile		25.96
1389	**The following statistics are computed using Gamma ROS Statistics on Imputed Data**											
1390	**Upper Limits using Wilson Hilferty (WH) and Hawkins Wixley (HW) Methods**											
1391					WH	HW					WH	HW
1392				95% Approx. Gamma UTL with 95% Coverage	24.82	24.87				95% Approx. Gamma UPL	24.28	24.31
1393				95% Gamma USL	28.43	28.58						
1394												
1395	**Estimates of Gamma Parameters using KM Estimates**											
1396					Mean (KM)	20.56				SD (KM)		2.109
1397					Variance (KM)	4.449				SE of Mean (KM)		0.187
1398					k hat (KM)	95				k star (KM)		92.82
1399					nu hat (KM)	24701				nu star (KM)		24132
1400					theta hat (KM)	0.216				theta star (KM)		0.222
1401					80% gamma percentile (KM)	22.33				90% gamma percentile (KM)		23.34
1402					95% gamma percentile (KM)	24.19				99% gamma percentile (KM)		25.85
1403												
1404	**The following statistics are computed using gamma distribution and KM estimates**											

	A	B	C	D	E	F	G	H	I	J	K	L
1405	**Upper Limits using Wilson Hilferty (WH) and Hawkins Wixley (HW) Methods**											
1406					WH	HW					WH	HW
1407	95% Approx. Gamma UTL with 95% Coverage				24.84	24.89	95% Approx. Gamma UPL				24.3	24.33
1408	95% KM Gamma Percentile				24.25	24.29	95% Gamma USL				28.48	28.63
1409												
1410	**Lognormal GOF Test on Detected Observations Only**											
1411	Shapiro Wilk Approximate Test Statistic				0.943		**Shapiro Wilk GOF Test**					
1412	5% Shapiro Wilk P Value				4.6428E-5		Data Not Lognormal at 5% Significance Level					
1413	Lilliefors Test Statistic				0.114		**Lilliefors GOF Test**					
1414	5% Lilliefors Critical Value				0.079		Data Not Lognormal at 5% Significance Level					
1415	Data Not Lognormal at 5% Significance Level											
1416												
1417	**Background Lognormal ROS Statistics Assuming Lognormal Distribution Using Imputed Non-Detects**											
1418	Mean in Original Scale				20.56		Mean in Log Scale				3.018	
1419	SD in Original Scale				2.1		SD in Log Scale				0.107	
1420	95% UTL95% Coverage				25.01		95% BCA UTL95% Coverage				23.6	
1421	95% Bootstrap (%) UTL95% Coverage				24		95% UPL (t)				24.42	
1422	90% Percentile (z)				23.45		95% Percentile (z)				24.37	
1423	99% Percentile (z)				26.21		95% USL				29.07	
1424												
1425	**Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution**											
1426	KM Mean of Logged Data				3.018		95% KM UTL (Lognormal)95% Coverage				25.03	
1427	KM SD of Logged Data				0.107		95% KM UPL (Lognormal)				24.44	
1428	95% KM Percentile Lognormal (z)				24.39		95% KM USL (Lognormal)				29.13	
1429												
1430	**Background DL/2 Statistics Assuming Lognormal Distribution**											
1431	Mean in Original Scale				20.36		Mean in Log Scale				3.005	
1432	SD in Original Scale				2.544		SD in Log Scale				0.142	
1433	95% UTL95% Coverage				26.37		95% UPL (t)				25.55	
1434	90% Percentile (z)				24.2		95% Percentile (z)				25.48	
1435	99% Percentile (z)				28.07		95% USL				32.22	
1436	DL/2 is not a Recommended Method. DL/2 provided for comparisons and historical reasons.											
1437												
1438	**Nonparametric Distribution Free Background Statistics**											
1439	Data do not follow a Discernible Distribution (0.05)											
1440												
1441	**Nonparametric Upper Limits for BTVs(no distinction made between detects and nondetects)**											
1442	Order of Statistic, r				127		95% UTL with95% Coverage				24	
1443	Approx, f used to compute achieved CC				1.671		Approximate Actual Confidence Coefficient achieved by UTL				0.894	
1444	Approximate Sample Size needed to achieve specified CC				153		95% UPL				23.55	
1445	95% USL				24.9		95% KM Chebyshev UPL				29.79	
1446												
1447	Note: The use of USL tends to yield a conservative estimate of BTV, especially when the sample size starts exceeding 20.											
1448	Therefore, one may use USL to estimate a BTV only when the data set represents a background data set free of outliers											
1449	and consists of observations collected from clean unimpacted locations.											
1450	The use of USL tends to provide a balance between false positives and false negatives provided the data											
1451	represents a background data set and when many onsite observations need to be compared with the BTV.											
1452												
1453	**pH-FIELD**											
1454												
1455	**General Statistics**											
1456	Total Number of Observations				119		Number of Missing Observations				15	

1457				Number of Distinct Observations		72						
1458				Number of Detects		115				Number of Non-Detects		4
1459				Number of Distinct Detects		68				Number of Distinct Non-Detects		4
1460				Minimum Detect		4.15				Minimum Non-Detect		4.75
1461				Maximum Detect		6.27				Maximum Non-Detect		5.59
1462				Variance Detected		0.111				Percent Non-Detects		3.361%
1463				Mean Detected		5.051				SD Detected		0.333
1464				Mean of Detected Logged Data		1.618				SD of Detected Logged Data		0.0647
1465												
1466						**Critical Values for Background Threshold Values (BTVs)**							
1467				Tolerance Factor K (For UTL)		1.898				d2max (for USL)		3.268
1468												
1469						**Normal GOF Test on Detects Only**							
1470				Shapiro Wilk Test Statistic		0.919				**Normal GOF Test on Detected Observations Only**		
1471				5% Shapiro Wilk P Value		9.7224E-8				Data Not Normal at 5% Significance Level		
1472				Lilliefors Test Statistic		0.137				**Lilliefors GOF Test**		
1473				5% Lilliefors Critical Value		0.0829				Data Not Normal at 5% Significance Level		
1474						Data Not Normal at 5% Significance Level						
1475												
1476						**Kaplan Meier (KM) Background Statistics Assuming Normal Distribution**						
1477				KM Mean		5.045				KM SD		0.332
1478				95% UTL95% Coverage		5.674				95% KM UPL (t)		5.597
1479				90% KM Percentile (z)		5.47				95% KM Percentile (z)		5.59
1480				99% KM Percentile (z)		5.816				95% KM USL		6.129
1481												
1482						**DL/2 Substitution Background Statistics Assuming Normal Distribution**						
1483				Mean		4.97				SD		0.547
1484				95% UTL95% Coverage		6.008				95% UPL (t)		5.88
1485				90% Percentile (z)		5.671				95% Percentile (z)		5.87
1486				99% Percentile (z)		6.242				95% USL		6.757
1487						DL/2 is not a recommended method. DL/2 provided for comparisons and historical reasons						
1488												
1489						**Gamma GOF Tests on Detected Observations Only**						
1490				A-D Test Statistic		2.836				**Anderson-Darling GOF Test**		
1491				5% A-D Critical Value		0.75				Data Not Gamma Distributed at 5% Significance Level		
1492				K-S Test Statistic		0.127				**Kolmogorov-Smirnov GOF**		
1493				5% K-S Critical Value		0.0853				Data Not Gamma Distributed at 5% Significance Level		
1494						Data Not Gamma Distributed at 5% Significance Level						
1495												
1496						**Gamma Statistics on Detected Data Only**						
1497				k hat (MLE)		239				k star (bias corrected MLE)		232.7
1498				Theta hat (MLE)		0.0211				Theta star (bias corrected MLE)		0.0217
1499				nu hat (MLE)		54959				nu star (bias corrected)		53526
1500				MLE Mean (bias corrected)		5.051						
1501				MLE Sd (bias corrected)		0.331				95% Percentile of Chisquare (2kstar)		516.7
1502												
1503						**Gamma ROS Statistics using Imputed Non-Detects**						
1504						GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs						
1505						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)						
1506						For such situations, GROS method may yield incorrect values of UCLs and BTVs						
1507						This is especially true when the sample size is small.						
1508						For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates						

1509					Minimum	4.15					Mean	5.045
1510					Maximum	6.27					Median	5.01
1511					SD	0.33					CV	0.0654
1512					k hat (MLE)	241.8					k star (bias corrected MLE)	235.7
1513					Theta hat (MLE)	0.0209					Theta star (bias corrected MLE)	0.0214
1514					nu hat (MLE)	57556					nu star (bias corrected)	56107
1515					MLE Mean (bias corrected)	5.045					MLE Sd (bias corrected)	0.329
1516					95% Percentile of Chisquare (2kstar)	523.1					90% Percentile	5.471
1517					95% Percentile	5.598					99% Percentile	5.841
1518	**The following statistics are computed using Gamma ROS Statistics on Imputed Data**											
1519	**Upper Limits using Wilson Hilferty (WH) and Hawkins Wixley (HW) Methods**											
1520					WH	HW					WH	HW
1521				95% Approx. Gamma UTL with 95% Coverage	5.682	5.683				95% Approx. Gamma UPL	5.6	5.601
1522				95% Gamma USL	6.179	6.187						
1523												
1524	**Estimates of Gamma Parameters using KM Estimates**											
1525					Mean (KM)	5.045					SD (KM)	0.332
1526					Variance (KM)	0.11					SE of Mean (KM)	0.0308
1527					k hat (KM)	231.3					k star (KM)	225.4
1528					nu hat (KM)	55038					nu star (KM)	53652
1529					theta hat (KM)	0.0218					theta star (KM)	0.0224
1530					80% gamma percentile (KM)	5.325					90% gamma percentile (KM)	5.48
1531					95% gamma percentile (KM)	5.61					99% gamma percentile (KM)	5.859
1532												
1533	**The following statistics are computed using gamma distribution and KM estimates**											
1534	**Upper Limits using Wilson Hilferty (WH) and Hawkins Wixley (HW) Methods**											
1535					WH	HW					WH	HW
1536				95% Approx. Gamma UTL with 95% Coverage	5.685	5.686				95% Approx. Gamma UPL	5.602	5.603
1537				95% KM Gamma Percentile	5.595	5.596				95% Gamma USL	6.185	6.193
1538												
1539	**Lognormal GOF Test on Detected Observations Only**											
1540					Shapiro Wilk Approximate Test Statistic	0.935	**Shapiro Wilk GOF Test**					
1541					5% Shapiro Wilk P Value	1.2827E-5	Data Not Lognormal at 5% Significance Level					
1542					Lilliefors Test Statistic	0.123	**Lilliefors GOF Test**					
1543					5% Lilliefors Critical Value	0.0829	Data Not Lognormal at 5% Significance Level					
1544	Data Not Lognormal at 5% Significance Level											
1545												
1546	**Background Lognormal ROS Statistics Assuming Lognormal Distribution Using Imputed Non-Detects**											
1547					Mean in Original Scale	5.045					Mean in Log Scale	1.616
1548					SD in Original Scale	0.33					SD in Log Scale	0.0642
1549					95% UTL95% Coverage	5.688					95% BCA UTL95% Coverage	5.94
1550					95% Bootstrap (%) UTL95% Coverage	5.942					95% UPL (t)	5.603
1551					90% Percentile (z)	5.467					95% Percentile (z)	5.596
1552					99% Percentile (z)	5.847					95% USL	6.211
1553												
1554	**Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution**											
1555					KM Mean of Logged Data	1.616					95% KM UTL (Lognormal)95% Coverage	5.691
1556					KM SD of Logged Data	0.0647					95% KM UPL (Lognormal)	5.606
1557					95% KM Percentile Lognormal (z)	5.599					95% KM USL (Lognormal)	6.219
1558												
1559	**Background DL/2 Statistics Assuming Lognormal Distribution**											
1560					Mean in Original Scale	4.97					Mean in Log Scale	1.596

1561				SD in Original Scale		0.547				SD in Log Scale		0.134
1562				95% UTL95% Coverage		6.364				95% UPL (t)		6.168
1563				90% Percentile (z)		5.858				95% Percentile (z)		6.151
1564				99% Percentile (z)		6.741				95% USL		7.651
1565	DL/2 is not a Recommended Method. DL/2 provided for comparisons and historical reasons.											
1566												
1567	**Nonparametric Distribution Free Background Statistics**											
1568	Data do not follow a Discernible Distribution (0.05)											
1569												
1570	**Nonparametric Upper Limits for BTVs(no distinction made between detects and nondetects)**											
1571				Order of Statistic, r		116				95% UTL with95% Coverage		5.94
1572				Approx, f used to compute achieved CC		1.526				Approximate Actual Confidence Coefficient achieved by UTL		0.851
1573				Approximate Sample Size needed to achieve specified CC		153				95% UPL		5.62
1574				95% USL		6.27				95% KM Chebyshev UPL		6.497
1575												
1576	Note: The use of USL tends to yield a conservative estimate of BTV, especially when the sample size starts exceeding 20.											
1577	Therefore, one may use USL to estimate a BTV only when the data set represents a background data set free of outliers											
1578	and consists of observations collected from clean unimpacted locations.											
1579	The use of USL tends to provide a balance between false positives and false negatives provided the data											
1580	represents a background data set and when many onsite observations need to be compared with the BTV.											
1581												
1582	**pH-LAB**											
1583												
1584	**General Statistics**											
1585				Total Number of Observations		128				Number of Missing Observations		6
1586				Number of Distinct Observations		79						
1587				Number of Detects		124				Number of Non-Detects		4
1588				Number of Distinct Detects		77				Number of Distinct Non-Detects		4
1589				Minimum Detect		4.43				Minimum Non-Detect		5.22
1590				Maximum Detect		7.08				Maximum Non-Detect		5.67
1591				Variance Detected		0.118				Percent Non-Detects		3.125%
1592				Mean Detected		5.646				SD Detected		0.344
1593				Mean of Detected Logged Data		1.729				SD of Detected Logged Data		0.0601
1594												
1595	**Critical Values for Background Threshold Values (BTVs)**											
1596				Tolerance Factor K (For UTL)		1.888				d2max (for USL)		3.292
1597												
1598	**Normal GOF Test on Detects Only**											
1599				Shapiro Wilk Test Statistic		0.958				**Normal GOF Test on Detected Observations Only**		
1600				5% Shapiro Wilk P Value		0.00535				Data Not Normal at 5% Significance Level		
1601				Lilliefors Test Statistic		0.0765				**Lilliefors GOF Test**		
1602				5% Lilliefors Critical Value		0.0799				Detected Data appear Normal at 5% Significance Level		
1603	Detected Data appear Approximate Normal at 5% Significance Level											
1604												
1605	**Kaplan Meier (KM) Background Statistics Assuming Normal Distribution**											
1606				KM Mean		5.632				KM SD		0.349
1607				95% UTL95% Coverage		6.291				95% KM UPL (t)		6.213
1608				90% KM Percentile (z)		6.079				95% KM Percentile (z)		6.206
1609				99% KM Percentile (z)		6.444				95% KM USL		6.781
1610												
1611	**DL/2 Substitution Background Statistics Assuming Normal Distribution**											
1612				Mean		5.554				SD		0.617

	A	B	C	D	E	F	G	H	I	J	K	L
1613				95% UTL95% Coverage		6.718					95% UPL (t)	6.58
1614				90% Percentile (z)		6.344					95% Percentile (z)	6.568
1615				99% Percentile (z)		6.989					95% USL	7.584
1616	DL/2 is not a recommended method. DL/2 provided for comparisons and historical reasons											
1617												
1618	Gamma GOF Tests on Detected Observations Only											
1619				A-D Test Statistic		1.174	Anderson-Darling GOF Test					
1620				5% A-D Critical Value		0.75	Data Not Gamma Distributed at 5% Significance Level					
1621				K-S Test Statistic		0.0716	Kolmogorov-Smirnov GOF					
1622				5% K-S Critical Value		0.083	Detected data appear Gamma Distributed at 5% Significance Level					
1623	Detected data follow Appr. Gamma Distribution at 5% Significance Level											
1624												
1625	Gamma Statistics on Detected Data Only											
1626				k hat (MLE)		276.9	k star (bias corrected MLE)					270.2
1627				Theta hat (MLE)		0.0204	Theta star (bias corrected MLE)					0.0209
1628				nu hat (MLE)		68681	nu star (bias corrected)					67021
1629				MLE Mean (bias corrected)		5.646						
1630				MLE Sd (bias corrected)		0.343	95% Percentile of Chisquare (2kstar)					595.7
1631												
1632	Gamma ROS Statistics using Imputed Non-Detects											
1633	GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs											
1634	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)											
1635	For such situations, GROS method may yield incorrect values of UCLs and BTVs											
1636	This is especially true when the sample size is small.											
1637	For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates											
1638				Minimum		4.43	Mean					5.631
1639				Maximum		7.08	Median					5.575
1640				SD		0.349	CV					0.062
1641				k hat (MLE)		267.1	k star (bias corrected MLE)					260.9
1642				Theta hat (MLE)		0.0211	Theta star (bias corrected MLE)					0.0216
1643				nu hat (MLE)		68380	nu star (bias corrected)					66778
1644				MLE Mean (bias corrected)		5.631	MLE Sd (bias corrected)					0.349
1645				95% Percentile of Chisquare (2kstar)		576	90% Percentile					6.083
1646				95% Percentile		6.217	99% Percentile					6.474
1647	The following statistics are computed using Gamma ROS Statistics on Imputed Data											
1648	Upper Limits using Wilson Hilferty (WH) and Hawkins Wixley (HW) Methods											
1649					WH	HW					WH	HW
1650			95% Approx. Gamma UTL with 95% Coverage		6.302	6.304	95% Approx. Gamma UPL				6.219	6.22
1651				95% Gamma USL	6.84	6.849						
1652												
1653	Estimates of Gamma Parameters using KM Estimates											
1654				Mean (KM)		5.632	SD (KM)					0.349
1655				Variance (KM)		0.122	SE of Mean (KM)					0.0312
1656				k hat (KM)		260.4	k star (KM)					254.3
1657				nu hat (KM)		66659	nu star (KM)					65099
1658				theta hat (KM)		0.0216	theta star (KM)					0.0221
1659				80% gamma percentile (KM)		5.927	90% gamma percentile (KM)					6.089
1660				95% gamma percentile (KM)		6.225	99% gamma percentile (KM)					6.486
1661												
1662	The following statistics are computed using gamma distribution and KM estimates											
1663	Upper Limits using Wilson Hilferty (WH) and Hawkins Wixley (HW) Methods											
1664					WH	HW					WH	HW

1665	95% Approx. Gamma UTL with 95% Coverage				6.304	6.306	95% Approx. Gamma UPL				6.22	6.222
1666	95% KM Gamma Percentile				6.213	6.215	95% Gamma USL				6.843	6.851
1667												
1668	**Lognormal GOF Test on Detected Observations Only**											
1669	Shapiro Wilk Approximate Test Statistic				0.968	**Shapiro Wilk GOF Test**						
1670	5% Shapiro Wilk P Value				0.0598	Detected Data appear Lognormal at 5% Significance Level						
1671	Lilliefors Test Statistic				0.0709	**Lilliefors GOF Test**						
1672	5% Lilliefors Critical Value				0.0799	Detected Data appear Lognormal at 5% Significance Level						
1673	Detected Data appear Lognormal at 5% Significance Level											
1674												
1675	**Background Lognormal ROS Statistics Assuming Lognormal Distribution Using Imputed Non-Detects**											
1676	Mean in Original Scale				5.632	Mean in Log Scale					1.727	
1677	SD in Original Scale				0.349	SD in Log Scale					0.0611	
1678	95% UTL95% Coverage				6.309	95% BCA UTL95% Coverage					6.482	
1679	95% Bootstrap (%) UTL95% Coverage				6.52	95% UPL (t)					6.223	
1680	90% Percentile (z)				6.079	95% Percentile (z)					6.216	
1681	99% Percentile (z)				6.48	95% USL					6.874	
1682												
1683	**Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution**											
1684	KM Mean of Logged Data				1.727	95% KM UTL (Lognormal)95% Coverage					6.312	
1685	KM SD of Logged Data				0.0614	95% KM UPL (Lognormal)					6.225	
1686	95% KM Percentile Lognormal (z)				6.218	95% KM USL (Lognormal)					6.88	
1687												
1688	**Background DL/2 Statistics Assuming Lognormal Distribution**											
1689	Mean in Original Scale				5.554	Mean in Log Scale					1.706	
1690	SD in Original Scale				0.617	SD in Log Scale					0.142	
1691	95% UTL95% Coverage				7.2	95% UPL (t)					6.974	
1692	90% Percentile (z)				6.606	95% Percentile (z)					6.956	
1693	99% Percentile (z)				7.663	95% USL					8.788	
1694	DL/2 is not a Recommended Method. DL/2 provided for comparisons and historical reasons.											
1695												
1696	**Nonparametric Distribution Free Background Statistics**											
1697	Data appear to follow a Discernible Distribution at 5% Significance Level											
1698												
1699	**Nonparametric Upper Limits for BTVs(no distinction made between detects and nondetects)**											
1700	Order of Statistic, r				125	95% UTL with95% Coverage					6.52	
1701	Approx, f used to compute achieved CC				1.645	Approximate Actual Confidence Coefficient achieved by UTL					0.887	
1702	Approximate Sample Size needed to achieve specified CC				153	95% UPL					6.171	
1703	95% USL				7.08	95% KM Chebyshev UPL					7.159	
1704												
1705	Note: The use of USL tends to yield a conservative estimate of BTV, especially when the sample size starts exceeding 20.											
1706	Therefore, one may use USL to estimate a BTV only when the data set represents a background data set free of outliers											
1707	and consists of observations collected from clean unimpacted locations.											
1708	The use of USL tends to provide a balance between false positives and false negatives provided the data											
1709	represents a background data set and when many onsite observations need to be compared with the BTV.											
1710												
1711	**POTASSIUM, TOTAL**											
1712												
1713	**General Statistics**											
1714	Total Number of Observations				47	Number of Distinct Observations					20	
1715						Number of Missing Observations					87	
1716	Minimum				1.7	First Quartile					2.2	

1717				Second Largest	3					Median	2.4	
1718				Maximum	3.1					Third Quartile	2.6	
1719				Mean	2.396					SD	0.298	
1720				Coefficient of Variation	0.124					Skewness	0.112	
1721				Mean of logged Data	0.866					SD of logged Data	0.126	
1722												
1723				**Critical Values for Background Threshold Values (BTVs)**								
1724				Tolerance Factor K (For UTL)	2.074					d2max (for USL)	2.933	
1725												
1726				**Normal GOF Test**								
1727				Shapiro Wilk Test Statistic	0.985	**Shapiro Wilk GOF Test**						
1728				5% Shapiro Wilk Critical Value	0.946	Data appear Normal at 5% Significance Level						
1729				Lilliefors Test Statistic	0.09	**Lilliefors GOF Test**						
1730				5% Lilliefors Critical Value	0.128	Data appear Normal at 5% Significance Level						
1731				Data appear Normal at 5% Significance Level								
1732												
1733				**Background Statistics Assuming Normal Distribution**								
1734			95% UTL with	95% Coverage	3.013					90% Percentile (z)	2.777	
1735				95% UPL (t)	2.901					95% Percentile (z)	2.886	
1736				95% USL	3.269					99% Percentile (z)	3.089	
1737												
1738				**Gamma GOF Test**								
1739				A-D Test Statistic	0.294	**Anderson-Darling Gamma GOF Test**						
1740				5% A-D Critical Value	0.747	Detected data appear Gamma Distributed at 5% Significance Level						
1741				K-S Test Statistic	0.0966	**Kolmogorov-Smirnov Gamma GOF Test**						
1742				5% K-S Critical Value	0.129	Detected data appear Gamma Distributed at 5% Significance Level						
1743				Detected data appear Gamma Distributed at 5% Significance Level								
1744												
1745				**Gamma Statistics**								
1746				k hat (MLE)	65.44					k star (bias corrected MLE)	61.28	
1747				Theta hat (MLE)	0.0366					Theta star (bias corrected MLE)	0.0391	
1748				nu hat (MLE)	6152					nu star (bias corrected)	5760	
1749				MLE Mean (bias corrected)	2.396					MLE Sd (bias corrected)	0.306	
1750												
1751				**Background Statistics Assuming Gamma Distribution**								
1752			95% Wilson Hilferty (WH) Approx. Gamma UPL		2.926					90% Percentile	2.795	
1753			95% Hawkins Wixley (HW) Approx. Gamma UPL		2.93					95% Percentile	2.92	
1754			95% WH Approx. Gamma UTL with	95% Coverage	3.057					99% Percentile	3.165	
1755			95% HW Approx. Gamma UTL with	95% Coverage	3.064							
1756				95% WH USL	3.37					95% HW USL	3.385	
1757												
1758				**Lognormal GOF Test**								
1759				Shapiro Wilk Test Statistic	0.983	**Shapiro Wilk Lognormal GOF Test**						
1760				5% Shapiro Wilk Critical Value	0.946	Data appear Lognormal at 5% Significance Level						
1761				Lilliefors Test Statistic	0.104	**Lilliefors Lognormal GOF Test**						
1762				5% Lilliefors Critical Value	0.128	Data appear Lognormal at 5% Significance Level						
1763				Data appear Lognormal at 5% Significance Level								
1764												
1765				**Background Statistics assuming Lognormal Distribution**								
1766			95% UTL with	95% Coverage	3.086					90% Percentile (z)	2.793	
1767				95% UPL (t)	2.943					95% Percentile (z)	2.924	
1768				95% USL	3.437					99% Percentile (z)	3.185	

1769												
1770	**Nonparametric Distribution Free Background Statistics**											
1771	Data appear Normal at 5% Significance Level											
1772												
1773	**Nonparametric Upper Limits for Background Threshold Values**											
1774					Order of Statistic, r	46			95% UTL with 95% Coverage	3		
1775					Approx, f used to compute achieved CC	1.211			Approximate Actual Confidence Coefficient achieved by UTL	0.688		
1776									Approximate Sample Size needed to achieve specified CC	93		
1777					95% Percentile Bootstrap UTL with 95% Coverage	3.07			95% BCA Bootstrap UTL with 95% Coverage	3		
1778					95% UPL	2.96			90% Percentile	2.758		
1779					90% Chebyshev UPL	3.299			95% Percentile	2.87		
1780					95% Chebyshev UPL	3.708			99% Percentile	3.054		
1781					95% USL	3.1						
1782												
1783	Note: The use of USL tends to yield a conservative estimate of BTV, especially when the sample size starts exceeding 20.											
1784	Therefore, one may use USL to estimate a BTV only when the data set represents a background data set free of outliers											
1785	and consists of observations collected from clean unimpacted locations.											
1786	The use of USL tends to provide a balance between false positives and false negatives provided the data											
1787	represents a background data set and when many onsite observations need to be compared with the BTV.											
1788												
1789	**POTASSIUM, DISSOLVED**											
1790												
1791	**General Statistics**											
1792					Total Number of Observations	72			Number of Distinct Observations	35		
1793									Number of Missing Observations	59		
1794					Minimum	1.7			First Quartile	2.238		
1795					Second Largest	3.1			Median	2.3		
1796					Maximum	3.14			Third Quartile	2.5		
1797					Mean	2.381			SD	0.274		
1798					Coefficient of Variation	0.115			Skewness	0.673		
1799					Mean of logged Data	0.861			SD of logged Data	0.113		
1800												
1801	**Critical Values for Background Threshold Values (BTVs)**											
1802					Tolerance Factor K (For UTL)	1.98			d2max (for USL)	3.094		
1803												
1804	**Normal GOF Test**											
1805					Shapiro Wilk Test Statistic	0.932			**Normal GOF Test**			
1806					5% Shapiro Wilk P Value	7.7522E-4			Data Not Normal at 5% Significance Level			
1807					Lilliefors Test Statistic	0.18			**Lilliefors GOF Test**			
1808					5% Lilliefors Critical Value	0.104			Data Not Normal at 5% Significance Level			
1809	Data Not Normal at 5% Significance Level											
1810												
1811	**Background Statistics Assuming Normal Distribution**											
1812					95% UTL with 95% Coverage	2.923			90% Percentile (z)	2.732		
1813					95% UPL (t)	2.84			95% Percentile (z)	2.831		
1814					95% USL	3.228			99% Percentile (z)	3.018		
1815												
1816	**Gamma GOF Test**											
1817					A-D Test Statistic	1.663			**Anderson-Darling Gamma GOF Test**			
1818					5% A-D Critical Value	0.749			Data Not Gamma Distributed at 5% Significance Level			
1819					K-S Test Statistic	0.165			**Kolmogorov-Smirnov Gamma GOF Test**			
1820					5% K-S Critical Value	0.105			Data Not Gamma Distributed at 5% Significance Level			

	A	B	C	D	E	F	G	H	I	J	K	L
1821	Data Not Gamma Distributed at 5% Significance Level											
1822												
1823	Gamma Statistics											
1824					k hat (MLE)	78.73			k star (bias corrected MLE)	75.45		
1825					Theta hat (MLE)	0.0302			Theta star (bias corrected MLE)	0.0315		
1826					nu hat (MLE)	11336			nu star (bias corrected)	10865		
1827					MLE Mean (bias corrected)	2.381			MLE Sd (bias corrected)	0.274		
1828												
1829	Background Statistics Assuming Gamma Distribution											
1830				95% Wilson Hilferty (WH) Approx. Gamma UPL		2.852			90% Percentile	2.738		
1831				95% Hawkins Wixley (HW) Approx. Gamma UPL		2.854			95% Percentile	2.849		
1832				95% WH Approx. Gamma UTL with 95% Coverage		2.945			99% Percentile	3.064		
1833				95% HW Approx. Gamma UTL with 95% Coverage		2.948						
1834				95% WH USL		3.305			95% HW USL	3.318		
1835												
1836	Lognormal GOF Test											
1837				Shapiro Wilk Test Statistic		0.949			Shapiro Wilk Lognormal GOF Test			
1838				5% Shapiro Wilk P Value		0.0131			Data Not Lognormal at 5% Significance Level			
1839				Lilliefors Test Statistic		0.157			Lilliefors Lognormal GOF Test			
1840				5% Lilliefors Critical Value		0.104			Data Not Lognormal at 5% Significance Level			
1841	Data Not Lognormal at 5% Significance Level											
1842												
1843	Background Statistics assuming Lognormal Distribution											
1844				95% UTL with 95% Coverage		2.96			90% Percentile (z)	2.735		
1845				95% UPL (t)		2.86			95% Percentile (z)	2.85		
1846				95% USL		3.358			99% Percentile (z)	3.078		
1847												
1848	Nonparametric Distribution Free Background Statistics											
1849	Data do not follow a Discernible Distribution (0.05)											
1850												
1851	Nonparametric Upper Limits for Background Threshold Values											
1852				Order of Statistic, r		71			95% UTL with 95% Coverage	3.1		
1853				Approx, f used to compute achieved CC		1.868			Approximate Actual Confidence Coefficient achieved by UTL	0.881		
1854									Approximate Sample Size needed to achieve specified CC	93		
1855				95% Percentile Bootstrap UTL with 95% Coverage		3.1			95% BCA Bootstrap UTL with 95% Coverage	3.1		
1856				95% UPL		3.064			90% Percentile	2.7		
1857				90% Chebyshev UPL		3.208			95% Percentile	2.972		
1858				95% Chebyshev UPL		3.582			99% Percentile	3.112		
1859				95% USL		3.14						
1860												
1861	Note: The use of USL tends to yield a conservative estimate of BTV, especially when the sample size starts exceeding 20.											
1862	Therefore, one may use USL to estimate a BTV only when the data set represents a background data set free of outliers											
1863	and consists of observations collected from clean unimpacted locations.											
1864	The use of USL tends to provide a balance between false positives and false negatives provided the data											
1865	represents a background data set and when many onsite observations need to be compared with the BTV.											
1866												
1867	SODIUM, TOTAL											
1868												
1869	General Statistics											
1870				Total Number of Observations		76			Number of Missing Observations	58		
1871				Number of Distinct Observations		30						
1872				Number of Detects		73			Number of Non-Detects	3		

1873					Number of Distinct Detects	30				Number of Distinct Non-Detects		1
1874					Minimum Detect	7.6				Minimum Non-Detect		11
1875					Maximum Detect	16.4				Maximum Non-Detect		11
1876					Variance Detected	2.694				Percent Non-Detects		3.947%
1877					Mean Detected	12.77				SD Detected		1.641
1878					Mean of Detected Logged Data	2.539				SD of Detected Logged Data		0.134
1879												
1880					**Critical Values for Background Threshold Values (BTVs)**							
1881					Tolerance Factor K (For UTL)	1.97				d2max (for USL)		3.114
1882												
1883					**Normal GOF Test on Detects Only**							
1884					Shapiro Wilk Test Statistic	0.968				**Normal GOF Test on Detected Observations Only**		
1885					5% Shapiro Wilk P Value	0.189				Detected Data appear Normal at 5% Significance Level		
1886					Lilliefors Test Statistic	0.141				**Lilliefors GOF Test**		
1887					5% Lilliefors Critical Value	0.104				Data Not Normal at 5% Significance Level		
1888					**Detected Data appear Approximate Normal at 5% Significance Level**							
1889												
1890					**Kaplan Meier (KM) Background Statistics Assuming Normal Distribution**							
1891					KM Mean	12.63				KM SD		1.763
1892					95% UTL95% Coverage	16.1				95% KM UPL (t)		15.58
1893					90% KM Percentile (z)	14.89				95% KM Percentile (z)		15.53
1894					99% KM Percentile (z)	16.73				95% KM USL		18.12
1895												
1896					**DL/2 Substitution Background Statistics Assuming Normal Distribution**							
1897					Mean	12.49				SD		2.149
1898					95% UTL95% Coverage	16.72				95% UPL (t)		16.09
1899					90% Percentile (z)	15.24				95% Percentile (z)		16.02
1900					99% Percentile (z)	17.49				95% USL		19.18
1901					**DL/2 is not a recommended method. DL/2 provided for comparisons and historical reasons**							
1902												
1903					**Gamma GOF Tests on Detected Observations Only**							
1904					A-D Test Statistic	0.877				**Anderson-Darling GOF Test**		
1905					5% A-D Critical Value	0.749				Data Not Gamma Distributed at 5% Significance Level		
1906					K-S Test Statistic	0.156				**Kolmogorov-Smirnov GOF**		
1907					5% K-S Critical Value	0.104				Data Not Gamma Distributed at 5% Significance Level		
1908					**Data Not Gamma Distributed at 5% Significance Level**							
1909												
1910					**Gamma Statistics on Detected Data Only**							
1911					k hat (MLE)	58.45				k star (bias corrected MLE)		56.05
1912					Theta hat (MLE)	0.219				Theta star (bias corrected MLE)		0.228
1913					nu hat (MLE)	8533				nu star (bias corrected)		8184
1914					MLE Mean (bias corrected)	12.77						
1915					MLE Sd (bias corrected)	1.706				95% Percentile of Chisquare (2kstar)		137.8
1916												
1917					**Gamma ROS Statistics using Imputed Non-Detects**							
1918					GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs							
1919					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)							
1920					For such situations, GROS method may yield incorrect values of UCLs and BTVs							
1921					This is especially true when the sample size is small.							
1922					For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates							
1923					Minimum	7.6				Mean		12.66
1924					Maximum	16.4				Median		12.7

	A	B	C	D	E	F	G	H	I	J	K	L
1925					SD	1.711					CV	0.135
1926					k hat (MLE)	52.91					k star (bias corrected MLE)	50.83
1927					Theta hat (MLE)	0.239					Theta star (bias corrected MLE)	0.249
1928					nu hat (MLE)	8042					nu star (bias corrected)	7726
1929					MLE Mean (bias corrected)	12.66					MLE Sd (bias corrected)	1.775
1930				95% Percentile of Chisquare (2kstar)		126.2					90% Percentile	14.98
1931					95% Percentile	15.71					99% Percentile	17.15
1932	**The following statistics are computed using Gamma ROS Statistics on Imputed Data**											
1933	**Upper Limits using Wilson Hilferty (WH) and Hawkins Wixley (HW) Methods**											
1934					WH	HW					WH	HW
1935	95% Approx. Gamma UTL with 95% Coverage				16.33	16.38	95% Approx. Gamma UPL				15.73	15.77
1936	95% Gamma USL				18.83	18.96						
1937												
1938	**Estimates of Gamma Parameters using KM Estimates**											
1939					Mean (KM)	12.63					SD (KM)	1.763
1940					Variance (KM)	3.108					SE of Mean (KM)	0.206
1941					k hat (KM)	51.3					k star (KM)	49.29
1942					nu hat (KM)	7798					nu star (KM)	7491
1943					theta hat (KM)	0.246					theta star (KM)	0.256
1944					80% gamma percentile (KM)	14.11					90% gamma percentile (KM)	14.98
1945					95% gamma percentile (KM)	15.72					99% gamma percentile (KM)	17.18
1946												
1947	**The following statistics are computed using gamma distribution and KM estimates**											
1948	**Upper Limits using Wilson Hilferty (WH) and Hawkins Wixley (HW) Methods**											
1949					WH	HW					WH	HW
1950	95% Approx. Gamma UTL with 95% Coverage				16.47	16.53	95% Approx. Gamma UPL				15.84	15.88
1951	95% KM Gamma Percentile				15.77	15.81	95% Gamma USL				19.09	19.25
1952												
1953	**Lognormal GOF Test on Detected Observations Only**											
1954				Shapiro Wilk Approximate Test Statistic		0.945	**Shapiro Wilk GOF Test**					
1955				5% Shapiro Wilk P Value		0.00625	Data Not Lognormal at 5% Significance Level					
1956				Lilliefors Test Statistic		0.166	**Lilliefors GOF Test**					
1957				5% Lilliefors Critical Value		0.104	Data Not Lognormal at 5% Significance Level					
1958	Data Not Lognormal at 5% Significance Level											
1959												
1960	**Background Lognormal ROS Statistics Assuming Lognormal Distribution Using Imputed Non-Detects**											
1961					Mean in Original Scale	12.66					Mean in Log Scale	2.529
1962					SD in Original Scale	1.71					SD in Log Scale	0.141
1963					95% UTL95% Coverage	16.54					95% BCA UTL95% Coverage	15.9
1964					95% Bootstrap (%) UTL95% Coverage	15.9					95% UPL (t)	15.87
1965					90% Percentile (z)	15.01					95% Percentile (z)	15.8
1966					99% Percentile (z)	17.39					95% USL	19.43
1967												
1968	**Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution**											
1969					KM Mean of Logged Data	2.525					95% KM UTL (Lognormal)95% Coverage	16.73
1970					KM SD of Logged Data	0.148					95% KM UPL (Lognormal)	16.01
1971					95% KM Percentile Lognormal (z)	15.94					95% KM USL (Lognormal)	19.81
1972												
1973	**Background DL/2 Statistics Assuming Lognormal Distribution**											
1974					Mean in Original Scale	12.49					Mean in Log Scale	2.506
1975					SD in Original Scale	2.149					SD in Log Scale	0.21
1976					95% UTL95% Coverage	18.52					95% UPL (t)	17.42

1977				90% Percentile (z)		16.03				95% Percentile (z)		17.3
1978				99% Percentile (z)		19.96				95% USL		23.55
1979	DL/2 is not a Recommended Method. DL/2 provided for comparisons and historical reasons.											
1980												
1981	Nonparametric Distribution Free Background Statistics											
1982	Data appear to follow a Discernible Distribution at 5% Significance Level											
1983												
1984	Nonparametric Upper Limits for BTVs(no distinction made between detects and nondetects)											
1985				Order of Statistic, r		75				95% UTL with95% Coverage		15.9
1986				Approx, f used to compute achieved CC		1.974				Approximate Actual Confidence Coefficient achieved by UTL		0.899
1987				Approximate Sample Size needed to achieve specified CC		93				95% UPL		15.8
1988				95% USL		16.4				95% KM Chebyshev UPL		20.36
1989												
1990	Note: The use of USL tends to yield a conservative estimate of BTV, especially when the sample size starts exceeding 20.											
1991	Therefore, one may use USL to estimate a BTV only when the data set represents a background data set free of outliers											
1992	and consists of observations collected from clean unimpacted locations.											
1993	The use of USL tends to provide a balance between false positives and false negatives provided the data											
1994	represents a background data set and when many onsite observations need to be compared with the BTV.											
1995												
1996	SODIUM, DISSOLVED											
1997												
1998	General Statistics											
1999				Total Number of Observations		98				Number of Distinct Observations		36
2000										Number of Missing Observations		33
2001				Minimum		10.7				First Quartile		12.33
2002				Second Largest		16				Median		13.05
2003				Maximum		16.4				Third Quartile		13.95
2004				Mean		13.11				SD		1.203
2005				Coefficient of Variation		0.0918				Skewness		0.118
2006				Mean of logged Data		2.569				SD of logged Data		0.0922
2007												
2008	Critical Values for Background Threshold Values (BTVs)											
2009				Tolerance Factor K (For UTL)		1.927				d2max (for USL)		3.203
2010												
2011	Normal GOF Test											
2012				Shapiro Wilk Test Statistic		0.967				Normal GOF Test		
2013				5% Shapiro Wilk P Value		0.0924				Data appear Normal at 5% Significance Level		
2014				Lilliefors Test Statistic		0.0866				Lilliefors GOF Test		
2015				5% Lilliefors Critical Value		0.0897				Data appear Normal at 5% Significance Level		
2016	Data appear Normal at 5% Significance Level											
2017												
2018	Background Statistics Assuming Normal Distribution											
2019				95% UTL with 95% Coverage		15.43				90% Percentile (z)		14.65
2020				95% UPL (t)		15.12				95% Percentile (z)		15.09
2021				95% USL		16.96				99% Percentile (z)		15.91
2022												
2023	Gamma GOF Test											
2024				A-D Test Statistic		0.726				Anderson-Darling Gamma GOF Test		
2025				5% A-D Critical Value		0.75				Detected data appear Gamma Distributed at 5% Significance Level		
2026				K-S Test Statistic		0.0986				Kolmogorov-Smirnov Gamma GOF Test		
2027				5% K-S Critical Value		0.0901				Data Not Gamma Distributed at 5% Significance Level		
2028	Detected data follow Appr. Gamma Distribution at 5% Significance Level											

	A	B	C	D	E	F	G	H	I	J	K	L
2029												
2030	**Gamma Statistics**											
2031					k hat (MLE)	119.5			k star (bias corrected MLE)			115.8
2032					Theta hat (MLE)	0.11			Theta star (bias corrected MLE)			0.113
2033					nu hat (MLE)	23415			nu star (bias corrected)			22699
2034					MLE Mean (bias corrected)	13.11			MLE Sd (bias corrected)			1.218
2035												
2036	**Background Statistics Assuming Gamma Distribution**											
2037				95% Wilson Hilferty (WH) Approx. Gamma UPL		15.18			90% Percentile			14.69
2038				95% Hawkins Wixley (HW) Approx. Gamma UPL		15.19			95% Percentile			15.17
2039				95% WH Approx. Gamma UTL with	95% Coverage	15.53			99% Percentile			16.11
2040				95% HW Approx. Gamma UTL with	95% Coverage	15.54						
2041					95% WH USL	17.32			95% HW USL			17.37
2042												
2043	**Lognormal GOF Test**											
2044					Shapiro Wilk Test Statistic	0.964			**Shapiro Wilk Lognormal GOF Test**			
2045					5% Shapiro Wilk P Value	0.0485			Data Not Lognormal at 5% Significance Level			
2046					Lilliefors Test Statistic	0.105			**Lilliefors Lognormal GOF Test**			
2047					5% Lilliefors Critical Value	0.0897			Data Not Lognormal at 5% Significance Level			
2048	Data Not Lognormal at 5% Significance Level											
2049												
2050	**Background Statistics assuming Lognormal Distribution**											
2051					95% UTL with	95% Coverage	15.59		90% Percentile (z)			14.69
2052					95% UPL (t)	15.23			95% Percentile (z)			15.19
2053					95% USL	17.54			99% Percentile (z)			16.18
2054												
2055	**Nonparametric Distribution Free Background Statistics**											
2056	Data appear Normal at 5% Significance Level											
2057												
2058	**Nonparametric Upper Limits for Background Threshold Values**											
2059					Order of Statistic, r	96			95% UTL with	95% Coverage		15.8
2060					Approx, f used to compute achieved CC	1.684			Approximate Actual Confidence Coefficient achieved by UTL			0.873
2061									Approximate Sample Size needed to achieve specified CC			124
2062				95% Percentile Bootstrap UTL with	95% Coverage	15.8			95% BCA Bootstrap UTL with	95% Coverage		15.83
2063					95% UPL	15.21			90% Percentile			14.53
2064					90% Chebyshev UPL	16.74			95% Percentile			15.03
2065					95% Chebyshev UPL	18.38			99% Percentile			16.01
2066					95% USL	16.4						
2067												
2068	Note: The use of USL tends to yield a conservative estimate of BTV, especially when the sample size starts exceeding 20.											
2069	Therefore, one may use USL to estimate a BTV only when the data set represents a background data set free of outliers											
2070	and consists of observations collected from clean unimpacted locations.											
2071	The use of USL tends to provide a balance between false positives and false negatives provided the data											
2072	represents a background data set and when many onsite observations need to be compared with the BTV.											
2073												
2074	**SPEC. COND., FIELD**											
2075												
2076	**General Statistics**											
2077					Total Number of Observations	119			Number of Missing Observations			14
2078					Number of Distinct Observations	70						
2079					Number of Detects	115			Number of Non-Detects			4
2080					Number of Distinct Detects	70			Number of Distinct Non-Detects			4

2081					Minimum Detect	173					Minimum Non-Detect	254
2082					Maximum Detect	358					Maximum Non-Detect	266
2083					Variance Detected	1009					Percent Non-Detects	3.361%
2084					Mean Detected	275.5					SD Detected	31.76
2085					Mean of Detected Logged Data	5.611					SD of Detected Logged Data	0.122
2086												
2087					**Critical Values for Background Threshold Values (BTVs)**							
2088					Tolerance Factor K (For UTL)	1.898					d2max (for USL)	3.268
2089												
2090					**Normal GOF Test on Detects Only**							
2091					Shapiro Wilk Test Statistic	0.971	**Normal GOF Test on Detected Observations Only**					
2092					5% Shapiro Wilk P Value	0.125	Detected Data appear Normal at 5% Significance Level					
2093					Lilliefors Test Statistic	0.0636	**Lilliefors GOF Test**					
2094					5% Lilliefors Critical Value	0.0829	Detected Data appear Normal at 5% Significance Level					
2095					Detected Data appear Normal at 5% Significance Level							
2096												
2097					**Kaplan Meier (KM) Background Statistics Assuming Normal Distribution**							
2098					KM Mean	274.2					KM SD	32.07
2099					95% UTL95% Coverage	335.1					95% KM UPL (t)	327.6
2100					90% KM Percentile (z)	315.3					95% KM Percentile (z)	327
2101					99% KM Percentile (z)	348.8					95% KM USL	379
2102												
2103					**DL/2 Substitution Background Statistics Assuming Normal Distribution**							
2104					Mean	270.6					SD	40.79
2105					95% UTL95% Coverage	348					95% UPL (t)	338.5
2106					90% Percentile (z)	322.9					95% Percentile (z)	337.7
2107					99% Percentile (z)	365.5					95% USL	403.9
2108					DL/2 is not a recommended method. DL/2 provided for comparisons and historical reasons							
2109												
2110					**Gamma GOF Tests on Detected Observations Only**							
2111					A-D Test Statistic	1.175	**Anderson-Darling GOF Test**					
2112					5% A-D Critical Value	0.75	Data Not Gamma Distributed at 5% Significance Level					
2113					K-S Test Statistic	0.0747	**Kolmogorov-Smirnov GOF**					
2114					5% K-S Critical Value	0.0853	Detected data appear Gamma Distributed at 5% Significance Level					
2115					Detected data follow Appr. Gamma Distribution at 5% Significance Level							
2116												
2117					**Gamma Statistics on Detected Data Only**							
2118					k hat (MLE)	70.92					k star (bias corrected MLE)	69.08
2119					Theta hat (MLE)	3.884					Theta star (bias corrected MLE)	3.987
2120					nu hat (MLE)	16313					nu star (bias corrected)	15889
2121					MLE Mean (bias corrected)	275.5						
2122					MLE Sd (bias corrected)	33.14					95% Percentile of Chisquare (2kstar)	166.6
2123												
2124					**Gamma ROS Statistics using Imputed Non-Detects**							
2125					GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs							
2126					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)							
2127					For such situations, GROS method may yield incorrect values of UCLs and BTVs							
2128					This is especially true when the sample size is small.							
2129					For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates							
2130					Minimum	173					Mean	274.3
2131					Maximum	358					Median	276
2132					SD	31.8					CV	0.116

	A	B	C	D	E	F	G	H	I	J	K	L
2133					k hat (MLE)	70.65				k star (bias corrected MLE)		68.88
2134					Theta hat (MLE)	3.883				Theta star (bias corrected MLE)		3.983
2135					nu hat (MLE)	16816				nu star (bias corrected)		16393
2136					MLE Mean (bias corrected)	274.3				MLE Sd (bias corrected)		33.06
2137					95% Percentile of Chisquare (2kstar)	166.1				90% Percentile		317.5
2138					95% Percentile	330.9				99% Percentile		357
2139	**The following statistics are computed using Gamma ROS Statistics on Imputed Data**											
2140	**Upper Limits using Wilson Hilferty (WH) and Hawkins Wixley (HW) Methods**											
2141					WH	HW					WH	HW
2142			95% Approx. Gamma UTL with 95% Coverage		339.9	340.7			95% Approx. Gamma UPL		331.1	331.7
2143				95% Gamma USL	394.3	396.9						
2144												
2145	**Estimates of Gamma Parameters using KM Estimates**											
2146					Mean (KM)	274.2				SD (KM)		32.07
2147					Variance (KM)	1029				SE of Mean (KM)		2.981
2148					k hat (KM)	73.1				k star (KM)		71.26
2149					nu hat (KM)	17397				nu star (KM)		16960
2150					theta hat (KM)	3.751				theta star (KM)		3.848
2151					80% gamma percentile (KM)	301.1				90% gamma percentile (KM)		316.6
2152					95% gamma percentile (KM)	329.7				99% gamma percentile (KM)		355.4
2153												
2154	**The following statistics are computed using gamma distribution and KM estimates**											
2155	**Upper Limits using Wilson Hilferty (WH) and Hawkins Wixley (HW) Methods**											
2156					WH	HW					WH	HW
2157			95% Approx. Gamma UTL with 95% Coverage		340.5	341.4			95% Approx. Gamma UPL		331.7	332.3
2158				95% KM Gamma Percentile	330.9	331.6				95% Gamma USL	395.8	398.5
2159												
2160	**Lognormal GOF Test on Detected Observations Only**											
2161					Shapiro Wilk Approximate Test Statistic	0.936	**Shapiro Wilk GOF Test**					
2162					5% Shapiro Wilk P Value	1.5895E-5	Data Not Lognormal at 5% Significance Level					
2163					Lilliefors Test Statistic	0.0826	**Lilliefors GOF Test**					
2164					5% Lilliefors Critical Value	0.0829	Detected Data appear Lognormal at 5% Significance Level					
2165	Detected Data appear Approximate Lognormal at 5% Significance Level											
2166												
2167	**Background Lognormal ROS Statistics Assuming Lognormal Distribution Using Imputed Non-Detects**											
2168					Mean in Original Scale	274.3				Mean in Log Scale		5.607
2169					SD in Original Scale	31.84				SD in Log Scale		0.122
2170					95% UTL95% Coverage	343.3				95% BCA UTL95% Coverage		326.3
2171					95% Bootstrap (%) UTL95% Coverage	329.4				95% UPL (t)		333.7
2172					90% Percentile (z)	318.5				95% Percentile (z)		332.9
2173					99% Percentile (z)	361.8				95% USL		405.8
2174												
2175	**Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution**											
2176					KM Mean of Logged Data	5.607				95% KM UTL (Lognormal)95% Coverage		344.2
2177					KM SD of Logged Data	0.124				95% KM UPL (Lognormal)		334.4
2178					95% KM Percentile Lognormal (z)	333.6				95% KM USL (Lognormal)		407.7
2179												
2180	**Background DL/2 Statistics Assuming Lognormal Distribution**											
2181					Mean in Original Scale	270.6				Mean in Log Scale		5.586
2182					SD in Original Scale	40.79				SD in Log Scale		0.18
2183					95% UTL95% Coverage	375.3				95% UPL (t)		359.9
2184					90% Percentile (z)	336				95% Percentile (z)		358.6

2185				99% Percentile (z)		405.4				95% USL		480.2
2186	DL/2 is not a Recommended Method. DL/2 provided for comparisons and historical reasons.											
2187												
2188	Nonparametric Distribution Free Background Statistics											
2189	Data appear to follow a Discernible Distribution at 5% Significance Level											
2190												
2191	Nonparametric Upper Limits for BTVs(no distinction made between detects and nondetects)											
2192				Order of Statistic, r		116				95% UTL with95% Coverage		329
2193				Approx, f used to compute achieved CC		1.526				Approximate Actual Confidence Coefficient achieved by UTL		0.851
2194				Approximate Sample Size needed to achieve specified CC		153				95% UPL		326
2195				95% USL		358				95% KM Chebyshev UPL		414.6
2196												
2197	Note: The use of USL tends to yield a conservative estimate of BTV, especially when the sample size starts exceeding 20.											
2198	Therefore, one may use USL to estimate a BTV only when the data set represents a background data set free of outliers											
2199	and consists of observations collected from clean unimpacted locations.											
2200	The use of USL tends to provide a balance between false positives and false negatives provided the data											
2201	represents a background data set and when many onsite observations need to be compared with the BTV.											
2202												
2203	SPEC. COND., LAB											
2204												
2205	General Statistics											
2206				Total Number of Observations		128				Number of Missing Observations		6
2207				Number of Distinct Observations		48						
2208				Number of Detects		125				Number of Non-Detects		3
2209				Number of Distinct Detects		48				Number of Distinct Non-Detects		2
2210				Minimum Detect		218				Minimum Non-Detect		260
2211				Maximum Detect		310				Maximum Non-Detect		270
2212				Variance Detected		300.5				Percent Non-Detects		2.344%
2213				Mean Detected		271.5				SD Detected		17.34
2214				Mean of Detected Logged Data		5.602				SD of Detected Logged Data		0.0651
2215												
2216	Critical Values for Background Threshold Values (BTVs)											
2217				Tolerance Factor K (For UTL)		1.888				d2max (for USL)		3.292
2218												
2219	Normal GOF Test on Detects Only											
2220				Shapiro Wilk Test Statistic		0.967				Normal GOF Test on Detected Observations Only		
2221				5% Shapiro Wilk P Value		0.0472				Data Not Normal at 5% Significance Level		
2222				Lilliefors Test Statistic		0.0866				Lilliefors GOF Test		
2223				5% Lilliefors Critical Value		0.0796				Data Not Normal at 5% Significance Level		
2224	Data Not Normal at 5% Significance Level											
2225												
2226	Kaplan Meier (KM) Background Statistics Assuming Normal Distribution											
2227				KM Mean		271.1				KM SD		17.45
2228				95% UTL95% Coverage		304				95% KM UPL (t)		300.1
2229				90% KM Percentile (z)		293.4				95% KM Percentile (z)		299.8
2230				99% KM Percentile (z)		311.7				95% KM USL		328.5
2231												
2232	DL/2 Substitution Background Statistics Assuming Normal Distribution											
2233				Mean		268.3				SD		27.1
2234				95% UTL95% Coverage		319.5				95% UPL (t)		313.4
2235				90% Percentile (z)		303				95% Percentile (z)		312.9
2236				99% Percentile (z)		331.3				95% USL		357.5

	A	B	C	D	E	F	G	H	I	J	K	L
2237	DL/2 is not a recommended method. DL/2 provided for comparisons and historical reasons											
2238												
2239	Gamma GOF Tests on Detected Observations Only											
2240					A-D Test Statistic	1.229	Anderson-Darling GOF Test					
2241					5% A-D Critical Value	0.75	Data Not Gamma Distributed at 5% Significance Level					
2242					K-S Test Statistic	0.0949	Kolmogorov-Smirnov GOF					
2243					5% K-S Critical Value	0.0828	Data Not Gamma Distributed at 5% Significance Level					
2244	Data Not Gamma Distributed at 5% Significance Level											
2245												
2246	Gamma Statistics on Detected Data Only											
2247					k hat (MLE)	241.2	k star (bias corrected MLE)	235.4				
2248					Theta hat (MLE)	1.126	Theta star (bias corrected MLE)	1.154				
2249					nu hat (MLE)	60292	nu star (bias corrected)	58847				
2250					MLE Mean (bias corrected)	271.5						
2251					MLE Sd (bias corrected)	17.7	95% Percentile of Chisquare (2kstar)	522.4				
2252												
2253	Gamma ROS Statistics using Imputed Non-Detects											
2254	GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs											
2255	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)											
2256	For such situations, GROS method may yield incorrect values of UCLs and BTVs											
2257	This is especially true when the sample size is small.											
2258	For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates											
2259					Minimum	218	Mean	271.1				
2260					Maximum	310	Median	270				
2261					SD	17.37	CV	0.0641				
2262					k hat (MLE)	240	k star (bias corrected MLE)	234.4				
2263					Theta hat (MLE)	1.129	Theta star (bias corrected MLE)	1.157				
2264					nu hat (MLE)	61451	nu star (bias corrected)	60012				
2265					MLE Mean (bias corrected)	271.1	MLE Sd (bias corrected)	17.71				
2266					95% Percentile of Chisquare (2kstar)	520.3	90% Percentile	294				
2267					95% Percentile	300.9	99% Percentile	314				
2268	The following statistics are computed using Gamma ROS Statistics on Imputed Data											
2269	Upper Limits using Wilson Hilferty (WH) and Hawkins Wixley (HW) Methods											
2270					WH	HW				WH	HW	
2271			95% Approx. Gamma UTL with 95% Coverage		305.3	305.4	95% Approx. Gamma UPL			301	301.1	
2272			95% Gamma USL		332.7	333.4						
2273												
2274	Estimates of Gamma Parameters using KM Estimates											
2275					Mean (KM)	271.1	SD (KM)	17.45				
2276					Variance (KM)	304.4	SE of Mean (KM)	1.558				
2277					k hat (KM)	241.4	k star (KM)	235.8				
2278					nu hat (KM)	61802	nu star (KM)	60355				
2279					theta hat (KM)	1.123	theta star (KM)	1.15				
2280					80% gamma percentile (KM)	285.8	90% gamma percentile (KM)	293.9				
2281					95% gamma percentile (KM)	300.8	99% gamma percentile (KM)	313.8				
2282												
2283	The following statistics are computed using gamma distribution and KM estimates											
2284	Upper Limits using Wilson Hilferty (WH) and Hawkins Wixley (HW) Methods											
2285					WH	HW				WH	HW	
2286			95% Approx. Gamma UTL with 95% Coverage		305.4	305.6	95% Approx. Gamma UPL			301.1	301.3	
2287			95% KM Gamma Percentile		300.8	300.9	95% Gamma USL			333.1	333.7	
2288												

	A	B	C	D	E	F	G	H	I	J	K	L
2289	**Lognormal GOF Test on Detected Observations Only**											
2290					Shapiro Wilk Approximate Test Statistic	0.955	**Shapiro Wilk GOF Test**					
2291					5% Shapiro Wilk P Value	0.00236	Data Not Lognormal at 5% Significance Level					
2292					Lilliefors Test Statistic	0.0999	**Lilliefors GOF Test**					
2293					5% Lilliefors Critical Value	0.0796	Data Not Lognormal at 5% Significance Level					
2294	Data Not Lognormal at 5% Significance Level											
2295												
2296	**Background Lognormal ROS Statistics Assuming Lognormal Distribution Using Imputed Non-Detects**											
2297					Mean in Original Scale	271.1			Mean in Log Scale	5.6		
2298					SD in Original Scale	17.37			SD in Log Scale	0.0653		
2299					95% UTL95% Coverage	306			95% BCA UTL95% Coverage	303.5		
2300					95% Bootstrap (%) UTL95% Coverage	305.6			95% UPL (t)	301.6		
2301					90% Percentile (z)	294.2			95% Percentile (z)	301.2		
2302					99% Percentile (z)	314.9			95% USL	335.4		
2303												
2304	**Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution**											
2305					KM Mean of Logged Data	5.6			95% KM UTL (Lognormal)95% Coverage	306.2		
2306					KM SD of Logged Data	0.0657			95% KM UPL (Lognormal)	301.7		
2307					95% KM Percentile Lognormal (z)	301.4			95% KM USL (Lognormal)	335.8		
2308												
2309	**Background DL/2 Statistics Assuming Lognormal Distribution**											
2310					Mean in Original Scale	268.3			Mean in Log Scale	5.585		
2311					SD in Original Scale	27.1			SD in Log Scale	0.126		
2312					95% UTL95% Coverage	337.8			95% UPL (t)	328.4		
2313					90% Percentile (z)	313			95% Percentile (z)	327.6		
2314					99% Percentile (z)	356.9			95% USL	402.9		
2315	DL/2 is not a Recommended Method. DL/2 provided for comparisons and historical reasons.											
2316												
2317	**Nonparametric Distribution Free Background Statistics**											
2318	Data do not follow a Discernible Distribution (0.05)											
2319												
2320	**Nonparametric Upper Limits for BTVs(no distinction made between detects and nondetects)**											
2321					Order of Statistic, r	125			95% UTL with95% Coverage	307		
2322					Approx, f used to compute achieved CC	1.645			Approximate Actual Confidence Coefficient achieved by UTL	0.887		
2323					Approximate Sample Size needed to achieve specified CC	153			95% UPL	298.7		
2324					95% USL	310			95% KM Chebyshev UPL	347.4		
2325												
2326	Note: The use of USL tends to yield a conservative estimate of BTV, especially when the sample size starts exceeding 20.											
2327	Therefore, one may use USL to estimate a BTV only when the data set represents a background data set free of outliers											
2328	and consists of observations collected from clean unimpacted locations.											
2329	The use of USL tends to provide a balance between false positives and false negatives provided the data											
2330	represents a background data set and when many onsite observations need to be compared with the BTV.											
2331												
2332	**SULFATE**											
2333												
2334	**General Statistics**											
2335					Total Number of Observations	93			Number of Missing Observations	41		
2336					Number of Distinct Observations	17						
2337					Number of Detects	33			Number of Non-Detects	60		
2338					Number of Distinct Detects	16			Number of Distinct Non-Detects	2		
2339					Minimum Detect	1.1			Minimum Non-Detect	2		
2340					Maximum Detect	4.4			Maximum Non-Detect	5		

	A	B	C	D	E	F	G	H	I	J	K	L
2341					Variance Detected	0.394				Percent Non-Detects		64.52%
2342					Mean Detected	1.912				SD Detected		0.628
2343					Mean of Detected Logged Data	0.604				SD of Detected Logged Data		0.295
2344												
2345					**Critical Values for Background Threshold Values (BTVs)**							
2346					Tolerance Factor K (For UTL)	1.935				d2max (for USL)		3.185
2347												
2348					**Normal GOF Test on Detects Only**							
2349					Shapiro Wilk Test Statistic	0.833	**Shapiro Wilk GOF Test**					
2350					5% Shapiro Wilk Critical Value	0.931	Data Not Normal at 5% Significance Level					
2351					Lilliefors Test Statistic	0.147	**Lilliefors GOF Test**					
2352					5% Lilliefors Critical Value	0.152	Detected Data appear Normal at 5% Significance Level					
2353					**Detected Data appear Approximate Normal at 5% Significance Level**							
2354												
2355					**Kaplan Meier (KM) Background Statistics Assuming Normal Distribution**							
2356					KM Mean	1.81				KM SD		0.589
2357					95% UTL95% Coverage	2.95				95% KM UPL (t)		2.794
2358					90% KM Percentile (z)	2.565				95% KM Percentile (z)		2.779
2359					99% KM Percentile (z)	3.18				95% KM USL		3.686
2360												
2361					**DL/2 Substitution Background Statistics Assuming Normal Distribution**							
2362					Mean	2.146				SD		0.596
2363					95% UTL95% Coverage	3.299				95% UPL (t)		3.141
2364					90% Percentile (z)	2.909				95% Percentile (z)		3.126
2365					99% Percentile (z)	3.532				95% USL		4.043
2366					**DL/2 is not a recommended method. DL/2 provided for comparisons and historical reasons**							
2367												
2368					**Gamma GOF Tests on Detected Observations Only**							
2369					A-D Test Statistic	0.876	**Anderson-Darling GOF Test**					
2370					5% A-D Critical Value	0.747	Data Not Gamma Distributed at 5% Significance Level					
2371					K-S Test Statistic	0.15	**Kolmogorov-Smirnov GOF**					
2372					5% K-S Critical Value	0.153	Detected data appear Gamma Distributed at 5% Significance Level					
2373					**Detected data follow Appr. Gamma Distribution at 5% Significance Level**							
2374												
2375					**Gamma Statistics on Detected Data Only**							
2376					k hat (MLE)	11.44				k star (bias corrected MLE)		10.42
2377					Theta hat (MLE)	0.167				Theta star (bias corrected MLE)		0.184
2378					nu hat (MLE)	754.9				nu star (bias corrected)		687.6
2379					MLE Mean (bias corrected)	1.912						
2380					MLE Sd (bias corrected)	0.592				95% Percentile of Chisquare (2kstar)		32.47
2381												
2382					**Gamma ROS Statistics using Imputed Non-Detects**							
2383					GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs							
2384					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)							
2385					For such situations, GROS method may yield incorrect values of UCLs and BTVs							
2386					This is especially true when the sample size is small.							
2387					For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates							
2388					Minimum	0.772				Mean		1.807
2389					Maximum	4.4				Median		1.726
2390					SD	0.577				CV		0.32
2391					k hat (MLE)	10.69				k star (bias corrected MLE)		10.36
2392					Theta hat (MLE)	0.169				Theta star (bias corrected MLE)		0.175

2393					nu hat (MLE)	1989				nu star (bias corrected)		1926
2394					MLE Mean (bias corrected)	1.807				MLE Sd (bias corrected)		0.562
2395					95% Percentile of Chisquare (2kstar)	32.31				90% Percentile		2.554
2396					95% Percentile	2.819				99% Percentile		3.363
2397	**The following statistics are computed using Gamma ROS Statistics on Imputed Data**											
2398	**Upper Limits using Wilson Hilferty (WH) and Hawkins Wixley (HW) Methods**											
2399					WH	HW					WH	HW
2400				95% Approx. Gamma UTL with 95% Coverage	3.028	3.051				95% Approx. Gamma UPL	2.826	2.839
2401				95% Gamma USL	4.117	4.216						
2402												
2403	**Estimates of Gamma Parameters using KM Estimates**											
2404					Mean (KM)	1.81				SD (KM)		0.589
2405					Variance (KM)	0.347				SE of Mean (KM)		0.094
2406					k hat (KM)	9.45				k star (KM)		9.153
2407					nu hat (KM)	1758				nu star (KM)		1702
2408					theta hat (KM)	0.192				theta star (KM)		0.198
2409					80% gamma percentile (KM)	2.285				90% gamma percentile (KM)		2.607
2410					95% gamma percentile (KM)	2.894				99% gamma percentile (KM)		3.484
2411												
2412	**The following statistics are computed using gamma distribution and KM estimates**											
2413	**Upper Limits using Wilson Hilferty (WH) and Hawkins Wixley (HW) Methods**											
2414					WH	HW					WH	HW
2415				95% Approx. Gamma UTL with 95% Coverage	2.963	2.971				95% Approx. Gamma UPL	2.773	2.775
2416				95% KM Gamma Percentile	2.755	2.756				95% Gamma USL	3.978	4.04
2417												
2418	**Lognormal GOF Test on Detected Observations Only**											
2419					Shapiro Wilk Test Statistic	0.931	**Shapiro Wilk GOF Test**					
2420					5% Shapiro Wilk Critical Value	0.931	Data Not Lognormal at 5% Significance Level					
2421					Lilliefors Test Statistic	0.151	**Lilliefors GOF Test**					
2422					5% Lilliefors Critical Value	0.152	Detected Data appear Lognormal at 5% Significance Level					
2423	**Detected Data appear Approximate Lognormal at 5% Significance Level**											
2424												
2425	**Background Lognormal ROS Statistics Assuming Lognormal Distribution Using Imputed Non-Detects**											
2426					Mean in Original Scale	1.809				Mean in Log Scale		0.552
2427					SD in Original Scale	0.548				SD in Log Scale		0.283
2428					95% UTL95% Coverage	3.003				95% BCA UTL95% Coverage		2.947
2429					95% Bootstrap (%) UTL95% Coverage	2.947				95% UPL (t)		2.787
2430					90% Percentile (z)	2.496				95% Percentile (z)		2.767
2431					99% Percentile (z)	3.355				95% USL		4.278
2432												
2433	**Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution**											
2434					KM Mean of Logged Data	0.55				95% KM UTL (Lognormal)95% Coverage		3.003
2435					KM SD of Logged Data	0.284				95% KM UPL (Lognormal)		2.786
2436					95% KM Percentile Lognormal (z)	2.765				95% KM USL (Lognormal)		4.282
2437												
2438	**Background DL/2 Statistics Assuming Lognormal Distribution**											
2439					Mean in Original Scale	2.146				Mean in Log Scale		0.717
2440					SD in Original Scale	0.596				SD in Log Scale		0.327
2441					95% UTL95% Coverage	3.857				95% UPL (t)		3.538
2442					90% Percentile (z)	3.115				95% Percentile (z)		3.508
2443					99% Percentile (z)	4.385				95% USL		5.807
2444	**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
2445												
2446	**Nonparametric Distribution Free Background Statistics**											
2447	Data appear to follow a Discernible Distribution at 5% Significance Level											
2448												
2449	**Nonparametric Upper Limits for BTVs(no distinction made between detects and nondetects)**											
2450					Order of Statistic, r	91			95% UTL with95% Coverage	5		
2451					Approx, f used to compute achieved CC	1.596			Approximate Actual Confidence Coefficient achieved by UTL	0.85		
2452					Approximate Sample Size needed to achieve specified CC	124			95% UPL	5		
2453					95% USL	5			95% KM Chebyshev UPL	4.391		
2454												
2455	Note: The use of USL tends to yield a conservative estimate of BTV, especially when the sample size starts exceeding 20.											
2456	Therefore, one may use USL to estimate a BTV only when the data set represents a background data set free of outliers											
2457	and consists of observations collected from clean unimpacted locations.											
2458	The use of USL tends to provide a balance between false positives and false negatives provided the data											
2459	represents a background data set and when many onsite observations need to be compared with the BTV.											
2460												
2461	**ALKALINITY**											
2462												
2463	**General Statistics**											
2464					Total Number of Observations	72			Number of Missing Observations	62		
2465					Number of Distinct Observations	5						
2466					Number of Detects	48			Number of Non-Detects	24		
2467					Number of Distinct Detects	5			Number of Distinct Non-Detects	1		
2468					Minimum Detect	5			Minimum Non-Detect	5		
2469					Maximum Detect	8			Maximum Non-Detect	5		
2470					Variance Detected	0.622			Percent Non-Detects	33.33%		
2471					Mean Detected	5.902			SD Detected	0.789		
2472					Mean of Detected Logged Data	1.767			SD of Detected Logged Data	0.132		
2473												
2474	**Critical Values for Background Threshold Values (BTVs)**											
2475					Tolerance Factor K (For UTL)	1.98			d2max (for USL)	3.094		
2476												
2477	**Normal GOF Test on Detects Only**											
2478					Shapiro Wilk Test Statistic	0.83			**Shapiro Wilk GOF Test**			
2479					5% Shapiro Wilk Critical Value	0.947			Data Not Normal at 5% Significance Level			
2480					Lilliefors Test Statistic	0.242			**Lilliefors GOF Test**			
2481					5% Lilliefors Critical Value	0.127			Data Not Normal at 5% Significance Level			
2482	Data Not Normal at 5% Significance Level											
2483												
2484	**Kaplan Meier (KM) Background Statistics Assuming Normal Distribution**											
2485					KM Mean	5.601			KM SD	0.766		
2486					95% UTL95% Coverage	7.118			95% KM UPL (t)	6.887		
2487					90% KM Percentile (z)	6.583			95% KM Percentile (z)	6.861		
2488					99% KM Percentile (z)	7.383			95% KM USL	7.972		
2489												
2490	**DL/2 Substitution Background Statistics Assuming Normal Distribution**											
2491					Mean	4.768			SD	1.738		
2492					95% UTL95% Coverage	8.209			95% UPL (t)	7.684		
2493					90% Percentile (z)	6.995			95% Percentile (z)	7.626		
2494					99% Percentile (z)	8.811			95% USL	10.15		
2495	DL/2 is not a recommended method. DL/2 provided for comparisons and historical reasons											
2496												

	A	B	C	D	E	F	G	H	I	J	K	L
2497	**Gamma GOF Tests on Detected Observations Only**											
2498					A-D Test Statistic	3.517	**Anderson-Darling GOF Test**					
2499					5% A-D Critical Value	0.748	Data Not Gamma Distributed at 5% Significance Level					
2500					K-S Test Statistic	0.234	**Kolmogorov-Smirnov GOF**					
2501					5% K-S Critical Value	0.127	Data Not Gamma Distributed at 5% Significance Level					
2502	Data Not Gamma Distributed at 5% Significance Level											
2503												
2504	**Gamma Statistics on Detected Data Only**											
2505					k hat (MLE)	58.65	k star (bias corrected MLE)	55				
2506					Theta hat (MLE)	0.101	Theta star (bias corrected MLE)	0.107				
2507					nu hat (MLE)	5631	nu star (bias corrected)	5280				
2508					MLE Mean (bias corrected)	5.902						
2509					MLE Sd (bias corrected)	0.796	95% Percentile of Chisquare (2kstar)	135.5				
2510												
2511	**Gamma ROS Statistics using Imputed Non-Detects**											
2512	GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs											
2513	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)											
2514	For such situations, GROS method may yield incorrect values of UCLs and BTVs											
2515	This is especially true when the sample size is small.											
2516	For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates											
2517					Minimum	3.157	Mean	5.342				
2518					Maximum	8	Median	5				
2519					SD	1.055	CV	0.198				
2520					k hat (MLE)	25.64	k star (bias corrected MLE)	24.59				
2521					Theta hat (MLE)	0.208	Theta star (bias corrected MLE)	0.217				
2522					nu hat (MLE)	3693	nu star (bias corrected)	3540				
2523					MLE Mean (bias corrected)	5.342	MLE Sd (bias corrected)	1.077				
2524					95% Percentile of Chisquare (2kstar)	66.54	90% Percentile	6.761				
2525					95% Percentile	7.229	99% Percentile	8.163				
2526	**The following statistics are computed using Gamma ROS Statistics on Imputed Data**											
2527	**Upper Limits using Wilson Hilferty (WH) and Hawkins Wixley (HW) Methods**											
2528					WH	HW				WH	HW	
2529				95% Approx. Gamma UTL with 95% Coverage	7.646	7.681	95% Approx. Gamma UPL			7.246	7.267	
2530				95% Gamma USL	9.25	9.361						
2531												
2532	**Estimates of Gamma Parameters using KM Estimates**											
2533					Mean (KM)	5.601	SD (KM)	0.766				
2534					Variance (KM)	0.587	SE of Mean (KM)	0.0912				
2535					k hat (KM)	53.47	k star (KM)	51.25				
2536					nu hat (KM)	7699	nu star (KM)	7380				
2537					theta hat (KM)	0.105	theta star (KM)	0.109				
2538					80% gamma percentile (KM)	6.247	90% gamma percentile (KM)	6.625				
2539					95% gamma percentile (KM)	6.947	99% gamma percentile (KM)	7.581				
2540												
2541	**The following statistics are computed using gamma distribution and KM estimates**											
2542	**Upper Limits using Wilson Hilferty (WH) and Hawkins Wixley (HW) Methods**											
2543					WH	HW				WH	HW	
2544				95% Approx. Gamma UTL with 95% Coverage	7.154	7.159	95% Approx. Gamma UPL			6.895	6.897	
2545				95% KM Gamma Percentile	6.867	6.868	95% Gamma USL			8.166	8.195	
2546												
2547	**Lognormal GOF Test on Detected Observations Only**											
2548					Shapiro Wilk Test Statistic	0.828	**Shapiro Wilk GOF Test**					

2549			5% Shapiro Wilk Critical Value			0.947	Data Not Lognormal at 5% Significance Level					
2550			Lilliefors Test Statistic			0.242	**Lilliefors GOF Test**					
2551			5% Lilliefors Critical Value			0.127	Data Not Lognormal at 5% Significance Level					
2552						Data Not Lognormal at 5% Significance Level						
2553												
2554						**Background Lognormal ROS Statistics Assuming Lognormal Distribution Using Imputed Non-Detects**						
2555			Mean in Original Scale			5.383	Mean in Log Scale					1.666
2556			SD in Original Scale			1.003	SD in Log Scale					0.186
2557			95% UTL95% Coverage			7.648	95% BCA UTL95% Coverage					6.45
2558			95% Bootstrap (%) UTL95% Coverage			7.3	95% UPL (t)					7.23
2559			90% Percentile (z)			6.716	95% Percentile (z)					7.186
2560			99% Percentile (z)			8.156	95% USL					9.409
2561												
2562						**Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution**						
2563			KM Mean of Logged Data			1.714	95% KM UTL (Lognormal)95% Coverage					7.177
2564			KM SD of Logged Data			0.13	95% KM UPL (Lognormal)					6.902
2565			95% KM Percentile Lognormal (z)			6.872	95% KM USL (Lognormal)					8.292
2566												
2567						**Background DL/2 Statistics Assuming Lognormal Distribution**						
2568			Mean in Original Scale			4.768	Mean in Log Scale					1.483
2569			SD in Original Scale			1.738	SD in Log Scale					0.418
2570			95% UTL95% Coverage			10.08	95% UPL (t)					8.883
2571			90% Percentile (z)			7.527	95% Percentile (z)					8.761
2572			99% Percentile (z)			11.65	95% USL					16.05
2573						DL/2 is not a Recommended Method. DL/2 provided for comparisons and historical reasons.						
2574												
2575						**Nonparametric Distribution Free Background Statistics**						
2576						Data do not follow a Discernible Distribution (0.05)						
2577												
2578						**Nonparametric Upper Limits for BTVs(no distinction made between detects and nondetects)**						
2579			Order of Statistic, r			71	95% UTL with95% Coverage					7.3
2580			Approx, f used to compute achieved CC			1.868	Approximate Actual Confidence Coefficient achieved by UTL					0.881
2581			Approximate Sample Size needed to achieve specified CC			93	95% UPL					7
2582			95% USL			8	95% KM Chebyshev UPL					8.964
2583												
2584						Note: The use of USL tends to yield a conservative estimate of BTV, especially when the sample size starts exceeding 20.						
2585						Therefore, one may use USL to estimate a BTV only when the data set represents a background data set free of outliers						
2586						and consists of observations collected from clean unimpacted locations.						
2587						The use of USL tends to provide a balance between false positives and false negatives provided the data						
2588						represents a background data set and when many onsite observations need to be compared with the BTV.						
2589												
2590	**TDS (TOTAL DISSOLVED SOLIDS)**											
2591												
2592	**General Statistics**											
2593			Total Number of Observations			105	Number of Distinct Observations					65
2594							Number of Missing Observations					29
2595			Minimum			110	First Quartile					180
2596			Second Largest			286	Median					200
2597			Maximum			294	Third Quartile					228
2598			Mean			202.3	SD					35.16
2599			Coefficient of Variation			0.174	Skewness					0.156
2600			Mean of logged Data			5.294	SD of logged Data					0.179

	A	B	C	D	E	F	G	H	I	J	K	L
2601												
2602	**Critical Values for Background Threshold Values (BTVs)**											
2603					Tolerance Factor K (For UTL)	1.916			d2max (for USL)	3.226		
2604												
2605	**Normal GOF Test**											
2606					Shapiro Wilk Test Statistic	0.986	**Normal GOF Test**					
2607					5% Shapiro Wilk P Value	0.806	Data appear Normal at 5% Significance Level					
2608					Lilliefors Test Statistic	0.0804	**Lilliefors GOF Test**					
2609					5% Lilliefors Critical Value	0.0867	Data appear Normal at 5% Significance Level					
2610	Data appear Normal at 5% Significance Level											
2611												
2612	**Background Statistics Assuming Normal Distribution**											
2613				95% UTL with	95% Coverage	269.7			90% Percentile (z)	247.4		
2614					95% UPL (t)	261			95% Percentile (z)	260.2		
2615					95% USL	315.8			99% Percentile (z)	284.1		
2616												
2617	**Gamma GOF Test**											
2618					A-D Test Statistic	0.301	**Anderson-Darling Gamma GOF Test**					
2619					5% A-D Critical Value	0.75	Detected data appear Gamma Distributed at 5% Significance Level					
2620					K-S Test Statistic	0.0595	**Kolmogorov-Smirnov Gamma GOF Test**					
2621					5% K-S Critical Value	0.0879	Detected data appear Gamma Distributed at 5% Significance Level					
2622	Detected data appear Gamma Distributed at 5% Significance Level											
2623												
2624	**Gamma Statistics**											
2625					k hat (MLE)	32.6			k star (bias corrected MLE)	31.67		
2626					Theta hat (MLE)	6.207			Theta star (bias corrected MLE)	6.388		
2627					nu hat (MLE)	6845			nu star (bias corrected)	6651		
2628					MLE Mean (bias corrected)	202.3			MLE Sd (bias corrected)	35.95		
2629												
2630	**Background Statistics Assuming Gamma Distribution**											
2631					95% Wilson Hilferty (WH) Approx. Gamma UPL	265.2			90% Percentile	249.6		
2632					95% Hawkins Wixley (HW) Approx. Gamma UPL	265.9			95% Percentile	264.9		
2633				95% WH Approx. Gamma UTL with	95% Coverage	276			99% Percentile	295.2		
2634				95% HW Approx. Gamma UTL with	95% Coverage	277						
2635					95% WH USL	337.4			95% HW USL	341.1		
2636												
2637	**Lognormal GOF Test**											
2638					Shapiro Wilk Test Statistic	0.981	**Shapiro Wilk Lognormal GOF Test**					
2639					5% Shapiro Wilk P Value	0.54	Data appear Lognormal at 5% Significance Level					
2640					Lilliefors Test Statistic	0.0661	**Lilliefors Lognormal GOF Test**					
2641					5% Lilliefors Critical Value	0.0867	Data appear Lognormal at 5% Significance Level					
2642	Data appear Lognormal at 5% Significance Level											
2643												
2644	**Background Statistics assuming Lognormal Distribution**											
2645				95% UTL with	95% Coverage	280.5			90% Percentile (z)	250.5		
2646					95% UPL (t)	268.4			95% Percentile (z)	267.3		
2647					95% USL	354.5			99% Percentile (z)	301.9		
2648												
2649	**Nonparametric Distribution Free Background Statistics**											
2650	Data appear Normal at 5% Significance Level											
2651												
2652	**Nonparametric Upper Limits for Background Threshold Values**											

2653				Order of Statistic, r	103			95% UTL with 95% Coverage			276	
2654			Approx, f used to compute achieved CC		1.807		Approximate Actual Confidence Coefficient achieved by UTL				0.901	
2655							Approximate Sample Size needed to achieve specified CC				124	
2656		95% Percentile Bootstrap UTL with 95% Coverage			275.2		95% BCA Bootstrap UTL with 95% Coverage				274.8	
2657				95% UPL	267.3			90% Percentile			247.6	
2658				90% Chebyshev UPL	308.3			95% Percentile			260.8	
2659				95% Chebyshev UPL	356.3			99% Percentile			285.6	
2660				95% USL	294							
2661												
2662	Note: The use of USL tends to yield a conservative estimate of BTV, especially when the sample size starts exceeding 20.											
2663	Therefore, one may use USL to estimate a BTV only when the data set represents a background data set free of outliers											
2664	and consists of observations collected from clean unimpacted locations.											
2665	The use of USL tends to provide a balance between false positives and false negatives provided the data											
2666	represents a background data set and when many onsite observations need to be compared with the BTV.											
2667												
2668	**TOC (TOTAL ORGANIC CARBON)**											
2669												
2670	**General Statistics**											
2671				Total Number of Observations	129			Number of Missing Observations			5	
2672				Number of Distinct Observations	17							
2673				Number of Detects	31			Number of Non-Detects			98	
2674				Number of Distinct Detects	17			Number of Distinct Non-Detects			3	
2675				Minimum Detect	0.5			Minimum Non-Detect			0.5	
2676				Maximum Detect	1.6			Maximum Non-Detect			1.5	
2677				Variance Detected	0.0963			Percent Non-Detects			75.97%	
2678				Mean Detected	1.002			SD Detected			0.31	
2679				Mean of Detected Logged Data	-0.0489			SD of Detected Logged Data			0.334	
2680												
2681	**Critical Values for Background Threshold Values (BTVs)**											
2682				Tolerance Factor K (For UTL)	1.887			d2max (for USL)			3.294	
2683												
2684	**Normal GOF Test on Detects Only**											
2685				Shapiro Wilk Test Statistic	0.949		**Shapiro Wilk GOF Test**					
2686				5% Shapiro Wilk Critical Value	0.929		Detected Data appear Normal at 5% Significance Level					
2687				Lilliefors Test Statistic	0.11		**Lilliefors GOF Test**					
2688				5% Lilliefors Critical Value	0.156		Detected Data appear Normal at 5% Significance Level					
2689	Detected Data appear Normal at 5% Significance Level											
2690												
2691	**Kaplan Meier (KM) Background Statistics Assuming Normal Distribution**											
2692				KM Mean	0.69			KM SD			0.256	
2693				95% UTL95% Coverage	1.173			95% KM UPL (t)			1.116	
2694				90% KM Percentile (z)	1.018			95% KM Percentile (z)			1.111	
2695				99% KM Percentile (z)	1.286			95% KM USL			1.534	
2696												
2697	**DL/2 Substitution Background Statistics Assuming Normal Distribution**											
2698				Mean	0.607			SD			0.278	
2699				95% UTL95% Coverage	1.132			95% UPL (t)			1.07	
2700				90% Percentile (z)	0.964			95% Percentile (z)			1.065	
2701				99% Percentile (z)	1.255			95% USL			1.524	
2702	DL/2 is not a recommended method. DL/2 provided for comparisons and historical reasons											
2703												
2704	**Gamma GOF Tests on Detected Observations Only**											

	A	B	C	D	E	F	G	H	I	J	K	L
2705					A-D Test Statistic	0.705	**Anderson-Darling GOF Test**					
2706					5% A-D Critical Value	0.746	Detected data appear Gamma Distributed at 5% Significance Level					
2707					K-S Test Statistic	0.152	**Kolmogorov-Smirnov GOF**					
2708					5% K-S Critical Value	0.158	Detected data appear Gamma Distributed at 5% Significance Level					
2709					Detected data appear Gamma Distributed at 5% Significance Level							
2710												
2711					**Gamma Statistics on Detected Data Only**							
2712					k hat (MLE)	9.938	k star (bias corrected MLE)	8.997				
2713					Theta hat (MLE)	0.101	Theta star (bias corrected MLE)	0.111				
2714					nu hat (MLE)	616.1	nu star (bias corrected)	557.8				
2715					MLE Mean (bias corrected)	1.002						
2716					MLE Sd (bias corrected)	0.334	95% Percentile of Chisquare (2kstar)	28.86				
2717												
2718					**Gamma ROS Statistics using Imputed Non-Detects**							
2719					GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs							
2720					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)							
2721					For such situations, GROS method may yield incorrect values of UCLs and BTVs							
2722					This is especially true when the sample size is small.							
2723					For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates							
2724					Minimum	0.01	Mean	0.617				
2725					Maximum	1.6	Median	0.59				
2726					SD	0.337	CV	0.546				
2727					k hat (MLE)	2.607	k star (bias corrected MLE)	2.552				
2728					Theta hat (MLE)	0.237	Theta star (bias corrected MLE)	0.242				
2729					nu hat (MLE)	672.7	nu star (bias corrected)	658.4				
2730					MLE Mean (bias corrected)	0.617	MLE Sd (bias corrected)	0.386				
2731					95% Percentile of Chisquare (2kstar)	11.23	90% Percentile	1.135				
2732					95% Percentile	1.358	99% Percentile	1.846				
2733					**The following statistics are computed using Gamma ROS Statistics on Imputed Data**							
2734					**Upper Limits using Wilson Hilferty (WH) and Hawkins Wixley (HW) Methods**							
2735						WH	HW				WH	HW
2736					95% Approx. Gamma UTL with 95% Coverage	1.503	1.586	95% Approx. Gamma UPL			1.355	1.415
2737					95% Gamma USL	2.685	3.045					
2738												
2739					**Estimates of Gamma Parameters using KM Estimates**							
2740					Mean (KM)	0.69	SD (KM)	0.256				
2741					Variance (KM)	0.0656	SE of Mean (KM)	0.0315				
2742					k hat (KM)	7.258	k star (KM)	7.094				
2743					nu hat (KM)	1873	nu star (KM)	1830				
2744					theta hat (KM)	0.0951	theta star (KM)	0.0972				
2745					80% gamma percentile (KM)	0.893	90% gamma percentile (KM)	1.036				
2746					95% gamma percentile (KM)	1.164	99% gamma percentile (KM)	1.43				
2747												
2748					**The following statistics are computed using gamma distribution and KM estimates**							
2749					**Upper Limits using Wilson Hilferty (WH) and Hawkins Wixley (HW) Methods**							
2750						WH	HW				WH	HW
2751					95% Approx. Gamma UTL with 95% Coverage	1.176	1.178	95% Approx. Gamma UPL			1.105	1.104
2752					95% KM Gamma Percentile	1.099	1.099	95% Gamma USL			1.694	1.726
2753												
2754					**Lognormal GOF Test on Detected Observations Only**							
2755					Shapiro Wilk Test Statistic	0.927	**Shapiro Wilk GOF Test**					
2756					5% Shapiro Wilk Critical Value	0.929	Data Not Lognormal at 5% Significance Level					

	A	B	C	D	E	F	G	H	I	J	K	L
2757					Lilliefors Test Statistic	0.171	**Lilliefors GOF Test**					
2758					5% Lilliefors Critical Value	0.156	Data Not Lognormal at 5% Significance Level					
2759					Data Not Lognormal at 5% Significance Level							
2760												
2761					**Background Lognormal ROS Statistics Assuming Lognormal Distribution Using Imputed Non-Detects**							
2762					Mean in Original Scale	0.652	Mean in Log Scale	-0.523				
2763					SD in Original Scale	0.294	SD in Log Scale	0.436				
2764					95% UTL95% Coverage	1.35	95% BCA UTL95% Coverage	1.2				
2765					95% Bootstrap (%) UTL95% Coverage	1.4	95% UPL (t)	1.225				
2766					90% Percentile (z)	1.037	95% Percentile (z)	1.215				
2767					99% Percentile (z)	1.635	95% USL	2.495				
2768												
2769					**Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution**							
2770					KM Mean of Logged Data	-0.426	95% KM UTL (Lognormal)95% Coverage	1.184				
2771					KM SD of Logged Data	0.316	95% KM UPL (Lognormal)	1.103				
2772					95% KM Percentile Lognormal (z)	1.097	95% KM USL (Lognormal)	1.846				
2773												
2774					**Background DL/2 Statistics Assuming Lognormal Distribution**							
2775					Mean in Original Scale	0.607	Mean in Log Scale	-0.58				
2776					SD in Original Scale	0.278	SD in Log Scale	0.388				
2777					95% UTL95% Coverage	1.163	95% UPL (t)	1.066				
2778					90% Percentile (z)	0.92	95% Percentile (z)	1.059				
2779					99% Percentile (z)	1.379	95% USL	2.007				
2780					DL/2 is not a Recommended Method. DL/2 provided for comparisons and historical reasons.							
2781												
2782					**Nonparametric Distribution Free Background Statistics**							
2783					Data appear to follow a Discernible Distribution at 5% Significance Level							
2784												
2785					**Nonparametric Upper Limits for BTVs(no distinction made between detects and nondetects)**							
2786					Order of Statistic, r	126	95% UTL with95% Coverage	1.5				
2787					Approx, f used to compute achieved CC	1.658	Approximate Actual Confidence Coefficient achieved by UTL	0.891				
2788					Approximate Sample Size needed to achieve specified CC	153	95% UPL	1.4				
2789					95% USL	1.6	95% KM Chebyshev UPL	1.81				
2790												
2791					Note: The use of USL tends to yield a conservative estimate of BTV, especially when the sample size starts exceeding 20.							
2792					Therefore, one may use USL to estimate a BTV only when the data set represents a background data set free of outliers							
2793					and consists of observations collected from clean unimpacted locations.							
2794					The use of USL tends to provide a balance between false positives and false negatives provided the data							
2795					represents a background data set and when many onsite observations need to be compared with the BTV.							
2796												
2797	**TOTAL PHENOLICS**											
2798												
2799					**General Statistics**							
2800					Total Number of Observations	130	Number of Missing Observations	4				
2801					Number of Distinct Observations	4						
2802					Number of Detects	2	Number of Non-Detects	128				
2803					Number of Distinct Detects	2	Number of Distinct Non-Detects	3				
2804					Minimum Detect	0.009	Minimum Non-Detect	0.005				
2805					Maximum Detect	0.01	Maximum Non-Detect	0.03				
2806					Variance Detected	5.0000E-7	Percent Non-Detects	98.46%				
2807					Mean Detected	0.0095	SD Detected	7.0711E-4				
2808					Mean of Detected Logged Data	-4.658	SD of Detected Logged Data	0.0745				

	A	B	C	D	E	F	G	H	I	J	K	L
2809												
2810	Warning: Data set has only 2 Detected Values.											
2811	This is not enough to compute meaningful or reliable statistics and estimates.											
2812												
2813												
2814	Critical Values for Background Threshold Values (BTVs)											
2815					Tolerance Factor K (For UTL)	1.886				d2max (for USL)	3.297	
2816												
2817	Normal GOF Test on Detects Only											
2818	Not Enough Data to Perform GOF Test											
2819												
2820	Kaplan Meier (KM) Background Statistics Assuming Normal Distribution											
2821					KM Mean	0.00527				KM SD	0.00106	
2822					95% UTL95% Coverage	0.00727				95% KM UPL (t)	0.00703	
2823					90% KM Percentile (z)	0.00663				95% KM Percentile (z)	0.00701	
2824					99% KM Percentile (z)	0.00774				95% KM USL	0.00876	
2825												
2826	DL/2 Substitution Background Statistics Assuming Normal Distribution											
2827					Mean	0.0107				SD	0.00543	
2828					95% UTL95% Coverage	0.0209				95% UPL (t)	0.0197	
2829					90% Percentile (z)	0.0176				95% Percentile (z)	0.0196	
2830					99% Percentile (z)	0.0233				95% USL	0.0286	
2831	DL/2 is not a recommended method. DL/2 provided for comparisons and historical reasons											
2832												
2833	Gamma GOF Tests on Detected Observations Only											
2834	Not Enough Data to Perform GOF Test											
2835												
2836	Gamma Statistics on Detected Data Only											
2837					k hat (MLE)	360.7				k star (bias corrected MLE)	N/A	
2838					Theta hat (MLE)	2.6340E-5				Theta star (bias corrected MLE)	N/A	
2839					nu hat (MLE)	1443				nu star (bias corrected)	N/A	
2840					MLE Mean (bias corrected)	N/A						
2841					MLE Sd (bias corrected)	N/A				95% Percentile of Chisquare (2kstar)	N/A	
2842												
2843	Estimates of Gamma Parameters using KM Estimates											
2844					Mean (KM)	0.00527				SD (KM)	0.00106	
2845					Variance (KM)	1.1187E-6				SE of Mean (KM)	2.7847E-4	
2846					k hat (KM)	24.87				k star (KM)	24.3	
2847					nu hat (KM)	6466				nu star (KM)	6318	
2848					theta hat (KM)	2.1210E-4				theta star (KM)	2.1706E-4	
2849					80% gamma percentile (KM)	0.00615				90% gamma percentile (KM)	0.00668	
2850					95% gamma percentile (KM)	0.00715				99% gamma percentile (KM)	0.00808	
2851												
2852	The following statistics are computed using gamma distribution and KM estimates											
2853	Upper Limits using Wilson Hilferty (WH) and Hawkins Wixley (HW) Methods											
2854						WH	HW				WH	HW
2855				95% Approx. Gamma UTL with 95% Coverage		0.00704	0.00701			95% Approx. Gamma UPL	0.00681	0.00678
2856				95% KM Gamma Percentile		0.00679	0.00676			95% Gamma USL	0.00865	0.00863
2857												
2858	Lognormal GOF Test on Detected Observations Only											
2859	Not Enough Data to Perform GOF Test											
2860												

2861	**Background Lognormal ROS Statistics Assuming Lognormal Distribution Using Imputed Non-Detects**											
2862					Mean in Original Scale	0.00676				Mean in Log Scale	-5.01	
2863					SD in Original Scale	0.00111				SD in Log Scale	0.163	
2864					95% UTL95% Coverage	0.00907				95% BCA UTL95% Coverage	0.00906	
2865					95% Bootstrap (%) UTL95% Coverage	0.00906				95% UPL (t)	0.00875	
2866					90% Percentile (z)	0.00822				95% Percentile (z)	0.00872	
2867					99% Percentile (z)	0.00975				95% USL	0.0114	
2868												
2869	**Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution**											
2870					KM Mean of Logged Data	-5.259				95% KM UTL (Lognormal)95% Coverage	0.00693	
2871					KM SD of Logged Data	0.152				95% KM UPL (Lognormal)	0.0067	
2872					95% KM Percentile Lognormal (z)	0.00668				95% KM USL (Lognormal)	0.00858	
2873												
2874	**Background DL/2 Statistics Assuming Lognormal Distribution**											
2875					Mean in Original Scale	0.0107				Mean in Log Scale	-4.741	
2876					SD in Original Scale	0.00543				SD in Log Scale	0.708	
2877					95% UTL95% Coverage	0.0332				95% UPL (t)	0.0283	
2878					90% Percentile (z)	0.0216				95% Percentile (z)	0.028	
2879					99% Percentile (z)	0.0453				95% USL	0.0902	
2880	DL/2 is not a Recommended Method. DL/2 provided for comparisons and historical reasons.											
2881												
2882	**Nonparametric Distribution Free Background Statistics**											
2883	Data do not follow a Discernible Distribution (0.05)											
2884												
2885	**Nonparametric Upper Limits for BTVs(no distinction made between detects and nondetects)**											
2886					Order of Statistic, r	127				95% UTL with95% Coverage	0.03	
2887					Approx, f used to compute achieved CC	1.671				Approximate Actual Confidence Coefficient achieved by UTL	0.894	
2888					Approximate Sample Size needed to achieve specified CC	153				95% UPL	0.03	
2889					95% USL	0.03				95% KM Chebyshev UPL	0.0099	
2890												
2891	Note: The use of USL tends to yield a conservative estimate of BTV, especially when the sample size starts exceeding 20.											
2892	Therefore, one may use USL to estimate a BTV only when the data set represents a background data set free of outliers											
2893	and consists of observations collected from clean unimpacted locations.											
2894	The use of USL tends to provide a balance between false positives and false negatives provided the data											
2895	represents a background data set and when many onsite observations need to be compared with the BTV.											
2896												
2897	**TURBIDITY**											
2898												
2899	**General Statistics**											
2900					Total Number of Observations	112				Number of Missing Observations	22	
2901					Number of Distinct Observations	108						
2902					Number of Detects	109				Number of Non-Detects	3	
2903					Number of Distinct Detects	105				Number of Distinct Non-Detects	3	
2904					Minimum Detect	1.23				Minimum Non-Detect	2.5	
2905					Maximum Detect	169				Maximum Non-Detect	3.6	
2906					Variance Detected	1664				Percent Non-Detects	2.679%	
2907					Mean Detected	38.38				SD Detected	40.79	
2908					Mean of Detected Logged Data	2.969				SD of Detected Logged Data	1.306	
2909												
2910	**Critical Values for Background Threshold Values (BTVs)**											
2911					Tolerance Factor K (For UTL)	1.906				d2max (for USL)	3.248	
2912												

	A	B	C	D	E	F	G	H	I	J	K	L
2913	**Normal GOF Test on Detects Only**											
2914				Shapiro Wilk Test Statistic		0.809	**Normal GOF Test on Detected Observations Only**					
2915				5% Shapiro Wilk P Value		0	Data Not Normal at 5% Significance Level					
2916				Lilliefors Test Statistic		0.191	**Lilliefors GOF Test**					
2917				5% Lilliefors Critical Value		0.0852	Data Not Normal at 5% Significance Level					
2918	Data Not Normal at 5% Significance Level											
2919												
2920	**Kaplan Meier (KM) Background Statistics Assuming Normal Distribution**											
2921				KM Mean		37.4				KM SD		40.49
2922				95% UTL95% Coverage		114.6				95% KM UPL (t)		104.9
2923				90% KM Percentile (z)		89.29				95% KM Percentile (z)		104
2924				99% KM Percentile (z)		131.6				95% KM USL		168.9
2925												
2926	**DL/2 Substitution Background Statistics Assuming Normal Distribution**											
2927				Mean		37.39				SD		40.68
2928				95% UTL95% Coverage		114.9				95% UPL (t)		105.2
2929				90% Percentile (z)		89.52				95% Percentile (z)		104.3
2930				99% Percentile (z)		132				95% USL		169.5
2931	DL/2 is not a recommended method. DL/2 provided for comparisons and historical reasons											
2932												
2933	**Gamma GOF Tests on Detected Observations Only**											
2934				A-D Test Statistic		0.897	**Anderson-Darling GOF Test**					
2935				5% A-D Critical Value		0.79	Data Not Gamma Distributed at 5% Significance Level					
2936				K-S Test Statistic		0.0738	**Kolmogorov-Smirnov GOF**					
2937				5% K-S Critical Value		0.0902	Detected data appear Gamma Distributed at 5% Significance Level					
2938	Detected data follow Appr. Gamma Distribution at 5% Significance Level											
2939												
2940	**Gamma Statistics on Detected Data Only**											
2941				k hat (MLE)		0.866				k star (bias corrected MLE)		0.848
2942				Theta hat (MLE)		44.34				Theta star (bias corrected MLE)		45.26
2943				nu hat (MLE)		188.7				nu star (bias corrected)		184.9
2944				MLE Mean (bias corrected)		38.38						
2945				MLE Sd (bias corrected)		41.68				95% Percentile of Chisquare (2kstar)		5.388
2946												
2947	**Gamma ROS Statistics using Imputed Non-Detects**											
2948	GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs											
2949	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)											
2950	For such situations, GROS method may yield incorrect values of UCLs and BTVs											
2951	This is especially true when the sample size is small.											
2952	For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates											
2953				Minimum		0.01				Mean		37.35
2954				Maximum		169				Median		20.75
2955				SD		40.71				CV		1.09
2956				k hat (MLE)		0.718				k star (bias corrected MLE)		0.704
2957				Theta hat (MLE)		52.04				Theta star (bias corrected MLE)		53.03
2958				nu hat (MLE)		160.8				nu star (bias corrected)		157.8
2959				MLE Mean (bias corrected)		37.35				MLE Sd (bias corrected)		44.5
2960				95% Percentile of Chisquare (2kstar)		4.785				90% Percentile		93.62
2961				95% Percentile		126.9				99% Percentile		206.1
2962	**The following statistics are computed using Gamma ROS Statistics on Imputed Data**											
2963	**Upper Limits using Wilson Hilferty (WH) and Hawkins Wixley (HW) Methods**											
2964					WH	HW					WH	HW

2965	95% Approx. Gamma UTL with 95% Coverage				145.4	162	95% Approx. Gamma UPL				121.8	132.1
2966				95% Gamma USL	334.2	431.5						
2967												
2968	**Estimates of Gamma Parameters using KM Estimates**											
2969				Mean (KM)		37.4				SD (KM)		40.49
2970				Variance (KM)		1639				SE of Mean (KM)		3.843
2971				k hat (KM)		0.853				k star (KM)		0.837
2972				nu hat (KM)		191.2				nu star (KM)		187.4
2973				theta hat (KM)		43.83				theta star (KM)		44.71
2974				80% gamma percentile (KM)		60.97				90% gamma percentile (KM)		89.97
2975				95% gamma percentile (KM)		119.4				99% gamma percentile (KM)		188.7
2976												
2977	**The following statistics are computed using gamma distribution and KM estimates**											
2978	**Upper Limits using Wilson Hilferty (WH) and Hawkins Wixley (HW) Methods**											
2979					WH	HW					WH	HW
2980	95% Approx. Gamma UTL with 95% Coverage				139.7	150.7	95% Approx. Gamma UPL				117.6	124
2981				95% KM Gamma Percentile	115.8	121.8				95% Gamma USL	315	386.5
2982												
2983	**Lognormal GOF Test on Detected Observations Only**											
2984				Shapiro Wilk Approximate Test Statistic		0.944	**Shapiro Wilk GOF Test**					
2985				5% Shapiro Wilk P Value		3.1317E-4	Data Not Lognormal at 5% Significance Level					
2986				Lilliefors Test Statistic		0.0647	**Lilliefors GOF Test**					
2987				5% Lilliefors Critical Value		0.0852	Detected Data appear Lognormal at 5% Significance Level					
2988	Detected Data appear Approximate Lognormal at 5% Significance Level											
2989												
2990	**Background Lognormal ROS Statistics Assuming Lognormal Distribution Using Imputed Non-Detects**											
2991				Mean in Original Scale		37.41				Mean in Log Scale		2.911
2992				SD in Original Scale		40.66				SD in Log Scale		1.335
2993				95% UTL95% Coverage		234.2				95% BCA UTL95% Coverage		140.7
2994				95% Bootstrap (%) UTL95% Coverage		140.7				95% UPL (t)		169.9
2995				90% Percentile (z)		101.7				95% Percentile (z)		165.2
2996				99% Percentile (z)		410.2				95% USL		1403
2997												
2998	**Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution**											
2999				KM Mean of Logged Data		2.904				95% KM UTL (Lognormal)95% Coverage		235.3
3000				KM SD of Logged Data		1.341				95% KM UPL (Lognormal)		170.4
3001				95% KM Percentile Lognormal (z)		165.7				95% KM USL (Lognormal)		1421
3002												
3003	**Background DL/2 Statistics Assuming Lognormal Distribution**											
3004				Mean in Original Scale		37.39				Mean in Log Scale		2.9
3005				SD in Original Scale		40.68				SD in Log Scale		1.355
3006				95% UTL95% Coverage		240.5				95% UPL (t)		173.7
3007				90% Percentile (z)		103.1				95% Percentile (z)		168.7
3008				99% Percentile (z)		424.8				95% USL		1480
3009	DL/2 is not a Recommended Method. DL/2 provided for comparisons and historical reasons.											
3010												
3011	**Nonparametric Distribution Free Background Statistics**											
3012	Data appear to follow a Discernible Distribution at 5% Significance Level											
3013												
3014	**Nonparametric Upper Limits for BTVs(no distinction made between detects and nondetects)**											
3015				Order of Statistic, r		109				95% UTL with95% Coverage		138
3016				Approx, f used to compute achieved CC		1.434	Approximate Actual Confidence Coefficient achieved by UTL					0.817

3017	Approximate Sample Size needed to achieve specified CC					153					95% UPL	126.4
3018					95% USL	169					95% KM Chebyshev UPL	214.7
3019												
3020	Note: The use of USL tends to yield a conservative estimate of BTV, especially when the sample size starts exceeding 20.											
3021	Therefore, one may use USL to estimate a BTV only when the data set represents a background data set free of outliers											
3022	and consists of observations collected from clean unimpacted locations.											
3023	The use of USL tends to provide a balance between false positives and false negatives provided the data											
3024	represents a background data set and when many onsite observations need to be compared with the BTV.											
3025												
3026	**BENZENE**											
3027												
3028	**General Statistics**											
3029	Total Number of Observations					134					Number of Missing Observations	0
3030	Number of Distinct Observations					1						
3031	Number of Detects					0					Number of Non-Detects	134
3032	Number of Distinct Detects					0					Number of Distinct Non-Detects	1
3033	Minimum Detect					N/A					Minimum Non-Detect	1
3034	Maximum Detect					N/A					Maximum Non-Detect	1
3035	Variance Detected					N/A					Percent Non-Detects	100%
3036	Mean Detected					N/A					SD Detected	N/A
3037	Mean of Detected Logged Data					N/A					SD of Detected Logged Data	N/A
3038												
3039	Warning: All observations are Non-Detects (NDs), therefore all statistics and estimates should also be NDs!											
3040	Specifically, sample mean, UCLs, UPLs, and other statistics are also NDs lying below the largest detection limit!											
3041	The Project Team may decide to use alternative site specific values to estimate environmental parameters (e.g., EPC, BTV).											
3042												
3043	The data set for variable BENZENE was not processed!											
3044												
3045												
3046	**1,1-DICHLOROETHANE**											
3047												
3048	**General Statistics**											
3049	Total Number of Observations					134					Number of Missing Observations	0
3050	Number of Distinct Observations					1						
3051	Number of Detects					0					Number of Non-Detects	134
3052	Number of Distinct Detects					0					Number of Distinct Non-Detects	1
3053	Minimum Detect					N/A					Minimum Non-Detect	1
3054	Maximum Detect					N/A					Maximum Non-Detect	1
3055	Variance Detected					N/A					Percent Non-Detects	100%
3056	Mean Detected					N/A					SD Detected	N/A
3057	Mean of Detected Logged Data					N/A					SD of Detected Logged Data	N/A
3058												
3059	Warning: All observations are Non-Detects (NDs), therefore all statistics and estimates should also be NDs!											
3060	Specifically, sample mean, UCLs, UPLs, and other statistics are also NDs lying below the largest detection limit!											
3061	The Project Team may decide to use alternative site specific values to estimate environmental parameters (e.g., EPC, BTV).											
3062												
3063	The data set for variable 1,1-DICHLOROETHANE was not processed!											
3064												
3065												
3066	**1,1-DICHLOROETHENE**											
3067												
3068	**General Statistics**											

3069				Total Number of Observations		134				Number of Missing Observations		0
3070				Number of Distinct Observations		1						
3071				Number of Detects		0				Number of Non-Detects		134
3072				Number of Distinct Detects		0				Number of Distinct Non-Detects		1
3073				Minimum Detect		N/A				Minimum Non-Detect		1
3074				Maximum Detect		N/A				Maximum Non-Detect		1
3075				Variance Detected		N/A				Percent Non-Detects		100%
3076				Mean Detected		N/A				SD Detected		N/A
3077				Mean of Detected Logged Data		N/A				SD of Detected Logged Data		N/A
3078												
3079	Warning: All observations are Non-Detects (NDs), therefore all statistics and estimates should also be NDs!											
3080	Specifically, sample mean, UCLs, UPLs, and other statistics are also NDs lying below the largest detection limit!											
3081	The Project Team may decide to use alternative site specific values to estimate environmental parameters (e.g., EPC, BTV).											
3082												
3083	The data set for variable 1,1-DICHLOROETHENE was not processed!											
3084												
3085												
3086	1,2-DICHLOROETHANE											
3087												
3088	General Statistics											
3089				Total Number of Observations		134				Number of Missing Observations		0
3090				Number of Distinct Observations		2						
3091				Number of Detects		0				Number of Non-Detects		134
3092				Number of Distinct Detects		0				Number of Distinct Non-Detects		2
3093				Minimum Detect		N/A				Minimum Non-Detect		1
3094				Maximum Detect		N/A				Maximum Non-Detect		2
3095				Variance Detected		N/A				Percent Non-Detects		100%
3096				Mean Detected		N/A				SD Detected		N/A
3097				Mean of Detected Logged Data		N/A				SD of Detected Logged Data		N/A
3098												
3099	Warning: All observations are Non-Detects (NDs), therefore all statistics and estimates should also be NDs!											
3100	Specifically, sample mean, UCLs, UPLs, and other statistics are also NDs lying below the largest detection limit!											
3101	The Project Team may decide to use alternative site specific values to estimate environmental parameters (e.g., EPC, BTV).											
3102												
3103	The data set for variable 1,2-DICHLOROETHANE was not processed!											
3104												
3105												
3106	cis 1,2-DICHLOROETHENE											
3107												
3108	General Statistics											
3109				Total Number of Observations		131				Number of Missing Observations		3
3110				Number of Distinct Observations		2						
3111				Number of Detects		0				Number of Non-Detects		131
3112				Number of Distinct Detects		0				Number of Distinct Non-Detects		2
3113				Minimum Detect		N/A				Minimum Non-Detect		1
3114				Maximum Detect		N/A				Maximum Non-Detect		2
3115				Variance Detected		N/A				Percent Non-Detects		100%
3116				Mean Detected		N/A				SD Detected		N/A
3117				Mean of Detected Logged Data		N/A				SD of Detected Logged Data		N/A
3118												
3119	Warning: All observations are Non-Detects (NDs), therefore all statistics and estimates should also be NDs!											
3120	Specifically, sample mean, UCLs, UPLs, and other statistics are also NDs lying below the largest detection limit!											

	A	B	C	D	E	F	G	H	I	J	K	L
3121	The Project Team may decide to use alternative site specific values to estimate environmental parameters (e.g., EPC, BTV).											
3122												
3123	The data set for variable cis 1,2-DICHLOROETHENE was not processed!											
3124												
3125												
3126	trans 1,2-DICHLOROETHENE											
3127												
3128	General Statistics											
3129						Total Number of Observations	134			Number of Missing Observations	0	
3130						Number of Distinct Observations	1					
3131						Number of Detects	0			Number of Non-Detects	134	
3132						Number of Distinct Detects	0			Number of Distinct Non-Detects	1	
3133						Minimum Detect	N/A			Minimum Non-Detect	1	
3134						Maximum Detect	N/A			Maximum Non-Detect	1	
3135						Variance Detected	N/A			Percent Non-Detects	100%	
3136						Mean Detected	N/A			SD Detected	N/A	
3137						Mean of Detected Logged Data	N/A			SD of Detected Logged Data	N/A	
3138												
3139	Warning: All observations are Non-Detects (NDs), therefore all statistics and estimates should also be NDs!											
3140	Specifically, sample mean, UCLs, UPLs, and other statistics are also NDs lying below the largest detection limit!											
3141	The Project Team may decide to use alternative site specific values to estimate environmental parameters (e.g., EPC, BTV).											
3142												
3143	The data set for variable trans 1,2-DICHLOROETHENE was not processed!											
3144												
3145												
3146	ETHYLBENZENE											
3147												
3148	General Statistics											
3149						Total Number of Observations	134			Number of Missing Observations	0	
3150						Number of Distinct Observations	1					
3151						Number of Detects	0			Number of Non-Detects	134	
3152						Number of Distinct Detects	0			Number of Distinct Non-Detects	1	
3153						Minimum Detect	N/A			Minimum Non-Detect	1	
3154						Maximum Detect	N/A			Maximum Non-Detect	1	
3155						Variance Detected	N/A			Percent Non-Detects	100%	
3156						Mean Detected	N/A			SD Detected	N/A	
3157						Mean of Detected Logged Data	N/A			SD of Detected Logged Data	N/A	
3158												
3159	Warning: All observations are Non-Detects (NDs), therefore all statistics and estimates should also be NDs!											
3160	Specifically, sample mean, UCLs, UPLs, and other statistics are also NDs lying below the largest detection limit!											
3161	The Project Team may decide to use alternative site specific values to estimate environmental parameters (e.g., EPC, BTV).											
3162												
3163	The data set for variable ETHYLBENZENE was not processed!											
3164												
3165												
3166	METHYLENE CHLORIDE											
3167												
3168	General Statistics											
3169						Total Number of Observations	134			Number of Missing Observations	0	
3170						Number of Distinct Observations	2					
3171						Number of Detects	0			Number of Non-Detects	134	
3172						Number of Distinct Detects	0			Number of Distinct Non-Detects	2	

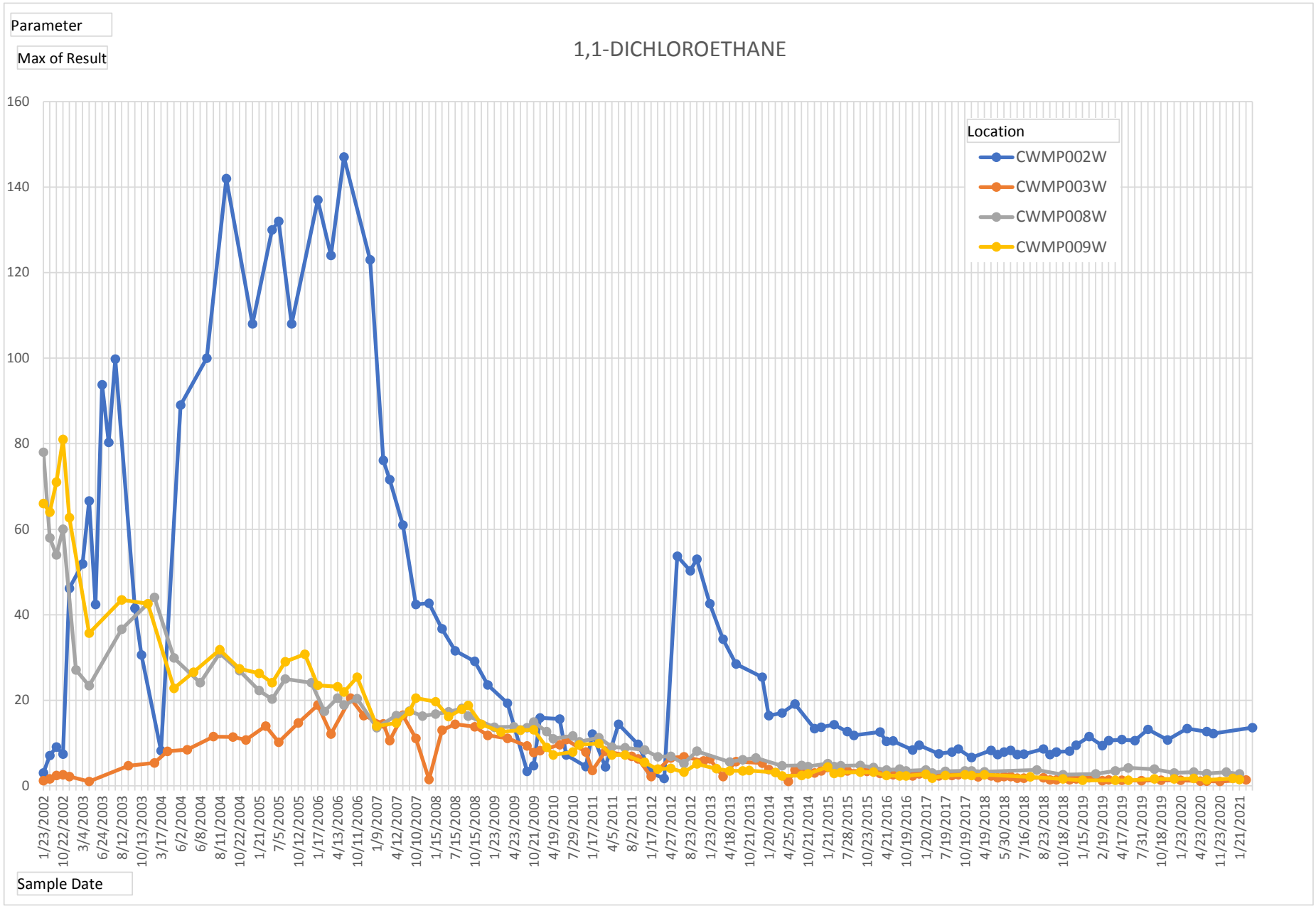
3173				Minimum Detect	N/A					Minimum Non-Detect	1	
3174				Maximum Detect	N/A					Maximum Non-Detect	2	
3175				Variance Detected	N/A					Percent Non-Detects	100%	
3176				Mean Detected	N/A					SD Detected	N/A	
3177				Mean of Detected Logged Data	N/A					SD of Detected Logged Data	N/A	
3178												
3179	Warning: All observations are Non-Detects (NDs), therefore all statistics and estimates should also be NDs!											
3180	Specifically, sample mean, UCLs, UPLs, and other statistics are also NDs lying below the largest detection limit!											
3181	The Project Team may decide to use alternative site specific values to estimate environmental parameters (e.g., EPC, BTV).											
3182												
3183	The data set for variable METHYLENE CHLORIDE was not processed!											
3184												
3185												
3186	TETRACHLOROETHENE											
3187												
3188	General Statistics											
3189				Total Number of Observations	134					Number of Missing Observations	0	
3190				Number of Distinct Observations	1							
3191				Number of Detects	0					Number of Non-Detects	134	
3192				Number of Distinct Detects	0					Number of Distinct Non-Detects	1	
3193				Minimum Detect	N/A					Minimum Non-Detect	1	
3194				Maximum Detect	N/A					Maximum Non-Detect	1	
3195				Variance Detected	N/A					Percent Non-Detects	100%	
3196				Mean Detected	N/A					SD Detected	N/A	
3197				Mean of Detected Logged Data	N/A					SD of Detected Logged Data	N/A	
3198												
3199	Warning: All observations are Non-Detects (NDs), therefore all statistics and estimates should also be NDs!											
3200	Specifically, sample mean, UCLs, UPLs, and other statistics are also NDs lying below the largest detection limit!											
3201	The Project Team may decide to use alternative site specific values to estimate environmental parameters (e.g., EPC, BTV).											
3202												
3203	The data set for variable TETRACHLOROETHENE was not processed!											
3204												
3205												
3206	TOLUENE											
3207												
3208	General Statistics											
3209				Total Number of Observations	132					Number of Missing Observations	2	
3210				Number of Distinct Observations	1							
3211				Number of Detects	0					Number of Non-Detects	132	
3212				Number of Distinct Detects	0					Number of Distinct Non-Detects	1	
3213				Minimum Detect	N/A					Minimum Non-Detect	1	
3214				Maximum Detect	N/A					Maximum Non-Detect	1	
3215				Variance Detected	N/A					Percent Non-Detects	100%	
3216				Mean Detected	N/A					SD Detected	N/A	
3217				Mean of Detected Logged Data	N/A					SD of Detected Logged Data	N/A	
3218												
3219	Warning: All observations are Non-Detects (NDs), therefore all statistics and estimates should also be NDs!											
3220	Specifically, sample mean, UCLs, UPLs, and other statistics are also NDs lying below the largest detection limit!											
3221	The Project Team may decide to use alternative site specific values to estimate environmental parameters (e.g., EPC, BTV).											
3222												
3223	The data set for variable TOLUENE was not processed!											
3224												

	A	B	C	D	E	F	G	H	I	J	K	L
3225												
3226	**1,1,1-TRICHLOROETHANE**											
3227												
3228	**General Statistics**											
3229	Total Number of Observations					134	Number of Missing Observations					0
3230	Number of Distinct Observations					1						
3231	Number of Detects					0	Number of Non-Detects					134
3232	Number of Distinct Detects					0	Number of Distinct Non-Detects					1
3233	Minimum Detect					N/A	Minimum Non-Detect					1
3234	Maximum Detect					N/A	Maximum Non-Detect					1
3235	Variance Detected					N/A	Percent Non-Detects					100%
3236	Mean Detected					N/A	SD Detected					N/A
3237	Mean of Detected Logged Data					N/A	SD of Detected Logged Data					N/A
3238												
3239	**Warning: All observations are Non-Detects (NDs), therefore all statistics and estimates should also be NDs!**											
3240	**Specifically, sample mean, UCLs, UPLs, and other statistics are also NDs lying below the largest detection limit!**											
3241	**The Project Team may decide to use alternative site specific values to estimate environmental parameters (e.g., EPC, BTV).**											
3242												
3243	**The data set for variable 1,1,1-TRICHLOROETHANE was not processed!**											
3244												
3245												
3246	**TRICHLOROETHENE**											
3247												
3248	**General Statistics**											
3249	Total Number of Observations					134	Number of Missing Observations					0
3250	Number of Distinct Observations					1						
3251	Number of Detects					0	Number of Non-Detects					134
3252	Number of Distinct Detects					0	Number of Distinct Non-Detects					1
3253	Minimum Detect					N/A	Minimum Non-Detect					1
3254	Maximum Detect					N/A	Maximum Non-Detect					1
3255	Variance Detected					N/A	Percent Non-Detects					100%
3256	Mean Detected					N/A	SD Detected					N/A
3257	Mean of Detected Logged Data					N/A	SD of Detected Logged Data					N/A
3258												
3259	**Warning: All observations are Non-Detects (NDs), therefore all statistics and estimates should also be NDs!**											
3260	**Specifically, sample mean, UCLs, UPLs, and other statistics are also NDs lying below the largest detection limit!**											
3261	**The Project Team may decide to use alternative site specific values to estimate environmental parameters (e.g., EPC, BTV).**											
3262												
3263	**The data set for variable TRICHLOROETHENE was not processed!**											
3264												
3265												
3266	**VINYL CHLORIDE**											
3267												
3268	**General Statistics**											
3269	Total Number of Observations					128	Number of Missing Observations					6
3270	Number of Distinct Observations					1						
3271	Number of Detects					0	Number of Non-Detects					128
3272	Number of Distinct Detects					0	Number of Distinct Non-Detects					1
3273	Minimum Detect					N/A	Minimum Non-Detect					1
3274	Maximum Detect					N/A	Maximum Non-Detect					1
3275	Variance Detected					N/A	Percent Non-Detects					100%
3276	Mean Detected					N/A	SD Detected					N/A

	A	B	C	D	E	F	G	H	I	J	K	L
3277				Mean of Detected Logged Data		N/A				SD of Detected Logged Data		N/A
3278												
3279					Warning: All observations are Non-Detects (NDs), therefore all statistics and estimates should also be NDs!							
3280					Specifically, sample mean, UCLs, UPLs, and other statistics are also NDs lying below the largest detection limit!							
3281					The Project Team may decide to use alternative site specific values to estimate environmental parameters (e.g., EPC, BTV).							
3282												
3283					The data set for variable VINYL CHLORIDE was not processed!							
3284												
3285												
3286	XYLENES (TOTAL)											
3287												
3288						General Statistics						
3289				Total Number of Observations		131				Number of Missing Observations		3
3290				Number of Distinct Observations		4						
3291				Number of Detects		0				Number of Non-Detects		131
3292				Number of Distinct Detects		0				Number of Distinct Non-Detects		4
3293				Minimum Detect		N/A				Minimum Non-Detect		1
3294				Maximum Detect		N/A				Maximum Non-Detect		5
3295				Variance Detected		N/A				Percent Non-Detects		100%
3296				Mean Detected		N/A				SD Detected		N/A
3297				Mean of Detected Logged Data		N/A				SD of Detected Logged Data		N/A
3298												
3299					Warning: All observations are Non-Detects (NDs), therefore all statistics and estimates should also be NDs!							
3300					Specifically, sample mean, UCLs, UPLs, and other statistics are also NDs lying below the largest detection limit!							
3301					The Project Team may decide to use alternative site specific values to estimate environmental parameters (e.g., EPC, BTV).							
3302												
3303					The data set for variable XYLENES (TOTAL) was not processed!							
3304												
3305												

ATTACHMENT 3

VOC TREND PLOTS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Max of Result
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CWMP002W
CWMP003W
CWMP008W
CWMP009W
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140
120
100
80
60
40
20
0
1/23/2002
10/22/2002
3/4/2003
6/24/2003
8/12/2003
10/13/2003
3/17/2004
6/2/2004
6/8/2004
8/11/2004
10/22/2004
1/21/2005
7/5/2005
10/12/2005
1/17/2006
4/13/2006
10/11/2006
1/9/2007
4/12/2007
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1/15/2008
7/15/2008
10/15/2008
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4/23/2009
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7/29/2010
1/17/2011
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8/2/2011
1/17/2012
4/27/2012
8/23/2012
1/23/2013
4/18/2013
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1/20/2014
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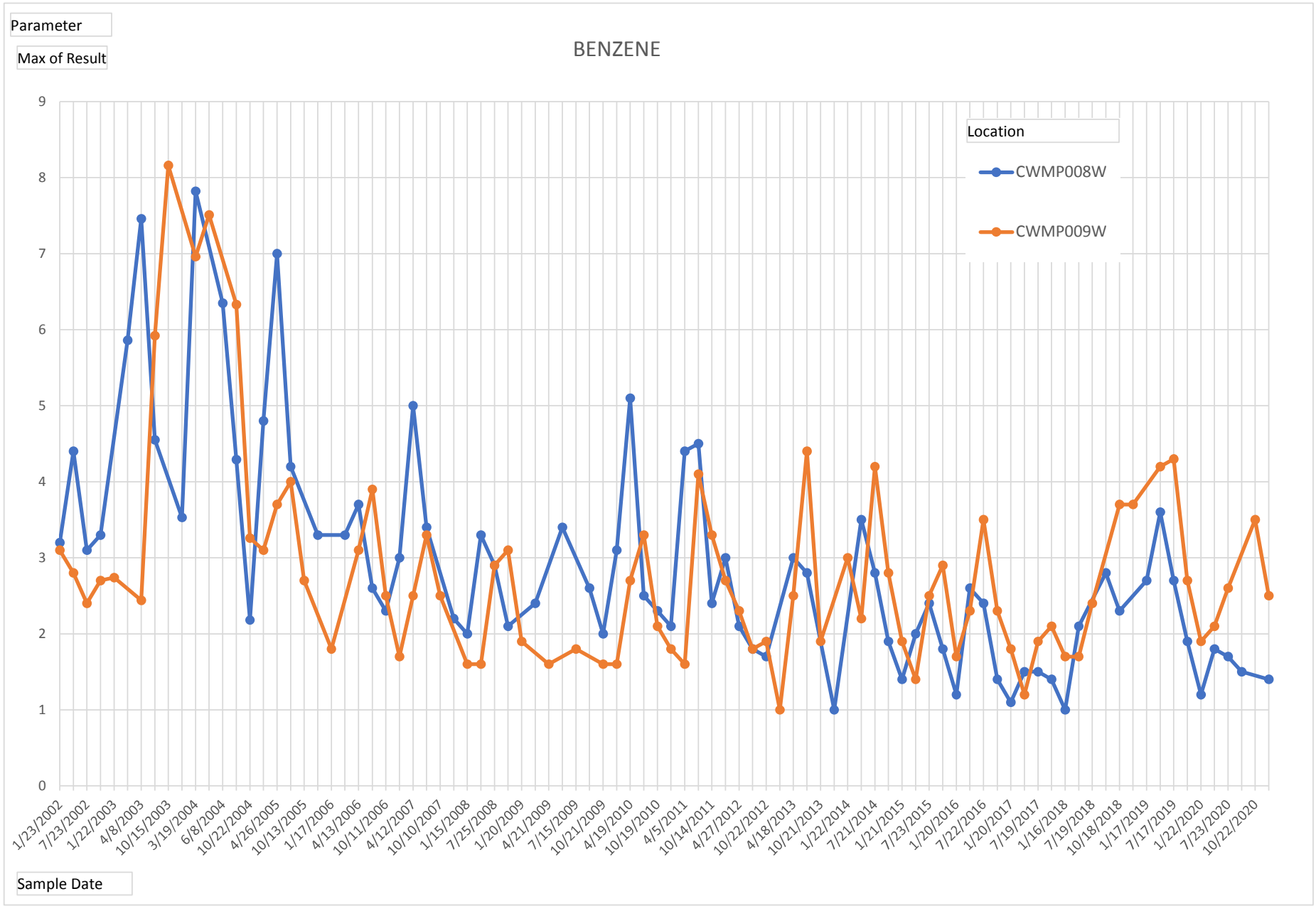
10/21/2014
1/21/2015
7/28/2015
10/23/2015
4/21/2016
10/19/2016
1/20/2017
7/19/2017
10/19/2017
4/19/2018
5/30/2018
7/16/2018
8/23/2018
10/18/2018
1/15/2019
2/19/2019
4/17/2019
7/31/2019
10/18/2019
1/23/2020
4/23/2020
11/23/2020
1/21/2021
Sample Date


Parameter
Max of Result
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Location
CWMP008W
CWMP009W
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8
7
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3
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10/15/2003
3/19/2004
6/8/2004
10/22/2004
4/26/2005
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1/17/2006
4/13/2006
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4/12/2007
10/10/2007
1/15/2008
7/25/2008
1/20/2009
4/21/2009
7/15/2009
10/21/2009
4/19/2010
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10/14/2011
4/27/2012
10/22/2012
4/18/2013
10/21/2013
1/22/2014
7/21/2014
1/21/2015
7/23/2015
1/20/2016
7/22/2016
1/20/2017
7/19/2017
1/16/2018
7/19/2018
10/18/2018
1/17/2019
7/17/2019
1/22/2020
7/23/2020
10/22/2020
Sample Date

COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF ENVIRONMENTAL PROTECTION
BUREAU OF WASTE MANAGEMENT

Date Prepared/Revised
05/26/2021
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: 5.97 ft — Measured from: ___ Land Surface X TOC

Casing Stickup: 1.50 ft — Elevation of Water Level: 447.43 ft./MSL

Sampling Depth: 33 ft — Volume of Water Column: 44.84 gal

Total Well Depth: 36.5 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): 1/18/2021 — Sample Collection Time: 12:02

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): 3152748001 — Final Lab Analysis CompletionDate: 2/3/2021

Name/Affiliation of Person who Filled Out Form: Daniel A. Brown

Comments:

I.D. No	100008
Monitoring Point No.	CWMP007W
Sample Date	1/18/2021

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	13	SM18-2321
CALCIUM, TOTAL	19	SW846 6010B
CALCIUM, DISSOLVED		SW 8466010B
COD (CHEMICAL OXYGEN DEMAND)	15 ND	EPA 410.4
CHLORIDE	63.4	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	9.6	SW846 6010B
MAGNESIUM, DISSOLVED		SW846 6010B
MANGANESE, TOTAL (ug/l)	7.2	SW846 6010B
MANGANESE, DISSOLVED (ug/l)		SW846 6010B
NITRATE-NITROGEN	9.7	EPA 300.0
pH-FIELD (SU)	5	FIELD
pH-LAB (SU)	6.96	EPA 150.1
POTASSIUM, TOTAL	2.4	SW846 6010B
POTASSIUM, DISSOLVED		SW846 6010B
SODIUM, TOTAL	33.5	SW846 6010B
SODIUM, DISSOLVED		SW846 6010B
SPEC. COND., FIELD (umhos/cm)	558	FIELD
SPEC. COND., LAB (umhos/cm)	360	EPA 120.1
SULFATE	21.2	EPA 300.0
ALKALINITY	13	SM18-2320B
TDS (TOTAL DISSOLVED SOLIDS)	242	SM18-2540C
TOC (TOTAL ORGANIC CARBON)	0.71	SM18-5310B
TOTAL PHENOLICS (ug/l)	5 ND	SW846 9066
TURBIDITY (N.T.U.)	0.1 ND	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	1/18/2021

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
05/26/2021
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: 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: 28.96 ft — Measured from: ___ Land Surface X TOC

Casing Stickup: 1.23 ft — Elevation of Water Level: 486.17 ft./MSL

Sampling Depth: 57 ft — Volume of Water Column: 54.84 gal

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

Well Purged: X Yes ___ No — Well Volumes Purged: 1.8

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

Spring Flow Rate: ___ gpm

Sample Date (mm/dd/yy): 1/18/2021 — Sample Collection Time: 13:20

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): 3152748002 — Final Lab Analysis CompletionDate: 2/3/2021

Name/Affiliation of Person who Filled Out Form: Daniel A. Brown

Comments:

I.D. No	100008
Monitoring Point No.	CWMP001W
Sample Date	1/18/2021

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	SM18-2321
CALCIUM, TOTAL	15.4	SW846 6010B
CALCIUM, DISSOLVED		SW 8466010B
COD (CHEMICAL OXYGEN DEMAND)	15 ND	EPA 410.4
CHLORIDE	27.1	EPA 300.0
FLUORIDE	0.2 ND	EPA 300.0
IRON, TOTAL (ug/l)	690	SW846 6010B
IRON, DISSOLVED (ug/l)		SW846 6010B
MAGNESIUM, TOTAL	10.5	SW846 6010B
MAGNESIUM, DISSOLVED		SW846 6010B
MANGANESE, TOTAL (ug/l)	51	SW846 6010B
MANGANESE, DISSOLVED (ug/l)		SW846 6010B
NITRATE-NITROGEN	17.9	EPA 300.0
pH-FIELD (SU)	5.07	FIELD
pH-LAB (SU)	6.52	EPA 150.1
POTASSIUM, TOTAL	2.3	SW846 6010B
POTASSIUM, DISSOLVED		SW846 6010B
SODIUM, TOTAL	13.2	SW846 6010B
SODIUM, DISSOLVED		SW846 6010B
SPEC. COND., FIELD (umhos/cm)	394	FIELD
SPEC. COND., LAB (umhos/cm)	266	EPA 120.1
SULFATE	2.3	EPA 300.0
ALKALINITY	5	SM18-2320B
TDS (TOTAL DISSOLVED SOLIDS)	208	SM18-2540C
TOC (TOTAL ORGANIC CARBON)	0.6	SM18-5310B
TOTAL PHENOLICS (ug/l)	5 ND	SW846 9066
TURBIDITY (N.T.U.)	15.9	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	1/18/2021

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.

COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF ENVIRONMENTAL PROTECTION
BUREAU OF WASTE MANAGEMENT

Date Prepared/Revised
05/26/2021
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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: 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: 42.29 ft — Measured from: ___ Land Surface X TOC

Casing Stickup: -0.37 ft — Elevation of Water Level: 471.14 ft./MSL

Sampling Depth: 130 ft — Volume of Water Column: 143.50 gal

Total Well Depth: 140 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): 1/19/2021 — Sample Collection Time: 12:02

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): 3152955001 — Final Lab Analysis CompletionDate: 2/10/2021

Name/Affiliation of Person who Filled Out Form: Daniel A. Brown

Comments:

I.D. No	100008
Monitoring Point No.	CWMP005W
Sample Date	1/19/2021

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	15	SM18-2321
CALCIUM, TOTAL	15	SW846 6010B
CALCIUM, DISSOLVED		SW 8466010B
COD (CHEMICAL OXYGEN DEMAND)	15 ND	EPA 410.4
CHLORIDE	62.2	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	7.9	SW846 6010B
MAGNESIUM, DISSOLVED		SW846 6010B
MANGANESE, TOTAL (ug/l)	52	SW846 6010B
MANGANESE, DISSOLVED (ug/l)		SW846 6010B
NITRATE-NITROGEN	7.7	EPA 300.0
pH-FIELD (SU)	8.06	FIELD
pH-LAB (SU)	5.9	EPA 150.1
POTASSIUM, TOTAL	2.2	SW846 6010B
POTASSIUM, DISSOLVED		SW846 6010B
SODIUM, TOTAL	31.3	SW846 6010B
SODIUM, DISSOLVED		SW846 6010B
SPEC. COND., FIELD (umhos/cm)	482	FIELD
SPEC. COND., LAB (umhos/cm)	341	EPA 120.1
SULFATE	4.7	EPA 300.0
ALKALINITY	15	SM18-2320B
TDS (TOTAL DISSOLVED SOLIDS)	232	SM18-2540C
TOC (TOTAL ORGANIC CARBON)	0.72	SM18-5310B
TOTAL PHENOLICS (ug/l)	5 ND	SW846 9066
TURBIDITY (N.T.U.)	0.31	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	1/19/2021

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.

COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF ENVIRONMENTAL PROTECTION
BUREAU OF WASTE MANAGEMENT

Date Prepared/Revised
05/26/2021
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: 9.72 ft — Measured from: ___ Land Surface X TOC

Casing Stickup: 2.53 ft — Elevation of Water Level: 302.25 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: 1.6

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

Spring Flow Rate: ___ gpm

Sample Date (mm/dd/yy): 1/20/2021 — Sample Collection Time: 13:14

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): 3153342001 — Final Lab Analysis CompletionDate: 2/3/2021

Name/Affiliation of Person who Filled Out Form: Daniel A. Brown

Comments:

I.D. No	100008
Monitoring Point No.	CWMP016W
Sample Date	1/20/2021

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	9	SM18-2321
CALCIUM, TOTAL	5.5	SW846 6010B
CALCIUM, DISSOLVED		SW 8466010B
COD (CHEMICAL OXYGEN DEMAND)	15 ND	EPA 410.4
CHLORIDE	2.7	EPA 300.0
FLUORIDE	0.2 ND	EPA 300.0
IRON, TOTAL (ug/l)	110	SW846 6010B
IRON, DISSOLVED (ug/l)		SW846 6010B
MAGNESIUM, TOTAL	1.3	SW846 6010B
MAGNESIUM, DISSOLVED		SW846 6010B
MANGANESE, TOTAL (ug/l)	8.2	SW846 6010B
MANGANESE, DISSOLVED (ug/l)		SW846 6010B
NITRATE-NITROGEN	1.4	EPA 300.0
pH-FIELD (SU)	5.62	FIELD
pH-LAB (SU)	6.47	EPA 150.1
POTASSIUM, TOTAL	0.56 ND	SW846 6010B
POTASSIUM, DISSOLVED		SW846 6010B
SODIUM, TOTAL	3.2	SW846 6010B
SODIUM, DISSOLVED		SW846 6010B
SPEC. COND., FIELD (umhos/cm)	92	FIELD
SPEC. COND., LAB (umhos/cm)	65	EPA 120.1
SULFATE	10	EPA 300.0
ALKALINITY	9	SM18-2320B
TDS (TOTAL DISSOLVED SOLIDS)	65	SM18-2540C
TOC (TOTAL ORGANIC CARBON)	0.5 ND	SM18-5310B
TOTAL PHENOLICS (ug/l)	5 ND	SW846 9066
TURBIDITY (N.T.U.)	0.88	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	1/20/2021

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.

COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF ENVIRONMENTAL PROTECTION
BUREAU OF WASTE MANAGEMENT

Date Prepared/Revised
05/26/2021
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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: 8.58 ft — Measured from: ___ Land Surface X TOC

Casing Stickup: 2.10 ft — Elevation of Water Level: 352.32 ft./MSL

Sampling Depth: 17 ft — Volume of Water Column: 7.19 gal

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

Well Purged: X Yes ___ No — Well Volumes Purged: 1.4

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

Spring Flow Rate: ___ gpm

Sample Date (mm/dd/yy): 1/20/2021 — Sample Collection Time: 13:44

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): 3153342002 — Final Lab Analysis CompletionDate: 2/3/2021

Name/Affiliation of Person who Filled Out Form: Daniel A. Brown

Comments:

I.D. No	100008
Monitoring Point No.	CWMP010W
Sample Date	1/20/2021

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	0.608	EPA 350.3
BICARBONATE	138	SM18-2321
CALCIUM, TOTAL	31.9	SW846 6010B
CALCIUM, DISSOLVED		SW 8466010B
COD (CHEMICAL OXYGEN DEMAND)	15 ND	EPA 410.4
CHLORIDE	181	EPA 300.0
FLUORIDE	0.2 ND	EPA 300.0
IRON, TOTAL (ug/l)	310	SW846 6010B
IRON, DISSOLVED (ug/l)		SW846 6010B
MAGNESIUM, TOTAL	28.9	SW846 6010B
MAGNESIUM, DISSOLVED		SW846 6010B
MANGANESE, TOTAL (ug/l)	210	SW846 6010B
MANGANESE, DISSOLVED (ug/l)		SW846 6010B
NITRATE-NITROGEN	15.1	EPA 300.0
pH-FIELD (SU)	6.62	FIELD
pH-LAB (SU)	7.73	EPA 150.1
POTASSIUM, TOTAL	6.8	SW846 6010B
POTASSIUM, DISSOLVED		SW846 6010B
SODIUM, TOTAL	116	SW846 6010B
SODIUM, DISSOLVED		SW846 6010B
SPEC. COND., FIELD (umhos/cm)	1584	FIELD
SPEC. COND., LAB (umhos/cm)	1010	EPA 120.1
SULFATE	27.8	EPA 300.0
ALKALINITY	141	SM18-2320B
TDS (TOTAL DISSOLVED SOLIDS)	568	SM18-2540C
TOC (TOTAL ORGANIC CARBON)	3.4	SM18-5310B
TOTAL PHENOLICS (ug/l)	5 ND	SW846 9066
TURBIDITY (N.T.U.)	2.25	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	1/20/2021

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
05/26/2021
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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 ft — Measured from: ___ Land Surface X TOC

Casing Stickup: 2.70 ft — Elevation of Water Level: 395.20 ft./MSL

Sampling Depth: 16 ft — Volume of Water Column: 6.98 gal

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

Well Purged: X Yes ___ No — Well Volumes Purged: 5.6

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

Spring Flow Rate: ___ gpm

Sample Date (mm/dd/yy): 1/21/2021 — Sample Collection Time: 12:05

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): 3153531001 — Final Lab Analysis CompletionDate: 2/10/2021

Name/Affiliation of Person who Filled Out Form: Daniel A. Brown

Comments:

I.D. No	100008
Monitoring Point No.	CWMP009W
Sample Date	1/21/2021

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	31.7	EPA 350.3
BICARBONATE	540	SM18-2321
CALCIUM, TOTAL	166	SW846 6010B
CALCIUM, DISSOLVED		SW 8466010B
COD (CHEMICAL OXYGEN DEMAND)	94	EPA 410.4
CHLORIDE	558	EPA 300.0
FLUORIDE	0.2 ND	EPA 300.0
IRON, TOTAL (ug/l)	36100	SW846 6010B
IRON, DISSOLVED (ug/l)		SW846 6010B
MAGNESIUM, TOTAL	75	SW846 6010B
MAGNESIUM, DISSOLVED		SW846 6010B
MANGANESE, TOTAL (ug/l)	13100	SW846 6010B
MANGANESE, DISSOLVED (ug/l)		SW846 6010B
NITRATE-NITROGEN	0.2 ND	EPA 300.0
pH-FIELD (SU)	6.15	FIELD
pH-LAB (SU)	8.23	EPA 150.1
POTASSIUM, TOTAL	33.6	SW846 6010B
POTASSIUM, DISSOLVED		SW846 6010B
SODIUM, TOTAL	177	SW846 6010B
SODIUM, DISSOLVED		SW846 6010B
SPEC. COND., FIELD (umhos/cm)	3576	FIELD
SPEC. COND., LAB (umhos/cm)	2280	EPA 120.1
SULFATE	5.7	EPA 300.0
ALKALINITY	540	SM18-2320B
TDS (TOTAL DISSOLVED SOLIDS)	1540	SM18-2540C
TOC (TOTAL ORGANIC CARBON)	37.3	SM18-5310B
TOTAL PHENOLICS (ug/l)	5 ND	SW846 9066
TURBIDITY (N.T.U.)	29	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	1/21/2021

FORM 19

QUARTERLY AND ANNUAL WATER QUALITY ANALYSES

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

ANALYTE	VALUE[T]	ANALYSIS METHOD NUMBER
BENZENE	2.5	SW846 8260B
1,2-DIBROMOETHANE (EDB) (ETHYLENE D	1 ND	SW846 8260B
1,1-DICHLOROETHANE	1.5	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.

COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF ENVIRONMENTAL PROTECTION
BUREAU OF WASTE MANAGEMENT

Date Prepared/Revised
05/26/2021
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: 2.28 ft — Measured from: ___ Land Surface X TOC

Casing Stickup: 2.80 ft — Elevation of Water Level: 420.02 ft./MSL

Sampling Depth: 19 ft — Volume of Water Column: 3.35 gal

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

Well Purged: X Yes ___ No — Well Volumes Purged: 7.5

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

Spring Flow Rate: ___ gpm

Sample Date (mm/dd/yy): 1/21/2021 — Sample Collection Time: 12:57

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): 3153531002 — Final Lab Analysis CompletionDate: 2/16/2021

Name/Affiliation of Person who Filled Out Form: Daniel A. Brown

Comments:

I.D. No	100008
Monitoring Point No.	CWMP008W
Sample Date	1/21/2021

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	6.3	EPA 350.3
BICARBONATE	344	SM18-2321
CALCIUM, TOTAL	64.1	SW846 6010B
CALCIUM, DISSOLVED		SW 8466010B
COD (CHEMICAL OXYGEN DEMAND)	15 ND	EPA 410.4
CHLORIDE	32.9	EPA 300.0
FLUORIDE	0.2 ND	EPA 300.0
IRON, TOTAL (ug/l)	24100	SW846 6010B
IRON, DISSOLVED (ug/l)		SW846 6010B
MAGNESIUM, TOTAL	28.3	SW846 6010B
MAGNESIUM, DISSOLVED		SW846 6010B
MANGANESE, TOTAL (ug/l)	15600	SW846 6010B
MANGANESE, DISSOLVED (ug/l)		SW846 6010B
NITRATE-NITROGEN	0.2 ND	EPA 300.0
pH-FIELD (SU)	6.27	FIELD
pH-LAB (SU)	8.39	EPA 150.1
POTASSIUM, TOTAL	8.2	SW846 6010B
POTASSIUM, DISSOLVED		SW846 6010B
SODIUM, TOTAL	33.9	SW846 6010B
SODIUM, DISSOLVED		SW846 6010B
SPEC. COND., FIELD (umhos/cm)	1184	FIELD
SPEC. COND., LAB (umhos/cm)	661	EPA 120.1
SULFATE	7.1	EPA 300.0
ALKALINITY	344	SM18-2320B
TDS (TOTAL DISSOLVED SOLIDS)	478	SM18-2540C
TOC (TOTAL ORGANIC CARBON)	7	SM18-5310B
TOTAL PHENOLICS (ug/l)	5 ND	SW846 9066
TURBIDITY (N.T.U.)	8.57	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	1/21/2021

FORM 19

QUARTERLY AND ANNUAL WATER QUALITY ANALYSES

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

ANALYTE	VALUE[T]	ANALYSIS METHOD NUMBER
BENZENE	1.4	SW846 8260B
1,2-DIBROMOETHANE (EDB) (ETHYLENE D	1 ND	SW846 8260B
1,1-DICHLOROETHANE	2.8	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.

COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF ENVIRONMENTAL PROTECTION
BUREAU OF WASTE MANAGEMENT

Date Prepared/Revised
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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: 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: 100.01 ft — Measured from: ___ Land Surface X TOC

Casing Stickup: -1.29 ft — Elevation of Water Level: 424.20 ft./MSL

Sampling Depth: 100 ft — Volume of Water Column: -36.73 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): 1/22/2021 — Sample Collection Time: 10:08

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): 3153814001 — Final Lab Analysis CompletionDate: 2/10/2021

Name/Affiliation of Person who Filled Out Form: Daniel A. Brown

Comments:

I.D. No	100008
Monitoring Point No.	CWMP003W
Sample Date	1/22/2021

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	0.121	EPA 350.3
BICARBONATE	18	SM18-2321
CALCIUM, TOTAL	21.8	SW846 6010B
CALCIUM, DISSOLVED		SW 8466010B
COD (CHEMICAL OXYGEN DEMAND)	15 ND	EPA 410.4
CHLORIDE	54.8	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	7.9	SW846 6010B
MAGNESIUM, DISSOLVED		SW846 6010B
MANGANESE, TOTAL (ug/l)	13	SW846 6010B
MANGANESE, DISSOLVED (ug/l)		SW846 6010B
NITRATE-NITROGEN	7	EPA 300.0
pH-FIELD (SU)	5.11	FIELD
pH-LAB (SU)	6.79	EPA 150.1
POTASSIUM, TOTAL	1.8	SW846 6010B
POTASSIUM, DISSOLVED		SW846 6010B
SODIUM, TOTAL	19.2	SW846 6010B
SODIUM, DISSOLVED		SW846 6010B
SPEC. COND., FIELD (umhos/cm)	396	FIELD
SPEC. COND., LAB (umhos/cm)	278	EPA 120.1
SULFATE	5	EPA 300.0
ALKALINITY	18	SM18-2320B
TDS (TOTAL DISSOLVED SOLIDS)	228	SM18-2540C
TOC (TOTAL ORGANIC CARBON)	0.78	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.	CWMP003W
Sample Date	1/22/2021

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	1.4	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
05/26/2021
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: 103.29 ft — Measured from: ___ Land Surface X TOC

Casing Stickup: -1.37 ft — Elevation of Water Level: 426.24 ft./MSL

Sampling Depth: 130 ft — Volume of Water Column: 53.91 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): 1/22/2021 — Sample Collection Time: 10:22

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): 3153814002 — Final Lab Analysis CompletionDate: 2/10/2021

Name/Affiliation of Person who Filled Out Form: Daniel A. Brown

Comments:

I.D. No	100008
Monitoring Point No.	CWMP004W
Sample Date	1/22/2021

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	0.109	EPA 350.3
BICARBONATE	24	SM18-2321
CALCIUM, TOTAL	19.2	SW846 6010B
CALCIUM, DISSOLVED		SW 8466010B
COD (CHEMICAL OXYGEN DEMAND)	15 ND	EPA 410.4
CHLORIDE	41.5	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	6.4	SW846 6010B
MAGNESIUM, DISSOLVED		SW846 6010B
MANGANESE, TOTAL (ug/l)	9.6	SW846 6010B
MANGANESE, DISSOLVED (ug/l)		SW846 6010B
NITRATE-NITROGEN	5.6	EPA 300.0
pH-FIELD (SU)	5.38	FIELD
pH-LAB (SU)	7.02	EPA 150.1
POTASSIUM, TOTAL	1.4	SW846 6010B
POTASSIUM, DISSOLVED		SW846 6010B
SODIUM, TOTAL	14.9	SW846 6010B
SODIUM, DISSOLVED		SW846 6010B
SPEC. COND., FIELD (umhos/cm)	253	FIELD
SPEC. COND., LAB (umhos/cm)	226	EPA 120.1
SULFATE	5.7	EPA 300.0
ALKALINITY	24	SM18-2320B
TDS (TOTAL DISSOLVED SOLIDS)	140	SM18-2540C
TOC (TOTAL ORGANIC CARBON)	0.67	SM18-5310B
TOTAL PHENOLICS (ug/l)	5 ND	SW846 9066
TURBIDITY (N.T.U.)	0.1 ND	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	1/22/2021

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
05/26/2021
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: 63.57 ft — Measured from: ___ Land Surface X TOC

Casing Stickup: 1.90 ft — Elevation of Water Level: 319.13 ft./MSL

Sampling Depth: 0 ft — Volume of Water Column: 56.29 gal

Total Well Depth: 101.9 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): 1/22/2021 — Sample Collection Time: 11:10

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): 3153814003 — Final Lab Analysis CompletionDate: 2/10/2021

Name/Affiliation of Person who Filled Out Form: Daniel A. Brown

Comments:

I.D. No	100008
Monitoring Point No.	CWMP012W
Sample Date	1/22/2021

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	69	SM18-2321
CALCIUM, TOTAL	31.1	SW846 6010B
CALCIUM, DISSOLVED		SW 8466010B
COD (CHEMICAL OXYGEN DEMAND)	15 ND	EPA 410.4
CHLORIDE	32.5	EPA 300.0
FLUORIDE	0.2 ND	EPA 300.0
IRON, TOTAL (ug/l)	14100	SW846 6010B
IRON, DISSOLVED (ug/l)		SW846 6010B
MAGNESIUM, TOTAL	8.8	SW846 6010B
MAGNESIUM, DISSOLVED		SW846 6010B
MANGANESE, TOTAL (ug/l)	140	SW846 6010B
MANGANESE, DISSOLVED (ug/l)		SW846 6010B
NITRATE-NITROGEN	8	EPA 300.0
pH-FIELD (SU)	5.84	FIELD
pH-LAB (SU)	7.07	EPA 150.1
POTASSIUM, TOTAL	1.4	SW846 6010B
POTASSIUM, DISSOLVED		SW846 6010B
SODIUM, TOTAL	13.4	SW846 6010B
SODIUM, DISSOLVED		SW846 6010B
SPEC. COND., FIELD (umhos/cm)	332	FIELD
SPEC. COND., LAB (umhos/cm)	291	EPA 120.1
SULFATE	4.8	EPA 300.0
ALKALINITY	69	SM18-2320B
TDS (TOTAL DISSOLVED SOLIDS)	226	SM18-2540C
TOC (TOTAL ORGANIC CARBON)	2.8	SM18-5310B
TOTAL PHENOLICS (ug/l)	5 ND	SW846 9066
TURBIDITY (N.T.U.)	45	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	1/22/2021

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
05/26/2021
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: 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): 1/22/2021 — Sample Collection Time: 11:50

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): 3153814004 — Final Lab Analysis CompletionDate: 2/10/2021

Name/Affiliation of Person who Filled Out Form: Daniel A. Brown

Comments:

I.D. No	100008
Monitoring Point No.	CWMP018S
Sample Date	1/22/2021

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	0.273	EPA 350.3
BICARBONATE	378	SM18-2321
CALCIUM, TOTAL	71.9	SW846 6010B
CALCIUM, DISSOLVED		SW 8466010B
COD (CHEMICAL OXYGEN DEMAND)	15 ND	EPA 410.4
CHLORIDE	433	EPA 300.0
FLUORIDE	0.5 ND	EPA 300.0
IRON, TOTAL (ug/l)	1000	SW846 6010B
IRON, DISSOLVED (ug/l)		SW846 6010B
MAGNESIUM, TOTAL	65.2	SW846 6010B
MAGNESIUM, DISSOLVED		SW846 6010B
MANGANESE, TOTAL (ug/l)	550	SW846 6010B
MANGANESE, DISSOLVED (ug/l)		SW846 6010B
NITRATE-NITROGEN	21.6	EPA 300.0
pH-FIELD (SU)	8.64	FIELD
pH-LAB (SU)	8.71	EPA 150.1
POTASSIUM, TOTAL	17.6	SW846 6010B
POTASSIUM, DISSOLVED		SW846 6010B
SODIUM, TOTAL	248	SW846 6010B
SODIUM, DISSOLVED		SW846 6010B
SPEC. COND., FIELD (umhos/cm)	2142	FIELD
SPEC. COND., LAB (umhos/cm)	1970	EPA 120.1
SULFATE	51.4	EPA 300.0
ALKALINITY	351	SM18-2320B
TDS (TOTAL DISSOLVED SOLIDS)	1170	SM18-2540C
TOC (TOTAL ORGANIC CARBON)	8.1	SM18-5310B
TOTAL PHENOLICS (ug/l)	5 ND	SW846 9066
TURBIDITY (N.T.U.)	1.44	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	1/22/2021

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
05/26/2021
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: 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): 1/22/2021 — Sample Collection Time: 12:10

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): 3153814005 — Final Lab Analysis CompletionDate: 2/16/2021

Name/Affiliation of Person who Filled Out Form: Daniel A. Brown

Comments:

I.D. No	100008
Monitoring Point No.	CWMP017S
Sample Date	1/22/2021

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	0.695	EPA 350.3
BICARBONATE	606	SM18-2321
CALCIUM, TOTAL	75.2	SW846 6010B
CALCIUM, DISSOLVED		SW 8466010B
COD (CHEMICAL OXYGEN DEMAND)	15 ND	EPA 410.4
CHLORIDE	580	EPA 300.0
FLUORIDE	0.5 ND	EPA 300.0
IRON, TOTAL (ug/l)	350	SW846 6010B
IRON, DISSOLVED (ug/l)		SW846 6010B
MAGNESIUM, TOTAL	90.2	SW846 6010B
MAGNESIUM, DISSOLVED		SW846 6010B
MANGANESE, TOTAL (ug/l)	120	SW846 6010B
MANGANESE, DISSOLVED (ug/l)		SW846 6010B
NITRATE-NITROGEN	30	EPA 300.0
pH-FIELD (SU)	8.08	FIELD
pH-LAB (SU)	8.45	EPA 150.1
POTASSIUM, TOTAL	19.2	SW846 6010B
POTASSIUM, DISSOLVED		SW846 6010B
SODIUM, TOTAL	364	SW846 6010B
SODIUM, DISSOLVED		SW846 6010B
SPEC. COND., FIELD (umhos/cm)	3144	FIELD
SPEC. COND., LAB (umhos/cm)	2750	EPA 120.1
SULFATE	63.6	EPA 300.0
ALKALINITY	606	SM18-2320B
TDS (TOTAL DISSOLVED SOLIDS)	1730	SM18-2540C
TOC (TOTAL ORGANIC CARBON)	6.3	SM18-5310B
TOTAL PHENOLICS (ug/l)	5 ND	SW846 9066
TURBIDITY (N.T.U.)	1.26	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	1/22/2021

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
05/26/2021
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: ___ ft — Measured from: ___ Land Surface X TOC

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

Sampling Depth: 63.38 ft — Volume of Water Column: #Error 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): 3/31/2021 — Sample Collection Time: 15:25

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): 3166636001 — Final Lab Analysis CompletionDate: 4/13/2021

Name/Affiliation of Person who Filled Out Form: Daniel A. Brown

Comments:

I.D. No	100008
Monitoring Point No.	CWMP002W
Sample Date	3/31/2021

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	0.205	EPA 350.3
BICARBONATE	11	SM18-2321
CALCIUM, TOTAL	50.8	SW846 6010B
CALCIUM, DISSOLVED		SW 8466010B
COD (CHEMICAL OXYGEN DEMAND)	22	EPA 410.4
CHLORIDE	94.2	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	16.3	SW846 6010B
MAGNESIUM, DISSOLVED		SW846 6010B
MANGANESE, TOTAL (ug/l)	1000	SW846 6010B
MANGANESE, DISSOLVED (ug/l)		SW846 6010B
NITRATE-NITROGEN	3.9	EPA 300.0
pH-FIELD (SU)	5.78	FIELD
pH-LAB (SU)	6.96	EPA 150.1
POTASSIUM, TOTAL	2.8	SW846 6010B
POTASSIUM, DISSOLVED		SW846 6010B
SODIUM, TOTAL	31.2	SW846 6010B
SODIUM, DISSOLVED		SW846 6010B
SPEC. COND., FIELD (umhos/cm)	552	FIELD
SPEC. COND., LAB (umhos/cm)	39	EPA 120.1
SULFATE	20.4	EPA 300.0
ALKALINITY	11	SM18-2320B
TDS (TOTAL DISSOLVED SOLIDS)	346	SM18-2540C
TOC (TOTAL ORGANIC CARBON)	5	SM18-5310B
TOTAL PHENOLICS (ug/l)	5 ND	SW846 9066
TURBIDITY (N.T.U.)	0.15	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	3/31/2021

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	13.6	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	3.3	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

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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

February 8, 2021

Ms. Jordan Gallagher
Lancaster County Solid Waste Authority
1299 Hbg Pike, P.O. Box 4425
Lancaster, PA 17604

Certificate of Analysis

Project Name:	**CRESWELL**	Workorder:	**3152748**
Purchase Order:	**PO-1000246**	Workorder ID:	**1st QTR 2021 CWMP-FORM 19Q**

Dear Ms. Gallagher:

Enclosed are the analytical results for samples received by the laboratory on Monday, January 18, 2021.

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: Ms. Ashley Gichuki , Mr. Daniel Brown , Mr. Jeff Musser

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

Susan J. Scherer

Ms. Susan J Scherer
Project Coordinator

ALS Environmental

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SAMPLE SUMMARY

Workorder: 3152748 1st QTR 2021 CWMP-FORM 19Q

Lab ID	Sample ID	Matrix	Date Collected	Date Received	Collected By
3152748001	CWMP007W	Ground Water	1/18/2021 12:02	1/18/2021 15:47	Mr. Brian G Shade
3152748002	CWMP001W	Ground Water	1/18/2021 13:20	1/18/2021 15:47	Mr. Brian G Shade

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SAMPLE SUMMARY

Workorder: 3152748 1st QTR 2021 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

C	Please reference the Project Summary section of this Certificate of Analysis for case narrative comments.
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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PROJECT SUMMARY

Workorder: 3152748 1st QTR 2021 CWMP-FORM 19Q

Workorder Comments

Temperature of sample taken at time of sample receipt in the laboratory. See chain of custody for actual temperature.

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ANALYTICAL RESULTS

Workorder: 3152748 1st QTR 2021 CWMP-FORM 19Q

Lab ID: **3152748001** Date Collected: 1/18/2021 12:02 Matrix: Ground Water

Sample ID: **CWMP007W** Date Received: 1/18/2021 15:47

Parameters	Results	Flag	Units	RDL	Method	Prepared	By	Analyzed	By	Cntr
VOLATILE ORGANICS										
Benzene	ND	C	ug/L	1.0	SW846 8260B			1/21/21 15:47	TMP	G
1,2-Dibromoethane	ND	C	ug/L	1.0	SW846 8260B			1/21/21 15:47	TMP	G
1,1-Dichloroethane	ND	C	ug/L	1.0	SW846 8260B			1/21/21 15:47	TMP	G
1,2-Dichloroethane	ND	C	ug/L	1.0	SW846 8260B			1/21/21 15:47	TMP	G
1,1-Dichloroethene	ND	C	ug/L	1.0	SW846 8260B			1/21/21 15:47	TMP	G
cis-1,2-Dichloroethene	ND	C	ug/L	1.0	SW846 8260B			1/21/21 15:47	TMP	G
trans-1,2-Dichloroethene	ND	C	ug/L	1.0	SW846 8260B			1/21/21 15:47	TMP	G
Ethylbenzene	ND	C	ug/L	1.0	SW846 8260B			1/21/21 15:47	TMP	G
Methylene Chloride	ND	C	ug/L	1.0	SW846 8260B			1/21/21 15:47	TMP	G
Tetrachloroethene	ND	C	ug/L	1.0	SW846 8260B			1/21/21 15:47	TMP	G
Toluene	ND	C	ug/L	1.0	SW846 8260B			1/21/21 15:47	TMP	G
Total Xylenes	ND	C	ug/L	3.0	SW846 8260B			1/21/21 15:47	TMP	G
1,1,1-Trichloroethane	ND	C	ug/L	1.0	SW846 8260B			1/21/21 15:47	TMP	G
Trichloroethene	ND	C	ug/L	1.0	SW846 8260B			1/21/21 15:47	TMP	G
Vinyl Chloride	ND	C	ug/L	1.0	SW846 8260B			1/21/21 15:47	TMP	G
Surrogate Recoveries	*Results*	*Flag*	*Units*	*Limits*	*Method*	*Prepared*	*By*	*Analyzed*	*By*	*Cntr*
1,2-Dichloroethane-d4 (S)	97	C	%	62 - 133	SW846 8260B			1/21/21 15:47	TMP	G
4-Bromofluorobenzene (S)	106	C	%	79 - 114	SW846 8260B			1/21/21 15:47	TMP	G
Dibromofluoromethane (S)	95	C	%	78 - 116	SW846 8260B			1/21/21 15:47	TMP	G
Toluene-d8 (S)	98.5	C	%	76 - 127	SW846 8260B			1/21/21 15:47	TMP	G
WET CHEMISTRY										
Alkalinity, Bicarbonate	13	C	mg/L	5	SM2320B-2011			1/20/21 10:33	R2B	B
Alkalinity, Total	13	C,2	mg/L	5	SM2320B-2011			1/20/21 10:33	R2B	I
Ammonia-N	ND	C	mg/L	0.100	ASTM D6919-09			1/30/21 13:50	JXL	A
Chemical Oxygen Demand (COD)	ND	C	mg/L	15	EPA 410.4			1/31/21 12:10	JAM	A
Chloride	63.4	C	mg/L	2.0	EPA 300.0			1/19/21 08:17	MBW	B
Fluoride	ND	C	mg/L	0.20	EPA 300.0			1/19/21 08:17	MBW	B
Nitrate-N	9.7	C	mg/L	0.20	EPA 300.0			1/19/21 08:17	MBW	B
pH	6.96	C,1	pH_Units		S4500HB-11			1/20/21 10:33	R2B	B
Phenolics	ND	C	mg/L	0.005	SW846 9066	1/25/21 21:00	VXF	2/3/21 12:11	VXF	F
Specific Conductance	360	C	umhos/cm	1	SW846 9050A			1/20/21 10:33	R2B	B
Sulfate	21.2	C	mg/L	2.0	EPA 300.0			1/19/21 08:17	MBW	B
Total Dissolved Solids	242	C	mg/L	5	S2540C-11			1/19/21 15:53	KMM	B
Total Organic Carbon (TOC)	0.71	C	mg/L	0.50	SW846 9060A			1/20/21 22:45	PAG	D
Turbidity	ND	C	NTU	0.10	SM2130B-2011			1/19/21 06:58	R2B	B

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ANALYTICAL RESULTS

Workorder: 3152748 1st QTR 2021 CWMP-FORM 19Q

Lab ID: **3152748001** Date Collected: 1/18/2021 12:02 Matrix: Ground Water

Sample ID: **CWMP007W** Date Received: 1/18/2021 15:47

Parameters	Results	Flag	Units	RDL	Method	Prepared	By	Analyzed	By	*Cntr*
METALS										
Calcium, Total	19.0	C	mg/L	0.11	SW846 6010C	1/20/21 21:40	SXC	1/21/21 12:36	SRT	J1
Iron, Total	ND	C	mg/L	0.067	SW846 6010C	1/20/21 21:40	SXC	1/21/21 12:36	SRT	J1
Magnesium, Total	9.6	C	mg/L	0.11	SW846 6010C	1/20/21 21:40	SXC	1/21/21 12:36	SRT	J1
Manganese, Total	0.0072	C	mg/L	0.0056	SW846 6010C	1/20/21 21:40	SXC	1/21/21 12:36	SRT	J1
Potassium, Total	2.4	C	mg/L	0.56	SW846 6010C	1/20/21 21:40	SXC	1/21/21 12:36	SRT	J1
Sodium, Total	33.5	C	mg/L	0.56	SW846 6010C	1/20/21 21:40	SXC	1/21/21 12:36	SRT	J1
FIELD PARAMETERS										
Depth to Water Level	5.97	C	Feet		Field			1/18/21 12:02	BGS	C
Elev Top MW Casing above MSL	453.40	C	Feet		Field			1/18/21 12:02	BGS	C
Flow Rate	1.61	C	gal/min		Field			1/18/21 12:02	BGS	C
Ground Water Elevation	447.43	C	ft/MSL		Field			1/18/21 12:02	BGS	C
pH, Field (SM4500B)	5.00	C	pH_Units		Field			1/18/21 12:02	BGS	C
Sample Depth	33.00	C	Feet		Field			1/18/21 12:02	BGS	C
Specific Conductance, Field	558	C	umhos/cm	1	Field			1/18/21 12:02	BGS	C
Temperature	13.33	C	Deg. C		Field			1/18/21 12:02	BGS	C
Total Well Depth	36.50	C	Feet		Field			1/18/21 12:02	BGS	C
Volume in Water Column	44.88	C	Gallons		Field			1/18/21 12:02	BGS	C
Water Level After Purge	6.61	C	Feet		Field			1/18/21 12:02	BGS	C
Well Volumes Purged	2.51	C	Vol		Field			1/18/21 12:02	BGS	C

Susan J. Scherer

Ms. Susan J Scherer
Project Coordinator

ALS Environmental

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ANALYTICAL RESULTS

Workorder: 3152748 1st QTR 2021 CWMP-FORM 19Q

Lab ID: **3152748002** Date Collected: 1/18/2021 13:20 Matrix: Ground Water
Sample ID: **CWMP001W** Date Received: 1/18/2021 15:47

Parameters	Results	Flag	Units	RDL	Method	Prepared	By	Analyzed	By	Cntr
VOLATILE ORGANICS										
Benzene	ND	C	ug/L	1.0	SW846 8260B			1/21/21 16:10	TMP	G
1,2-Dibromoethane	ND	C	ug/L	1.0	SW846 8260B			1/21/21 16:10	TMP	G
1,1-Dichloroethane	ND	C	ug/L	1.0	SW846 8260B			1/21/21 16:10	TMP	G
1,2-Dichloroethane	ND	C	ug/L	1.0	SW846 8260B			1/21/21 16:10	TMP	G
1,1-Dichloroethene	ND	C	ug/L	1.0	SW846 8260B			1/21/21 16:10	TMP	G
cis-1,2-Dichloroethene	ND	C	ug/L	1.0	SW846 8260B			1/21/21 16:10	TMP	G
trans-1,2-Dichloroethene	ND	C	ug/L	1.0	SW846 8260B			1/21/21 16:10	TMP	G
Ethylbenzene	ND	C	ug/L	1.0	SW846 8260B			1/21/21 16:10	TMP	G
Methylene Chloride	ND	C	ug/L	1.0	SW846 8260B			1/21/21 16:10	TMP	G
Tetrachloroethene	ND	C	ug/L	1.0	SW846 8260B			1/21/21 16:10	TMP	G
Toluene	ND	C	ug/L	1.0	SW846 8260B			1/21/21 16:10	TMP	G
Total Xylenes	ND	C	ug/L	3.0	SW846 8260B			1/21/21 16:10	TMP	G
1,1,1-Trichloroethane	ND	C	ug/L	1.0	SW846 8260B			1/21/21 16:10	TMP	G
Trichloroethene	ND	C	ug/L	1.0	SW846 8260B			1/21/21 16:10	TMP	G
Vinyl Chloride	ND	C	ug/L	1.0	SW846 8260B			1/21/21 16:10	TMP	G
Surrogate Recoveries	*Results*	*Flag*	*Units*	*Limits*	*Method*	*Prepared*	*By*	*Analyzed*	*By*	*Cntr*
1,2-Dichloroethane-d4 (S)	96	C	%	62 - 133	SW846 8260B			1/21/21 16:10	TMP	G
4-Bromofluorobenzene (S)	104	C	%	79 - 114	SW846 8260B			1/21/21 16:10	TMP	G
Dibromofluoromethane (S)	94	C	%	78 - 116	SW846 8260B			1/21/21 16:10	TMP	G
Toluene-d8 (S)	96.5	C	%	76 - 127	SW846 8260B			1/21/21 16:10	TMP	G
WET CHEMISTRY										
Alkalinity, Bicarbonate	5	C	mg/L	5	SM2320B-2011			1/20/21 10:33	R2B	B
Alkalinity, Total	5	C,2	mg/L	5	SM2320B-2011			1/20/21 10:33	R2B	I
Ammonia-N	ND	C	mg/L	0.100	ASTM D6919-09			1/30/21 14:04	JXL	A
Chemical Oxygen Demand (COD)	ND	C	mg/L	15	EPA 410.4			1/31/21 12:10	JAM	A
Chloride	27.1	C	mg/L	2.0	EPA 300.0			1/19/21 08:32	MBW	B
Fluoride	ND	C	mg/L	0.20	EPA 300.0			1/19/21 08:32	MBW	B
Nitrate-N	17.9	C	mg/L	0.20	EPA 300.0			1/19/21 08:32	MBW	B
pH	6.52	C,1	pH_Units		S4500HB-11			1/20/21 10:33	R2B	B
Phenolics	ND	C	mg/L	0.005	SW846 9066	1/25/21 21:00	VXF	2/3/21 12:11	VXF	F
Specific Conductance	266	C	umhos/cm	1	SW846 9050A			1/20/21 10:33	R2B	B
Sulfate	2.3	C	mg/L	2.0	EPA 300.0			1/19/21 08:32	MBW	B
Total Dissolved Solids	208	C	mg/L	5	S2540C-11			1/19/21 15:53	KMM	B
Total Organic Carbon (TOC)	0.60	C	mg/L	0.50	SW846 9060A			1/20/21 22:45	PAG	D
Turbidity	15.9	C	NTU	0.10	SM2130B-2011			1/19/21 06:58	R2B	B

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

ANALYTICAL RESULTS

Workorder: 3152748 1st QTR 2021 CWMP-FORM 19Q

Lab ID: **3152748002** Date Collected: 1/18/2021 13:20 Matrix: Ground Water

Sample ID: **CWMP001W** Date Received: 1/18/2021 15:47

Parameters	Results	Flag	Units	RDL	Method	Prepared	By	Analyzed	By	*Cntr*
METALS										
Calcium, Total	15.4	C	mg/L	0.11	SW846 6010C	1/20/21 21:40	SXC	1/21/21 12:40	SRT	J1
Iron, Total	0.69	C	mg/L	0.067	SW846 6010C	1/20/21 21:40	SXC	1/21/21 12:40	SRT	J1
Magnesium, Total	10.5	C	mg/L	0.11	SW846 6010C	1/20/21 21:40	SXC	1/21/21 12:40	SRT	J1
Manganese, Total	0.051	C	mg/L	0.0056	SW846 6010C	1/20/21 21:40	SXC	1/21/21 12:40	SRT	J1
Potassium, Total	2.3	C	mg/L	0.56	SW846 6010C	1/20/21 21:40	SXC	1/21/21 12:40	SRT	J1
Sodium, Total	13.2	C	mg/L	0.56	SW846 6010C	1/20/21 21:40	SXC	1/21/21 12:40	SRT	J1
FIELD PARAMETERS										
Depth to Water Level	28.96	C	Feet		Field			1/18/21 13:20	BGS	C
Elev Top MW Casing above MSL	515.13	C	Feet		Field			1/18/21 13:20	BGS	C
Flow Rate	1.65	C	gal/min		Field			1/18/21 13:20	BGS	C
Ground Water Elevation	486.17	C	ft/MSL		Field			1/18/21 13:20	BGS	C
pH, Field (SM4500B)	5.07	C	pH_Units		Field			1/18/21 13:20	BGS	C
Sample Depth	57.00	C	Feet		Field			1/18/21 13:20	BGS	C
Specific Conductance, Field	394	C	umhos/cm	1	Field			1/18/21 13:20	BGS	C
Temperature	13.29	C	Deg. C		Field			1/18/21 13:20	BGS	C
Total Well Depth	66.30	C	Feet		Field			1/18/21 13:20	BGS	C
Volume in Water Column	54.89	C	Gallons		Field			1/18/21 13:20	BGS	C
Water Level After Purge	49.21	C	Feet		Field			1/18/21 13:20	BGS	C
Well Volumes Purged	1.81	C	Vol		Field			1/18/21 13:20	BGS	C

Susan J. Scherer

Ms. Susan J Scherer
Project Coordinator

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ANALYTICAL RESULTS

Workorder: 3152748 1st QTR 2021 CWMP-FORM 19Q

PARAMETER QUALIFIERS

Lab ID	#	Sample ID	Analytical Method	Analyte
3152748001	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.				
3152748001	2	CWMP007W	SM2320B-2011	Alkalinity, Total
The Total Alkalinity is titrated to a pH of 4.5 and reported as mg CaCO3/L.				
3152748002	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.				
3152748002	2	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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ANALYSIS - PREP METHOD CROSS REFERENCE TABLE

Workorder: 3152748 1st QTR 2021 CWMP-FORM 19Q

Lab ID	Sample ID	Analysis Method	Prep Method	Leachate Method
3152748001	CWMP007W	ASTM D6919-09		
3152748001	CWMP007W	EPA 300.0		
3152748001	CWMP007W	EPA 410.4		
3152748001	CWMP007W	Field		
3152748001	CWMP007W	S2540C-11		
3152748001	CWMP007W	S4500HB-11		
3152748001	CWMP007W	SM2130B-2011		
3152748001	CWMP007W	SM2320B-2011		
3152748001	CWMP007W	SW846 6010C	SW846 3015	
3152748001	CWMP007W	SW846 8260B		
3152748001	CWMP007W	SW846 9050A		
3152748001	CWMP007W	SW846 9060A		
3152748001	CWMP007W	SW846 9066	420.4/9066	
3152748002	CWMP001W	ASTM D6919-09		
3152748002	CWMP001W	EPA 300.0		
3152748002	CWMP001W	EPA 410.4		
3152748002	CWMP001W	Field		
3152748002	CWMP001W	S2540C-11		
3152748002	CWMP001W	S4500HB-11		
3152748002	CWMP001W	SM2130B-2011		
3152748002	CWMP001W	SM2320B-2011		
3152748002	CWMP001W	SW846 6010C	SW846 3015	
3152748002	CWMP001W	SW846 8260B		
3152748002	CWMP001W	SW846 9050A		
3152748002	CWMP001W	SW846 9060A		
3152748002	CWMP001W	SW846 9066	420.4/9066	

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CHAIN OF CUSTODY/ REQUEST FOR ANALYSIS

Generated by ALS

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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: Dan Brown
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

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	
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									
					Enter Number of Containers Per Sample or Field Results Below.									
1. CWMP007W	01/18/21	1202	G	GW	2	1	2	x	x	1	1	1	1	
2. CWMP001W	01/18/21	1320	G	GW	2	1	2	x	x	1	1	1	1	
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] ALS	1-18-21	1657	2 [signature]	1/18/21	1547
3			4		
5			6		
7			8		
9			10		

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

Cooler Temp: 4 Therm ID: 15 (Receiving Lab)
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 [ ]
Sample Disposal: Lab [X] Special [ ]
PWSID #
EDDS: Formal 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			1/19/21

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?[1]	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:	525							

Radiological (µCi): _____

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

[1]Final determination of correct preservation for analysis such as volatiles, microbiology, and oil and grease is made in the analytical department at the time of or following the analysis

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April 15, 2021

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:	**3166636**
Purchase Order:	**PO-1000246**	Workorder ID:	**1st QTR 2021 CWMP-FORM 19Q**

Dear Mr. Brown:

Enclosed are the analytical results for samples received by the laboratory on Wednesday, March 31, 2021.

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: Ms. Ashley Gichuki , 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.

Susan J. Scherer

Ms. Susan J Scherer
Project Coordinator

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SAMPLE SUMMARY

Workorder: 3166636 1st QTR 2021 CWMP-FORM 19Q

Lab ID	Sample ID	Matrix	Date Collected	Date Received	Collected By
3166636001	CWMP002W	Ground Water	3/31/2021 15:25	3/31/2021 15:35	Mr. Brian G Shade

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SAMPLE SUMMARY

Workorder: 3166636 1st QTR 2021 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

C	Please reference the Project Summary section of this Certificate of Analysis for case narrative comments.
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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PROJECT SUMMARY

Workorder: 3166636 1st QTR 2021 CWMP-FORM 19Q

Workorder Comments

Temperature of sample taken at time of sample receipt in the laboratory. See chain of custody for actual temperature.

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ANALYTICAL RESULTS

Workorder: 3166636 1st QTR 2021 CWMP-FORM 19Q

Lab ID: **3166636001** Date Collected: 3/31/2021 15:25 Matrix: Ground Water

Sample ID: **CWMP002W** Date Received: 3/31/2021 15:35

Parameters	Results	Flag	Units	RDL	Method	Prepared	By	Analyzed	By	Cntr
VOLATILE ORGANICS										
Benzene	ND	C	ug/L	1.0	SW846 8260B			4/5/21 13:45	DPC	G
Bromodichloromethane	ND	C	ug/L	1.0	SW846 8260B			4/5/21 13:45	DPC	G
Bromoform	ND	C	ug/L	1.0	SW846 8260B			4/5/21 13:45	DPC	G
Bromomethane	ND	C	ug/L	1.0	SW846 8260B			4/5/21 13:45	DPC	G
Carbon Tetrachloride	ND	C	ug/L	1.0	SW846 8260B			4/5/21 13:45	DPC	G
Chlorobenzene	1.9	C	ug/L	1.0	SW846 8260B			4/5/21 13:45	DPC	G
Chlorodibromomethane	ND	C	ug/L	1.0	SW846 8260B			4/5/21 13:45	DPC	G
Chloroethane	94.0	C	ug/L	1.0	SW846 8260B			4/5/21 13:45	DPC	G
Chloroform	ND	C	ug/L	1.0	SW846 8260B			4/5/21 13:45	DPC	G
Chloromethane	ND	C	ug/L	1.0	SW846 8260B			4/5/21 13:45	DPC	G
1,2-Dibromoethane	ND	C	ug/L	1.0	SW846 8260B			4/5/21 13:45	DPC	G
1,2-Dichlorobenzene	ND	C	ug/L	1.0	SW846 8260B			4/5/21 13:45	DPC	G
1,3-Dichlorobenzene	ND	C	ug/L	1.0	SW846 8260B			4/5/21 13:45	DPC	G
1,4-Dichlorobenzene	1.5	C	ug/L	1.0	SW846 8260B			4/5/21 13:45	DPC	G
1,1-Dichloroethane	13.6	C	ug/L	1.0	SW846 8260B			4/5/21 13:45	DPC	G
1,2-Dichloroethane	ND	C	ug/L	1.0	SW846 8260B			4/5/21 13:45	DPC	G
1,1-Dichloroethene	ND	C	ug/L	1.0	SW846 8260B			4/5/21 13:45	DPC	G
cis-1,2-Dichloroethene	ND	C	ug/L	1.0	SW846 8260B			4/5/21 13:45	DPC	G
trans-1,2-Dichloroethene	ND	C	ug/L	1.0	SW846 8260B			4/5/21 13:45	DPC	G
1,2-Dichloropropane	ND	C	ug/L	1.0	SW846 8260B			4/5/21 13:45	DPC	G
1,3-Dichloropropene, Total	ND	C	ug/L	2.0	SW846 8260B			4/5/21 13:45	DPC	G
Ethylbenzene	ND	C	ug/L	1.0	SW846 8260B			4/5/21 13:45	DPC	G
Methylene Chloride	ND	C	ug/L	1.0	SW846 8260B			4/5/21 13:45	DPC	G
Styrene	ND	C	ug/L	1.0	SW846 8260B			4/5/21 13:45	DPC	G
1,1,2,2-Tetrachloroethane	ND	C	ug/L	1.0	SW846 8260B			4/5/21 13:45	DPC	G
Tetrachloroethene	ND	C	ug/L	1.0	SW846 8260B			4/5/21 13:45	DPC	G
Toluene	3.3	C	ug/L	1.0	SW846 8260B			4/5/21 13:45	DPC	G
Total Xylenes	ND	C	ug/L	3.0	SW846 8260B			4/5/21 13:45	DPC	G
1,2,4-Trichlorobenzene	ND	C	ug/L	2.0	SW846 8260B			4/5/21 13:45	DPC	G
1,1,1-Trichloroethane	ND	C	ug/L	1.0	SW846 8260B			4/5/21 13:45	DPC	G
1,1,2-Trichloroethane	ND	C	ug/L	1.0	SW846 8260B			4/5/21 13:45	DPC	G
Trichloroethene	ND	C	ug/L	1.0	SW846 8260B			4/5/21 13:45	DPC	G
Trichlorofluoromethane	ND	C	ug/L	1.0	SW846 8260B			4/5/21 13:45	DPC	G
1,2,3-Trichloropropane	ND	C	ug/L	2.0	SW846 8260B			4/5/21 13:45	DPC	G
Vinyl Chloride	ND	C	ug/L	1.0	SW846 8260B			4/5/21 13:45	DPC	G

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

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ANALYTICAL RESULTS

Workorder: 3166636 1st QTR 2021 CWMP-FORM 19Q

Lab ID: **3166636001** Date Collected: 3/31/2021 15:25 Matrix: Ground Water

Sample ID: **CWMP002W** Date Received: 3/31/2021 15:35

Parameters	Results	Flag	Units	RDL	Method	Prepared	By	Analyzed	By	*Cntr*
1,2-Dichloroethane-d4 (S)	107	C	%	62 - 133	SW846 8260B			4/5/21 13:45	DPC	G
4-Bromofluorobenzene (S)	92.7	C	%	79 - 114	SW846 8260B			4/5/21 13:45	DPC	G
Dibromofluoromethane (S)	88.4	C	%	78 - 116	SW846 8260B			4/5/21 13:45	DPC	G
Toluene-d8 (S)	78.9	C	%	76 - 127	SW846 8260B			4/5/21 13:45	DPC	G
WET CHEMISTRY										
Alkalinity, Bicarbonate	11	C	mg/L	5	SM2320B-2011			4/8/21 07:05	MBS	B
Alkalinity, Total	11	C,3	mg/L	5	SM2320B-2011			4/8/21 07:05	MBS	I
Ammonia-N	0.205	C	mg/L	0.100	ASTM D6919-09			4/9/21 00:47	MAP	A
Chemical Oxygen Demand (COD)	22	C	mg/L	15	EPA 410.4			4/13/21 18:02	ALK	A
Chloride	94.2	C	mg/L	2.0	EPA 300.0			4/1/21 16:30	MBW	B
Fluoride	ND	C	mg/L	0.20	EPA 300.0			4/1/21 16:30	MBW	B
Nitrate-N	3.9	C	mg/L	0.20	EPA 300.0			4/1/21 16:30	MBW	B
pH	6.96	C,1	pH_Units		S4500HB-11			4/8/21 07:05	MBS	B
Phenolics	ND	C	mg/L	0.005	SW846 9066	4/12/21 15:46	MXF	4/13/21 09:02	MXF	F
Specific Conductance	39	C,2	umhos/cm	1	SW846 9050A			4/8/21 07:05	MBS	B
Sulfate	20.4	C	mg/L	2.0	EPA 300.0			4/1/21 16:30	MBW	B
Total Dissolved Solids	346	C	mg/L	25	S2540C-11			4/6/21 14:27	KMM	B
Total Organic Carbon (TOC)	5.0	C	mg/L	0.50	SW846 9060A			4/2/21 01:22	PAG	D
Turbidity	0.15	C	NTU	0.10	SM2130B-2011			4/1/21 07:55	LXZ	B
METALS										
Calcium, Total	50.8	C	mg/L	0.11	SW846 6010C	4/4/21 12:50	SXC	4/5/21 16:48	SRT	J1
Iron, Total	ND	C	mg/L	0.067	SW846 6010C	4/4/21 12:50	SXC	4/5/21 16:48	SRT	J1
Magnesium, Total	16.3	C	mg/L	0.11	SW846 6010C	4/4/21 12:50	SXC	4/5/21 16:48	SRT	J1
Manganese, Total	1.0	C	mg/L	0.0056	SW846 6010C	4/4/21 12:50	SXC	4/5/21 16:48	SRT	J1
Potassium, Total	2.8	C	mg/L	0.56	SW846 6010C	4/4/21 12:50	SXC	4/5/21 16:48	SRT	J1
Sodium, Total	31.2	C	mg/L	0.56	SW846 6010C	4/4/21 12:50	SXC	4/5/21 16:48	SRT	J1
FIELD PARAMETERS										
pH, Field (SM4500B)	5.78	C	pH_Units		Field			3/31/21 15:25	BGS	C
Specific Conductance, Field	552	C	umhos/cm	1	Field			3/31/21 15:25	BGS	C
Temperature	15.00	C	Deg. C		Field			3/31/21 15:25	BGS	C

Susan J. Scherer

Ms. Susan J Scherer
Project Coordinator

ALS Environmental

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ANALYTICAL RESULTS

Workorder: 3166636 1st QTR 2021 CWMP-FORM 19Q

PARAMETER QUALIFIERS

Lab ID	#	Sample ID	Analytical Method	Analyte
3166636001	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.				
3166636001	2	CWMP002W	SW846 9050A	Specific Conductance
The Method Blank for method SM2510B-2011 reported a value greater than the reporting level for the analyte Specific Conductance. The concentration was 2.2 umhos/cm.				
3166636001	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: 3166636 1st QTR 2021 CWMP-FORM 19Q

Lab ID	Sample ID	Analysis Method	Prep Method	Leachate Method
3166636001	CWMP002W	ASTM D6919-09		
3166636001	CWMP002W	EPA 300.0		
3166636001	CWMP002W	EPA 410.4		
3166636001	CWMP002W	Field		
3166636001	CWMP002W	S2540C-11		
3166636001	CWMP002W	S4500HB-11		
3166636001	CWMP002W	SM2130B-2011		
3166636001	CWMP002W	SM2320B-2011		
3166636001	CWMP002W	SW846 6010C	SW846 3015	
3166636001	CWMP002W	SW846 8260B		
3166636001	CWMP002W	SW846 9050A		
3166636001	CWMP002W	SW846 9060A		
3166636001	CWMP002W	SW846 9066	420.4/9066	

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Middletown, PA 17057
P. 717-944-5541
F.717-944-1430

CHAIN OF CUSTODY/ REQUEST FOR ANALYSIS

3166636

6 of

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

Client Name: Lancaster County Solid Waste Mangement Authority

Address: 1299 Harrisburg Pike
Lancaster, PA 17604

Contact: Mr. Dan Brown

Phone#: (717) 553-5864

Project Name/#:

Bill To: LCSWMA

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

Date Required: **Approved?**

Email? [ ] -Y dbrown@lcswma.org

Fax? [ ] -Y No.:

	Container Type	AG	AW	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)	Date Collected mm/dd/yy	Time hh:mm	*G or C	**Matrix	TOC	O-OH	VOC - Form 19Q	Samle Depth for AUX Data	NH3-N, COD	Metals: Fe, Mn, Na, Ca, K, Mg	pH, Cl, SpC, F, SO4, TDS, NO3, Turb.	Alkalinity Bicarbonate			Sample/COC Comments
				Enter Number of Containers Per Sample or Field Results Below.												
1	CWMP002W	3/31/21	1525	G	GW	2	1	2	63.38	1	1	1	1			pH = 5.78
2																SpC = 552
3																Temp. = 15 degrees celsius
4																
5																
6																
7																
8																
9																
10																

W.O. Temp: 5° **Therm ID:** 401

Courier/Tracking #:

Purchase Order #:

Project Comments:

ALS Field Services: ☐ Pickup ☐ Labor
☐ Composite Sampling ☐ Rental Equipment
Other:

SAMPLED BY (Please Print): BG Shade ALS

Sampler Comments:

Relinquished By / Company Name	Date	Time	Received By / Company Name	Date	Time
1 BG Shade ALS	3-31-21	1534	2 [illegible]	3/31/21	1535
3			4		
5			6		
7			8		
9			10		

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

Special Processing: USACE [ ] Navy [ ] [ ]

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

Reportable to PADEP? Yes [ ] No [ ]

PWSID #

Sample Disposal: Lab [ ] 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 SHIPPING ADDRESS: 301 Fulling Mill Road, MIDDLETOWN, PA 17057

Rev 11/18

ALS

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

3166636

ion of Sample Receipt Form

Client: Lancaster County Solid Waste Authority

Initials: BBD Date: 04/01/21

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?[1]	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): 5.C

Thermometer ID: 401

Radiological (µCi): _____

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

[1]Final determination of correct preservation for analysis such as volatiles, microbiology, and oil and grease is made in the analytical department at the time of or following the analysis

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February 19, 2021

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:	**3153814**
Purchase Order:	**PO-1000246**	Workorder ID:	**1st QTR 2021 CWMP-FORM 19Q**

Dear Mr. Brown:

Enclosed are the analytical results for samples received by the laboratory on Friday, January 22, 2021.

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: Ms. Ashley Gichuki , 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.

Susan J. Scherer

Ms. Susan J Scherer
Project Coordinator

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SAMPLE SUMMARY

Workorder: 3153814 1st QTR 2021 CWMP-FORM 19Q

Lab ID	Sample ID	Matrix	Date Collected	Date Received	Collected By
3153814001	CWMP003W	Ground Water	1/22/2021 10:08	1/22/2021 15:26	Mr. Brian G Shade
3153814002	CWMP004W	Ground Water	1/22/2021 10:22	1/22/2021 15:26	Mr. Brian G Shade
3153814003	CWMP012W	Ground Water	1/22/2021 11:10	1/22/2021 15:26	Mr. Brian G Shade
3153814004	CWMP018S	Ground Water	1/22/2021 11:50	1/22/2021 15:26	Mr. Brian G Shade
3153814005	CWMP017S	Ground Water	1/22/2021 12:10	1/22/2021 15:26	Mr. Brian G Shade
3153814006	Field Blank	Water	1/22/2021 14:30	1/22/2021 15:26	Mr. Brian G Shade
3153814007	Trip Blank	Water	1/22/2021 15:26	1/22/2021 15:26	Mr. Brian G Shade

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SAMPLE SUMMARY

Workorder: 3153814 1st QTR 2021 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

C	Please reference the Project Summary section of this Certificate of Analysis for case narrative comments.
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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PROJECT SUMMARY

Workorder: 3153814 1st QTR 2021 CWMP-FORM 19Q

Workorder Comments

Temperature of sample taken at time of sample receipt in the laboratory. See chain of custody for actual temperature.

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ANALYTICAL RESULTS

Workorder: 3153814 1st QTR 2021 CWMP-FORM 19Q

Lab ID: **3153814001** Date Collected: 1/22/2021 10:08 Matrix: Ground Water

Sample ID: **CWMP003W** Date Received: 1/22/2021 15:26

Parameters	Results	Flag	Units	RDL	Method	Prepared	By	Analyzed	By	Cntr
VOLATILE ORGANICS										
Benzene	ND	C	ug/L	1.0	SW846 8260B			1/26/21 01:57	PDK	G
Bromodichloromethane	ND	C	ug/L	1.0	SW846 8260B			1/26/21 01:57	PDK	G
Bromoform	ND	C,3,4	ug/L	1.0	SW846 8260B			1/26/21 01:57	PDK	G
Bromomethane	ND	C,6	ug/L	1.0	SW846 8260B			1/26/21 01:57	PDK	G
Carbon Tetrachloride	ND	C	ug/L	1.0	SW846 8260B			1/26/21 01:57	PDK	G
Chlorobenzene	ND	C	ug/L	1.0	SW846 8260B			1/26/21 01:57	PDK	G
Chlorodibromomethane	ND	C	ug/L	1.0	SW846 8260B			1/26/21 01:57	PDK	G
Chloroethane	ND	C	ug/L	1.0	SW846 8260B			1/26/21 01:57	PDK	G
Chloroform	ND	C	ug/L	1.0	SW846 8260B			1/26/21 01:57	PDK	G
Chloromethane	ND	C	ug/L	1.0	SW846 8260B			1/26/21 01:57	PDK	G
1,2-Dibromoethane	ND	C	ug/L	1.0	SW846 8260B			1/26/21 01:57	PDK	G
1,2-Dichlorobenzene	ND	C	ug/L	1.0	SW846 8260B			1/26/21 01:57	PDK	G
1,3-Dichlorobenzene	ND	C	ug/L	1.0	SW846 8260B			1/26/21 01:57	PDK	G
1,4-Dichlorobenzene	ND	C	ug/L	1.0	SW846 8260B			1/26/21 01:57	PDK	G
1,1-Dichloroethane	1.4	C	ug/L	1.0	SW846 8260B			1/26/21 01:57	PDK	G
1,2-Dichloroethane	ND	C	ug/L	1.0	SW846 8260B			1/26/21 01:57	PDK	G
1,1-Dichloroethene	ND	C	ug/L	1.0	SW846 8260B			1/26/21 01:57	PDK	G
cis-1,2-Dichloroethene	ND	C	ug/L	1.0	SW846 8260B			1/26/21 01:57	PDK	G
trans-1,2-Dichloroethene	ND	C	ug/L	1.0	SW846 8260B			1/26/21 01:57	PDK	G
1,2-Dichloropropane	ND	C	ug/L	1.0	SW846 8260B			1/26/21 01:57	PDK	G
1,3-Dichloropropene, Total	ND	C	ug/L	2.0	SW846 8260B			1/26/21 01:57	PDK	G
Ethylbenzene	ND	C	ug/L	1.0	SW846 8260B			1/26/21 01:57	PDK	G
Methylene Chloride	ND	C	ug/L	1.0	SW846 8260B			1/26/21 01:57	PDK	G
Styrene	ND	C	ug/L	1.0	SW846 8260B			1/26/21 01:57	PDK	G
1,1,2,2-Tetrachloroethane	ND	C	ug/L	1.0	SW846 8260B			1/26/21 01:57	PDK	G
Tetrachloroethene	ND	C	ug/L	1.0	SW846 8260B			1/26/21 01:57	PDK	G
Toluene	ND	C	ug/L	1.0	SW846 8260B			1/26/21 01:57	PDK	G
Total Xylenes	ND	C	ug/L	3.0	SW846 8260B			1/26/21 01:57	PDK	G
1,2,4-Trichlorobenzene	ND	C,2	ug/L	2.0	SW846 8260B			1/26/21 01:57	PDK	G
1,1,1-Trichloroethane	ND	C	ug/L	1.0	SW846 8260B			1/26/21 01:57	PDK	G
1,1,2-Trichloroethane	ND	C	ug/L	1.0	SW846 8260B			1/26/21 01:57	PDK	G
Trichloroethene	ND	C	ug/L	1.0	SW846 8260B			1/26/21 01:57	PDK	G
Trichlorofluoromethane	ND	C	ug/L	1.0	SW846 8260B			1/26/21 01:57	PDK	G
1,2,3-Trichloropropane	ND	C,5	ug/L	2.0	SW846 8260B			1/26/21 01:57	PDK	G
Vinyl Chloride	ND	C	ug/L	1.0	SW846 8260B			1/26/21 01:57	PDK	G

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

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ANALYTICAL RESULTS

Workorder: 3153814 1st QTR 2021 CWMP-FORM 19Q

Lab ID: **3153814001** Date Collected: 1/22/2021 10:08 Matrix: Ground Water

Sample ID: **CWMP003W** Date Received: 1/22/2021 15:26

Parameters	Results	Flag	Units	RDL	Method	Prepared	By	Analyzed	By	*Cntr*
1,2-Dichloroethane-d4 (S)	100	C	%	62 - 133	SW846 8260B			1/26/21 01:57	PDK	G
4-Bromofluorobenzene (S)	98.4	C	%	79 - 114	SW846 8260B			1/26/21 01:57	PDK	G
Dibromofluoromethane (S)	98.9	C	%	78 - 116	SW846 8260B			1/26/21 01:57	PDK	G
Toluene-d8 (S)	92.1	C	%	76 - 127	SW846 8260B			1/26/21 01:57	PDK	G
WET CHEMISTRY										
Alkalinity, Bicarbonate	18	C	mg/L	5	SM2320B-2011			1/31/21 09:35	R2B	B
Alkalinity, Total	18	C,7	mg/L	5	SM2320B-2011			1/31/21 09:35	R2B	I
Ammonia-N	0.121	C	mg/L	0.100	ASTM D6919-09			2/6/21 00:32	JXL	A
Chemical Oxygen Demand (COD)	ND	C	mg/L	15	EPA 410.4			1/31/21 14:10	JAM	A
Chloride	54.8	C	mg/L	2.0	EPA 300.0			1/23/21 13:18	MBW	B
Fluoride	ND	C	mg/L	0.20	EPA 300.0			1/23/21 13:18	MBW	B
Nitrate-N	7.0	C	mg/L	0.20	EPA 300.0			1/23/21 13:18	MBW	B
pH	6.79	C,1	pH_Units		S4500HB-11			1/31/21 09:35	R2B	B
Phenolics	ND	C	mg/L	0.005	SW846 9066	1/26/21 21:00	VXF	2/10/21 15:28	VXF	F
Specific Conductance	278	C,8	umhos/cm	1	SW846 9050A			2/5/21 22:04	R2B	B
Sulfate	5.0	C	mg/L	2.0	EPA 300.0			1/23/21 13:18	MBW	B
Total Dissolved Solids	228	C	mg/L	25	S2540C-11			1/26/21 14:56	KMM	B
Total Organic Carbon (TOC)	0.78	C	mg/L	0.50	SW846 9060A			1/26/21 07:33	PAG	D
Turbidity	0.74	C	NTU	0.10	SM2130B-2011			1/23/21 06:30	MBW	B
METALS										
Calcium, Total	21.8	C	mg/L	0.11	SW846 6010C	1/24/21 19:10	SXC	1/25/21 12:13	SRT	J1
Iron, Total	ND	C	mg/L	0.067	SW846 6010C	1/24/21 19:10	SXC	1/25/21 12:13	SRT	J1
Magnesium, Total	7.9	C	mg/L	0.11	SW846 6010C	1/24/21 19:10	SXC	1/25/21 12:13	SRT	J1
Manganese, Total	0.013	C	mg/L	0.0056	SW846 6010C	1/24/21 19:10	SXC	1/25/21 12:13	SRT	J1
Potassium, Total	1.8	C	mg/L	0.56	SW846 6010C	1/24/21 19:10	SXC	1/25/21 12:13	SRT	J1
Sodium, Total	19.2	C	mg/L	0.56	SW846 6010C	1/24/21 19:10	SXC	1/25/21 12:13	SRT	J1
FIELD PARAMETERS										
Depth to Water Level	100.01	C	Feet		Field			1/22/21 10:08	BGS	C
Elev Top MW Casing above MSL	524.21	C	Feet		Field			1/22/21 10:08	BGS	C
Ground Water Elevation	424.20	C	ft/MSL		Field			1/22/21 10:08	BGS	C
pH, Field (SM4500B)	5.11	C	pH_Units		Field			1/22/21 10:08	BGS	C
Sample Depth	100.00	C	Feet		Field			1/22/21 10:08	BGS	C
Specific Conductance, Field	396	C	umhos/cm	1	Field			1/22/21 10:08	BGS	C
Temperature	13.03	C	Deg. C		Field			1/22/21 10:08	BGS	C
Total Well Depth	140.00	C	Feet		Field			1/22/21 10:08	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: 3153814 1st QTR 2021 CWMP-FORM 19Q

Lab ID:	**3153814001**	Date Collected:	1/22/2021 10:08	Matrix:	Ground Water
Sample ID:	**CWMP003W**	Date Received:	1/22/2021 15:26		

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

Ms. Susan J Scherer
Project Coordinator

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ANALYTICAL RESULTS

Workorder: 3153814 1st QTR 2021 CWMP-FORM 19Q

Lab ID: **3153814002** Date Collected: 1/22/2021 10:22 Matrix: Ground Water

Sample ID: **CWMP004W** Date Received: 1/22/2021 15:26

Parameters	Results	Flag	Units	RDL	Method	Prepared	By	Analyzed	By	Cntr
VOLATILE ORGANICS										
Benzene	ND	C	ug/L	1.0	SW846 8260B			1/26/21 02:19	PDK	G
Bromodichloromethane	ND	C	ug/L	1.0	SW846 8260B			1/26/21 02:19	PDK	G
Bromoform	ND	C	ug/L	1.0	SW846 8260B			1/26/21 02:19	PDK	G
Carbon Tetrachloride	ND	C	ug/L	1.0	SW846 8260B			1/26/21 02:19	PDK	G
Chlorobenzene	ND	C	ug/L	1.0	SW846 8260B			1/26/21 02:19	PDK	G
Chlorodibromomethane	ND	C	ug/L	1.0	SW846 8260B			1/26/21 02:19	PDK	G
Chloroethane	ND	C	ug/L	1.0	SW846 8260B			1/26/21 02:19	PDK	G
Chloroform	ND	C	ug/L	1.0	SW846 8260B			1/26/21 02:19	PDK	G
Chloromethane	ND	C	ug/L	1.0	SW846 8260B			1/26/21 02:19	PDK	G
1,2-Dibromoethane	ND	C	ug/L	1.0	SW846 8260B			1/26/21 02:19	PDK	G
1,2-Dichlorobenzene	ND	C	ug/L	1.0	SW846 8260B			1/26/21 02:19	PDK	G
1,3-Dichlorobenzene	ND	C	ug/L	1.0	SW846 8260B			1/26/21 02:19	PDK	G
1,4-Dichlorobenzene	ND	C	ug/L	1.0	SW846 8260B			1/26/21 02:19	PDK	G
1,1-Dichloroethane	ND	C	ug/L	1.0	SW846 8260B			1/26/21 02:19	PDK	G
1,2-Dichloroethane	ND	C	ug/L	1.0	SW846 8260B			1/26/21 02:19	PDK	G
1,1-Dichloroethene	ND	C	ug/L	1.0	SW846 8260B			1/26/21 02:19	PDK	G
cis-1,2-Dichloroethene	ND	C	ug/L	1.0	SW846 8260B			1/26/21 02:19	PDK	G
trans-1,2-Dichloroethene	ND	C	ug/L	1.0	SW846 8260B			1/26/21 02:19	PDK	G
1,2-Dichloropropane	ND	C	ug/L	1.0	SW846 8260B			1/26/21 02:19	PDK	G
1,3-Dichloropropene, Total	ND	C	ug/L	2.0	SW846 8260B			1/26/21 02:19	PDK	G
Ethylbenzene	ND	C	ug/L	1.0	SW846 8260B			1/26/21 02:19	PDK	G
Methylene Chloride	ND	C	ug/L	1.0	SW846 8260B			1/26/21 02:19	PDK	G
Styrene	ND	C	ug/L	1.0	SW846 8260B			1/26/21 02:19	PDK	G
1,1,2,2-Tetrachloroethane	ND	C	ug/L	1.0	SW846 8260B			1/26/21 02:19	PDK	G
Tetrachloroethene	ND	C	ug/L	1.0	SW846 8260B			1/26/21 02:19	PDK	G
Toluene	ND	C	ug/L	1.0	SW846 8260B			1/26/21 02:19	PDK	G
Total Xylenes	ND	C	ug/L	3.0	SW846 8260B			1/26/21 02:19	PDK	G
1,2,4-Trichlorobenzene	ND	C	ug/L	2.0	SW846 8260B			1/26/21 02:19	PDK	G
1,1,1-Trichloroethane	ND	C	ug/L	1.0	SW846 8260B			1/26/21 02:19	PDK	G
1,1,2-Trichloroethane	ND	C	ug/L	1.0	SW846 8260B			1/26/21 02:19	PDK	G
Trichloroethene	ND	C	ug/L	1.0	SW846 8260B			1/26/21 02:19	PDK	G
Trichlorofluoromethane	ND	C	ug/L	1.0	SW846 8260B			1/26/21 02:19	PDK	G
1,2,3-Trichloropropane	ND	C	ug/L	2.0	SW846 8260B			1/26/21 02:19	PDK	G
Vinyl Chloride	ND	C	ug/L	1.0	SW846 8260B			1/26/21 02:19	PDK	G
Surrogate Recoveries	*Results*	*Flag*	*Units*	*Limits*	*Method*	*Prepared*	*By*	*Analyzed*	*By*	*Cntr*
1,2-Dichloroethane-d4 (S)	101	C	%	62 - 133	SW846 8260B			1/26/21 02:19	PDK	G

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ANALYTICAL RESULTS

Workorder: 3153814 1st QTR 2021 CWMP-FORM 19Q

Lab ID: **3153814002** Date Collected: 1/22/2021 10:22 Matrix: Ground Water

Sample ID: **CWMP004W** Date Received: 1/22/2021 15:26

Parameters	Results	Flag	Units	RDL	Method	Prepared	By	Analyzed	By	Cntr
4-Bromofluorobenzene (S)	98	C	%	79 - 114	SW846 8260B			1/26/21 02:19	PDK	G
Dibromofluoromethane (S)	99.7	C	%	78 - 116	SW846 8260B			1/26/21 02:19	PDK	G
Toluene-d8 (S)	93.5	C	%	76 - 127	SW846 8260B			1/26/21 02:19	PDK	G
WET CHEMISTRY										
Alkalinity, Bicarbonate	24	C	mg/L	5	SM2320B-2011			1/31/21 09:35	R2B	B
Alkalinity, Total	24	C,2	mg/L	5	SM2320B-2011			1/31/21 09:35	R2B	I
Ammonia-N	0.109	C	mg/L	0.100	ASTM D6919-09			2/6/21 00:46	JXL	A
Chemical Oxygen Demand (COD)	ND	C	mg/L	15	EPA 410.4			1/31/21 14:10	JAM	A
Chloride	41.5	C	mg/L	2.0	EPA 300.0			1/23/21 14:48	MBW	B
Fluoride	ND	C	mg/L	0.20	EPA 300.0			1/23/21 14:48	MBW	B
Nitrate-N	5.6	C	mg/L	0.20	EPA 300.0			1/23/21 14:48	MBW	B
pH	7.02	C,1	pH_Units		S4500HB-11			1/31/21 09:35	R2B	B
Phenolics	ND	C,4	mg/L	0.005	SW846 9066	1/26/21 21:00	VXF	2/10/21 15:28	VXF	F
Specific Conductance	226	C,3	umhos/cm	1	SW846 9050A			2/5/21 22:04	R2B	B
Sulfate	5.7	C	mg/L	2.0	EPA 300.0			1/23/21 14:48	MBW	B
Total Dissolved Solids	140	C	mg/L	25	S2540C-11			1/26/21 14:56	KMM	B
Total Organic Carbon (TOC)	0.67	C	mg/L	0.50	SW846 9060A			1/26/21 07:33	PAG	D
Turbidity	ND	C	NTU	0.10	SM2130B-2011			1/23/21 06:30	MBW	B
METALS										
Calcium, Total	19.2	C	mg/L	0.11	SW846 6010C	1/24/21 19:10	SXC	1/25/21 12:24	SRT	J1
Iron, Total	ND	C	mg/L	0.067	SW846 6010C	1/24/21 19:10	SXC	1/25/21 12:24	SRT	J1
Magnesium, Total	6.4	C	mg/L	0.11	SW846 6010C	1/24/21 19:10	SXC	1/25/21 12:24	SRT	J1
Manganese, Total	0.0096	C	mg/L	0.0056	SW846 6010C	1/24/21 19:10	SXC	1/25/21 12:24	SRT	J1
Potassium, Total	1.4	C	mg/L	0.56	SW846 6010C	1/24/21 19:10	SXC	1/25/21 12:24	SRT	J1
Sodium, Total	14.9	C	mg/L	0.56	SW846 6010C	1/24/21 19:10	SXC	1/25/21 12:24	SRT	J1
FIELD PARAMETERS										
Depth to Water Level	103.29	C	Feet		Field			1/22/21 10:27	BGS	C
Elev Top MW Casing above MSL	529.53	C	Feet		Field			1/22/21 10:27	BGS	C
Ground Water Elevation	426.24	C	ft/MSL		Field			1/22/21 10:27	BGS	C
pH, Field (SM4500B)	5.38	C	pH_Units		Field			1/22/21 10:27	BGS	C
Sample Depth	130.00	C	Feet		Field			1/22/21 10:27	BGS	C
Specific Conductance, Field	253	C	umhos/cm	1	Field			1/22/21 10:27	BGS	C
Temperature	13.72	C	Deg. C		Field			1/22/21 10:27	BGS	C
Total Well Depth	140.00	C	Feet		Field			1/22/21 10:27	BGS	C

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ANALYTICAL RESULTS

Workorder: 3153814 1st QTR 2021 CWMP-FORM 19Q

Lab ID:	**3153814002**	Date Collected:	1/22/2021 10:22	Matrix:	Ground Water
Sample ID:	**CWMP004W**	Date Received:	1/22/2021 15:26		

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

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Project Coordinator

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ANALYTICAL RESULTS

Workorder: 3153814 1st QTR 2021 CWMP-FORM 19Q

Lab ID: **3153814003** Date Collected: 1/22/2021 11:10 Matrix: Ground Water

Sample ID: **CWMP012W** Date Received: 1/22/2021 15:26

Parameters	Results	Flag	Units	RDL	Method	Prepared	By	Analyzed	By	Cntr
VOLATILE ORGANICS										
Benzene	ND	C	ug/L	1.0	SW846 8260B			1/26/21 02:42	PDK	G
1,2-Dibromoethane	ND	C	ug/L	1.0	SW846 8260B			1/26/21 02:42	PDK	G
1,1-Dichloroethane	ND	C	ug/L	1.0	SW846 8260B			1/26/21 02:42	PDK	G
1,2-Dichloroethane	ND	C	ug/L	1.0	SW846 8260B			1/26/21 02:42	PDK	G
1,1-Dichloroethene	ND	C	ug/L	1.0	SW846 8260B			1/26/21 02:42	PDK	G
cis-1,2-Dichloroethene	ND	C	ug/L	1.0	SW846 8260B			1/26/21 02:42	PDK	G
trans-1,2-Dichloroethene	ND	C	ug/L	1.0	SW846 8260B			1/26/21 02:42	PDK	G
Ethylbenzene	ND	C	ug/L	1.0	SW846 8260B			1/26/21 02:42	PDK	G
Methylene Chloride	ND	C	ug/L	1.0	SW846 8260B			1/26/21 02:42	PDK	G
Tetrachloroethene	ND	C	ug/L	1.0	SW846 8260B			1/26/21 02:42	PDK	G
Toluene	ND	C	ug/L	1.0	SW846 8260B			1/26/21 02:42	PDK	G
Total Xylenes	ND	C	ug/L	3.0	SW846 8260B			1/26/21 02:42	PDK	G
1,1,1-Trichloroethane	ND	C	ug/L	1.0	SW846 8260B			1/26/21 02:42	PDK	G
Trichloroethene	ND	C	ug/L	1.0	SW846 8260B			1/26/21 02:42	PDK	G
Vinyl Chloride	ND	C	ug/L	1.0	SW846 8260B			1/26/21 02:42	PDK	G
Surrogate Recoveries	*Results*	*Flag*	*Units*	*Limits*	*Method*	*Prepared*	*By*	*Analyzed*	*By*	*Cntr*
1,2-Dichloroethane-d4 (S)	101	C	%	62 - 133	SW846 8260B			1/26/21 02:42	PDK	G
4-Bromofluorobenzene (S)	96.7	C	%	79 - 114	SW846 8260B			1/26/21 02:42	PDK	G
Dibromofluoromethane (S)	100	C	%	78 - 116	SW846 8260B			1/26/21 02:42	PDK	G
Toluene-d8 (S)	91.9	C	%	76 - 127	SW846 8260B			1/26/21 02:42	PDK	G
WET CHEMISTRY										
Alkalinity, Bicarbonate	69	C	mg/L	5	SM2320B-2011			1/31/21 09:35	R2B	B
Alkalinity, Total	69	C,2	mg/L	5	SM2320B-2011			1/31/21 09:35	R2B	I
Ammonia-N	ND	C	mg/L	0.100	ASTM D6919-09			2/6/21 01:00	JXL	A
Chemical Oxygen Demand (COD)	ND	C	mg/L	15	EPA 410.4			2/4/21 15:49	AK	A
Chloride	32.5	C	mg/L	2.0	EPA 300.0			1/23/21 15:03	MBW	B
Fluoride	ND	C	mg/L	0.20	EPA 300.0			1/23/21 15:03	MBW	B
Nitrate-N	8.0	C	mg/L	0.20	EPA 300.0			1/23/21 15:03	MBW	B
pH	7.07	C,1	pH_Units		S4500HB-11			1/31/21 09:35	R2B	B
Phenolics	ND	C	mg/L	0.005	SW846 9066	1/26/21 21:00	VXF	2/10/21 15:28	VXF	F
Specific Conductance	291	C,3	umhos/cm	1	SW846 9050A			2/5/21 22:04	R2B	B
Sulfate	4.8	C	mg/L	2.0	EPA 300.0			1/23/21 15:03	MBW	B
Total Dissolved Solids	226	C	mg/L	25	S2540C-11			1/26/21 14:56	KMM	B
Total Organic Carbon (TOC)	2.8	C	mg/L	0.50	SW846 9060A			1/26/21 07:33	PAG	D
Turbidity	45.0	C	NTU	0.10	SM2130B-2011			1/23/21 06:30	MBW	B

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ANALYTICAL RESULTS

Workorder: 3153814 1st QTR 2021 CWMP-FORM 19Q

Lab ID: **3153814003** Date Collected: 1/22/2021 11:10 Matrix: Ground Water

Sample ID: **CWMP012W** Date Received: 1/22/2021 15:26

Parameters	Results	Flag	Units	RDL	Method	Prepared	By	Analyzed	By	*Cntr*
METALS										
Calcium, Total	31.1	C	mg/L	0.11	SW846 6010C	1/24/21 19:10	SXC	1/25/21 12:31	SRT	J1
Iron, Total	14.1	C	mg/L	0.067	SW846 6010C	1/24/21 19:10	SXC	1/25/21 12:31	SRT	J1
Magnesium, Total	8.8	C	mg/L	0.11	SW846 6010C	1/24/21 19:10	SXC	1/25/21 12:31	SRT	J1
Manganese, Total	0.14	C	mg/L	0.0056	SW846 6010C	1/24/21 19:10	SXC	1/25/21 12:31	SRT	J1
Potassium, Total	1.4	C	mg/L	0.56	SW846 6010C	1/24/21 19:10	SXC	1/25/21 12:31	SRT	J1
Sodium, Total	13.4	C	mg/L	0.56	SW846 6010C	1/24/21 19:10	SXC	1/25/21 12:31	SRT	J1
FIELD PARAMETERS										
Depth to Water Level	63.57	C	Feet		Field			1/22/21 11:10	BGS	C
pH, Field (SM4500B)	5.84	C	pH_Units		Field			1/22/21 11:10	BGS	C
Specific Conductance, Field	332	C	umhos/cm	1	Field			1/22/21 11:10	BGS	C
Temperature	12.14	C	Deg. C		Field			1/22/21 11:10	BGS	C

Susan J. Scherer

Ms. Susan J Scherer
Project Coordinator

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ANALYTICAL RESULTS

Workorder: 3153814 1st QTR 2021 CWMP-FORM 19Q

Lab ID: **3153814004** Date Collected: 1/22/2021 11:50 Matrix: Ground Water

Sample ID: **CWMP018S** Date Received: 1/22/2021 15:26

Parameters	Results	Flag	Units	RDL	Method	Prepared	By	Analyzed	By	Cntr
VOLATILE ORGANICS										
Benzene	ND	C	ug/L	1.0	SW846 8260B			1/26/21 03:04	PDK	G
1,2-Dibromoethane	ND	C	ug/L	1.0	SW846 8260B			1/26/21 03:04	PDK	G
1,1-Dichloroethane	ND	C	ug/L	1.0	SW846 8260B			1/26/21 03:04	PDK	G
1,2-Dichloroethane	ND	C	ug/L	1.0	SW846 8260B			1/26/21 03:04	PDK	G
1,1-Dichloroethene	ND	C	ug/L	1.0	SW846 8260B			1/26/21 03:04	PDK	G
cis-1,2-Dichloroethene	ND	C	ug/L	1.0	SW846 8260B			1/26/21 03:04	PDK	G
trans-1,2-Dichloroethene	ND	C	ug/L	1.0	SW846 8260B			1/26/21 03:04	PDK	G
Ethylbenzene	ND	C	ug/L	1.0	SW846 8260B			1/26/21 03:04	PDK	G
Methylene Chloride	ND	C	ug/L	1.0	SW846 8260B			1/26/21 03:04	PDK	G
Tetrachloroethene	ND	C	ug/L	1.0	SW846 8260B			1/26/21 03:04	PDK	G
Toluene	ND	C	ug/L	1.0	SW846 8260B			1/26/21 03:04	PDK	G
Total Xylenes	ND	C	ug/L	3.0	SW846 8260B			1/26/21 03:04	PDK	G
1,1,1-Trichloroethane	ND	C	ug/L	1.0	SW846 8260B			1/26/21 03:04	PDK	G
Trichloroethene	ND	C	ug/L	1.0	SW846 8260B			1/26/21 03:04	PDK	G
Vinyl Chloride	ND	C	ug/L	1.0	SW846 8260B			1/26/21 03:04	PDK	G
Surrogate Recoveries	*Results*	*Flag*	*Units*	*Limits*	*Method*	*Prepared*	*By*	*Analyzed*	*By*	*Cntr*
1,2-Dichloroethane-d4 (S)	99.9	C	%	62 - 133	SW846 8260B			1/26/21 03:04	PDK	G
4-Bromofluorobenzene (S)	97.8	C	%	79 - 114	SW846 8260B			1/26/21 03:04	PDK	G
Dibromofluoromethane (S)	99.3	C	%	78 - 116	SW846 8260B			1/26/21 03:04	PDK	G
Toluene-d8 (S)	91.6	C	%	76 - 127	SW846 8260B			1/26/21 03:04	PDK	G
WET CHEMISTRY										
Alkalinity, Bicarbonate	378	C	mg/L	5	SM2320B-2011			1/31/21 09:35	R2B	B
Alkalinity, Total	351	C,2	mg/L	5	SM2320B-2011			1/31/21 09:35	R2B	I
Ammonia-N	0.273	C	mg/L	0.100	ASTM D6919-09			2/6/21 01:41	JXL	A
Chemical Oxygen Demand (COD)	ND	C	mg/L	15	EPA 410.4			1/31/21 14:10	JAM	A
Chloride	433	C	mg/L	5.0	EPA 300.0			1/23/21 15:18	MBW	B
Fluoride	ND	C	mg/L	0.50	EPA 300.0			1/23/21 15:18	MBW	B
Nitrate-N	21.6	C	mg/L	0.50	EPA 300.0			1/23/21 15:18	MBW	B
pH	8.71	C,1	pH_Units		S4500HB-11			1/31/21 09:35	R2B	B
Phenolics	ND	C	mg/L	0.005	SW846 9066	1/26/21 21:00	VXF	2/10/21 15:28	VXF	F
Specific Conductance	1970	C,3	umhos/cm	1	SW846 9050A			2/5/21 22:04	R2B	B
Sulfate	51.4	C	mg/L	5.0	EPA 300.0			1/23/21 15:18	MBW	B
Total Dissolved Solids	1170	C	mg/L	25	S2540C-11			1/26/21 14:56	KMM	B
Total Organic Carbon (TOC)	8.1	C	mg/L	0.50	SW846 9060A			1/26/21 07:33	PAG	D
Turbidity	1.44	C	NTU	0.10	SM2130B-2011			1/23/21 06:30	MBW	B

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ANALYTICAL RESULTS

Workorder: 3153814 1st QTR 2021 CWMP-FORM 19Q

Lab ID: **3153814004** Date Collected: 1/22/2021 11:50 Matrix: Ground Water

Sample ID: **CWMP018S** Date Received: 1/22/2021 15:26

Parameters	Results	Flag	Units	RDL	Method	Prepared	By	Analyzed	By	*Cntr*
METALS										
Calcium, Total	71.9	C	mg/L	0.11	SW846 6010C	1/24/21 19:10	SXC	1/25/21 12:42	SRT	J1
Iron, Total	1.0	C	mg/L	0.067	SW846 6010C	1/24/21 19:10	SXC	1/25/21 12:42	SRT	J1
Magnesium, Total	65.2	C	mg/L	0.11	SW846 6010C	1/24/21 19:10	SXC	1/25/21 12:42	SRT	J1
Manganese, Total	0.55	C	mg/L	0.0056	SW846 6010C	1/24/21 19:10	SXC	1/25/21 12:42	SRT	J1
Potassium, Total	17.6	C	mg/L	0.56	SW846 6010C	1/24/21 19:10	SXC	1/25/21 12:42	SRT	J1
Sodium, Total	248	C	mg/L	0.56	SW846 6010C	1/24/21 19:10	SXC	1/25/21 12:42	SRT	J1
FIELD PARAMETERS										
Dissolved Oxygen	14.32	C	mg/L	0.01	Field			1/22/21 11:50	BGS	C
pH, Field (SM4500B)	8.64	C	pH_Units		Field			1/22/21 11:50	BGS	C
Specific Conductance, Field	2142	C	umhos/cm	1	Field			1/22/21 11:50	BGS	C
Temperature	6.19	C	Deg. C		Field			1/22/21 11:50	BGS	C

Susan J. Scherer

Ms. Susan J Scherer
Project Coordinator

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ANALYTICAL RESULTS

Workorder: 3153814 1st QTR 2021 CWMP-FORM 19Q

Lab ID: **3153814005** Date Collected: 1/22/2021 12:10 Matrix: Ground Water

Sample ID: **CWMP017S** Date Received: 1/22/2021 15:26

Parameters	Results	Flag	Units	RDL	Method	Prepared	By	Analyzed	By	Cntr
VOLATILE ORGANICS										
Benzene	ND	C	ug/L	1.0	SW846 8260B			1/26/21 03:26	PDK	G
1,2-Dibromoethane	ND	C	ug/L	1.0	SW846 8260B			1/26/21 03:26	PDK	G
1,1-Dichloroethane	ND	C	ug/L	1.0	SW846 8260B			1/26/21 03:26	PDK	G
1,2-Dichloroethane	ND	C	ug/L	1.0	SW846 8260B			1/26/21 03:26	PDK	G
1,1-Dichloroethene	ND	C	ug/L	1.0	SW846 8260B			1/26/21 03:26	PDK	G
cis-1,2-Dichloroethene	ND	C	ug/L	1.0	SW846 8260B			1/26/21 03:26	PDK	G
trans-1,2-Dichloroethene	ND	C	ug/L	1.0	SW846 8260B			1/26/21 03:26	PDK	G
Ethylbenzene	ND	C	ug/L	1.0	SW846 8260B			1/26/21 03:26	PDK	G
Methylene Chloride	ND	C	ug/L	1.0	SW846 8260B			1/26/21 03:26	PDK	G
Tetrachloroethene	ND	C	ug/L	1.0	SW846 8260B			1/26/21 03:26	PDK	G
Toluene	ND	C	ug/L	1.0	SW846 8260B			1/26/21 03:26	PDK	G
Total Xylenes	ND	C	ug/L	3.0	SW846 8260B			1/26/21 03:26	PDK	G
1,1,1-Trichloroethane	ND	C	ug/L	1.0	SW846 8260B			1/26/21 03:26	PDK	G
Trichloroethene	ND	C	ug/L	1.0	SW846 8260B			1/26/21 03:26	PDK	G
Vinyl Chloride	ND	C	ug/L	1.0	SW846 8260B			1/26/21 03:26	PDK	G
Surrogate Recoveries	*Results*	*Flag*	*Units*	*Limits*	*Method*	*Prepared*	*By*	*Analyzed*	*By*	*Cntr*
1,2-Dichloroethane-d4 (S)	104	C	%	62 - 133	SW846 8260B			1/26/21 03:26	PDK	G
4-Bromofluorobenzene (S)	99.2	C	%	79 - 114	SW846 8260B			1/26/21 03:26	PDK	G
Dibromofluoromethane (S)	104	C	%	78 - 116	SW846 8260B			1/26/21 03:26	PDK	G
Toluene-d8 (S)	93.2	C	%	76 - 127	SW846 8260B			1/26/21 03:26	PDK	G
WET CHEMISTRY										
Alkalinity, Bicarbonate	606	C	mg/L	50	SM2320B-2011			2/5/21 22:04	R2B	B
Alkalinity, Total	606	C,2	mg/L	50	SM2320B-2011			2/5/21 22:04	R2B	I
Ammonia-N	0.695	C	mg/L	0.100	ASTM D6919-09			2/6/21 01:55	JXL	A
Chemical Oxygen Demand (COD)	ND	C	mg/L	15	EPA 410.4			1/31/21 14:10	JAM	A
Chloride	580	C	mg/L	10.0	EPA 300.0			1/26/21 03:47	MBW	B
Fluoride	ND	C	mg/L	0.50	EPA 300.0			1/23/21 15:32	MBW	B
Nitrate-N	30.0	C	mg/L	0.50	EPA 300.0			1/23/21 15:32	MBW	B
pH	8.45	C,1	pH_Units		S4500HB-11			1/31/21 09:35	R2B	B
Phenolics	ND	C	mg/L	0.005	SW846 9066	1/26/21 21:00	VXF	2/16/21 20:41	VXF	F
Specific Conductance	2750	C,3	umhos/cm	1	SW846 9050A			2/5/21 22:04	R2B	B
Sulfate	63.6	C	mg/L	5.0	EPA 300.0			1/23/21 15:32	MBW	B
Total Dissolved Solids	1730	C	mg/L	25	S2540C-11			1/26/21 14:56	KMM	B
Total Organic Carbon (TOC)	6.3	C	mg/L	0.50	SW846 9060A			1/26/21 07:33	PAG	D
Turbidity	1.26	C	NTU	0.10	SM2130B-2011			1/23/21 06:30	MBW	B

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ANALYTICAL RESULTS

Workorder: 3153814 1st QTR 2021 CWMP-FORM 19Q

Lab ID: **3153814005** Date Collected: 1/22/2021 12:10 Matrix: Ground Water

Sample ID: **CWMP017S** Date Received: 1/22/2021 15:26

Parameters	Results	Flag	Units	RDL	Method	Prepared	By	Analyzed	By	*Cntr*
METALS										
Calcium, Total	75.2	C	mg/L	0.11	SW846 6010C	1/24/21 19:10	SXC	1/25/21 12:46	SRT	J1
Iron, Total	0.35	C	mg/L	0.067	SW846 6010C	1/24/21 19:10	SXC	1/25/21 12:46	SRT	J1
Magnesium, Total	90.2	C	mg/L	0.11	SW846 6010C	1/24/21 19:10	SXC	1/25/21 12:46	SRT	J1
Manganese, Total	0.12	C	mg/L	0.0056	SW846 6010C	1/24/21 19:10	SXC	1/25/21 12:46	SRT	J1
Potassium, Total	19.2	C	mg/L	0.56	SW846 6010C	1/24/21 19:10	SXC	1/25/21 12:46	SRT	J1
Sodium, Total	364	C	mg/L	0.56	SW846 6010C	1/24/21 19:10	SXC	1/25/21 12:46	SRT	J1
FIELD PARAMETERS										
Dissolved Oxygen	11.89	C	mg/L	0.01	Field			1/22/21 12:10	BGS	C
pH, Field (SM4500B)	8.08	C	pH_Units		Field			1/22/21 12:10	BGS	C
Specific Conductance, Field	3144	C	umhos/cm	1	Field			1/22/21 12:10	BGS	C
Temperature	12.00	C	Deg. C		Field			1/22/21 12:10	BGS	C

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Project Coordinator

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ANALYTICAL RESULTS

Workorder: 3153814 1st QTR 2021 CWMP-FORM 19Q

Lab ID: **3153814006** Date Collected: 1/22/2021 14:30 Matrix: Water

Sample ID: **Field Blank** Date Received: 1/22/2021 15:26

Parameters	Results	Flag	Units	RDL	Method	Prepared	By	Analyzed	By	Cntr
VOLATILE ORGANICS										
Benzene	ND	C	ug/L	1.0	SW846 8260B			1/26/21 01:34	PDK	G
1,2-Dibromoethane	ND	C	ug/L	1.0	SW846 8260B			1/26/21 01:34	PDK	G
1,1-Dichloroethane	ND	C	ug/L	1.0	SW846 8260B			1/26/21 01:34	PDK	G
1,2-Dichloroethane	ND	C	ug/L	1.0	SW846 8260B			1/26/21 01:34	PDK	G
1,1-Dichloroethene	ND	C	ug/L	1.0	SW846 8260B			1/26/21 01:34	PDK	G
cis-1,2-Dichloroethene	ND	C	ug/L	1.0	SW846 8260B			1/26/21 01:34	PDK	G
trans-1,2-Dichloroethene	ND	C	ug/L	1.0	SW846 8260B			1/26/21 01:34	PDK	G
Ethylbenzene	ND	C	ug/L	1.0	SW846 8260B			1/26/21 01:34	PDK	G
Methylene Chloride	ND	C	ug/L	1.0	SW846 8260B			1/26/21 01:34	PDK	G
Tetrachloroethene	ND	C	ug/L	1.0	SW846 8260B			1/26/21 01:34	PDK	G
Toluene	ND	C	ug/L	1.0	SW846 8260B			1/26/21 01:34	PDK	G
Total Xylenes	ND	C	ug/L	3.0	SW846 8260B			1/26/21 01:34	PDK	G
1,1,1-Trichloroethane	ND	C	ug/L	1.0	SW846 8260B			1/26/21 01:34	PDK	G
Trichloroethene	ND	C	ug/L	1.0	SW846 8260B			1/26/21 01:34	PDK	G
Vinyl Chloride	ND	C	ug/L	1.0	SW846 8260B			1/26/21 01:34	PDK	G
Surrogate Recoveries	*Results*	*Flag*	*Units*	*Limits*	*Method*	*Prepared*	*By*	*Analyzed*	*By*	*Cntr*
1,2-Dichloroethane-d4 (S)	98.9	C	%	62 - 133	SW846 8260B			1/26/21 01:34	PDK	G
4-Bromofluorobenzene (S)	98.8	C	%	79 - 114	SW846 8260B			1/26/21 01:34	PDK	G
Dibromofluoromethane (S)	99.1	C	%	78 - 116	SW846 8260B			1/26/21 01:34	PDK	G
Toluene-d8 (S)	91.9	C	%	76 - 127	SW846 8260B			1/26/21 01:34	PDK	G
WET CHEMISTRY										
Alkalinity, Bicarbonate	ND	C	mg/L	5	SM2320B-2011			1/31/21 09:35	R2B	B
Alkalinity, Total	ND	C,2	mg/L	5	SM2320B-2011			1/31/21 09:35	R2B	I
Ammonia-N	ND	C	mg/L	0.100	ASTM D6919-09			2/6/21 02:08	JXL	A
Chemical Oxygen Demand (COD)	ND	C	mg/L	15	EPA 410.4			1/31/21 14:10	JAM	A
Chloride	ND	C	mg/L	1.0	EPA 300.0			1/23/21 15:47	MBW	B
Fluoride	ND	C	mg/L	0.10	EPA 300.0			1/23/21 15:47	MBW	B
Nitrate-N	ND	C	mg/L	0.10	EPA 300.0			1/23/21 15:47	MBW	B
pH	5.92	C,1	pH_Units		S4500HB-11			1/31/21 09:35	R2B	B
Phenolics	ND	C	mg/L	0.005	SW846 9066	1/26/21 21:00	VXF	2/16/21 20:41	VXF	F
Specific Conductance	2	C,3	umhos/cm	1	SW846 9050A			2/5/21 22:04	R2B	B
Sulfate	ND	C	mg/L	1.0	EPA 300.0			1/23/21 15:47	MBW	B
Total Dissolved Solids	ND	C	mg/L	25	S2540C-11			1/26/21 14:56	KMM	B
Total Organic Carbon (TOC)	ND	C	mg/L	0.50	SW846 9060A			1/26/21 12:43	PAG	D
Turbidity	ND	C	NTU	0.10	SM2130B-2011			1/23/21 06:30	MBW	B

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ANALYTICAL RESULTS

Workorder: 3153814 1st QTR 2021 CWMP-FORM 19Q

Lab ID: **3153814006** Date Collected: 1/22/2021 14:30 Matrix: Water

Sample ID: **Field Blank** Date Received: 1/22/2021 15:26

Parameters	Results	Flag	Units	RDL	Method	Prepared	By	Analyzed	By	*Cntr*
METALS										
Calcium, Total	ND	C	mg/L	0.11	SW846 6010C	1/24/21 19:10	SXC	1/25/21 12:49	SRT	J1
Iron, Total	ND	C	mg/L	0.067	SW846 6010C	1/24/21 19:10	SXC	1/25/21 12:49	SRT	J1
Magnesium, Total	ND	C	mg/L	0.11	SW846 6010C	1/24/21 19:10	SXC	1/25/21 12:49	SRT	J1
Manganese, Total	ND	C	mg/L	0.0056	SW846 6010C	1/24/21 19:10	SXC	1/25/21 12:49	SRT	J1
Potassium, Total	ND	C	mg/L	0.56	SW846 6010C	1/24/21 19:10	SXC	1/25/21 12:49	SRT	J1
Sodium, Total	ND	C	mg/L	0.56	SW846 6010C	1/24/21 19:10	SXC	1/25/21 12:49	SRT	J1

Susan J. Scherer

Ms. Susan J Scherer
Project Coordinator

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ANALYTICAL RESULTS

Workorder: 3153814 1st QTR 2021 CWMP-FORM 19Q

Lab ID: **3153814007** Date Collected: 1/22/2021 15:26 Matrix: Water

Sample ID: **Trip Blank** Date Received: 1/22/2021 15:26

Parameters	Results	Flag	Units	RDL	Method	Prepared	By	Analyzed	By	Cntr
VOLATILE ORGANICS										
Benzene	ND	C	ug/L	1.0	SW846 8260B			1/26/21 01:12	PDK	A
1,2-Dibromoethane	ND	C	ug/L	1.0	SW846 8260B			1/26/21 01:12	PDK	A
1,1-Dichloroethane	ND	C	ug/L	1.0	SW846 8260B			1/26/21 01:12	PDK	A
1,2-Dichloroethane	ND	C	ug/L	1.0	SW846 8260B			1/26/21 01:12	PDK	A
1,1-Dichloroethene	ND	C	ug/L	1.0	SW846 8260B			1/26/21 01:12	PDK	A
cis-1,2-Dichloroethene	ND	C	ug/L	1.0	SW846 8260B			1/26/21 01:12	PDK	A
trans-1,2-Dichloroethene	ND	C	ug/L	1.0	SW846 8260B			1/26/21 01:12	PDK	A
Ethylbenzene	ND	C	ug/L	1.0	SW846 8260B			1/26/21 01:12	PDK	A
Methylene Chloride	ND	C	ug/L	1.0	SW846 8260B			1/26/21 01:12	PDK	A
Tetrachloroethene	ND	C	ug/L	1.0	SW846 8260B			1/26/21 01:12	PDK	A
Toluene	ND	C	ug/L	1.0	SW846 8260B			1/26/21 01:12	PDK	A
Total Xylenes	ND	C	ug/L	3.0	SW846 8260B			1/26/21 01:12	PDK	A
1,1,1-Trichloroethane	ND	C	ug/L	1.0	SW846 8260B			1/26/21 01:12	PDK	A
Trichloroethene	ND	C	ug/L	1.0	SW846 8260B			1/26/21 01:12	PDK	A
Vinyl Chloride	ND	C	ug/L	1.0	SW846 8260B			1/26/21 01:12	PDK	A
Surrogate Recoveries	*Results*	*Flag*	*Units*	*Limits*	*Method*	*Prepared*	*By*	*Analyzed*	*By*	*Cntr*
1,2-Dichloroethane-d4 (S)	96.8	C	%	62 - 133	SW846 8260B			1/26/21 01:12	PDK	A
4-Bromofluorobenzene (S)	99.7	C	%	79 - 114	SW846 8260B			1/26/21 01:12	PDK	A
Dibromofluoromethane (S)	97.2	C	%	78 - 116	SW846 8260B			1/26/21 01:12	PDK	A
Toluene-d8 (S)	92.9	C	%	76 - 127	SW846 8260B			1/26/21 01:12	PDK	A

Susan J. Scherer

Ms. Susan J Scherer
Project Coordinator

ANALYTICAL RESULTS

Workorder: 3153814 1st QTR 2021 CWMP-FORM 19Q

PARAMETER QUALIFIERS

Lab ID	#	Sample ID	Analytical Method	Analyte
3153814001	1	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.				
3153814001	2	CWMP003W	SW846 8260B	1,2,4-Trichlorobenzene
The QC sample type MS for method SW846 8260B was outside the control limits for the analyte 1,2,4-Trichlorobenzene. The % Recovery was reported as 66 and the control limits were 67 to 123.				
3153814001	3	CWMP003W	SW846 8260B	Bromoform
The QC sample type MS for method SW846 8260B was outside the control limits for the analyte Bromoform. The % Recovery was reported as 68.7 and the control limits were 70 to 123.				
3153814001	4	CWMP003W	SW846 8260B	Bromoform
The QC sample type MSD for method SW846 8260B was outside the control limits for the analyte Bromoform. The % Recovery was reported as 67.9 and the control limits were 70 to 123.				
3153814001	5	CWMP003W	SW846 8260B	1,2,3-Trichloropropane
The QC sample type MSD for method SW846 8260B was outside the control limits for the analyte 1,2,3-Trichloropropane. The % Recovery was reported as 74.3 and the control limits were 75 to 132.				
3153814001	6	CWMP003W	SW846 8260B	Bromomethane
The QC sample type MS for method SW846 8260B was outside the control limits for the analyte Bromomethane. The % Recovery was reported as 155 and the control limits were 45 to 148.				
3153814001	7	CWMP003W	SM2320B-2011	Alkalinity, Total
The Total Alkalinity is titrated to a pH of 4.5 and reported as mg CaCO3/L.				
3153814001	8	CWMP003W	SW846 9050A	Specific Conductance
The Method Blank for method SM2510B-2011 reported a value greater than the reporting level for the analyte Specific Conductance. The concentration was 2.7 umhos/cm				
3153814002	1	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.				
3153814002	2	CWMP004W	SM2320B-2011	Alkalinity, Total
The Total Alkalinity is titrated to a pH of 4.5 and reported as mg CaCO3/L.				
3153814002	3	CWMP004W	SW846 9050A	Specific Conductance
The Method Blank for method SM2510B-2011 reported a value greater than the reporting level for the analyte Specific Conductance. The concentration was 2.7 umhos/cm				
3153814002	4	CWMP004W	SW846 9066	Phenolics
The QC sample type MS for method 9066 was outside the control limits for the analyte Phenolics. The % Recovery was reported as 89.8 and the control limits were 90 to 110.				
3153814003	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.				
3153814003	2	CWMP012W	SM2320B-2011	Alkalinity, Total
The Total Alkalinity is titrated to a pH of 4.5 and reported as mg CaCO3/L.				
3153814003	3	CWMP012W	SW846 9050A	Specific Conductance
The Method Blank for method SM2510B-2011 reported a value greater than the reporting level for the analyte Specific Conductance. The concentration was 2.7 umhos/cm				

ANALYTICAL RESULTS

Workorder: 3153814 1st QTR 2021 CWMP-FORM 19Q

3153814004	1	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.				
3153814004	2	CWMP018S	SM2320B-2011	Alkalinity, Total
The Total Alkalinity is titrated to a pH of 4.5 and reported as mg CaCO3/L.				
3153814004	3	CWMP018S	SW846 9050A	Specific Conductance
The Method Blank for method SM2510B-2011 reported a value greater than the reporting level for the analyte Specific Conductance. The concentration was 2.7 umhos/cm				
3153814005	1	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.				
3153814005	2	CWMP017S	SM2320B-2011	Alkalinity, Total
The Total Alkalinity is titrated to a pH of 4.5 and reported as mg CaCO3/L.				
3153814005	3	CWMP017S	SW846 9050A	Specific Conductance
The Method Blank for method SM2510B-2011 reported a value greater than the reporting level for the analyte Specific Conductance. The concentration was 2.7 umhos/cm				
3153814006	1	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.				
3153814006	2	Field Blank	SM2320B-2011	Alkalinity, Total
The Total Alkalinity is titrated to a pH of 4.5 and reported as mg CaCO3/L.				
3153814006	3	Field Blank	SW846 9050A	Specific Conductance
The Method Blank for method SM2510B-2011 reported a value greater than the reporting level for the analyte Specific Conductance. The concentration was 2.7 umhos/cm				

ANALYSIS - PREP METHOD CROSS REFERENCE TABLE

Workorder: 3153814 1st QTR 2021 CWMP-FORM 19Q

Lab ID	Sample ID	Analysis Method	Prep Method	Leachate Method
3153814001	CWMP003W	ASTM D6919-09		
3153814001	CWMP003W	EPA 300.0		
3153814001	CWMP003W	EPA 410.4		
3153814001	CWMP003W	Field		
3153814001	CWMP003W	S2540C-11		
3153814001	CWMP003W	S4500HB-11		
3153814001	CWMP003W	SM2130B-2011		
3153814001	CWMP003W	SM2320B-2011		
3153814001	CWMP003W	SW846 6010C	SW846 3015	
3153814001	CWMP003W	SW846 8260B		
3153814001	CWMP003W	SW846 9050A		
3153814001	CWMP003W	SW846 9060A		
3153814001	CWMP003W	SW846 9066	420.4/9066	
3153814002	CWMP004W	ASTM D6919-09		
3153814002	CWMP004W	EPA 300.0		
3153814002	CWMP004W	EPA 410.4		
3153814002	CWMP004W	Field		
3153814002	CWMP004W	S2540C-11		
3153814002	CWMP004W	S4500HB-11		
3153814002	CWMP004W	SM2130B-2011		
3153814002	CWMP004W	SM2320B-2011		
3153814002	CWMP004W	SW846 6010C	SW846 3015	
3153814002	CWMP004W	SW846 8260B		
3153814002	CWMP004W	SW846 9050A		
3153814002	CWMP004W	SW846 9060A		
3153814002	CWMP004W	SW846 9066	420.4/9066	
3153814003	CWMP012W	ASTM D6919-09		
3153814003	CWMP012W	EPA 300.0		
3153814003	CWMP012W	EPA 410.4		
3153814003	CWMP012W	Field		
3153814003	CWMP012W	S2540C-11		
3153814003	CWMP012W	S4500HB-11		
3153814003	CWMP012W	SM2130B-2011		
3153814003	CWMP012W	SM2320B-2011		
3153814003	CWMP012W	SW846 6010C	SW846 3015	
3153814003	CWMP012W	SW846 8260B		
3153814003	CWMP012W	SW846 9050A		
3153814003	CWMP012W	SW846 9060A		
3153814003	CWMP012W	SW846 9066	420.4/9066	
3153814004	CWMP018S	ASTM D6919-09		
3153814004	CWMP018S	EPA 300.0		
3153814004	CWMP018S	EPA 410.4		
3153814004	CWMP018S	Field		
3153814004	CWMP018S	S2540C-11		
3153814004	CWMP018S	S4500HB-11		
3153814004	CWMP018S	SM2130B-2011		

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ANALYSIS - PREP METHOD CROSS REFERENCE TABLE

Workorder: 3153814 1st QTR 2021 CWMP-FORM 19Q

Lab ID	Sample ID	Analysis Method	Prep Method	Leachate Method
3153814004	CWMP018S	SM2320B-2011		
3153814004	CWMP018S	SW846 6010C	SW846 3015	
3153814004	CWMP018S	SW846 8260B		
3153814004	CWMP018S	SW846 9050A		
3153814004	CWMP018S	SW846 9060A		
3153814004	CWMP018S	SW846 9066	420.4/9066	
3153814005	CWMP017S	ASTM D6919-09		
3153814005	CWMP017S	EPA 300.0		
3153814005	CWMP017S	EPA 410.4		
3153814005	CWMP017S	Field		
3153814005	CWMP017S	S2540C-11		
3153814005	CWMP017S	S4500HB-11		
3153814005	CWMP017S	SM2130B-2011		
3153814005	CWMP017S	SM2320B-2011		
3153814005	CWMP017S	SW846 6010C	SW846 3015	
3153814005	CWMP017S	SW846 8260B		
3153814005	CWMP017S	SW846 9050A		
3153814005	CWMP017S	SW846 9060A		
3153814005	CWMP017S	SW846 9066	420.4/9066	
3153814006	Field Blank	ASTM D6919-09		
3153814006	Field Blank	EPA 300.0		
3153814006	Field Blank	EPA 410.4		
3153814006	Field Blank	S2540C-11		
3153814006	Field Blank	S4500HB-11		
3153814006	Field Blank	SM2130B-2011		
3153814006	Field Blank	SM2320B-2011		
3153814006	Field Blank	SW846 6010C	SW846 3015	
3153814006	Field Blank	SW846 8260B		
3153814006	Field Blank	SW846 9050A		
3153814006	Field Blank	SW846 9060A		
3153814006	Field Blank	SW846 9066	420.4/9066	
3153814007	Trip Blank	SW846 8260B		

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CHAIN OF CUSTODY/ REQUEST FOR ANALYSIS

Generated by ALS

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

COC / ALS

* 3 1 5 3 8 1 4 *

Client Name: Lancaster County Solid Waste MA
Address: 1299 Harrisburg Pike, P.O. Box 4424
Lancaster, PA 17604
Contact: Dan Brown
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
1. CWMP003W	01/22/21	1008	G	GW	2	1	2	x	x	1	1	1	1
2. CWMP004W	01/22/21	1022	G	GW	2	1	2	x	x	1	1	1	1
3. CWMP012W	01/22/21	1110	G	GW	2	1	2	x	x	1	1	1	1
4. CWMP018S	01/22/21	1150	G	GW	2	1	2	x	x	1	1	1	1
5. CWMP017S	01/22/21	1210	G	GW	2	1	2	x	x	1	1	1	1
6. Field Blank	01/22/21	1430	G	GW	2	1	2			1	1	1	1
7. Trip Blank	01/22/21	1526	G	GW			2						
8													
9													
10													

Enter Number of Containers Per Sample or Field Results Below.

Cooler Temp: 1 Therm ID: 525
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 [illegible] ALS	1-22-21	1526	2 MEG	1/22/21	15:26
3			4		
5			6		
7			8		
9			10		

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

Reportable to PADEP? Yes [ ]
PWSID #

Special Processing: USACE [ ] Navy [ ]

Sample Disposal: Lab [X] Special [ ]

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

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

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

Condition of Sample Receipt Form

Client: LCSWMA Work Order #: 315814 Initials: AS Date: 1/23/21

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?[1]	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): 1

Thermometer ID: 525

Radiological (µCi): _____

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

[1]Final determination of correct preservation for analysis such as volatiles, microbiology, and oil and grease is made in the analytical department at the time of or following the analysis

Rev 1/20/2020

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February 12, 2021

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:	**3152955**
Purchase Order:	**PO-1000246**	Workorder ID:	**1st QTR 2021 CWMP-FORM 19Q**

Dear Mr. Brown:

Enclosed are the analytical results for samples received by the laboratory on Tuesday, January 19, 2021.

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: Ms. Ashley Gichuki , 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: 3152955 1st QTR 2021 CWMP-FORM 19Q

Lab ID	Sample ID	Matrix	Date Collected	Date Received	Collected By
3152955001	CWMP005W	Ground Water	1/19/2021 12:02	1/19/2021 16:06	Mr. Brian G Shade

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SAMPLE SUMMARY

Workorder: 3152955 1st QTR 2021 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

C	Please reference the Project Summary section of this Certificate of Analysis for case narrative comments.
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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PROJECT SUMMARY

Workorder: 3152955 1st QTR 2021 CWMP-FORM 19Q

Workorder Comments

Temperature of sample taken at time of sample receipt in the laboratory. See chain of custody for actual temperature.

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ANALYTICAL RESULTS

Workorder: 3152955 1st QTR 2021 CWMP-FORM 19Q

Lab ID: **3152955001** Date Collected: 1/19/2021 12:02 Matrix: Ground Water

Sample ID: **CWMP005W** Date Received: 1/19/2021 16:06

Parameters	Results	Flag	Units	RDL	Method	Prepared	By	Analyzed	By	Cntr
VOLATILE ORGANICS										
Benzene	ND	C	ug/L	1.0	SW846 8260B			1/21/21 18:02	TMP	G
1,2-Dibromoethane	ND	C	ug/L	1.0	SW846 8260B			1/21/21 18:02	TMP	G
1,1-Dichloroethane	ND	C	ug/L	1.0	SW846 8260B			1/21/21 18:02	TMP	G
1,2-Dichloroethane	ND	C	ug/L	1.0	SW846 8260B			1/21/21 18:02	TMP	G
1,1-Dichloroethene	ND	C	ug/L	1.0	SW846 8260B			1/21/21 18:02	TMP	G
cis-1,2-Dichloroethene	ND	C	ug/L	1.0	SW846 8260B			1/21/21 18:02	TMP	G
trans-1,2-Dichloroethene	ND	C	ug/L	1.0	SW846 8260B			1/21/21 18:02	TMP	G
Ethylbenzene	ND	C	ug/L	1.0	SW846 8260B			1/21/21 18:02	TMP	G
Methylene Chloride	ND	C	ug/L	1.0	SW846 8260B			1/21/21 18:02	TMP	G
Tetrachloroethene	ND	C	ug/L	1.0	SW846 8260B			1/21/21 18:02	TMP	G
Toluene	ND	C	ug/L	1.0	SW846 8260B			1/21/21 18:02	TMP	G
Total Xylenes	ND	C	ug/L	3.0	SW846 8260B			1/21/21 18:02	TMP	G
1,1,1-Trichloroethane	ND	C	ug/L	1.0	SW846 8260B			1/21/21 18:02	TMP	G
Trichloroethene	ND	C	ug/L	1.0	SW846 8260B			1/21/21 18:02	TMP	G
Vinyl Chloride	ND	C	ug/L	1.0	SW846 8260B			1/21/21 18:02	TMP	G
Surrogate Recoveries	*Results*	*Flag*	*Units*	*Limits*	*Method*	*Prepared*	*By*	*Analyzed*	*By*	*Cntr*
1,2-Dichloroethane-d4 (S)	96.7	C	%	62 - 133	SW846 8260B			1/21/21 18:02	TMP	G
4-Bromofluorobenzene (S)	105	C	%	79 - 114	SW846 8260B			1/21/21 18:02	TMP	G
Dibromofluoromethane (S)	93.7	C	%	78 - 116	SW846 8260B			1/21/21 18:02	TMP	G
Toluene-d8 (S)	97.3	C	%	76 - 127	SW846 8260B			1/21/21 18:02	TMP	G
WET CHEMISTRY										
Alkalinity, Bicarbonate	15	C	mg/L	5	SM2320B-2011			1/30/21 06:15	R2B	B
Alkalinity, Total	15	C,2	mg/L	5	SM2320B-2011			1/30/21 06:15	R2B	I
Ammonia-N	ND	C	mg/L	0.100	ASTM D6919-09			2/2/21 13:22	JXL	A
Chemical Oxygen Demand (COD)	ND	C	mg/L	15	EPA 410.4			1/31/21 10:10	JAM	A
Chloride	62.2	C	mg/L	2.0	EPA 300.0			1/20/21 16:47	MBW	B
Fluoride	ND	C	mg/L	0.20	EPA 300.0			1/20/21 16:47	MBW	B
Nitrate-N	7.7	C	mg/L	0.20	EPA 300.0			1/20/21 16:47	MBW	B
pH	5.90	C,1	pH_Units		S4500HB-11			1/22/20 06:50	R2B	B
Phenolics	ND	C	mg/L	0.005	SW846 9066	1/25/21 21:00	VXF	2/10/21 15:28	VXF	F
Specific Conductance	341	C	umhos/cm	1	SW846 9050A			1/20/21 22:04	R2B	B
Sulfate	4.7	C	mg/L	2.0	EPA 300.0			1/20/21 16:47	MBW	B
Total Dissolved Solids	232	C	mg/L	5	S2540C-11			1/20/21 15:27	KMM	B
Total Organic Carbon (TOC)	0.72	C	mg/L	0.50	SW846 9060A			1/25/21 21:04	PAG	D
Turbidity	0.31	C	NTU	0.10	SM2130B-2011			1/20/21 07:48	R2B	B

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ANALYTICAL RESULTS

Workorder: 3152955 1st QTR 2021 CWMP-FORM 19Q

Lab ID: **3152955001** Date Collected: 1/19/2021 12:02 Matrix: Ground Water

Sample ID: **CWMP005W** Date Received: 1/19/2021 16:06

Parameters	Results	Flag	Units	RDL	Method	Prepared	By	Analyzed	By	*Cntr*
METALS										
Calcium, Total	15.0	C	mg/L	0.11	SW846 6010C	1/20/21 21:40	SXC	1/21/21 13:10	SRT	J1
Iron, Total	ND	C	mg/L	0.067	SW846 6010C	1/20/21 21:40	SXC	1/21/21 13:10	SRT	J1
Magnesium, Total	7.9	C	mg/L	0.11	SW846 6010C	1/20/21 21:40	SXC	1/21/21 13:10	SRT	J1
Manganese, Total	0.052	C	mg/L	0.0056	SW846 6010C	1/20/21 21:40	SXC	1/21/21 13:10	SRT	J1
Potassium, Total	2.2	C	mg/L	0.56	SW846 6010C	1/20/21 21:40	SXC	1/21/21 13:10	SRT	J1
Sodium, Total	31.3	C	mg/L	0.56	SW846 6010C	1/20/21 21:40	SXC	1/21/21 13:10	SRT	J1
FIELD PARAMETERS										
Depth to Water Level	42.29	C	Feet		Field			1/19/21 12:05	BGS	C
Elev Top MW Casing above MSL	513.43	C	Feet		Field			1/19/21 12:05	BGS	C
Flow Rate	4.00	C	gal/min		Field			1/19/21 12:05	BGS	C
Ground Water Elevation	471.14	C	ft/MSL		Field			1/19/21 12:05	BGS	C
pH, Field (SM4500B)	8.06	C	pH_Units		Field			1/19/21 12:05	BGS	C
Sample Depth	130.00	C	Feet		Field			1/19/21 12:05	BGS	C
Specific Conductance, Field	482	C	umhos/cm	1	Field			1/19/21 12:05	BGS	C
Temperature	13.00	C	Deg. C		Field			1/19/21 12:05	BGS	C
Total Well Depth	138.92	C	Feet		Field			1/19/21 12:05	BGS	C
Volume in Water Column	142.05	C	Gallons		Field			1/19/21 12:05	BGS	C
Water Level After Purge	45.34	C	Feet		Field			1/19/21 12:05	BGS	C
Well Volumes Purged	1.97	C	Vol		Field			1/19/21 12:05	BGS	C

Susan J. Scherer

Ms. Susan J Scherer
Project Coordinator

ALS Environmental

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ANALYTICAL RESULTS

Workorder: 3152955 1st QTR 2021 CWMP-FORM 19Q

PARAMETER QUALIFIERS

Lab ID	#	Sample ID	Analytical Method	Analyte
3152955001	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.				
3152955001	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: 3152955 1st QTR 2021 CWMP-FORM 19Q

Lab ID	Sample ID	Analysis Method	Prep Method	Leachate Method
3152955001	CWMP005W	ASTM D6919-09		
3152955001	CWMP005W	EPA 300.0		
3152955001	CWMP005W	EPA 410.4		
3152955001	CWMP005W	Field		
3152955001	CWMP005W	S2540C-11		
3152955001	CWMP005W	S4500HB-11		
3152955001	CWMP005W	SM2130B-2011		
3152955001	CWMP005W	SM2320B-2011		
3152955001	CWMP005W	SW846 6010C	SW846 3015	
3152955001	CWMP005W	SW846 8260B		
3152955001	CWMP005W	SW846 9050A		
3152955001	CWMP005W	SW846 9060A		
3152955001	CWMP005W	SW846 9066	420.4/9066	

CHAIN OF CUSTODY/ REQUEST FOR ANALYSIS

Generated by ALS

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

CO
AL

* 3 1 5 2 9 5 5 *

1 of 1

(eiving Lab)

Client Name: Lancaster County Solid Waste MA

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

Contact: Dan Brown

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

Cooler Temp: 2 Therm ID: 525

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 #:

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		Sample/COC Comments
					Enter Number of Containers Per Sample or Field Results Below.										
1. CWMP005W	01/19/21	1202	G	GW	2	1	2	x	x	1	1	1	1		
2															
3															
4															
5															
6															
7															
8															
9															
10															

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] DLS	1-19-21	1606	2 LMEE	1/19/21	16:06
3			4		
5			6		
7			8		
9			10		

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

Special Processing: USACE ☐ Navy ☐ ☐

State Samples Collected In: ☐NY ☐NJ ☒PA ☐NC ☐

Reportable to PADEP? Yes ☐ PWSID # _____

Sample Disposal: Lab ☒ 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 #: | Initials: | Date: 1/12/21

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?[1]	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): 2

Thermometer ID: 525

Radiological (µCi): _____

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

[1]Final determination of correct preservation for analysis such as volatiles, microbiology, and oil and grease is made in the analytical department at the time of or following the analysis

Rev 1/20/2020

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February 19, 2021

Ms. Jordan Gallagher
Lancaster County Solid Waste Authority
1299 Hbg Pike, P.O. Box 4425
Lancaster, PA 17604

Certificate of Analysis

Project Name:	**CRESWELL**	Workorder:	**3153531**
Purchase Order:	**PO-1000246**	Workorder ID:	**1st QTR 2021 CWMP-FORM 19Q**

Dear Ms. Gallagher:

Enclosed are the analytical results for samples received by the laboratory on Thursday, January 21, 2021.

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: Ms. Ashley Gichuki , Mr. Daniel Brown , Mr. Jeff Musser

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

Susan J. Scherer

Ms. Susan J Scherer
Project Coordinator

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SAMPLE SUMMARY

Workorder: 3153531 1st QTR 2021 CWMP-FORM 19Q

Lab ID	Sample ID	Matrix	Date Collected	Date Received	Collected By
3153531001	CWMP009W	Ground Water	1/21/2021 12:05	1/21/2021 14:53	Mr. Brian G Shade
3153531002	CWMP008W	Ground Water	1/21/2021 12:57	1/21/2021 14:53	Mr. Brian G Shade

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SAMPLE SUMMARY

Workorder: 3153531 1st QTR 2021 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

C	Please reference the Project Summary section of this Certificate of Analysis for case narrative comments.
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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PROJECT SUMMARY

Workorder: 3153531 1st QTR 2021 CWMP-FORM 19Q

Workorder Comments

Temperature of sample taken at time of sample receipt in the laboratory. See chain of custody for actual temperature.

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ANALYTICAL RESULTS

Workorder: 3153531 1st QTR 2021 CWMP-FORM 19Q

Lab ID: **3153531001** Date Collected: 1/21/2021 12:05 Matrix: Ground Water

Sample ID: **CWMP009W** Date Received: 1/21/2021 14:53

Parameters	Results	Flag	Units	RDL	Method	Prepared	By	Analyzed	By	Cntr
VOLATILE ORGANICS										
Benzene	2.5	C	ug/L	1.0	SW846 8260B			1/25/21 22:41	PDK	G
1,2-Dibromoethane	ND	C	ug/L	1.0	SW846 8260B			1/25/21 22:41	PDK	G
1,1-Dichloroethane	1.5	C	ug/L	1.0	SW846 8260B			1/25/21 22:41	PDK	G
1,2-Dichloroethane	ND	C	ug/L	1.0	SW846 8260B			1/25/21 22:41	PDK	G
1,1-Dichloroethene	ND	C	ug/L	1.0	SW846 8260B			1/25/21 22:41	PDK	G
cis-1,2-Dichloroethene	ND	C	ug/L	1.0	SW846 8260B			1/25/21 22:41	PDK	G
trans-1,2-Dichloroethene	ND	C	ug/L	1.0	SW846 8260B			1/25/21 22:41	PDK	G
Ethylbenzene	ND	C	ug/L	1.0	SW846 8260B			1/25/21 22:41	PDK	G
Methylene Chloride	ND	C	ug/L	1.0	SW846 8260B			1/25/21 22:41	PDK	G
Tetrachloroethene	ND	C	ug/L	1.0	SW846 8260B			1/25/21 22:41	PDK	G
Toluene	ND	C	ug/L	1.0	SW846 8260B			1/25/21 22:41	PDK	G
Total Xylenes	ND	C	ug/L	3.0	SW846 8260B			1/25/21 22:41	PDK	G
1,1,1-Trichloroethane	ND	C	ug/L	1.0	SW846 8260B			1/25/21 22:41	PDK	G
Trichloroethene	ND	C	ug/L	1.0	SW846 8260B			1/25/21 22:41	PDK	G
Vinyl Chloride	ND	C	ug/L	1.0	SW846 8260B			1/25/21 22:41	PDK	G
Surrogate Recoveries	*Results*	*Flag*	*Units*	*Limits*	*Method*	*Prepared*	*By*	*Analyzed*	*By*	*Cntr*
1,2-Dichloroethane-d4 (S)	85.7	C	%	62 - 133	SW846 8260B			1/25/21 22:41	PDK	G
4-Bromofluorobenzene (S)	89	C	%	79 - 114	SW846 8260B			1/25/21 22:41	PDK	G
Dibromofluoromethane (S)	91.9	C	%	78 - 116	SW846 8260B			1/25/21 22:41	PDK	G
Toluene-d8 (S)	86.3	C	%	76 - 127	SW846 8260B			1/25/21 22:41	PDK	G
WET CHEMISTRY										
Alkalinity, Bicarbonate	540	C	mg/L	50	SM2320B-2011			1/31/21 09:35	R2B	B
Alkalinity, Total	540	C,3	mg/L	50	SM2320B-2011			1/31/21 09:35	R2B	I
Ammonia-N	31.7	C	mg/L	0.100	ASTM D6919-09			2/5/21 03:41	JXL	A
Chemical Oxygen Demand (COD)	94	C	mg/L	15	EPA 410.4			1/31/21 14:10	JAM	A
Chloride	558	C	mg/L	10.0	EPA 300.0			1/26/21 02:32	MBW	B
Fluoride	ND	C	mg/L	0.20	EPA 300.0			1/22/21 08:19	MBW	B
Nitrate-N	ND	C	mg/L	0.20	EPA 300.0			1/22/21 08:19	MBW	B
pH	8.23	C,1	pH_Units		S4500HB-11			1/30/21 06:15	R2B	B
Phenolics	ND	C	mg/L	0.005	SW846 9066	1/26/21 21:00	VXF	2/10/21 15:28	VXF	F
Specific Conductance	2280	C,2	umhos/cm	1	SW846 9050A			1/30/21 06:15	R2B	B
Sulfate	5.7	C	mg/L	2.0	EPA 300.0			1/22/21 08:19	MBW	B
Total Dissolved Solids	1540	C	mg/L	5	S2540C-11			1/25/21 14:19	KMM	B
Total Organic Carbon (TOC)	37.3	C	mg/L	5.0	SW846 9060A			1/26/21 02:18	PAG	D
Turbidity	29.0	C	NTU	0.10	SM2130B-2011			1/22/21 03:40	MBW	B

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ANALYTICAL RESULTS

Workorder: 3153531 1st QTR 2021 CWMP-FORM 19Q

Lab ID: **3153531001** Date Collected: 1/21/2021 12:05 Matrix: Ground Water

Sample ID: **CWMP009W** Date Received: 1/21/2021 14:53

Parameters	Results	Flag	Units	RDL	Method	Prepared	By	Analyzed	By	*Cntr*
METALS										
Calcium, Total	166	C	mg/L	0.11	SW846 6010C	1/24/21 19:10	SXC	1/25/21 11:48	SRT	J1
Iron, Total	36.1	C	mg/L	0.067	SW846 6010C	1/24/21 19:10	SXC	1/25/21 11:48	SRT	J1
Magnesium, Total	75.0	C	mg/L	0.11	SW846 6010C	1/24/21 19:10	SXC	1/25/21 11:48	SRT	J1
Manganese, Total	13.1	C	mg/L	0.0056	SW846 6010C	1/24/21 19:10	SXC	1/25/21 11:48	SRT	J1
Potassium, Total	33.6	C	mg/L	0.56	SW846 6010C	1/24/21 19:10	SXC	1/25/21 11:48	SRT	J1
Sodium, Total	177	C	mg/L	0.56	SW846 6010C	1/24/21 19:10	SXC	1/25/21 11:48	SRT	J1
FIELD PARAMETERS										
Depth to Water Level	9.00	C	Feet		Field			1/21/21 12:16	BGS	C
Elev Top MW Casing above MSL	404.20	C	Feet		Field			1/21/21 12:16	BGS	C
Flow Rate	1.93	C	gal/min		Field			1/21/21 12:16	BGS	C
Ground Water Elevation	395.20	C	ft/MSL		Field			1/21/21 12:16	BGS	C
pH, Field (SM4500B)	6.15	C	pH_Units		Field			1/21/21 12:16	BGS	C
Sample Depth	16.00	C	Feet		Field			1/21/21 12:16	BGS	C
Specific Conductance, Field	3576	C	umhos/cm	1	Field			1/21/21 12:16	BGS	C
Temperature	12.22	C	Deg. C		Field			1/21/21 12:16	BGS	C
Total Well Depth	19.70	C	Feet		Field			1/21/21 12:16	BGS	C
Volume in Water Column	6.96	C	Gallons		Field			1/21/21 12:16	BGS	C
Water Level After Purge	9.12	C	Feet		Field			1/21/21 12:16	BGS	C
Well Volumes Purged	5.56	C	Vol		Field			1/21/21 12:16	BGS	C

Susan J. Scherer

Ms. Susan J Scherer
Project Coordinator

ALS Environmental

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ANALYTICAL RESULTS

Workorder: 3153531 1st QTR 2021 CWMP-FORM 19Q

Lab ID: **3153531002** Date Collected: 1/21/2021 12:57 Matrix: Ground Water
Sample ID: **CWMP008W** Date Received: 1/21/2021 14:53

Parameters	Results	Flag	Units	RDL	Method	Prepared	By	Analyzed	By	Cntr
VOLATILE ORGANICS										
Benzene	1.4	C	ug/L	1.0	SW846 8260B			1/25/21 23:04	PDK	G
1,2-Dibromoethane	ND	C	ug/L	1.0	SW846 8260B			1/25/21 23:04	PDK	G
1,1-Dichloroethane	2.8	C	ug/L	1.0	SW846 8260B			1/25/21 23:04	PDK	G
1,2-Dichloroethane	ND	C	ug/L	1.0	SW846 8260B			1/25/21 23:04	PDK	G
1,1-Dichloroethene	ND	C	ug/L	1.0	SW846 8260B			1/25/21 23:04	PDK	G
cis-1,2-Dichloroethene	ND	C	ug/L	1.0	SW846 8260B			1/25/21 23:04	PDK	G
trans-1,2-Dichloroethene	ND	C	ug/L	1.0	SW846 8260B			1/25/21 23:04	PDK	G
Ethylbenzene	ND	C	ug/L	1.0	SW846 8260B			1/25/21 23:04	PDK	G
Methylene Chloride	ND	C	ug/L	1.0	SW846 8260B			1/25/21 23:04	PDK	G
Tetrachloroethene	ND	C	ug/L	1.0	SW846 8260B			1/25/21 23:04	PDK	G
Toluene	ND	C	ug/L	1.0	SW846 8260B			1/25/21 23:04	PDK	G
Total Xylenes	ND	C	ug/L	3.0	SW846 8260B			1/25/21 23:04	PDK	G
1,1,1-Trichloroethane	ND	C	ug/L	1.0	SW846 8260B			1/25/21 23:04	PDK	G
Trichloroethene	ND	C	ug/L	1.0	SW846 8260B			1/25/21 23:04	PDK	G
Vinyl Chloride	ND	C	ug/L	1.0	SW846 8260B			1/25/21 23:04	PDK	G
Surrogate Recoveries	*Results*	*Flag*	*Units*	*Limits*	*Method*	*Prepared*	*By*	*Analyzed*	*By*	*Cntr*
1,2-Dichloroethane-d4 (S)	93.6	C	%	62 - 133	SW846 8260B			1/25/21 23:04	PDK	G
4-Bromofluorobenzene (S)	88	C	%	79 - 114	SW846 8260B			1/25/21 23:04	PDK	G
Dibromofluoromethane (S)	91.9	C	%	78 - 116	SW846 8260B			1/25/21 23:04	PDK	G
Toluene-d8 (S)	86.5	C	%	76 - 127	SW846 8260B			1/25/21 23:04	PDK	G
WET CHEMISTRY										
Alkalinity, Bicarbonate	344	C	mg/L	50	SM2320B-2011			1/31/21 09:35	R2B	B
Alkalinity, Total	344	C,4	mg/L	50	SM2320B-2011			1/31/21 09:35	R2B	I
Ammonia-N	6.30	C	mg/L	0.100	ASTM D6919-09			2/5/21 03:55	JXL	A
Chemical Oxygen Demand (COD)	ND	C,1	mg/L	15	EPA 410.4			1/31/21 14:10	JAM	A
Chloride	32.9	C	mg/L	2.0	EPA 300.0			1/22/21 08:34	MBW	B
Fluoride	ND	C	mg/L	0.20	EPA 300.0			1/22/21 08:34	MBW	B
Nitrate-N	ND	C	mg/L	0.20	EPA 300.0			1/22/21 08:34	MBW	B
pH	8.39	C,2	pH_Units		S4500HB-11			1/30/21 06:15	R2B	B
Phenolics	ND	C	mg/L	0.005	SW846 9066	1/26/21 21:00	VXF	2/16/21 20:41	VXF	F
Specific Conductance	661	C,3	umhos/cm	1	SW846 9050A			1/30/21 06:15	R2B	B
Sulfate	7.1	C	mg/L	2.0	EPA 300.0			1/22/21 08:34	MBW	B
Total Dissolved Solids	478	C	mg/L	5	S2540C-11			1/25/21 14:19	KMM	B
Total Organic Carbon (TOC)	7.0	C	mg/L	0.50	SW846 9060A			1/26/21 02:18	PAG	D
Turbidity	8.57	C	NTU	0.10	SM2130B-2011			1/22/21 03:40	MBW	B

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ANALYTICAL RESULTS

Workorder: 3153531 1st QTR 2021 CWMP-FORM 19Q

Lab ID: **3153531002** Date Collected: 1/21/2021 12:57 Matrix: Ground Water

Sample ID: **CWMP008W** Date Received: 1/21/2021 14:53

Parameters	Results	Flag	Units	RDL	Method	Prepared	By	Analyzed	By	*Cntr*
METALS										
Calcium, Total	64.1	C	mg/L	0.11	SW846 6010C	1/24/21 19:10	SXC	1/25/21 11:58	SRT	J1
Iron, Total	24.1	C	mg/L	0.067	SW846 6010C	1/24/21 19:10	SXC	1/25/21 11:58	SRT	J1
Magnesium, Total	28.3	C	mg/L	0.11	SW846 6010C	1/24/21 19:10	SXC	1/25/21 11:58	SRT	J1
Manganese, Total	15.6	C	mg/L	0.0056	SW846 6010C	1/24/21 19:10	SXC	1/25/21 11:58	SRT	J1
Potassium, Total	8.2	C	mg/L	0.56	SW846 6010C	1/24/21 19:10	SXC	1/25/21 11:58	SRT	J1
Sodium, Total	33.9	C	mg/L	0.56	SW846 6010C	1/24/21 19:10	SXC	1/25/21 11:58	SRT	J1
FIELD PARAMETERS										
Depth to Water Level	2.28	C	Feet		Field			1/21/21 12:57	BGS	C
Elev Top MW Casing above MSL	422.30	C	Feet		Field			1/21/21 12:57	BGS	C
Flow Rate	1.23	C	gal/min		Field			1/21/21 12:57	BGS	C
Ground Water Elevation	420.02	C	ft/MSL		Field			1/21/21 12:57	BGS	C
pH, Field (SM4500B)	6.27	C	pH_Units		Field			1/21/21 12:57	BGS	C
Sample Depth	19.00	C	Feet		Field			1/21/21 12:57	BGS	C
Specific Conductance, Field	1184	C	umhos/cm	1	Field			1/21/21 12:57	BGS	C
Temperature	13.56	C	Deg. C		Field			1/21/21 12:57	BGS	C
Total Well Depth	22.80	C	Feet		Field			1/21/21 12:57	BGS	C
Volume in Water Column	3.28	C	Gallons		Field			1/21/21 12:57	BGS	C
Water Level After Purge	16.76	C	Feet		Field			1/21/21 12:57	BGS	C
Well Volumes Purged	7.51	C	Vol		Field			1/21/21 12:57	BGS	C

Susan J. Scherer

Ms. Susan J Scherer
Project Coordinator

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ANALYTICAL RESULTS

Workorder: 3153531 1st QTR 2021 CWMP-FORM 19Q

PARAMETER QUALIFIERS

Lab ID	#	Sample ID	Analytical Method	Analyte
3153531001	1	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.				
3153531001	2	CWMP009W	SW846 9050A	Specific Conductance
The Method Blank for method SM2510B-2011 reported a value greater than the reporting level for the analyte Specific Conductance. The concentration was 1.25				
3153531001	3	CWMP009W	SM2320B-2011	Alkalinity, Total
The Total Alkalinity is titrated to a pH of 4.5 and reported as mg CaCO3/L.				
3153531002	1	CWMP008W	EPA 410.4	Chemical Oxygen Demand (COD)
The QC sample type MSLO for method EPA 410.4 was outside the control limits for the analyte Chemical Oxygen Demand (COD). The % Recovery was reported as 115 and the control limits were 90 to 110.				
3153531002	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.				
3153531002	3	CWMP008W	SW846 9050A	Specific Conductance
The Method Blank for method SM2510B-2011 reported a value greater than the reporting level for the analyte Specific Conductance. The concentration was 1.25				
3153531002	4	CWMP008W	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: 3153531 1st QTR 2021 CWMP-FORM 19Q

Lab ID	Sample ID	Analysis Method	Prep Method	Leachate Method
3153531001	CWMP009W	ASTM D6919-09		
3153531001	CWMP009W	EPA 300.0		
3153531001	CWMP009W	EPA 410.4		
3153531001	CWMP009W	Field		
3153531001	CWMP009W	S2540C-11		
3153531001	CWMP009W	S4500HB-11		
3153531001	CWMP009W	SM2130B-2011		
3153531001	CWMP009W	SM2320B-2011		
3153531001	CWMP009W	SW846 6010C	SW846 3015	
3153531001	CWMP009W	SW846 8260B		
3153531001	CWMP009W	SW846 9050A		
3153531001	CWMP009W	SW846 9060A		
3153531001	CWMP009W	SW846 9066	420.4/9066	
3153531002	CWMP008W	ASTM D6919-09		
3153531002	CWMP008W	EPA 300.0		
3153531002	CWMP008W	EPA 410.4		
3153531002	CWMP008W	Field		
3153531002	CWMP008W	S2540C-11		
3153531002	CWMP008W	S4500HB-11		
3153531002	CWMP008W	SM2130B-2011		
3153531002	CWMP008W	SM2320B-2011		
3153531002	CWMP008W	SW846 6010C	SW846 3015	
3153531002	CWMP008W	SW846 8260B		
3153531002	CWMP008W	SW846 9050A		
3153531002	CWMP008W	SW846 9060A		
3153531002	CWMP008W	SW846 9066	420.4/9066	

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CHAIN OF CUSTODY/ REQUEST FOR ANALYSIS

Generated by ALS

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

COC #: ALS Qt

3153531

1 of 1

Client Name: Lancaster County Solid Waste MA
Address: 1299 Harrisburg Pike, P.O. Box 4424
Lancaster, PA 17604
Contact: Dan Brown
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 dbrown@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. CWMP009W	01/21/21	1205	G	GW	2	1	2	x	x	1	1	1	1	
2. CWMP008W	01/21/21	1257	G	GW	2	1	2	x	x	1	1	1	1	
3														
4														
5														
6														
7														
8														
9														
10														

Cooler Temp: 1 Therm ID: 56 (Lab)
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	BGNicoll ALS	1-21-21	1453	2	TS	1/21/21	1453
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:
LCSWMA	3531	TS	12221

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?[1]	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):	1							
Thermometer ID:	525							
Radiological (µCi):								

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

[1]Final determination of correct preservation for analysis such as volatiles, microbiology, and oil and grease is made in the analytical department at the time of or following the analysis

Rev 1/20/2020

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February 8, 2021

Ms. Jordan Gallagher
Lancaster County Solid Waste Authority
1299 Hbg Pike, P.O. Box 4425
Lancaster, PA 17604

Certificate of Analysis

Project Name:	**CRESWELL**	Workorder:	**3153342**
Purchase Order:	**PO-1000246**	Workorder ID:	**1st QTR 2021 CWMP-FORM 19Q**

Dear Ms. Gallagher:

Enclosed are the analytical results for samples received by the laboratory on Wednesday, January 20, 2021.

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: Ms. Ashley Gichuki , Mr. Daniel Brown , Mr. Jeff Musser

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

Susan J. Scherer

Ms. Susan J Scherer
Project Coordinator

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SAMPLE SUMMARY

Workorder: 3153342 1st QTR 2021 CWMP-FORM 19Q

Lab ID	Sample ID	Matrix	Date Collected	Date Received	Collected By
3153342001	CWMP016W	Ground Water	1/20/2021 13:14	1/20/2021 15:23	Mr. Brian G Shade
3153342002	CWMP010W	Ground Water	1/20/2021 13:44	1/20/2021 15:23	Mr. Brian G Shade

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SAMPLE SUMMARY

Workorder: 3153342 1st QTR 2021 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

C	Please reference the Project Summary section of this Certificate of Analysis for case narrative comments.
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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PROJECT SUMMARY

Workorder: 3153342 1st QTR 2021 CWMP-FORM 19Q

Workorder Comments

Temperature of sample taken at time of sample receipt in the laboratory. See chain of custody for actual temperature.

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ANALYTICAL RESULTS

Workorder: 3153342 1st QTR 2021 CWMP-FORM 19Q

Lab ID: **3153342001** Date Collected: 1/20/2021 13:14 Matrix: Ground Water

Sample ID: **CWMP016W** Date Received: 1/20/2021 15:23

Parameters	Results	Flag	Units	RDL	Method	Prepared	By	Analyzed	By	Cntr
VOLATILE ORGANICS										
Benzene	ND	C	ug/L	1.0	SW846 8260B			1/22/21 04:27	PDK	G
1,2-Dibromoethane	ND	C	ug/L	1.0	SW846 8260B			1/22/21 04:27	PDK	G
1,1-Dichloroethane	ND	C	ug/L	1.0	SW846 8260B			1/22/21 04:27	PDK	G
1,2-Dichloroethane	ND	C	ug/L	1.0	SW846 8260B			1/22/21 04:27	PDK	G
1,1-Dichloroethene	ND	C	ug/L	1.0	SW846 8260B			1/22/21 04:27	PDK	G
cis-1,2-Dichloroethene	ND	C	ug/L	1.0	SW846 8260B			1/22/21 04:27	PDK	G
trans-1,2-Dichloroethene	ND	C	ug/L	1.0	SW846 8260B			1/22/21 04:27	PDK	G
Ethylbenzene	ND	C	ug/L	1.0	SW846 8260B			1/22/21 04:27	PDK	G
Methylene Chloride	ND	C	ug/L	1.0	SW846 8260B			1/22/21 04:27	PDK	G
Tetrachloroethene	ND	C	ug/L	1.0	SW846 8260B			1/22/21 04:27	PDK	G
Toluene	ND	C	ug/L	1.0	SW846 8260B			1/22/21 04:27	PDK	G
Total Xylenes	ND	C	ug/L	3.0	SW846 8260B			1/22/21 04:27	PDK	G
1,1,1-Trichloroethane	ND	C	ug/L	1.0	SW846 8260B			1/22/21 04:27	PDK	G
Trichloroethene	ND	C	ug/L	1.0	SW846 8260B			1/22/21 04:27	PDK	G
Vinyl Chloride	ND	C	ug/L	1.0	SW846 8260B			1/22/21 04:27	PDK	G
Surrogate Recoveries	*Results*	*Flag*	*Units*	*Limits*	*Method*	*Prepared*	*By*	*Analyzed*	*By*	*Cntr*
1,2-Dichloroethane-d4 (S)	96.6	C	%	62 - 133	SW846 8260B			1/22/21 04:27	PDK	G
4-Bromofluorobenzene (S)	105	C	%	79 - 114	SW846 8260B			1/22/21 04:27	PDK	G
Dibromofluoromethane (S)	93.7	C	%	78 - 116	SW846 8260B			1/22/21 04:27	PDK	G
Toluene-d8 (S)	96.9	C	%	76 - 127	SW846 8260B			1/22/21 04:27	PDK	G
WET CHEMISTRY										
Alkalinity, Bicarbonate	9	C	mg/L	5	SM2320B-2011			1/30/21 06:15	R2B	B
Alkalinity, Total	9	C,2	mg/L	5	SM2320B-2011			1/30/21 06:15	R2B	I
Ammonia-N	ND	C	mg/L	0.100	ASTM D6919-09			2/3/21 21:45	JXL	A
Chemical Oxygen Demand (COD)	ND	C	mg/L	15	EPA 410.4			1/31/21 12:10	JAM	A
Chloride	2.7	C	mg/L	2.0	EPA 300.0			1/21/21 09:03	MBW	B
Fluoride	ND	C	mg/L	0.20	EPA 300.0			1/21/21 09:03	MBW	B
Nitrate-N	1.4	C	mg/L	0.20	EPA 300.0			1/21/21 09:03	MBW	B
pH	6.47	C,1	pH_Units		S4500HB-11			1/22/20 06:50	R2B	B
Phenolics	ND	C	mg/L	0.005	SW846 9066	1/26/21 21:00	VXF	2/3/21 12:11	VXF	F
Specific Conductance	65	C	umhos/cm	1	SW846 9050A			1/22/20 06:50	R2B	B
Sulfate	10.0	C	mg/L	2.0	EPA 300.0			1/21/21 09:03	MBW	B
Total Dissolved Solids	65	C	mg/L	5	S2540C-11			1/22/21 14:46	KMM	B
Total Organic Carbon (TOC)	ND	C	mg/L	0.50	SW846 9060A			1/25/21 21:04	PAG	D
Turbidity	0.88	C	NTU	0.10	SM2130B-2011			1/21/21 06:11	R2B	B

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ANALYTICAL RESULTS

Workorder: 3153342 1st QTR 2021 CWMP-FORM 19Q

Lab ID: **3153342001** Date Collected: 1/20/2021 13:14 Matrix: Ground Water

Sample ID: **CWMP016W** Date Received: 1/20/2021 15:23

Parameters	Results	Flag	Units	RDL	Method	Prepared	By	Analyzed	By	*Cntr*
METALS										
Calcium, Total	5.5	C	mg/L	0.11	SW846 6010C	1/24/21 19:10	SXC	1/25/21 11:36	SRT	J1
Iron, Total	0.11	C	mg/L	0.067	SW846 6010C	1/24/21 19:10	SXC	1/25/21 11:36	SRT	J1
Magnesium, Total	1.3	C	mg/L	0.11	SW846 6010C	1/24/21 19:10	SXC	1/25/21 11:36	SRT	J1
Manganese, Total	0.0082	C	mg/L	0.0056	SW846 6010C	1/24/21 19:10	SXC	1/25/21 11:36	SRT	J1
Potassium, Total	ND	C	mg/L	0.56	SW846 6010C	1/24/21 19:10	SXC	1/25/21 11:36	SRT	J1
Sodium, Total	3.2	C	mg/L	0.56	SW846 6010C	1/24/21 19:10	SXC	1/25/21 11:36	SRT	J1
FIELD PARAMETERS										
Depth to Water Level	9.72	C	Feet		Field			1/20/21 13:14	BGS	C
Elev Top MW Casing above MSL	311.97	C	Feet		Field			1/20/21 13:14	BGS	C
Flow Rate	2.11	C	gal/min		Field			1/20/21 13:14	BGS	C
Ground Water Elevation	302.25	C	ft/MSL		Field			1/20/21 13:14	BGS	C
pH, Field (SM4500B)	5.62	C	pH_Units		Field			1/20/21 13:14	BGS	C
Sample Depth	71.00	C	Feet		Field			1/20/21 13:14	BGS	C
Specific Conductance, Field	92	C	umhos/cm	1	Field			1/20/21 13:14	BGS	C
Temperature	12.45	C	Deg. C		Field			1/20/21 13:14	BGS	C
Total Well Depth	73.52	C	Feet		Field			1/20/21 13:14	BGS	C
Volume in Water Column	93.79	C	Gallons		Field			1/20/21 13:14	BGS	C
Water Level After Purge	18.98	C	Feet		Field			1/20/21 13:14	BGS	C
Well Volumes Purged	1.57	C	Vol		Field			1/20/21 13:14	BGS	C

Susan J. Scherer

Ms. Susan J Scherer
Project Coordinator

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ANALYTICAL RESULTS

Workorder: 3153342 1st QTR 2021 CWMP-FORM 19Q

Lab ID: **3153342002** Date Collected: 1/20/2021 13:44 Matrix: Ground Water

Sample ID: **CWMP010W** Date Received: 1/20/2021 15:23

Parameters	Results	Flag	Units	RDL	Method	Prepared	By	Analyzed	By	Cntr
VOLATILE ORGANICS										
Benzene	ND	C	ug/L	1.0	SW846 8260B			1/22/21 04:50	PDK	G
1,2-Dibromoethane	ND	C	ug/L	1.0	SW846 8260B			1/22/21 04:50	PDK	G
1,1-Dichloroethane	ND	C	ug/L	1.0	SW846 8260B			1/22/21 04:50	PDK	G
1,2-Dichloroethane	ND	C	ug/L	1.0	SW846 8260B			1/22/21 04:50	PDK	G
1,1-Dichloroethene	ND	C	ug/L	1.0	SW846 8260B			1/22/21 04:50	PDK	G
cis-1,2-Dichloroethene	ND	C	ug/L	1.0	SW846 8260B			1/22/21 04:50	PDK	G
trans-1,2-Dichloroethene	ND	C	ug/L	1.0	SW846 8260B			1/22/21 04:50	PDK	G
Ethylbenzene	ND	C	ug/L	1.0	SW846 8260B			1/22/21 04:50	PDK	G
Methylene Chloride	ND	C	ug/L	1.0	SW846 8260B			1/22/21 04:50	PDK	G
Tetrachloroethene	ND	C	ug/L	1.0	SW846 8260B			1/22/21 04:50	PDK	G
Toluene	ND	C	ug/L	1.0	SW846 8260B			1/22/21 04:50	PDK	G
Total Xylenes	ND	C	ug/L	3.0	SW846 8260B			1/22/21 04:50	PDK	G
1,1,1-Trichloroethane	ND	C	ug/L	1.0	SW846 8260B			1/22/21 04:50	PDK	G
Trichloroethene	ND	C	ug/L	1.0	SW846 8260B			1/22/21 04:50	PDK	G
Vinyl Chloride	ND	C	ug/L	1.0	SW846 8260B			1/22/21 04:50	PDK	G
Surrogate Recoveries	*Results*	*Flag*	*Units*	*Limits*	*Method*	*Prepared*	*By*	*Analyzed*	*By*	*Cntr*
1,2-Dichloroethane-d4 (S)	97.6	C	%	62 - 133	SW846 8260B			1/22/21 04:50	PDK	G
4-Bromofluorobenzene (S)	104	C	%	79 - 114	SW846 8260B			1/22/21 04:50	PDK	G
Dibromofluoromethane (S)	92.8	C	%	78 - 116	SW846 8260B			1/22/21 04:50	PDK	G
Toluene-d8 (S)	96.5	C	%	76 - 127	SW846 8260B			1/22/21 04:50	PDK	G
WET CHEMISTRY										
Alkalinity, Bicarbonate	138	C	mg/L	5	SM2320B-2011			1/30/21 06:15	R2B	B
Alkalinity, Total	141	C,2	mg/L	5	SM2320B-2011			1/30/21 06:15	R2B	I
Ammonia-N	0.608	C	mg/L	0.100	ASTM D6919-09			2/3/21 22:00	JXL	A
Chemical Oxygen Demand (COD)	ND	C	mg/L	15	EPA 410.4			1/31/21 12:10	JAM	A
Chloride	181	C	mg/L	2.0	EPA 300.0			1/21/21 09:18	MBW	B
Fluoride	ND	C	mg/L	0.20	EPA 300.0			1/21/21 09:18	MBW	B
Nitrate-N	15.1	C	mg/L	0.20	EPA 300.0			1/21/21 09:18	MBW	B
pH	7.73	C,1	pH_Units		S4500HB-11			1/22/20 06:50	R2B	B
Phenolics	ND	C	mg/L	0.005	SW846 9066	1/26/21 21:00	VXF	2/3/21 12:11	VXF	F
Specific Conductance	1010	C	umhos/cm	1	SW846 9050A			1/22/20 06:50	R2B	B
Sulfate	27.8	C	mg/L	2.0	EPA 300.0			1/21/21 09:18	MBW	B
Total Dissolved Solids	568	C	mg/L	5	S2540C-11			1/22/21 14:46	KMM	B
Total Organic Carbon (TOC)	3.4	C	mg/L	0.50	SW846 9060A			1/25/21 21:04	PAG	D
Turbidity	2.25	C	NTU	0.10	SM2130B-2011			1/21/21 06:11	R2B	B

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ANALYTICAL RESULTS

Workorder: 3153342 1st QTR 2021 CWMP-FORM 19Q

Lab ID: **3153342002** Date Collected: 1/20/2021 13:44 Matrix: Ground Water

Sample ID: **CWMP010W** Date Received: 1/20/2021 15:23

Parameters	Results	Flag	Units	RDL	Method	Prepared	By	Analyzed	By	*Cntr*
METALS										
Calcium, Total	31.9	C	mg/L	0.11	SW846 6010C	1/24/21 19:10	SXC	1/25/21 11:40	SRT	J1
Iron, Total	0.31	C	mg/L	0.067	SW846 6010C	1/24/21 19:10	SXC	1/25/21 11:40	SRT	J1
Magnesium, Total	28.9	C	mg/L	0.11	SW846 6010C	1/24/21 19:10	SXC	1/25/21 11:40	SRT	J1
Manganese, Total	0.21	C	mg/L	0.0056	SW846 6010C	1/24/21 19:10	SXC	1/25/21 11:40	SRT	J1
Potassium, Total	6.8	C	mg/L	0.56	SW846 6010C	1/24/21 19:10	SXC	1/25/21 11:40	SRT	J1
Sodium, Total	116	C	mg/L	0.56	SW846 6010C	1/24/21 19:10	SXC	1/25/21 11:40	SRT	J1
FIELD PARAMETERS										
Depth to Water Level	8.58	C	Feet		Field			1/20/21 13:44	BGS	C
Elev Top MW Casing above MSL	360.90	C	Feet		Field			1/20/21 13:44	BGS	C
Flow Rate	1.02	C	gal/min		Field			1/20/21 13:44	BGS	C
Ground Water Elevation	352.32	C	ft/MSL		Field			1/20/21 13:44	BGS	C
pH, Field (SM4500B)	6.62	C	pH_Units		Field			1/20/21 13:44	BGS	C
Sample Depth	17.00	C	Feet		Field			1/20/21 13:44	BGS	C
Specific Conductance, Field	1584	C	umhos/cm	1	Field			1/20/21 13:44	BGS	C
Temperature	10.37	C	Deg. C		Field			1/20/21 13:44	BGS	C
Total Well Depth	19.60	C	Feet		Field			1/20/21 13:44	BGS	C
Volume in Water Column	7.16	C	Gallons		Field			1/20/21 13:44	BGS	C
Water Level After Purge	16.07	C	Feet		Field			1/20/21 13:44	BGS	C
Well Volumes Purged	1.42	C	Vol		Field			1/20/21 13:44	BGS	C

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ANALYTICAL RESULTS

Workorder: 3153342 1st QTR 2021 CWMP-FORM 19Q

PARAMETER QUALIFIERS

Lab ID	#	Sample ID	Analytical Method	Analyte
3153342001	1	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.				
3153342001	2	CWMP016W	SM2320B-2011	Alkalinity, Total
The Total Alkalinity is titrated to a pH of 4.5 and reported as mg CaCO3/L.				
3153342002	1	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.				
3153342002	2	CWMP010W	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: 3153342 1st QTR 2021 CWMP-FORM 19Q

Lab ID	Sample ID	Analysis Method	Prep Method	Leachate Method
3153342001	CWMP016W	ASTM D6919-09		
3153342001	CWMP016W	EPA 300.0		
3153342001	CWMP016W	EPA 410.4		
3153342001	CWMP016W	Field		
3153342001	CWMP016W	S2540C-11		
3153342001	CWMP016W	S4500HB-11		
3153342001	CWMP016W	SM2130B-2011		
3153342001	CWMP016W	SM2320B-2011		
3153342001	CWMP016W	SW846 6010C	SW846 3015	
3153342001	CWMP016W	SW846 8260B		
3153342001	CWMP016W	SW846 9050A		
3153342001	CWMP016W	SW846 9060A		
3153342001	CWMP016W	SW846 9066	420.4/9066	
3153342002	CWMP010W	ASTM D6919-09		
3153342002	CWMP010W	EPA 300.0		
3153342002	CWMP010W	EPA 410.4		
3153342002	CWMP010W	Field		
3153342002	CWMP010W	S2540C-11		
3153342002	CWMP010W	S4500HB-11		
3153342002	CWMP010W	SM2130B-2011		
3153342002	CWMP010W	SM2320B-2011		
3153342002	CWMP010W	SW846 6010C	SW846 3015	
3153342002	CWMP010W	SW846 8260B		
3153342002	CWMP010W	SW846 9050A		
3153342002	CWMP010W	SW846 9060A		
3153342002	CWMP010W	SW846 9066	420.4/9066	

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CHAIN OF CUSTODY/ REQUEST FOR ANALYSIS

Generated by 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: Dan Brown
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 dbrown@LCSWMA.com
Fax? [X] -Y No.: (717) 397-9973

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	
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									
					Enter Number of Containers Per Sample or Field Results Below.									
1.CWMP016W	01/20/21	1314	G	GW	2	1	2	x	x	1	1	1	1	
2. CWMP010W	01/20/21	1344	G	GW	2	1	2	x	x	1	1	1	1	
3														
4														
5														
6														
7														
8														
9														
10														

(Completed by Receiving Lab)
Cooler Temp: 2° Therm ID: 52
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	1-20-21	1503	2 [signature]	1/20/21	15:23
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 ☐
Sample Disposal: Lab [X] Special ☐
PWSID # _____
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

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

Condition of Sample Receipt Form

Client: LCSWMA | Work Order #: 3153342 | Initials: TS | Date: 12/21

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?[1]	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):	3							
Thermometer ID:	525							
Radiological (µCi):								

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

[1]Final determination of correct preservation for analysis such as volatiles, microbiology, and oil and grease is made in the analytical department at the time of or following the analysis

Rev 1/20/2020